Revision 1

Certain figures in this Report contain sensitive, security-related information protected from public disclosure by Federal and State law. This Report is suitable for public disclosure only after these figures are removed.

HYDROGEOLOGIC INVESTIGATION REPORT

FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Prepared For:
Exelon Generation Company, LLC

DISCLAIMER:
SOME FORMATTING CHANGES MAY HAVE OCCURRED WHEN THE ORIGINAL DOCUMENT WAS PRINTED TO PDF; HOWEVER, THE ORIGINAL CONTENT REMAINS UNCHANGED.

Prepared by:
Conestoga-Rovers & Associates

651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

Office: (519) 884-0510
Fax: (519) 884-0525

web: http:\\www.CRAworld.com

SEPTEMBER 2006
REF. NO. 045136 (21)

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY i

1.0 INTRODUCTION 1

2.0 STATION DESCRIPTION 3
2.1 STATION LOCATION 3
2.2 OVERVIEW OF COOLING WATER OPERATIONS 3
2.3 SURROUNDING LAND USE 5
2.4 STATION SETTING 5
2.4.1 TOPOGRAPHY AND SURFACE WATER FEATURES 6
2.4.2 GEOLOGY 7
2.4.3 HYDROGEOLOGY 8
2.4.3.1 EXISTING WELL NETWORK 10
2.4.3.2 GROUNDWATER FLOW CONDITIONS 10
2.5 AREA GROUNDWATER USE 11

3.0 AREAS FOR FURTHER EVALUATION 13
3.1 SYSTEMS EVALUATIONS 13
3.2 HISTORICAL RELEASES 16
3.3 STATION INVESTIGATIONS 16
3.3.1 PRE-OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM 16
3.3.2 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM 17
3.3.3 GROUNDWATER MONITORING PROGRAMS 18
3.4 IDENTIFIED AREAS FOR FURTHER EVALUATION 19

4.0 FIELD METHODS 23
4.1 STAFF GAUGES INSTALLATION 23
4.2 GROUNDWATER MONITORING WELL INSTALLATION 23
4.3 GROUNDWATER MONITORING WELL DEVELOPMENT 25
4.4 SURVEY 26
4.5 GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS 26
4.6 GROUNDWATER AND SURFACE WATER SAMPLE COLLECTION 27
4.7 DATA QUALITY OBJECTIVES 29
4.8 SAMPLE IDENTIFICATION 29
4.9 CHAIN-OF-CUSTODY RECORD 30
4.10 QUALITY CONTROL SAMPLES 30
4.11 ANALYSES 31

TABLE OF CONTENTS

Page

5.0 RESULTS SUMMARY 32
5.1 STATION GEOLOGY 32
5.2 STATION HYDROGEOLOGY 33
5.2.1 GROUNDWATER FLOW DIRECTIONS 34
5.2.2 MAN-MADE INFLUENCES ON GROUNDWATER FLOW 35
5.2.3 VERTICAL HYDRAULIC GRADIENTS 37
5.2.4 LATERAL GROUNDWATER FLOW AND VELOCITY 38
5.3 GROUNDWATER QUALITY 39
5.3.1 SUMMARY OF BETA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS 39
5.3.2 SUMMARY OF GAMMA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS 40
5.3.3 SUMMARY OF FIELD MEASUREMENTS 40
5.4 SURFACE WATER QUALITY 40
5.4.1 SUMMARY OF BETA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS 41
5.4.2 SUMMARY OF GAMMA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS 41

6.0 RADIONUCLIDES OF CONCERN AND SOURCE AREAS 42
6.1 GAMMA-EMITTING RADIONUCLIDES 42
6.2 BETA-EMITTING RADIONUCLIDES 42
6.3 TRITIUM 42
6.3.1 GENERAL CHARACTERISTICS 42
6.3.2 DISTRIBUTION IN STATION GROUNDWATER 43
6.3.3 DISTRIBUTION IN STATION SURFACE WATER 47
6.3.4 CONCEPTUAL MODEL OF TRITIUM RELEASE AND MIGRATION 47

7.0 EXPOSURE PATHWAY ASSESSMENT 49
7.1 HEALTH EFFECTS OF TRITIUM 49
7.2 BACKGROUND CONCENTRATIONS OF TRITIUM 50
7.2.1 GROUNDWATER 50
7.2.2 PRECIPITATION DATA 50
7.2.3 SURFACE WATER DATA 51
7.2.4 DRINKING WATER DATA 52
7.2.5 EXPECTED TRITIUM BACKGROUND FOR THE STATION 52
7.3 IDENTIFICATION OF POTENTIAL EXPOSURE PATHWAYS AND POTENTIAL RECEPTORS 53
7.3.1 POTENTIAL GROUNDWATER MIGRATION TO DRINKING WATER USERS AT THE STATION 53
7.3.2 POTENTIAL GROUNDWATER MIGRATION TO DRINKING WATER USERS OFF THE STATION PROPERTY 54

TABLE OF CONTENTS

Page

7.3.3 POTENTIAL GROUNDWATER MIGRATION TO SURFACE WATER USERS 55
7.3.4 POTENTIAL EXPOSURE TO GROUNDWATER FROM SECONDARY PLANT SYSTEMS 55
7.4 SUMMARY OF POTENTIAL TRITIUM EXPOSURE PATHWAYS 56
7.5 OTHER RADIONUCLIDES 56

8.0 CONCLUSIONS 57

9.0 RECOMMENDATIONS 61
9.1 FILL DATA GAPS 61
9.2 GROUNDWATER MONITORING 61

10.0 REFERENCES 62

LIST OF FIGURES
(Following Text)

FIGURE 1.1	STATION LOCATION MAP
FIGURE 1.2	STATION BOUNDARIES AND FEATURES
FIGURE 2.1	GENERAL PROCESS DIAGRAM
FIGURE 2.2	SURFACE WATER USE SCHEMATIC
FIGURE 2.3	GROUNDWATER USE SCHEMATIC
FIGURE 2.4	REGIONAL GROUNDWATER DISCHARGE SCHEMATIC
FIGURE 2.5	EXISTING MONITORING WELL LOCATIONS
FIGURE 2.6	AREA WATER SUPPLY WELLS
FIGURE 3.1	AREAS FOR FURTHER EVALUATION
FIGURE 4.1	SURFACE WATER AND OFF-STATION GROUNDWATER SAMPLE LOCATIONS
FIGURE 4.2	GROUNDWATER MONITORING WELL LOCATIONS
FIGURE 4.3	GROUNDWATER MONITORING WELL LOCATIONS - AERIAL
FIGURE 5.1	BEDROCK SURFACE CONTOUR MAP
FIGURE 5.2	GEOLOGIC CROSS-SECTION LOCATION MAP
FIGURE 5.3	GEOLOGIC CROSS-SECTION A-A'
FIGURE 5.4	GEOLOGIC CROSS-SECTION B-B'
FIGURE 5.5	OVERBURDEN SATURATED THICKNESS – JULY 2006
FIGURE 5.6	POTENTIOMETRIC SURFACE CONTOURS – OVERBURDEN - JUNE 2006
FIGURE 5.7	POTENTIOMETRIC SURFACE CONTOURS – OVERBURDEN - JULY 2006
FIGURE 5.8	POTENTIOMETRIC SURFACE CONTOURS – BEDROCK - JUNE 2006
FIGURE 5.9	POTENTIOMETRIC SURFACE CONTOURS – BEDROCK - JULY 2006

LIST OF FIGURES
(Following Text)

FIGURE 5.10	HYDROGEOLOGIC PROFILE A-A'
FIGURE 5.11	HYDROGEOLOGIC PROFILE B-B'
FIGURE 5.12	TRITIUM CONCENTRATIONS – GROUNDWATER
FIGURE 5.13	TRITIUM CONCENTRATIONS – OVERBURDEN
FIGURE 5.14	TRITIUM CONCENTRATIONS – UPPER BEDROCK
FIGURE 5.15	TRITIUM CONCENTRATIONS – DEEP BEDROCK
FIGURE 5.16	RADIONUCLIDES CONCENTRATIONS - GROUNDWATER
FIGURE 5.17	TRITIUM CONCENTRATIONS - SURFACE WATER
FIGURE 5.18	RADIONUCLIDES CONCENTRATIONS - SURFACE WATER
FIGURE 6.1	MONITORING WELL RW-2 TRITIUM CONCENTRATIONS VERSUS GROUNDWATER ELEVATIONS
FIGURE 6.2	CONCEPTUAL STATION MODEL

LIST OF TABLES
(Following Text)

TABLE 4.1	SUMMARY OF MONITORING WELL INSTALLATION DETAILS
TABLE 4.2	SUMMARY OF GROUNDWATER ELEVATIONS
TABLE 4.3	SUMMARY OF SURFACE WATER ELEVATIONS
TABLE 4.4	SAMPLE KEY
TABLE 4.5	FIELD MEASUREMENT RESULTS
TABLE 5.1	SUMMARY OF CALCULATED VERTICAL GRADIENTS
TABLE 5.2	ANALYTICAL RESULTS SUMMARY - TRITIUM IN GROUNDWATER
TABLE 5.3	ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
TABLE 5.4	ANALYTICAL RESULTS SUMMARY - TRITIUM IN SURFACE WATER
TABLE 5.5	ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN SURFACE WATER

LIST OF APPENDICES

APPENDIX A	EXISTING MONITORING WELL INVENTORY
APPENDIX B	PaGWIS WATER SUPPLY WELL INVENTORY
APPENDIX C	STRATIGRAPHIC AND INSTRUMENTATION LOGS
APPENDIX D	QUALITY ASSURANCE PROGRAM – TELEDYNE BROWN ENGINEERING, INC.
APPENDIX E	LABORATORY ANALYTICAL REPORTS
APPENDIX F	DATA VALIDATION MEMORANDUM

EXECUTIVE SUMMARY

This Hydrogeologic Investigation Report (HIR) documents the results of Conestoga-Rovers & Associates' (CRA's) May to August 2006 hydrogeologic investigation pertaining to the Three Mile Island Generating Station in Middletown, Pennsylvania. CRA prepared this HIR for Exelon Generation Company, LLC (Exelon) as part of its Fleetwide Program to determine whether groundwater at and in the vicinity of its nuclear power generating facilities has been adversely impacted by any releases of radionuclides.

CRA collected and analyzed information on any historical releases, the structures, components, and areas of the Station that have the potential to release tritium or other radioactive liquids to the environment and past hydrogeologic investigations at the Station. CRA used this information, combined with its understanding of groundwater flow at the Station, to identify Areas for Further Evaluation (AFEs) and sample locations for the Station.

CRA collected 58 groundwater samples and three surface water samples at the Station. CRA also collected a full round of water levels from the newly installed and existing wells and measured surface water levels. Groundwater and surface water samples were analyzed for tritium, strontium-89/90, and gamma-emitting radionuclides.

The results of the hydrogeologic investigation are as follows:

- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective Lower Limits of Detection (LLDs) in any of the groundwater or surface water samples obtained and analyzed during the course of this investigation;
- Strontium-89/90 was not detected at a concentration greater than the LLD of 2.0 picoCuries/liter (pCi/L) in any of the groundwater or surface water samples obtained and analyzed during the course of this investigation;
- Tritium was not detected at concentration greater than the United States Environmental Protection Agency drinking water standard of 20,000 pCi/L in any of the groundwater or surface water samples obtained during the course of this investigation;
- Tritium was not detected in any of the surface water samples at a concentration greater than the LLD of 200 pCi/L;

- Tritium was detected in groundwater at concentrations greater than the LLD of 200 pCi/L in 42 of the 58 groundwater samples collected, but all were below the applicable drinking water standard;
- These tritium concentrations ranged from 223 ± 114 pCi/L to 13,500 ± 1,390 pCi/L. The highest concentrations of tritium were predominantly in the upper bedrock;
- The tritium in the groundwater is primarily related to three historical releases: The Auxiliary Boiler blowdown sump, the deicing line from the Condensate Storage Tank, and the Waste Evaporator Condensate Storage Tank line to the River Water Discharge line;
- Based on the results of this investigation, no tritium is migrating from the Station so as to cause any offsite detectable concentrations in surface water of the Susquehanna River[1];
- Based upon the results of this investigation, there is no current risk of exposure to radionuclides associated with licensed plant operations through any of the identified potential exposure pathways; and
- Based upon the results of this investigation, there are no known active releases into the groundwater at the Station.

Based upon the information collected to date, CRA recommends that Exelon conduct periodic monitoring of selected sample locations.

1 Based on the results of this investigation, the only tritium impacted groundwater migrating from the Station above detectable levels is that which flows into the Susquehanna River, which is the only surface water body adjacent to the Station.

1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) prepared this Hydrogeologic Investigation Report (HIR) for Exelon Generation Company, LLC (Exelon) as part of its Fleetwide Program to determine whether groundwater at and near its nuclear power generating facilities has been adversely impacted by any releases of radionuclides. This report documents the results of CRA's May 2006 Hydrogeologic Investigation Work Plan (Work Plan), as well as several other investigative tasks recommended during the course of the investigation. These additional recommendations were presented in the following documents, collectively referred to as "associated correspondence":

- AMO Environmental Decisions' May 9, 2006 Technical Review of RW-2 and Recommended Additional Work letter; and
- CRA's May 25, 2006 Technical Review of MW-TMI-10S/10I and Recommended Additional Work memorandum.

These investigations pertain to Exelon's Three Mile Island (TMI) Generating Station in Middletown, Pennsylvania (Station) (see Figure 1.1).

The Station is defined as the portion of the property containing structures, systems, and components owned, operated, or maintained by AmerGen Energy Corporation, LLC, (AmerGen) an Exelon Company, located at State Highway PA441 South, Londonderry Township, Dauphin County, Middletown, Pennsylvania. For purposes of this HIR, TMI refers to the entire island. The approximate Station boundary and features are depicted on Figure 1.2.

Pursuant to the Work Plan and associated correspondence, CRA assessed groundwater quality at the Station in locations designated as areas for further evaluation (AFEs). The process by which CRA identified AFEs is discussed in Section 3.0 of this HIR.

The objectives of the Work Plan and associated correspondence were to:

- characterize the geologic and hydrogeologic conditions at the Station including subsurface soil types, the presence or absence of confining layers, and the direction and rate of groundwater flow;
- characterize the groundwater/surface water interaction at the Station, including a determination of the surface water flow regime;

- evaluate groundwater quality at the Station including the vertical and horizontal extent, quantity, concentrations, and potential sources of tritium and other radionuclides in the groundwater, if any;
- define the probable sources of any radionuclides released at the Station;
- evaluate potential human, ecological, or environmental receptors of any radionuclides that might have been released to the groundwater; and
- evaluate whether interim response activities are warranted.

2.0 STATION DESCRIPTION

The following section presents a general summary of the Station location and definition, overview of Station operations, surrounding land use, and an overview of both regional and Station-specific topography, surface water features, geology, hydrogeology, and groundwater flow conditions. This section also presents an overview of groundwater use in the area.

2.1 STATION LOCATION

The Station is on the northern portion of the 472-acre (United States Atomic Energy Commission [USAEC], 1972) Three Mile Island in the Susquehanna River, approximately 2.5 miles south of Middletown in Londonderry Township, Dauphin County, Pennsylvania, at latitude 40°9'10", longitude 76°43'25".

The section of the river in which the Station is located is referred to as York Haven Pond or Lake Frederick (both names are used interchangeably). Three Mile Island and Shelley Island to the west divide the Susquehanna River into three main channels in this area. The banks of the river are approximately 1,000 feet to the east and 6,500 feet to the west of the Station.

The reactors within the Station are designated as TMI-1 and TMI-2. TMI-1 is owned by AmerGen. TMI-2, which is not operational, is owned by Metropolitan Edison (50 percent), Pennsylvania Electric (25 percent), and Jersey Central Power & Light (25 percent). The maintenance and management of TMI-2 is subcontracted to AmerGen. A Station plan showing the locations of the Station's major operations and features is presented on Figure 1.2.

2.2 OVERVIEW OF COOLING WATER OPERATIONS

The Station consists of two Babcock and Wilcox designed pressurized water reactors (TMI-1 and TMI-2), two steam turbine generators, closed-loop heat-dissipation systems, and associated auxiliary facilities and engineering safeguards. TMI-1 produces 850 megawatts of electricity and entered commercial service in September 1974 (Exelon, 2006). TMI-2 entered commercial service in December 1978, but was permanently shut down in March 1979. TMI-2 is presently in a condition referred to as Post-Defueling Monitored Storage (Radiological Environmental Monitoring Program [REMP], 2004).

TMI-1 uses three coolant loops to transfer heat from the reactor core to a turbine, which drives a generator to produce electricity. Each loop uses water, in a liquid or vapor form, as its coolant. A general process diagram of the operations is presented on Figure 2.1.

The primary coolant loop begins in the reactor vessel where the bundles of sealed fuel rods produce heat through fission. The primary water passes among the fuel rod bundles and is heated to a high temperature and pressure. The heated primary water is carried to the steam generators through the hot legs where it passes through sealed tubes. Most of the heat from the primary water is transferred through the tube walls to the cooler water in the secondary loop flowing around the tubes under a far lower pressure. Once cooled, the primary water is pumped back to the reactor vessel through the cold legs to repeat the process.

The secondary coolant loop is the power-generating loop and begins at the outlets of the steam generators. The secondary water flashes quickly to steam in the steam generators using the heat created in the primary loop and is sent to turn the turbine and generates electricity. After leaving the turbine, the secondary steam is sent to the condenser to convert the steam back to water. Following polishing, the secondary water is then sent back to the steam generators by feedwater pumps to repeat the process.

The primary and secondary coolant loops are closed systems and designed to avoid mixing the fluids of one loop with the fluids of another. The loops are located within building structures and the potential for radioactively contaminated liquids to impact the environment is minimized.

The Circulating Water System pumps water from the natural draft cooling water tower basins to the condensers to cool and condense the secondary waters in turbine outlet steam. The heated water from the condensers is cooled by evaporation by circulating it through natural draft cooling towers. After being cooled, the water is re-circulated into the condenser to repeat the process. Makeup water lost through evaporation is replaced by water from the Susquehanna River.

The Station additionally uses Susquehanna River water for various functions including nuclear service non-contact cooling water (safety related system cooling), secondary service non-contact cooling water (non-safety related system cooling), decay heat non-contact cooling water, and reactor building emergency cooling. A water balance for surface waters used at the Station is presented on Figure 2.2.

The Station also uses groundwater for various functions including makeup to the fire service system, river water pump lubrication, and for the production of demineralized water. Approximately 90,000 gallons per day (gpd) of groundwater is pumped from three production supply wells (NW-A, NW-B, and NW-C) and approximately 30,000 gpd of groundwater is pumped from a drinking water supply well (OSF). A water balance for groundwater used at the Station is presented on Figure 2.3.

Water from the Station's Industrial Waste Treatment System, Secondary Neutralizer Tank, and treated radioactively-contaminated liquids are discharged intermittently in batch releases to the river water discharge line in accordance with the Station's National Pollutant Discharge Elimination System (NPDES) Permit PA0009920 and pursuant to Nuclear Regulatory Commission (NRC) Operating License DPR-50.

2.3 SURROUNDING LAND USE

The Station is on an island in the Susquehanna River. The Station owns the entire island; there is no other private property on the island. Land use in the immediate vicinity north, south, east, and west of the Station, consists primarily of agricultural, rural residential, and recreational use.

Beyond the Susquehanna River to the north is a rural residential area and the town of Middletown (approximately 2.5 miles). East of the Susquehanna River is State Highway PA 441, the AmerGen Training Center, and agricultural land. The York Haven Dam is located south of the Station on the Susquehanna River. Beech Island and Shelley Island are located to the west of the Station on the Suquehanna River, as well as the town of Goldsboro, which is on the River's west bank (approximately 1 mile).

According to the 2005 REMP, the nearest residences to the Station are 0.4 miles to the east, west northwest, and northwest. Agricultural products produced in the area include poultry, meat, fruit, dairy products, vegetables, corn, wheat, alfalfa, and tobacco (USAEC, 1972).

2.4 STATION SETTING

The following sections present a summary of the topography, surface water features, geology, hydrogeology, and groundwater flow conditions in the region surrounding the Station. The information presented was primarily gathered from Station reports, including the Environmental Statement (USAEC, 1972), the Hydrogeological

Investigation Report (Ground/Water Technology, 1981), Ground Water Monitoring Program Technical Report (Bechtel Northern Corporation, 1981), Updated Final Safety Analysis Reports (UFSAR, Revision 16, dated 2006), and REMP reports.

The information presented in the reports was confirmed by CRA through review of documents from Dauphin County, the United States Geologic Survey (USGS), and the Pennsylvania Department of Conservation and Natural Resources (DCNR). The main references relied upon are listed in Section 10.0. CRA checked and verified the references that apply to this HIR.

2.4.1 TOPOGRAPHY AND SURFACE WATER FEATURES

As shown on Figure 1.1, the topography of the region is undulating, ranging in elevation between approximately 200 and 500 feet above mean sea level (AMSL). The land surface of the island is relatively flat, ranging in elevation from approximately 280 feet AMSL at the perimeter of the island to approximately 300 feet AMSL in the northern portion of the island where the Station is located (USGS Quadrangle Map).

The major surface water feature in the region is the Susquehanna River. The drainage area of the Susquehanna River begins at Otsego Lake in Cooperstown, New York, crosses the states of Pennsylvania and Maryland, and ends in Chesapeake Bay, a distance of 444 miles. The total watershed area is approximately 27,500 square miles [Susquehanna River Basin Commission (SRBC)].

TMI is located in the reach of the river referred to as the Lower Susquehanna River. The major tributaries contributing to the Susquehanna River near TMI are the Swatara and Conewago Creeks (SRBC). The river and streams near TMI are used for water supply, power generation, boating, fishing, and recreation.

TMI is in a channel of the river referred to interchangeably as either York Haven Pond or Lake Frederick. The Pond, which is formed by the York Haven and Red Hill dams, is approximately 1.5 miles wide at the Station. The direction of flow of the River changes from northwest/southeast to north/south a short distance north of TMI where the stream cuts through a diabase dike (an erosion-resistant geologic formation) crossing the River near Hill Island (UFSAR, 1998). The average elevation of the water surface in the River at TMI is approximately 277 feet AMSL as shown on the USGS quadrangle map presented on Figure 1.1.

Figure 1.2 presents portions of some of the relevant surface water features at the Station such as the storm and yard drainage system. Surface water runoff at the Station flows via storm sewers and man-made ditches to the East Dike Settling Basin prior to discharging to the Susquehanna River through outfall DSN 005. The East Dike Settling Basin is equipped with a floating oil boom and a gate valve that can be closed to stop the discharge of liquids from the basin. Furthermore, operating a valve in the discharge weir wall can increase the East Dike Settling Basin holding capacity. This valve in the discharge weir wall is normally kept closed.

2.4.2 GEOLOGY

TMI is located in the Triassic Lowlands of Pennsylvania. The Triassic Lowlands in this region are referred to as the Gettysburg Basin. To the north and west of the Triassic Lowlands, there are folded and thrust-faulted Paleozoic rocks comprising the Appalachian Mountains (Wood, 1980). Southeast of the Triassic Lowlands is the Piedmont, which is of Pre-Cambrian and Early Paleozoic Age, composed of granite, gneisses, and schists (UFSAR, 1982; DCNR, 2000).

TMI, Shelley Island, and the other small islands in the area were formed as a result of low-energy fluvial deposition by the Susquehanna River. Boulders carried by glacial melt-water or transported downstream by ice rafts were deposited in this area of the river where the channel was wide and flow velocity low. The deposited boulders became the nuclei for deposition of smaller materials (UFSAR, 1990).

The island soils are comprised of an overburden layer underlain by the sedimentary rocks of the Gettysburg Formation, which is part of the Newark group of Triassic Age. At the south end of the island, the overburden thickness is approximately 6 feet. The maximum thickness of overburden is approximately 30 feet in the central portion of the island. In the area of the Station, the overburden thickness is approximately 20 feet (USAEC, 1972). The overburden immediately overlying the bedrock is a coarse-grained sand and gravel. At the extreme north end of the island, the overburden is described as having boulders incorporated in the soil matrix (Ground/Water Technology, 1981). CRA's review of the historic soil boring logs indicates that the overburden also has substantial amounts of clay and silt at most boring locations. The presence of these fine-grained materials (clay and silts) with the coarse fraction (sand and gravel) indicates that the overburden is well graded, with a low hydraulic conductivity or a low water transmitting capability.

During construction of the Reactor Buildings, Turbine Buildings, Fuel Handling Buildings, and Auxiliary Buildings, herein referred to as the foundation footprint, overburden and considerable bedrock were excavated. Engineered backfill and, to a lesser extent, excavated overburden were used as backfill around the foundation footprint.

The bedrock surface of the Gettysburg Formation underlying the Station has minimal relief and lies at approximately 277 feet AMSL (USAEC, 1972). Gettysburg Formation lithologies vary from red-to-brown, interbedded, fine- to medium-grained sandstone, shaley-siltstone, and shaley-claystone which, range from medium-hard to hard. There is 1 to 3 feet of weathered rock at the overburden-bedrock interface (USAEC, 1972). The regional dip of the Gettysburg Formation is to the northwest at 10° to 50°. Near the Station, the altitude of these beds, measured in surface outcrops, varies from N65° to 80°E with 35° to 70° northerly dips. This variation in inclination of strata was not apparent from drill cores, as a fairly consistent dip of 38° to 40° to the northwest was observed in the subsurface of TMI (UFSAR, 1998). Well developed near vertical jointing is conspicuous along a N10°E trend (UFSAR, 1990). The joint spacing, as seen in a railroad cut adjacent to the island, is 1 to 7 feet (Bechtel Northern Corporation, 1981). Borehole data substantiated surface observations regarding jointing and revealed that healing of some joints has occurred, while others were altered by oxidation.

Two easterly trending diabase intrusions cut through the Gettysburg Formation, one approximately 1 mile upstream from TMI and a second about 0.2 mile downstream from TMI. These more erosion-resistant diabase dikes and the metamorphosed shales along their edge have caused restrictions in the river north of TMI at Hill Island and at Conewago Falls downstream of TMI (UFSAR, 1998).

2.4.3 HYDROGEOLOGY

Regionally, groundwater ultimately discharges to the Susquehanna River. Groundwater elevations higher than the river surface elevation have been documented along both the east and west banks of the river (UFSAR, 1974). These hydraulic gradients toward the river from both directions indicate that the river acts as a barrier to groundwater flow across the river. A schematic cross-section that shows the regional groundwater discharge pathways is shown on Figure 2.4.

The hydrostratigraphic units under the Station consist of the overburden and the bedrock. The unconsolidated overburden materials in the region have low hydraulic conductivity and low water transmissivity and are not a major source of water

(Ground/Water Technology, 1981). Based on historical groundwater elevation data (URS Corporation, 2006), the water table surface in the unconsolidated sediments at the Station typically lies at approximately 283 to 286 feet AMSL[2], above the average 277 feet AMSL Susquehanna River elevation. This elevation difference implies the island is under positive head and typically discharges to the river. However, the water level of the river influences the elevation of the groundwater on the island. Historic groundwater studies demonstrated that a rapid rise in the river produces a rise in groundwater elevations (UFSAR, 1998). The typical 283 to 286 feet AMSL elevation correlates to a saturated thickness of approximately 6 to 9 feet in the overburden.

The Gettysburg Formation has relatively low primary porosity. Groundwater is stored and transmitted through secondary fractures and joints. The water-bearing characteristics of the Gettysburg Formation shale have been described as a "tabular aquifer" with some beds having the ability to transmit water while other beds have little to no capacity to transmit water. The difference in transmissivity principally lies in the number and width of the secondary openings (fractures, joints, and bedding planes) where, in general, unfractured rock has negligible capacity to store or transmit water. The tabular aquifer beds are further described as being overlapping and discontinuous in every direction, but may extend laterally (generally east-west) up to several thousand feet and is strongly anisotropic (i.e., not the same in all directions) (Ground/Water Technology, 1981). Groundwater in the bedrock occurs under artesian conditions.

Earlier hydrogeologic investigations attempted to quantify the transmissivity of both the shallow unconsolidated and the deeper bedrock regime. The pumping tests conducted at shallow wells inside the foundation footprint (MS-2, MS-3, and MS-5) estimated the transmissivity to be 1,000 gallons per day per foot (gpd/foot). Relating the performances of these wells to wells outside the foundation footprint (MS-1, MS-4, and MS-7) would likely be lower than 1,000 gpd/foot. The estimated average transmissivity of shallow wells outside the foundation footprint is 200 gpd/foot (Ground/Water Technology, 1981).

Inspection reports of bedrock core samples indicates that permeability of the rock is primarily due to fractures. The tested intervals may include anomalous high fracture frequencies, and thus represent high values in the range of bedrock permeability.

---

2 A groundwater elevation of 295 feet AMSL was measured at OS-16. However, this measurement appears anomalous due to proximity to building foundations.

2.4.3.1 EXISTING WELL NETWORK

Fifty-six groundwater monitoring wells were installed at the Station between 1980 and 1999. Of the 56 wells, 44 are active. Monitoring wells installed at the Station prior to this investigation were used in conjunction with various monitoring and investigative programs and have been sampled at varying frequencies and for a variety of parameters.

Monitoring wells MS-1 though MS-8 were initially installed in 1980 after the TMI-2 accident in order to monitor the accident-generated water (AGW) present in the basement of the TMI-2 Reactor Building. The groundwater collected from these wells contained tritium at concentrations consistent with leaks from the TMI-2 Borated Water Storage Tank (BWST) near the TMI-2 Reactor Building. As such, additional wells (OS-9 though OS-12, OS-13B, and OS-14 through OS-18) were installed to continue to monitor the impact of the TMI-2 BWST leaks. The remaining wells were installed over the course of several investigations conducted in the past 25 years, which are discussed further in this HIR.

The locations of the existing monitoring wells are shown on Figure 2.5. A summary of the installation details of the existing wells was provided by the Station and is presented in Appendix A.

2.4.3.2 GROUNDWATER FLOW CONDITIONS

Previous investigations indicate that water levels generally occurred at a depth in excess of 15 feet and ranged from 14 to 19 feet below ground surface (bgs). Groundwater in the overburden was found to be generally present at the soil/bedrock interface. Groundwater flow in the overburden is generally toward the east and/or middle channels of the Susquehanna River. Groundwater is also present in the bedrock aquifer under artesian conditions. Groundwater in the bedrock aquifer is present along the bedding plane separations, closely spaced joints and fractures (UFSAR, 1998).

Pumping tests were conducted on some of the monitoring wells installed as part of previous investigations conducted at the Station. The groundwater studies indicate that the greatest movement of water in response to pumping is parallel to the strike of the bedding. The maximum drawdown occurs in wells aligned parallel to the strike of the bedding. The strike of the bedding ranged between 54°N-64E and the dip ranged between 38° to 40° to the northwest. Groundwater studies also indicate that fracture

zones were common to all three of the production supply wells (NW-A, NW-B, and NW-C) (UFSAR, 1998).

CRA concurs with this assessment. However, the majority of the monitoring wells previously installed are screened at intervals across the overburden/bedrock interface. Therefore, it is uncertain whether the groundwater elevations measured at these wells represent the overburden, bedrock or a combination of the overburden and bedrock. To better understand the hydrogeology at the Station, additional wells were installed as part of this investigation.

2.5 AREA GROUNDWATER USE

In the area of Pennsylvania where the Station is located, groundwater is used as a source for both industrial and potable water. Water supply wells are generally completed in the bedrock, the Gettysburg Formation.

In May 2006, CRA completed a search of the Pennsylvania Groundwater Information System (PaGWIS, http://www.dcnr.state.pa.us/topogeo/groundwater/index.aspx) to identify water supply wells within a 1.0 mile radius of the Station. The results of this search are provided in Appendix B. As shown on Figure 2.6, there are 54 water supply wells, including seven at the Station, within 1 mile of the center of the Station. An additional 13 wells are outside the 1 mile radius but within 1.3 miles of the Station. However, the completeness and accuracy of the database has not been field verified with the exception of an industrial well owned by the John Stapf Corporation of Harrisburg, Pennsylvania. The coordinates provided by the database for this well corresponded to a location on the island; however, CRA field verified that this well is not located on the island.

Most of these water supply wells are completed as open boreholes within the upper bedrock (less than 100 feet below grade); however, the depths of some wells reach up to 775 feet below grade. As shown on Figure 2.6, most of the wells are used for domestic water supply. Outside of the Station, one well (#19) is used for public drinking water supply and five wells are used as supply wells for industrial or other uses.

CRA understands that the Station maintains the following five water supply wells:

- 48S was installed in 1991 as a drinking water supply well. The well was completed as an open borehole from 123 feet bgs to 996 feet bgs and the pump is set at 340 feet bgs. During 2005, the average flow from 48S was approximately 7 gallons per

minute (gpm) based on weekly monitoring. Run times and water elevations are not collected from 48S.

- OSF was installed in 1986 as a drinking water supply well, but has recently been used as a production water supply for various Station functions. The well was completed as an open borehole from 126 feet bgs to 775 feet bgs and the pump is set at 210 feet bgs. Although flow is not metered, the flow data is estimated at approximately 35 gpm. The flow assumes continuous pumping while in service; however, run times are not collected from the OSF pump. Water elevations are also not collected from OSF.
- NW-A was installed in 1996 as a production supply well to supplement makeup water at the Station. The well was completed as an open borehole from 52 feet bgs to 400 feet bgs. The pump is set at 357 feet bgs and depth to water ranged between 38 and 304 feet bgs during weekly monitoring in 2005. During 2005, the flow from NW-A ranged from 22.6 to 43.8 gpm, with an average flow of approximately 36 gpm.
- NW-B was installed in 1996 as a production supply well to supplement makeup water at the Station. The well was completed as an open borehole from 52 feet bgs to 500 feet bgs. The pump is set at 483 feet bgs and depth to water ranged between 51 and 476 feet bgs during weekly monitoring in 2005. During 2005, the flow from NW-B ranged from 0 to 20.5 gpm, with an average flow of approximately 12 gpm.
- NW-C was installed in 1996 as a production supply well to supplement makeup water at the Station. The well was completed as an open borehole from 52 feet bgs to 400 feet bgs. The pump is set at 378 feet bgs and depth to water ranged between 13 and 286 feet bgs during weekly monitoring in 2005. During 2005, the flow from NW-C ranged from 3.8 to 20.9 gpm, with an average flow of approximately 13 gpm.

3.0 AREAS FOR FURTHER EVALUATION

CRA considered all Station operations in assessing groundwater quality at the Station. During this process, CRA identified areas at the Station that warranted further evaluation or "AFEs". This section discusses the process by which AFEs were selected.

CRA's identification of AFEs involved the following components:

- Station inspection on March 22 and 23, 2006;
- interviews with Station personnel;
- evaluation of Station systems;
- investigation of confirmed and unconfirmed releases of radionuclides; and
- review of previous Station investigations.

CRA analyzed the information collected from these components combined with information obtained from CRA's study of hydrogeologic conditions at the Station to identify those areas where groundwater potentially could be impacted from operations at the Station.

CRA then designed an investigation to determine whether any confirmed or potential releases or any other release of radionuclides adversely affected groundwater. This entailed evaluating whether existing Station groundwater monitoring systems were sufficient to assess the groundwater quality at the AFEs. If the systems were not sufficient to adequately investigate groundwater quality associated with any AFE, additional monitoring wells were installed by CRA.

The following sections describe the above considerations and the identification of AFEs. The results of CRA's investigation are discussed in Section 5.0.

3.1 SYSTEMS EVALUATIONS

Exelon launched an initiative to systematically assess the structures, systems and components that store, use, or convey potentially radioactively contaminated liquids. Maps depicting each of these systems were developed and provided to CRA for review. The locations of these systems are presented on Figure 3.1. The Station identified a total of 36 systems that contain or could contain potentially radioactively contaminated liquids. The following presents a list of these systems.

System Identification	*Description*
121	Storm Sewers and Yard Drainage
122	Dike/Flood Control System
182	Miscellaneous Structures
183	Long Term On Site Radwaste Storage Facility
212	Low Pressure Injection (LPI)/Decay Heat Removal System
214	Reactor Building Spray System
232	Liquid Radwaste Disposal System
236	Processed Water
237	Respirator Repair and Cleaning System
238	Waste Handling System
314	Gland Seal System
331	Main Condenser Air Removal System
411	Main Steam System
412	Steam Dump and Bypass System
414	Auxiliary Steam System
415	Main Steam to Relief Valve Post Supports
421	Main Condensate System
423	Powdex Condensate Polishing System
424	Emergency Feedwater System
432	Feedwater Heater Vents, Reliefs and Miscellaneous Drains
441	Auxiliary Boilers
502	Mechanical Draft Cooling Towers
522	Cycle Makeup Demineralizer System
531	Nuclear Services River Water System
532	Secondary Services River Water System
553	Turbine Plant Sampling System
571	Turbine Building Sumps and Drains System
572	Reactor Building Sumps and Drains System
573	Auxiliary Building Sumps and Drain System
574	Intermediate Building Sump
577	Miscellaneous Sumps and Drains
581	Sewage Treatment System
582	Industrial Waste Treatment System
591	Turbine Plant Chemical Cleaning System
864	Station Blackout Diesel Generator and Support Systems
Unit 2	TMI-2 Overall

After these systems were identified, Exelon developed a list of the various structures, components and areas of the systems (e.g., piping, tanks, process equipment) that handle or could potentially handle any radioactively contaminated liquids. The structures, components, and areas included:

- aboveground storage tanks;
- condensate vents;
- areas where confirmed or potential historical releases, spills or accidental discharges may have occurred;
- pipes;
- pools;
- sumps;
- surface water bodies (i.e., basins, pits, ponds, or lagoons);
- trenches;
- underground storage tanks; and
- vaults.

The Station then individually evaluated the various system components to determine the potential for any release of radioactively contaminated liquid to enter the environment. Each structure or identified component was evaluated against the following seven primary criteria:

- location of the component (i.e., basement or second floor of building);
- component construction material (i.e., stainless steel or steel tanks);
- construction methodologies (i.e., welded or mechanical pipe joints);
- concentration of radioactively contaminated liquid stored or conveyed;
- amount of radioactively contaminated liquid stored or conveyed;
- existing controls (i.e., containment and detection); and
- maintenance history.

System components, which were located inside a building or otherwise had some form of secondary containment, such that a release of radioactively contaminated liquid would not be discharged directly to the environment, were eliminated from further evaluation. System components that are not located within buildings or did not have some other form of secondary containment were retained for further qualitative

evaluation of the risk of a release or radioactively contaminated liquid to the environment and the potential magnitude of any release.

Exelon's risk evaluation took into consideration factors such as:

- the potential concentration of radionuclides;
- the volume of liquid stored or managed;
- the probabilities of the systems actually containing radioactively contaminated liquid; and
- the potential for a release of radioactively contaminated liquid from the system component.

These factors were then used to rank the systems and system components as to the risk for a potential release of radioactively contaminated liquid to the environment. The evaluation process resulted in the identification of structures, components, and areas to be considered for further evaluation.

3.2 HISTORICAL RELEASES

CRA also reviewed information concerning confirmed or potential historical releases of radionuclides at the Station, including reports and documents previously prepared by Exelon and compiled for CRA's review. CRA evaluated this information in identifying the AFEs. Any historical releases identified during the course of this assessment that may have a current impact on Station conditions are further discussed in Section 3.4.

3.3 STATION INVESTIGATIONS

CRA considered previous Station investigations in the process of selecting the AFEs for the Station. This section presents a summary of the pre-operational radiological environmental monitoring program, past station investigations, and the radiological environmental monitoring program.

3.3.1 PRE-OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

A pre-operational REMP was conducted to establish background radioactivity levels prior to operation of the Station. The environmental media sampled and analyzed

during the pre-operational REMP were surface water, rain water, direct radiation, air particulates, air iodine, and sediment (Radiation Management Corporation [RMC], 1975). The results of the monitoring were detailed in the report entitled, "Three Mile Island Nuclear Station Pre-Operational Radiological Environmental Monitoring Program, January 1, 1974 – June 5, 1974".

The maximum tritium concentration detected in the pre-operational REMP surface water samples was 440 ± 70 picoCuries per liter (pCi/L).

Drinking water was not listed in the pre-operational REMP as a media sampled; however, data for strontium-89 and strontium-90 are presented in Table V of the pre-operational REMP, "Sr-89 and Sr-90 Concentrations in Untreated Drinking Water Samples". Only one sample collected in May 1974 from TM-SW-7G1 contained strontium-90 at a concentration of 0.97 ± 0.52 pCi/L.

The conclusions presented in the report were:

1. *The concentrations of radionucludes in environmental samples were generally low, frequently undetectable, and consistent with results reported by other agencies for this region.*
2. *Ambient radiation dose levels and their variations were normal and consistent with published data for the region.*
3. *The environment surrounding the Station showed no unusual or unique radiological characteristics.*

3.3.2 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

The REMP at the Station was initiated in 1974. The most recent REMP includes the collection of multi-media samples including air, surface water, groundwater, fish, direct radiation, sediment, and vegetation. The samples are analyzed for beta and gamma emitting radionuclides, tritium, iodine-131, and/or strontium as established in the procedures developed for the REMP. The samples are collected at established locations, identified as stations, in order for trends in the data to be monitored.

An annual report is prepared providing a description of the activities performed and the results of the analysis of the samples collected from the various media. Station personnel provided tritium data for surface water, groundwater, and drinking water samples collected off the Station as part of the REMP. The surface water results for

tritium range from the Lower Limit of Detection (LLD) of 200 pCi/L to 33,500 ± 489 pCi/L. However, this maximum concentration corresponds to a mixing zone influence during a permitted discharge. The groundwater results for tritium range from the LLD of 200 pCi/L to 245 pCi/L (no range of error was reported). The drinking water results for tritium range from LLD of 200 pCi/L to 601 ± 120 pCi/L.

The latest REMP annual report reviewed by CRA was prepared by Teledyne Brown Engineering Environmental Services and is entitled "Three Mile Island Nuclear Station Units 1 and 2; Annual Radiological Environmental Operating Report" for 2005. This report concluded that in assessing all the data gathered for the REMP and comparing these results with pre-operational data and operational REMP data, it was concluded that the operation of TMI-1 had no adverse radiological impact on the environment. The annual report is submitted to the NRC.

3.3.3 GROUNDWATER MONITORING PROGRAMS

Since 1980, numerous monitoring wells have been installed at the Station for various monitoring or investigative programs and have been sampled at varying frequencies and for a variety of parameters. Details of the most noteworthy investigations were presented in the following reports:

- "Ground Water Monitoring Program Technical Report for GPU Service Corporation Three Mile Island - Unit 2" prepared by Bechtel Northern Corporation, February 1981. This report summarizes the initiation of a groundwater monitoring and aquifer testing program intended to monitor the AGW. In early 1980, eight groundwater monitoring wells (MS-1 through MS-8) were installed. Due to the detection of above-background tritium concentrations, the program was expanded to include the installation of 10 observation wells (OS-9 through OS-12, OS-13B, and OS-14 through OS-18). The report concluded that while there was no leakage from the TMI-2 containment structure, tritium-impacted groundwater associated with the BWST and other unidentified sources was present near TMI-2.
- "Hydrogeological Investigation, Three Mile Island Nuclear Station, Londonderry Township, Pennsylvania" prepared by Ground/Water Technology, Inc., December 1981. This report summarizes the geology and hydrogeology of the island based on reviews of published literature and the groundwater investigations completed subsequent to the 1979 accident. This report concluded that the BWST was the "*apparent source of the above-background concentrations of tritium in groundwater*".

- "EPRI Groundwater Evaluation for the Three Mile Island (TMI) Site, December 5, 2005 through December 8, 2005" prepared by Electric Power Research Institute, February 2006. This report provides a brief evaluation of the TMI groundwater monitoring program and includes several recommendations for program improvements.

Historic analytical data from samples collected from these wells have been used in assessing trends in tritium concentrations at specific locations over time. Further, the data from these wells were used in the development of the Work Plan to assess potential sources of tritium in groundwater beneath the Station.

3.4 IDENTIFIED AREAS FOR FURTHER EVALUATION

CRA used the information presented in the above sections along with its understanding of the hydrogeology at the Station to identify AFEs, which were a primary consideration in the development of the scope of work in the Work Plan. The establishment of AFEs is a standard planning practice in hydrogeologic investigations to focus the investigation activities at areas where there is the greatest potential for impact to groundwater.

Specifically, AFEs were identified based on these six considerations:

- systems evaluations;
- risk evaluations;
- review of confirmed and/or potential releases;
- review of documents;
- review of the hydrogeologic conditions; and
- Station inspection completed on March 22 and 23, 2006.

Prior to CRA completing its analysis and determination of AFEs, Station personnel completed an exhaustive review of all historic and current management of systems that may contain potentially radioactively contaminated liquids.

CRA reviewed the systems identified by the Station, which have the potential for the release of radioactively contaminated liquids to the environment, and groundwater flow at the Station. This evaluation allowed CRA to become familiar with Station operations and potential systems that may impact groundwater. CRA then evaluated information concerning historic releases as provided by the Station. This information, along with a review of the results from historic investigations, was used to refine CRA's

understanding of areas likely to have the highest possibility of impacting groundwater. Where at risk systems or identified historical releases were located in close proximity or were located in areas which could not be evaluated separately, the systems and historical releases were combined into a single AFE. At times, during the Station investigation, separate AFEs were combined into one or are otherwise altered based on additional information and consideration.

Finally, CRA used its understanding of known hydrogeologic conditions (prior to this investigation) to identify AFEs. Groundwater flow was an important factor in deciding whether to combine systems or historical releases into a single AFE or create a separate AFE. For example, groundwater beneath several systems that contain radioactively contaminated liquids that flows toward a common discharge point were likely combined into a single AFE. The AFEs were created based on known groundwater flow conditions prior to the work completed during this investigation.

Based upon its review of information concerning confirmed or potential historical releases, historic investigations, and the systems at the Station that have the potential for release of radioactively contaminated liquids to the environment combined with its understanding of groundwater flow at the Station, CRA has identified the following as the AFEs (Figure 3.1).

AFE-TMI-1: Unit 1 Plant Area

This AFE collectively consists of the areas surrounding the Reactor and Turbine Buildings of TMI-1 where numerous systems that may contain radioactively contaminated liquids are located. Historical releases of water containing elevated tritium are documented to have occurred in this area.

In 1986 and again in 1996, a small water leak (of two to three drops per minute) from the TMI-1 BWST flange was released to the environment. In 1987, a small volume of TMI-1 BWST water was released to the environment during a heater replacement.

In 1991, less than 100 gallons of radioactively contaminated liquid generated from leaking valves migrated off a containment pad onto the soil. In 1995 and 2004, a pipe to the Auxiliary Boiler blowdown sump leaked an unknown quantity of radioactively contaminated liquid to the environment. All leaks were identified and repaired.

Recently, in 2006, a leak from the Condensate Storage Tank (CO-T-1A) deicing line released radioactively contaminated liquid to the environment. The radioactively

contaminated liquid migrated through a preferential pathway to a manhole immediately south of the utility building 48. The leak was identified and repaired.

AFE-TMI-2: Unit 2 Plant Area

This AFE collectively consists of the areas surrounding the Reactor and Turbine Buildings of TMI-2 where numerous systems that may contain radioactively contaminated liquids were located. Historical releases of water containing elevated concentrations of tritium are documented to have occurred in this area.

In 1981, suspected underground piping leaks and incidents of manway gasket leakage released an unknown quantity of contaminated material to surrounding soils. In 1981, 1982, 1983, 1984, and 1987 leaks from the TMI-2 BWST and associated pipes and gaskets were identified based on elevated tritium concentrations found in the groundwater at wells MS-2, MS-3, OW-9, OW-10, OW-16, and OW-17. Groundwater quality data were detailed in the associated REMP reports.

During the years 1990 to 1993, the Station was permitted by the NRC and Commonwealth of Pennsylvania to evaporate approximately 2.3 million gallons of tritiated water generated from the TMI-2 accident in 1979. Radiological Effluent Technical Specifications (RETS) and REMP reports from that time period reflect and document this process.

AFE-TMI-3: Treatment and River Discharge Area

The Treatment and River Discharge Area consists of the Industrial Waste Treatment System (IWTS), Sewage Treatment Plant, Mechanical Draft Cooling Tower, and River Discharge, which were identified by Station personnel as containing radioactively contaminated liquids. Specifically, the 1999 leak in the WECST discharge pipe just north of the Unit 1 Mechanical Draft Cooling Tower building released radioactively contaminated liquids. This AFE also encompasses the river water discharge line, which is the release path for the WECST discharge.

AFE-TMI-4: Solid Waste Staging Facility

The Solid Waste Staging Facility was identified by Station personnel as potentially containing radioactively contaminated liquids. There is a sump in the Solid Waste Staging Facility that can collect radioactively contaminated liquids.

AFE-TMI-5: East Dike Settling Basin

This AFE consists of the unlined retention basin associated with managing the storm water within the flood protection dike. Several known historical releases of water containing radioactively contaminated liquids are documented to have occurred that have discharged to the storm water and yard drainage system. Specifically in 1990, 58,000 gallons of radioactively contaminated liquid was released from the TMI-1 feedwater heaters to the roof drains and ultimately to East Dike Settling Basin.

4.0 FIELD METHODS

The field investigations completed for this HIR were completed in May through August 2006. CRA supervised the installation of monitoring wells and staff gauges, collected samples from the newly-installed and existing monitoring wells, and collected samples from surface water locations. The field investigations were completed in accordance with the methodologies presented in the Work Plan (CRA, 2006).

4.1 STAFF GAUGES INSTALLATION

CRA installed staff gauges at three locations: on the north bridge (SG-TMI-1), the south bridge (SG-TMI-2) and the East Dike Settling Basin (SG-TMI-3). Figure 4.1 presents the location of the three new staff gauges installed as part of this investigation.

4.2 GROUNDWATER MONITORING WELL INSTALLATION

CRA installed thirty-one new monitoring wells as part of the investigation. The well locations were selected based on a review of all data provided, the hydrogeology at the Station, and the understanding of identified AFEs. The proposed well locations were adjusted based on field conditions and MW-TMI-5I was not installed due to proximity to subsurface utilities. MW-TMI-5D was relocated to the nested MW-TMI-4S/I monitoring wells. Additional wells were installed beyond the scope of the Work Plan as described in AMO Environmental Decisions' May 9, 2006 Technical Review of RW-2 and Recommended Additional Work letter and CRA's May 25, 2006 Technical Review of MW-TMI-10S/10I and Recommended Additional Work memorandum. Figure 4.2 presents the location of the 31 new monitoring wells. Figure 4.3 presents the new well locations on an aerial photograph. Table 4.1 summarizes the well completion details. Monitoring well construction logs are provided in Appendix C.

The nomenclature of the new monitoring wells designates the formation in which the monitoring well was constructed. Wells beginning with the letters "MW-TMI" identify it as being a monitoring well installed at TMI. These letters are followed by sequential numbers. Monitoring wells screened within the shallow overburden are designated with an "S", monitoring wells installed in the upper bedrock are designated with an "I", and monitoring wells installed in the deep bedrock are designated with a "D".

Prior to completing any ground penetration activities, CRA completed subsurface utility clearance procedures to minimize the potential of injury to workers and/or damage to

subsurface utility structures. The subsurface clearance procedures consisted of completing an electronic survey within a minimum of 10-foot radius of the proposed location utilizing electromagnetic and ground penetrating radar technology. Additionally, an air knife was utilized to verify utilities were not present at the proposed location to a depth to 10 feet bgs.

Specific installation protocols for the 11 shallow overburden monitoring wells ("S" wells) are described below:

- the borehole was advanced to the target depth using 6.25-inch or 4.25-inch inside diameter hollow-stem augers (HSA);
- a nominal 2-inch diameter (No. 10 slot) polyvinyl chloride (PVC) screen of various length depending on observed saturated thickness, attached to a sufficient length of 2-inch diameter schedule 40 PVC riser pipe to extend to the surface, was placed into the borehole through the augers;
- a filter sand pack consisting of silica sand was installed to a minimum height of 2 feet above the top of the screen as the augers are removed;
- a minimum 2-foot thick seal consisting of granular bentonite was placed on top of the sand pack and hydrated using potable water;
- the remaining borehole annulus was sealed to within 1 feet of the surface using cement/bentonite grout; and
- the remaining portion of the annulus was filled with concrete in which a 6-inch diameter protective flushmount or above-grade casing was set. The well head was fitted with a water-tight, lockable cap.

Specific installation protocols for the 20 bedrock monitoring wells ("I" and "D" wells) are described below:

- the borehole was advanced to the target depth using an air rotary drill rig;
- a 10-inch diameter temporary steel casing was installed to approximately the overburden/bedrock interface to prevent the overburden from collapsing into the boring;
- for the "I" monitoring wells, a 6-inch diameter permanent steel casing was seated approximately 10 feet into the bedrock. For the "D" monitoring wells, a 6-inch diameter permanent steel casing was seated approximately 10 feet beyond the boring terminus of the nested "I" monitoring well. For MW-TMI-1D and MW-TMI-2D where no "I" nested monitoring wells were installed, the 6-inch diameter permanent steel casing was seated approximately 40 feet into the bedrock.

The 6-inch diameter permanent steel casing was temporarily sealed using a minimum 2 vertical feet of bentonite;

- following installation of the 6-inch diameter permanent steel casing, a 6-inch diameter hammer drill was advanced to the target depth. For the "I" monitoring wells, the target depth varied based on groundwater observations. Once groundwater was observed, the "I" monitoring well was advanced and additional 10 feet. All "D" monitoring wells were terminated at 100 feet bgs with the exception of MW-TMI-17D (82 feet bgs) and MW-TMI-19D (120 feet bgs). The bedrock monitoring wells were completed as open boreholes;
- once target depths were achieved, the 6-inch diameter permanent steel casing was affixed using cement/bentonite grout to within 1 foot of the ground surface and the 10-inch diameter temporary steel casing was removed, if possible; and
- the remaining portion of the annulus was filled with concrete in which a flushmount or above-grade casing was set. The well head was fitted with a water-tight, lockable cap.

4.3 GROUNDWATER MONITORING WELL DEVELOPMENT

In order to establish good hydraulic communication with the aquifer and reduce the volume of sediment in the monitoring well, monitoring well development was performed in accordance with the procedure outlined below.

- For the overburden monitoring wells, the water was purged from the monitoring well using a submersible pump. For the bedrock monitoring wells, the water was purged from the monitoring well using the drill rig.
- Groundwater from the overburden monitoring wells was collected at regular intervals with the pH, temperature, and conductivity measured using field instruments. These instruments were calibrated daily according to the manufacturer's specifications. Additional observations such as color, odor, and turbidity of the purged water were recorded. Due to the difficulty of collecting the groundwater from the bedrock monitoring wells, no field measurements were collected during development.
- Development continued until the turbidity and silt content of the monitoring wells was significantly reduced and three consistent readings of pH, temperature, and conductivity were recorded, or a minimum of ten well volumes were purged.

4.4 SURVEY

The new monitoring wells and staff gauges were surveyed to establish reference elevations relative to mean sea level. The top of each well casing was surveyed to the nearest 0.01 foot relative to the North American Vertical Datum (NAVD) 1988, and the survey point was marked on the well casing. The survey included the well location to the nearest 0.10 foot relative to the Universal Transverse Mercator (UTM) 18 North American Datum (NAD) 1983.

4.5 GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS

On June 5, 2006 and July 31, 2006, CRA collected a round of water level measurements from the monitoring wells and staff gauges at the Station in accordance with the Work Plan. Based on the measured depth to water from the reference point and the surveyed elevation of the reference point, the groundwater or surface water elevation was calculated. A summary of groundwater elevations for the events is provided in Table 4.2. A summary of surface water elevations for the events is provided in Table 4.3.

Prior to the water level measurements, the wells and staff gauges were identified and located. Once the wells were identified, CRA completed a thorough inspection of each well and noted any deficiencies. Water level measurements were collected using an electronic depth-to-water probe accurate to ± 0.01 foot. The measurements were made from the designated location on the inner riser or steel casing of each monitoring well and reference point on each staff gauge. The water level measurements were obtained using the following procedures:

- the proper elevation of the meter was checked by inserting the tip into water and noting if the contact was registering correctly;
- the tip was dried, and then slowly lowered into the well or surface water body until contact with the water was indicated;
- the tip was slowly raised until the light and/or buzzer just began to activate. This indicated the static water level;
- the reading at the reference point was noted to the nearest hundredth of a foot;
- the reading was then re-checked; and
- the water level was then recorded, and the water level meter decontaminated prior to use at the next location.

4.6 GROUNDWATER AND SURFACE WATER SAMPLE COLLECTION

CRA conducted one complete round of groundwater sampling during the completion of the Work Plan for these hydrogeologic investigations. CRA attempted to sample a total of 78 wells. CRA was able to collect a groundwater sample from 58 wells (32 existing wells and 26 were newly installed wells). CRA was unable to collect groundwater samples from the remaining 20 wells because they were dry (18 wells), contained oil (1 well), or had a blockage (1 well). The sampling was scheduled to allow for 2 weeks to elapse between well development and groundwater sample collection. The existing wells were selected for inclusion in this investigation based on their proximity to AFEs.

At the monitoring well locations, CRA conducted the sampling using pneumatic bladder pumps or peristaltic pumps and dedicated polyethylene tubing to employ low flow purging techniques as described in Puls and Barcelona (1996). CRA sampled the drinking water/production wells using the existing pumping system and collecting a sample from a sample port/tap upstream of any treatment system or storage/pressure tank following approximately 10 to 15 minutes of purging.

The groundwater in the monitoring wells was sampled by the following low-flow procedures:

- the wells were located and the well identification numbers were verified;
- a water level measurement was taken;
- the well was sounded by carefully lowering the water level tape to the bottom of the well (so as to minimize penetration and disturbance of the well bottom sediment), and comparing the sounded depth to the installed depth to assess the presence of any excess sediment or drill cuttings;
- the pump or tubing was lowered slowly into the well and fixed into place such that the intake was located at the mid-point of the well screen, or a minimum of 2 feet above the well bottom/sediment level;
- the purging was conducted using a pumping rate between 100 to 500 milliliters per minute (mL/min). Initial purging began using the lower end of this range. The groundwater level was monitored to ensure that a drawdown of less than 0.3 foot occurred. If this criterion was met, the pumping rate was increased dependent on the behavior of the well. During purging, the pumping rate and groundwater level were measured and recorded approximately every 10 minutes;
- the field parameters (pH, temperature, conductivity, oxidation-reduction potential [ORP], dissolved oxygen [DO], and turbidity) were monitored during the purging to

evaluate the stabilization of the purged groundwater. Stabilization was considered to be achieved when three consecutive readings for each parameter, taken at 5-minute intervals, were within the following limits:

pH	± 0.1 pH units of the average value of the three readings,
Temperature	± 3 percent of the average value of the three readings,
Conductivity	± 0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and ± 0.01 mS/cm of the average value of the three readings for conductivity >1 mS/cm,
ORP	± 10 millivolts (mV) of the average value of the three readings,
DO	± 10 percent of the average value of the three readings, and
Turbidity	± 10 percent of the average value of the three readings, or a final value of less than 5 nephelometric turbidity units (NTUs);

- once purging was complete, the groundwater samples were collected directly from the pump/tubing directly into the sample containers; and
- in the event that the groundwater recharge to the monitoring well was insufficient to conduct the low-flow procedure, the well was pumped dry and allowed to sufficiently recharge prior to sampling.

All groundwater samples were labeled with a unique sample number, the date and time, the parameters to be analyzed, the job number, and the sampler's initials. The samples were then screened by the Station for shipment to Teledyne Brown Engineering, Inc. (Teledyne Brown).

A sample key is presented in Table 4.4; field measurements for the hydrogeologic investigation are presented in Table 4.5.

CRA containerized the water purged from the monitoring wells during the sampling, as well as the water purged from all of the wells during the hydrogeologic investigation. The water was placed into 55-gallon drums, which will be processed by the Station in accordance with its NPDES permit.

Surface water samples were collected on June 6, 2006 at the REMP locations A3-2, Q9-1, and J1-2. The surface water sampling locations are presented on Figure 4.1.

The surface water samples were collected by directly filling the sample container from the composite samplers at the determined locations until completely filled. A sample key is presented in Table 4.4.

4.7 DATA QUALITY OBJECTIVES

CRA has validated the analytical data to establish the accuracy and completeness of the data reported. Teledyne Brown provided the analytical services. The Quality Assurance Programs for the laboratory are described in Appendix D. Analytical data for groundwater and surface water samples collected in accordance with the Work Plan are presented in Appendix E. Data validation memoranda are presented in Appendix F. The data validation included the following information and evaluations:

- sample preservation;
- sample holding times;
- laboratory method blanks;
- laboratory control samples;
- laboratory duplicates;
- verification of laboratory qualifiers; and
- field quality control (field blanks and duplicates).

Following the completion of field activities, CRA compiled and reviewed the geologic, hydrogeologic, and analytical data.

The data were reviewed using the following techniques:

- data tables and databox figures;
- hydrogeologic cross-sections; and
- hydraulic analyses.

4.8 SAMPLE IDENTIFICATION

Systematic sample identification codes were used to uniquely identify all samples. The identification code format used in the field was: WG - TMI – MS - 7 - 060806 – JC - 001. A summary of sample identification numbers is presented in Table 4.4.

WG - Sample matrix - groundwater
WS - Sample matrix - surface water
RB - Sample matrix - rinse blank

TMI	-	Station code
MS-7	-	Well location
060806	-	Date
JC	-	Sampler initial
001	-	Sample number

4.9 CHAIN-OF-CUSTODY RECORD

The samples were delivered to Station personnel under chain-of-custody protocol. Subsequently, the Station shipped the samples under chain-of-custody protocol to Teledyne Brown for analyses.

4.10 QUALITY CONTROL SAMPLES

Quality control samples were collected to evaluate the sampling and analysis process.

Field Duplicates

Field duplicates were collected to verify the accuracy of the analytical laboratory by providing two samples collected at the same location and then comparing the analytical results for consistency. Field duplicate samples were collected at a frequency of one duplicate for every ten samples collected. A total of seven duplicate samples were collected. The locations of duplicate samples were selected in the field during the performance of sample collection activities. The duplicate samples were collected simultaneously with the actual sample and were analyzed for the same parameters as the actual samples.

Rinsate Blank Samples

Rinsate blanks were collected to verify that decontamination procedures conducted in the field were adequate. Rinsate blanks were collected by routing Station-supplied demineralized water through decontaminated sampling equipment. Rinsate blanks were collected at a frequency of one rinsate blank for every day samples were collected using non-disposable or non-dedicated equipment. A total of eleven rinsate blanks were collected.

4.11 ANALYSES

Groundwater and surface water samples were analyzed for tritium, and gamma-emitting radionuclides as listed in NUREG-1301 and strontium-89/90 as listed in 40 CFR 141.25. It should be noted that the groundwater sample collected from MW-TMI-12S was only analyzed for tritium because insufficient sample volume was available due to insufficient groundwater recharge.

5.0 RESULTS SUMMARY

This section provides a summary of Station-specific geology and hydrogeology, along with a discussion of hydraulic gradients, groundwater elevations, and flow directions in the vicinity of the Station. This section also presents and evaluates the analytical results obtained from activities performed in accordance with the Work Plan and associated correspondence.

5.1 STATION GEOLOGY

As presented in the stratigraphic and instrumentation logs (see Appendix C), the geology encountered during monitoring well installation is consistent with the geology described in Section 2.4.3. The geology beneath the Station consists of overburden soil underlain by the sedimentary rocks of the Gettysburg Formation. The thickness of the overburden ranges from approximately 15 to 30 feet. The overburden material consists of silty sand with varying amounts of rounded gravel and medium- to coarse-grained sand.

There is 1 to 3 feet of weathered rock at the overburden-bedrock interface. The weathered rock consists of hard silty-clay derived from weathering of the Gettysburg Formation. The competent bedrock primarily is a fractured, red-brown, interbedded, fine- to medium-grained sandstone, shaley-siltstone, and shaley-mudstone. As shown on the bedrock surface contour map (Figure 5.1), the bedrock is typically encountered between 272 to 280 feet AMSL. Some of the Station structures within the foundation footprint are constructed to depths of approximately 50 feet bgs (approximately 250 feet AMSL), which required the complete removal of overburden and blasting into the bedrock surface.

Figure 5.2 identifies the location of the lines-of-section onto which the wells, buildings, and other features were projected. The geologic cross-sections shown on Figures 5.3 and 5.4 provide representative depictions of the geologic conditions at the Station, and the relationship between the geology, construction area, and the foundation footprint. These profile locations were selected because of they are close to the AFEs, structures potentially influencing groundwater flow patterns, and geologic features.

Profile A-A' (Figure 5.3) is a west-southwest to east-northeast profile that begins at the MW-TMI-3S/I monitoring well nest and terminates at MW-TMI-1D. This profile transects with AFE-TMI-1 and AFE-TMI-3. The profile is along geologic strike.

Profile B-B' (Figure 5.4) is a north to south profile that runs from near monitoring well MW-TMI-17I/D through the Station to MW-TMI-7S and intersects AFE-TMI-1 and AFE-TMI-2. This profile shows the relationship between the geology and building foundations. The cross-section is approximately along geologic dip.

The thickness of the overburden ranges from approximately 15 to 30 feet. These cross-sections show that the building structures extend approximately 15 to 25 feet into competent bedrock with the base of the tendon galleries at approximately 250 feet AMSL. Engineered backfill, which consists of screened excavated soils, crushed stone, and concrete fill, is around the building structures in the foundation footprint. Cross-section B-B' depicts the bedrock bedding planes, which dip approximately 40 degrees to the northwest. In addition, the historic soil boring log identifies a diabase dike was encountered at well 48S, which is located at the northern end of the Station.

5.2 STATION HYDROGEOLOGY

In general, there are two water-bearing units in the naturally deposited materials at the Station. These are the overburden and the bedrock.

Overburden

Based on water level measurements collected on July 31, 2006, the water table in the overburden at the Station, where present, lies between 277.29 to 281.81 feet AMSL, above the measured 278.40 feet AMSL Susquehanna River elevation. The corresponding saturated thickness of the overburden water-bearing unit ranges from zero to greater than 6 feet (Figure 5.5). Although most of the overburden contains some groundwater, there are isolated areas that are unsaturated. These generally coincide with bedrock topographic highs. Although of limited saturated thickness, the overburden forms a continuous flow zone. During drilling, CRA identified an unsaturated zone between the saturated overburden and the first occurrence of water in the bedrock. Primary sources of water to the overburden include recharge from precipitation and lateral flow from the backfill around the foundation footprint. The hydraulic conductivity of overburden was estimated to be from 0.027 to 1.08 feet per day (Ground/Water Technology, 1981).

Bedrock

The bedrock wells installed during the field investigation were constructed as open rock boreholes open across tens of feet; therefore, the wells may intercept several water-bearing bedding planes or fractures. Groundwater within the bedrock is stored

and transmitted through secondary porosity features (i.e., along bedding plane strike and dip, fractures, and joints). The natural groundwater flow within the bedrock would be upward along secondary features and then laterally along the strike of the bedding with discharge to the Susquehanna River. The sources of water to the bedrock include downward recharge from the saturated overburden at the subcrop, the saturated backfill around the foundation footprint, or groundwater flowing vertically upward from deeper rock.

Overburden/Bedrock

Many of the historical wells were constructed such that they are screened in both the overburden and the upper bedrock (average 15 to 20 feet into bedrock). Based upon CRA's review of the well logs, and the fact that these wells are screened across two potential water-bearing units, CRA cannot determine whether groundwater elevations in these wells are representative of the overburden, the bedrock, or a combination of the two. CRA used professional judgment in determining whether to include these data in the evaluation of the water level data.

5.2.1 GROUNDWATER FLOW DIRECTIONS

Figures 5.6 and 5.7 present potentiometric surface contour maps for the overburden based on water level data collected on June 5, 2006 and July 31, 2006, respectively. Figures 5.8 and 5.9 present potentiometric surface contour maps for the bedrock based on water level data collected by CRA on June 5, 2006 July 31, 2006, respectively. CRA used a commercially available contouring program (Surfer, Version 8.02, 2002) to provide an initial contouring of groundwater elevations. The initial contours were then modified using professional judgment to prepare the final contour maps. Modification was necessary to include proper consideration of surface water body elevations and the limits of the saturated overburden. The extent of the overburden aquifer, as shown on Figure 5.5, was considered in preparing the overburden groundwater contour map. The bedrock wells are open boreholes that intercept multiple fractures; therefore, the water levels measured in these wells represent an average of the groundwater elevations within the individual water-bearing zones.

The hydrogeologic profiles presented on Figures 5.10 and 5.11 assist in understanding the water table flow patterns at the Station. These profiles were prepared along the same cross-section lines shown on Figure 5.2.

In general, the groundwater flow in the overburden is outward from the center of the Station towards the east and west. This flow pattern would be the natural groundwater flow conditions had there been no development on the island. However, the groundwater flow in the overburden is influenced by man-made structures as discussed in Section 5.2.2. The water stored in the backfill material around the foundation footprint serves as a preferential pathway and enhances the lateral flow of water in the overburden.

Groundwater flow in the bedrock is outward from the center of the Station along strike towards the northeast and southwest. Like the overburden, the bedrock groundwater flow is influenced by man-made structures. It is also influenced by the pumping of production supply wells at the Station. The water stored in the backfill material around the foundation footprint serves as a preferential pathway and can recharge the bedrock. The pumping of the Station's production supply wells captures a portion of the groundwater beneath the Station primarily along strike (NE-SW) within the pumped interval of these wells.

As discussed in Section 2.4.4, regionally, bedrock groundwater discharges to the Susquehanna River. Groundwater at the Station is prevented from migrating beneath the river to the mainland due to the opposing flow of groundwater from higher land on both sides of the river.

5.2.2 MAN-MADE INFLUENCES ON GROUNDWATER FLOW

During construction of the foundation footprint, the native overburden and bedrock were excavated. The bedrock surface at the Station has minimal relief and is typically encountered between 272 to 280 feet AMSL (Figure 5.1). The inverts of most structures are at 270 feet AMSL, which is below the pre-construction bedrock surface, below the natural groundwater elevation, and below the surface water elevation of the Susquehanna River (average 277 feet AMSL). Some inverts (e.g., the tendon galleries) reach 250 feet AMSL. All non-process related utilities (e.g., storm drains) are above the water table. In addition, the East Dike Settling Basin has minimal hydraulic connection as its surface water elevation is 283.32 feet AMSL compared to the approximate groundwater elevation of 280.5 feet AMSL near the basin.

Engineered backfill and, to a lesser extent, the excavated overburden, was used as backfill around the foundation footprint to depths similar to the invert depths. The hydraulic conductivity of the engineered backfill (2.83 to 28.3 feet per day) is two to three orders of magnitude greater than the native overburden (Ground/Water

Technology, 1981). The surrounding lower hydraulic conductivity overburden prevents groundwater from readily flowing laterally from the engineered fill into the overburden. Consequently, the backfill material around the foundation footprint may serve as a preferential pathway to collect water. The potential for the backfill to store water creates a downward vertical gradient that causes groundwater to flow directly downward into the bedrock. Since the foundation footprint is in the middle of the Station, this condition would enhance the natural flow gradient from the center of the Station downward and then outward towards the river on both sides of the island.

Additionally, the three production supply wells (NW-A, NW-B, and NW-C), and to a lesser extent the Station's drinking water supply well (OSF) are essentially pumped continuously to supply water for various functions including makeup to the fire service system, river water pump lubrication, and for the production of demineralized water. This pumping also recovers some tritiated groundwater from beneath the Station.

The principle transmissive features at the Station are bedding planes or water-bearing fractures. The NW-A, NW-B, and NW-C production supply wells are open boreholes from 52 feet bgs to between 400 and 500 feet bgs, and the OSF production supply well is an open borehole from 126 feet bgs to 775 feet bgs. Therefore, the wells likely intercept and stress several of these transmissive features. The term "pumped interval" is used to describe a zone that includes all of the transmissive features intercepted by an individual pumping well. Pumped intervals will draw down without having a significant hydraulic influence above or below the pumped interval. In this sense, the pumped interval behaves as a single aquifer unit.

If the pumped intervals are not recharged, groundwater elevations would continue to drop during pumping. However, the production supply wells have been pumping for years and the groundwater elevations are relatively stable based on historic water elevation data. The pumped intervals must be recharged at a rate equal to the pumping rate or the drawdown response to pumping would continue indefinitely. There are four possible sources of recharge:

- vertically downward flow from bedrock overlying the pumped interval potentially enhanced by water collected by the backfill;
- vertically upward flow from bedrock underlying the pumped interval;
- flow along the bedding, which dips at forty degrees to the northwest, entering the pumped interval subcrop in the surficial deposits; or
- lateral flow along bedding entering the pumped interval subcrop in the river.

The primary mode of recharge to a pumped interval appears to be its subcrop in the river. Due to pumping conditions on the western portion of the Station, water is pulled from the river at the subcrop and flows laterally and down dip, along the transmissive bedding-parallel intervals. A secondary mode of recharge to the pumped interval appears to be vertically downward flow from the bedrock overlying the pumped interval. Normally, this would not be a significant source of water to the wells; however, due to the foundation footprint being constructed within the pumped interval and water stored in the backfill, an artificially enhanced vertically downward gradient has been created drawing water into the bedrock.

The recharge that occurs at the bedrock subcrop in the overburden is insufficient to supply the water withdrawn by the production wells. Based on a subcrop of 500 feet (thickness of pumped interval) by 1,800 feet (approximate width of the island) and a groundwater recharge rate of 10 inches per year (Sloto, 1994), the estimated water available to a well in this pumped interval would be approximately 10 gpm. As identified on Figure 2.3, the cumulative pumping rate of the three production supply wells is approximately 60 gpm.

Based on this analysis, it appears that the production supply wells derive their water primarily from the Susquehanna River and secondarily receive artificial recharge from water stored around the Station structures. Figures 5.8 and 5.9 indicate that the groundwater flow potential in the bedrock is from the Susquehanna River and from the Station along strike towards the production supply wells. Consequently, the production wells do not capture all of the radioactively contaminated groundwater beneath the Station.

5.2.3 VERTICAL HYDRAULIC GRADIENTS

Several monitoring well nests have been installed at the Station not only to determine the vertical distribution of impacted groundwater, but also to evaluate the vertical hydraulic gradients. The calculated hydraulic gradients for the Station are provided in Table 5.1.

CRA calculated the vertical hydraulic gradients between the overburden and the upper bedrock ("S" and "I" wells). During the June 2006 hydraulic monitoring, the vertical gradient was downward near the foundation footprint ranging from 0.032 feet/foot (MW-TMI-14S and MW-TMI-14I) to 0.072 feet/foot (MW-TMI-13S and MW-TMI-13I) and became slightly upward closer to the river with a maximum of -0.003 feet/foot (MW-TMI-10S and MW-TMI-10I). During the July 2006 hydraulic monitoring, the

vertical gradient was downward near the foundation footprint and the river ranging from 0.002 feet/foot (MW-TMI-4S and MW-TMI-4I) to 0.083 feet/foot (MW-TMI-13S and MW-TMI-13I). The vertical gradient was slightly upward at MW-TMI-14S and MW-TMI-14I (-0.004 feet/foot). The vertical gradient fluctuations are attributed to precipitation recharge in the overburden.

CRA calculated the vertical hydraulic gradients between the upper and deep bedrock ("I" and "D" wells). Minimal vertical gradient fluctuations were observed by CRA during the June and July 2006 hydraulic monitoring events. The vertical gradient ranges from zero (MW-TMI-10I and MW-TMI-10D) to 0.028 feet/foot (MW-TMI-14I and MW-TMI-14D). Natural groundwater flow within the bedrock is anticipated to be upward along secondary features and then laterally along the strike of the bedding with discharge to the Susquehanna River. However, these calculations indicate that there is a slight downward vertical gradient within the bedrock, which may be attributed to the pumping of the three production supply wells.

5.2.4 LATERAL GROUNDWATER FLOW AND VELOCITY

The general groundwater flow direction in the overburden is radially outward from the foundation footprint (Figures 5.6 and 5.7). The horizontal hydraulic gradient in the overburden ranges from 0.002 feet/foot (north of the foundation footprint) to 0.01 feet/foot (southeast of foundation footprint). Based on an average hydraulic conductivity of the overburden of 0.24 feet/day (Ground/Water Technology, 1981) and an assumed average effective porosity of 30 percent, the average groundwater velocity in the overburden is approximately 1.8 feet/year.

The general groundwater flow potential in the bedrock is outward from the center of the Station along strike towards the northeast and southwest (Figures 5.8 and 5.9). The horizontal hydraulic gradient in the bedrock ranges from 0.002 feet/foot (east of the foundation footprint) to 0.035 feet/foot (west of foundation footprint). Based on a hydraulic conductivity of the bedrock of 5.1 feet/day (Ground/Water Technology, 1981) and an assumed average effective porosity of 10 percent, the average groundwater velocity in the bedrock is approximately 37 feet/year to the east of the foundation footprint and approximately 651 feet/year to the west of the foundation footprint. The groundwater velocity towards west of the foundation footprint is influenced by the pumping of the production supply wells.

Previous investigations calculated the groundwater velocity to range between 40 to 200 feet/year (Ground/Water Technology, 1981).

5.3 GROUNDWATER QUALITY

CRA personnel collected groundwater samples from 58 wells. The samples were analyzed for tritium and additional radionuclides. Teledyne Brown provided the analytical services. The Quality Assurance Program for the laboratory is described in Appendix D. The analytical data reports are provided in Appendix E.

The analytical data presented herein have been subjected to CRA's data validation process. CRA has used the data with appropriate qualifiers where necessary.

The data reported in the figures and tables do not include the results of recounts that the laboratory completed, except if those results ultimately replaced an initial report. The tables and figures, therefore, include only the first analysis reported by the laboratory. Where multiple samples were collected over time, then the most recent result has been used in the discussion, below.

5.3.1 SUMMARY OF BETA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS

A summary of the tritium results for the groundwater samples collected during this investigation is provided in Table 5.2 and shown on Figure 5.12. The lateral distribution of tritium in the overburden, upper bedrock, and deep bedrock is shown on Figures 5.13, 5.14, and 5.15, respectively.

Tritium was not detected at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water standard of 20,000 pCi/L. Tritium was detected at concentrations greater than the LLD of 200 pCi/L. These tritium concentrations ranged from 223 ± 114 pCi/L to 13,500 ± 1,390 pCi/L. Eleven of the 58 groundwater samples collected contained tritium at concentrations greater than 1,000 pCi/L. However, only three of the 58 groundwater samples contained tritium at concentrations greater than 5,000 pCi/L. Additional details of tritium distribution are provided in Section 6.3.

Strontium-89/90 was not detected at concentrations greater than the LLD of 2.0 pCi/L. A summary of the strontium-89/90 results for the groundwater samples collected as part of the investigation that is the subject of this HIR is provided in Table 5.3 and shown on Figure 5.16.

5.3.2 SUMMARY OF GAMMA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS

Gamma-emitting target radionuclides were not detected at concentrations that exceeded their respective LLDs. A summary of the gamma-emitting radionuclides results for the groundwater samples collected as part of the investigation that is the subject of this HIR is provided in Table 5.3 and shown on Figure 5.16.

Other non-targeted radionuclides were also included in the tables but excluded from discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.

5.3.3 SUMMARY OF FIELD MEASUREMENTS

Table 4.5 presents of a summary of field measurements collected during the well purging and sampling activities. These field measurements included pH, dissolved oxygen, conductivity, turbidity and temperature and were typical of the region. The pH values where found to be 7.00 ± 1.54 with the exception of the groundwater sample from MW-TMI-1D and MW-TMI-19I, which exceeded 12. The pH in the groundwater sample from MW-TMI-1D and MW-TMI-19I appear to be anomalous. The temperature readings along strike from MW-TMI-1D in the northeast to the three production supply wells (NW-A, NW-B, and NW-B) in the southwest were slightly higher than those perpendicular to strike.

5.4 SURFACE WATER QUALITY

Three surface water samples were collected from the locations shown on Figure 4.1. The samples were analyzed for tritium, gamma-emitting radionuclides, and strontium-89/90. Teledyne Brown provided the analytical services. The Quality Assurance Program for the laboratory is described in Appendix D. The analytical data reports are provided in Appendix E.

5.4.1 SUMMARY OF BETA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS

Tritium was not detected in any of surface water samples collected at concentrations greater than the LLD of 200 pCi/L. A summary of the tritium results for the surface water samples collected in this investigation is provided in Table 5.4 and shown on Figure 5.17.

Strontium-89/90 was not detected at concentrations greater than the LLD of 2.0 pCi/L. A summary of the strontium-89/90 analytical results for the surface water samples collected in this investigation is provided in Table 5.5 and shown on Figure 5.18.

5.4.2 SUMMARY OF GAMMA-EMITTING RADIONUCLIDES ANALYTICAL RESULTS

Gamma-emitting target radionuclides were not detected at concentrations greater than their respective LLDs. A summary of the gamma-emitting target radionuclide results for the surface water samples collected in this investigation is provided in Table 5.5 and shown on Figure 5.18.

Other non-targeted radionuclides were also included in the tables but excluded from discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.

6.0 RADIONUCLIDES OF CONCERN AND SOURCE AREAS

This section discusses radionuclides evaluated in this investigation, potential sources of the radionuclides detected, and their distribution.

6.1 GAMMA-EMITTING RADIONUCLIDES

Gamma-emitting target radionuclides were not detected at concentrations greater than their respective LLDs. Other non-targeted radionuclides were also included in the tables but excluded from discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.

6.2 BETA-EMITTING RADIONUCLIDES

Strontium-89/90 was not detected in any of the samples collected at concentrations greater than the LLD of 2.0 pCi/L. Concentrations of tritium ranged from the LLD of 200 pCi/L to 13,500 ± 1,390 pCi/L.

Since only tritium was detected at concentrations greater than the LLDs, the following sections focus on tritium; specifically, providing general characteristics of tritium, potential sources, distribution in groundwater, and a conceptual model for migration.

6.3 TRITIUM

This section discusses the general characteristics of tritium, the distribution of tritium in groundwater and surface water, and the conceptual model of tritium release and migration.

6.3.1 GENERAL CHARACTERISTICS

Tritium (chemical symbol H-3) is a radioactive isotope of hydrogen. The most common forms of tritium are tritium gas and tritium oxide, which is also called "tritiated water." The chemical properties of tritium are essentially those of ordinary hydrogen. Tritiated water behaves the same as ordinary water in both the environment and the body.

Tritium can be taken into the body by drinking water, breathing air, eating food, or absorption through skin. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted primarily from the body through urine within a month or so after ingestion. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period, with a biological half life of approximately 10 days, the same as for water.

Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity, and in special production reactors, where the isotopes lithium-7 and/or boron-10 are bombarded to produce tritium.

Although tritium can be a gas, its most common form is in water because, like non-radioactive hydrogen, radioactive tritium reacts with oxygen to form water. Tritium replaces one of the stable hydrogen atoms in the water molecule and is called tritiated water. Like normal water, tritiated water is colorless and odorless. Tritiated water behaves chemically and physically like non-tritiated water in the subsurface, and therefore tritiated water will travel at the same velocity as the average groundwater velocity.

Tritium has a radiological half-life of approximately 12.3 years. It decays spontaneously to helium-3 (^{3}He). This radioactive decay releases a beta particle (low-energy electron). The radioactivity of tritium is the source of the risk of exposure.

Tritium is one of the least dangerous radionuclides because it emits very weak radiation and leaves the body relatively quickly. Since tritium is almost always found as water, it goes directly into soft tissues and organs. The associated dose to these tissues is generally uniform and is dependent on the water content of the specific tissue.

6.3.2 DISTRIBUTION IN STATION GROUNDWATER

This section provides an overview of the lateral and vertical distribution of tritium detected in groundwater at the Station. Tritium was detected in groundwater at concentrations greater than the LLD of 200 pCi/L in both the overburden and bedrock.

As discussed in Section 5.2, many of the historical wells were constructed such that they are screened in both the overburden and the upper bedrock (average 15 to 20 feet into bedrock). Therefore, CRA considered these wells as overburden/bedrock wells.

Overburden

There are ten monitoring wells that are screened in the overburden. In addition, there are 16 monitoring wells that are screened across the overburden and the bedrock. The data from all 26 monitoring wells are used to show the distribution of tritium in the overburden (Figure 5.13.).

Of these wells, fifteen of the twenty-six samples had tritium concentrations detected above the LLD of 200 pCi/L. These tritium concentrations ranged from 223± 114 pCi/L (less than LLD of 200 pCi/L in the duplicate) (48N) to 11,500 ± 1,200 pCi/L (MW-TMI-10S). Elevated concentrations of tritium were detected in groundwater samples collected from around four AFEs (AFE–TMI-1: Unit 1 Plant Area, AFE-TMI-2: Unit 2 Plant Area, AFE-TMI-3: Treatment and River Discharge Area, and AFE-TMI-4: Solid Waste Staging Facility).

In general, the wells screened across the overburden and bedrock are situated within the engineered backfill of the foundation footprint (AFE-TMI-1 and AFE-TMI-2). The tritium detected in these areas is most likely the result of historic spills and releases within the engineered backfill of the foundation footprint. The hydraulic conductivity of the engineered backfill is two to three orders-of-magnitude greater than the native overburden (Ground/Water Technology, 1981). The surrounding lower hydraulic conductivity of the overburden prevents groundwater from readily flowing laterally. Consequently, the backfill material around the foundation footprint may serve as a preferential pathway.

The source of tritium associated with AFE-TMI-1 is previous releases in this area, including a recent (June 2006) leak from the deicing line for the Condensate Storage Tank (CO-T-1A). Discussion of this source of tritium is presented in detail below (see section headed "RW-2").

Tritium concentrations detected in the groundwater samples collected near AFE-TMI-3 (OS-18 and MW-TMI-10S) are most likely from the 1999 release from the WECST discharge pipe.

Tritium concentrations marginally greater than the LLD of 200 pCi/L were detected in the groundwater samples collected near AFE-TMI-4 (MW-TMI-7S and MW-TMI-8S). The tritium concentrations in groundwater samples from MW-TMI-7S and MW-TMI-8S were 237 ± 117 pCi/L and 246 ± 109 pCi/L (349 ± 112 pCi/L in the duplicate), respectively. The source of tritium detected in AFE-TMI-4 is most likely from historic releases.

Upper Bedrock

CRA sampled twenty-four upper bedrock monitoring wells, which are defined as wells that are completed in bedrock at depths no greater than 120 feet bgs. The data from all 24 monitoring wells is used to show the distribution of tritium in the upper bedrock (Figure 5.14).

Samples collected from twenty-two of these wells contained tritium at concentrations above the LLD of 200 pCi/L. These tritium concentrations ranged from 225 J ± 119 pCi/L (MW-TMI-18D) to 13,500 ± 1,390 pCi/L (MW-TMI-10I). Elevated concentrations of tritium were detected in groundwater samples collected near three AFEs (AFE-TMI-1: Unit 1 Plant Area, AFE-TMI-2: Unit 2 Plant Area, and AFE-TMI-3: Treatment and River Discharge Area) as shown on Figure 5.14.

As discussed in Section 5.2.2, the hydraulic conductivity of the engineered backfill is two to three orders of magnitude greater than the overburden (Ground/Water Technology, 1981). The surrounding lower hydraulic conductivity of the overburden retards groundwater from readily flowing laterally. Consequently, the backfill material around the foundation footprint may serve as a preferential pathway that creates a downward vertical gradient. Groundwater movement within the bedrock is both laterally along the strike of the bedding and vertically downward along secondary features.

In general, tritium is present in the groundwater across much of the foundation footprint (AFE-TMI-1 and AFE-TMI-2) at varying depths extending down dip to the northwest and laterally along strike to the Susquehanna River as presented on the hydrogeologic profiles (Figures 5.10 and 5.11). In addition, tritium is present in the groundwater near AFE-TMI-3, which is the location of the WECST discharge pipe.

Lower Bedrock

CRA sampled eight lower bedrock monitoring wells, which are defined as wells that are completed in bedrock at depths greater than 120 feet bgs. The data from all eight monitoring wells is used to show the distribution of tritium in the lower bedrock (Figure 5.15).

Samples collected from five of these wells contained tritium at concentrations above the LLD of 200 pCi/L. These tritium concentrations ranged from 223 ± 116 pCi/L (48S) to 3,650 ± 416 pCi/L (NW-C). Tritium in the lower bedrock is primarily present in the area of the production supply wells.

RW-2

Wells RW-1 and RW-2 were constructed such that they are screened in both the overburden and upper bedrock. Since their installation, these wells have been routinely sampled to monitor the concentration of tritium in groundwater.

In 2005, tritium concentrations in groundwater samples collected from RW-2 increased from 900 pCi/L to 33,100 pCi/L. Following a peak tritium concentration of 33,100 pCi/L on September 20, 2005, there was a rapid decline in the concentration in the groundwater at RW-2. The tritium analytical results for a groundwater sample CRA collected on June 6, 2006 were 5,600 ± 621 pCi/L (6,700 ± 723 pCi/L in the duplicate). Initially, Exelon attributed this increase in tritium concentrations to a December 2004 leak in the TMI-1 Auxiliary Boiler Sump that is 100 feet southwest of RW-2.

Tritium concentrations from groundwater samples collected from RW-2 correlate well with groundwater elevations as shown on Figure 6.1. When the water table is high, tritium concentrations tend to be low. This is expected as the source of rising groundwater elevation is clean precipitation recharge causing a dilution effect.

To assess the horizontal and vertical migration of tritiated groundwater near RW-2, additional monitoring wells (MW-TMI-12S, MW-TMI-13S/I, MW-TMI-14S/I/D, and MW-TMI-15S) were installed during the course of the field investigation, which were not originally contemplated in the Work Plan. These wells were developed, and sampled in accordance with the procedures set out in the Work Plan and described in Section 4.0.

The groundwater results indicate that there is tritium present in the overburden groundwater and upper bedrock groundwater to the south and east of RW-2. In the overburden, tritium was detected at a concentration of 2,690 ± 319 pCi/L in a groundwater sample collected from MW-TMI-12S, which is located approximately 20 feet to the south of RW-2. Tritium concentrations declined to less than the LLD of 200 pCi/L in the groundwater samples collected from wells MW-1 and MW-3, which are 1,000 feet to the east near the Susquehanna River. In the upper bedrock, tritium was detected at a concentration of 597 ± 140 pCi/L in a sample from MW-TMI-14I, which is located approximately 175 feet to the east of RW-2. Tritium concentrations were similar (440 ± 127 pCi/L) for the groundwater sample collected from MW-TMI-1D, which is approximately 1,000 feet to the east of RW-2 near the Susquehanna River. These results reveal that the tritium may have migrated laterally to the east of RW-2 further in the bedrock than in the overburden.

During this investigation, water was identified by Station personnel seeping from a manhole located immediately south of the Utility Building 48 (near drinking water supply well 48S) in June 2006. Following investigation by Station personnel, the source of the leak was pinpointed to the deicing line for the Condensate Storage Tank (CO-T-1A), which is near RW-2. According to Station personnel, the tritiated water migrated from the deicing line break into a telephone duct bank that ran in a north-south orientation and is in close proximity to MS-1. Once in the telephone duct bank, the tritiated water flowed via gravity to the lowest elevation manhole where it seeped from the manhole. At the time of the preparation of this HIR, the deicing line has been repaired; however, the quantity of water released or duration of the leak is unknown.

To assess the horizontal and vertical migration of tritiated groundwater along the preferential pathway (i.e., telephone duct bank), additional monitoring wells (MW-TMI-16I/D and MW-TMI-17I/D) were installed during the course of the field investigation, which were not originally contemplated in the Work Plan. These wells were developed and sampled in accordance with the procedures set out in the Work Plan and described in Section 4.0.

Tritium leaking from the Condensate Storage Tank deicing line is currently believed to be a probable source of the elevated tritium concentrations in groundwater samples collected from RW-2 and the surrounding wells.

6.3.3 DISTRIBUTION IN STATION SURFACE WATER

Tritium was not detected at concentrations greater than the LLD of 200 pCi/L in any of the three surface water samples collected during this hydrogeologic investigation. The surface water samples were located upstream and downstream of the Station as shown on Figure 4.1.

6.3.4 CONCEPTUAL MODEL OF TRITIUM RELEASE AND MIGRATION

This section presents CRA's conceptual model of groundwater and tritium migration at the Station. Figure 6.2 presents a conceptual model for the Station.

During construction, the native overburden and bedrock was excavated in order to build the Station. Consequently, the bottom of some structures extend into competent bedrock up to 25 feet (approximately 250 feet AMSL). Engineered backfill was used around the foundation footprint. This backfill serves as a preferential pathway, potentially creating a vertical downward gradient that results in flow directly into the bedrock. In addition, some of the water leaks into the overburden and flows laterally to the east and west with eventual discharge to the Susquehanna River.

Groundwater flow in the bedrock is outward from the center of the Station along strike towards the northeast and southwest with discharge to the Susquehanna River. The pumping of the Station's production supply wells, which are on the western side of the Station, captures a portion of the groundwater beneath the Station. The groundwater captured by pumping these wells is primarily from along strike (NE-SW) within the pumped interval. However, most of the water that is pumped from these wells is derived from the Susquehanna River. Groundwater does not migrate beneath the river from the island to the mainland or other nearby islands due to the opposing flow of groundwater from higher land on both sides of the river.

The highest concentrations of tritium have been detected in the overburden and bedrock groundwater near the foundation footprint. However, tritium migrates from the primary sources to the east and west in both the overburden and bedrock. Tritium migration in the overburden is estimated to be slow (1.8 feet/year). Tritium migration in the bedrock is estimated to be relatively fast (37 feet/year to 651 feet/year). On the western half of the island, a portion of the tritiated groundwater in bedrock is captured by the three production supply wells.

In summary, the tritium in the groundwater beneath the Station is primarily related to three historical releases. The primary sources are the Auxiliary Boiler blowdown sump, the deicing line from the Condensate Storage Tank, and the WECST line to the River Water Discharge line.

7.0 EXPOSURE PATHWAY ASSESSMENT

This section addresses the groundwater impacts from tritium and other radionuclides at the Station and potential risks to human health and the environment.

Based upon historical knowledge and data related to the Station operations, and based upon radionuclide analyses of groundwater samples, the primary constituent of concern (COC) is tritium. The discussions that follow are restricted to the exposure pathways related to tritium.

Teledyne Brown reports all samples to their statistically-derived Minimum Detectable Concentration (MDC) of approximately 150 to 170 pCi/L, which is associated with 95 percent confidence interval on their hard-copy reports. However, the laboratory uses a 99 percent confidence range (± 3 sigma) for determining whether to report the sample activity concentration as detected or not. This 3-sigma confidence range typically equates to 150 (± 135.75) pCi/L.

Exelon has specified a LLD of 200 pCi/L for the Fleetwide Assessment. Exelon has also required the laboratory to report related peaks identified at the 95 percent confidence level (2-sigma).

This HIR, therefore, screens and assesses data using Exelon's LLD of 200 pCi/L. As is outlined below, this concentration is also a reasonable approximation of the background concentration of tritium in groundwater at the Station.

7.1 HEALTH EFFECTS OF TRITIUM

Tritium is a radionuclide that decays by emitting a low-energy beta particle that cannot penetrate deeply into tissue or travel far in air. A person's exposure to tritium is primarily through the ingestion of water (drinking water) or through ingestion of water bearing food products. Inhalation of tritium requires the water to be in a vapor form (i.e., through evaporation or vaporization due to heating). Inhalation is a minor exposure route when compared to direct ingestion or drinking of tritiated water. Absorption of tritium through skin is possible, but tritium exposure is more limited here versus direct ingestion or drinking of tritiated water.

7.2 BACKGROUND CONCENTRATIONS OF TRITIUM

The purpose of the following paragraphs is to establish a background concentration through review of various media.

7.2.1 GROUNDWATER

Tritium is created in the environment from naturally occurring processes both cosmic and subterranean, as well as from anthropogenic (i.e., man-made) sources. In the upper atmosphere, "cosmogenic" tritium is produced from the bombardment of stable nuclides and combines with oxygen to form tritiated water, which will then enter the hydrologic cycle. Below ground, "lithogenic" tritium is produced by the bombardment of natural lithium isotopes ^{6}Li (92.5% abundance) and ^{7}Li (7.5% abundance) present in crystalline rocks by neutrons produced by the radioactive decay of uranium and thorium. Lithogenic production of tritium is usually negligible compared to other sources due to the limited abundance of lithium in rock. The lithogenic tritium is introduced directly to groundwater.

A major anthropogenic source of tritium comes from the former atmospheric testing of thermonuclear weapons. Levels of tritium in precipitation increased during the 1950s and early 1960s, coinciding with the release of significant amounts of tritium to the atmosphere during nuclear weapons testing prior to the signing of the Limited Test Ban Treaty in 1963, which prohibited atmospheric nuclear tests.

7.2.2 PRECIPITATION DATA

Precipitation samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provided tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected world wide from 1960 to 2006. RadNet provides tritium precipitation concentration data for samples collected at Stations through the U.S. from 1960 up to and including 2006.

Based on GNIP data for sample stations located in the eastern U.S. including Boston, Washington, DC and Hatteras, North Carolina, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons during the 1950s and early 1960s before

the 1963 test ban treaty. Tritium concentrations showed a sharp decline up until about 1975 and continued to exhibit a gradual decline since that time. Tritium concentrations in the precipitation collected at these sample stations have typically been less than 100 pCi/L since around 1982-1983.

The RadNet database for several Pennsylvania and area stations (Washington D.C., Philadelphia, New York, Harrisburg, Wilmington, and Trenton) did not show the same trend, which can be attributed to pre-1995 data handling procedures. The pre-1995 data were rounded to the nearest 100 pCi/L, which dampened out variances in the data. The post-1995 RadNet data, where rounding was not applied, exhibit much more scatter, and similar to the GNIP data, the vast majority of the data were less than 100 pCi/L.

An upper tolerance limit on the 95th percentile (with 95 percent confidence) of tritium in precipitation for the Pennsylvania and surrounding area stations RadNet Data between 2000 and 2005 were calculated (Section 5.3 of USEPA, 1989). The assumption of normal distribution of the data was verified using the Studentized Range test (Section 4.2.4.1 of USEPA, 2006), and the data were confirmed to be normally distributed. The resulting upper tolerance limit is 98.2 pCi/L, which indicates that we are 95 percent confident that 95 percent of the ambient precipitation concentration results are less than 98.2 pCi/L. The statistical confidence, however, must be compared with the limitations of the underlying RadNet data, which does not include the minimum detectable concentration for a majority of the measurements. Some of the RadNet values less than 200 pCi/L may be approximated. Nevertheless, these results show a background contribution from precipitation of up to 98.2 pCi/L.

7.2.3 SURFACE WATER DATA

Surface water tritium concentration data from the RadNet database for Pennsylvania sampling stations Danville (Susquehanna River), Philadelphia/Baxter (Delaware River) Philadelphia/Queen (Schuylkill River) and Philadelphia/Belmont (Schuylkill River) show the same trend as the precipitation data for the above noted Pennsylvania and surrounding area sampling stations. As is the case for the RadNet precipitation data, the pre-September 1995 Pennsylvania surface water data was rounded to the nearest 100 pCi/L, creating a dampening of variances in the data. The post-1995 Pennsylvania surface water data, similar to the post-1995 precipitation data, was typically less than 100 pCi/L with exception of three samples collected at the Schuylkill River Stations (128 to 363 pCi/L) and one sample from the Susquehanna River Station (124 pCi/L).

The USEPA RadNet surface water data typically has a reported "Combined Standard Uncertainty" ranging from 35 to 50 pCi/L. According to USEPA, this corresponds to a ± 70 to 100 pCi/L 95 percent confidence bound on each given measurement. Therefore, the typical background data provided may be subject to measurement uncertainty of approximately ± 70 to 100 pCi/L.

7.2.4 DRINKING WATER DATA

Tritium concentrations in drinking water from the RadNet database for Pennsylvania and surrounding area stations (Washington, DC, Philadelphia, New York, Dover, Wilmington, and Trenton) exhibit trends similar to the precipitation and surface water data. As with the precipitation and surface water data, the pre-1995 drinking water data have dampened out variances due to rounding the data to the nearest 100 pCi/L. The post-1995 results show tritium concentrations less than 100 pCi/L consistent with the tritium concentrations found in precipitation and surface water.

Composite samples of untreated drinking water for analysis of strontium-89 and strontium-90 were collected at the Steelton Water Company and Columbia Water Treatment Plant during the pre-operational REMP monitoring conducted between February and May 1974. Analytes were detected in only one sample, strontium-90 at 0.97 ± 0.52 pCi/L, collected from the Columbia Water Treatment Plant in May 1974.

7.2.5 EXPECTED TRITIUM BACKGROUND FOR THE STATION

As reported in the GNIP and RadNet databases, tritium concentrations in eastern U.S. precipitation has typically been less than 100 pCi/L since 1995. Based on the 2000 to 2005 RadNet precipitation data for the Pennsylvania stations, 95 percent of the ambient concentrations of tritiated water are expected to be less than 98.2 pCi/L, based on a 95% upper tolerance limit. Tritium concentrations in surface water and drinking water are expected to be comparable or less based on historical data or trends.

Concentrations in groundwater, similar to surface water and drinking water, are expected to be less than precipitation values. The lower groundwater concentrations are related to the age of the groundwater as compared to the half-life of tritium. Deep aquifers in proximity to crystalline basement rock, however, can potentially show elevated concentrations of tritium due to lithogenic sources.

As was noted in Section 7.0, the analytical laboratory is reporting tritium results to a LLD of 200 pCi/L. This concentration also represents a reasonable representation of background groundwater quality, given the data for precipitation, surface water, and drinking water.

Based on the evaluation presented above, the background concentration for tritium at the Station is reasonably represented by the LLD of 200 pCi/L.

7.3 IDENTIFICATION OF POTENTIAL EXPOSURE PATHWAYS AND POTENTIAL RECEPTORS

Four potential exposure pathways were considered during the evaluation of tritium in groundwater.

- potential groundwater migration to the Station's potable water supply well;
- potential groundwater migration off the Station property to private and public groundwater users;
- potential groundwater migration off the Station property to a surface water body; and
- potential exposure to groundwater from secondary plant systems.

The following section provides an overview of each of these four potential exposure pathways for tritium in groundwater.

7.3.1 POTENTIAL GROUNDWATER MIGRATION TO DRINKING WATER USERS AT THE STATION

Based on groundwater samples collected, the concentrations of tritium in groundwater are less than the USEPA drinking water standard of 20,000 pCi/L at the Station. Consequently, there is currently no tritium in the groundwater that could migrate to the Station's water supply well at concentrations exceeding the USEPA drinking water standard.

Two potable water supply wells (48S and OSF) are located on the northern portion of the Station. The OSF well, which was installed as a backup potable water supply well, is not normally used at the Station. The 48S well is completed as an open borehole from approximately 123 to 996 feet bgs.

In May 2006, water was identified by Station personnel seeping from a manhole located immediately south of the Utility Building 48 (near drinking water supply well 48S). Water samples that were collected by Station personnel from the manhole contained tritium at concentrations greater than the LLD of 200 pCi/L. The source of this water was the Condensate Storage Tank deicing line leak. The water flowed south to north to the lowest elevation manhole. The volume of water released has been estimated, by Station personnel, to be approximately 50,000 gallons. Tritium was detected in the groundwater sample collected from 48S at a concentration of 223 ± 116 pCi/L, which is slightly greater than the LLD, but significantly below the USEPA drinking water standard of 20,000 pCi/L.

The OSF well is completed as an open borehole from approximately 126 to 775 feet bgs. Tritium was detected in the groundwater sample collected from OSF at a concentration of 424 ± 124 pCi/L. The OSF well, which was installed as a backup potable water supply well, is not normally used at the Station.

Accordingly, although there is a potentially complete exposure pathway, there is no current risk of exposure associated with groundwater ingestion at the Station.

7.3.2 POTENTIAL GROUNDWATER MIGRATION TO DRINKING WATER USERS OFF THE STATION PROPERTY

Based on groundwater samples collected during this investigation, the concentrations of tritium in groundwater are less than the USEPA drinking water standard of 20,000 pCi/L within the Station. Consequently, there is no tritium in the groundwater that could migrate off the Station at concentrations exceeding the USEPA drinking water standard.

The Gettysburg Formation is used for water supply in the surrounding area. Groundwater samples collected from monitoring wells on the Station, installed in the Gettysburg Formation, revealed a maximum tritium concentration of 13,500 ± 1,390 pCi/L. Groundwater does not migrate from the island beneath the river to the mainland or other nearby islands due to the opposing flow of groundwater from higher land across the river. Thus, the groundwater migration pathway is not complete and there is no current risk of exposure associated with groundwater ingestion off the Station property.

7.3.3 POTENTIAL GROUNDWATER MIGRATION TO SURFACE WATER USERS

Evaluation of groundwater flow at the Station indicates that the groundwater discharges to the Susquehanna River. Therefore, there is a potentially complete exposure route to recreational users of surface water, including boating, fishing and swimming. In addition, there are public drinking water supplies which are downstream from TMI, that treat water from the Susquehanna River.

Although tritium in the groundwater discharges to the Susquehanna River, the tritium results for surface samples collected as part of this investigation are less than the LLD of 200 pCi/L. In addition, the quantity of groundwater that discharges from the Station to the Susquehanna River is an extremely small fraction of the total river volume.

With regard to public drinking water users, the REMP has included sampling of the following downstream off-Station public drinking water systems: Columbia Water Treatment Plant, Wrightsville Water Treatment Plant, and Lancaster Water Treatment Plant. In 2005, the mean tritium concentrations at the indicator locations were less than the LLD of 200 pCi/L at Wrightsville Water Treatment Plant and 286 ± 346 pCi/L at Lancaster Water Treatment Plant. No data was available for the Columbia Water Treatment Plant in 2005, but samples collected in 1996 were less than the LLD of 200 pCi/L.

Although a potential exposure pathway exists, there is no current risk of exposure associated with groundwater migration to surface water users off the Station property.

7.3.4 POTENTIAL EXPOSURE TO GROUNDWATER FROM SECONDARY PLANT SYSTEMS

Based on groundwater samples collected during this investigation, the concentrations of tritium in groundwater are less than the USEPA drinking water standard of 20,000 pCi/L at the Station.

Under this potential exposure pathway, groundwater used for secondary plant equipment and makeup must be released via system actuation or system breach. Although water from the production wells contains tritium, Station personnel are protected and monitored by the Radiation Protection Program, which is controlled by Federal guidelines. This is a potentially complete exposure pathway, but there is no

current risk of exposure associated with ingestion, inhalation or absorption on Station property.

7.4 SUMMARY OF POTENTIAL TRITIUM EXPOSURE PATHWAYS

In summary, four potential groundwater exposure pathways for tritium originating at the Station were considered:

- potential groundwater migration to the Station's potable water supply well;
- potential groundwater migration off the Station property to private and public drinking water users (note that the groundwater migration pathway to private drinking water users is not complete);
- potential groundwater migration off the Station property to surface water users; and
- potential exposure to groundwater from secondary plant systems.

Based upon the groundwater and surface water data provided and referenced in this investigation, none of the potential receptors are currently at risk of exposure to concentrations of tritium greater than the USEPA drinking water standard (20,000 pCi/L).

7.5 OTHER RADIONUCLIDES

Target radionuclides were not detected at concentrations greater than their respective LLDs in the groundwater and surface water samples collected. Other non-targeted radionuclides were also included in the tables but excluded from discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.

8.0 CONCLUSIONS

Based on this hydrogeologic investigation, CRA concludes:

Groundwater Flow

- Groundwater flow in the overburden and bedrock is outward from the foundation footprint with eventual discharge to the Susquehanna River.
- The water stored in the backfill material around the foundation footprint serves as a preferential pathway and can recharge the bedrock.
- The pumping of the Station's production supply wells captures a portion of the groundwater beneath the Station primarily along strike (NE-SW) within the pumped interval of these wells.
- Groundwater at the Station is prevented from migrating beneath the river to the mainland and other nearby islands due to the opposing flow of groundwater from higher land to either side of the river.

Groundwater Quality

- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the 57 groundwater samples analyzed.
- Strontium-89/90 was not detected at a concentration greater than the LLD of 2.0 pCi/L in any of the 57 groundwater samples analyzed.
- Tritium was not detected in any of the groundwater samples at concentrations greater than the USEPA drinking water standard of 20,000 pCi/L.
- Tritium was detected at concentrations greater than the LLD of 200 pCi/L, but well below the applicable drinking water standard.
- These tritium concentrations ranged from 223 ± 114 pCi/L to 13,500 ± 1,390 pCi/L. The highest concentrations of tritium were predominantly in the upper bedrock.
- Eleven of the 58 groundwater samples collected contained tritium at concentrations greater than 1,000 pCi/L.
- Three of the 58 groundwater samples contained tritium at concentrations greater than 5,000 pCi/L.

Surface Water Quality

- Tritium was not detected at concentrations greater than the LLD of 200 pCi/L in any of the three surface water samples collected as part of this investigation.
- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the three surface water samples collected as part of this investigation.
- Strontium-89/90 was not detected at a concentration greater than the LLD of 2.0 pCi/L in any of the three surface water samples collected as part of this investigation.

AFE-TMI-1 – Unit 1 Plant Area

- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the groundwater samples collected from monitoring wells near AFE-TMI-1.
- Strontium-89/90 was not detected in any of the groundwater samples collected from monitoring wells near AFE-TMI-1.
- Tritium was detected in the overburden and bedrock groundwater across much of AFE-TMI-1 - Unit 1 Plant Area.
- A maximum tritium concentration of 5,600 ± 621 pCi/L (6,700 ± 723 pCi/L in the duplicate) was detected in the groundwater sample collected from RW-2.
- The tritium in AFE-TMI-1 - Unit 1 Plant Area is mostly the result of two historic releases: a recent Condensate Storage Tank (CO-T-1A) deicing line leak and leaks from the Auxiliary Boiler blowdown sump. The identified leaks have been repaired.

AFE-TMI-2 – Unit 2 Plant Area

- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the groundwater samples collected from monitoring wells near AFE-TMI-2.
- Strontium-89/90 was not detected at a concentration greater than the LLD of 2.0 pCi/L in any of the groundwater samples collected from monitoring wells near AFE-TMI-2.
- Low concentrations of tritium were detected in the overburden and bedrock groundwater around much of AFE-TMI-2.

- The maximum concentration of 799 ± 126 pCi/L was detected in the groundwater sample collected from MS-8.
- The tritium in AFE-TMI-2 - Unit 2 Plant Area is most likely attributable to historic releases of tritium at this AFE.

AFE-TMI-3 – Treatment and River Discharge Area

- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the groundwater samples collected from monitoring wells near AFE-TMI-3.
- Strontium-89/90 was not detected at a concentration greater than the LLD of 2.0 pCi/L in any of the groundwater samples collected from monitoring wells near AFE-TMI-3.
- Tritium was detected in the overburden and bedrock groundwater near the Mechanical Draft Cooling Towers and river water discharge line at a maximum concentration of 13,500 ± 1,390 pCi/L (MW-TMI-10I).
- The tritium in AFE-TMI-3 - Treatment and River Discharge Area is most likely attributable to a historic leak from the WECST discharge pipe in the area north of the TMI-1 Mechanical Draft Cooling Tower Building, which has since been repaired.

AFE-TMI-4 – Solid Waste Staging Facility

- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the groundwater samples collected from monitoring wells near AFE-TMI-4.
- Strontium-89/90 was not detected at a concentration greater than the LLD of 2.0 pCi/L in any of the groundwater samples collected from monitoring wells near AFE-TMI-4.
- Tritium was not detected at a concentration greater than the LLD of 200 pCi/L in the groundwater sample collected from the bedrock monitoring well, MW-TMI-9I, which is used to evaluate this AFE.

AFE-TMI-5 – East Dike Settling Basin

- Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the groundwater samples collected from monitoring wells near AFE-TMI-5.

- Strontium-89/90 was not detected at a concentration greater than the LLD of 2.0 pCi/L in any of the groundwater samples collected from monitoring wells near AFE-TMI-5.
- Tritium was detected at a concentration greater than the LLD of 200 pCi/L in one groundwater sample collected from a bedrock monitoring well (MW-TMI-18D) at a concentration of 225J ± 119 pCi/L.
- Tritium in AFE-TMI-5 - East Dike Settling Basin is most likely attributable to historic releases.

Potential Receptors

- Based upon the results of this investigation, there is no current risk of exposure to radionuclides associated with plant operations through any of the identified potential exposure pathways.

General Conclusions

- Based on the results of this investigation, no tritium is migrating from the Station so as to cause any offsite detectable concentrations in surface water of the Susquehanna River[1];
- Based on the results of this investigation, there are no known active releases into the groundwater at the Station.

9.0 RECOMMENDATIONS

The following presents CRA's recommendations for proposed activities to be competed at the Station.

9.1 FILL DATA GAPS

Based on the results of this hydrogeologic investigation, there are no data gaps remaining to support CRA's conclusions regarding the characterization of the groundwater regime and potential impacts from radionuclides at the Station.

9.2 GROUNDWATER MONITORING

Based upon the information collected to date, CRA recommends that Exelon conduct periodic monitoring of selected sample locations.

10.0 REFERENCES

"Dauphin County Comprehensive Plan: Basic Studies & Trends" (http://www.tcrpc-pa.org/text/Dauphin/Basic_Studies/BS3.pdf).

"Environmental Assessment of Contamination of Expansion Joint Filler Material and Evaluation of Ground Water Monitoring" prepared by GEO Engineering, Inc., May 1994.

"EPRI Groundwater Evaluation for the Three Mile Island (TMI) Site, December 5, 2005 through December 8, 2005" prepared by Electric Power Research Institute, February 2006.

"Geologic Map of Pennsylvania", Commonwealth of Pennsylvania Department of Conservation and Natural Resources (PaDNR), Bureau of Topographic & Geologic Survey Revised 2000. (http://www.dcnr.state.pa.us/topogeo/gismaps/geomaps.aspx).

Bechtel Northern Corporation, February 1981. "Ground Water Monitoring Program Technical Report," Revision D.

Correspondence, C. Butts & D. Umpierre (GEOEngineering) to L. Toke (GPU) dated October 29, 1991.

Correspondence, GPU to L. Taylor (Susquehanna River Basin Commission) dated October 17, 1996.

Correspondence, T. Broughton (GPU) to R. Bartholomew (PaDEP) dated March 30, 1992.

Exelon Fact Sheet (http://www.exeloncorp.com/NR/rdonlyres/122C645B-58D1-48DB-9B7D-7FACD0ABEA11/959/ThreeMileIslandPlantFactSheetInternet. pdf).

F.T. Kitlinski & Associates, Inc., 1984. "Report on Geotechnical Engineering Investigation for Proposed Solid Waste Disposal Facility".

GPU Nuclear Corporation. "1987 Radiological Environmental Monitoring Report," Three Mile Island Environmental Controls.

Ground/Water Technology, Inc., December 29, 1981. "Hydrogeological Investigation".

Ground-Water System, Estimation of Aquifer Hydraulic Properties, and Effects of Pumping on Ground-Water Flow in Triassic Sedimentary Rocks in and near Lansdale, Pennsylvania. Water-Resources Investigations Report 99-4228.

L.E. Taylor and D.W. Royer, "Summary of Groundwater Resources of Adams County, Pennsylvania," Pennsylvania Geological Survey, Water Resources Report No. 52.

Memorandum, "Groundwater dewatering or recovery wells," S. Acker, March 17, 2006.

Puls and Barcelona, April 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, EPA Ground Water Issue, EPA/540/S-95/504, R. S. Kerr Environmental Research Center, Ada, Oklahoma.

Radiation Management Corporation (RMC), January 1975. "Three Mile Island Nuclear Station, Preoperational Radiological Environmental Monitoring Program, January 1, 1974 – June 5, 1974".

Sloto, R.A. and Schreffler, C.L., 1994. Hydrogeology and Ground-Water Quality of Northern Bucks county, Pennsylvania. USGS Water Resource Investigations Report 94-4109.

Susquehanna River Basin Commission (SRBC) (http://www.srbc.net/).

Teledyne Brown Engineering Environmental Services, April 2004. "Three Mile Island Nuclear Station Units 1 and 2, Annual Radiological Environmental Operating Report, 1 January through 31 December 2003".

Teledyne Brown Engineering Environmental Services, April 2005. "Three Mile Island Nuclear Station Units 1 and 2, Annual Radiological Environmental Operating Report, 1 January through 31 December 2004".

Teledyne Brown Engineering Environmental Services, April 2006. "Three Mile Island Nuclear Station Units 1 and 2, Annual Radiological Environmental Operating Report, 1 January through 31 December 2005".

Three Mile Island Environmental Affairs, "Three Mile Island Nuclear Generating Station Radiological Environmental Monitoring Report 1996".

Three Mile Island Environmental Controls, "1981 Radiological Environmental Monitoring Report for Three Mile Island Nuclear Generating Station".

Three Mile Island Environmental Controls, May 1991. "1990 Radiological Environmental Monitoring Report".

TMI Environmental Controls, "1993 Three Mile Island Nuclear Station Radiological Environmental Monitoring Report".

United States Atomic Energy Commission (USAEC), December 1972. "Environmental Statement Related to Operation of Three Mile Island Nuclear Station Units 1 and 2".

USEPA, February 2006. Data Quality Assessment: Statistical Methods for Practitioners (EPA QA/G-9S). Office of Environmental Information, EPA/240/B-06/003. http://www.epa.gov/quality/qs-docs/g9s-final.pdf

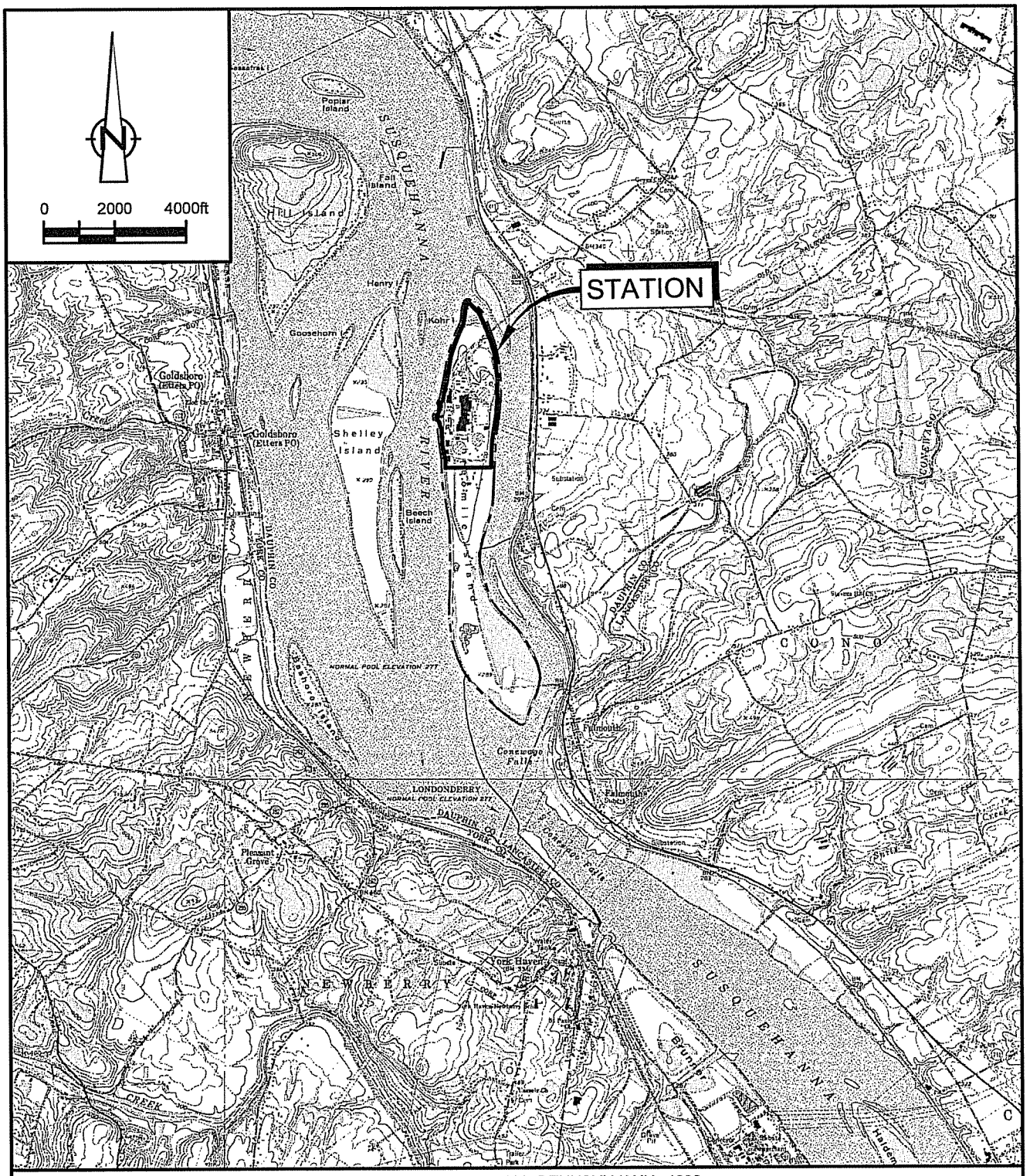
URS Corporation, Three Mile Island Groundwater Elevations – January 6, 2006 contour plan.

UFSAR, Revisions dated 1974 through 2004.

USGS Quadrangle Map, Three Mile Island Mosaic, Pennsylvania.

USGS, 1997. Simulation of Aquifer Tests and Ground-Water Flowpaths at the Local Scale in Fractures Shales and Sandstones of the Brunswick Group and Lockatong Formation, Lansdale, Montgomery County, Pennsylvania.

Wood, Charles R., 1980. Groundwater Resources of the Gettysburg and Hammer Creek Formations, Southeastern Pennsylvania., USGS Water Resource Report 49.



SOURCE: USGS QUADRANGLE MAP; THREE MILE ISLAND MOSAIC, PENNSYLVANIA, 1990

LEGEND

PROPERTY BOUNDARY

STATION DEFINITION

NOTE: OFF-ISLAND PROPERTY NOT SHOWN.

Exelon

GPA

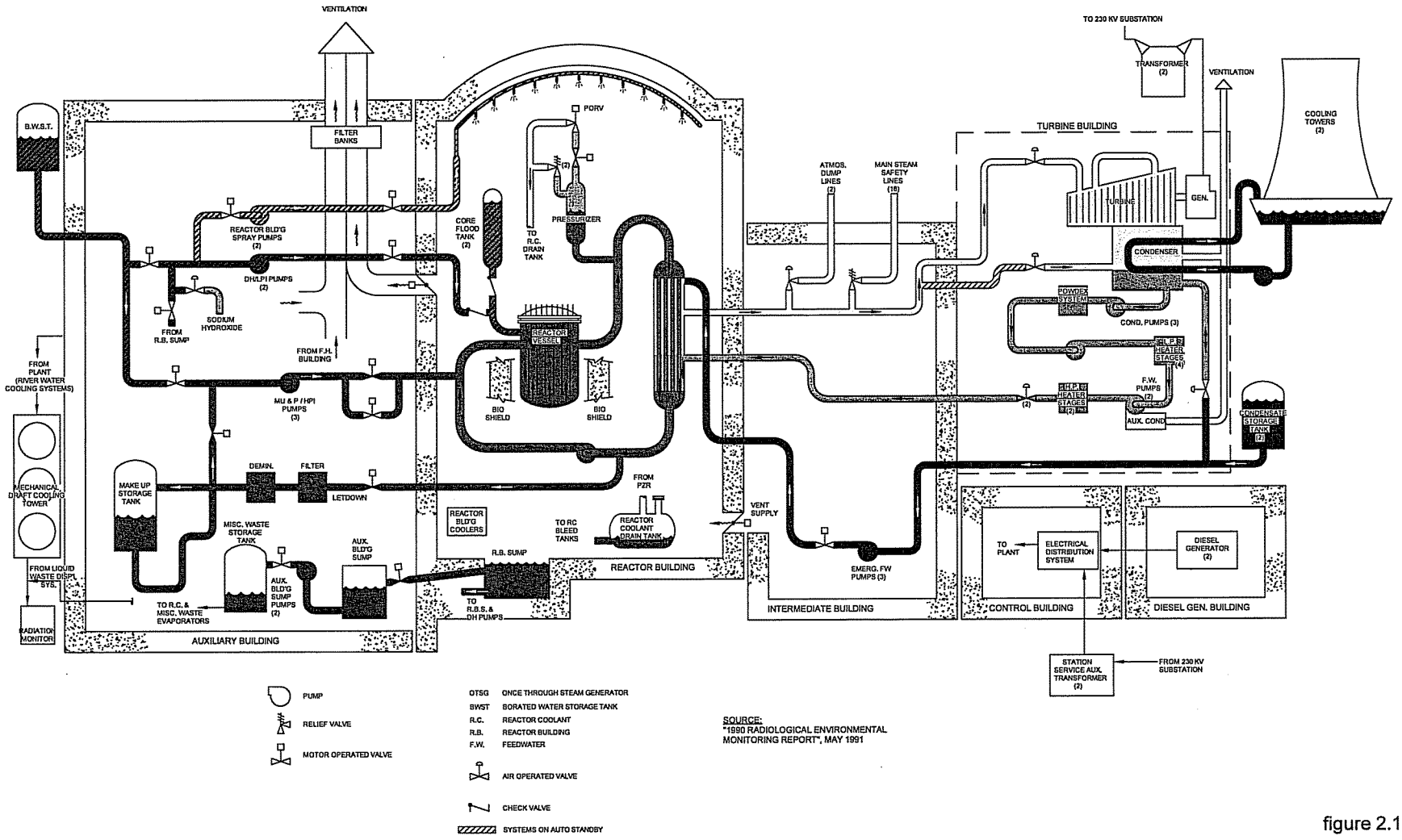
figure 1.1

STATION LOCATION MAP
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

45136-29(021)GN-WA042 AUG 31/2006

FIGURE 1.2
STATION BOUNDARIES AND FEATURES

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION



SOURCE:
"1990 RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT", MAY 1991

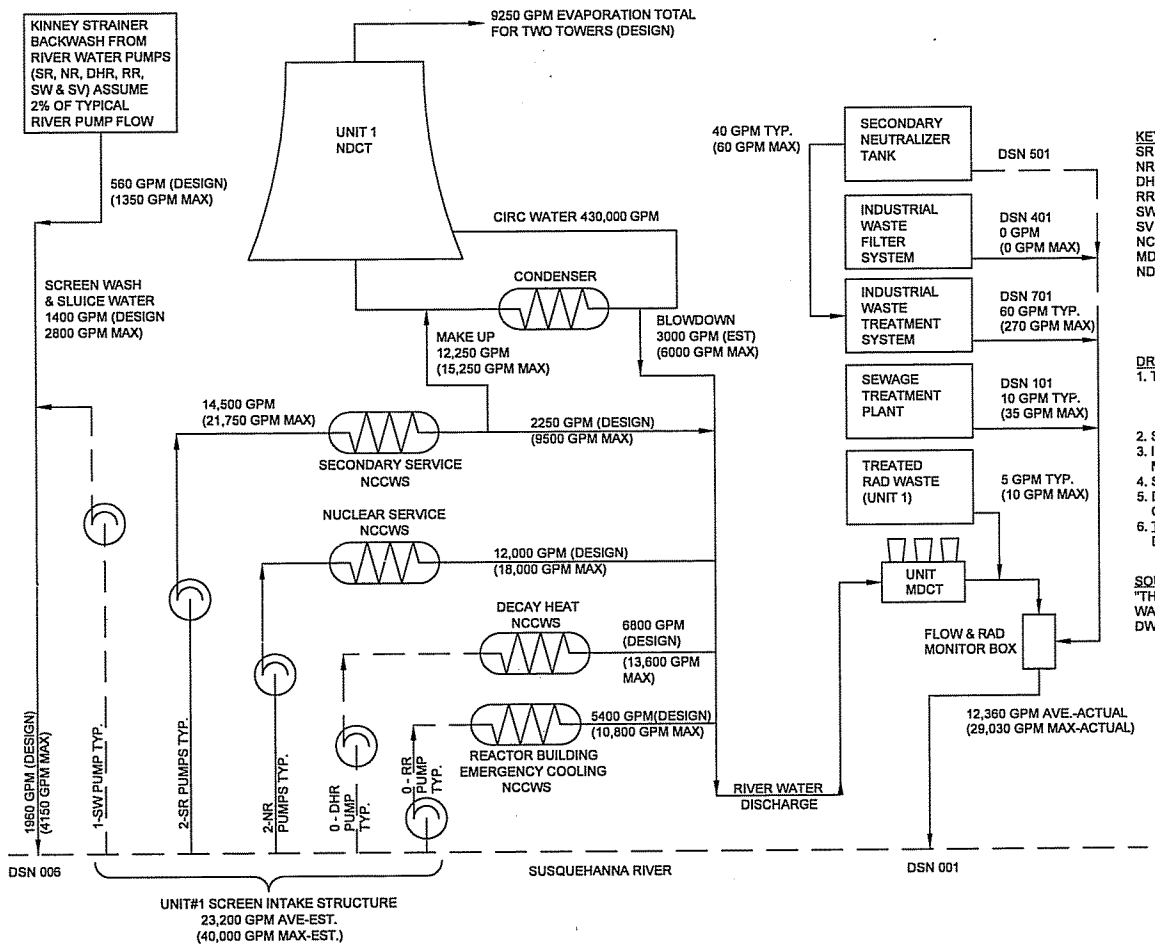
Exelon.

CRA

figure 2.1

GENERAL PROCESS DIAGRAM
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

45136-29(021)GN-WA044 AUG 31/2006



KEY
SR - SECONDARY RIVER WATER SYSTEM (3 PUMPS @ 7250 GPM)
NR - NUCLEAR RIVER WATER SYSTEM (3 PUMPS @ 6000 GPM)
DHR - DECAY HEAT RIVER WATER SYSTEM (2 PUMPS @ 6800 GPM)
RR - REACTOR BUILDING EMERGENCY COOLING WATER SYSTEM (2 PUMPS @ 5400 GPM)
SW - SCREEN WASH AND SLUICE WATER SYSTEM (2 PUMPS @1400 GPM)
SV - SCREEN INTAKE STRUCTURE VENTILATION SYSTEM (2 PUMPS @ 150 GPM)
NCCWS - NON-CONTACT COOLING WATER SYSTEM
MDCT - MECHANICAL DRAFT COOLING TOWER
NDCT - NATURAL DRAFT COOLING TOWER

DRAWING NOTES
1. THE FOLLOWING DISCHARGES ARE INTERMITTENT BATCH RELEASES:
   INDUSTRIAL WASTE TREATMENT SYSTEM (IWTS - DSN 701)
   SECONDARY NEUTRALIZER TANK (DSN 501)
   TREATED LIQUID RADIOACTIVE WASTE TREATMENT
2. SECONDARY NEUTRALIZER TANK NORMALLY DISCHARGES TO IWTS (DSN 701).
3. INDUSTRIAL WASTE FILTER SYSTEM IS OUT-OF-SERVICE AS A TREATMENT SYSTEM. SUMP MAY BE USED AS HOLDING TANK FOR IWTS TREATMENT.
4. SCREEN WASH AND SLUICE WATER SYSTEM OPERATES INTERMITTENTLY.
5. DECAY HEAT RIVER AND REACTOR BUILDING EMERGENCY COOLING RIVER PUMPS ARE OPERATED INTERMITTENTLY.
6. TYPICAL FLOWS AND MAXIMUM FLOWS ARE ACTUAL 5-YEAR FLOW DATA WHERE AVAILABLE. DESIGN OR ESTIMATED FLOWS ARE USED WHEN ACTUAL FLOW DATA IS NOT AVAILABLE.

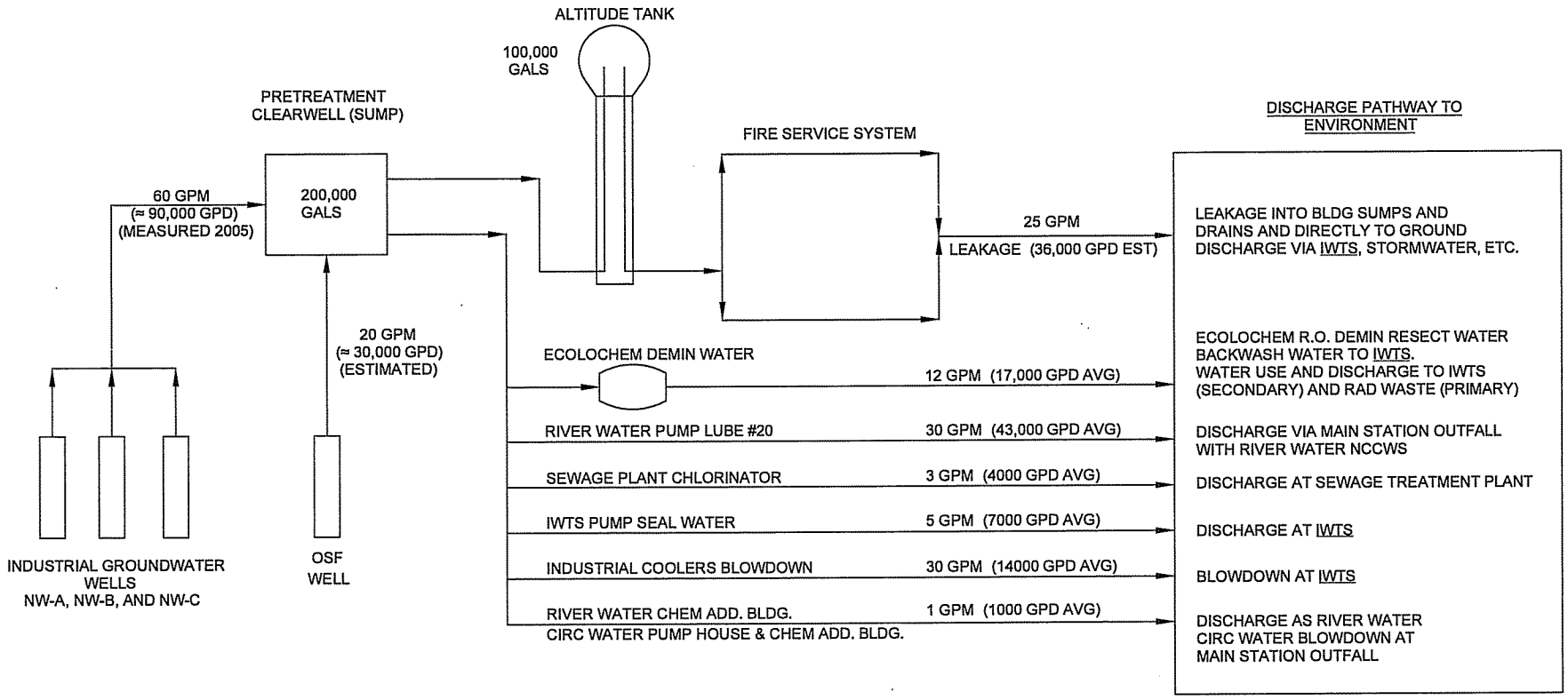
SOURCE:
"THREE MILE ISLAND NUCLEAR STATION, WATER USE SCHEMATIC, NPDES PA 0009920," DWG. NO. 1B-SKM-261, FEBRUARY 11,2002.

Exelon.

figure 2.2

SURFACE WATER USE SCHEMATIC
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

45136-29(021)GN-WA045 AUG 31/2006



NOTE: 1. IWTS DISCHARGES 2005 MEASURED = 67,700 GPD AVE EQUIVALENT TO 47 GPM.

2. EST. INPUT WELL WATER DISPOSITIONED VIA IWTS FROM WATER BALANCE = 12 + 30 + 5 = 47 GPM

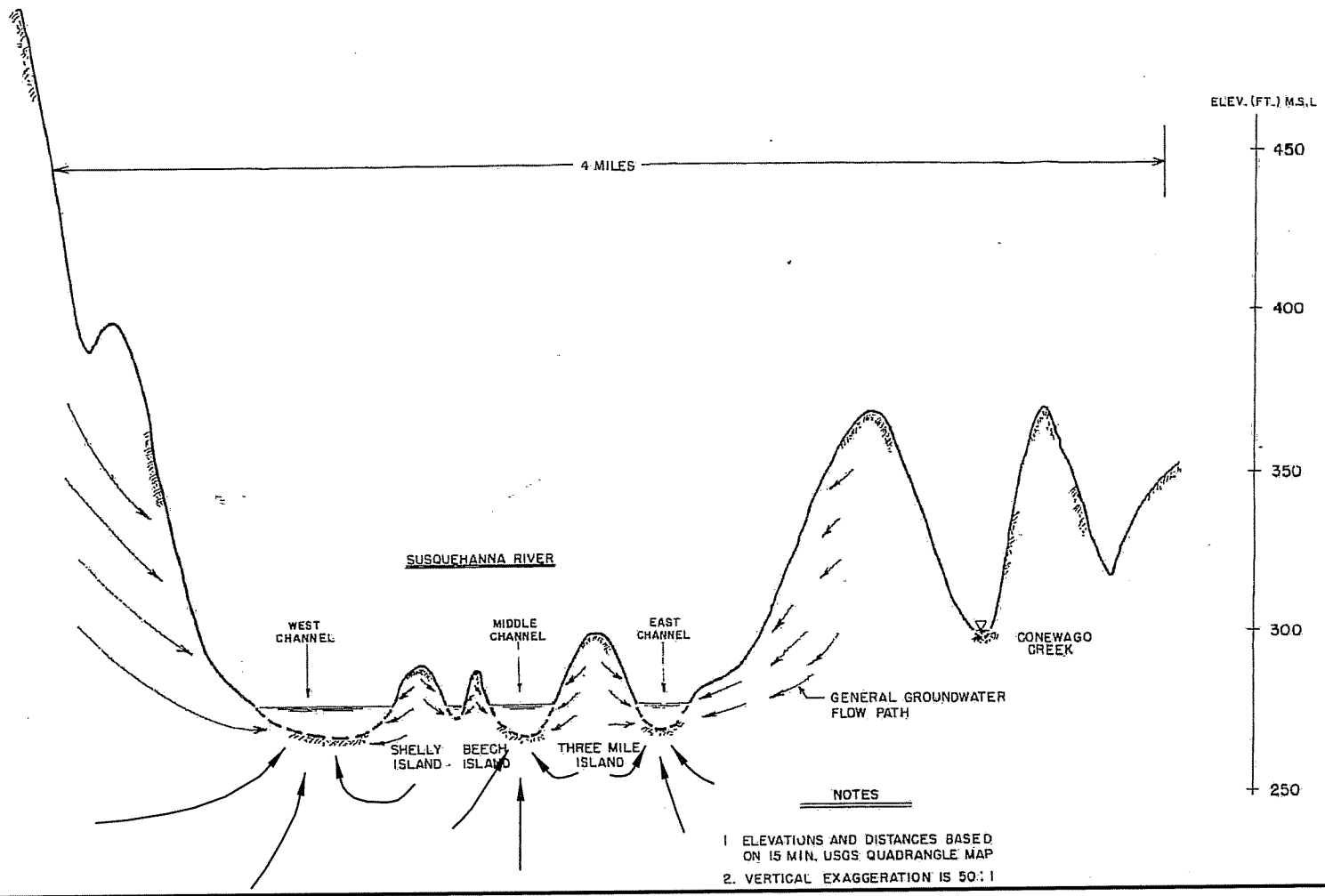
SOURCE: DRAWING BY S. COGLEY, MARCH 30, 2006

Exelon.

figure 2.3

GROUNDWATER USE SCHEMATIC
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

45136-29(021)GN-WA046 AUG 31/2006



SOURCE: MODIFIED FROM "HYDROGEOLOGICAL INVESTIGATION, THREE MILE ISLAND NUCLEAR STATION, LONDONDERRY TOWNSHIP, PENNSYLVANIA" PREPARED BY GROUND/WATER TECHNOLOGY, 1981.

figure 2.4

REGIONAL GROUNDWATER DISCHARGE SCHEMATIC
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

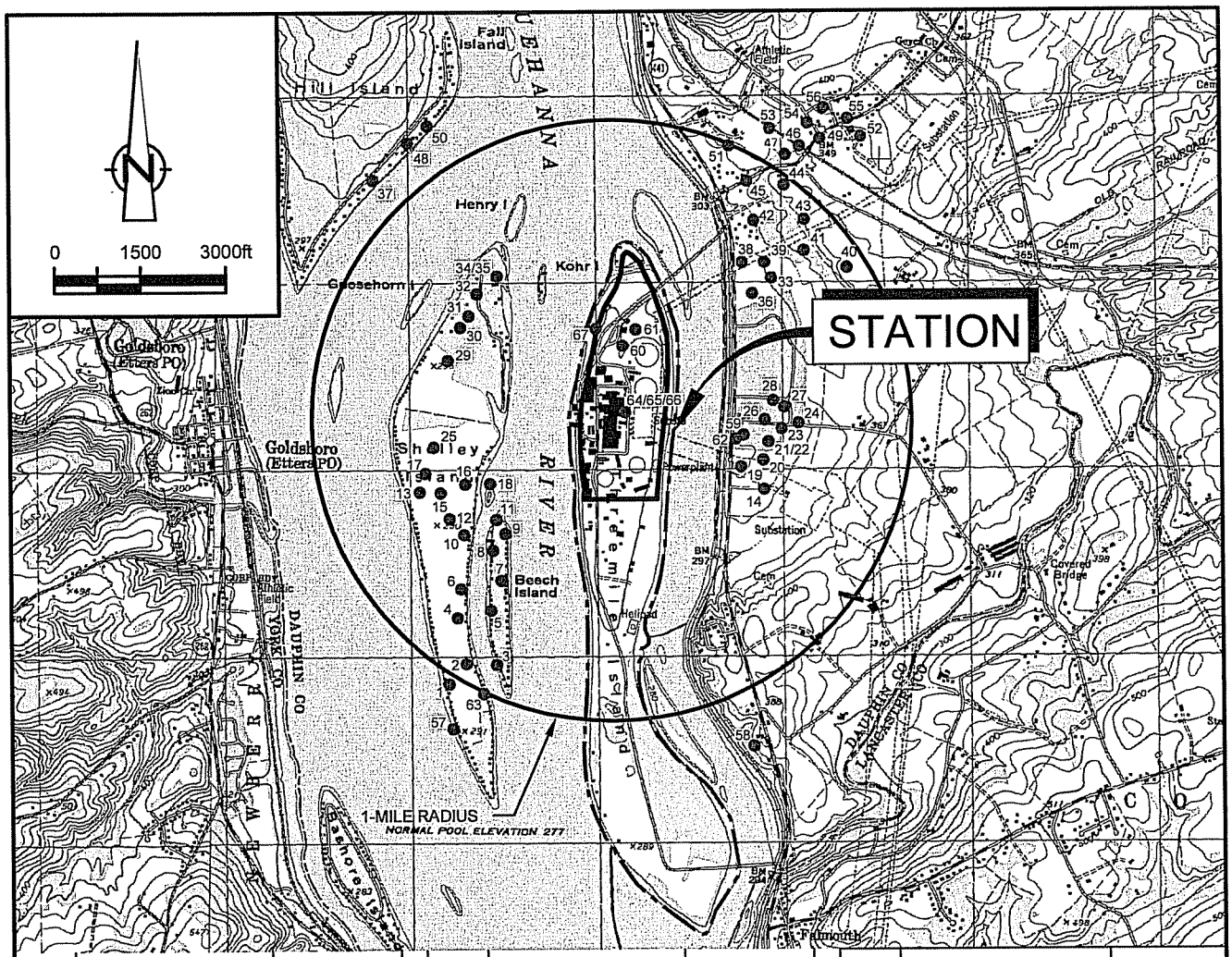
Exelon

CRA

45136-29(021)GN-WA047 AUG 31/2006

FIGURE 2.5
EXISTING MONITORING WELL LOCATIONS

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION



WELL	OWNER	WATER USE
1	HEREK, TOM	DOMESTIC
2	SINKOVICH, JOE	DOMESTIC
3	HANULA, R.	DOMESTIC
4	MC BRIDE, J.	DOMESTIC
5	KINARD, R.	DOMESTIC
6	SINKOVICH, M.	DOMESTIC
7	FATHER DELLER	DOMESTIC
8	HELWIG, EARL	DOMESTIC
9	GAY, ED	DOMESTIC
10	BRYAN, KEN	DOMESTIC
11	FAGER, DOC	DOMESTIC
12	HUNTSBERGER, GAR	DOMESTIC
13	ROSENBERY, C.	DOMESTIC
14	METROPOLITAN EDISON	DOMESTIC
15	SCHAEFFER, M.	DOMESTIC
16	HASTINGS, G.	DOMESTIC
17	GINGRICH, DAVE	DOMESTIC
18	SABOLD, P.	DOMESTIC
19	CORBITS CONTRS	PUBLIC SUPPLY
20	DONELAN, M.	DOMESTIC
21	BEAVER HOMES	DOMESTIC

WELL	OWNER	WATER USE
22	HERSHEY, CLAIR C.	DOMESTIC
23	HERSHEY, CLAIR	DOMESTIC
24	SWEITZER, J.	DOMESTIC
25	GRUFF, D.	DOMESTIC
26	AINSLEY, TIMOTHY	DOMESTIC
27	SHOWALTER, EARL	DOMESTIC
28	SCHMIDT, DENNIS	DOMESTIC
29	REESE, OLIVER	DOMESTIC
30	HARPER, D.	DOMESTIC
31	HUMMEL, WAYNE	DOMESTIC
32	LONG, J.	DOMESTIC
33	KIM LEE INC.	DOMESTIC
34	ETHRIDGE, DAVID	DOMESTIC
35	ZEITER, DAVID	DOMESTIC
36	BLACK, RONALD	DOMESTIC
37	HOUSER, ROBERT	DOMESTIC
38	FAWVER, A.	DOMESTIC
39	LINDERMAN, R. JR.	DOMESTIC
40	WRIGHT, FRANCIS	DOMESTIC
41	LEBO, WAYNE	OTHER
42	ENDMAN, JAMES	DOMESTIC
43	EVANS, RICHARD	DOMESTIC

WELL	OWNER	WATER USE
44	STALEY, DONALD	DOMESTIC
45	ERDMAN, J.	DOMESTIC
46	VIOLA, DENNIS	DOMESTIC
47	VIOLA, DENNIS	DOMESTIC
48	WINARD, JACK JR.	DOMESTIC
49	EVANS JOB 9505	OTHER
50	MANSBERGER ROBT	DOMESTIC
51	HANSHAW INC.	INDUSTRIAL
52	GEYER, PAUL M.	DOMESTIC
53	LONDONDERRY TWP	IRRIGATION
54	PLANKENHORN, K.	DOMESTIC
55	DEARDORF, G.	DOMESTIC
56	EPPINGER, NEAL	DOMESTIC
57	BARE, R B	DOMESTIC
58	ENGLE, EUGENE	DOMESTIC
59	GPU NUCLEAR CORP TMI TRNG CTR	COMMERCIAL
60	GPU NUCLEAR CORP. (MS-1)	INDUSTRIAL
61	GPU NUCLEAR CORP. (MS-2)	INDUSTRIAL
62	METROPOLITAN EDISON	COMMERCIAL
63	SHAFFER, FRANK	DOMESTIC
64	TMI, GPU NUCLEAR (RW-1)	INDUSTRIAL
65	TMI, GPU NUCLEAR (RW-2)	INDUSTRIAL
66	TMI, GPU NUCLEAR (MS-18)	INDUSTRIAL
67	TMI DRINKING WATER SYSTEM	COMMERCIAL

SOURCE: PENNSYLVANIA GROUNDWATER INFORMATION SYSTEM

LEGEND

STATION BOUNDARY

PROPERTY BOUNDARY

7 APPROXIMATE WELL LOCATION (NOT FIELD VERIFIED)

Exelon

NOTE: OFF ISLAND PROPERTY NOT SHOWN

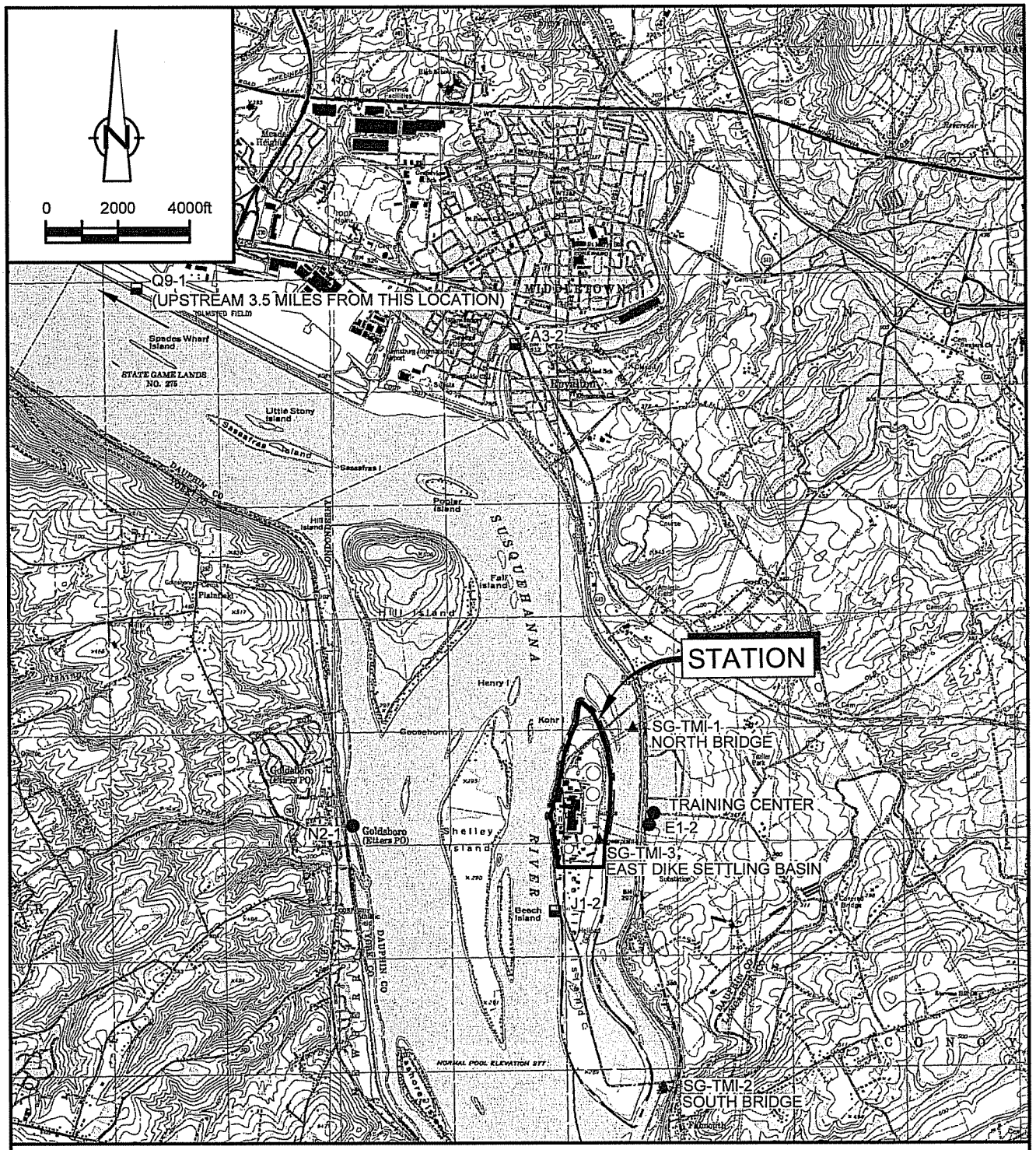
figure 2.6

AREA WATER SUPPLY WELLS
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

45136-29(021)GN-WA049 AUG 31/2006

FIGURE 3.1
AREAS FOR FURTHER EVALUATION

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION



SOURCE: USGS QUADRANGLE MAP; THREE MILE ISLAND MOSAIC, PENNSYLVANIA, 2001

LEGEND

- PROPERTY BOUNDARY
- STATION DEFINITION
- GROUNDWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- STAFF GAUGE LOCATION

NOTE: OFF-ISLAND PROPERTY NOT SHOWN.

Exelon

figure 4.1

SURFACE WATER AND OFF-STATION GROUNDWATER SAMPLE LOCATIONS
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

45136-29(021)GN-WA051 AUG 31/2006

FIGURE 4.2
GROUNDWATER MONITORING WELL LOCATIONS

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 4.3
GROUNDWATER MONITORING WELL LOCATIONS – AERIAL

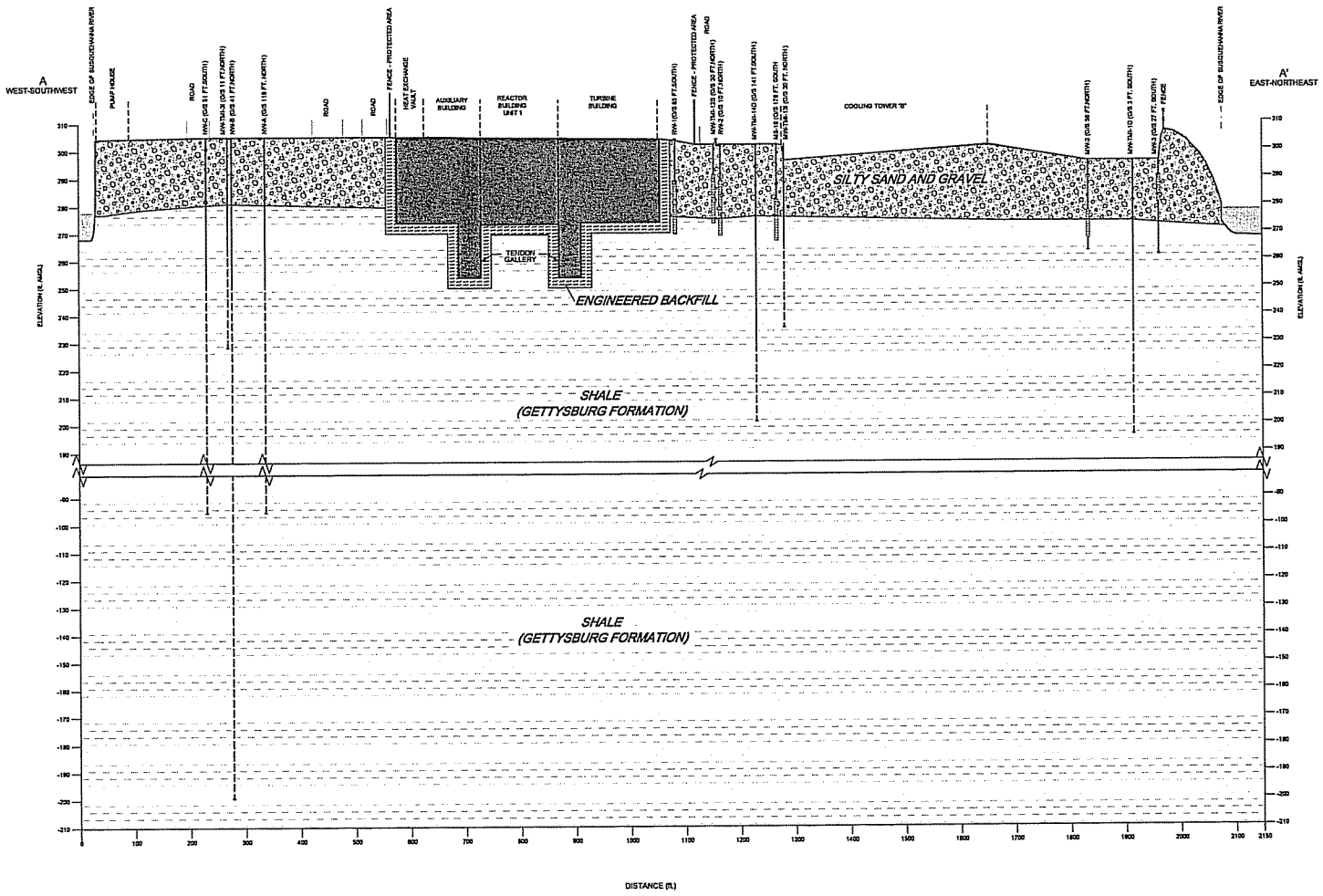
REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.1
BEDROCK SURFACE CONTOUR MAPS

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.2
GEOLOGIC CROSS-SECTION LOCATION MAP

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION



VERTICAL EXAGGERATION = 10X

LEGEND

FENCE

ENGINEERED BACKFILL

SILTY SAND AND GRAVEL

SHALE (GETTYSBURG FORMATION)

FORMATION CONTACT (DASHED WHERE INFERRED)

WELL DESIGNATION

GROUND SURFACE

OBSERVATION WELL INSTALLATION

STRATIGRAPHIC BOUNDARY

TYPICAL SOIL CLASSIFICATION

SCREENED INTERVAL

OPEN BEDROCK INTERVAL

NOTE: BEDROCK SURFACE TAKEN FROM FIGURE 5.1

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

EXELON GENERATION COMPANY, LLC

FLEETWIDE ASSESSMENT

GEOLOGIC CROSS-SECTION A-A'
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Exelon.

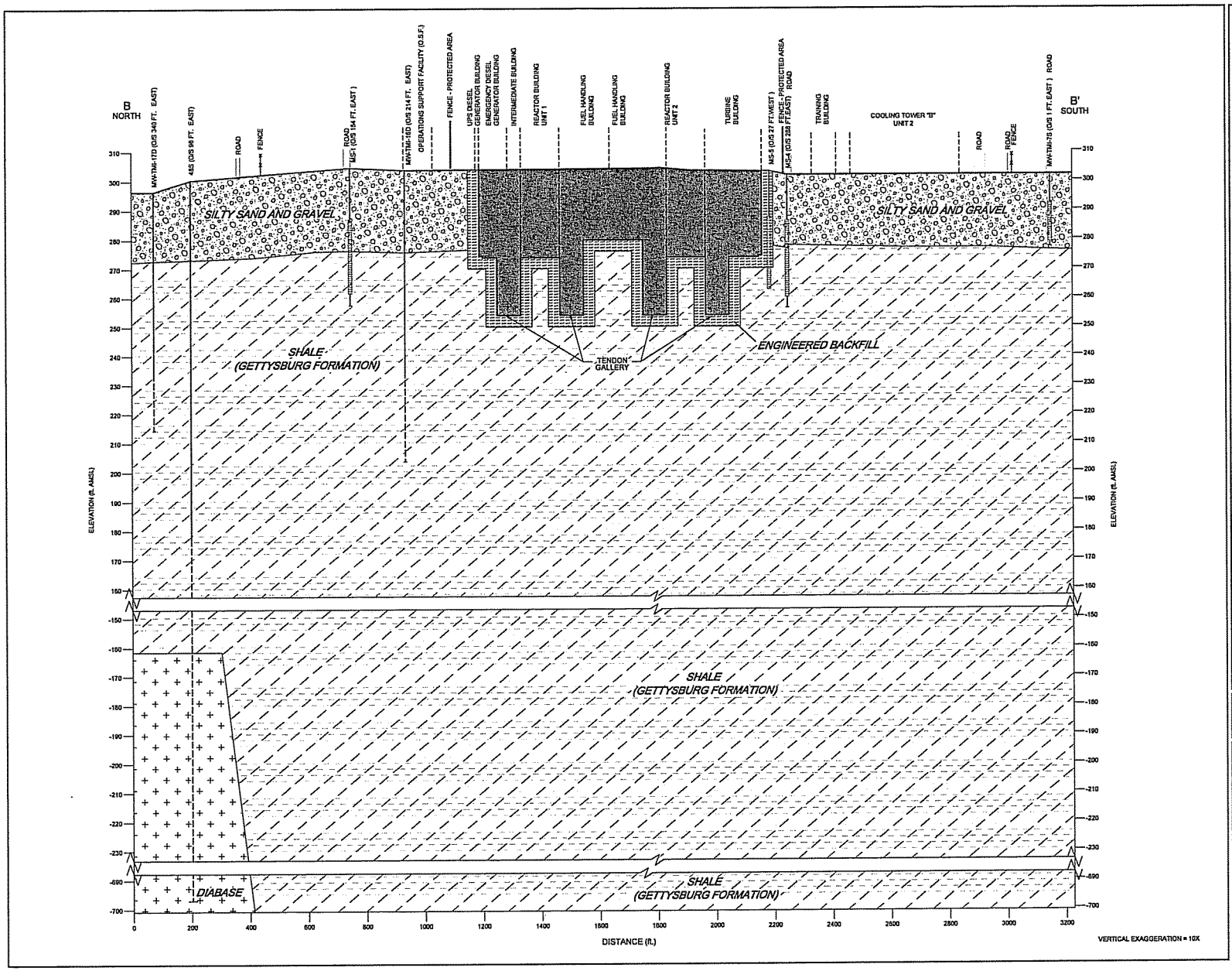
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
S. GUIGLEY	J. LAMBERT	AUGUST 2006	
Scale: AS SHOWN	Project No: 45136-29	Report No: 021	Drawing No: figure 5.3

REVISION 1

45136-29(021)GI-WA032 AUG 31/2006



LEGEND

- FENCE
- ENGINEERED BACKFILL
- SILTY SAND AND GRAVEL
- SHALE (GETTYSBURG FORMATION)
- APPROXIMATE BEDDING PLANE ORIENTATION IN GETTYSBURG FORMATION (40 TYP)
- DIABASE
- FORMATION CONTACT (DASHED WHERE INFERRED)
- WELL DESIGNATION
- GROUND SURFACE
- OBSERVATION WELL INSTALLATION
- STRATIGRAPHIC BOUNDARY
- TYPICAL SOIL CLASSIFICATION
- SCREENED INTERVAL
- OPEN BEDROCK INTERVAL

NOTE: BEDROCK SURFACE TAKEN FROM FIGURE 5.1

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

EXELON GENERATION COMPANY, LLC

FLEETWIDE ASSESSMENT

GEOLOGIC CROSS-SECTION B-B'
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Exelon.

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
S. QUIGLEY	J. LAMBERT	AUGUST 2006	
Scale:	Project N#:	Report N#:	Drawing N#:
AS SHOWN	45136-29	021	figure 5.4

REVISION 1

45136-29(021)GN-WA032 AUG 31/2006

FIGURE 5.5
OVERBURDEN SATURATED THICKNESS – JULY 2006

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.6
POTENTIOMETRIC SURFACE CONTOURS – OVERBURDEN, JUNE 2006

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.7
POTENTIOMETRIC SURFACE CONTOURS – OVERBURDEN, JULY 2006

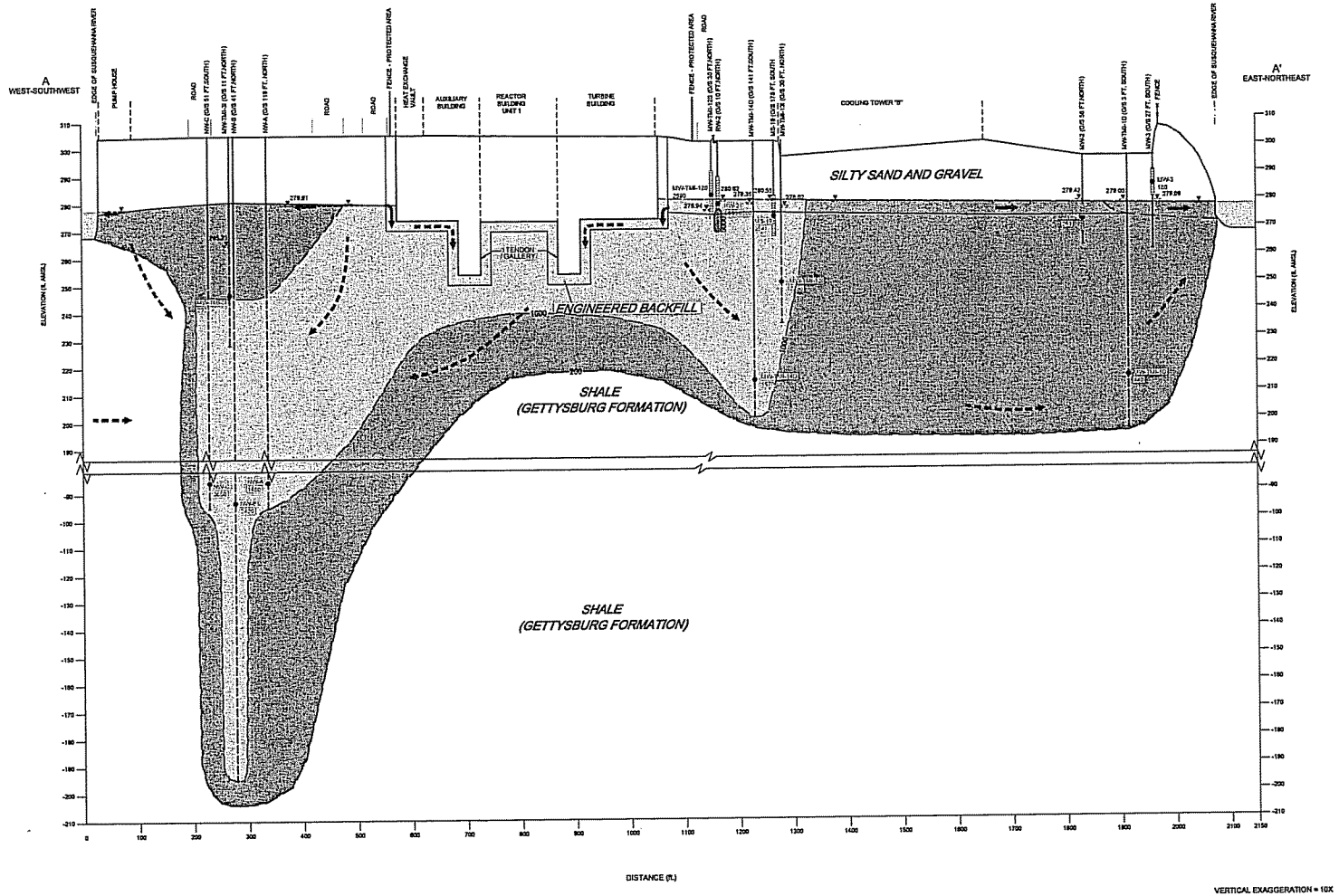
REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.8
POTENTIOMETRIC SURFACE CONTOURS – BEDROCK, JUNE 2006

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.9
POTENTIOMETRIC SURFACE CONTOURS – BEDROCK, JULY 2006

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION



LEGEND

- WELL DESIGNATION
- GROUND SURFACE
- OBSERVATION WELL INSTALLATION
- GROUNDWATER ELEVATION
- STRATIGRAPHIC BOUNDARY
- TYPICAL SOIL CLASSIFICATION
- SCREENED INTERVAL
- TRITIUM CONCENTRATION
- OPEN BEDROCK INTERVAL
- WATER TABLE (FROM FIGURE 5.8)
- OVERBURDEN GROUNDWATER FLOW PATH
- BEDROCK GROUNDWATER FLOW POTENTIAL
- TRITIUM RESULTS GREATER THAN 5,000 (pCi/L)
- TRITIUM RESULTS 1,000 TO 5,000 (pCi/L)
- TRITIUM RESULTS 200 TO 1,000 (pCi/L)
- TRITIUM RESULTS 0 TO 200 (pCi/L)

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

EXELON GENERATION COMPANY, LLC

FLEETWIDE ASSESSMENT

HYDROGEOLOGIC PROFILE A-A'
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

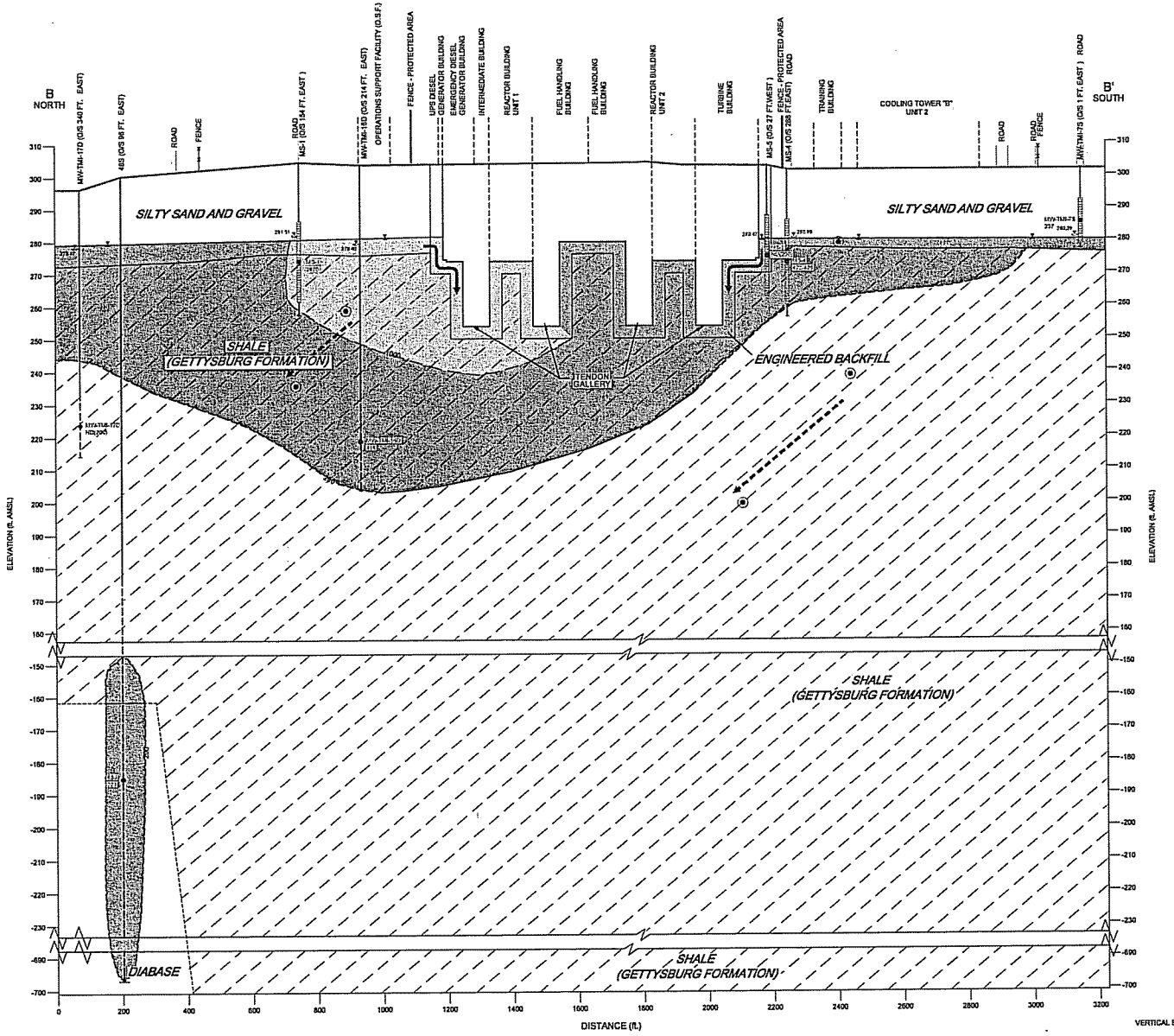
Exelon. CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
S. GUGLEY	J. LAMBERT	AUGUST 2006	
Scale: AS SHOWN	Project N°: 45136-29	Report N°: 021	Drawing N°: figure 5.10

REVISION 1

45136-29(021)GN-WA032 AUG 31/2006



LEGEND

- WELL DESIGNATION
- GROUND SURFACE
- OBSERVATION WELL INSTALLATION
- GROUNDWATER ELEVATION
- STRATIGRAPHIC BOUNDARY
- TYPICAL SOIL CLASSIFICATION
- SCREENED INTERVAL
- TRITIUM CONCENTRATION
- OPEN BEDROCK INTERVAL
- WATER TABLE (FROM FIGURE 5.9)
- APPROXIMATE BEDDING PLANE ORIENTATION IN GETTYSBURG FORMATION (ASTM)
- OVERBURDEN GROUNDWATER FLOW PATH
- BEDROCK GROUNDWATER FLOW POTENTIAL
- FLOW INTO PAGE (TO EAST)
- FLOW OUT OF PAGE (TO WEST)
- TRITIUM RESULTS GREATER THAN 5,000 (pCi/L)
- TRITIUM RESULTS 1,000 TO 5,000 (pCi/L)
- TRITIUM RESULTS 200 TO 1,000 (pCi/L)
- TRITIUM RESULTS 0 TO 200 (pCi/L)

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

EXELON GENERATION COMPANY, LLC

FLEETWIDE ASSESSMENT

HYDROGEOLOGIC PROFILE B-B'
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Exelon.

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
B. QUIGLEY	J. LAMBERT	AUGUST 2008	
Scale:	Project No:	Report No:	Drawing No:
AS SHOWN	45136-29	021	figure 5.11

REVISION 1

45136-29(021)GH-WA032 AUG 31/2008

FIGURE 5.12
TRITIUM CONCENTRATIONS – GROUNDWATER

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.13
TRITIUM CONCENTRATIONS – OVERBURDEN

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.14
TRITIUM CONCENTRATIONS – UPPER BEDROCK

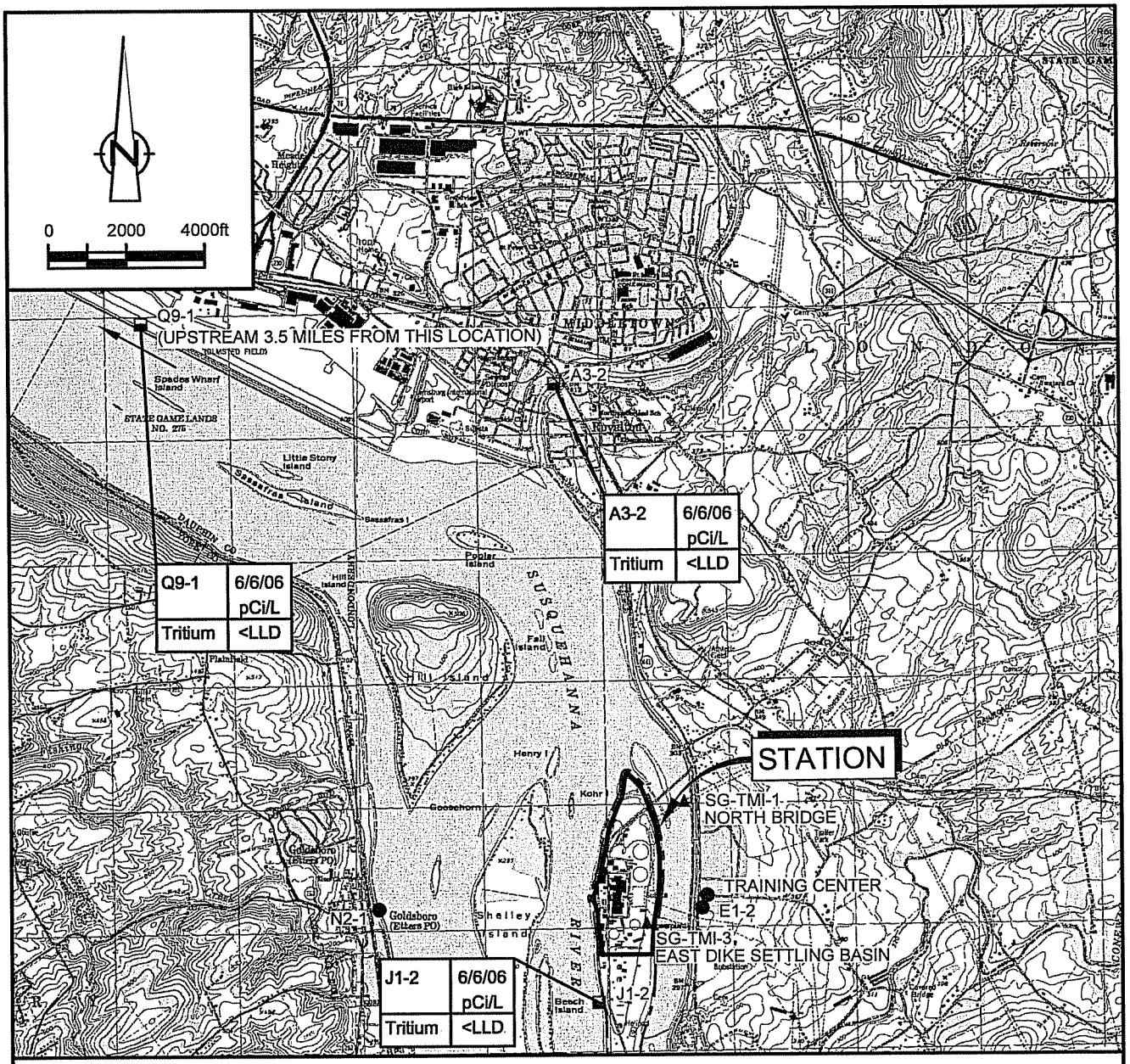
REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.15
TRITIUM CONCENTRATIONS – LOWER BEDROCK

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

FIGURE 5.16
RADIONUCLIDE CONCENTRATIONS GROUND WATER

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION



SOURCE: USGS QUADRANGLE MAP; THREE MILE ISLAND MOSAIC, PENNSYLVANIA, 2001

LEGEND

- PROPERTY BOUNDARY
- STATION DEFINITION
- GROUNDWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- STAFF GAUGE LOCATION

MW-15K-1A	5/4/06
	pci/L
Tritium	167/211

- MONITORING POINT
- SAMPLE DATE
- SAMPLE UNIT
- SAMPLE RESULT
- SAMPLE PARAMETER

167/211 PARENT SAMPLE/DUPLICATE SAMPLE

<LLD - LESS THAN LOWER LIMIT OF DETECTION

pCi/L - PICOCURIES PER LITER

ANALYTE	LLD (pCi/L)
TRITIUM	200

figure 5.17

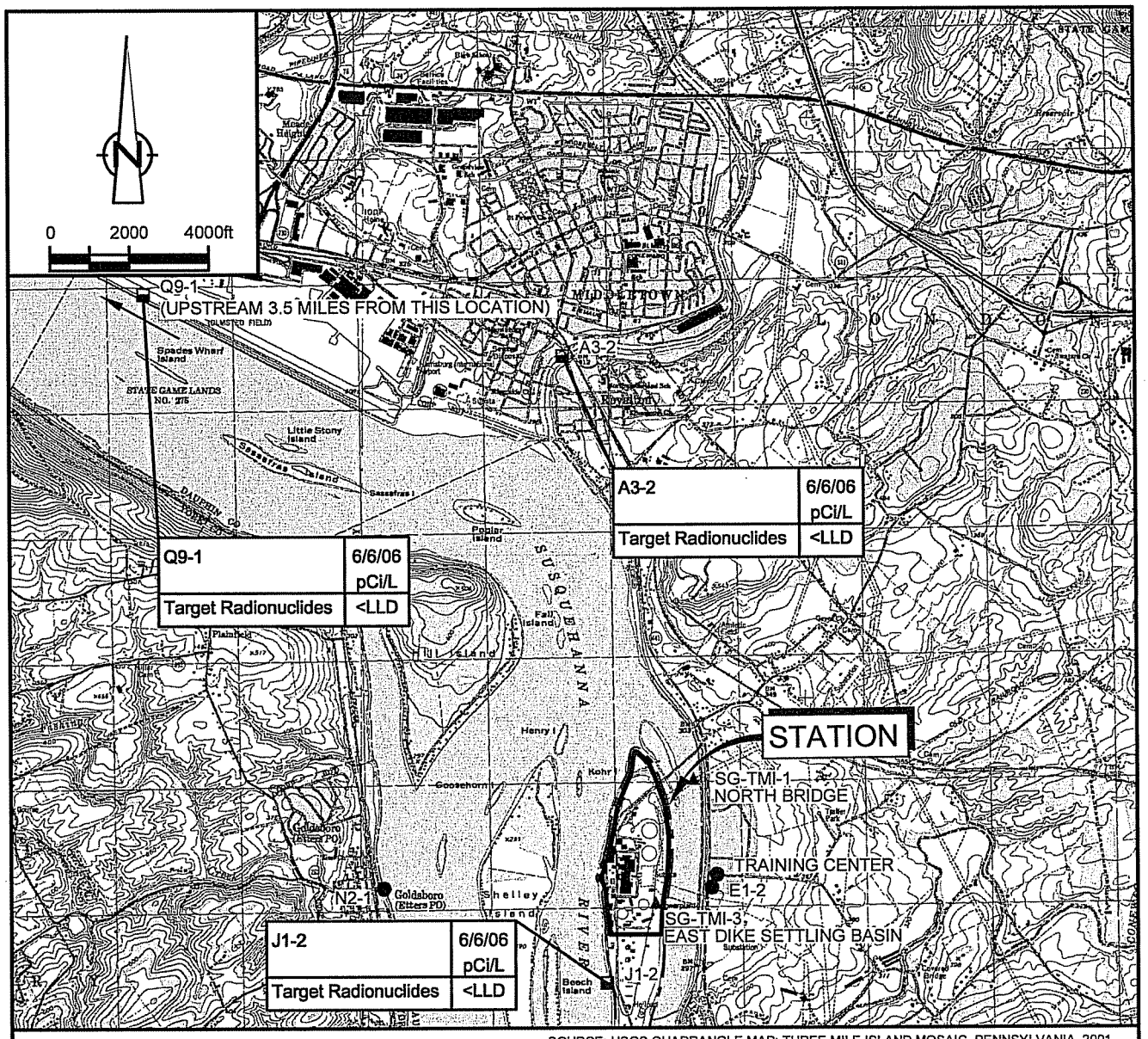
TRITIUM CONCENTRATIONS
SURFACE WATER
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

Exelon

CRA

NOTE: OFF-ISLAND PROPERTY NOT SHOWN.

45136-29(021)GN-WA052 AUG 31/2006



SOURCE: USGS QUADRANGLE MAP; THREE MILE ISLAND MOSAIC, PENNSYLVANIA, 2001

LEGEND

- PROPERTY BOUNDARY
- STATION DEFINITION
- GROUNDWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- STAFF GAUGE LOCATION

MW-15K-1A	5/4/06
	pci/L
Tritium	167/211

- MONITORING POINT
- SAMPLE DATE
- SAMPLE UNIT
- SAMPLE RESULT
- SAMPLE PARAMETER

167/211 PARENT SAMPLE/ DUPLICATE SAMPLE

<LLD - LESS THAN LOWER LIMIT OF DETECTION

pCi/L - PICOCURIES PER LITER

TARGET RADIONUCLIDES	LLD (pCi/L)
STRONTIUM-89/90 (TOTAL)	2
MANGANESE - 54	15
COBALT - 58	15
IRON - 59	30
COBALT - 60	15
ZINC - 65	30
NIOBIUM - 95	10
ZIRCONIUM - 95	10
CESIUM - 134	10
CESIUM - 137	18
BARIUM - 140	60
LANTHANUM - 140	15

figure 5.18

RADIONUCLIDE CONCENTRATIONS
SURFACE WATER
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

Exelon

NOTE: OFF-ISLAND PROPERTY NOT SHOWN.

45136-29(021)GN-WA053 AUG 31/2006

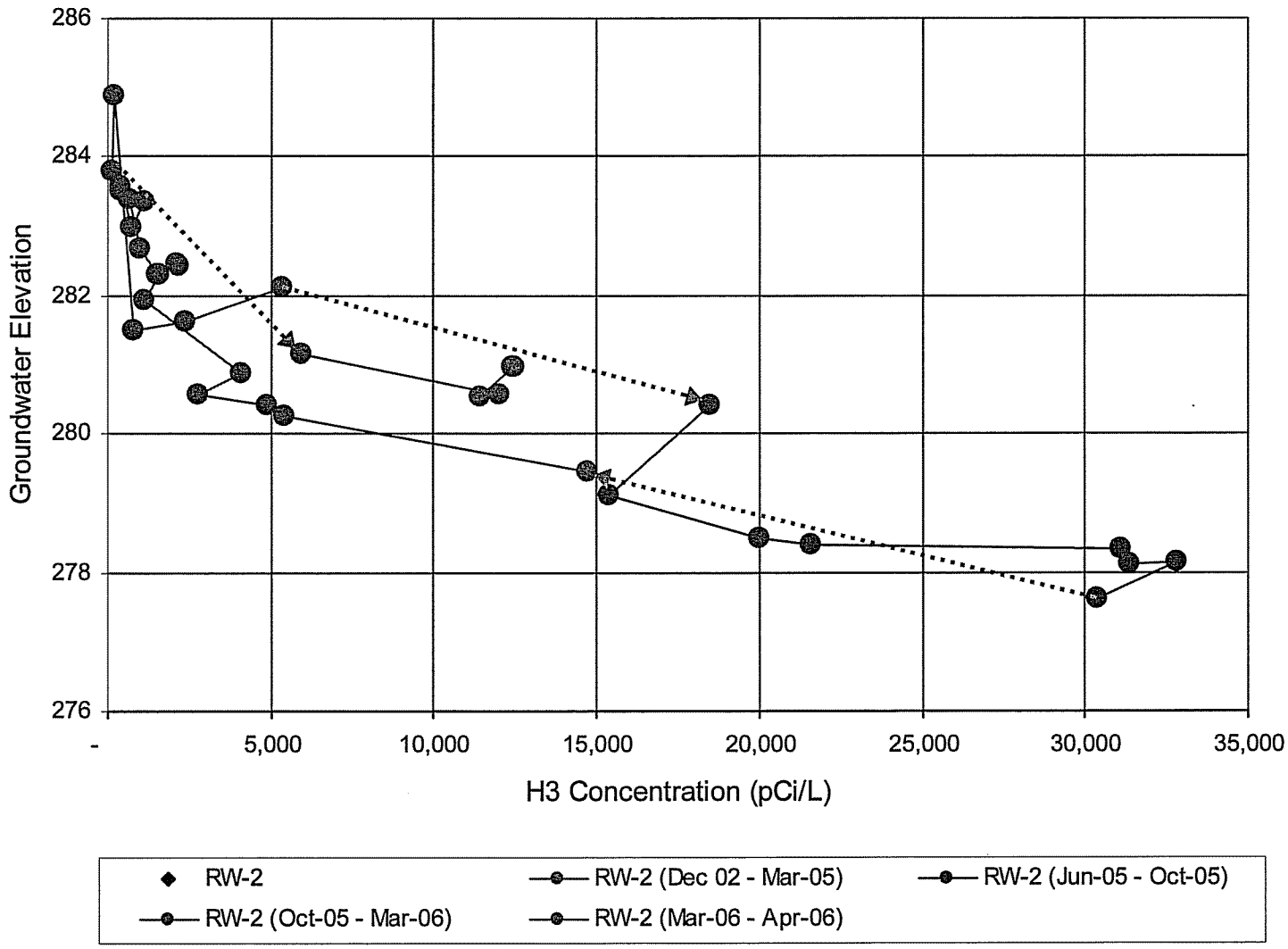


figure 6.1

MONITORING WELL RW-2 TRITIUM CONCENTRATIONS VERSUS GROUNDWATER ELEVATIONS
THREE MILE ISLAND GENERATING STATION
EXELON GENERATION COMPANY, LLC
Middletown, Pennsylvania

Exelon

CRA

45136-29(021)GN-WA054 AUG 31/2006

FIGURE 6.2
CONCEPTUAL STATION MODEL

REMOVED TO PROTECT SENSITIVE, SECURITY-RELATED INFORMATION

TABLE 4.1

SUMMARY OF MONITORING WELL INSTALLATION DETAILS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	Northing (UTM Coordinates [1])	Easting (UTM Coordinates [1])	Installation Date	Surface Elevation (ft AMSL)	Reference Elevation (ft AMSL)	Boring Total Depth (ft BGS)	Screened Interval Top (ft bgs)	Screened Interval Bottom (ft bgs)	Screened Interval Top (ft AMSL)	Screened Interval Bottom (ft AMSL)	Well Construction	Formation Screened
MW-TMI-1D	14588168.80	1159377.99	5/16/2006	295.39	298.53	100	60	100	235.39	195.39	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-2D	14587630.63	1159345.29	5/15/2006	293.54	296.53	100	60	100	233.54	193.54	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-3S	14587505.97	1157874.61	5/10/2006	303.41	303.00	22.5	7.5	22.5	295.91	280.91	2-inch PVC Screen	Overburden
MW-TMI-3I	14587492.87	1157877.70	5/24/2006	303.31	302.85	75	38	75	265.31	228.31	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-4S	14588309.67	1158074.38	5/19/2006	302.06	301.53	26	11	26	291.06	276.06	2-inch PVC Screen	Overburden
MW-TMI-4I	14588298.12	1158066.95	5/18/2006	302.00	301.56	56	36	56	266.00	246.00	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-5D	14588320.31	1158081.92	5/19/2006	302.28	301.82	100	66	100	236.28	202.28	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-6I	14587248.47	1158109.95	5/12/2006	301.44	301.09	62	30	62	271.44	239.44	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-6D	14587232.72	1158109.25	5/16/2006	301.47	301.15	100	72	100	229.47	201.47	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-7S	14585971.52	1158279.21	5/8/2006	300.68	300.34	24.7	8.5	23.5	292.18	277.18	2-inch PVC Screen	Overburden
MW-TMI-8S	14586508.74	1159035.26	5/9/2006	297.76	297.42	22	7	22	290.76	275.76	2-inch PVC Screen	Overburden
MW-TMI-9S	14586169.70	1158920.66	5/9/2006	295.93	295.47	19	5	15	290.93	280.93	2-inch PVC Screen	Overburden
MW-TMI-9I	14586155.78	1158920.98	7/19/2006	295.68	294.84	77	52	77	242.84	217.84	6-inch Steel, Open Borehole (2)	Overburden
MW-TMI-10S	14587056.30	1157831.08	5/5/2006	301.31	300.87	28	18	28	283.31	273.31	2-inch PVC Screen	Overburden
MW-TMI-10I	14587041.00	1157830.73	5/18/2006	301.29	300.96	63	35	63	266.29	238.29	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-10D	14587028.66	1157827.76	5/10/2006	301.26	300.78	100	73	100	228.26	201.26	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-11S	14587179.52	1158702.41	5/22/2006	303.05	302.70	22	7	22	296.05	281.05	2-inch PVC Screen	Overburden
MW-TMI-12S	14587844.76	1158688.11	6/1/2006	302.70	302.24	28.5	11	28.5	291.70	274.20	2-inch PVC Screen	Overburden
MW-TMI-13S	14587947.49	1158784.32	5/22/2006	296.39	298.90	22	7	22	289.39	274.39	2-inch PVC Screen	Overburden
MW-TMI-13I	14587934.00	1158787.79	5/23/2006	296.22	298.72	61	31	61	265.22	235.22	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-14S	14587760.60	1158803.12	5/24/2006	301.04	303.14	26	11	26	290.04	275.04	2-inch PVC Screen	Overburden
MW-TMI-14I	14587745.64	1158809.35	5/23/2006	301.05	303.76	60	37	60	264.05	241.05	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-14D	14587756.70	1158813.62	5/30/2006	300.96	303.08	100	73	100	227.96	200.96	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-15S	14587807.56	1158687.19	6/1/2006	303.03	302.58	19.5	9.5	19.5	293.53	283.53	2-inch PVC Screen	Overburden
MW-TMI-16I	14588192.14	1158595.54	7/24/2006	303.96	303.74	60	40	60	263.96	243.96	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-16D	14588173.09	1158595.02	7/25/2006	303.92	303.65	100	70	100	233.92	203.92	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-17I	14589027.11	1158760.79	7/20/2006	296.77	296.19	52	35	52	261.77	244.77	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-17D	14589027.12	1158772.53	7/21/2006	296.81	296.38	82	63	82	233.81	214.81	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-18D	14586771.23	1159276.41	7/25/2006	293.35	293.03	100	60	100	233.35	193.35	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-19I	14586661.45	1157864.17	7/25/2006	299.60	299.21	82	35	82	264.60	217.60	6-inch Steel, Open Borehole [2]	Bedrock
MW-TMI-19D	14586646.96	1157863.71	7/26/2006	299.69	299.31	120	92	120	207.69	179.69	6-inch Steel, Open Borehole [2]	Bedrock

Notes:

(1) Universal Transverse Mercator (UTM), Zone 18, NAD 83, in feet
(2) At bedrock wells, outer steel casing extends to top of open borehole.
ft AMSL feet above mean sea level
ft BGS feet below ground surface
PVC polyvinyl chloride

TABLE 4.2

SUMMARY OF GROUNDWATER ELEVATIONS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Top of Casing Elevation (ft AMSL)*	*Total Depth (ft below Reference)*	*June 5, 2006*		*July 31, 2006*	
			Depth to Water (ft below Reference)	*Groundwater Elevation (ft AMSL)*	*Depth to Water (ft below Reference)*	*Groundwater Elevation (ft AMSL)*
#1	303.00	34.00	26.82	276.18	21.80	281.20
#2	303.34	23.00	21.74	281.60	21.76	281.58
#3	302.86	26.20	21.70	281.16	22.65	280.21
48N	298.70	36.63	19.80	278.90	19.71	278.99
MS-1	305.51	42.39	24.00	281.51	23.92	281.59
MS-2	305.94	31.15	24.56	281.38	23.65	282.29
MS-3	304.74	40.90	23.53	281.21	22.73	282.01
MS-4	301.24	41.30	20.25	280.99	19.87	281.37
MS-5	304.03	44.30	23.56	280.47	22.33	281.70
MS-6	303.42	40.75	23.09	280.33	21.85	281.57
MS-7	304.24	42.12	23.85	280.39	23.34	280.90
MS-8	303.71	45.00	22.65	281.06	23.05	280.66
MS-19	302.67	37.78	22.12	280.55	21.76	280.91
MS-20	302.80	38.20	24.25	278.55	23.45	279.35
MS-21	303.45	38.85	26.70	276.75	24.95	278.50
MS-22	--	31.10	26.90	--	26.90	--
OS-9	305.32	22.75	23.72	281.60	23.73	281.59
OS-13B	303.54	24.12	22.55	280.99	22.64	280.90
OS-14	305.75	29.20	24.99	280.76	24.68	281.07
OS-16	303.74	13.90	9.45	294.29	9.85	293.89
OS-17	305.53	26.70	21.81	283.72	21.42	284.11
OS-18	301.41	26.00	21.41	280.00	21.25	280.16
RW-1	303.04	22.31	22.24	280.80	21.45	281.59
RW-2	303.13	34.50	22.51	280.62	22.47	280.66
GP-1	301.27	22.10	21.29	279.98	DRY	--
GP-4	301.57	20.75	DRY	--	DRY	--
GP-6	301.44	22.90	21.24	280.20	DRY	--

TABLE 4.2

SUMMARY OF GROUNDWATER ELEVATIONS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Top of Casing Elevation (ft AMSL)*	*Total Depth (ft below Reference)*	*June 5, 2006*		*July 31, 2006*	
			Depth to Water (ft below Reference)	*Groundwater Elevation (ft AMSL)*	*Depth to Water (ft below Reference)*	*Groundwater Elevation (ft AMSL)*
GP-7	302.21	16.30	DRY	--	DRY	--
GP-8	303.80	25.80	DRY	--	DRY	--
GP-9	301.57	22.35	DRY	--	DRY	--
GP-10	301.43	21.35	DRY	--	DRY	--
GP-11	301.45	20.90	DRY	--	DRY	--
GP-12	300.82	22.00	20.15	280.67	DRY	--
MW-1	295.17	27.61	15.42	279.75	15.97	279.20
MW-2	296.97	26.82	17.55	279.42	17.80	279.17
MW-3	310.03	41.02	30.94	279.09	31.33	278.70
MW-4	296.31	27.28	17.35	278.96	17.83	278.48
UST Closure Well	299.30	29.20	19.16	280.14	19.35	279.95
MW-TMI-1D	298.53	96.35	19.53	279.00	19.68	278.85
MW-TMI-2D	296.53	103.44	17.11	279.42	17.45	279.08
MW-TMI-3S	303.00	20.05	DRY	---	DRY	---
MW-TMI-3I	302.85	74.36	37.62	265.23	43.22	259.63
MW-TMI-4S	301.53	24.24	22.28	279.25	21.24	280.29
MW-TMI-4I	301.56	55.25	22.26	279.30	21.32	280.24
MW-TMI-5D	301.82	101.05	22.70	279.12	21.61	280.21
MW-TMI-6I	301.09	59.44	20.88	280.21	20.86	280.23
MW-TMI-6D	301.15	98.25	21.24	279.91	21.27	279.88
MW-TMI-7S	300.34	23.11	20.11	280.23	20.04	280.3
MW-TMI-8S	297.42	22.69	15.84	281.58	15.61	281.81
MW-TMI-9S	295.47	14.36	DRY	---	DRY	---
MW-TMI-9I	294.84	76.16	NI	--	16.29	278.55
MW-TMI-10S	300.87	27.52	21.53	279.34	21.18	279.69
MW-TMI-10I	300.96	62.56	21.54	279.42	22.69	278.27
MW-TMI-10D	300.78	99.00	21.35	279.43	22.71	278.07

TABLE 4.2

SUMMARY OF GROUNDWATER ELEVATIONS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Top of Casing Elevation (ft AMSL)*	*Total Depth (ft below Reference)*	*June 5, 2006*		*July 31, 2006*	
			Depth to Water (ft below Reference)	*Groundwater Elevation (ft AMSL)*	*Depth to Water (ft below Reference)*	*Groundwater Elevation (ft AMSL)*
MW-TMI-11S	302.70	20.88	DRY	---	11.56	291.14
MW-TMI-12S	302.24	28.50	DRY	---	24.95	277.29
MW-TMI-13S	298.90	24.47	18.60	280.30	17.91	280.99
MW-TMI-13I	298.72	64.64	20.70	278.02	20.37	278.35
MW-TMI-14S	303.14	27.30	22.38	280.76	22.31	280.83
MW-TMI-14I	303.76	65.15	23.96	279.80	23.31	280.45
MW-TMI-14D	303.08	101.90	23.72	279.36	23.70	279.38
MW-TMI-15S	302.58	19.50	DRY	---	DRY	---
MW-TMI-16I	303.74	59.78	NI	--	23.10	280.64
MW-TMI-16D	303.65	99.73	NI	--	24.25	279.4
MW-TMI-17I	296.19	51.42	NI	--	17.86	278.33
MW-TMI-17D	296.38	81.57	NI	--	17.91	278.47
MW-TMI-18D	293.03	99.68	NI	--	14.43	278.60
MW-TMI-19I	299.21	81.61	NI	--	20.21	279.00
MW-TMI-19D	299.31	119.62	NI	--	20.12	279.19

Notes:

ft AMSL - feet above mean sea level
NI - not installed

TABLE 4.3

SUMMARY OF SURFACE WATER ELEVATIONS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Staff Gauge	*Surface Water Location*	*Reference Elevation (ft AMSL)*	*June 5, 2006*		*July 31, 2006*	
			Depth to Water (ft Below Reference)	*Surface Water Elevation (ft AMSL)*	*Depth to Water (ft Below Refference)*	*Surface Water Elevation (ftAMSL)*
SG-TMI-1	North Bridge	314.00	34.86	279.14	35.60	278.40
SG-TMI-2	South Bridge	296.62	24.03	272.59	26.24	270.38
SG-TMI-3	East Dike Settling Basin	287.17	3.51	283.66	3.85	283.32

Note:

ft AMSL - feet above mean sea level

TABLE 4.4

SAMPLE KEY
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Sample Identification*	*QC Sample*	*Date*	*Time*	*Matrix*	*Analysis*
MW-4	WG-TMI-MW-4-052606-JAS-001		5/26/2006	11:20	Groundwater	Tritium / Target Radionuclides
MW-2	WG-TMI-MW-2-052606-JC-002		5/26/2006	11:25	Groundwater	Tritium / Target Radionuclides
MW-3	WG-TMI-MW-3-052606-JC-003		5/26/2006	12:35	Groundwater	Tritium / Target Radionuclides
MW-1	WG-TMI-MW-1-052606-JC-004		5/26/2006	13:50	Groundwater	Tritium / Target Radionuclides
NW-A[1]	WG-TMI-NW-A-053006-JC-005		5/30/2006	16:15	Groundwater	Tritium / Target Radionuclides
NW-B[1]	WG-TMI-NW-B-053006-JC-006		5/30/2006	17:20	Groundwater	Tritium / Target Radionuclides
NW-C[1]	WG-TMI-NW-C-053006-JC-007		5/30/2006	17:25	Groundwater	Tritium / Target Radionuclides
OSF[2]	WG-TMI-OSF-053006-JC-008		5/30/2006	18:15	Groundwater	Tritium / Target Radionuclides
48N	WG-TMI-48N-053106-JC-009		5/31/2006	9:50	Groundwater	Tritium / Target Radionuclides
48N	WG-TMI-48N-053106-JC-010	Duplicate (009)	5/31/2006	9:55	Groundwater	Tritium / Target Radionuclides
MS-1	WG-TMI-MS-1-053106-JAS-011		5/31/2006	11:25	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB-1-053106-JAS-002	Rinsate	5/31/2006	12:30	Water	Tritium / Target Radionuclides
48S[2]	WG-TMI-48S-053106-JC-013		5/31/2006	11:30	Groundwater	Tritium / Target Radionuclides
OS-18	WG-TMI-OS-18-053106-MM-014		5/31/2006	14:20	Groundwater	Tritium / Target Radionuclides
MS-7	WG-TMI-MS-7-053106-JAS-015		5/31/2006	16:05	Groundwater	Tritium / Target Radionuclides
UST Closure Well	WG-TMI-UST-053106-JC-016		5/31/2006	16:20	Groundwater	Tritium / Target Radionuclides
MS-19	WG-TMI-MS-19-053106-JAS-017		5/31/2006	18:55	Groundwater	Tritium / Target Radionuclides
MW-TMI-6D	WG-TMI-6D-053106-EV-018		5/31/2006	16:00	Groundwater	Tritium / Target Radionuclides
MW-TMI-6I	WG-TMI-MW-6I-053106-JC-019		5/31/2006	17:05	Groundwater	Tritium / Target Radionuclides
MW-TMI-4I	WG-TMI-MW-4I-060106-JAS-020		6/1/2006	11:15	Groundwater	Tritium / Target Radionuclides
MW-TMI-1D	WG-TMI-1D-060106-JC-021		6/1/2006	11:20	Groundwater	Tritium / Target Radionuclides
MW-TMI-10S	WG-TMI-10S-060106-JAS-022		6/1/2006	15:35	Groundwater	Tritium / Target Radionuclides
MW-TMI-8S	WG-TMI-8S-060106-JC-023	Duplicate (024)	6/1/2006	16:30	Groundwater	Tritium / Target Radionuclides
MW-TMI-8S	WG-TMI-8S-060106-JC-024		6/1/2006	16:30	Groundwater	Tritium / Target Radionuclides
MW-TMI-10I	WG-TMI-MW-10I-060106-JAS-005		6/1/2006	17:45	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB2-060106-JAS-026	Rinsate	6/1/2006	18:45	Water	Tritium / Target Radionuclides
MW-TMI-2D	WG-TMI-MW-2D-060106-EV-027		6/1/2006	16:00	Groundwater	Tritium / Target Radionuclides
MS-2	WG-TMI-MS2-060206-JAS-028		6/2/2006	13:05	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB3-060206-JAS-029	Rinsate	6/2/2006	14:00	Water	Tritium / Target Radionuclides
MS-8	WG-TMI-MS8-060506-MMM-030		6/5/2006	14:45	Groundwater	Tritium / Target Radionuclides
OS-13B	WG-TMI-OS13B-060506-MMM-031		6/5/2006	16:30	Groundwater	Tritium / Target Radionuclides
MS-3	WG-TMI-MS-3-060506-JC-032		6/5/2006	16:05	Groundwater	Tritium / Target Radionuclides
MS-3	WG-TMI-MS-3-060506-JC-033	Duplicate (032)	6/5/2006	16:10	Groundwater	Tritium / Target Radionuclides
#3	WG-TMI-3-060606-JC-034		6/6/2006	10:50	Groundwater	Tritium / Target Radionuclides
J1-2	WS-TMI-SWJ1-2-060606-MMM-035		6/6/2006	11:15	Surface Water	Tritium / Target Radionuclides
E1-2[3]	WG-TMI-E1-2-060606-MMM-036		6/6/2006	11:45	Groundwater	Tritium / Target Radionuclides
Training Center[3]	WG-TMI-TRAINING-CTR-060606-MMM-037		6/6/2006	12:30	Groundwater	Tritium / Target Radionuclides
OS-14	WG-TMI-OS14-060606-EV-038		6/6/2006	11:55	Groundwater	Tritium / Target Radionuclides
MS-5	WG-TMI-MS-5-060606-EV-039		6/6/2006	14:05	Groundwater	Tritium / Target Radionuclides
MS-6	WG-TMI-MS-6-060606-EV-040		6/6/2006	14:10	Groundwater	Tritium / Target Radionuclides
A3-2	WS-TMI-SWA3-2-060606-MMM-041		6/6/2006	13:00	Surface Water	Tritium / Target Radionuclides
Q9-1	WS-TMI-SWQ9-1-060606-MMM-042		6/6/2006	16:00	Surface Water	Tritium / Target Radionuclides
N2-1[3]	WG-TMI-N2-1-060606-MMM-043		6/6/2006	16:00	Groundwater	Tritium / Target Radionuclides
RW-2	WG-TMI-RW-2-060606-JC-044		6/6/2006	15:20	Groundwater	Tritium / Target Radionuclides
RW-2	WG-TMI-RW-2-060606-JC-045	Duplicate (044)	6/6/2006	15:25	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB4-060606-JC-046	Rinsate	6/6/2006	17:30	Water	Tritium / Target Radionuclides
MS-20	WG-TMI-MS-20-060706-EV-047		6/7/2006	12:45	Groundwater	Tritium / Target Radionuclides
MS-21	WG-TMI-MS-21-060706-EV-048		6/7/2006	9:40	Groundwater	Tritium / Target Radionuclides
MS-22	WG-TMI-MS-22-060706-MMM-049		6/7/2006	11:30	Groundwater	Tritium / Target Radionuclides
MS-4	WG-TMI-MS-4-060706-JC-050		6/7/2006	10:20	Groundwater	Tritium / Target Radionuclides
MS-4	WG-TMI-MS-4-060706-JC-051	Duplicate (050)	6/7/2006	10:25	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB-5-060706-JC-052	Rinsate	6/7/2006	11:30	Water	Tritium / Target Radionuclides
MW-TMI-14I	WG-TMI-14I-060706-JC-053		6/7/2006	15:30	Groundwater	Tritium / Target Radionuclides
MW-TMI-5D	WG-TMI-5D-060806-EV-054		6/8/2006	9:35	Groundwater	Tritium / Target Radionuclides
MW-TMI-4S	WG-TMI-4S-060806-EV-055		6/8/2006	10:00	Groundwater	Tritium / Target Radionuclides
MW-TMI-13I	WG-TMI-MW-13I-060806-MMM-056		6/8/2006	10:45	Groundwater	Tritium / Target Radionuclides
MW-TMI-7S	WG-TMI-7S-060806-JC-057		6/8/2006	10:05	Groundwater	Tritium / Target Radionuclides
MW-TMI-3I	WG-TMI-3I-060806-JC-058		6/8/2006	11:45	Groundwater	Tritium / Target Radionuclides
MW-TMI-13S	WG-TMI-13S-060806-JC-059		6/8/2006	14:35	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB6-060806-JC-060	Rinsate	6/8/2006	15:50	Water	Tritium / Target Radionuclides
Closed Demo DW10	WG-TMI-DW10-061206-MMM-061		6/12/2006	11:15	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB7-061206-MMM-062	Rinsate	6/12/2006	15:00	Water	Tritium / Target Radionuclides
MW-TMI-14D	WG-TMI-MW14D-061306-MMM-063		6/13/2006	10:45	Groundwater	Tritium / Target Radionuclides
MW-TMI-10D	WG-TMI-MW10D-061306-MMM-064		6/13/2006	13:00	Groundwater	Tritium / Target Radionuclides
MW-TMI-10D	WG-TMI-MW10D-061306-MMM-065	Duplicate (064)	6/13/2006	13:10	Groundwater	Tritium / Target Radionuclides
--	RB-TMI-RB8-061306-MMM-066	Rinsate	6/13/2006	14:00	Water	Tritium / Target Radionuclides
MW-TMI-12S	WG-TMI-MW12S-061406-MMM-067		6/14/2006	14:30	Groundwater	Tritium Analysis Only
MW-TMI-17I	WG-TMI-17I-080406-MM-100		8/8/2006	11:15	Groundwater	Tritium / Target Radionuclides
MW-TMI-17D	WG-TMI-17D-080406-MM-101		8/4/2006	11:45	Groundwater	Tritium / Target Radionuclides
MW-TMI-9I	WG-TMI-9I-080406-MM-102		8/4/2006	14:15	Groundwater	Tritium / Target Radionuclides
--	WG-TMI-RB-080406-MM-103	Rinsate	8/4/2006	15:00	Water	Tritium / Target Radionuclides
MW-TMI-16I	WG-TMI-16I-080806-MM-104		8/8/2006	10:35	Groundwater	Tritium / Target Radionuclides

TABLE 4.4

SAMPLE KEY
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Sample Identification*	*QC Sample*	*Date*	*Time*	*Matrix*	*Analysis*
MW-TMI-16D	WG-TMI-16I-080806-MM-105		8/8/2006	11:55	Groundwater	Tritium / Target Radionuclides
MW-TMI-18D	WG-TMI-16I-080806-MM-106		8/8/2006	14:10	Groundwater	Tritium / Target Radionuclides
--	WG-TMI-16I-080806-MM-107	Rinsate	8/8/2006	14:30	Water	Tritium / Target Radionuclides
MW-TMI-19D	WG-TMI-19D-080906-MM-108		8/9/2006	10:00	Groundwater	Tritium / Target Radionuclides
MW-TMI-19I	WG-TMI-19D-080906-MM-109		8/9/2006	11:45	Groundwater	Tritium / Target Radionuclides
MW-TMI-19D	WG-TMI-19D-080906-MM-110	Duplicate (064)	8/9/2006	13:00	Groundwater	Tritium / Target Radionuclides
--	WG-TMI-19D-080906-MM-111	Rinsate	8/9/2006	13:30	Water	Tritium / Target Radionuclides

Notes:

QC - Quality Control
Target Radionuclides: Sr-89/90, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140, and La-140
Duplicate (064) - Duplicate of sample number in parenthesis
(1) Production Supply Well
(2) Drinking Water Well
(3) Drinking Water Well - Off Station

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP* [5] *(mV)* [6]	*DO* [7] *(mg/L)* [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
MW-4	05/26/2006	10:10	375	5.67	11.90	879	204	9.87	485	0.00
		10:15	375	5.76	11.70	873	238	8.68	320	0.50
		10:20	375	5.87	11.60	872	257	8.79	239	0.99
		10:25	375	6.03	11.70	873	255	8.81	190	1.49
		10:30	375	6.13	11.70	876	259	8.83	163	1.98
		10:35	375	6.16	11.70	874	263	8.72	132	2.48
		10:40	375	6.17	11.60	875	269	8.69	110	2.97
		10:45	375	6.18	11.70	879	273	8.03	90	3.47
		10:50	375	6.19	11.70	876	276	8.59	80	3.96
		10:55	375	6.20	11.70	876	280	8.54	64	4.46
		11:00	375	6.20	11.70	876	283	8.54	59	4.95
		11:05	375	6.21	11.70	875	288	8.51	54	5.45
MW-2	05/26/2006	10:50	400	6.58	11.21	600	-76	0.0	6.8	0.00
		11:00	400	6.76	11.10	608	-72	0.0	11	1.06
		11:10	400	6.82	11.12	605	-71	0.0	5.6	2.11
		11:20	400	6.86	11.10	607	-69	0.0	2.9	3.17
MW-3	05/26/2006	11:55	400	5.62	14.40	660	265	5.01	77	0.00
		12:00	400	5.76	13.90	654	269	4.76	35	0.53
		12:05	400	5.82	13.50	651	273	4.62	22	1.06
		12:10	400	5.84	13.40	647	277	4.56	17	1.59
		12:15	400	5.85	13.20	646	280	4.42	16	2.11
		12:20	400	5.87	13.30	647	281	4.35	15	2.64
MW-1	05/26/2006	12:20	200	6.34	12.72	318	56	11.54	33	0.00
		12:30	200	6.41	12.79	317	67	11.39	26	0.53
		12:40	200	6.47	12.64	316	82	11.32	21	1.06
		12:50	200	6.48	12.54	315	92	11.19	12	1.59
		13:00	150	6.50	13.09	315	95	11.20	9.4	1.98
		13:10	150	6.50	13.11	315	97	11.23	7.9	2.38
NW-A	05/30/2006	15:25	400	6.77	17.10	384	84	3.66	0.55	0.00
		15:35	400	6.88	17.15	381	84	3.30	0.50	1.06
		15:45	400	6.93	17.63	382	78	3.20	0.50	2.11
		15:55	400	7.16	17.21	387	75	3.25	0.25	3.17
		16:05	400	7.23	17.58	381	79	3.37	0.55	4.23
NW-B	05/30/2006	16:40	500	6.91	23.80	370	73	1.90	2.00	0.00
		16:50	500	7.06	22.81	370	69	1.98	1.98	1.32
		17:00	500	7.05	22.77	373	77	1.54	1.51	2.64
		17:10	500	7.09	22.70	373	77	1.51	0.35	3.96
		17:20	500	7.13	22.67	374	75	1.44	0.50	5.28

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [5] [6]	*DO (mg/L)* [7] [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
NW-C	05/30/2006	17:05	NR	6.84	22.37	465	16	0.00	1.56	NR
		17:10	NR	6.79	22.31	466	23	0.00	1.36	NR
		17:15	NR	6.91	22.47	465	17	0.00	1.27	NR
		17:20	NR	7.01	22.57	465	15	0.00	0.89	NR
		17:25	NR	7.05	22.52	464	13	0.00	0.80	NR
OSF	05/30/2006	17:45	500	6.81	16.44	869	45	3.70	0.43	0.00
		17:55	500	7.02	16.28	865	41	3.50	0.27	1.32
		18:05	500	7.05	16.26	864	40	3.52	0.35	2.64
		18:15	500	7.05	16.25	866	40	3.56	0.31	3.96
48N	5/31/2006	8:30	250	6.08	15.38	872	-55	3.69	6.71	0.00
		8:40	250	5.93	14.87	868	22	4.11	1.41	0.66
		8:50	250	6.05	14.90	865	23	4.24	0.91	1.32
		9:00	250	6.11	14.87	861	34	4.25	0.68	1.98
		9:10	250	6.11	14.90	860	44	4.30	0.80	2.64
		9:20	250	6.11	14.91	860	54	4.43	1.50	3.30
		9:30	250	6.12	15.02	857	64	4.40	0.63	3.96
		9:40	250	6.12	15.04	855	72	4.41	0.54	4.62
		9:50	250	6.11	14.92	852	78	4.45	0.48	5.28
MS-1	05/31/2006	10:35	350	6.61	17.50	600	161	9.58	19	0.00
		10:45	350	6.64	16.75	590	169	9.14	11	0.92
		10:55	350	6.69	16.80	596	162	9.08	9	1.85
		11:00	350	6.74	16.90	597	160	9.47	7	2.31
		11:05	350	6.77	16.90	596	160	9.40	7	2.77
		11:10	350	6.80	16.90	600	162	9.41	9	3.24
48S	05/31/2006	11:00	500	7.30	14.53	1280	87	4.87	0.29	0.00
		11:10	500	7.46	14.69	1260	82	4.79	0.27	1.32
		11:20	500	7.49	14.51	1270	79	4.71	0.21	2.64
		11:30	500	7.51	14.72	1280	81	4.66	0.16	3.96
OS-18	05/31/2006	13:00	200	7.15	18.22	485	173	9.25	282	0.00
		13:10	200	6.93	17.47	480	194	8.58	206	0.53
		13:20	200	7.02	17.55	487	195	8.48	138	1.06
		13:30	200	7.16	17.50	475	190	9.47	108	1.59
		13:40	200	7.22	17.25	495	188	9.32	63	2.11
		14:00	200	7.31	17.72	473	191	9.89	61	3.17
		14:05	200	7.29	17.37	472	193	9.89	58	3.43
		14:10	200	7.35	18.15	456	188	9.87	56	3.70
		14:15	200	7.33	17.34	436	189	9.78	51	3.96

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [6] [5]	*DO (mg/L)* [8] [7]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
MS-7	05/31/2006	14:15	220	6.88	20.10	608	118	6.65	732	0.00
		14:45	300	7.23	20.70	606	133	5.27	992	2.38
		14:55	300	6.96	18.20	617	151	5.66	950	3.17
		15:05	300	7.00	17.90	618	153	5.30	909	3.96
		15:10	300	7.00	18.00	621	155	5.42	876	4.36
		15:15	300	7.02	18.40	627	154	5.33	823	4.76
		15:20	300	7.15	17.80	629	153	5.53	763	5.15
		15:25	300	7.28	17.90	623	150	5.31	419	5.55
		15:30	300	7.20	18.10	614	155	5.58	404	5.94
		15:35	300	7.13	17.70	638	158	5.71	416	6.34
		15:40	300	7.14	18.10	626	159	5.59	404	6.74
		15:45	300	7.10	18.10	634	160	5.56	376	7.13
		15:50	300	7.10	17.80	637	160	5.59	372	7.53
UST Closure Well	5/31/2006	15:20	400	6.61	16.37	1260	-159	0.00	6.57	0.00
		15:30	400	6.78	15.69	1150	-169	0.00	6.03	1.06
		15:40	400	6.79	15.49	1070	-170	0.00	6.29	2.11
		15:50	400	6.79	15.34	1010	-166	0.00	2.35	3.17
		16:00	400	6.77	15.44	950	-160	0.00	1.25	4.23
		16:10	400	6.76	15.42	976	-152	0.00	1.17	5.28
		16:20	400	6.74	15.39	976	-141	0.00	1.04	6.34
MS-19	05/31/2006	17:25	350	6.03	16.70	243	184	5.28	175	0.00
		17:35	350	5.46	16.00	242	217	3.98	31	0.92
		17:45	350	6.09	15.80	229	188	5.38	30	1.85
		17:50	350	6.19	15.40	220	182	5.48	30	2.31
		17:55	350	6.24	15.50	222	180	5.46	30	2.77
		18:00	350	6.26	15.50	224	181	5.53	29	3.24
MW-TMI-6D	05/31/2006	18:15	150	7.17	17.56	346	-39	8.53	85	0.00
		18:20	150	7.13	17.48	346	-31	7.80	90	0.20
		18:25	150	7.13	17.43	346	-23	7.36	90	0.40
		18:30	150	7.16	17.37	346	-27	6.82	84	0.59
		18:35	150	7.18	17.48	346	-29	6.52	80	0.79
		18:40	150	7.24	17.44	346	-31	6.16	82	0.99
MW-TMI-6I	05/31/2006	16:05	400	6.87	17.27	729	48	7.30	56	0.00
		16:15	400	6.96	17.45	742	42	7.05	60	1.06
		16:25	100	6.98	19.44	746	34	6.68	55	1.32
		16:35	100	6.95	19.85	731	34	6.61	71	1.59
		16:45	100	6.93	19.67	722	37	6.62	75	1.85
		16:55	100	6.91	19.50	713	40	6.64	72	2.11
		17:05	100	6.91	19.45	710	42	6.64	71	2.38

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	Date	Time	Pumping Rate (mL/min) (1)	pH (Std. Units) (2)	Temperature (°C) (3)	Conductivity (µS/cm) (4)	ORP (5) (mV) (6)	DO (7) (mg/L) (8)	Turbidity (NTU) (9)	Volume Purged (gallons)
MW-TMI-4I	6/1/2006	9:10	375	6.21	17.60	2000	118	2.15	995	0.00
		9:20	375	6.36	17.40	1970	125	2.86	597	0.99
		9:30	375	6.41	17.50	1950	124	1.70	684	1.98
		9:35	375	6.44	17.20	1940	125	1.61	625	2.48
		9:40	375	6.45	17.60	1960	127	1.62	591	2.97
		9:45	375	6.46	17.80	1950	128	1.54	563	3.47
		9:50	375	6.47	18.00	1950	129	1.50	520	3.96
		9:55	375	6.46	18.10	1960	131	1.52	506	4.46
		10:00	375	6.47	18.00	1960	132	1.50	514	4.95
		10:05	375	6.47	18.20	1960	134	1.48	479	5.45
		10:10	375	6.47	18.30	1960	136	1.50	475	5.94
		10:15	375	6.46	18.00	1940	136	1.47	494	6.44
		10:20	375	6.48	18.00	1920	136	1.48	485	6.94
		10:25	375	6.48	17.90	1920	137	1.48	478	7.43
		10:30	375	6.47	18.00	1920	139	1.41	466	7.93
		10:35	375	6.47	17.90	1930	139	1.44	439	8.42
		10:40	375	6.47	18.10	1920	139	1.46	426	8.92
		10:45	375	6.47	18.20	1930	139	1.47	421	9.41
		10:50	375	6.48	18.50	1920	140	1.55	410	9.91
		10:55	375	6.48	18.60	1910	140	1.51	395	10.40
		11:00	375	6.48	18.80	1910	141	1.43	389	10.90
MW-TMI-1D	6/1/2006	10:40	100	12.37	19.52	8100	-180	0.00	7.66	0.00
		10:50	100	12.42	19.57	8030	-183	0.00	6.04	0.26
		11:00	100	12.40	20.32	8030	-181	0.00	6.09	0.53
		11:10	100	12.37	20.51	8050	-180	0.00	5.03	0.79
		11:20	100	12.44	20.11	7990	-176	0.00	4.37	1.06
MW-TMI-10S	6/1/2006	13:05	275	6.52	18.00	1140	35	0.74	1020	0.00
		13:15	275	6.89	17.80	887	1	0.57	1059	0.73
		13:25	275	6.98	17.90	865	-7	0.50	1053	1.45
		13:30	275	7.01	17.90	858	-8	0.50	1134	1.82
		13:35	275	7.03	17.90	857	-7	0.47	1279	2.18
		13:40	275	7.04	18.10	856	-6	0.50	1201	2.54
		13:45	225	6.99	18.10	856	0	0.50	1001	2.84
		13:50	225	6.98	17.90	854	2	0.47	819	3.14
		13:55	225	7.00	17.90	859	2	0.45	752	3.43
		14:00	225	7.01	18.00	858	5	0.51	572	3.73
		14:05	225	7.02	18.10	846	5	0.50	478	4.03
		14:10	225	7.03	18.10	849	5	0.45	400	4.33
		14:15	225	7.04	17.90	850	4	0.44	332	4.62
		14:20	225	7.05	18.10	848	5	0.45	277	4.92

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [5] [6]	*DO (mg/L)* [7] [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
MW-TMI-10S (Continued)	6/1/2006	14:25	225	7.07	18.30	847	5	0.44	211	5.22
		14:30	225	7.07	18.10	846	6	0.46	174	5.52
		14:35	225	7.08	18.20	846	6	0.48	151	5.81
		14:40	225	7.09	18.30	844	7	0.47	128	6.11
		14:45	225	7.09	18.30	842	7	0.45	105	6.41
		14:50	225	7.10	18.30	845	6	0.46	89	6.70
		14:55	225	7.10	18.20	845	7	0.46	74	7.00
		15:00	225	7.10	18.40	843	7	0.46	62	7.30
		15:05	225	7.11	18.60	842	7	0.47	55	7.60
		15:10	225	7.11	18.60	843	7	0.44	47	7.89
		15:15	225	7.11	18.70	844	7	0.48	43	8.19
		15:20	225	7.12	18.80	834	7	0.49	40	8.49
MW-TMI-8S	6/1/2006	15:25	100	5.88	17.24	345	114	2.56	316	0.00
		15:35	100	6.00	16.88	340	110	2.54	108	0.26
		15:45	100	6.01	16.65	337	114	2.69	60.2	0.53
		15:50	100	6.02	16.75	336	115	2.80	86.7	0.66
		15:55	100	6.03	16.76	333	117	2.81	24.8	0.79
		16:00	100	6.04	16.99	333	117	2.83	23.6	0.92
		16:05	100	6.04	16.98	333	118	2.88	15.8	1.06
		16:10	100	6.04	16.52	336	118	2.95	10.5	1.19
		16:15	100	6.04	16.31	336	120	3.16	7.32	1.32
		16:20	100	6.04	16.23	336	120	3.03	7.34	1.45
		16:25	100	6.04	16.37	337	120	3.04	4.86	1.59
MW-TMI-10I	6/1/2006	16:20	200	7.14	20.70	758	121	2.24	223	0.00
		16:30	200	7.33	19.50	746	95	1.74	152	0.53
		16:40	200	7.33	18.90	753	82	1.63	141	1.06
		16:45	200	7.33	19.10	765	77	1.64	132	1.32
		16:50	200	7.33	19.30	764	73	1.63	128	1.59
		16:55	200	7.33	19.20	770	70	1.58	125	1.85
		17:00	200	7.32	19.20	768	67	1.75	124	2.11
		17:05	200	7.31	18.90	779	66	1.59	127	2.38
		17:10	200	7.30	18.80	783	66	1.58	120	2.64
		17:15	200	7.29	18.60	789	67	1.60	119	2.91
		17:20	200	7.29	18.60	788	67	1.61	118	3.17
		17:25	200	7.30	18.70	787	66	1.59	123	3.43
		17:30	200	7.31	18.70	786	65	1.57	120	3.70

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [5] [6]	*DO (mg/L)* [7] [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
MW-TMI-2D	6/1/2006	18:05	150	7.75	14.93	189	155	4.80	55	0.00
		18:15	100	7.74	15.40	188	146	4.78	50	0.26
		18:25	100	7.74	15.53	189	137	4.86	45	0.53
		18:30	100	7.74	15.67	188	130	4.92	55	0.66
		18:35	100	7.77	15.64	189	123	4.91	55	0.79
		18:40	100	7.82	15.54	189	117	4.95	50	0.92
		18:45	100	7.92	15.54	188	113	4.91	50	1.06
		18:50	100	7.96	15.43	188	108	4.92	50	1.19
		18:55	100	7.99	15.46	188	105	4.92	50	1.32
MS-2	6/2/2006	12:15	350	7.68	14.6	403	133	7.86	30	0.00
		12:25	350	7.22	13.4	381	175	5.17	26	0.92
		12:35	350	7.51	13.4	395	166	4.99	17	1.85
		12:40	350	7.58	13.3	394	164	4.94	16	2.31
		12:45	350	7.62	13.3	393	165	4.91	16	2.77
		12:50	350	7.63	13.4	393	166	4.90	16	3.24
MS-8	06/05/2006	13:40	400	7.59	18.31	391	201	3.11	75	0.00
		13:50	400	7.51	17.67	389	203	3.09	81	1.06
		14:00	400	7.42	17.31	382	197	3.11	67	2.11
		14:10	400	7.31	17.29	376	195	3.03	48	3.17
		14:20	400	7.75	17.31	376	197	10.11	45	4.23
		14:30	400	7.76	16.80	370	200	9.27	30	5.28
		14:40	400	7.71	16.58	364	204	9.23	35	6.34
		14:45	400	7.72	16.50	368	206	9.23	39	6.87
OS-13B	06/05/2006	15:15	400	8.29	23.13	276	209	10.18	86	0.00
		15:30	400	8.14	17.32	274	224	10.88	42	1.59
		15:40	400	8.11	16.15	323	225	11.12	42	2.64
		15:50	400	8.17	17.54	321	222	10.75	46	3.70
		16:00	400	8.29	16.32	332	224	10.81	51	4.76
		16:10	400	8.27	16.15	331	224	10.98	50	5.81
		16:20	400	8.28	16.17	336	224	10.99	45	6.87
MS-3	6/5/2006	15:30	200	6.73	18.28	380	167	4.25	70	0.00
		15:40	200	6.80	18.03	379	161	3.87	50	0.53
		15:45	200	6.85	17.69	380	158	3.86	45	0.79
		15:50	200	6.94	17.45	379	152	3.82	36	1.06
		15:55	200	6.99	17.39	379	148	3.77	31	1.32
		16:00	200	7.04	17.40	379	145	3.77	28	1.59
		16:05	200	7.06	17.33	379	144	3.78	25	1.85

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [5] [6]	*DO (mg/L)* [7] [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
#3	06/06/2006	10:00	250	6.82	19.22	217	164	5.09	12	0.00
		10:10	250	6.72	18.77	213	165	5.30	9.5	0.66
		10:20	250	6.73	18.76	217	160	4.91	6.4	1.32
		10:30	250	6.70	18.74	222	160	4.78	5.1	1.98
		10:40	250	6.69	18.82	224	160	4.47	5.3	2.64
		10:50	250	6.69	18.76	226	159	5.33	4.2	3.30
E1-2	6/6/2006	11:45	NR	7.00	13.90	421	110	10.81	25	NR
Training Ctr.	6/6/2006	12:10	NR	7.10	14.10	315	90	11.23	4.0	NR
OS-14	6/6/2006	9:50	100	7.24	18.62	478	93	9.64	20	0.00
		10:45	100	6.76	17.39	476	119	3.56	65	1.45
		11:45	100	6.85	17.22	469	-26	1.18	6.2	3.04
		11:50	100	6.84	17.16	469	-27	1.17	5.2	3.17
		11:55	100	6.86	17.20	469	-27	1.16	4.6	3.30
MS-5	6/6/2006	13:40	150	7.25	18.50	468	73	3.04	6.2	0.00
		13:50	150	7.07	17.46	460	78	1.89	3.5	0.40
		14:00	150	7.10	16.23	461	77	1.71	3.2	0.79
		14:05	150	7.13	15.93	460	75	1.69	3.0	0.99
MS-6	6/6/2006	13:20	100	8.09	17.69	244	233	10.71	>1000	0.00
		13:30	100	8.17	20.75	244	232	11.56	>1000	0.26
		13:40	100	8.17	19.08	249	235	12.36	>1000	0.53
		13:50	100	8.18	19.01	248	235	12.20	>1000	0.79
		14:00	100	8.20	18.73	246	236	11.50	>1000	1.06
		14:05	100	8.20	18.46	248	236	12.00	>1000	1.19
		14:10	100	8.19	18.31	246	236	11.86	>1000	1.32
N2-1	6/6/2006	16:00	NR	8.30	13.85	514	125	12.44	150	NR
RW-2	6/6/2006	14:20	300	6.48	20.04	250	185	9.58	36	0.00
		14:30	300	6.17	19.99	257	197	9.15	30	0.79
		14:40	300	6.37	19.53	254	186	9.59	20	1.59
		14:50	300	6.46	19.55	252	181	9.62	19	2.38
		15:00	300	6.62	19.55	254	172	9.51	15	3.17
		15:10	300	6.63	19.56	254	172	9.44	14	3.96
		15:20	300	6.61	19.57	255	173	9.32	12	4.76

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	Date	Time	Pumping Rate (mL/min) (1)	pH (Std. Units) (2)	Temperature (°C) (3)	Conductivity (µS/cm) (4)	ORP (5) (mV) (6)	DO (7) (mg/L) (8)	Turbidity (NTU) (9)	Volume Purged (gallons)
MS-20	6/7/2006	12:20	100	7.24	22.54	241	130	10.20	1042	0.00
		12:30	100	7.25	22.07	240	130	10.10	1016	0.26
		12:35	100	7.24	22.09	240	130	10.17	883	0.40
		12:40	100	7.26	21.65	237	131	10.21	839	0.53
		12:45	100	7.27	21.50	236	131	10.26	817	0.66
MS-21	6/7/2006	8:35	150	6.40	16.06	475	172	7.44	70	0.00
		8:45	100	6.53	16.80	471	166	7.65	90	0.26
		8:55	100	6.70	17.03	473	158	7.97	80	0.53
		9:05	100	6.87	16.94	472	150	8.22	70	0.79
		9:15	100	7.02	16.99	470	142	8.41	57	1.06
		9:25	100	7.06	17.36	469	139	8.42	55	1.32
		9:30	100	7.09	17.42	470	136	8.41	54	1.45
		9:35	100	7.13	17.40	469	134	8.50	57	1.59
		9:40	100	7.15	17.41	469	133	8.48	57	1.72
MS-22	06/07/2006	10:10	400	6.49	19.94	1.71	139	8.41	51.5	0.00
		10:20	400	6.51	21.23	1.83	145	8.37	36.1	1.06
		10:30	400	6.30	21.11	1.61	140	5.70	67.0	2.11
		10:40	400	6.29	21.19	1.57	136	5.61	42.7	3.17
		10:50	400	6.25	20.00	1.49	126	4.92	20.0	4.23
		11:00	400	6.23	19.65	1.58	127	4.80	21.3	5.28
		11:10	400	6.22	19.60	1.56	129	4.78	22.1	6.34
		11:20	400	6.23	19.66	1.59	126	4.80	21.0	7.40
MS-4	06/07/2006	9:30	300	5.88	14.75	186	274	11.16	2.47	0.00
		9:40	300	5.95	14.36	185	259	10.24	1.80	0.79
		9:50	300	6.12	14.33	184	237	10.04	1.21	1.59
		10:00	300	6.43	14.39	184	214	9.89	1.15	2.38
		10:10	300	6.48	14.45	184	205	9.88	1.15	3.17
		10:20	300	6.50	14.49	184	201	9.87	1.15	3.96
MW-TMI-14I	06/07/2006	14:00	400	5.92	17.50	295	112	4.85	167	0.00
		14:10	400	5.86	17.45	295	125	4.22	109	1.06
		14:20	400	6.10	17.37	296	116	4.27	91	2.11
		14:30	400	6.22	17.27	293	115	4.59	75	3.17
		14:40	400	6.26	17.14	292	115	4.64	64	4.23
		14:50	400	6.25	17.04	291	115	4.60	60	5.28
		15:00	400	6.25	17.05	291	116	4.58	53	6.34
		15:10	400	6.25	17.10	291	119	4.73	44	7.40
		15:20	400	6.24	17.13	291	121	4.74	44	8.45
		15:30	400	6.24	17.06	291	121	4.75	44	9.51

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [5] [6]	*DO (mg/L)* [7] [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
MW-TMI-5D	06/08/2006	9:00	150	7.32	17.62	2039	60	0.19	61	0.00
		9:10	100	7.30	18.16	2038	54	0.26	44	0.26
		9:20	100	7.29	18.53	2038	52	0.34	51	0.53
		9:30	100	7.26	18.69	2038	49	0.39	50	0.79
		9:35	100	7.24	18.89	2038	49	0.41	50	0.92
		9:40	100	7.24	18.95	2038	48	0.43	47	1.06
MW-TMI-4S	06/08/2006	9:37	150	7.45	19.74	1990	118	7.39	14	0.00
		9:47	150	6.86	19.66	2000	117	7.27	14	0.40
		9:57	150	6.83	19.31	1990	116	7.40	12	0.79
MW-TMI-13I	6/8/2006	9:25	400	6.91	20.00	543	197	9.55	44	0.00
		9:35	400	7.00	19.70	539	171	6.03	41	1.06
		9:45	400	7.02	20.10	537	138	9.13	63	2.11
		9:55	400	7.06	20.20	535	123	4.44	56	3.17
		10:05	400	7.10	20.30	539	115	4.44	61	4.23
		10:15	400	7.10	20.30	538	112	4.41	55	5.28
		10:25	400	7.14	20.40	538	113	4.38	50	6.34
		10:35	400	7.14	20.10	536	113	4.39	45	7.40
MW-TMI-7S	6/8/2006	8:25	300	6.47	14.75	358	61	4.06	213	0.00
		8:35	300	6.44	14.78	351	63	4.48	173	0.79
		8:45	300	6.40	14.82	340	71	5.39	57	1.59
		8:55	300	6.38	14.82	333	76	8.53	36	2.38
		9:05	300	6.36	14.83	333	81	6.08	22	3.17
		9:15	300	6.35	14.87	331	86	6.40	13	3.96
		9:25	300	6.34	15.06	333	91	6.86	7.6	4.76
		9:35	300	6.33	15.06	332	92	7.64	17	5.55
		9:45	300	6.33	15.08	332	96	7.52	5.9	6.34
		9:55	300	6.33	15.11	332	99	7.44	2.9	7.13
		10:05	300	6.33	15.12	332	101	7.43	2.5	7.93
MW-TMI-3I	6/8/2006	10:55	400	7.14	16.78	540	121	9.30	6.1	0.00
		11:05	300	7.24	17.17	540	114	3.85	6.2	0.79
		11:15	200	7.41	17.22	539	103	2.91	5.0	1.32
		11:25	200	7.45	18.07	537	100	2.70	4.9	1.85
		11:35	100	7.46	18.73	538	99	2.75	5.1	2.11
		11:45	100	7.46	19.15	541	99	2.79	4.9	2.38

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [6]	*DO (mg/L)* [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
MW-TMI-13S	6/8/2006	13:55	300	6.90	20.69	652	141	3.55	16	0.00
		14:05	200	6.78	20.51	642	136	3.42	31	0.53
		14:15	200	6.79	20.46	638	130	3.40	12	1.06
		14:25	200	6.78	20.46	630	126	3.46	7.6	1.59
		14:35	200	6.77	20.50	624	120	3.50	4.3	2.11
Closed Demo DW10	6/12/2006	10:00	NR	7.85	18.10	544	NR	0.13	>1000	NR
		10:20	NR	6.87	17.50	505	NR	0.12	90	NR
		10:40	NR	6.77	16.80	514	NR	0.15	90	NR
		11:10	NR	6.12	17.10	506	NR	0.12	76	NR
MW-TMI-14D	6/13/2006	9:30	350	7.30	17.10	439	-60	1.51	550	0.00
		9:40	350	7.34	17.30	441	-54	1.45	400	0.92
		9:50	350	7.32	17.10	436	-51	1.41	380	1.85
		10:00	350	7.38	17.40	430	-58	0.84	290	2.77
		10:10	350	7.41	17.50	427	-63	0.81	210	3.70
		10:20	350	7.41	17.50	428	-68	0.82	212	4.62
		10:30	350	7.42	17.40	428	-69	0.83	208	5.55
		10:40	350	7.43	17.50	428	-70	0.81	208	6.47
MW-TMI-10D	6/13/2006	11:50	350	7.46	19.80	424	-133	2.80	400	0.00
		12:00	350	7.46	19.70	424	-130	1.89	378	0.92
		12:10	350	7.46	19.70	426	-108	0.94	340	1.85
		12:20	350	7.49	20.00	431	-96	0.70	250	2.77
		12:30	350	7.49	20.10	431	-96	0.69	235	3.70
		12:40	350	7.50	20.50	431	-106	0.59	230	4.62
		12:50	350	7.51	20.70	432	-108	0.51	210	5.55
		13:00	350	7.52	20.80	431	-110	0.50	205	6.47
MW-TMI-9I	8/4/2006	12:45	400	6.87	20.60	475	56	13.42	171	0.00
		12:55	400	6.83	20.45	473	65	12.59	177	1.06
		13:05	400	6.51	20.23	460	115	9.59	195	2.11
		13:15	400	6.47	20.77	455	131	8.46	204	3.17
		13:25	400	6.54	21.80	455	135	8.42	194	4.23
		13:35	400	6.80	19.10	444	128	9.53	210	5.28
		13:45	400	6.73	19.08	437	128	8.41	400	6.34
		13:55	400	6.54	19.11	434	116	8.17	410	7.40
		14:05	400	6.51	19.14	430	115	8.11	405	8.45

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* [1]	*pH (Std. Units)* [2]	*Temperature (°C)* [3]	*Conductivity (µS/cm)* [4]	*ORP (mV)* [6]	*DO (mg/L)* [8]	*Turbidity (NTU)* [9]	*Volume Purged (gallons)*
MW-TMI-17I	8/4/2006	8:45	400	5.24	24.17	1830	166	2.91	96.1	0.00
		8:55	400	5.25	23.81	1970	170	2.92	94.7	1.06
		9:05	400	5.26	23.61	1620	174	2.92	95.3	2.11
		9:15	400	5.30	22.47	1770	181	2.86	95.0	3.17
		9:25	400	5.39	21.95	1810	186	2.83	97.8	4.23
		9:35	400	5.35	20.81	1650	170	2.80	98.0	5.28
		9:45	400	5.46	21.22	1540	103	2.77	97.7	6.34
		9:55	400	5.49	21.31	1580	101	2.79	98.8	7.40
		10:05	400	5.47	21.33	1560	102	2.76	90.0	8.45
MW-TMI-17D	8/4/2006	10:30	400	5.44	23.92	1940	118	4.16	95.3	0.00
		10:40	400	5.33	22.91	1970	120	3.59	90.7	1.06
		10:50	400	5.64	22.58	1830	122	3.25	96.5	2.11
		11:00	400	5.59	21.53	1810	124	3.15	83.2	3.17
		11:10	400	5.55	20.67	1730	125	2.95	88.7	4.23
		11:20	400	5.64	20.62	1550	123	2.82	85.0	5.28
		11:30	400	5.65	20.64	1570	120	2.80	80.5	6.34
		11:40	400	5.64	20.63	1590	121	2.83	81.5	7.40
MW-TMI-19D	8/8/2006	8:45	400	8.50	17.97	1040	145	8.71	>999	0.00
		8:55	400	8.34	17.81	1080	96	9.05	>999	1.06
		9:05	400	8.14	17.70	1100	55	9.93	>999	2.11
		9:15	400	6.91	17.30	1150	76	8.67	320	3.17
		9:25	400	6.92	17.32	1140	75	8.65	330	4.23
		9:35	400	7.09	17.28	1140	79	8.21	360	5.28
		9:45	400	7.10	17.27	1140	78	8.18	365	6.34
		9:55	400	7.08	17.29	1150	76	8.19	300	7.40
MW-TMI-19I	8/8/2006	10:20	400	9.17	18.97	900	47	6.79	200	0.00
		10:30	400	9.09	19.25	882	68	4.49	143	1.06
		10:40	400	9.29	19.09	877	84	4.25	108	2.11
		10:50	400	9.75	19.55	903	72	3.99	100	3.17
		11:00	400	11.62	19.96	1190	-20	3.85	110	4.23
		11:10	400	12.28	19.84	1910	-30	4.42	200	5.28
		11:20	400	12.61	20.52	2320	-57	5.13	150	6.34
		11:30	400	12.68	20.45	2390	-58	5.12	120	7.40
		11:40	400	12.67	20.46	2370	-54	5.11	110	8.45

TABLE 4.5

FIELD MEASUREMENT RESULTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Date*	*Time*	*Pumping Rate (mL/min)* (1)	*pH (Std. Units)* (2)	*Temperature (°C)* (3)	*Conductivity (µS/cm)* (4)	*ORP (mV)* (5) (6)	*DO (mg/L)* (7) (8)	*Turbidity (NTU)* (9)	*Volume Purged (gallons)*
MW-TMI-18D	8/8/2006	13:00	400	7.00	17.22	1050	24	17.45	212	0.00
		13:10	400	7.72	17.25	1070	33	15.60	350	1.06
		13:20	400	7.73	16.40	1050	34	8.00	490	2.11
		13:30	400	8.13	16.67	1040	9	6.49	380	3.17
		13:40	400	8.34	16.71	1040	0	5.81	310	4.23
		13:50	400	8.47	16.44	1040	-13	5.54	240	5.28
		14:00	400	8.49	16.48	1040	-11	5.51	227	6.34
		14:10	400	8.46	16.46	1050	-9	5.53	220	7.40
MW-TMI-16I	8/8/2006	9:15	400	6.94	21.04	1280	72	7.46	690	0.00
		9:25	400	6.93	21.04	1290	72	7.32	722	1.06
		9:35	400	6.91	20.89	1320	65	6.36	509	2.11
		9:45	400	7.09	20.89	1300	33	6.74	684	3.17
		9:55	400	7.67	20.57	1290	9	7.05	730	4.23
		10:05	400	7.82	19.91	1240	-4	5.88	NR	5.28
		10:15	400	7.83	19.96	1200	-7	5.32	NR	6.34
		10:25	400	7.81	19.94	1200	-7	5.29	NR	7.40
		10:35	400	7.82	19.95	1210	-7	5.30	NR	8.45
MW-TMI-16D	8/8/2006	10:45	400	10.57	20.83	1020	-36	13.30	171	0.00
		10:55	400	7.47	22.90	1050	67	7.92	99	1.06
		11:05	400	7.54	20.17	1010	54	7.88	100	2.11
		11:15	400	7.52	20.32	990	39	8.25	91	3.17
		11:25	400	7.50	20.24	980	35	8.52	84	4.23
		11:35	400	7.48	20.06	970	34	8.43	86	5.28
		11:45	400	7.48	19.58	970	34	8.43	90	6.34
		11:55	400	7.49	19.60	980	35	8.41	91	7.40

Notes:

(1) mL/min - milliLiters per minute
(2) Std. Units - standard units
(3) °C - degrees Celsius
(4) µS/cm - microSiemens per centimeter
(5) ORP - oxidation-reduction potential
(6) mV - milliVolts
(7) DO - dissolved oxygen
(8) mg/L - milligrams per Liter
(9) NTU - nephelometric turbidity units
(10) NR - not recorded

TABLE 5.1

SUMMARY OF CALCULATED VERTICAL GRADIENTS
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Top of Screen Elevation (ft AMSL)*	*Bottom of Screen Elevation (ft AMSL)*	*Mid-Point of Screen Elevation (ft AMSL)*	*June 5, 2006*		*July 31, 2006*	
				Water Level (ft AMSL)	*Vertical Gradient (ft/ft downward)* (1)	*Water Level (ft AMSL)*	*Vertical Gradient (ft/ft downward)* (1)
Between Overburden and Bedrock							
MW-TMI-4S	291.06	276.06	283.56	279.25	-0.002	280.29	0.002
MW-TMI-4I	266.00	246.00	256.00	279.30		280.24	
MW-TMI-10S	283.31	273.31	278.31	279.34	-0.003	279.69	0.055
MW-TMI-10I	266.29	238.29	252.29	279.42		278.27	
MW-TMI-13S	289.39	274.39	281.89	280.30	0.072	280.99	0.083
MW-TMI-13I	265.22	235.22	250.22	278.02		278.35	
MW-TMI-14S	290.04	275.04	282.54	280.76	0.032	280.33	-0.004
MW-TMI-14I	264.05	241.05	252.55	279.80		280.45	
Within Upper Bedrock							
MW-TMI-4I	266.00	246.00	256.00	279.30	0.005	280.24	0.001
MW-TMI-5D	236.28	202.28	219.28	279.12		280.21	
MW-TMI-6I	271.44	239.44	255.44	280.21	0.008	280.23	0.009
MW-TMI-6D	229.47	201.47	215.47	279.91		279.88	
MW-TMI-10I	266.29	238.29	252.29	279.42	0.000	278.27	0.005
MW-TMI-10D	228.26	201.26	214.76	279.43		278.07	
MW-TMI-14I	264.05	241.05	252.55	279.80	0.012	280.45	0.028
MW-TMI-14D	227.96	200.96	214.46	279.36		279.38	

Notes:

ft AMSL - feet above mean sea level
(1) - Positive value denotes downward vertical gradient; negative value denotes upward vertical gradient

TABLE 5.2

ANALYTICAL RESULTS SUMMARY - TRITIUM IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Sample Identification*	*QC Sample*	*Sample Date*	*Tritium (pCi/L)*	*Result Error*
#3	WG-TMI-3-060606-JC-034		6/6/2006	ND (200)	-
48N	WG-TMI-48N-053106-JC-009		5/31/2006	223	+/-114
48N	WG-TMI-48N-053106-JC-010	Duplicate (009)	5/31/2006	ND (200)	-
48S	WG-TMI-48S-053106-JC-013		5/31/2006	223	+/-116
Closed Demo DW10	WG-TMI-DW10-061206-MMM-061		6/12/2006	ND (200)	-
E1-2	WG-TMI-E1-2-060606-MMM-036		6/6/2006	ND (200)	-
MS-1	WG-TMI-MS-1-053106-JAS-011		5/31/2006	2870	+/-176
MS-2	WG-TMI-MS2-060206-JAS-028		6/2/2006	ND (200)	-
MS-3	WG-TMI-MS-3-060506-JC-032		6/5/2006	278	+/-122
MS-3	WG-TMI-MS-3-060506-JC-033	Duplicate (032)	6/5/2006	ND (200)	-
MS-4	WG-TMI-MS-4-060706-JC-050		6/7/2006	472 J	+/-131
MS-4	WG-TMI-MS-4-060706-JC-051	Duplicate (050)	6/7/2006	426 J	+/-128
MS-5	WG-TMI-MS-5-060606-EV-039		6/6/2006	ND (200)	-
MS-6	WG-TMI-MS-6-060606-EV-040		6/6/2006	ND (200)	-
MS-7	WG-TMI-MS-7-053106-JAS-015		5/31/2006	305	+/-115
MS-8	WG-TMI-MS8-060506-MMM-030		6/5/2006	799	+/-126
MS-19	WG-TMI-MS-19-053106-JAS-017		5/31/2006	254	+/-117
MS-20	WG-TMI-MS-20-060706-EV-047		6/7/2006	390 J	+/-127
MS-21	WG-TMI-MS-21-060706-EV-048		6/7/2006	408 J	+/-129
MS-22	WG-TMI-MS-22-060706-MMM-049		6/7/2006	1050	+/-166
MW-1	WG-TMI-MW-1-052606-JC-004		5/26/2006	ND (200)	-
MW-2	WG-TMI-MW-2-052606-JC-002		5/26/2006	263	+/-121
MW-3	WG-TMI-MW-3-052606-JC-003		5/26/2006	ND (200)	-
MW-4	WG-TMI-MW-4-052606-JAS-001		5/26/2006	ND (200)	-
MW-TMI-1D	WG-TMI-1D-060106-JC-021		6/1/2006	440	+/-127
MW-TMI-2D	WG-TMI-MW-2D-060106-EV-027		6/1/2006	954	+/-153
MW-TMI-3I	WG-TMI-3I-060806-JC-058		6/8/2006	292	+/-112
MW-TMI-4I	WG-TMI-MW-4I-060106-JAS-020		6/1/2006	236	+/-114
MW-TMI-4S	WG-TMI-4S-060806-EV-055		6/8/2006	ND (200)	-
MW-TMI-5D	WG-TMI-5D-060806-EV-054		6/8/2006	298	+/-112
MW-TMI-6D	WG-TMI-6D-053106-EV-018		5/31/2006	275	+/-117
MW-TMI-6I	WG-TMI-MW-6I-053106-JC-019		5/31/2006	772	+/-144
MW-TMI-7S	WG-TMI-7S-060806-JC-057		6/8/2006	237	+/-117
MW-TMI-8S	WG-TMI-8S-060106-JC-023	Duplicate (024)	6/1/2006	349	+/-112
MW-TMI-8S	WG-TMI-8S-060106-JC-024		6/1/2006	246	+/-109
MW-TMI-9I	WG-TMI-9I-080406-MM-102		8/4/2006	ND (200)	-
MW-TMI-10D	WG-TMI-MW10D-061306-MMM-064		6/13/2006	522 J	+/-130
MW-TMI-10D	WG-TMI-MW10D-061306-MMM-065	Duplicate (064)	6/13/2006	631 J	+/-136
MW-TMI-10I	WG-TMI-MW-10I-060106-JAS-005		6/1/2006	13500	+/-1390
MW-TMI-10S	WG-TMI-10S-060106-JAS-022		6/1/2006	11500	+/-1200
MW-TMI-12S	WG-TMI-MW12S-061406-MMM-067		6/14/2006	2690	+/-319
MW-TMI-13I	WG-TMI-MW-13I-060806-MMM-056		6/8/2006	2250	+/-161
MW-TMI-13S	WG-TMI-13S-060806-JC-059		6/8/2006	403	+/-115
MW-TMI-14D	WG-TMI-MW14D-061306-MMM-063		6/13/2006	1510	+/-204
MW-TMI-14I	WG-TMI-14I-060706-JC-053		6/7/2006	597 J	+/-140
MW-TMI-16D	WG-TMI-16D-080806-MM-105		8/8/2006	416 J	+/-131
MW-TMI-16I	WG-TMI-16I-080806-MM-104		8/8/2006	504 J	+/-135
MW-TMI-17D	WG-TMI-17D-080406-MM-101		8/4/2006	ND (200)	-
MW-TMI-17I	WG-TMI-17I-080406-MM-100		8/4/2006	292	+/-124
MW-TMI-18D	WG-TMI-18D-080806-MM-106		8/8/2006	225 J	+/-119
MW-TMI-19D	WG-TMI-19D-080906-MM-108		8/9/2006	317	+/-126
MW-TMI-19D	WG-TMI-DUP-080906-MM-110	Duplicate (108)	8/9/2006	331	+/-129
MW-TMI-19I	WG-TMI-19I-080906-MM-109		8/9/2006	257	+/-119
N2-1	WG-TMI-N2-1-060606-MMM-043		6/6/2006	ND (200)	-
NW-A	WG-TMI-NW-A-053006-JC-005		5/30/2006	1480	+/-200
NW-B	WG-TMI-NW-B-053006-JC-006		5/30/2006	2420	+/-293

TABLE 5.2

ANALYTICAL RESULTS SUMMARY - TRITIUM IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Sample Identification*	*QC Sample*	*Sample Date*	*Tritium (pCi/L)*	*Result Error*
NW-C	WG-TMI-NW-C-053006-JC-007		5/30/2006	3650	+/-416
OS-13B	WG-TMI-OS13B-060506-MMM-031		6/5/2006	261	+/-107
OS-14	WG-TMI-OS14-060606-EV-038		6/6/2006	ND (200)	-
OS-18	WG-TMI-OS-18-053106-MM-014		5/31/2006	399	+/-126
OSF	WG-TMI-OSF-053006-JC-008		5/30/2006	424	+/-124
RW-2	WG-TMI-RW-2-060606-JC-044		6/6/2006	5660	+/-621
RW-2	WG-TMI-RW-2-060606-JC-045	Duplicate (044)	6/6/2006	6700	+/-723
Training Center	WG-TMI-TRAINING-CTR-060606-MMM-037		6/6/2006	ND (200)	-
UST Closure Well	WG-TMI-UST-053106-JC-016		5/31/2006	ND (200)	-

Notes:

Samples analyzed by: Teledyne Brown Engineering, Inc.
QC - Quality Control
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
- - Non-detect value, +/- value not reported.
J - Estimated concentration.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-4I*	*MW-TMI-4I*	*48N*	*48N*	*48N*	*48N*	*48S*	*48S*
Sample Identification:		*WG-TMI-3-060606-JC-034*	*Result*	*WG-TMI-48N-053106-JC-009*	*Result*	*WG-TMI-48N-053106-JC-010*	*Result*	*WG-TMI-48S-053106-JC-013*	*Result*
Sample Date:		*6/6/2006*	*Error*	*5/31/2006*	*Error*	*5/31/2006*	*Error*	*5/31/2006*	*Error*
Sample Type						*Duplicate*			
	Units								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10)	-	ND (10) U*	-	ND (10) U*	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30)	-	ND (30) U*	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location: *Sample Identification:* *Sample Date:* Sample Type	*Units*	*Closed Demo DW10* *WG-TMI-DW10-061206-MMM-061* *6/12/2006*	*Closed Demo DW10* *Result* *Error*	*E1-2* *WG-TMI-E1-2-060606-MMM-036* *6/6/2006*	*E1-2* *Result* *Error*	*MS-1* *WG-TMI-MS-1-053106-JAS-011* *5/31/2006*	*MS-1* *Result* *Error*	*MS-2* *WG-TMI-MS2-060206-JAS-028* *6/2/2006*	*MS-2* *Result* *Error*
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10) U*	-	ND (10) U*	-	ND (10)	-	ND (10)	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10) U*	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30) U*	-	ND (30) U*	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	7.54	+/-4.513	9.399	+/-5.916	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
-- Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MS-3*	*MS-3*	*MS-3*	*MS-3*	*MS-4*	*MS-4*	*MS-4*	*MS-4*
Sample Identification:		*WG-TMI-MS-3-060506-JC-032*	*Result*	*WG-TMI-MS-3-060506-JC-033*	*Result*	*WG-TMI-MS-4-060706-JC-050*	*Result*	*WG-TMI-MS-4-060706-JC-051*	*Result*
Sample Date:		*6/5/2006*	*Error*	*6/5/2006*	*Error*	*6/7/2006*	*Error*	*6/7/2006*	*Error*
Sample Type				*Duplicate*				*Duplicate*	
	Units								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10) U*	-	ND (10)	-	ND (10)	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30) U*	-	ND (30)	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	63.97	+/-39.72	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MS-5*	*MS-5*	*MS-6*	*MS-6*	*MS-7*	*MS-7*	*MS-8*	*MS-8*
Sample Identification:		*WG-TMI-MS-5-060606-EV-039*	*Result*	*WG-TMI-MS-6-060606-EV-040*	*Result*	*WG-TMI-MS-7-053106-JAS-015*	*Result*	*WG-TMI-MS8-060506-MMM-030*	*Result*
Sample Date:		*6/6/2006*	*Error*	*6/6/2006*	*Error*	*5/31/2006*	*Error*	*6/5/2006*	*Error*
Sample Type	*Units*								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10) U*	-	ND (10)	-	ND (10)	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	141.1	+/-40.15	RNI	--	89.73	+/-47.9
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MS-19*	*MS-19*	*MS-20*	*MS-20*	*MS-21*	*MS-21*	*MS-22*	*MS-22*	*MW-1*
Sample Identification:		*WG-TMI-MS-19-053106-JAS-017*	*Result*	*WG-TMI-MS-20-060706-EV-047*	*Result*	*WG-TMI-MS-21-060706-EV-048*	*Result*	*WG-TMI-MS-22-060706-MMM-049*	*Result*	*WG-TMI-MW-1-052606-JC-004*
Sample Date:		*5/31/2006*	*Error*	*6/7/2006*	*Error*	*6/7/2006*	*Error*	*6/7/2006*	*Error*	*5/26/2006*
Sample Type										
	Units									
Target Radionuclides										
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)
Cesium-134	pCi/L	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-	ND (10) U*
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)
Zinc-65	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30) U*	-	ND (30) U*
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)
Non-Target Radionuclides (1)										
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI
Thorium-228	pCi/L	RNI	--	RNI	--	15.83	+/-6.711	RNI	--	RNI

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
-- Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-1*	*MW-2*	*MW-2*	*MW-3*	*MW-3*	*MW-4*	*MW-4*
Sample Identification:		*Result*	*WG-TMI-MW-2-052606-JC-002*	*Result*	*WG-TMI-MW-3-052606-JC-003*	*Result*	*WG-TMI-MW-4-052606-JAS-001*	*Result*
Sample Date:		*Error*	*5/26/2006*	*Error*	*5/26/2006*	*Error*	*5/26/2006*	*Error*
Sample Type								
	Units							
Target Radionuclides								
Barium-140	pCi/L	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	-	ND (10)	-	ND (10)	-	ND (10)	-
Cesium-137	pCi/L	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	-	ND (30)	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)								
Actinium-228	pCi/L	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-1D*	*MW-TMI-1D*	*MW-TMI-2D*	*MW-TMI-2D*	*MW-TMI-3I*	*MW-TMI-3I*	*MW-TMI-4I*	*MW-TMI-4I*
Sample Identification:		*WG-TMI-1D-060106-JC-021*	*Result*	*WG-TMI-MW-2D-060106-EV-027*	*Result*	*WG-TMI-3I-060806-JC-058*	*Result*	*WG-TMI-MW-4I-060106-JAS-020*	*Result*
Sample Date:		*6/1/2006*	*Error*	*6/1/2006*	*Error*	*6/8/2006*	*Error*	*6/1/2006*	*Error*
Sample Type	*Units*								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10) U*	-	ND (10)	-	ND (10) U*	-	ND (10)	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30)	-	ND (30) U*	-	ND (30) U*	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	168.8	+/-42.56	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	9.307	+/-5.607	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
-- Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-4S*	*MW-TMI-4S*	*MW-TMI-5D*	*MW-TMI-5D*	*MW-TMI-6D*	*MW-TMI-6D*	*MW-TMI-6I*	*MW-TMI-6I*
Sample Identification:		*WG-TMI-4S-060806-EV-055*	*Result*	*WG-TMI-5D-060806-EV-054*	*Result*	*WG-TMI-6D-053106-EV-018*	*Result*	*WG-TMI-MW-6I-053106-JC-019*	*Result*
Sample Date:		*6/8/2006*	*Error*	*6/8/2006*	*Error*	*5/31/2006*	*Error*	*5/31/2006*	*Error*
Sample Type	*Units*								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-7S*	*MW-TMI-7S*	*MW-TMI-8S*	*MW-TMI-8S*	*MW-TMI-8S*	*MW-TMI-8S*	*MW-TMI-9I*	*MW-TMI-9I*
Sample Identification:		*WG-TMI-7S-060806-JC-057*	*Result*	*WG-TMI-8S-060106-JC-023*	*Result*	*WG-TMI-8S-060106-JC-024*	*Result*	*WG-TMI-9I-080406-MM-102*	*Result*
Sample Date:		*6/8/2006*	*Error*	*6/1/2006*	*Error*	*6/1/2006*	*Error*	*8/4/2006*	*Error*
Sample Type				*Duplicate*					
	Units								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10) U*	-	ND (10)	-	ND (10)	-	ND (10) U*	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10) U*	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	--
Zinc-65	pCi/L	ND (30) U*	-	ND (30)	-	ND (30)	-	ND (30) U*	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
-- Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-10D*	*MW-TMI-10D*	*MW-TMI-10D*	*MW-TMI-10D*	*MW-TMI-10I*	*MW-TMI-10I*	*MW-TMI-10S*	*MW-TMI-10S*
Sample Identification:		*WG-TMI-MW10D-061306-MMM-064*	*Result*	*WG-TMI-MW10D-061306-MMM-065*	*Result*	*WG-TMI-MW-10I-060106-JAS-005*	*Result*	*WG-TMI-10S-060106-JAS-022*	*Result*
Sample Date:		*6/13/2006*	*Error*	*6/13/2006*	*Error*	*6/1/2006*	*Error*	*6/1/2006*	*Error*
Sample Type				*Duplicate*					
	Units								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10) U*	-	ND (10) U*	-	ND (10)	-	ND (10)	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10) U*	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30) U*	-	ND (30) U*	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	10.83	+/-5.906

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-13I*	*MW-TMI-13I*	*MW-TMI-13S*	*MW-TMI-13S*	*MW-TMI-14D*	*MW-TMI-14D*	*MW-TMI-14I*	*MW-TMI-14*
Sample Identification:		*IG-TMI-MW-13I-060806-MMM-05*	*Result*	*WG-TMI-13S-060806-JC-059*	*Result*	*IG-TMI-MW14D-061306-MMM-0*	*Result*	*WG-TMI-14I-060706-JC-053*	*Result*
Sample Date:		*6/8/2006*	*Error*	*6/8/2006*	*Error*	*6/13/2006*	*Error*	*6/7/2006*	*Error*
Sample Type	*Units*								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30) U*	-	ND (30) U*	-	ND (30) U*	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
-- Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-16D*	*W-TMI-1(*	*MW-TMI-16I*	*W-TMI-1*	*MW-TMI-17D*	*W-TMI-1:*	*MW-TMI-17I*	*W-TMI-1:*
Sample Identification:		*WG-TMI-16D-080806-MM-105*	*Result*	*WG-TMI-16I-080806-MM-104*	*Result*	*WG-TMI-17D-080406-MM-101*	*Result*	*WG-TMI-17I-080406-MM-100*	*Result*
Sample Date:		*8/8/2006*	*Error*	*8/8/2006*	*Error*	*8/4/2006*	*Error*	*8/4/2006*	*Error*
Sample Type									
	Units								
Target Radionuclides									
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10) U*	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10) U*	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	–	ND (2)	–
Zinc-65	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30) U*	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)									
Actinium-228	pCi/L	RNI	–	RNI	–	RNI	–	RNI	–
Potassium-40	pCi/L	RNI	–	RNI	–	RNI	–	RNI	–
Thorium-228	pCi/L	RNI	–	RNI	–	RNI	–	RNI	–

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*MW-TMI-18D*	*W-TMI-1*	*MW-TMI-19D*	*W-TMI-1*	*MW-TMI-19D*	*W-TMI-1*	*MW-TMI-19I*	*W-TMI-1*	*N2-1*	*N2-1*
Sample Identification:		*WG-TMI-18D-080806-MM-106*	*Result*	*WG-TMI-19D-080906-MM-108*	*Result*	*WG-TMI-DUP-080906-MM-110*	*Result*	*WG-TMI-19I-080906-MM-109*	*Result*	*WG-TMI-N2-1-060606-MMM-043*	*Result*
Sample Date:		*8/8/2006*	*Error*	*8/9/2006*	*Error*	*8/9/2006*	*Error*	*8/9/2006*	*Error*	*6/6/2006*	*Error*
Sample Type						*Duplicate*					
	Units										
Target Radionuclides											
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10) U*	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10) U*	-	ND (10) U*	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30) U*	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)											
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	20.16	+/-11.25
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	66.55	+/-37.1
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*NW-A*	*NW-A*	*NW-B*	*NW-B*	*NW-C*	*NW-C*	*OS-13B*	*OS-13B*	*OS-14*	*OS-14*
Sample Identification:		*WG-TMI-NW-A-053006-JC-005*	*Result*	*WG-TMI-NW-B-053006-JC-006*	*Result*	*-NW-C-05300*	*Result*	*S13B-060506-*	*Result*	*-OS14-06060*	*Result*
Sample Date:		*5/30/2006*	*Error*	*5/30/2006*	*Error*	*5/30/2006*	*Error*	*6/5/2006*	*Error*	*6/6/2006*	*Error*
Sample Type											
	Units										
Target Radionuclides											
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-	ND (10)	-	ND (10) U*	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10) U*	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30)	-	ND (30) U*	-	ND (30)	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)											
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI	--
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI	--
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI	--

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

TABLE 5.3

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN GROUNDWATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*OS-18*	*OS-18*	*OSF*	*OSF*	*RW-2*	*RW-2*	*RW-2*	*RW-2*	*Training Center*	*Training Center*	*UST Closure Well*	*UST Closure Well*
Sample Identification:		*OS-18-05310t*	*Result*	*T-OSF-05300t*	*Result*	*'-RW-2-06060*	*Result*	*'-RW-2-06060*	*Result*	*WG-TMI-TRAINING-CTR-060606-MMM-037*	*Result*	*WG-TMI-UST-053106-JC-016*	*Result*
Sample Date:		*5/31/2006*	*Error*	*5/30/2006*	*Error*	*6/6/2006*	*Error*	*6/6/2006*	*Error*	*6/6/2006*	*Error*	*5/31/2006*	*Error*
Sample Type								*Duplicate*					
	Units												
Target Radionuclides													
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-	ND (10) U*	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30) U*	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-
Non-Target Radionuclides (1)													
Actinium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI	--	RNI	
Potassium-40	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	101	+/-47.42	RNI	
Thorium-228	pCi/L	RNI	--	RNI	--	RNI	--	RNI	--	RNI	--	RNI	

Notes:

Samples analyzed by: Teledyne Brown
(1) - These non-targeted radionuclides are included in this table but excluded from the discussion in this report. These radionuclides were either a) naturally occurring and thus not produced by the Station, or b) could be definitively evaluated as being naturally occurring due to the lack of presence of other radionuclides which would otherwise indicate the potential of production from the Station.
RNI- Radionuclide Not Identified during analysis.
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds Minimum Detectable Concentration and 3 sigma.
-- Non-detect value, +/- value not reported.

TABLE 5.4

ANALYTICAL RESULTS SUMMARY - TRITIUM IN SURFACE WATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location	*Sample Identification*	*Sample Date*	*Tritium (pCi/L)*	*Result Error*
A3-2	WS-TMI-SWA3-2-060606-MMM-041	6/6/2006	ND (200)	-
J1-2	WS-TMI-SWJ1-2-060606-MMM-035	6/6/2006	ND (200)	-
Q9-1	WS-TMI-SWQ9-1-060606-MMM-042	6/6/2006	ND (200)	-

Notes:

Samples analyzed by: Teledyne Brown Engineering, Inc.
QC - Quality Control
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
- - Non-detect value, +/- value not reported.

TABLE 5.5

ANALYTICAL RESULTS SUMMARY - RADIONUCLIDES IN SURFACE WATER
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Sample Location:		*A3-2*	*A3-2*	*J1-2*	*J1-2*	*Q9-1*	*Q9-1*
Sample Identification:		*WS-TMI-SWA3-2-060606-MMM-041*	*Result*	*WS-TMI-SWJ1-2-060606-MMM-035*	*Result*	*WS-TMI-SWQ9-1-060606-MMM-042*	*Result*
Sample Date:		*6/6/2006*	*Error*	*6/6/2006*	*Error*	*6/6/2006*	*Error*
Target Radionuclides	*Units*						
Barium-140	pCi/L	ND (60)	-	ND (60)	-	ND (60)	-
Cesium-134	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-
Cesium-137	pCi/L	ND (18)	-	ND (18)	-	ND (18)	-
Cobalt-58	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-
Cobalt-60	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-
Fe-59	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-
Lanthanum-140	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-
Manganese-54	pCi/L	ND (15)	-	ND (15)	-	ND (15)	-
Niobium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-
Strontium - 89/90 (Total)	pCi/L	ND (2)	-	ND (2)	-	ND (2)	-
Zinc-65	pCi/L	ND (30)	-	ND (30)	-	ND (30)	-
Zirconium-95	pCi/L	ND (10)	-	ND (10)	-	ND (10)	-

Notes:

Samples analyzed by: Teledyne Brown
ND ( ) - Non-detect; value in parentheses is the LLD.
LLD - Lower limit of detection.
U* - Compound/Analyte not detected.
Peak not identified, but forced activity
concentration exceeds Minimum
Detectable Concentration and 3 sigma.
- - Non-detect value, +/- value not reported.

APPENDIX A

EXISTING MONITORING WELL INVENTORY

DRAFT
PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT COMMUNICATION
ATTORNEY WORK PRODUCT

TABLE A.1

EXISTING MONITORING WELL INVENTORY
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Well ID	*Status*	*Install Date*	*Surface Elev (ft)*	*Casing Elev (ft)*	*Northing*	*Easting*	*Total Depth (ft)*	*Depth to Rock (ft)*	*Screen Top (ft)*	*Screen Bot (ft)*	*Well Material*	*Well Diam (in)*
#1	Active	1990	303.60	303.68	14587740.7650	1158657.8520	26.0	25.0	Screened	Screened	PVC	6 4-in casing
#2	Active	1990	303.46	304.01	14587741.3283	1158637.2844	25.0	20.5	Screened	Screened	PVC	6 4-in casing
#3	Active	1990	303.43	303.43	14587724.6280	1158657.3320	28.5	27.0	Screened	Screened	PVC	6 4-in casing
41-1	Abandoned	1998	290.00	grade (2)	Not Listed	Not Listed	22.0 (2)	Not Active Wells - It is believed that these locations were soil sampling borings conducted by PECO for plant purchase due diligence by PECO.				
41-2	Abandoned	1998	290.00	grade (2)	Not Listed	Not Listed	22.0 (2)	Not Active Wells - It is believed that these locations were soil sampling borings conducted by PECO for plant purchase due diligence by PECO.				
48N	Active	1989	299.05	grade (2)	14589118.8410	1158587.8880	38.0 (2)	22.0 (2)	Screened	Screened	C. Steel	6-in 25 ft 4-in 38 ft
48S	Active	1991	300.30	300.3 +	302084.924 (1)	2286529.0504 (1)	996.0	26.0	Not Listed	Not Listed	C. Steel	6-in 123 ft 10-in 29 ft
GP-1	Active	1999	301.93	301.90 (2)	14587336.1680	1157958.0300	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-2	Cannot Locate	1999	GP-2 cannot be visually located in the field; appears to be covered with gravel.				15.0 (2)	15.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-3	Cannot Locate	1999	GP-3 cannot be visually located in the field; appears to be covered with gravel.				20.0 (2)	20.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-4	Active	1999	301.60	302.18 (2)	14587288.9629	1157958.7572	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-5	Abandoned	1999	GP-5 removed from service. Not available for sampling				25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-6	Active	1999	302.11	302.05 (2)	14587239.4011	1157955.5351	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-7	Active	1999	302.21	303 (2)	14587189.4960	1157953.5950	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-8	Active	1999	304.55	304.41 (2)	14587133.2183	1157952.8121	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-9	Active	1999	301.60	302.18 (2)	14587207.8044	1157954.0784	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-10	Active	1999	301.48	302.05 (2)	14587312.1428	1157959.1811	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-11	Active	1999	301.49	302.06 (2)	14587267.6129	1157958.1733	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
GP-12	Active	1999	301.66	301.45 (2)	14587328.5428	1158084.5088	25.0 (2)	25.0 (2)	Not Listed	Not Listed	PVC	2-in
MEK-01	Abandoned	1998	297.00	grade (2)	Not Listed	Not Listed	25.0 (2)	Not Active Wells. These locations were soil sample borings conducted for MEK spill investigation. Soil borings were located in the North Parking Lot east of Building 48.				
MEK-02	Abandoned	1998	297.00	grade (2)	Not Listed	Not Listed	22.0 (2)	Not Active Wells. These locations were soil sample borings conducted for MEK spill investigation. Soil borings were located in the North Parking Lot east of Building 48.				
MEK-03	Abandoned	1998	297.00	grade (2)	Not Listed	Not Listed	20.0 (2)	Not Active Wells. These locations were soil sample borings conducted for MEK spill investigation. Soil borings were located in the North Parking Lot east of Building 48.				

DRAFT
PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT COMMUNICATION
ATTORNEY WORK PRODUCT

TABLE A.1

EXISTING MONITORING WELL INVENTORY
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Well ID	*Status*	*Install Date*	*Surface Elev (ft)*	*Casing Elev (ft)*	*Northing*	*Easting*	*Total Depth (ft)*	*Depth to Rock (ft)*	*Screen Top (ft)*	*Screen Bot (ft)*	*Well Material*	*Well Diam (in)*
MS-1	Active	1980	305.80	306.19	14588363.7088	1158543.6468	47.0	27.5	18.0	43.0	C. Steel PVC	8-in 5 ft 6-in 46 ft
MS-2	Active	1980	306.14	306.63	14587299.7200	1158585.3300	49.0	33.8	15.0	42.5	C. Steel PVC	8-in 5 ft 6-in 46 ft
MS-3	Active	1980	304.76	305.42	14587177.5101	1158563.6087	42.5	25.9	14.2	39.0	C. Steel PVC	8-in 5 ft 6-in 42 ft
MS-4	Active	1980	301.50	301.94	14586858.7209	1158608.0367	44.0	25.0	15.5	40.5	C. Steel PVC	8-in 5 ft 6-in 44 ft
MS-5	Active	1980	304.20	304.71	14586935.0455	1158296.2349	43.0	26.1	17.0	41.5	C. Steel PVC	8-in 5 ft 6-in 45 ft
MS-6	Active	1980	303.52	304.10	14586938.2669	1158196.8296	43.0	23.5	13.0	38.0	C. Steel PVC	8-in 5 ft 6-in 42 ft
MS-7	Active	1980	303.36	304.85	14587126.0776	1158068.1737	40.0	23.9	14.0	40.0	C. Steel PVC	8-in 5 ft 6-in 42 ft
MS-8	Active	1980	303.94	304.38	14587356.9334	1158229.1277	44.0	24.0	16.5	41.5	C. Steel PVC	8-in 5 ft 6-in 45 ft
MS-19	Active	1990s	303.12	303.33	14587739.1561	1158862.8854	35.0 (2)	10.0 (2)	20.0 (2)	35.0 (2)	C. Steel PVC	8-in 4-in
MS-20	Active	1990s	303.27	303.47	14587862.3687	1158207.6347	40.0 (2)	15.0 (2)	25.0 (2)	40.0 (2)	C. Steel PVC	8-in 4-in
MS-21	Active	1990s	303.89	304.13	14588029.7281	1158297.1942	40.0 (2)	15.0 (2)	25.0 (2)	.0 (2)40	C. Steel PVC	8-in 4-in
MS-22	Active	1990s	304.89	304.22	300801.8167 (1)	2286189.6568 (1)	45.0 (2)	10.0 (2)	20.0 (2)	45.0 (2)	C. Steel PVC	8-in 4-in
MW-1	Active	1984	295.51	296.50	14587648.0120	1159367.0420	35.0	20 to 30	20	30	PVC	2-in PVC
MW-2	Active	1984	297.41	298.00	14588179.4480	1159284.4410	34.5	20 to 30	20	30	C. Steel PVC	4-in Steel 2-in PVC
MW-3	Active	1984	310.41	311.40	14588166.7831	1159430.3167	49.0	20 to 30	20	30	C. Steel PVC	4-in Steel 2-in PVC
MW-4	Active	1984	296.87	296.40	14588716.4169	1159384.6046	35.0	20 to 30	20	30	C. Steel PVC	4-in Steel 2-in PVC
NW-A	Active	1996	303.57	300.58	14587619.7161	1157893.8083	400.0 (2)	26.0 (2)	Not Listed	Not Listed	C. Steel C. Steel	4-in Steel 6-in 52 ft
NW-B	Active	1996	304.13	301.16	14587523.3742	1157872.2815	500.0 (2)	25.0 (2)	Not Listed	Not Listed	C. Steel	6-in 52 ft
NW-C	Active	1996	303.88	300.85	14587420.0378	1157868.3592	400.0 (2)	25.0 (2)	Not Listed	Not Listed	C. Steel	6-in 52 ft
OS-9	Active	1980	306.00	306.21	14587314.2600 (1)	1158536.9200 (1)	28.0	27.1	14.7	27.5	PVC C. Steel	4-in 5 ft 2-in 30 ft
OS-10	Abandoned	1980	305.00	306.90	300448.3800 (1)	2286586.3100 (1)	27.1	26.8	11.8	24.6	PVC C. Steel	4-in 5 ft 2-in 27 ft

DRAFT
PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT COMMUNICATION
ATTORNEY WORK PRODUCT

TABLE A.1

EXISTING MONITORING WELL INVENTORY
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Well ID	*Status*	*Install Date*	*Surface Elev (ft)*	*Casing Elev (ft)*	*Northing*	*Easting*	*Total Depth (ft)*	*Depth to Rock (ft)*	*Screen Top (ft)*	*Screen Bot (ft)*	*Well Material*	*Well Diam (in)*
OS-11	Abandoned	1980	There are no records of groundwater sampling from OS-11. Construction information indicates well construction was attempted in 1980 but not completed for reasons not recorded in reviewed package.									
OS-12	Abandoned	1980	There are no records of groundwater sampling from OS-12. Construction information indicates well construction was attempted in 1980 but not completed for reasons not recorded in reviewed package.									
OS-13B	Active	1980	303.74	304.21	14587268.9594	1158217.9944	42.5	23.6	17.0	42.0	PVC C. Steel	4-in 5 ft 2-in 44 ft
OS-14	Active	1980	305.80	306.43	14587085.7117	1158210.5718	46.0	31.5	46.0	46.0	PVC C. Steel	4-in 5 ft 2-in 48 ft
OS-15	In-active	1980	285.00	287.20	292985.0000 (1)	2287765.0000 (1)	19.7	8.6	9.7	19.7	PVC C. Steel	4-in 5 ft 2-in 22 ft
OS-16	Active	1980	303.72	304.42	14587332.4973	1158497.0038	27.8	27.2	13.0	26.5	PVC C. Steel	4-in 5 ft 2-in 29 ft
OS-17	Active	1980	305.61	306.66	14587298.6998	1158557.9882	28.0	27.6	17.6	27.6	PVC C. Steel	4-in 5 ft 2-in 30 ft
OS-18	Active	1980	301.92	302.04	14587263.8979	1157928.2969	26.0 (2)	26.0 (2)	16.0 (2)	26.0 (2)	PVC C. Steel	4-in PVC 6-in Steel
OSF Well	Active	1986	304.55	305.73 + (2)	Not Listed	Not Listed	775.0 (2)	35.0 (2)	Not Listed	Not Listed	C. Steel	6-in 126 ft 10-in 26 ft
RW-1	Active	1992	303.44	303.74	14587746.0320	1158656.3200	35.0	27.5	15.0	35.0	PVC	6-in
RW-2	Active	1992	303.51	303.91	14587864.1534	1158684.4225	35.0	27.5	15.0	35.0	PVC	6-in
Training Ctr Well	Active	1981	331.90	337 + (2)	14587301.5640	1160967.9940	100.0 (2)	13.0 (2)	Not Listed	Not Listed	C. Steel	6-in 63 ft
E1-2	Active	1971	337.00	337 + (2)	Not Listed	Not Listed	121.0 (2)	Not Listed	Not Listed	Not Listed	C. Steel	6-in
UST Closure	Active	1990	299.30	300 (2)	14585392.3572	1158388.1380	30.0 (2)	30.0 (2)	Screened	Screened	PVC C. Steel	6-in 2-in 17 ft
Closed Demo Landfill	Active	1980s	Variable South TMI Area	Variable South TMI Area	14583912.9629	1158351.2159	Variable (2)	Variable (2)	Variable (2)	Slotted PVC	Slotted PVC	4-in PVC
N2-1	Active	Unknown	River Bank West Shore	Unknown	West shore	commercial est.	Unknown (2)	Unknown (2)	Unknown (2)	Unknown (2)	Unknown (2)	Well sampled via spigot

Notes:

1. Survey data provided by station and may not be on the same datum.
2. Well log not received.

APPENDIX B

PaGWIS WATER SUPPLY WELL INVENTORY

DRAFT
PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT COMMUNICATION
ATTORNEY WORK PRODUCT

TABLE B.1

PaGWIS WATER SUPPLY WELL INVENTORY
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Ref. No.	*Well ID*	*Date Drilled*	*Owner*	*Latitude*	*Longitude*	*Well Depth (feet)*	*Well Finish*	*Depth To Bedrock (feet)*	*Water Use*
1	87517		Herek, Tom	40.141	-76.736	70	Open Hole	15	Domestic
2	87520		Sincovich, Joe	40.143	-76.737	68	Open Hole	20	Domestic
3	87399	10/10/1983	Hanula, R.	40.143	-76.733	48	Open Hole	32	Domestic
4	258841	6/1/1990	McBride, J.	40.145	-76.734	120	Open Hole	18	Domestic
5	87400	10/22/1983	Kinard, R.	40.145	-76.733	40	Open Hole	18	Domestic
6	87397	6/30/1983	Sinkovich, M.	40.146	-76.734	67	Open Hole	18	Domestic
7	87505		Father, Deller	40.146	-76.732	49	Open Hole	15	Domestic
8	87508		Helwig, Earl	40.147	-76.733	34	Open Hole	15	Domestic
9	87504		Gay, Ed	40.147	-76.732	51	Open Hole	15	Domestic
10	87519		Bryan, Ken	40.148	-76.734	47	Open Hole	10	Domestic
11	87506		Fager, Doc	40.148	-76.733	39	Open Hole	15	Domestic
12	87522		Huntsberger, Gar	40.149	-76.738	98	Open Hole	15	Domestic
13	87377	7/17/1980	Rosenbery, C.	40.151	-76.740	73	Open Hole	8	Domestic
14	17524	11/24/1971	Metropolitan, Edison	40.151	-76.714	160	Open Hole		Domestic
15	87362	7/13/1979	Schaeffer, M.	40.151	-76.738	68	Open Hole	12	Domestic
16	87398	8/10/1983	Hastings, G.	40.151	-76.734	60	Open Hole	15	Domestic
17	87523		Gingrich, Dave	40.152	-76.739	53	Open Hole	10	Domestic
18	87373	6/9/1980	Sabold, P.	40.154	-76.733	44	Open Hole	10	Domestic
19	87549		Corbits Contrs	40.154	-76.717	120	Open Hole	48	Public Supply
20	87641		Donelan, M.	40.154	-76.716	125	Open Hole	41	Domestic
21	87473		Beaver Homes	40.154	-76.715	50	Open Hole	26	Domestic
22	87475		Hershey, Clair C.	40.154	-76.715	60	Open Hole	35	Domestic
23	17526	11/2/1972	Hershey, Clair	40.155	-76.714	60	Open Hole		Domestic
24	87640		Sweitzer, J.	40.155	-76.714	60	Open Hole	30	Domestic
25	87375	8/9/1980	Gruff, D.	40.156	-76.738	64	Open Hole	12	Domestic
26	87639		Ainsley, Timothy	40.156	-76.714	75	Open Hole		Domestic
27	87638		Showalter, Earl	40.157	-76.714	70	Open Hole		Domestic
28	87637		Schmidt, Dennis	40.157	-76.715	300	Open Hole	45	Domestic
29	87521		Reese, Oliver	40.158	-76.736	70	Open Hole	12	Domestic
30	87374	7/27/1981	Harper, D.	40.159	-76.735	72	Open Hole	10	Domestic
31	87525		Hummel, Wayne	40.159	-76.735	56	Open Hole	10	Domestic
32	87376	6/23/1980	Long, J.	40.159	-76.735	68	Open Hole	12	Domestic
33	87514		Kim Lee Incorporated	40.162	-76.743	62	Open Hole	25	Domestic
34	87496		Ethridge, David	40.163	-76.733	75	Open Hole	45	Domestic
35	87497		Zeiter, David	40.163	-76.733	100	Open Hole	70	Domestic
36	87531		Black, Ronald	40.164	-76.717	75	Open Hole	1	Domestic
37	87513		Houser, Robert	40.165	-76.740	54	Open Hole	15	Domestic
38	87384	4/27/1983	Fawver, A.	40.165	-76.717	120	Open Hole	60	Domestic

DRAFT
PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT COMMUNICATION
ATTORNEY WORK PRODUCT

TABLE B.1

PaGWIS WATER SUPPLY WELL INVENTORY
FLEETWIDE ASSESSMENT
THREE MILE ISLAND GENERATING STATION
MIDDLETOWN, PENNSYLVANIA

Ref. No.	*Well ID*	*Date Drilled*	*Owner*	*Latitude*	*Longitude*	*Well Depth (feet)*	*Well Finish*	*Depth To Bedrock (feet)*	*Water Use*
39	87389	7/1/1981	Linderman, R. Jr.	40.165	-76.716	125	Open Hole	71	Domestic
40	87540		Wright, Francis	40.165	-76.711	125	Open Hole	70	Domestic
41	258899	6/24/1997	Lebo, Wayne	40.165	-76.714	200	Open Hole	25	Other
42	87534		Endman, James	40.166	-76.717	103	Open Hole	36	Domestic
43	87625		Evans, Richard	40.166	-76.713	125	Open Hole	55	Domestic
44	87626		Staley, Donald	40.166	-76.716	100	Open Hole	30	Domestic
45	87387	7/1/1980	Erdman, J.	40.166	-76.717	107	Open Hole		Domestic
46/47	257591	8/6/1986	Dennisviola	40.167	-76.714	160		29	Domestic
48	87515		Winard, Jack Jr.	40.168	-76.737	50	Open Hole		Domestic
49	258901	5/11/1995	Evans Job 9505	40.168	-76.713	225	Open Hole	40	Other
50	87516		Mansberger Robt	40.169	-76.736	54	Open Hole		Domestic
51	87529		Hanshaw Inc	40.169	-76.720	123	Open Hole	67	Industrial
52	87502		Geyer, Paul M.	40.169	-76.710	300	Open Hole	30	Domestic
53	17529	8/6/1963	Londonderry Township	40.174	-76.718	81	Open Hole		Irrigation
54	87624		Plankenhorn, K.	40.169	-76.711	150	Open Hole	30	Domestic
55	87627		Deardorf, G.	40.169	-76.709	125	Open Hole	30	Domestic
56	87489		Eppinger, Neal	40.170	-76.711	122	Open Hole	4	Domestic
57	87524		Bare, R. B.	40.139	-76.735	71	Open Hole	12	Domestic
58	87487		Engle, Eugene	40.138	-76.716	122	Open Hole	75	Domestic
59	254353		GPU Nuclear Corp TMI Trng Ctr	40.153	-76.717	100			Commercial
60	258840	9/1/1990	GPU Nuclear Corp.	40.158	-76.724	25	Screen		Industrial
61	258842	9/1/1990	GPU Nuclear Corp.	40.158	-76.724	26	Screen	20.5	Industrial
62	17525	6/12/1969	Metropolitan Edison	40.153	-76.717	120	Open Hole		Commercial
63	87518		Shaffer, Frank	40.141	-76.733	48	Open Hole	15	Domestic
64	258250	10/1/1992	Three Mile Island, GPU Nuclear	40.154	-76.724	35	Screen	26	Industrial
65	258251	10/1/1992	Three Mile Island, GPU Nuclear	40.154	-76.724	35	Screen	26	Industrial
66	258961	10/1/1992	Three Mile Island, GPU Nuclear	40.154	-76.724	26.5	Screen	24	Industrial
67	254369		TMI Drinking Water Sys	40.158	-76.726	775	Perforated Or Slotted		Commercial

Note:
All wells located in Dauphin County, Londonderry Township.
Source: PaGWIS Download List, Pennsylvania Topographic & Geologic Survey
PaGWIS - Pennsylvania Groundwater Information System
An industrial supply well (Well ID 87476) owned by the John Stapf Corporation was also identified in PaGWIS but is not listed above. The latitude and longitude for this well was 40.153 and -76.725, respectively. These coordinates correspond to a location on the island; however, CRA field verified that this well is not located on the island.

APPENDIX C

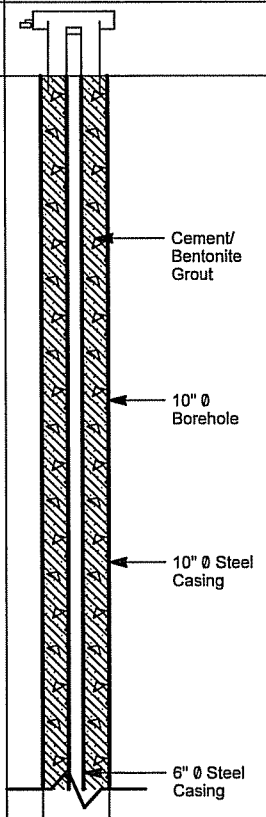
STRATIGRAPHIC AND INSTRUMENTATION LOGS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-1D
DATE COMPLETED: May 16, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	298.53 295.39					
	Air Knife/Vac Cleared to 10.1ft BGS						
10	SILTY SAND, brown and black, with cobbles, well rounded, up to 3" in diameter	285.29					
22	END OF OVERBURDEN HOLE @ 22.0ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-1D
DATE COMPLETED: May 16, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
22	SILTY SANDSTONE, reddish, weathered	273.39	6" Ø Steel Casing			
24						
26						
28	SHALE, red, competent	268.39				
30			10" Ø Borehole			
32						
34						
36						
38						
40						
42	- fracture zone from 42.0 to 44.0ft BGS					
44						
46						
48			Cement/ Bentonite Grout			
50						
52	- fracture from 52.0 to 53.0ft BGS					
54						
56						
58						
60			Bentonite Chips			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-1D
DATE COMPLETED: May 16, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
62	SHALE, red	233.39				
64						
66						
68						
70			6" Ø Borehole			
72						
74						
76						
78						
80						
82						
84						
86						
88						
90	- fracture from 90.0 to 95.0ft BGS					
92						
94						
96						
98						
100	END OF BOREHOLE @ 100.0ft BGS	195.39				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-2D
DATE COMPLETED: May 10, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	TOP OF CASING GROUND SURFACE	296.53 293.54						
2, 4, 6, 8	Air Knife/Vac Cleared to 10.0ft BGS		10" Ø Borehole					
10, 12, 14, 16, 18, 20, 22	ML-SILT, with well rounded gravel, low plasticity, dark brown, moist	283.54	10" Ø Steel Casing; 6" Ø Steel Casing; Cement/ Bentonite Grout					0.2; 9.6
22	END OF OVERBURDEN HOLE @ 22.5ft BGS							
24, 26, 28, 30, 32, 34, 36, 38, 40								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-2D
DATE COMPLETED: May 10, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
22	SILTY SANDSTONE, reddish	271.04	Cement/ Bentonite Grout			
24						
26						
28						
30			6" Ø Steel Casing			
32						
34						
36						
38						
40						
42						
44			10" Ø Borehole			
46						
48						
50						
52						
54						
56						
58						
60			6"			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-2D
DATE COMPLETED: May 10, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
62			Ø Borehole			
64						
	- Weathered Zone from 65.0 to 70.0ft BGS					
66						
68						
70			6" Ø Borehole			
72						
74						
76						
78						
80						
82						
	- fracture and water bearing zone from 83.0 to 85.0ft BGS					
84						
86						
88						
90						
92						
94						
96						
98						
100	END OF BOREHOLE @ 100.0ft BGS	193.54				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-3S
DATE COMPLETED: May 10, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	303.41 303.00						
2, 4, 6, 8	Air Knife/Vac Cleared to 10.1ft BGS		Concrete Bentonite 2" Ø PVC Well Casing					
10	SANDY SILT, with gravel, brown, moist	293.41						0
12, 14, 16			10" Ø Borehole Sand					50
18			2" Ø PVC Well Screen					
20	SANDY SILT, brown, dry	283.41						250
22	END OF BOREHOLE @ 22.5ft BGS	280.91						
24, 26, 28, 30, 32, 34, 36, 38								

WELL DETAILS
Screened interval:
295.91 to 280.91ft AMSL
7.50 to 22.50ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
298.41 to 280.91ft AMSL
5.00 to 22.50ft BGS
Material: #1 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-3I
DATE COMPLETED: May 24, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: J. Close

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	303.31 302.85						
2	Air Knife/Vac Cleared to 10.5ft BGS							0
4			6" Ø Steel Casing					
6								
8								
10			12" Ø Borehole					
12	SW - Sand, medium to coarse-grained, well graded, loose, brown, dry	292.81						0
14								
16								
18			10" Ø Temporary Steel Casing					
20								
22			Cement/ Bentonite Grout					0.1
24	Weathered Bedrock	280.31						
26	END OF OVERBURDEN HOLE @ 26.0ft BGS							
28								
30								
32								
34								
36								
38								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-3I
DATE COMPLETED: May 24, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: J. Close

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
26	LIMESTONE, gray	277.31	Bentonite Chips			
28						
30	SILTSTONE, red	273.31	6" Ø Steel Casing			
32			Cement/ Bentonite Grout			
34			10" Ø Borehole			
36						
38						
40			6" Ø Borehole			
42						
44						
46						
48						
50						
52						
54						
56						
58						
60						
62						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-3I
DATE COMPLETED: May 24, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: J. Close

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
66						
68			6" Ø Borehole			
70						
72						
74						
	END OF BOREHOLE @ 75.0ft BGS	228.31				
76						
78						
80						
82						
84						
86						
88						
90						
92						
94						
96						
98						
100						
102						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-4S
DATE COMPLETED: May 19, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	302.06 301.56						
2, 4, 6, 8, 10	Air Knife/Vac Cleared to 10.2ft BGS		Concrete Bentonite					
12, 14, 16, 18, 20, 22, 24, 26	SILTY SAND, with gravel, brown, moist	291.86	10.5" Ø Borehole					
	SILT, brown, trace gravel, moist	287.06	Sand					0
	SILT, brown, trace gravel, compact	282.06	2" Ø PVC Well Screen					31
	SILT, brown, trace gravel, dry	277.06						
	END OF BOREHOLE @ 26.0ft BGS	276.06						
28, 30, 32, 34, 36, 38								

WELL DETAILS
Screened interval:
291.06 to 276.06ft AMSL
11.00 to 26.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
295.06 to 276.06ft AMSL
7.00 to 26.00ft BGS
Material: #1 Silica Sand

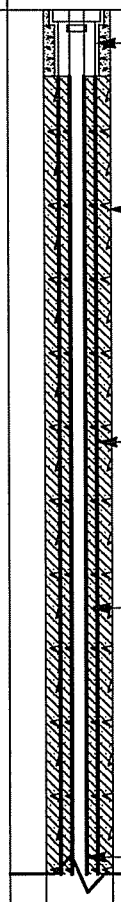
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-4I
DATE COMPLETED: May 18, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	302.00 301.56						
2, 4, 6, 8	Air Knife/Vac Cleared to 9.8ft BGS		Concrete; 12" Ø Borehole					
10, 12, 14, 16, 18, 20, 22, 24	ML-SANDY SILT (NATIVE), brown, trace gravel, moist	292.20	10" Ø Temporary Steel Casing; Cement/ Bentonite Grout					0; 34; 51
26	END OF OVERBURDEN HOLE @ 26.0ft BGS		6" Ø Steel Casing					
28, 30, 32, 34, 36, 38								



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-4I
DATE COMPLETED: May 18, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
26	SANDSTONE/SILTSTONE, competent, fine grained, brown, moist	276.00	6" Ø Steel Casing			
28	SILTSTONE, brown, moist	274.00	10" Ø Borehole			
30	SANDSTONE/SHALE, red-brown, dry	272.00				
32			Cement/ Bentonite Grout			
34						
36			Bentonite Chip Seal			
38						
40						
42	- Fracture zone in bedrock, water bearing zone at 41.0ft BGS					
44						
46			6" Ø Borehole			
48						
50						
52						
54						
56	END OF BOREHOLE @ 56.0ft BGS	246.00				
58						
60						
62						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-5D
DATE COMPLETED: May 19, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	302.28 301.82						
2, 4, 6, 8	Air Knife/Vac Cleared to 8.6ft BGS		Concrete; 12" Ø Borehole					
10, 12, 14	SANDY SILT, brown, dry	293.68						0
16, 18, 20, 22, 24, 26, 28	SANDY SILT, with gravel, dark brown, moist	287.28	10" Ø Temporary Steel Casing; Cement/ Bentonite Grout; 6" Ø Steel Casing					0 0.3 21 11
	END OF OVERBURDEN HOLE @ 27.0ft BGS							
30, 32, 34, 36, 38, 40								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-5D
DATE COMPLETED: May 19, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SANDSTONE, brown, dry	275.28	6" Ø Steel Casing			
28						
30			10" Ø Borehole			
32						
34						
36						
38						
40			Cement/ Bentonite Grout			
42						
44						
46						
48						
50						
52						
54						
56	MUDSTONE, red-brown, hard	246.28				
	Water Bearing Zone 4 GPM from 56.0 to 58.0ft BGS	244.28				
58	Water Bearing Zone 5 GPM from 58.0 to 66.0ft BGS					
60						
62						
64			Bentonite Chips			
66		236.28				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-5D
DATE COMPLETED: May 19, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
68						
70						
72						
	- fracture at 73.0ft BGS					
74						
			6" Ø Borehole			
76						
78						
80	- fracture at 80.0ft BGS					
82						
84						
	- Water Bearing Zone 5 GPM at 85.0ft BGS					
86						
88						
90						
92						
94						
96						
98						
100	END OF BOREHOLE @ 100.0ft BGS	202.28				
102						
104						
106						

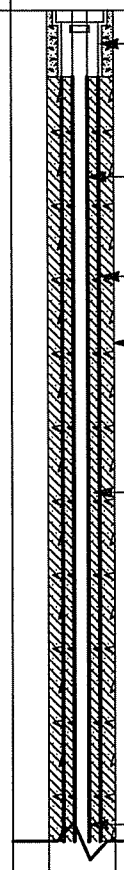
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-6I
DATE COMPLETED: May 12, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	301.44 301.09						
2, 4, 6, 8, 10	Air Knife/Vac Cleared to 11.7ft BGS		Concrete; 6" Ø Steel Casing; 8" Ø Temporary Steel casing; 10" Ø Borehole					0
12, 14	ML-SANDY SILT (NATIVE), brown, with gravel, moist	289.74	Cement/ Bentonite Grout					0
16, 18	ML-SANDY SILT (NATIVE), brown, with gravel, dry	286.44						0
20, 22, 24	ML-SANDY SILT (NATIVE), brown, trace gravel, dry	281.44	6" Ø Steel casing					0
26, 28, 30, 32, 34, 36, 38	END OF OVERBURDEN HOLE @ 25.0ft BGS							



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-6I
DATE COMPLETED: May 12, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SANDSTONE/SILTSTONE, fine grained, brown, dry	276.44	6" Ø Steel casing; Cement/ Bentonite Grout; Bentonite Chip Seal; 8" Ø Borehole			
26						
28						
30	CLAYSTONE/SILTSTONE, red, dry	271.44				
32						
34			6" Ø Borehole			
36						
38						
40						
42						
44						
46						
48						
50	- Probable water in fractures for the next 2 ft at 50.0ft BGS					
52						
54						
56						
58						
60	CLAYSTONE/SILTSTONE, wet	241.44				
62	END OF BOREHOLE @ 62.0ft BGS	239.44				

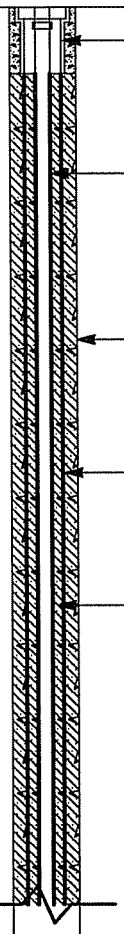
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-6D
DATE COMPLETED: May 16, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	301.47 301.15						
2, 4, 6, 8, 10	Air Knife/Vac Cleared to 10.5ft BGS		Concrete; 6" Ø Steel Casing; 12" Ø Borehole					0
12, 14, 16, 18	ML-SANDY SILT (NATIVE), dark brown, with gravel, dry	290.97	10" Ø Temporary Steel Casing; Cement/ Bentonite Grout					0.2
20, 22, 24, 26	ML-SANDY SILT (NATIVE), brown, trace gravel, dry - brown at 25.0ft BGS	281.47						0
28, 30, 32, 34, 36, 38	END OF OVERBURDEN HOLE @ 27.0ft BGS							



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-6D
DATE COMPLETED: May 16, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTSTONE, red, dry	274.47				
28						
30						
32			10" Ø Borehole			
34						
36			Cement/ Bentonite Grout			
38						
40						
42						
44						
46						
48	- wet at 48.0ft BGS					
50			6" Ø Steel Casing			
52						
54						
56						
58						
60						
62						
64						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-6D
DATE COMPLETED: May 16, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
68			Cement/ Bentonite Grout			
70			Bentonite Chips			
72	SHALE/MUDSTONE, red, wet	229.47				
74						
76						
78						
80						
82						
84						
86			6" Ø Borehole			
88						
90						
92						
94						
96						
98						
100	END OF BOREHOLE @ 100.0ft BGS	201.47				
102						
104						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-7S
DATE COMPLETED: May 8, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	300.68 300.34						
	Air Knife/Vac Cleared to 9.8ft BGS		Concrete Bentonite Chips 2" Ø PVC Well Casing					
10	SILT (BACKFILL), trace sand and gravel, brown, dry	290.68 289.98						3.5
12	SANDY SILT, with gravel, brown, dry		10" Ø Borehole					
14								
16			Sand					13
18								
20	SILTY SAND, with gravel, brown, humid to saturated	280.68	2" Ø PVC Well Screen 10 Slot					43
22								
24	SILT & GRAVEL, brown, saturated - REFUSAL ON PROBABLE BEDROCK at 24.7ft BGS	277.08 275.98						41
26	END OF BOREHOLE @ 24.7ft BGS							
28								
30								
32								
34								
36								
38								

WELL DETAILS
Screened interval:
292.18 to 277.18ft AMSL
8.50 to 23.50ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
294.68 to 275.98ft AMSL
6.00 to 24.70ft BGS
Material: #1 Silica Sand

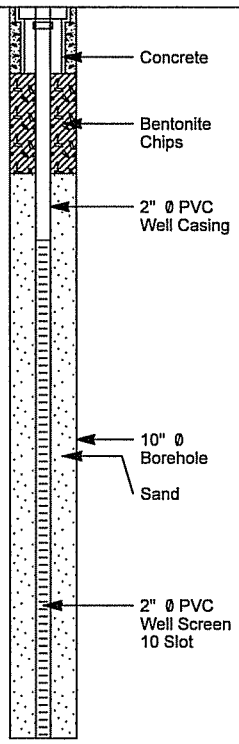
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-8S
DATE COMPLETED: May 9, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	297.76 297.42						
	Air Knife/Vac Cleared to 9.0ft BGS							
10	SAND (PROBABLE BACKFILL), fine to medium grained, brown, trace of gravels, moist	287.76 287.06						24
14	NO SOIL RECOVERY	282.76 282.46						0
20	SILTY SAND, with gravel, brown, saturated	277.76 277.66						0
22	END OF BOREHOLE @ 22.0ft BGS	275.76						



WELL DETAILS
Screened interval:
290.76 to 275.76ft AMSL
7.00 to 22.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
292.76 to 275.76ft AMSL
5.00 to 22.00ft BGS
Material: #1 Silica Sand

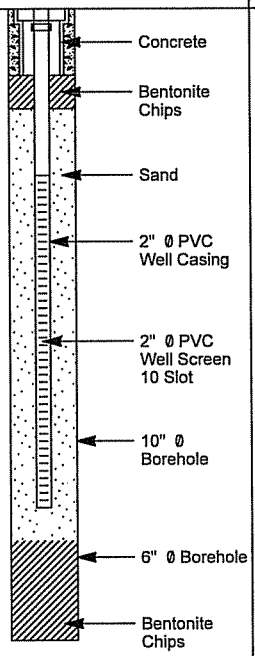
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-9S
DATE COMPLETED: May 9, 2006
DRILLING METHOD: Hollow Stem Auger/Air Hammer
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	295.93 295.47						
	Air Knife/Vac Cleared to 8.0ft BGS							
10	GRAVELLY SILT,brown, dry	285.93 285.43						0
16	NO SOIL RECOVERY - refusal with augers @ 15.3 ft BGS SHALE BEDROCK, red, wet to saturated	280.93 280.63						
19	END OF BOREHOLE @ 19.0ft BGS	276.93						



WELL DETAILS
Screened interval:
290.93 to 280.93ft AMSL
5.00 to 15.00ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
292.93 to 279.93ft AMSL
3.00 to 16.00ft BGS
Material: #1 Silica Sand

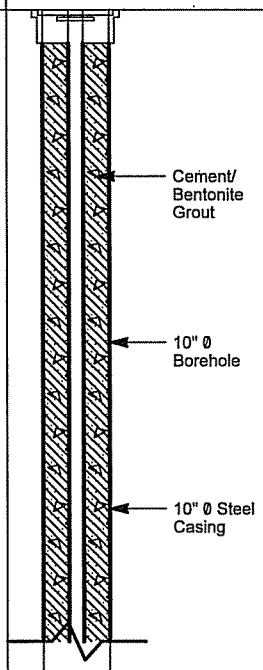
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-9I
DATE COMPLETED: July 19, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	295.68 294.84					
	Air Knife/Vac Cleared to 10.0ft BGS						
10	SILTY SAND, very fine to very coarse, with well rounded gravel, dark brown - dark red brown at 13.0ft BGS	285.68					
19.0	END OF OVERBURDEN HOLE @ 19.0ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-9I
DATE COMPLETED: July 19, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTSTONE, micaceous, dark red brown, competent	276.68	6" Ø Steel Casing; 10" Ø Borehole			
36	SILTY SANDSTONE, dark red brown, very fine	259.68				
	SILTSTONE, micaceous, dark red brown, competent	256.68				
	SILTY SANDSTONE, dark red brown, very fine	248.68	Cement/ Bentonite Grout			

20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-9I
DATE COMPLETED: July 19, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
60						
62						
64						
66						
68	- fracture zone, water bearing zone from 67.0 to 69.0ft BGS - dark gray red at 69.0ft BGS					
70			6" Ø Borehole			
72						
74						
76						
78	END OF BOREHOLE @ 77.0ft BGS	218.68				
80						
82						
84						
86						
88						
90						
92						
94						
96						

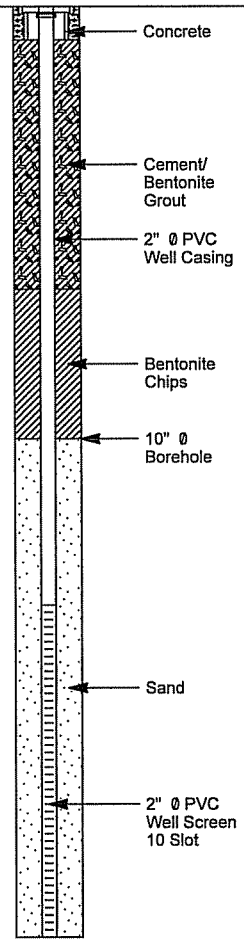
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-10S
DATE COMPLETED: May 5, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: S. Murray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	301.31 300.87						
	Air Knife/Vac Cleared to 8.8ft BGS							
10	SILT, trace sand and gravel, brown, dry	291.31						0.2
16								9.6
20	SILT, trace sand and gravel, brown, moist - Refusal on probable cobbles at 20.5ft BGS SILT & GRAVEL, brown, saturated	280.71						0
26	REFUSAL ON PROBABLE BEDROCK	274.81						31
28	END OF BOREHOLE @ 28.0ft BGS	273.31						



WELL DETAILS
Screened interval:
283.31 to 273.31ft AMSL
18.00 to 28.00ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.010
Sand Pack:
288.31 to 273.31ft AMSL
13.00 to 28.00ft BGS
Material: #1 Silica Sand

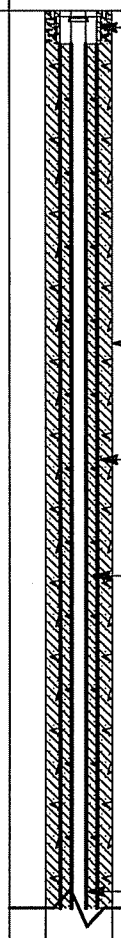
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-10I
DATE COMPLETED: May 18, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	301.29 300.96					
2, 4, 6, 8	Air Knife/Vac Cleared to 8.5ft BGS		Concrete				
10, 12, 14, 16, 18, 20, 22, 24, 26	SILTY SAND, brown, black, with well-rounded cobbles	292.79	12" Ø Borehole 10" Ø Temporary Steel Casing Cement/ Bentonite Grout 6" Ø Steel Casing				
28, 30, 32, 34, 36, 38	END OF OVERBURDEN HOLE @ 27.0ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-10I
DATE COMPLETED: May 18, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTY SANDSTONE, reddish, competent	274.29	6" Ø Steel Casing			
28						
			Cement/ Bentonite Grout			
30	- weathered zone at 30.0ft BGS					
32						
			10" Ø Borehole			
34			Bentonite Chips			
36						
38						
40						
42						
44						
46						
48						
50			6" Ø Borehole			
52						
	- Fracture at 53.0ft BGS					
54						
56						
58						
60						
62						
	END OF BOREHOLE @ 63.0ft BGS	238.29				
64						
	Estimated Well Yield 5 GPM					

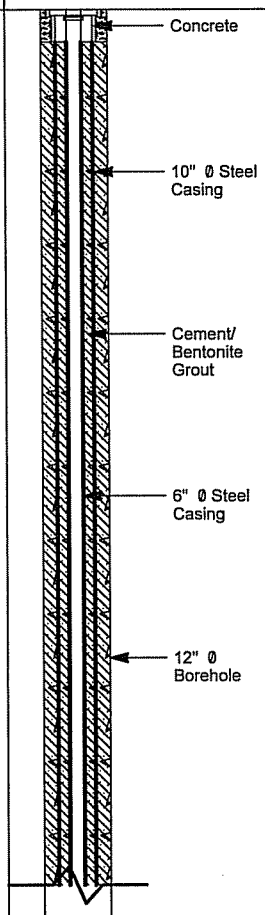
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-10D
DATE COMPLETED:
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge/M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	301.26 300.78					
	Air Knife/Vac Cleared to 8.0ft BGS						
8	SILT, dark tan and red, well rounded gravel < 5"	293.26					
27	END OF OVERBURDEN HOLE @ 27.0ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-10D
DATE COMPLETED:
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge/M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	Compact Bedrock	274.26				
28						
30	SILTSTONE, trace sand, dark red/brown	271.26	10" Ø Borehole			
32						
34						
36						
38						
	- Water Bearing Zone 5 - 8 GPM at 39.0ft BGS					
40						
42						
44						
46						
48						
50			6" Ø Steel Casing			
52						
54						
56						
	- Broken Zone from 57.0 to 58.5ft BGS					
58						
60			Cement/ Bentonite Grout			
62						
64						
66						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-10D
DATE COMPLETED:
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge/M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
68						
70						
72			Bentonite Chips			
74						
76						
78						
80			6" Ø Borehole			
82						
84						
86						
88						
90						
92	- Broken Zone Water Bearing Zone 5 GPM at 92.0ft BGS					
94						
96						
98						
100	END OF BOREHOLE @ 100.0ft BGS	201.26				
102						
104						
106						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-11S
DATE COMPLETED: May 22, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	303.05 302.70						
	Air Knife/Vac Cleared to 10.5ft BGS		Concrete Cement/ Bentonite Grout Bentonite Chips 2" Ø PVC Well Casing					
2								
4								
6								
8								
10								0
	SILTY SAND, dark brown and black, with cobbles, well rounded Gravel with Sand, Black ash like material at 13.0ft BGS	292.55	10" Ø Borehole					
12								
14								
16			2" Ø PVC Well Screen					0
18								
20	COBBLES, well rounded	283.05	Sand					
22	END OF BOREHOLE @ 22.0ft BGS	281.05						
24								
26								
28								
30								
32								
34								
36								
38								

WELL DETAILS
Screened interval:
296.05 to 281.05ft AMSL
7.00 to 22.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
298.05 to 281.05ft AMSL
5.00 to 22.00ft BGS
Material: #1 Silica Sand

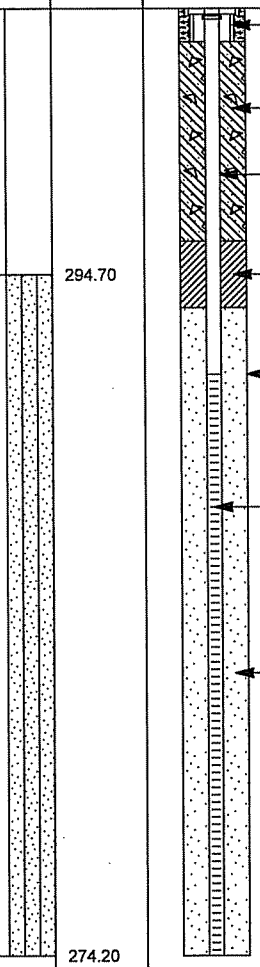
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-12S
DATE COMPLETED: June 1, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	GROUND SURFACE TOP OF CASING	302.70 302.24						
2, 4, 6	Air Knife/Vac Cleared to 8.0ft BGS		Concrete; Cement/ Bentonite Grout; 2" Ø PVC Well Casing					
8, 10, 12, 14, 16, 18, 20, 22, 24, 26	SILTY SAND, brown, with cobbles, well rounded	294.70	Bentonite Chips; 8" Ø Borehole; 2" Ø PVC Well Screen; Sand					0
28	Weathered Silty Sandstone	274.20						
	END OF BOREHOLE @ 28.5ft BGS							



WELL DETAILS
Screened interval:
291.70 to 274.20ft AMSL
11.00 to 28.50ft BGS
Length: 17.5ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
293.70 to 274.20ft AMSL
9.00 to 28.50ft BGS
Material: #1 Silica Sand

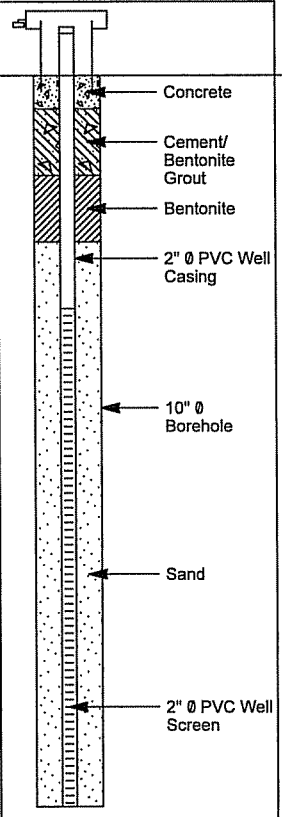
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-13S
DATE COMPLETED: May 22, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	299.26 296.39					
	Air Knife/Vac Cleared to 10.5ft BGS						
10	SILTY SAND, with cobbles, well rounded	285.89					
22	END OF BOREHOLE @ 22.0ft BGS	274.39					



WELL DETAILS
Screened interval:
289.39 to 274.39ft AMSL
7.00 to 22.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
291.39 to 274.39ft AMSL
5.00 to 22.00ft BGS
Material: #1 Silica Sand

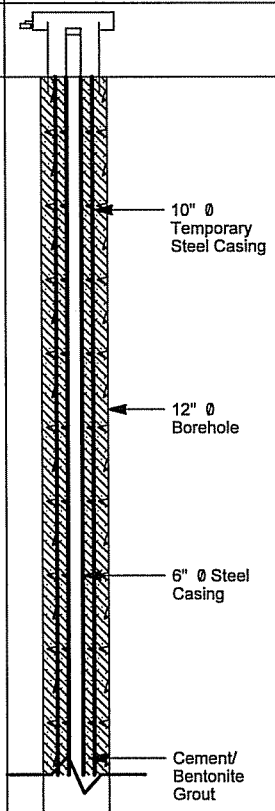
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-13I
DATE COMPLETED: May 23, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	298.72 296.22					
	Air Knife/Vac Cleared to 10.4ft BGS						
10	SILTY SAND, brown with cobbles	285.82					
21	END OF OVERBURDEN HOLE @ 21.0ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-13I
DATE COMPLETED: May 23, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTY SANDSTONE, weathered, reddish brown	275.22	Cement/ Bentonite Grout			
22						
24	SILTY SANDSTONE, reddish brown, competent	272.72	10" Ø Borehole			
26						
28			6" Ø Steel Casing			
30						
32						
34						
36						
38						
40						
42						
44						
46						
48						
50	- fracture at 50.0ft BGS Water Bearing Zone	245.22	6" Ø Borehole			
52						
54						
56						
58						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-13I
DATE COMPLETED: May 23, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %	
	END OF BOREHOLE @ 61.0ft BGS Estimated Well Yield 3 - 5 GPM	235.22					
62							
64							
66							
68							
70							
72							
74							
76							
78							
80							
82							
84							
86							
88							
90							
92							
94							
96							
98							

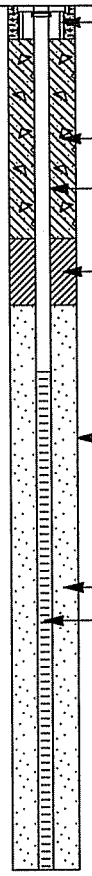
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-14S
DATE COMPLETED: May 24, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	303.14 301.04					
2, 4, 6, 8	Air Knife/Vac Cleared to 10.0ft BGS		Concrete Cement/ Bentonite Grout 2" Ø PVC Well Casing Bentonite Chips				
10, 12, 14, 16, 18, 20, 22, 24	SAND AND SILT, poorly sorted, brown with well rounded cobbles	291.04	10" Ø Borehole Sand 2" Ø PVC Well Screen				
26	SILTY SANDSTONE, reddish	276.04					
	END OF BOREHOLE @ 26.0ft BGS	275.04					



WELL DETAILS
Screened interval:
290.04 to 275.04ft AMSL
11.00 to 26.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
292.04 to 275.04ft AMSL
9.00 to 26.00ft BGS
Material: #1 Silica Sand

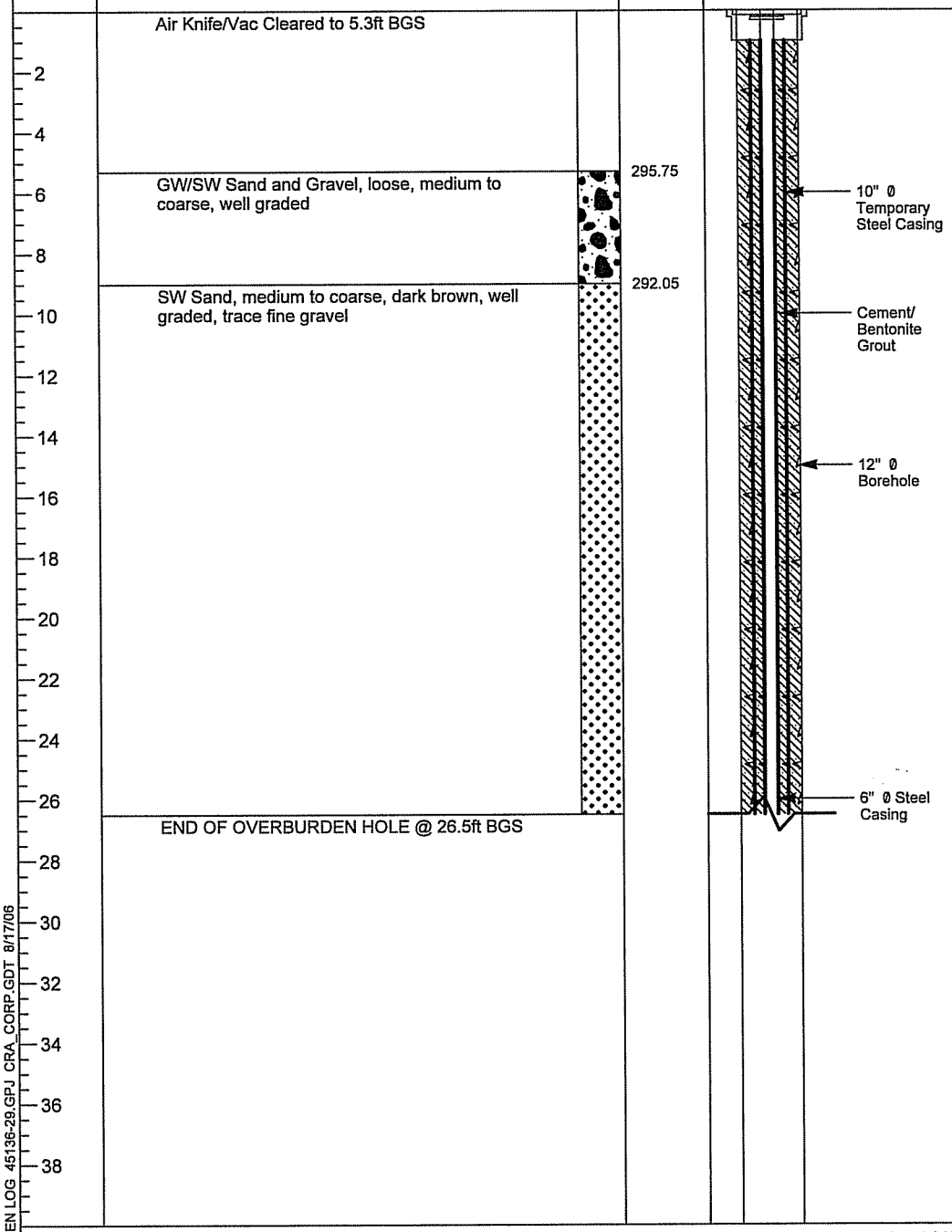
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-14I
DATE COMPLETED: May 23, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: J. Close

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	303.76 301.05					
	Air Knife/Vac Cleared to 5.3ft BGS						
	GW/SW Sand and Gravel, loose, medium to coarse, well graded	295.75					
	SW Sand, medium to coarse, dark brown, well graded, trace fine gravel	292.05					
	END OF OVERBURDEN HOLE @ 26.5ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-14I
DATE COMPLETED: May 23, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: J. Close

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
26			6" Ø Steel Casing			
	SHALE, red	274.55				
28						
30			10" Ø Borehole			
32						
34			Cement/ Bentonite Grout			
36						
38						
40						
42						
44						
46						
48						
	SILTSTONE, reddish brown	252.05				
50	- Fracture Zone 4-5 GPM at 50.0ft BGS		6" Ø Borehole			
52						
54	- fine grained sandstone at 54.0ft BGS					
56						
58						
60	END OF BOREHOLE @ 60.0ft BGS	241.05				
62						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-14D
DATE COMPLETED: May 30, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (PPM)
	TOP OF CASING GROUND SURFACE	303.08 300.96						
	Air Knife/Vac Cleared to 10.0ft BGS		Concrete					
2								
4								
6			10" Ø Temporary Steel Casing					
8								
10	SILTY SAND, with well-rounded cobbles, brown	290.96	Cement/ Bentonite Grout					0
12								
14			12" Ø Borehole					0
16								
18								
20								
22								
24								
26	END OF OVERBURDEN HOLE @ 26.0ft BGS		6" Ø Steel Casing					
28								
30								
32								
34								
36								
38								
40								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-14D
DATE COMPLETED: May 30, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
26	SILTY SANDSTONE, reddish, competent	274.96	6" Ø Steel Casing			
28						
30						
32						
34						
36						
38						
40						
42						
44						
46						
48						
50			10" Ø Borehole			
52	- Water Bearing Zone 3 GPM fracture at 52.0ft BGS					
54						
56						
58						
60			Cement/ Bentonite Grout			
62						
64						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-14D
DATE COMPLETED: May 30, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
66			10" Ø Borehole			
68			Cement/ Bentonite Grout			
70						
72			Bentonite Chips			
74						
76						
78						
80						
82						
84	- Water Bearing Zone 8 - 10 GPM fracture from 85.0 to 87.0ft BGS		6" Ø Borehole			
86						
88						
90						
92						
94						
96						
98						
100	END OF BOREHOLE @ 100.0ft BGS	200.96				
102						
104						

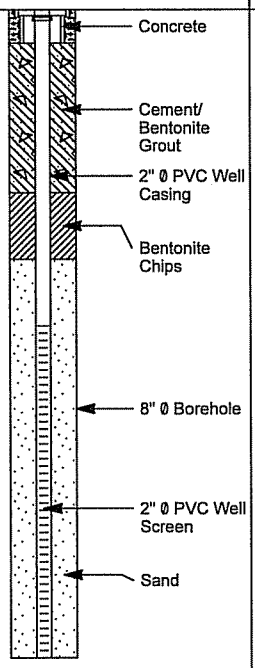
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-15S
DATE COMPLETED: June 1, 2006
DRILLING METHOD: Hollow Stem Auger
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	303.03 302.58					
	Air Knife/Vac Cleared to 10.6ft BGS						
10	SILTY SAND, brown, with rock cobbles, well rounded	292.43					
18	Weathered Silty Sandstone						
20	END OF BOREHOLE @ 19.5ft BGS	283.53					



WELL DETAILS
Screened interval:
293.53 to 283.53ft AMSL
9.50 to 19.50ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Sand Pack:
295.53 to 283.53ft AMSL
7.50 to 19.50ft BGS
Material: #1 Silica Sand

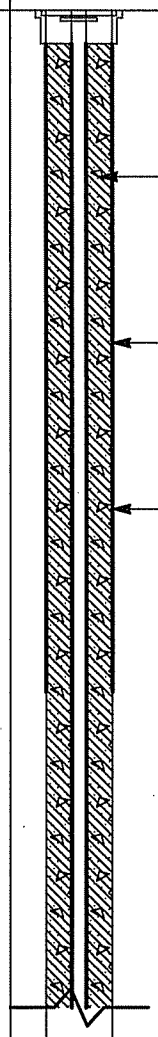
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-16I
DATE COMPLETED: July 24, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	303.96 303.74					
0–11.5	SILT and well-rounded gravel, dark brown		Cement/ Bentonite Grout; 10" Ø Borehole; 10" Ø Steel Casing				
11.5–18	GRAVEL, well-rounded	292.96					
18–30	SILT and well-rounded gravel, dark brown	285.96					
30	END OF OVERBURDEN HOLE @ 30.0ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-16I
DATE COMPLETED: July 24, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
30	SILTSTONE, competent, micaceous, dark red-brown	273.96	10" Ø Borehole			
32						
34	SILTY SANDSTONE, very fine, dark brown to dark red-brown	269.96	Cement/ Bentonite Grout			
36						
38			6" Ø Steel Casing			
40						
42			6" Ø Borehole			
44						
46						
48	SILTSTONE, micaceous, dark red-brown water bearing zone estimated 1 GPM at 47.0ft BGS	256.96				
50						
52						
54						
56						
58						
60	END OF BOREHOLE @ 60.0ft BGS	243.96				
62						
64						
66						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-16D
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	303.92 303.65					
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28	SILT and well-rounded gravel, dark brown		Cement/ Bentonite Grout; 10" Ø Borehole; 10" Ø Steel Casing				
28	SILTSTONE, weathered, dark red-brown	275.92					
30	END OF OVERBURDEN HOLE @ 30.0ft BGS						
32, 34, 36, 38							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-16D
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTSTONE, weathered, dark red-brown	275.92				
30	SILTY SANDSTONE, competent, very fine, dark red-brown	273.92				
32						
34			10" Ø Borehole			
36						
38						
40			Cement/ Bentonite Grout			
42						
44	SILTSTONE, micaceous, dark red-brown water bearing zone 2 GPM at 43.0ft BGS	260.92				
46						
48			6" Ø Steel Casing			
50						
52	SILTY SANDSTONE, very fine, dark red-brown	253.42				
54						
56	SILTSTONE, micaceous, dark red-brown	248.92				
58	SILTY SANDSTONE, very fine, dark red-brown	246.92				
60						
62						
64						
66						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-16D
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
70						
72	- dark gray-red at 72.0ft BGS					
74						
	- dark red-brown at 75.0ft BGS		6" Ø Borehole			
76						
	- dark gray-red, water bearing zone estimate 2 GPM at 77.0ft BGS					
78						
80						
82						
84						
86						
88						
90						
92						
94	- fracture, angular gravel, <3/4", water bearing zone from 94.0 to 95.0ft BGS					
96						
98	SANDSTONE, very fine to fine, dark gray-green	205.92				
100	END OF BOREHOLE @ 100.0ft BGS	203.92				
102						
104						
106						

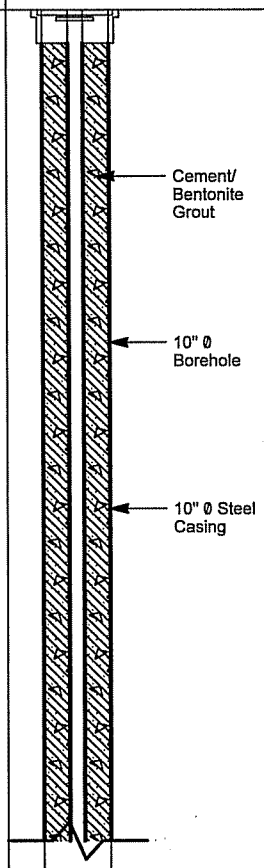
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-17I
DATE COMPLETED: July 20, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	296.77 296.19					
2, 4, 6	SILT, with well-rounded gravel, dark brown		Cement/ Bentonite Grout				
8, 10, 12, 14	CLAYEY SILT, with well-rounded gravel, dark brown	290.77	10" Ø Borehole; 10" Ø Steel Casing				
16, 18, 20, 22	SILT, with well-rounded gravel, dark brown - water in borehole, not certain if in gravel subbase or in overburden at 20.0ft BGS	280.77					
24, 26	SILTSTONE, weathered, micaceous, dark red brown END OF OVERBURDEN HOLE @ 25.0ft BGS	272.77					
28, 30, 32, 34, 36, 38							



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-17I
DATE COMPLETED: July 20, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTSTONE, weathered, micaceous, dark red brown	272.77				
	SILTSTONE, competent, micaceous, dry, dark red brown	271.77				
26			6" Ø Steel Casing			
28						
30			10" Ø Borehole			
	SILTY SANDSTONE, very fine, micaceous, dark red brown	265.77				
32						
34			Cement/ Bentonite Grout			
36						
	- dark gray, dry at 37.0ft BGS					
38						
40						
	- water bearing zone 2 GPM at 41.0ft BGS					
42			6" Ø Borehole			
44						
46						
48		248.77				
	SILTSTONE, tan-gray, water bearing zone					
50						
52		244.77				
	END OF BOREHOLE @ 52.0ft BGS					
54						
56						
58						
60						
62						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-17D
DATE COMPLETED: July 21, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	296.81 296.38					
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38	SILT, with well-rounded gravel, dark brown		Cement/ Bentonite Grout 10" Ø Borehole 10" Ø Steel Casing				
	no returns	282.81					
	END OF OVERBURDEN HOLE @ 22.0ft BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-17D
DATE COMPLETED: July 21, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
22	SILTSTONE, micaceous, dark red brown, competent	274.81				
24						
26			6" Ø Steel Casing			
28	- trace sands, very fine at 29.0ft BGS					
30	SILTY SANDSTONE, micaceous, very fine, dark red brown	266.81				
32						
34	- dark gray at 35.0ft BGS		10" Ø Borehole			
36						
38						
40			Cement/ Bentonite Grout			
42						
44						
46	- tan gray, water bearing zone 2 GPM from 46.0 to 47.0ft BGS					
48						
50	- water bearing zone 5 GPM from 51.0 to 53.0ft BGS					
52	- dark red gray at 53.0ft BGS					
54						
56						
58						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-17D
DATE COMPLETED: July 21, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: C. Pidge

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
62						
64						
66						
68						
70						
72						
74			6" Ø Borehole			
76						
78						
80						
82	END OF BOREHOLE @ 82.0ft BGS	214.81				
84						
86						
88						
90						
92						
94						
96						
98						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-18D
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: D. Gray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING	293.35 293.03					
	ML-SILT, little to trace sand, little clay, trace gravel, low plasticity, brown, moist						
2							
4							
	- trace to no gravel at 5.0ft BGS		Cement/ Bentonite Grout				
6							
8							
10			10" Ø Borehole				
12							
	- trace gravel at 13.0ft BGS						
14							
	SM/GM - SILTY SAND AND GRAVEL, trace clay, fine to med grained, poorly graded, brown, moist	278.35	10" Ø Steel Casing				
16							
18							
20	END OF OVERBURDEN HOLE @ 20.0ft BGS						
22							
24							
26							
28							
30							
32							
34							
36							
38							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-18D
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: D. Gray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
20	SILTSTONE, Gettysburg Formation, microcrystalline, weathered, fractured, red, fairly soft	273.35				
22		270.35				
24	SILTSTONE, microcrystalline, slightly weathered, slightly more competent		10" Ø Borehole			
26						
28						
30						
32						
34			Cement/ Bentonite Grout			
36						
38	- water bearing zone 2-3 GPM at 38.0ft BGS					
40						
42	- water bearing zone 1 GPM from 41.5 to 43.0ft BGS.					
44	SILTSTONE, microcrystalline, low weathering, random fracturing, soft & hard intervals, red, relatively hard	250.35	6" Ø Steel Casing			
46						
48						
50						
52	- water bearing zone 2 GPM at 52.0ft BGS					
54						
56						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-18D
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: D. Gray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
60	SILTSTONE, micro to fine crystalline, competent, red, hard	233.35	Bentonite Gravel Seal			
62						
64						
66						
68						
70	- water bearing zone 5 GPM at 70.0ft BGS		6" Ø Borehole			
72						
74	- water bearing zone 8-10 GPM at 73.0ft BGS					
76						
78						
80	SILTSTONE, fine to microcrystalline, competent, red, hard	213.35				
82	- water bearing zone at 82.0ft BGS					
84						
86						
88						
90	- possible water bearing zone from 89.0 to 89.5ft BGS					
92						
94						
96	- possible water bearing at 96.0ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-18D
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: D. Gray

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %	
100	END OF BOREHOLE @ 100.0ft BGS	193.35					
102							
104							
106							
108							
110							
112							
114							
116							
118							
120							
122							
124							
126							
128							
130							
132							
134							
136							

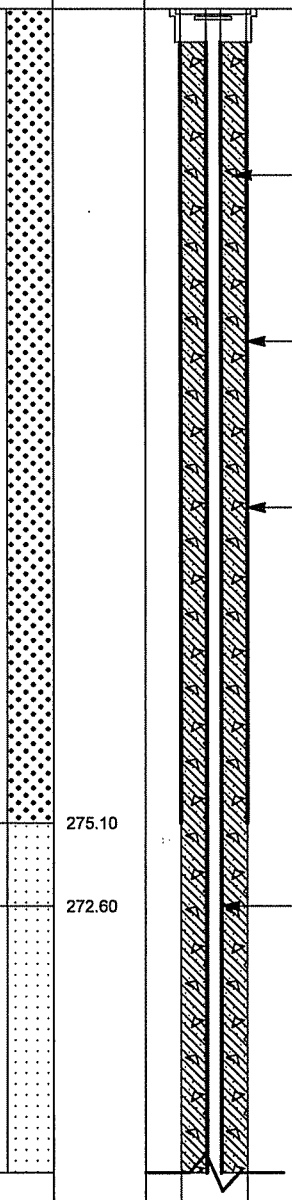
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-19I
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	299.60 299.21					
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38	mix of fine, medium, coarse sands, poorly sorted, brown, cobbles, well rounded, up to 3" long - perched water on top of rock at 22.0ft BGS		Cement/ Bentonite Grout 10" Ø Borehole 10" Ø Steel Casing 6" Ø Steel Casing				
	SANDSTONE, weathered, grayish red	275.10					
	SANDSTONE, weathered, increasing in competency with depth, becoming more red in color with depth	272.60					
	END OF OVERBURDEN HOLE @ 35.0ft BGS						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-19I
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	SANDSTONE, red, very competent, no fractures or water bearing zones	264.60	6" Ø Borehole			
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						
58						
60						
62	SANDSTONE, red, competent	237.60				
64						
66						
68						
70	- fracture, water bearing zone 1 GPM from 71.0 to 72.0ft BGS					
72						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-19I
DATE COMPLETED: July 25, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
76						
78	- fracture, water bearing zone 1 GPM from 78.0 to 80.0ft BGS		6" Ø Borehole			
80						
82	END OF BOREHOLE @ 82.0ft BGS	217.60				
84						
86						
88						
90						
92						
94						
96						
98						
100						
102						
104						
106						
108						
110						
112						

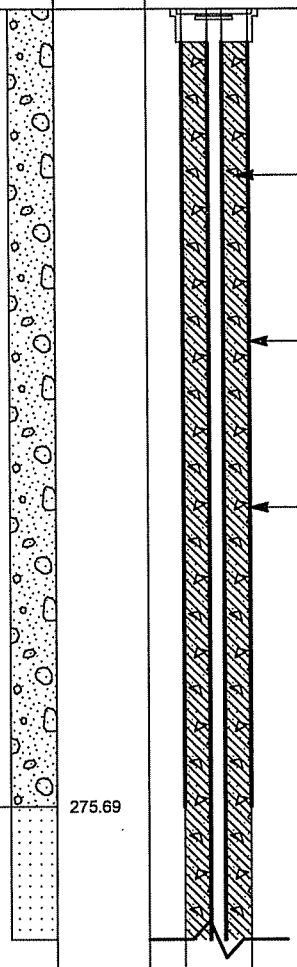
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-19D
DATE COMPLETED: July 26, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE TOP OF CASING	299.69 299.31					
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	fine, medium, coarse sands and gravel, brown, poorly sorted, cobbles, well rounded, up to 4" long		Cement/ Bentonite Grout; 10" Ø Borehole; 10" Ø Steel Casing				
24	SANDSTONE, weathered, grayish-red, becoming more competent with depth	275.69					
26, 28	END OF OVERBURDEN HOLE @ 28.0ft BGS						
30, 32, 34, 36, 38							



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-19D
DATE COMPLETED: July 26, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
28						
30			10" Ø Borehole			
32						
34			Cement/ Bentonite Grout			
	SANDSTONE, red, very competent	264.69				
36						
38						
40						
42						
44			6" Ø Steel Casing			
46						
48						
50						
52						
54						
56						
58						
60						
62						
64						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-19D
DATE COMPLETED: July 26, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
68						
70						
72	- small fracture 1 GPM from 72.0 to 73.0ft BGS					
74						
76						
78						
80						
82						
84	- fracture zone, water bearing zone 15 GPM from 83.0 to 85.0ft BGS					
86						
88						
90						
92						
94						
96						
98			6" Ø Borehole			
100						
102						
104	- reddish-brown from 105.0 to 120.0ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: THREE MILE ISLAND GENERATING STATION
PROJECT NUMBER: 45136-29
CLIENT: EXELON GENERATION COMPANY LLC
LOCATION: MIDDLETOWN, PENNSYLVANIA

HOLE DESIGNATION: MW-TMI-19D
DATE COMPLETED: July 26, 2006
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: M. Mylet

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
	- fracture, slight water bearing zone <5 GPM at 106.0ft BGS					
108						
110						
112	- fracture, slight water bearing zone 5-10 GPM at 112.0ft BGS		6" Ø Borehole			
114						
116						
118	- fracture, slight water bearing zone 5-10 GPM at 118.0ft BGS					
120	END OF BOREHOLE @ 120.0ft BGS	179.69				
122						
124						
126						
128						
130						
132						
134						
136						
138						
140						
142						
144						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

APPENDIX D

QUALITY ASSURANCE PROGRAM – TELEDYNE BROWN ENGINEERING INC.

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company

Rev. 8 Effective October 26, 2005
Document K-QAM-1

Quality Assurance Manual

For

Teledyne Brown Engineering

Environmental Services

2508 Quality Lane
Knoxville, Tennessee 37931-3133
865-690-6819

Generated by: Lynne Perry
Lynne Perry, QA Manager

Approved by: Keith Jeter
Keith Jeter, Operations Manager

Copy No.: Original
Issued To: Lynne Perry
Date: 10/26/05

TABLE OF CONTENTS

Section	Title	Page
1.0	**KNOXVILLE QAM SECTION INTRODUCTION**	**7**
2.0	**QUALITY SYSTEM**	**10**
2.1	Policy	10
2.2	Quality System Structure	10
2.3	Quality System Objectives	10
2.4	Personnel Orientation, Training, and Qualification	11
3.0	**ORGANIZATION, AUTHORITY, AND RESPONSIBILITY**	**12**
4.0	**PERSONNEL ORIENTATION, DATA INTEGRITY, TRAINING, AND QUALIFICATION**	**13**
4.1	Orientation	13
4.2	Data Integrity	13
4.3	Training	13
4.4	Qualification	13
4.5	Records	13
5.0	**CUSTOMER INTERFACES**	**14**
5.1	Interface Personnel	14
5.2	Bid Requests and Tenders	14
5.3	Contracts	14
5.4	TBE's Expectation of Customers	14
5.5	Customer Satisfaction	15
	5.5.1 Customer Complaints	15
	5.5.2 Customer Confidentiality	15
6.0	**DOCUMENTATION GENERATION AND CONTROL**	**16**
6.1	General	16
6.2	New Documentation	16
6.3	Documentation Changes	16

TABLE OF CONTENTS - Continued

6.4	Documentation Lists and Distributions	16
6.5	Other Documentation	16
6.6	Documentation Reviews	16
7.0	**DESIGN OF LABORATORY CONTROLS**	**17**
7.1	General	17
7.2	Facility	17
7.3	Technical Processes and Methods	17
	7.3.1 Operational Flow	17
	7.3.2 Methods	18
	7.3.3 Data Reduction and Analysis	18
7.4	Verification of Technical Processes, Methods, and Software	18
	7.4.1 Operational Flow Verification	18
	7.4.2 Method Verifications	18
	7.4.3 Data Reduction and Analysis Verification	18
7.5	Design of Quality Controls	18
	7.5.1 General	19
	7.5.2 Demonstration of Capability (D of C)	19
	7.5.3 Process Control Checks	19
7.6	Counting Instrument Controls	20
8.0	**PURCHASING AND SUBCONTRACT CONTROLS**	**21**
8.1	General	21
8.2	Source Selection	21
8.3	Procurement of Supplies and Support Services	21
	8.3.1 Catalog Supplies	21
	8.3.2 Support Services	21
	8.3.3 Equipment and Software	22
8.4	Subcontracting of Analytical Services	22
8.5	Acceptance of Items or Services	22

TABLE OF CONTENTS - Continued

9.0	**TEST SAMPLE IDENTIFICATION AND CONTROL**	**23**
9.1	Sample Identification	23
9.2	LIMS	23
9.3	Sample Control	23
10.0	**SPECIAL PROCESSES, INSPECTION, AND TEST**	**24**
10.1	Special Processes	24
10.2	Inspections and Tests	24
	10.2.1 Intra Laboratory Checks (QC Checks)	24
	10.2.2 Inter Laboratory Checks	24
	10.2.3 Data Reviews	24
10.3	Control of Sampling of Samples	24
10.4	Reference Standards / Material	24
	10.4.1 Weights and Temperatures	25
	10.4.2 Radioactive Materials	25
11.0	**EQUIPMENT MAINTENANCE AND CALIBRATION**	**26**
11.1	General	26
11.2	Support Equipment	26
11.3	Instruments	26
11.4	Nonconformances and Corrective Actions	26
11.5	Records	27
12.0	**NONCONFORMANCE CONTROLS**	**28**
12.1	General	28
12.2	Responsibility and Authority	28
12.3	10CFR21 Reporting	28

TABLE OF CONTENTS - Continued

13.0	**CORRECTIVE AND PREVENTIVE ACTIONS**	**29**
13.1	General	29
13.2	Corrective Actions	29
13.3	Preventive Actions	29
14.0	**RESULTS ANALYSIS AND REPORTING**	**30**
14.1	General	30
14.2	Results Review	30
14.3	Reports	30
15.0	**RECORDS**	**31**
15.1	General	31
15.2	Type of Records	31
15.3	Storage and Retention	31
15.4	Destruction or Disposal	31
16.0	**ASSESSMENTS**	**32**
16.1	General	32
16.2	Audits	32
16.3	Management Reviews	32

REVISION HISTORY

Revision 7	Complete re-write	January 1, 2005	Bill Meyer
Revision 8	Updated organization chart, minor change to 1.0, 4.4, 7.5.3.2, 10.2.3, and 12.3		

1.0 Knoxville QAM Section Introduction

This Quality Assurance Manual (QAM) and related Procedures describes the Knoxville Environmental Services Laboratory's QA system. This system is designed to meet multiple quality standards imposed by Customers and regulatory agencies including:

NRC's 10 CFR 50 Appendix B
NRC's Regulatory Guide 4.15
DOE's Order 414.1
DOE's QSAS
ANSI N 42.23
ANSI N 13.30
NELAC Standard, Chapter 5

The Environmental Services (ES) Laboratory does low level radioactivity analyses for Power Plants and other customers. It primarily analyzes environmental samples (natural products from around plants such as milk), in-plant samples (air filters, waters), bioassay samples from customer's employees, and waste disposal samples (liquids and solids).

Potable and non-potable water samples are tested using methods based on EPA standards as cited in State licenses (see Procedure 4010). The listing [current as of initial printing of this Manual – see current index for revision status and additions / deletions] of implementing Procedures (SOPs) covering Administration, Methods, Counting Instruments, Technical, Miscellaneous, and LIMS is shown in Table 1-1. Reference to these Procedures by number is made throughout this QAM.

Table 1-1

Number	Title
Part 1	**Administrative Procedures**
1001	Validation and Verification of Computer Programs for Radiochemistry Data Reduction
1002	Organization and Responsibility
1003	Control, Retention, and Disposal of Quality Assurance Records
1004	Definitions
1005	Data Integrity
1006	Job Descriptions
1007	Training and Certifications
1008	Procedure and Document Control
1009	Calibration System
1010	Nonconformance Controls
1011	10CFR21 Reporting
1012	Corrective Action and Preventive Action

Number	Title
1013	Internal Audits and Management Reviews
1014	RFP, Contract Review, and Order Entry (formerly 4001)
1015	Procurement Controls
Part 2	**Method Procedures**
2001	Alpha Isotopic and Plutonium-241
2002	Carbon-14 Activity in Various Matrices
2003	Carbon-14 and Tritium in Soils, Solids, and Biological Samples; Harvey Oxidizer Method
2004	Cerium-141 and Cerium-144 by Radiochemical Separation
2005	Cesium-137 by Radiochemical Separation
2006	Iron-55 Activity in Various Matrices
2007	Gamma Emitting Radioisotope Analysis
2008	Gross Alpha and/or Gross Beta Activity in Various Matrices
2009	Gross Beta Minus Potassium-40 Activity in Urine and Fecal Samples
2010	Tritium and Carbon-14 Analysis by Liquid Scintillation
2011	Tritium Analysis in Drinking Water by Liquid Scintillation
2012	Radioiodine in Various Matrices
2013	Radionickel Activity in Various Matrices
2014	Phosphorus-32 Activity in Various Matrices
2015	Lead-210 Activity in Various Matrices
2016	Radium-226 Analysis in Various Matrices
2017	Total Radium in Water Samples
2018	Radiostrontium Analysis by Chemical Separation
2019	Radiostrontium Analysis by Ion Exchange
2020	Sulfur-35 Analysis
2021	Technetium-99 Analysis by Eichrom Resin Separation
2022	Total Uranium Analysis by KPA
2023	Compositing of Samples
2024	Dry Ashing of Environmental Samples
2025	Preparation and Standardization of Carrier Solutions
2026	Radioactive Reference Standard Solutions and Records
2027	Glassware Washing and Storage
2028	Moisture Content of Various Matrices
2029	Polonium-210 Activity in Various Matrices
2030	Promethium-147 Analysis

Number	Title
Part 3	**Instrument Procedures**
3001	Calibration and Control of Gamma-Ray Spectrometers
3002	Calibration of Alpha Spectrometers
3003	Calibration and Control of Alpha and Beta Counting Instruments
3004	Calibration and Control of Liquid Scintillation Counters
3005	Calibration and Operation of pH Meters
3006	Balance Calibration and Check
3008	Negative Results Evaluation Policy
3009	Use and Maintenance of Mechanical Pipettors
3010	Microwave Digestion System Use and Maintenance
Part 4	**Technical Procedures**
4001	Not Used
4002	QC Checks on Data
4003	Sample Regent and Control
4004	Data Package Preparation and Reporting
4005	Blank, Spike, and Duplicate Controls
4006	Inter-Laboratory Comparison Study Process
4007	Method Basis and Initial Validation Process
4008	Not Used
4009	MDL Controls
4010	State Certification Process
4011	Accuracy, Precision, Efficiency, and Bias Controls and Data Quality Objectives
4012	Not Used
4013	Not Used
4014	Facility Operation and Control
4015	Documentation of Analytical Laboratory Logbooks (formerly 1002)
4016	Total Propagated Uncertainty (formerly 1004)
4017	LIMS Operation
4018	Instrument Calibration System
4019	Radioactive Reference Material Standards
Part 5	**Miscellaneous Procedures**
5001	Laboratory Hood Operations
5002	Operation and Maintenance of Deionized Water System
5003	Waste Management
5004	Acid Neutralization and Purification System Operation Procedure

Part 6	LIMS
6001	LIMS Raw Data Processing and Reporting
6002	Software Development and/or Pilots of COTS Packages
6003	Software Change and Version Control
6004	Backup of Data and System Files
6005	Disaster Recovery Plan
6006	LIMS Hardware
6007	LIMS User Access
6008	LIMS Training
6009	LIMS Security

2.0 QUALITY SYSTEM

The TBE-ES QA system is designed to comply with multiple customer- and regulatory agency-imposed specifications related to quality. This quality system applies to all activities of TBE-ES that affect the quality of analyses performed by the laboratory.

2.1 Policy

The TBE quality policy, given in Company Policy P-501, is "TBE will continually improve our processes and effectiveness in providing products and services that exceed our customer's expectations."

This policy is amplified by this Laboratory's commitment, as attested to by the title page signatures, to perform all work to good professional practices and to deliver high quality services to our customers with full data integrity. (See Section 4.0 and Procedure 1005).

2.2 Quality System Structure

The Quality System is operated by the organizations described in Section 3.0 of this Manual. The Quality System is described in this Manual and in the Procedures Manual, both of which are maintained by the QA Manager. Procedures are divided into 6 sections – Administrative, Methods, Equipments, Technical, Miscellaneous, and LIMS. This Manual is structured as shown in the Table of Contents and refers to Procedures when applicable. Cross references to the various imposed quality specifications are contained in Appendices to this Manual.

2.3 Quality System Objectives

The Quality System is established to meet the objective of assuring all operations are planned and executed in accordance with system requirements. The Quality System also assures that performance evaluations are performed (see Procedure 4006), and that appropriate verifications are performed (see Procedures in the 1000 and 4000 series) to further assure compliance. Verification includes

examination of final reports (prior to submittal to customers) to determine their quality (see Procedure 4004).

To further these objectives, various in-process assessments of data, as well as assessments of the system, via internal audits and management reviews, are performed. Both internal experts and customer / regulatory agencies perform further assessments of the system and compliance to requirements.

2.4 Personnel Orientation, Training, and Qualification

TBE provides indoctrination and training to employees and performs proficiency evaluation of technical personnel. This effort is described in Section 4.0.

3.0 ORGANIZATION, AUTHORITY, AND RESPONSIBILITY

TBE has established an effective organization for conducting laboratory analyses at the Knoxville Environmental Services Laboratory. The basic organization is shown in Figure 3-1. Detail organization charts with names, authorities, and responsibilities are given in Procedure 1002. Job descriptions are given in Procedure 1006.

This organization provides clearly established Quality Assurance authorities, duties, and functions. QA has the organizational freedom needed to:

(1) Identify problems
(2) Stop nonconforming work
(3) Initiate investigations
(4) Recommend corrective and preventive actions
(5) Provide solutions or recommend solutions
(6) Verify implementation of actions

All Laboratory personnel have the authority and resources to do their assigned duties and have the freedom to act on problems. The QA personnel have direct, independent access to Company management as shown in Figure 3-1.

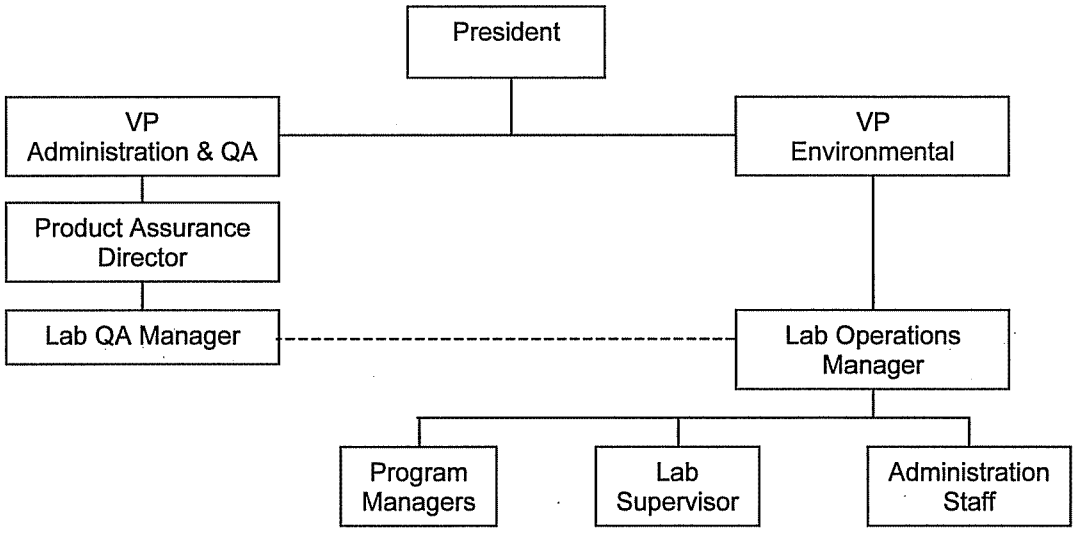


Figure 3.1. Laboratory Organization

4.0 PERSONNEL ORIENTATION, DATA INTEGRITY, TRAINING, AND QUALIFICATION

4.1 Orientation

All laboratory personnel must receive orientation to the quality program if their work can affect quality. Orientation includes a brief review of customer- and regulatory agency-imposed quality requirements, the structure of the QAM, and the implementing procedures. The goal of orientation is to cover the nature and goals of the QA program.

4.2 Data Integrity

The primary output of the Laboratory is data. Special emphasis and training in data integrity is given to all personnel whose work provides or supports data delivery. The Laboratory Data Integrity Procedure (Procedure 1005) describes training, personnel attestations, and monitoring operations. Annual reviews are required.

4.3 Training

The Quality Assurance Manager (QAM) maintains a training matrix indicating which laboratory personnel need training in which specific Procedures. This matrix is updated when personnel change or change assignments. All personnel are trained per these requirements and procedures. This training program is described in Procedure 1007. The assigned responsibilities for employees are described in Procedure 1002 (See Section 3.0) on Organization and in Procedure 1006, Job Descriptions. Refresher training or re-training is given annually as appropriate.

4.4 Qualification

Personnel are qualified as required by their job description. Management and non-analysts are evaluated based on past experience, education, and management's assessment of their capabilities. Formal qualification is required of analysts and related technical personnel who perform laboratory functions. Each applicable person is given training and then formally evaluated by the Operations Manager (or his designees) and by QA. Each analyst must initially demonstrate capability to perform each assigned analytical effort. Each year, thereafter, he or she must perform similar analyses on Interlab Comparison Samples (see Procedure 4006) or on equivalent blanks and spikes samples. Acceptable results extend qualifications (certification). Unacceptable results require retraining in the subject method / Procedures. (See Procedure 1007 for added information, records, forms, etc. used.)

4.5 Records

Records of training subjects, contents, attendees, instructors, and certifications are maintained by QA.

5.0 CUSTOMER INTERFACES

5.1 Interface Personnel

The Laboratory has designated Program Managers as the primary interface with all customers. Other interfaces may be the QA Manager or the Lab Operations Manager.

5.2 Bid Requests and Tenders

The Program Managers respond to customer requests for bids and proposals per Procedure 1014 for bids, proposals, and contract reviews. They clarify customer requests so both the customer and the lab staff understand requests. As responses are developed, internal reviews are conducted to ensure that requirements are adequately defined and documented and to verify that the Laboratory has adequate resources in physical capabilities, personal skills, and technical information to perform the work. Accreditation needs are reviewed. If subcontracts are required to perform any analysis, the subcontractor is similarly evaluated and the client notified in writing of the effort. Most qualifications are routine with standard pricing and the review of these quotes is performed by the Program Manager. Larger or more complex quotes are reviewed by the Operations Manager and the QA Manager (or designees). Evidence of review is by initialing and dating applicable papers, signatures on quotations, or by memo.

5.3 Contracts

The Program Manager's receive contract awards (oral or written) and generate the work planning for initiation preparation (charge numbers, data structure or contents in LIMS, etc.). They review contracts for possible differences from quotations and, if acceptable, contracts are processed. Documentation of the review is by initials and date as a minimum. Contract changes receive similar reviews and planning.

5.4 TBE's Expectation of Customers

TBE expects customers to provide samples suitable for lab analysis. These expectations include:

- Accurate and unambiguous identification of samples
- Proper collection and preservation of samples
- Use of appropriate containers free from external and internal contamination
- Integrity preservation during shipment and timely delivery of samples that are age sensitive
- Adequate sized samples that allow for retest, if needed
- Specification of unique MOA/MDC requirements
- Alerting the lab about abnormal samples (high activity, different chemical contents, etc.)
- Chain of custody initiation, when required.

5.5 Customer Satisfaction

TBE's quality policy centers on customer satisfaction (See 2.0). TBE will work to satisfy customers through full compliance with contract requirements, providing accurate data and properly responding to any questions or complaints. Customers are provided full cooperation in their monitoring of Laboratory performance. Customers are notified if any applicable State Accreditation is withdrawn, revoked, or suspended.

5.5.1 Customer Complaints

Any customer complaints are documented and tracked to closure. Most complaints concern analysis data and are received by Program Managers. They log each such complaint, order retests for verification, and provide documented results to customers. Complaints may also be received by QA or Operations.

If complaints are other than re-test type, the nonconformance and corrective action systems (Sections 12 and 13) are used to resolve them and record all actions taken.

5.5.2 Customer Confidentiality

All laboratory personnel maintain confidentiality of customer-unique information.

6.0 DOCUMENTATION GENERATION & CONTROL

6.1 General

The documentation generation and control system is detailed in Procedure 1008. An overview is given below. The basic quality system documents are described in Section 2.0.

6.2 New Documentation

Each Procedure and this QAM is written by appropriate personnel, validated if applicable (see Section 7.0), reviewed for adequacy, completeness, and correctness, and, if acceptable, accepted by the authorized approver [QA Manager, Operations Manager (or their designee)]. Both approvals are required if a Procedure affects both QA and Operations. (See Responsibilities in Section 3.0). These procedures control the quality measurements and their accuracy.

Each document carries a unique identification number, a revision level, dates, page numbers and total page count, and approver identification and sign off. If TBE writes code for software, the software is version identified and issued after Verification and Validation per Section 7.0.

6.3 Documentation Changes

Each change is reviewed in the same manner and by the same people as new documentation. Revision identifications are updated and changes indicated by side bars, italicized words, or by revision description when practical. Obsolete revisions are maintained by QA after being identified as obsolete.

6.4 Documentation Lists and Distributions

Computer indexes of documents are maintained by Quality showing the current authorized revision level of each document. These revisions are placed on the Laboratory server and obsolete ones are removed so that all personnel have only the current documents. If hard copies are produced and distributed, separate distribution lists are maintained indicating who has them and their revision level(s). Copies downloaded off the server are uncontrolled unless verified by the user (on the computer) to be the latest revision.

6.5 Other Documentation

In addition to TBE-generated documentation, QA maintains copies of applicable specifications, regulations, and standard methods.

6.6 Documentation Reviews

Each issued document is reviewed at least every third year by the approving personnel. This review determines continued suitability for use and compliance with requirements.

7.0 DESIGN OF LABORATORY CONTROLS

7.1 General

The Laboratory and its operating procedures are designed specifically for low level (environmental and in-plant) radioactive sample analysis. The various aspects of the laboratory design include the following which are discussed in subsequent paragraphs of this Section:

(a) Facility
(b) Technical Processes and Methods
(c) Verification of Design of Processes, Methods, and Software.
(d) Design of Quality Controls
(e) Counting Instrument Controls

7.2 Facility

The facility was designed and built in 2000 to facilitate correct performance of operations in accordance with good laboratory practices and regulatory requirements. It provides security for operations and samples. It separates sample storage areas based on activity levels, separates wet chemistry from counting instrumentation for contamination control, and provides space and electronic systems for documentation, analysis, and record storage. Procedure 4014 describes the facility, room uses, layouts, etc.

7.3 Technical Processes and Methods

7.3.1 Operational Flow

The laboratory design provides for sample receipt and storage (including special environmental provisions for perishable items) where samples are received from clients and other labs (see Section 9.0). The samples are logged into the computer based Laboratory Information Management System (LIMS) and receive unique identification numbers and bar code labels. (See Procedure 4017 for LIMS description and user procedures). The Program Managers then plan the work and assure LIMS contains any special instructions to analysts. Samples then go to sample preparation, wet chemistry (for chemical separation), and counting based on the radionuclides. See Procedures in the 2000 and 3000 series. Analysts perform the required tasks with data being entered into logbooks, LIMS, and counting equipment data systems as appropriate. Results are collected and reviewed by the Operations Manager and Program Managers and reports to clients are generated (See Section 14.0). All records (electronic or hard copy) are maintained in files or in back-up electronic copies (see Section 15.0). After the required hold periods and client notification and approval, samples are disposed of in compliance with regulatory requirements (see Procedures 5003 and 5004).

7.3.2 Methods

The laboratory methods documented in the 2000 and 3000 series of Procedures were primarily developed by senior TBE laboratory personnel based on years of experience at our prior facility in New Jersey. They have been improved, supplemented and implemented here. Where EPA or other accepted national methods exist (primarily for water analyses under State certification programs - see Procedure 4010), the TBE methods conform to the imposed requirements or State accepted alternate requirements. Any method modifications are documented and described in the Procedure. There are no nationally recognized methods for most other analysis methods but references to other method documents are noted where applicable.

7.3.3 Data Reduction and Analysis

Whenever possible automatic data capture and computerized data reduction programs are used. Calculations are either performed using commercial software (counting system operating systems) or TBE developed and validated software is used (see 7.4 below). Analysis of reduced data is performed as described in Section 14.0 and Procedure 4004.

7.4 Verification of Technical Processes, Methods, and Software

7.4.1 Operational Flow Verification

The entire QA Manual and related procedures describe the verification of elements of the technical process flow and the establishment of quality check points, reviews, and controls.

7.4.2 Method Verifications

Methods are verified and validated per Procedure 4007 prior to use unless otherwise agreed to by the client. For most TBE methods initial validation occurred well in the past. New or significantly revised Methods receive initial validation by demonstration of their performance using known analytes (NIST traceable) in appropriate matrices. Sufficient samples are run to obtain statistical data that provides evidence of process capability and control, establishes detection levels (see procedure 4009), bias and precision data (see Procedure 4011). All method procedures and validation data are available to respective clients. Also see Section 7.5 below for the Demonstration of Capability program.

7.4.3 Data Reduction and Analysis Verification

Data reduction and analysis verification is performed by personnel who did not generate the data. (See Section 14.0).

7.5 Design of Quality Controls

7.5.1 General

There are multiple quality controls designed into the laboratory operations. Many of these are described elsewhere in this manual and include personnel qualification (Section 4.0), Document control (6.0), Sample identification and control (9.0), Use of reference standards (10.0), intra- and inter- laboratory tests (10.0), etc. This Section describes the basic quality control systems used to verify Method capability and performance.

7.5.2 Demonstration of Capability (D of C)

The demonstration of capability system verifies and documents that the method, analyst, and the equipment can perform within acceptable limits. The D of C is certified for each combination of analyte, method, and instrument type. D of C's are certified based on objective evidence at least annually. This program is combined with the analyst D of C program (See Section 4.0). Initial D of C's use the method validation effort as covered above. Subsequent D of C's use Inter-Laboratory samples (Procedure 4006) or, if necessary, laboratory generated samples using NIST traceable standards. If results are outside of control limits, re-demonstration is required after investigation and corrective action is accomplished (See Sections 12.0 and 13.0)

7.5.3 Process Control Checks

Process control checks are designed to include Inter-Lab samples, Intra-lab QC check samples, and customer provided check samples. 10% of laboratory analysis samples are for process control purposes.

7.5.3.1 Inter- Lab Samples. Inter-lab samples are procured or obtained from sources providing analytes of interest in matrices similar to normal client samples. These samples may be used for Demonstration of Capability of analyst's, equipment and methods. They also provide for independent insight into the lab's process capabilities. Any value reported as being in the warning zone (over 2 sigma) is reviewed and improvements taken. Any value failing (over 3 sigma) is documented on an NCR and formal investigation per Section 12.0 and 13.0 is performed. If root causes are not clearly understood and fixed, re-tests are required using lab prepared samples (See Procedure 4006).

7.5.3.2 QC Samples. QC samples, along with Inter-lab samples and customer check samples, are 10% of the annual lab workload for the applicable analyte and method. If batch processing is used, some specifications require specific checks with each batch or each day rather than as continuous process controls. (See Procedure 4005)

QC samples consist of multiple types of samples including:

(a) Method blanks
(b) Blank spikes
(c) Matrix spikes

(d) Duplicates
(e) Tracers and carriers

Acceptance limits for these samples are given in Procedures or in lab standards. The number, frequency, and use of these sample types varies with the method, matrix, and supplemental requirements. The patterns of use versus method and the use of the resulting test data is described in Procedure 4005.

7.5.3.3 Customer Provided Check Samples. Customers may provide blind check samples and duplicates to aid in their evaluation of the Laboratory. When the lab is notified that samples are check samples their results are included in the QC sample percentage counts. Any reported problems are treated as formal complaints and investigated per Section 5.

7.6 Counting Instrument Controls

The calibration of instruments is their primary control and is described in Section 11.0. In addition, counting procedures (3000 series) also specify use of background checks (method blank data is not used for this) to evaluate possible counting equipment contamination. Instrument calibration checks using a lab standard from a different source than the one used for calibration are also used. Background data can be used to adjust client and test data. Checks with lab standards indicate potential calibration changes.

8.0 PURCHASING AND SUBCONTRACT CONTROLS

8.1 General

Procurement and Subcontracts efforts use the Huntsville-based Cost Point computer system to process orders. The Laboratory-generated Purchase Requisitions are electronically copied into Purchase Orders in Huntsville. The Laboratory also specifies sources to be used. Procured items and services are received at the Laboratory where receiving checks and inspections are made. Laboratory Procedure 1015 provides details on the procurement control system at the Laboratory and references the Huntsville procedures as applicable.

8.2 Source Selection

Sources for procurements of items and services are evaluated and approved by QA as described in Procedure 1015. Nationally recognized catalog item sources are approved by the QA Manager based on reputation. Maintenance services by an approved distributor or the equipment manufacturing company are pre-approved. Sources for other services are evaluated by QA, based on service criticality to the quality system, by phone, mail out, or site visit.

Subcontract sources for laboratory analysis services are only placed with accredited laboratories (by NELAP, NUPIC, State, Client, etc.) as applicable for the type of analysis to be performed. QA maintains lists of approved vendors and records of evaluations performed.

8.3 Procurement of Supplies and Support Services

8.3.1 Catalog Supplies

The Laboratory procures reagents, processing chemicals, laboratory "glassware," consumables, and other catalog items from nationally known vendors and to applicable laboratory grades, purities, concentrations, accuracy levels, etc. Purchase Requisitions for these items specify catalog numbers or similar call-outs for these off-the-shelf items. Requisitions are generated by the personnel in the lab needing the item and are approved by the Operations or Production Manager. Reagents are analytical reagent grade only.

8.3.2 Support Services

Purchase Requisitions for support services (such as balance calibration, equipment maintenance, etc.) are processed as in 8.3.1 but technical requirements are specified and reviewed before approvals are given.

8.3.3 Equipment and Software

Purchase Requisitions for new equipment, software programs, and major facility modifications affecting the quality system are reviewed and approved by the Operations Manager and the QA Manager.

8.4 Subcontracting of Analytical Services

When necessary, the Laboratory may subcontract analytical services required by a client. This may be because of special needs, infrequency of analysis, etc. Applicable quality and regulatory requirements are imposed in the Purchase Requisition and undergo a technical review by QA. TBE reserves the right of access by TBE and our client for verification purposes.

8.5 Acceptance of Items or Services

Items and services affecting the quality system are verified at receipt based on objective evidence supplied by the vendor. Supply items are reviewed by the requisitioner and, if acceptable, are accepted via annotation on the vendor packing list or similar document. Similarly, equipment services are accepted by the requisitioning lab person. Calibration services are accepted by QA based on certification reviews. (See Section 11.0.)

Data reports from analytical subcontractors are evaluated by Program Managers and subsequently by the Operations Manager (or designee) as part of client report reviews.

Items are not used until accepted and if items or services are rejected, QA is notified and nonconformance controls per Section 12.0 are followed. Vendors may be removed from the approved vendor's list if their performance is unacceptable.

9.0 TEST SAMPLE IDENTIFICATION AND CONTROL

9.1 Sample Identification

Incoming samples are inspected for customer identification, container condition, chain of custody forms, and radioactivity levels. If acceptable, the sample information is entered into LIMS which generates bar coded labels for attachment to the sample(s). The labels are attached and samples stored in the assigned location. If environmental controls are needed (refrigeration, freezing, etc.), the samples are placed in these storage locations. If not acceptable, the Program Manager is notified, the customer contacted, and the problem resolved (return of sample, added data receipts, etc.). See Procedure 4003 for more information on sample receipt.

9.2 LIMS

The LIMS is used to schedule work, provide special information to analysts, and record all actions taken on samples. See Procedure 4017 and the 6000 series of procedures for more information on LIMS operations.

9.3 Sample Control

The sample, with its bar coded label, is logged out to the applicable lab operation where the sample is processed per the applicable methods (Procedures 2000 and 3000). The LIMS-assigned numbers are used for identification through all operations to record data. Data is entered into LIMS, log books (kept by the analysts) or equipment data systems to record data. The combination of LIMS, logbooks, and equipment data systems provide the Chain of Custody data and document all actions taken on samples. Unused sample portions are returned to its storage area for possible verification use. Samples are discarded after required time limits are passed and after client notification and approval, if required.

10.0 SPECIAL PROCESSES, INSPECTION, AND TEST

10.1 Special Processes

The Laboratory's special processes are the methods used to analyze a sample and control equipment. These methods are defined in Procedures in the 2000 and 3000 series. These processes are performed to the qualified methods (see Section 7.0) by qualified people (see 4.0).

10.2 Inspections and Tests

The quality of the process is monitored by indirect means. This program involves calibration checks on counting equipments (see Section 11.0), intra-laboratory checks, and inter-laboratory checks. In addition, some customers submit quality control check samples (blinds, duplicates, external reference standards). All generated data gets independent reviews.

10.2.1 Intra Laboratory Checks (QC Checks)

The quantity and types of checks varies with the method, but basic checks which may include blanks, spiked blanks, matrix spikes, matrix spike duplicates, and duplicates are used as appropriate for customer samples. This process is described in Procedure 4005 and in Section 7.0.

10.2.2 Inter Laboratory Checks

TBE participates in Inter-lab performance evaluation (check) programs with multiple higher level labs. These programs provide blind matrices for the types of matrix/analyte combinations routinely processed by the Lab, if available. This program is described in Procedure 4006.

10.2.3 Data Reviews

Raw data and reports are reviewed by the Operations Manager, or designees. This review checks for data logic, expected results, procedure compliance, etc. (See Section 14.0).

10.3 Control of Sampling of Samples

Samples for analysis are supplied by customers preferably in quantities sufficient to allow re-verification analyses if needed. The samples are prepared for analysis by analysts and then an aliquot (partial sample extraction) is taken from the homogeneous customer sample for the initial analysis. Methods specify standard volumes of sample material required. Sampling data is recorded in LIMS and/or logbooks.

10.4 Reference Standards / Material

10.4.1 Weights and Temperatures

Reference standards are used by the Laboratory's calibration vendor to calibrate the Labs working instruments measuring weights and thermometers.

10.4.2 Radioactive Materials

Reference radioactive standards, traceable to NIST, are procured from higher level laboratories. These reference materials are maintained in the standards area and are diluted down for use by laboratory analysts. All original and diluted volumes are fully traceable to source, procedure, analyst, dilution, and acquisition dates. See Section 11.0 and Procedure 1009.

11.0 EQUIPMENT MAINTENANCE AND CALIBRATION

11.1 General

There are two types of equipment used by the Laboratory: support equipment (scales, glassware, weights, thermometers, etc.) and instruments for counting. Standards traceable to NIST are used for calibration and are of the needed accuracy for laboratory operations. Procedures 1009, 4018, and 4019 describe the calibration and maintenance programs.

11.2 Support Equipment

Analytical support equipment is purchased with the necessary accuracies and appropriate calibration data. If needed, initial calibration by the Laboratory or its calibration vendor is performed. Recalibration schedules are established and equipment recalibrated by the scheduled date by a calibration vendor or by Laboratory personnel. Maintenance is performed, as needed, per manufacturer's manuals or lab procedures.

In addition to calibrations and recalibrations, checks are made on the continued accuracy of items as described in Procedure 1009. Records are maintained of calibration and specified checks.

11.3 Instruments

Instruments receive initial calibration using radioactive sources traceable to NIST. The initial calibration establishes statistical limits of variation that are used to set control limits for future checks and recalibration. This process is described in Procedure 4018. Instruments are maintained per Instrument Manual requirements. Recalibrations are performed per the Procedure.

Between calibrations, check sources are used to assure no significant changes have occurred in the calibration of items. Background checks are performed to check for possible radioactive contamination. Background values are used to adjust sample results. Hardware and software are safeguarded from adjustments that could invalidate calibrations or results.

11.4 Nonconformances and Corrective Actions

If calibrations or checks indicate a problem, the nonconformance system (Section 12.0) and corrective action system (Section 13.0) are initiated to document the problem and its resolution. Equipment is promptly removed from service if questionable.

11.5 Records

Records of calibrations are maintained. Calibration certificates from calibration vendors are maintained by QA. Other calibration data and check data is maintained in log books, LIMS, or instrument software as appropriate and as described in Procedures 1009, 4018, and 4019.

12.0 NONCONFORMANCE CONTROLS

12.1 General

The nonconformance control system is implemented whenever a nonconforming condition on any aspect of Laboratory analysis, testing, or results exist. The system takes graded actions based on the nature and severity of the nonconformance. Nonconforming items or processes are controlled to prevent inadvertent use. Nonconformances are documented and dispositioned. Notification is made to affected organizations, including clients. Procedure 1010 describes the procedures followed. Sample results are only reported after resolution.

12.2 Responsibility and Authority

Each Laboratory employee has the responsibility to report nonconformances and the authority to stop performing nonconforming work or using nonconforming equipment. Laboratory supervision can disposition and take corrective actions on minor problems. Any significant problem is documented by QA using the Laboratory's NCR system per Procedure 1010. QA conducts or assures the conduct of cause analyses, disposition of items or data, and initiation of corrective action if the nonconformance could recur.

12.3 10CFR21 Reporting

The QA Manager reviews NCRs for possible need of customer and/or NRC notification per the requirements of 10CFR21. Procedure 1011 is followed in this review and for any required reporting.

13.0 CORRECTIVE AND PREVENTIVE ACTIONS

13.1 General

The Laboratory takes corrective actions on significant nonconformances (see Section 12.0). It also initiates preventive and improvement actions per the Company Quality Policy (see Section 2.0). The procedures for Corrective Action/Preventive Action systems are contained in Procedure 1012.

13.2 Corrective Actions

Corrective actions are taken by Operations and Quality to promptly correct significant conditions adverse to quality. The condition is identified and cause analysis is performed to identify root causes. Solutions are evaluated and the optimum one selected that will prevent recurrence, can be implemented by the Laboratory, allows the Laboratory to meet its other goals, and is commensurate with the significance of the problem. All steps are documented, action plans developed for major efforts, and reports made to Management. QA verifies the implementation effectiveness. Procedure 1012 provides instructions and designates authorities and responsibilities.

13.3 Preventive Actions

Preventive actions are improvements intended to reduce the potential for nonconformances. Possible preventive actions are developed from suggestions from employees and from analysis of Laboratory technical and quality systems by management. If preventive actions or improvements are selected for investigation, the issues, investigation, recommendations, and implementation actions are documented. Follow up verifies effectiveness.

14.0 RESULTS ANALYSIS AND REPORTING

14.1 General

The Laboratory's role is to provide measurement-based information to clients that is technically valid, legally defensible, and of known quality.

14.2 Results Review

The results obtained from analytical efforts are collected and reviewed by the Operations Manager and the Program Manager. This review verifies the reasonableness and consistency of the results. It includes review of sample and the related QC activity data. Procedure 4002 describes the process. Any deficiencies are corrected by re-analyses, recalculations, or corrective actions per Sections 12.0 and 13.0. Use of the LIMS with its automatic data loading features (see Procedure 4017) minimizes the possibility of transcription or calculation errors.

14.3 Reports

Reports range from simple results reporting to elaborate analytical reports based on the client requirements and imposed specifications and standards. (See Procedure 4004.) Reports present results accurately, clearly, unambiguously, objectively, and as required by the applicable Method(s). Reports include reproduction restrictions, information on any deviations from methods, and any needed data qualifiers based on QC data. If any data is supplied by analytical subcontractors (see Section 8.0), it is clearly identified and attributed to that Laboratory by either name or accreditation number.

If results are faxed or transmitted electronically, confidentiality statements are included in case of receipt by other than the intended client.

Reports are approved by the Program Manager and Operations Manager and record copies kept in file (See Section 15.0).

15.0 RECORDS

15.1 General

The Laboratory collects generated data and information related to quality or technical data and maintains them as records. Records are identified, prepared, reviewed, placed in storage, and maintained as set forth in Procedure 1003.

15.2 Type of Records

All original observations, calculations, derived data, calibration data, and test reports are included. In addition QA data such as audits, management reviews, corrective and preventive actions, manuals, and procedures are included.

15.3 Storage and Retention

Records are stored in files after completion in the lab. Files are in specified locations and under the control of custodians. Filing systems provide for retrieval. Electronic files are kept on Company servers (with regular back up) or on media stored in fireproof file cabinets. Records are kept in Laboratory files for at least 2 years after the last entry and then in Company files for another year as a minimum. Some customers specify larger periods – up to 7 years – which is also met. Generic records supporting multiple customers are kept for the longest applicable period.

15.4 Destruction or Disposal

Records may be destroyed after the retention period and after client notification and acceptance, if required. If the Laboratory closes, records will go in to company storage in Huntsville unless otherwise directed by customers. If the Laboratory is sold, either the new owner will accept record ownership or the records will go into Company storage as stated above.

16.0 ASSESSMENTS

16.1 General

Assessments consist of internal audits and management reviews as set forth in Procedure 1013.

16.2 Audits

Internal audits are planned, performed at least annually on all areas of the quality system, and are performed by qualified people who are as independent as possible from the activity audited. (The Laboratory's small size inhibits full independence in some technical areas.) Audits are coordinated by the Quality Manager who assures audit plans and checklists are generated and the results documented. Reports include descriptions of any findings and provide the auditor's assessment of the effectiveness of the audited activity. Report data includes personnel contacted.

Audit findings are reviewed with management and corrective actions agreed to and scheduled. Follow up is performed by QA to verify accomplishment and effectiveness of the corrective action.

16.3 Management Reviews

The Annual Quality Assurance Report, prepared for some clients, is the Management Review vehicle. These reports cover audit results, corrective and preventive actions, external assessments, and QC and inter-laboratory performance checks. The report is reviewed with Management by the QA Manager for the continued suitability of the Quality Program and its effectiveness. Any needed improvements are defined, documented, and implemented. Follow ups are made to verify implementation and effectiveness.

APPENDIX E

LABORATORY ANALYTICAL REPORTS

TELEDYNE
BROWN ENGINEERING
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931
865-690-6819 (Phone)

Work Order #: L28973

Exelon

June 23, 2006

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133

Kathy Shaw
Conestoga-Rovers & Associates
45 Farmington Valley Road
Plainville CT 06062

Case Narrative - L28973
EX001-3ESPTMI-06

06/23/2006 08:14

Sample Receipt

The following samples were received on June 16, 2006 in good condition, unless otherwise noted.

Cross Reference Table

Client ID	Laboratory ID	Station ID(if applicable)
RB-TMI-RB7-061206-MMM-062	L28973-1	
WG-TMI-MW14D-061306-MMM-063	L28973-2	
RB-TMI-RB8-061306-MMM-066	L28973-3	
WG-TMI-DW10-061206-MMM-061	L28973-4	
WG-TMI-MW10D-061306-MMM-064	L28973-5	
WG-TMI-MW10D-061306-MMM-065	L28973-6	
WG-TMI-MW12S-061406-MMM-067	L28973-7	

Analytical Method Cross Reference Table

Radiological Parameter	TBE Knoxville Method	Reference Method
Gamma Spectrometry	TBE-2007	EPA 901.1
H-3	TBE-2010	EPA 906.0
TOTAL SR	TBE-2018	EPA 905.0

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133

Case Narrative - L28973
EX001-3ESPTMI-06

06/23/2006 08:14

Gamma Spectroscopy

Quality Control

Quality control samples were analyzed as WG4152.

Duplicate Sample

Duplicates were analyzed for the following samples. All duplicate results were within acceptance limits, unless otherwise noted.

Client ID	Laboratory ID	QC Sample #
RB-TMI-RB7-061206-MMM-062	L28973-1	WG4152-1

H-3

Quality Control

Quality control samples were analyzed as WG4153.

Method Blank

All blanks were within acceptance limits, unless otherwise noted.

Laboratory Control Sample

All laboratory control samples were within acceptance limits, unless otherwise noted.

Duplicate Sample

Duplicates were analyzed for the following samples. All duplicate results were within acceptance limits, unless otherwise noted.

Client ID	Laboratory ID	QC Sample #
RB-TMI-RB7-061206-MMM-062	L28973-1	WG4153-3

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133

Case Narrative - L28973
EX001-3ESPTMI-06

06/23/2006 08:14

TOTAL SR

Quality Control

Quality control samples were analyzed as WG4170.

Method Blank
All blanks were within acceptance limits, unless otherwise noted.

Laboratory Control Sample
All laboratory control samples were within acceptance limits, unless otherwise noted.

Duplicate Sample
Duplicates were analyzed for the following samples. All duplicate results were within acceptance limits, unless otherwise noted.

Client ID	Laboratory ID	QC Sample #
RB-TMI-RB7-061206-MMM-062	L28973-1	WG4170-3

Certification

This is to certify that Teledyne Brown Engineering - Environmental Services, located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.

Keith Jeter
Operations Manager

Sample Receipt Summary

06/16/06 10:09

SR #: SR08946

Client: Exelon

Teledyne Brown Engineering
Sample Receipt Verification/Variance Report

Project #: EX001-3ESPTMI-06

LIMS #: L28973

Initiated By: BWILKERSON
Init Date: 06/16/06 Receive Date: 06/16/06

Notification of Variance

Person Notified:

Contacted By:

Notify Date:

Notify Method:

Notify Comment:

Client Response

Person Responding:

Response Date:

Response Method:

Response Comment

	Criteria	Yes No NA	Comment
1	Shipping container custody seals present and intact.	NA	
2	Sample container custody seals present and intact.	NA	
3	Sample containers received in good condition	Y	
4	Chain of custody received with samples	Y	
5	All samples listed on chain of custody received	Y	
6	Sample container labels present and legible.	Y	
7	Information on container labels correspond with chain of custody	Y	
8	Sample(s) properly preserved and in appropriate container(s)	NA	
9	Other (Describe)	N	
	WG-TMI-MW125-061406-MMM-067		Sample for tritium only

L28973

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE - BROWN

REFERENCE NUMBER: 045136-29

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: MARTIN MYLET

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS: CADMIUM EMITTERS	TELLURIUM	SELENIUM BATCH							REMARKS
	6/13/06	1500	RB-TMI-RB7-061306-MMM-062	AQU	2	X	X	X							
	6/13/06	1045	MW14D-061306-MMM-063	AQU	2	X	X	X							20 ml Amber
	6/13/06	1400	RB-TMI-RB8-061306-MMM-066	AQU	2	X	X	X							

TOTAL NUMBER OF CONTAINERS: 6

HEALTH/CHEMICAL HAZARDS:

RELINQUISHED BY: ① [signature]	DATE: 6/15/06 TIME: 1245	RECEIVED BY: ① [signature] AmerGen	DATE: 6/15/06 TIME: 1245
RELINQUISHED BY: ② [signature] AmerGen	DATE: 6/15/06 TIME: 1246	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT: WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM:

RECEIVED FOR LABORATORY BY: B Wilkerson DATE: 6-16-06 TIME: 9 am

No CRA 06214

1001 (D) APR 28/97(NF) REV. 0 (F-15)

CHAIN OF CUSTODY RECORD

L 28973

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE BROWN

REFERENCE NUMBER: 045186-29

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: MARTIN MYLOT

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS: CADMIUM/METALS	STRONTIUM 90	TRITIUM							REMARKS
	6/12/06	1115	WG-TMI-DW10-061206-MMM-061	DBW	2	X	X	X							
	6/13/06	1300	WG-TMI-MW10D-061306-MMM-064	DBW	2	X	X	X							
	6/13/06	1310	WG-TMI-MW10D-061306-MMM-065	DBW	2	X	X	X							
	6/14/06	1430	WG-TMI-MW125-061406-MMM-~~065~~ -067	DBW	1			X							22 ml HNO3

TOTAL NUMBER OF CONTAINERS: 7

HEALTH/CHEMICAL HAZARDS:

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME
① [signature]	15 JUN 06	1255	① [signature] - AMERGEN	6/15/06	1255
② [signature] Amergen	6/15/06	1256	②		
③			③		

METHOD OF SHIPMENT:

WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: M. MYLOT

RECEIVED FOR LABORATORY BY: B Wilherson

DATE: 6-16-06 TIME: 9 am

No CRA 06213

1001 (D) APR 28/97(NF) REV. 0 (F-15)

L28973 8 of 67

Printed on : 6/15/2006 during Package Characterization

NRC and DOT Regulations messages for Package

Package ID Number : RS-06-097-I

NRC: No messages.

DOT: DOT Non-Radioactive

Package does NOT contain fissile nuclides.

Grams of U233 = 0.00E+00
Grams of U235 = 0.00E+00
Grams of Pu239 = 0.00E+00
Grams of Pu241 = 0.00E+00

Package Characterization Report

Printed on: 6/15/2006 during Package Characterization
Method Used: Multi-Sample Package C

Package ID:	RS-06-097-I	Date:	06/15/2006
Material Type:	Assorted Sample(s)	DOT Package Class:	DOT Non-Radioactive
Chemical Form:	Metal Oxides	Physical Form:	L
Liner Serial No.	N/A	Container Type:	2X2X3
Material Volume (Ft3):	4.503E-01	Package Volume (Ft^3):	12.00
Material Weight (lbs):	2.811E+01	Package Weight (lbs):	78.1089
Dose / Curie Factor:	N/A	Characterization Dist (in):	N/A

Contact Rad Level (mR/hr): 1 Meter Rad Level (mR/hr):

Nuclide:	mCi:	Nuclide:	mCi:	Nuclide:	mCi:
H-3	3.96E-05				
				Total:	3.96E-05

#	Sample Id	Form	Weight (gms)	Volume (cc's)	Activity (mCi)
1	RS-06-097-I	Liquid	12750	12750	3.96E-05

Printed on: 06/15/2006

RAMSHP Radioactive Report

Package ID Number : RS-06-097-I

Material Weight (gms) : 1.27E+04

Nuclide	Activity (mCi)	Activity limit for exempt consignment (Ci)	Fraction	Specific Activity (Ci/g)	Activity Concentration for exempt material (Ci/g)	Fraction
H-3	3.96E-05	2.70E-02	1.47E-06	3.11E-12	2.70E-05	1.15E-07

Activity (mCi) : 3.96E-05 Exempt Activity Fraction: 1.47E-06 Exempt Concentration Fraction : 1.15E-07

Package IS NOT-RADIOACTIVE per 49 CFR 173.436

Printed on : 6/15/2006 during Package Characterization

NRC and DOT Regulations messages for Package

Package ID Number : RS-06-100-I

NRC: No messages.

DOT: DOT Non-Radioactive

Package does NOT contain fissile nuclides.

Grams of U233 = 0.00E+00
Grams of U235 = 0.00E+00
Grams of Pu239 = 0.00E+00
Grams of Pu241 = 0.00E+00

Package Characterization Report

Printed on: 6/15/2006 during Package Characterization
Method Used: Multi-Sample Package C

Package ID:	RS-06-100-I	Date:	06/15/2006
Material Type:	Assorted Sample(s)	DOT Package Class:	DOT Non-Radioactive
Chemical Form:	Metal Oxides	Physical Form:	L
Liner Serial No.	N/A	Container Type:	2X2X3
Material Volume (Ft3):	4.503E-01	Package Volume (Ft^3):	12.00
Material Weight (lbs):	2.811E+01	Package Weight (lbs):	78.1089
Dose / Curie Factor:	N/A	Characterization Dist (in):	N/A

Contact Rad Level (mR/hr): 1 Meter Rad Level (mR/hr):

Nuclide:	mCi:	Nuclide:	mCi:	Nuclide:	mCi:
H-3	3.02E-05				
				Total:	3.02E-05

#	Sample Id	Form	Weight (gms)	Volume (cc's)	Activity (mCi)
1	RS-06-100-I	Liquid	12750	12750	3.02E-05

Printed on: 06/15/2006

RAMSHP Radioactive Report

Package ID Number : RS-06-100-I

Material Weight (gms) : 1.27E+04

Nuclide	Activity (mCi)	Activity limit for exempt consignment (Ci)	Fraction	Specific Activity (Ci/g)	Activity Concentration for exempt material (Ci/g)	Fraction
H-3	3.02E-05	2.70E-02	1.12E-06	2.37E-12	2.70E-05	8.77E-08

Activity (mCi) : 3.02E-05 Exempt Activity Fraction: 1.12E-06 Exempt Concentration Fraction : 8.77E-08

Package IS NOT-RADIOACTIVE per 49 CFR 173.436

TELEDYNE BROWN ENGINEERING
2508 Quality Lane
Knoxville, TN 37931-3133

ACKNOWLEDGEMENT
This is not an. invoice

June 16, 2006

Kathy Shaw
Conestoga-Rovers & Associates
45 Farmington Valley Road
Plainville, CT 06062

The following sample(s) were received at Teledyne Brown Engineering Knoxville laboratory on June 16, 2006. The sample(s) have been scheduled .for the analyses listed below and the report is scheduled for completion by June 20, 2006. Please review the following login information and pricing. Contact me if anything is incorrect or you have questions about the status of your sample(s).

Thank you for choosing Teledyne Brown Engineering for your analytical needs.

Sincerely,
Rebecca Charles
Project Manager
(865)934-0379

Project ID: EX001-3ESPTMI-06
P.O. #: 00411203
Release #:
Contract #: 00411203
Kathy Shaw, FAX#: 860-747-1900, larry.walton@exeloncorp.com

Client ID/ Station	Laboratory ID Analysis	Vol/Units Price	Start Collect Date Time	End Collect Date Time
RB-TMI-RB7-061206-MMM-062	L28973-1		06/21/06:1500	
WG	GELI	162.00		
WG	H-3	162.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MW14D-061306-MMM-063	L28973-2		08/13/06:1045	
WG	GELI	162.00		
WG	H-3	162.00		
WG	SR-90 (FAST)	140.00		
RB-TMI-RB8-061306-MMM-066	L28973-3		06/13/06:1400	
WG	GELI	162.00		
WG	H-3	162.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-DW10-061206-MMM-061	L28973-4		06/13/08:1115	
WG	GELI	162.00		
WG	H-3	162.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MW10D-061306-MMM-064	L28973-5		06/13/06:1300	

Client ID/ Station	Laboratory ID Analysis	Vol/Units Price	Start Collect Date/Time	End Collect Date/Time
WG	GELI	162.00		
WG	H-3	162.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MW10D-061306-MMM-065	L28973-6		06/13/06:1310	
WG	GELI	162.00		
WG	H-3	162.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MW12S-061406-MMM-067	L28973-7		06/13/06:1430	
WG	H-3	162.00		

End of document

Internal Chain of Custody

Internal Chain of Custody

****

Sample # L28973-1 Containernum 1

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:30	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-1 Containernum 2

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:28	030854	Donna Webb	029728	Lauren Larsen
06/16/2006 14:58	029728	Lauren Larsen	030854	Donna Webb
06/16/2006 14:58	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-2 Containernum 1

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:30	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-2 Containernum 2

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:28	030854	Donna Webb	029728	Lauren Larsen
06/16/2006 14:58	029728	Lauren Larsen	030854	Donna Webb
06/16/2006 14:58	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-3 Containernum 1

Prod	Analyst

****

Sample # L28973-3 Containernum 1

GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:30	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-3 Containernum 2

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:28	030854	Donna Webb	029728	Lauren Larsen
06/16/2006 14:58	029728	Lauren Larsen	030854	Donna Webb
06/16/2006 14:58	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-4 Containernum 1

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:30	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-4 Containernum 2

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:28	030854	Donna Webb	029728	Lauren Larsen
06/16/2006 14:58	029728	Lauren Larsen	030854	Donna Webb
06/16/2006 14:58	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-5 Containernum 1

Prod	Analyst

Internal Chain of Custody

****

Sample # L28973-5 Containernum 1

GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:30	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-5 Containernum 2

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:28	030854	Donna Webb	029728	Lauren Larsen
06/16/2006 14:58	029728	Lauren Larsen	030854	Donna Webb
06/16/2006 14:58	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-6 Containernum 1

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:30	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-6 Containernum 2

Prod	Analyst
GELI	DW
H-3	DW
SR-90 (FAST)	CJF

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:27	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:28	030854	Donna Webb	029728	Lauren Larsen
06/16/2006 14:58	029728	Lauren Larsen	030854	Donna Webb
06/16/2006 14:58	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28973-7 Containernum 1

Prod Analyst

06/23/06 08:15

Teledyne Brown Engineering
Internal Chain of Custody

****
Sample # L28973-7 Containernum 1

H-3 DW

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian
06/16/2006 11:29	099999	Sample Custodian	030854	Donna Webb
06/16/2006 11:30	030854	Donna Webb	099999	Sample Custodian

****
Sample # L28973-7 Containernum 2

Prod	Analyst
H-3	DW

Relinquish Date	Relinquish By		Received By	
06/16/2006 00:00			099999	Sample Custodian

06/23/06

Teledyne Brown Engineering
Internal Chain of Custody
Supplemental Sheet

L28973

****

L28973-1 **WG** **RB-TMI-RB7-061206-MMM-062**

Process step	Prod	Analyst	Date
Login		RCHARLES	06/16/06
Aliquot	GELI	DW	06/16/06
Aliquot	H-3	DW	06/16/06
Aliquot	SR-90 (FAST)	CJF	06/21/06
Count Room	GELI	KOJ	06/16/06
Count Room	H-3	KOJ	06/16/06
Count Room	SR-90 (FAST)	KOJ	06/22/06

****

L28973-2 **WG** **WG-TMI-MW14D-061306-MMM-063**

Process step	Prod	Analyst	Date
Login		RCHARLES	06/16/06
Aliquot	GELI	DW	06/16/06
Aliquot	H-3	DW	06/16/06
Aliquot	SR-90 (FAST)	CJF	06/21/06
Count Room	GELI	ILL	06/16/06
Count Room	H-3	KOJ	06/16/06
Count Room	SR-90 (FAST)	KOJ	06/22/06

****

L28973-3 **WG** **RB-TMI-RB8-061306-MMM-066**

Process step	Prod	Analyst	Date
Login		RCHARLES	06/16/06
Aliquot	GELI	DW	06/16/06
Aliquot	H-3	DW	06/16/06
Aliquot	SR-90 (FAST)	CJF	06/21/06
Count Room	GELI	ILL	06/16/06
Count Room	H-3	KOJ	06/16/06
Count Room	SR-90 (FAST)	KOJ	06/22/06

****

L28973-4 **WG** **WG-TMI-DW10-061206-MMM-061**

Process step	Prod	Analyst	Date
Login		RCHARLES	06/16/06
Aliquot	GELI	DW	06/16/06
Aliquot	H-3	DW	06/16/06
Aliquot	SR-90 (FAST)	CJF	06/21/06
Count Room	GELI	ILL	06/16/06
Count Room	H-3	KOJ	06/16/06
Count Room	SR-90 (FAST)	KOJ	06/22/06

****

L28973-5 **WG** **WG-TMI-MW10D-061306-MMM-064**

Process step	Prod	Analyst	Date
Login		RCHARLES	06/16/06
Aliquot	GELI	DW	06/16/06
Aliquot	H-3	DW	06/16/06
Aliquot	SR-90 (FAST)	CJF	06/21/06
Count Room	GELI	ILL	06/16/06

06/23/06

Teledyne Brown Engineering
Internal Chain of Custody
Supplemental Sheet

L28973

L28973-5	**WG**	**WG-TMI-MW10D-061306-MMM-064**		
Count Room	H-3		KOJ	06/16/06
Count Room	SR-90	(FAST)	KOJ	06/22/06

****

L28973-6	**WG**	**WG-TMI-MW10D-061306-MMM-065**		
Process step	Prod		Analyst	Date
Login			RCHARLES	06/16/06
Aliquot	GELI		DW	06/16/06
Aliquot	H-3		DW	06/16/06
Aliquot	SR-90	(FAST)	CJF	06/21/06
Count Room	GELI		ILL	06/16/06
Count Room	H-3		KOJ	06/17/06
Count Room	SR-90	(FAST)	KOJ	06/22/06

****

L28973-7	**WG**	**WG-TMI-MW12S-061406-MMM-067**		
Process step	Prod		Analyst	Date
Login			RCHARLES	06/16/06
Aliquot	H-3		DW	06/16/06
Count Room	H-3		KOJ	06/17/06

Analytical Results Summary

Report of Analysis

06/23/06 08:19

L28973

Conestoga-Rovers & Associates

EX001-3ESPTMI-06

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

Kathy Shaw

Sample ID: **RB-TMI-RB7-061206-MMM-062**
Station:
Description:
LIMS Number: L28973-1

Collect Start: 06/12/2006 15:00
Collect Stop:
Receive Date: 06/16/2006

Matrix: Ground Water (WG)
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values		
H-3	2010	**2.00E+02**	1.10E+02	1.59E+02	pCi/L		10	ml		06/16/06	60	M	+		
TOTAL SR	2018	1.01E+00	8.61E-01	**1.57E+00**	pCi/L		450	ml	06/12/06 15:00	06/22/06	120	M	U		
MN-54	2007	8.62E-01	2.45E+00	**4.06E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
CO-58	2007	6.57E-02	2.43E+00	**3.97E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
FE-59	2007	2.89E+00	4.63E+00	**7.93E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
CO-60	2007	-8.10E-01	2.61E+00	**4.17E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U*		No
ZN-65	2007	1.33E+01	6.45E+00	**1.03E+01**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
NB-95	2007	2.15E+00	2.57E+00	**4.36E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
ZR-95	2007	-7.50E-01	4.95E+00	**7.40E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U*		No
CS-134	2007	2.29E+01	4.61E+00	**5.45E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
CS-137	2007	-3.87E-01	2.62E+00	**4.32E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
BA-140	2007	5.54E+00	1.02E+01	**1.71E+01**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	U		No
LA-140	2007	-8.85E-01	3.46E+00	**5.56E+00**	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	+		Yes
TH-228	2007	**9.15E+00**	4.54E+00	7.21E+00	pCi/L		3055.23	ml	06/12/06 15:00	06/16/06	27098	Sec	+		

Flag Values
U = Compound/Analyte not detected or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum
**** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Report of Analysis

06/23/06 08:19

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L28973

Conestoga-Rovers & Associates

EX001-3ESPTMI-06

Kathy Shaw

Sample ID: **WG-TMI-MW14D-061306-MMM-063**
Station:
Description:
LIMS Number: L28973-2

Collect Start: 06/13/2006 10:45
Collect Stop:
Receive Date: 06/16/2006

Matrix: Ground Water (WG)
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values			
H-3	2010	**1.51E+03**	2.04E+02	1.92E+02	pCi/L		10	ml		06/16/06	43.39	M	+			
TOTAL SR	2018	6.90E-01	6.19E-01	**1.14E+00**	pCi/L		450	ml	06/13/06 10:45	06/22/06	120	M	U			
MN-54	2007	5.69E-01	1.99E+00	**3.30E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
CO-58	2007	-1.07E+00	2.04E+00	**3.28E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
FE-59	2007	2.09E+00	3.95E+00	**6.66E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
CO-60	2007	1.21E+00	2.01E+00	**3.44E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
ZN-65	2007	1.18E+01	5.49E+00	**8.65E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U*		No	
NB-95	2007	2.84E+00	2.04E+00	**3.55E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
ZR-95	2007	-1.00E+00	3.54E+00	**5.79E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
CS-134	2007	9.72E+00	3.32E+00	**4.29E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U*		No	
CS-137	2007	1.12E+00	2.34E+00	**3.64E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
BA-140	2007	6.07E+00	8.05E+00	**1.37E+01**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	
LA-140	2007	3.89E+00	2.90E+00	**5.09E+00**	pCi/L		3062.01	ml	06/13/06 10:45	06/16/06	26555	Sec	U		No	

Flag Values
U = Compound/Analyte not detected or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum
**** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Report of Analysis

06/23/06 08:19

L28973

Conestoga-Rovers & Associates

EX001-3ESPTMI-06

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

Kathy Shaw

Sample ID: **RB-TMI-RB8-061306-MMM-066**
Station:
Description:
LIMS Number: L28973-3

Collect Start: 06/13/2006 14:00
Collect Stop:
Receive Date: 06/16/2006

Matrix: Ground Water (WG)
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values		
H-3	2010	**2.24E+02**	1.15E+02	1.65E+02	pCi/L		10	ml		06/16/06	60	M	+		
TOTAL SR	2018	1.51E+00	9.03E-01	**1.57E+00**	pCi/L		450	ml	06/13/06 14:00	06/22/06	120	M	U		
K-40	2007	**1.03E+02**	3.43E+01	3.85E+01	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	+		Yes
MN-54	2007	-8.36E-02	2.27E+00	**3.68E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
CO-58	2007	6.91E-01	2.38E+00	**3.93E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
FE-59	2007	2.21E+00	4.68E+00	**7.80E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
CO-60	2007	2.80E+00	1.63E+00	**4.00E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		Yes
ZN-65	2007	1.23E+01	6.32E+00	**1.00E+01**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U*		No
NB-95	2007	2.81E+00	2.33E+00	**4.01E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
ZR-95	2007	-1.24E+00	3.96E+00	**6.39E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
CS-134	2007	7.56E+00	5.15E+00	**4.48E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
CS-137	2007	5.50E-01	2.37E+00	**3.97E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
BA-140	2007	7.41E+00	9.16E+00	**1.55E+01**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No
LA-140	2007	1.73E+00	3.04E+00	**5.19E+00**	pCi/L		3021.19	ml	06/13/06 14:00	06/16/06	25200	Sec	U		No

Flag Values
U = Compound/Analyte not detected or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum
**** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Report of Analysis

06/23/06 08:19

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L28973

Conestoga-Rovers & Associates

EX001-3ESPTMI-06

Kathy Shaw

Sample ID: **WG-TMI-DW10-061206-MMM-061**
Station:
Description:
LIMS Number: L28973-4

Collect Start: 06/13/2006 11:15
Collect Stop:
Receive Date: 06/16/2006

Matrix: Ground Water (WG)
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values		
H-3	2010	1.45E+02	1.12E+02	**1.67E+02**	pCi/L		10	ml		06/16/06	60	M	U		
TOTAL SR	2018	7.76E-01	6.76E-01	**1.24E+00**	pCi/L		450	ml	06/13/06 11:15	06/22/06	120	M	U		
MN-54	2007	1.02E+00	1.92E+00	**3.35E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
CO-58	2007	-1.12E+00	2.05E+00	**3.40E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
FE-59	2007	5.69E-01	3.66E+00	**6.39E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
CO-60	2007	-4.43E-01	1.87E+00	**3.20E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
ZN-65	2007	1.23E+01	4.92E+00	**8.43E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U*		No
NB-95	2007	2.35E+00	2.01E+00	**3.60E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
ZR-95	2007	-5.30E-01	3.60E+00	**6.11E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
CS-134	2007	1.01E+01	3.89E+00	**4.36E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U*		No
CS-137	2007	1.58E+00	2.14E+00	**3.77E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
BA-140	2007	-2.21E+00	8.59E+00	**1.43E+01**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
LA-140	2007	1.79E+00	2.76E+00	**5.01E+00**	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	U		No
TH-228	2007	**7.54E+00**	4.51E+00	6.69E+00	pCi/L		3100.45	ml	06/13/06 11:15	06/16/06	25200	Sec	+		Yes

Flag Values
U = Compound/Analyte not detected or less than 3 sigma
+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum
**** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Report of Analysis

06/23/06 08:19

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L28973

Conestoga-Rovers & Associates

EX001-3ESPTMI-06

Kathy Shaw

Sample ID: **WG-TMI-MW10D-061306-MMM-064**
Station:
Description:
LIMS Number: L28973-5

Collect Start: 06/13/2006 13:00
Collect Stop:
Receive Date: 06/16/2006

Matrix: Ground Water (WG)
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values			
H-3	2010	**5.22E+02**	1.30E+02	1.61E+02	pCi/L		10	ml		06/16/06	60	M	+			
TOTAL SR	2018	4.87E-01	9.25E-01	**1.81E+00**	pCi/L		450	ml	06/13/06 13:00	06/22/06	120	M	U			
MN-54	2007	1.57E+00	3.02E+00	**5.05E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
CO-58	2007	2.00E+00	3.06E+00	**5.15E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
FE-59	2007	2.61E+00	5.59E+00	**9.43E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
CO-60	2007	-1.85E+00	2.95E+00	**4.69E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U*		No	
ZN-65	2007	2.05E+01	6.86E+00	**1.25E+01**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
NB-95	2007	3.66E+00	3.14E+00	**5.36E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
ZR-95	2007	2.26E-01	6.48E+00	**8.93E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U*		No	
CS-134	2007	3.81E+01	4.21E+00	**7.47E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
CS-137	2007	-6.80E-01	3.33E+00	**5.47E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
BA-140	2007	8.71E+00	1.31E+01	**2.19E+01**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	
LA-140	2007	-1.02E+00	3.57E+00	**5.80E+00**	pCi/L		3077.52	ml	06/13/06 13:00	06/16/06	25200	Sec	U		No	

Flag Values
U = Compound/Analyte not detected or less than 3 sigma
+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum
**** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Report of Analysis

06/23/06 08:19

L28973

Conestoga-Rovers & Associates

EX001-3ESPTMI-06

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

Kathy Shaw

Sample ID: **WG-TMI-MW10D-061306-MMM-065**
Station:
Description:
LIMS Number: L28973-6

Collect Start: 06/13/2006 13:10
Collect Stop:
Receive Date: 06/16/2006

Matrix: Ground Water (WG)
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values		
H-3	2010	**6.31E+02**	1.36E+02	1.62E+02	pCi/L		10	ml		06/17/06	60	M	+		
TOTAL SR	2018	7.52E-01	8.78E-01	**1.66E+00**	pCi/L		450	ml	06/13/06 13:10	06/22/06	120	M	U		
MN-54	2007	-2.37E+00	2.43E+00	**3.83E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No
CO-58	2007	-8.36E-01	2.38E+00	**3.84E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No
FE-59	2007	2.94E+00	4.44E+00	**7.56E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No
CO-60	2007	-1.14E+00	2.31E+00	**3.67E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No
ZN-65	2007	2.08E+01	5.71E+00	**1.06E+01**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U*		No
NB-95	2007	4.76E+00	2.62E+00	**4.14E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U*		No
ZR-95	2007	-1.04E+01	5.50E+00	**6.78E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No
CS-134	2007	3.28E+01	6.99E+00	**6.48E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U*		No
CS-137	2007	2.15E+00	2.52E+00	**4.29E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No
BA-140	2007	-2.67E+00	9.52E+00	**1.56E+01**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No
LA-140	2007	4.34E-01	3.10E+00	**5.11E+00**	pCi/L		3070.84	ml	06/13/06 13:10	06/16/06	23400	Sec	U		No

Sample ID: **WG-TMI-MW12S-061406-MMM-067**
Station:
Description:
LIMS Number: L28973-7

Collect Start: 06/13/2006 14:30
Collect Stop:
Receive Date: 06/16/2006

Matrix: Ground Water (WG)
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values		
H-3	2010	**2.69E+03**	3.19E+02	2.47E+02	pCi/L		10	ml		06/17/06	27.86	M	+	High	

Flag Values
U = Compound/Analyte not detected or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum
**** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

QC Results Summary

QC Summary Report for L28973

6/23/2006 8:17:40AM

TELEDYNE BROWN ENGINEERING
A Teledyne Technologies Company

H-3

Method Blank Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Blank Result	Units	Qualifier	P/F
WG4153-1	H-3	WO	06/16/2006 17:16	< 1.670E+00	pCi/Total	U	P

LCS Sample Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Spike Value	LCS Result	Units	Spike Recovery	Range	Qualifier	P/F
WG4153-2	H-3	WO	06/16/2006 18:20	5.05E+002	4.870E+02	pCi/Total	96.5	70-130	+	P

Spike ID: 3H-041706-1
Spike conc: 5.05E+002
Spike Vol: 1.00E+000

Duplicate Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Original Result	DUP Result	Units	RPD	Range	Qualifier	P/F
WG4153-3 L28973-1	H-3	WG	06/16/2006 18:39	2.000E+02	< 1.590E+02	pCi/L		<30	*	NE

L28973 H-3

Associated Samples for WG4153

SAMPLENUM	CLIENTID
L28973-1	RB-TMI-RB7-061206-MMM-062
L28973-2	WG-TMI-MW14D-061306-MMM-063
L28973-3	RB-TMI-RB8-061306-MMM-066
L28973-4	WG-TMI-DW10-061206-MMM-061
L28973-5	WG-TMI-MW10D-061306-MMM-064
L28973-6	WG-TMI-MW10D-061306-MMM-065
L28973-7	WG-TMI-MW12S-061406-MMM-067

+	Positive Result
U	Compound/analyte was analyzed, peak not identified and/or not detected above MDC
*	< 5 times the MDC are not evaluated
**	Nuclide not detected
***	Spiking level < 5 times activity
P	Pass
F	Fail
NE	Not evaluated

QC Summary Report for L28973

6/23/2006 8:17:40AM

TELEDYNE BROWN ENGINEERING
A Teledyne Technologies Company

TOTAL SR

Method Blank Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Blank Result	Units	Qualifier	P/F
WG4170-1	TOTAL SR	WO	06/22/2006 16:17	< 6.870E-01	pCi/Total	U	P

LCS Sample Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Spike Value	LCS Result	Units	Spike Recovery	Range	Qualifier	P/F
WG4170-2	TOTAL SR	WO	06/22/2006 16:17	5.84E+001	6.510E+01	pCi/Total	111.5	70-130	+	P

Spike ID: 90SR-011905
Spike conc: 2.34E+002
Spike Vol: 2.50E-001

Duplicate Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Original Result	DUP Result	Units	RPD	Range	Qualifier	P/F
WG4170-3 L28973-1	TOTAL SR	WG	06/22/2006 16:17	< 1.570E+00	< 1.030E+00	pCi/L		<30	**	NE

+	Positive Result
U	Compound/analyte was analyzed, peak not identified and/or not detected above MDC
*	< 5 times the MDC are not evaluated
**	Nuclide not detected
***	Spiking level < 5 times activity
P	Pass
F	Fail
NE	Not evaluated

Raw Data

Raw Data Sheet (rawdata)
Jun 23 2006, 08:34 am

Work Order: *L28973* Customer: *Exelon*

Nuclide: *H-3* Project : *EX001-3ESPTMI-06*

Sample ID / Client ID	Run #	Analysis	Reference Date/time	Volume/ Aliquot	Scavenge Date/time	Milking Date/time	Mount Weight	Recovery	Count Date/time	Counter ID	Total counts	Sample dt(min)	Bkg counts	Bkg dt(min)	Eff.	Decay & Ingrowth Factor	Analyst
L28973-1		H-3					0		16-jun-06 19:42	LS7	154	60	1.6	60	.216		DW
RB-TMI-RB7-061206-MMM-				10 ml													
Activity: 2E+02 * Error: 1.1E+02				MDC: 1.59E+02													
L28973-2		H-3					0		16-jun-06 20:45	LS7	373	43.39	1.6	60	.21		DW
WG-TMI-MW14D-061306-MM				10 ml													
Activity: 1.51E+03 * Error: 2.04E+02				MDC: 1.92E+02													
L28973-3		H-3					0		16-jun-06 21:32	LS7	158	60	1.6	60	.207		DW
RB-TMI-RB8-061306-MMM-				10 ml													
Activity: 2.24E+02 * Error: 1.15E+02				MDC: 1.65E+02													
L28973-4		H-3					0		16-jun-06 22:35	LS7	136	60	1.6	60	.205		DW
WG-TMI-DW10-061206-MMM				10 ml													
Activity: 1.45E+02 Error: 1.12E+02				MDC: 1.67E+02 *													
L28973-5		H-3					0		16-jun-06 23:39	LS7	244	60	1.6	60	.213		DW
WG-TMI-MW10D-061306-MM				10 ml													
Activity: 5.22E+02 * Error: 1.3E+02				MDC: 1.61E+02													
L28973-6		H-3					0		17-jun-06 00:42	LS7	274	60	1.6	60	.212		DW
WG-TMI-MW10D-061306-MM				10 ml													
Activity: 6.31E+02 * Error: 1.36E+02				MDC: 1.62E+02													
L28973-7		H-3					0		17-jun-06 01:45	LS7	384	27.86	1.6	60	.204		DW
WG-TMI-MW12S-061406-MM				10 ml													
Activity: 2.69E+03 * Error: 3.19E+02				MDC: 2.47E+02													

Raw Data Sheet (rawdata)
Jun 23 2006, 08:34 am

Work Order: L28973 Customer: Exelon

Nuclide: SR-90 (FAST) Project : EX001-3ESPTMI-06

Sample ID / Client ID	Run #	Analysis	Reference Date/time	Volume/ Aliquot	Scavenge Date/time	Milking Date/time	Mount Weight	Recovery	Count Date/time	Counter ID	Total counts	Sample dt(min)	Bkg counts	Bkg dt(min)	Eff.	Decay & Ingrowth Factor	Analyst
L28973-1		TOTAL SR	12-jun-06 15:00	450 ml	22-jun-06 11:45		0	62.37	22-jun-06 16:17	X2A	106	120	264	400	.354	.999	CJF
RB-TMI-RB7-061206-MMM-																	
Activity: 1.01E+00		Error: 8.61E-01		MDC: 1.57E+00 *													
L28973-2		TOTAL SR	13-jun-06 10:45	450 ml	22-jun-06 11:45		0	92.20	22-jun-06 16:17	X2B	113	120	289	400	.345	.999	CJF
WG-TMI-MW14D-061306-MM																	
Activity: 6.9E-01		Error: 6.19E-01		MDC: 1.14E+00 *													
L28973-3		TOTAL SR	13-jun-06 14:00	450 ml	22-jun-06 11:45		0	65.59	22-jun-06 20:24	X2C	124	120	277	400	.344	.999	CJF
RB-TMI-RB8-061306-MMM-																	
Activity: 1.51E+00		Error: 9.03E-01		MDC: 1.57E+00 *													
L28973-4		TOTAL SR	13-jun-06 11:15	450 ml	22-jun-06 11:45		0	87.37	22-jun-06 16:17	X2D	120	120	307	400	.343	.999	CJF
WG-TMI-DW10-061206-MMM																	
Activity: 7.76E-01		Error: 6.76E-01		MDC: 1.24E+00 *													
L28973-5		TOTAL SR	13-jun-06 13:00	450 ml	22-jun-06 11:45		0	66.94	22-jun-06 16:17	X3A	122	120	363	400	.335	.999	CJF
WG-TMI-MW10D-061306-MM																	
Activity: 4.87E-01		Error: 9.25E-01		MDC: 1.81E+00 *													
L28973-6		TOTAL SR	13-jun-06 13:10	450 ml	22-jun-06 11:45		0	66.94	22-jun-06 16:17	X3B	117	120	321	400	.343	.999	CJF
WG-TMI-MW10D-061306-MM																	
Activity: 7.52E-01		Error: 8.78E-01		MDC: 1.66E+00 *													

Sec. Review: Analyst: LIMS: ✓

VAX/VMS Teledyne Brown Eng. Laboratory Gamma Report: 16-JUN-2006 22:09:45.86
TBE10 12892256 HpGe ********** Aquisition Date/Time: 16-JUN-2006 14:37:52.80

LIMS No., Customer Name, Client ID: WG L28973-1 EX TMI

Sample ID : 10L28973-1
Sample Type : WG
Quantity : 3.05520E+00 L
Start Channel : 80 Energy Tol : 1.50000
End Channel : 4090 Pk Srch Sens: 5.00000
MDA Constant : 0.00 Library Used: LIBD

Smple Date: 12-JUN-2006 15:00:00.
Geometry : 103L083004
BKGFILE : 10BG060306MT
Real Time : 0 07:31:42.44
Live time : 0 07:31:37.69

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	%Eff	Cts/Sec	%Err	Fit
1	1	66.22*	179	1009	1.47	131.86	7.24E-01	6.60E-03	33.4	1.57E+00
2	1	77.24*	98	598	0.81	153.90	1.10E+00	3.62E-03	44.1	1.15E+00
3	1	139.70	183	960	1.12	278.89	1.91E+00	6.76E-03	31.2	2.33E+00
4	1	198.02*	203	795	2.64	395.58	1.72E+00	7.48E-03	29.2	3.89E+00
5	2	238.59*	192	461	1.58	476.77	1.54E+00	7.07E-03	24.8	2.70E+00
6	2	241.95	221	455	1.59	483.48	1.52E+00	8.16E-03	20.0	
7	1	295.24	324	497	1.16	590.13	1.33E+00	1.19E-02	14.0	1.20E+00
8	1	351.93*	403	502	1.23	703.59	1.17E+00	1.49E-02	14.1	1.23E+00
9	1	583.57*	14	162	2.00	1167.23	7.98E-01	5.13E-04	207.9	2.47E+00
10	1	596.25	128	200	2.97	1192.61	7.85E-01	4.73E-03	26.4	1.40E+00
11	1	609.29*	444	168	1.77	1218.72	7.72E-01	1.64E-02	9.1	3.61E+00
12	1	768.72	49	116	1.60	1537.88	6.45E-01	1.82E-03	44.1	9.53E-01
13	1	934.21	30	87	1.37	1869.23	5.54E-01	1.09E-03	62.8	5.70E-01
14	1	1121.66	25	157	1.14	2244.62	4.78E-01	9.15E-04	138.3	5.20E+00
15	1	1238.02*	40	47	1.84	2477.67	4.42E-01	1.49E-03	42.2	1.10E+00
16	1	1460.85*	5	70	3.61	2924.03	3.89E-01	1.85E-04	575.1	1.21E+00
17	1	1764.26*	87	26	2.34	3531.95	3.39E-01	3.20E-03	20.3	8.63E-01

Flag: "*" = Peak area was modified by background subtraction

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/L	Decay Corr pCi/L	2-Sigma %Error
K-40	1460.81	5	10.67*	3.886E-01	3.936E+00	3.936E+00	1150.23
TH-228	238.63	192	44.60*	1.538E+00	9.112E+00	9.149E+00	49.67
	240.98	221	3.95	1.525E+00	1.198E+02	1.203E+02	39.95

Flag: "*" = Keyline

Summary of Nuclide Activity
Sample ID : 10L28973-1

Acquisition date : 16-JUN-2006 14:37:52

Total number of lines in spectrum	17	
Number of unidentified lines	13	
Number of lines tentatively identified by NID	4	23.53%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected pCi/L	Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	3.936E+00	3.936E+00	45.28E+00	1150.23	
TH-228	1.91Y	1.00	9.112E+00	9.149E+00	4.544E+00	49.67	
			---	---			
Total Activity :			1.305E+01	1.309E+01			
Grand Total Activity :			1.305E+01	1.309E+01			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Unidentified Energy Lines
Sample ID : 10L28973-1

Acquisition date : 16-JUN-2006 14:37:52

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	66.22	179	1009	1.47	131.86	129	8	6.60E-03	66.8	7.24E-01	
1	77.24	98	598	0.81	153.90	152	5	3.62E-03	88.3	1.10E+00	
1	139.70	183	960	1.12	278.89	274	9	6.76E-03	62.5	1.91E+00	
1	198.02	203	795	2.64	395.58	390	10	7.48E-03	58.5	1.72E+00	
1	295.24	324	497	1.16	590.13	586	10	1.19E-02	28.1	1.33E+00	
1	351.93	403	502	1.23	703.59	696	15	1.49E-02	28.2	1.17E+00	
1	583.57	14	162	2.00	1167.23	1163	10	5.13E-04	****	7.98E-01	T
1	596.25	128	200	2.97	1192.61	1185	16	4.73E-03	52.8	7.85E-01	
1	609.29	444	168	1.77	1218.72	1210	16	1.64E-02	18.2	7.72E-01	
1	768.72	49	116	1.60	1537.88	1531	11	1.82E-03	88.1	6.45E-01	
1	934.21	30	87	1.37	1869.23	1865	10	1.09E-03	****	5.54E-01	
1	1121.66	25	157	1.14	2244.62	2233	23	9.15E-04	****	4.78E-01	
1	1238.02	40	47	1.84	2477.67	2471	11	1.49E-03	84.3	4.42E-01	
1	1764.26	87	26	2.34	3531.95	3524	15	3.20E-03	40.7	3.39E-01	

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of lines in spectrum	17	
Number of unidentified lines	13	
Number of lines tentatively identified by NID	4	23.53%

Nuclide Type : natural

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/L	Wtd Mean Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	3.936E+00	3.936E+00	45.28E+00	1150.23	
TH-228	1.91Y	1.00	9.112E+00	9.149E+00	4.544E+00	49.67	
			---	---			
	Total Activity :		1.305E+01	1.309E+01			

Grand Total Activity : 1.305E+01 1.309E+01

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Interference Report

No interference correction performed

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/L)	Act error	MDA (pCi/L)	MDA error	Act/MDA
K-40	3.936E+00	4.528E+01	4.157E+01	0.000E+00	0.095
TH-228	9.149E+00	4.544E+00	7.212E+00	0.000E+00	1.269

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/L)	K.L. Ided	Act error	MDA (pCi/L)	MDA error	Act/MDA
BE-7	3.938E+00		2.034E+01	3.404E+01	0.000E+00	0.116
NA-24	-7.333E+01		2.726E+02	4.450E+02	0.000E+00	-0.165
CR-51	-1.533E+01		2.237E+01	3.551E+01	0.000E+00	-0.432
MN-54	8.617E-01		2.451E+00	4.056E+00	0.000E+00	0.212
CO-57	5.217E-01		2.241E+00	3.742E+00	0.000E+00	0.139
CO-58	6.568E-02		2.426E+00	3.967E+00	0.000E+00	0.017
FE-59	2.893E+00		4.630E+00	7.929E+00	0.000E+00	0.365
CO-60	-8.101E-01		2.609E+00	4.173E+00	0.000E+00	-0.194
ZN-65	1.328E+01		6.451E+00	1.026E+01	0.000E+00	1.294
SE-75	8.391E-01		3.288E+00	5.427E+00	0.000E+00	0.155
SR-85	1.905E+01		2.785E+00	5.401E+00	0.000E+00	3.526
Y-88	-6.593E-01		2.947E+00	4.761E+00	0.000E+00	-0.138
NB-94	2.194E-01		2.392E+00	3.966E+00	0.000E+00	0.055
NB-95	2.154E+00		2.570E+00	4.360E+00	0.000E+00	0.494
ZR-95	-7.498E-01		4.948E+00	7.396E+00	0.000E+00	-0.101
MO-99	4.836E+00		5.065E+01	8.369E+01	0.000E+00	0.058
RU-103	2.995E-01		2.544E+00	4.234E+00	0.000E+00	0.071
RU-106	9.253E+00		2.350E+01	3.733E+01	0.000E+00	0.248
AG-110m	4.195E-01		2.346E+00	3.924E+00	0.000E+00	0.107
SN-113	1.884E+00		3.126E+00	5.233E+00	0.000E+00	0.360
SB-124	7.280E+00		4.468E+00	4.003E+00	0.000E+00	1.819
SB-125	1.411E+00		6.936E+00	1.140E+01	0.000E+00	0.124
TE-129M	4.083E+01		2.955E+01	5.023E+01	0.000E+00	0.813
I-131	1.195E+00		3.471E+00	5.792E+00	0.000E+00	0.206
BA-133	1.562E+01		4.232E+00	6.731E+00	0.000E+00	2.321
CS-134	2.289E+01		4.611E+00	5.448E+00	0.000E+00	4.200
CS-136	-2.140E+00		2.808E+00	4.409E+00	0.000E+00	-0.485
CS-137	-3.873E-01		2.615E+00	4.317E+00	0.000E+00	-0.090
CE-139	-1.472E+00		2.336E+00	3.770E+00	0.000E+00	-0.390
BA-140	5.543E+00		1.015E+01	1.707E+01	0.000E+00	0.325
LA-140	-8.852E-01		3.462E+00	5.556E+00	0.000E+00	-0.159
CE-141	5.511E+00		4.927E+00	7.130E+00	0.000E+00	0.773
CE-144	-4.573E+00		2.078E+01	2.921E+01	0.000E+00	-0.157
EU-152	-8.621E+00		8.885E+00	1.199E+01	0.000E+00	-0.719
EU-154	2.174E+00		4.664E+00	7.815E+00	0.000E+00	0.278
RA-226	-3.781E+01		6.468E+01	9.742E+01	0.000E+00	-0.388
AC-228	3.945E+00		1.002E+01	1.570E+01	0.000E+00	0.251
TH-232	3.939E+00		1.000E+01	1.567E+01	0.000E+00	0.251
U-235	2.291E+01		2.077E+01	3.007E+01	0.000E+00	0.762
U-238	1.233E+02		2.585E+02	4.343E+02	0.000E+00	0.284
AM-241	-2.966E+01		2.021E+01	3.094E+01	0.000E+00	-0.959

```
A,10L28973-1       ,06/16/2006 22:09,06/12/2006 15:00,   3.055E+00,WG L28973-1 EX
B,10L28973-1       ,LIBD                ,06/13/2006 09:42,103L083004
C,K-40     ,YES,   3.936E+00,   4.528E+01,   4.157E+01,,    0.095
C,TH-228   ,YES,   9.149E+00,   4.544E+00,   7.212E+00,,    1.269
C,BE-7     ,NO ,   3.938E+00,   2.034E+01,   3.404E+01,,    0.116
C,NA-24    ,NO ,  -7.333E+01,   2.726E+02,   4.450E+02,,   -0.165
C,CR-51    ,NO ,  -1.533E+01,   2.237E+01,   3.551E+01,,   -0.432
C,MN-54    ,NO ,   8.617E-01,   2.451E+00,   4.056E+00,,    0.212
C,CO-57    ,NO ,   5.217E-01,   2.241E+00,   3.742E+00,,    0.139
C,CO-58    ,NO ,   6.568E-02,   2.426E+00,   3.967E+00,,    0.017
C,FE-59    ,NO ,   2.893E+00,   4.630E+00,   7.929E+00,,    0.365
C,CO-60    ,NO ,  -8.101E-01,   2.609E+00,   4.173E+00,,   -0.194
C,ZN-65    ,NO ,   1.328E+01,   6.451E+00,   1.026E+01,,    1.294
C,SE-75    ,NO ,   8.391E-01,   3.288E+00,   5.427E+00,,    0.155
C,SR-85    ,NO ,   1.905E+01,   2.785E+00,   5.401E+00,,    3.526
C,Y-88     ,NO ,  -6.593E-01,   2.947E+00,   4.761E+00,,   -0.138
C,NB-94    ,NO ,   2.194E-01,   2.392E+00,   3.966E+00,,    0.055
C,NB-95    ,NO ,   2.154E+00,   2.570E+00,   4.360E+00,,    0.494
C,ZR-95    ,NO ,  -7.498E-01,   4.948E+00,   7.396E+00,,   -0.101
C,MO-99    ,NO ,   4.836E+00,   5.065E+01,   8.369E+01,,    0.058
C,RU-103   ,NO ,   2.995E-01,   2.544E+00,   4.234E+00,,    0.071
C,RU-106   ,NO ,   9.253E+00,   2.350E+01,   3.733E+01,,    0.248
C,AG-110m  ,NO ,   4.195E-01,   2.346E+00,   3.924E+00,,    0.107
C,SN-113   ,NO ,   1.884E+00,   3.126E+00,   5.233E+00,,    0.360
C,SB-124   ,NO ,   7.280E+00,   4.468E+00,   4.003E+00,,    1.819
C,SB-125   ,NO ,   1.411E+00,   6.936E+00,   1.140E+01,,    0.124
C,TE-129M  ,NO ,   4.083E+01,   2.955E+01,   5.023E+01,,    0.813
C,I-131    ,NO ,   1.195E+00,   3.471E+00,   5.792E+00,,    0.206
C,BA-133   ,NO ,   1.562E+01,   4.232E+00,   6.731E+00,,    2.321
C,CS-134   ,NO ,   2.289E+01,   4.611E+00,   5.448E+00,,    4.200
C,CS-136   ,NO ,  -2.140E+00,   2.808E+00,   4.409E+00,,   -0.485
C,CS-137   ,NO ,  -3.873E-01,   2.615E+00,   4.317E+00,,   -0.090
C,CE-139   ,NO ,  -1.472E+00,   2.336E+00,   3.770E+00,,   -0.390
C,BA-140   ,NO ,   5.543E+00,   1.015E+01,   1.707E+01,,    0.325
C,LA-140   ,NO ,  -8.852E-01,   3.462E+00,   5.556E+00,,   -0.159
C,CE-141   ,NO ,   5.511E+00,   4.927E+00,   7.130E+00,,    0.773
C,CE-144   ,NO ,  -4.573E+00,   2.078E+01,   2.921E+01,,   -0.157
C,EU-152   ,NO ,  -8.621E+00,   8.885E+00,   1.199E+01,,   -0.719
C,EU-154   ,NO ,   2.174E+00,   4.664E+00,   7.815E+00,,    0.278
C,RA-226   ,NO ,  -3.781E+01,   6.468E+01,   9.742E+01,,   -0.388
C,AC-228   ,NO ,   3.945E+00,   1.002E+01,   1.570E+01,,    0.251
C,TH-232   ,NO ,   3.939E+00,   1.000E+01,   1.567E+01,,    0.251
C,U-235    ,NO ,   2.291E+01,   2.077E+01,   3.007E+01,,    0.762
C,U-238    ,NO ,   1.233E+02,   2.585E+02,   4.343E+02,,    0.284
C,AM-241   ,NO ,  -2.966E+01,   2.021E+01,   3.094E+01,,   -0.959
```

Sec. Review: Analyst: LIMS: ✓

VAX/VMS Teledyne Brown Eng. Laboratory Gamma Report: 16-JUN-2006 22:10:30.62
TBE13 P-10727B HpGe ********** Aquisition Date/Time: 16-JUN-2006 14:47:29.86

LIMS No., Customer Name, Client ID: WG L28973-2 EXELON/TMI

Sample ID : 13L28973-2
Sample Type : WG
Quantity : 3.06200E+00 L
Start Channel : 25 Energy Tol : 1.50000
End Channel : 4090 Pk Srch Sens: 5.00000
MDA Constant : 0.00 Library Used: LIBD

Smple Date: 13-JUN-2006 10:45:00.
Geometry : 133L082404
BKGFILE : 13BG060306MT
Real Time : 0 07:22:42.69
Live time : 0 07:22:35.05

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	%Eff	Cts/Sec	%Err	Fit
1	1	66.66	191	654	1.19	133.28	8.41E-01	7.21E-03	22.5	1.79E+00
2	2	77.07*	215	818	1.09	154.12	1.25E+00	8.11E-03	25.3	2.15E+00
3	1	87.08*	47	672	1.04	174.12	1.58E+00	1.76E-03	98.8	1.99E+00
4	1	139.73*	252	1125	1.54	279.44	2.27E+00	9.47E-03	28.1	2.23E+00
5	1	185.73*	23	842	1.00	371.43	2.18E+00	8.61E-04	266.7	6.12E-01
6	1	198.31*	277	687	1.45	396.60	2.12E+00	1.04E-02	19.8	9.50E-01
7	2	238.57*	119	435	1.07	477.11	1.94E+00	4.47E-03	36.8	1.57E+00
8	2	241.92	210	612	1.43	483.83	1.92E+00	7.92E-03	22.6	
9	1	295.19*	430	441	1.35	590.38	1.70E+00	1.62E-02	11.5	2.17E+00
10	1	351.90*	571	471	1.11	703.81	1.51E+00	2.15E-02	9.7	7.51E-01
11	1	583.00*	11	185	1.35	1166.13	1.04E+00	4.15E-04	291.0	1.31E+00
12	1	595.55	66	206	1.30	1191.26	1.02E+00	2.49E-03	41.0	1.78E+00
13	1	609.18*	601	211	1.45	1218.52	1.01E+00	2.26E-02	7.1	2.23E+00
14	1	831.58	45	79	2.27	1663.51	7.91E-01	1.70E-03	38.3	2.62E+00
15	1	969.00*	20	125	1.88	1938.51	7.01E-01	7.44E-04	141.2	1.70E+00
16	1	1120.55*	110	81	2.14	2241.82	6.26E-01	4.14E-03	23.6	1.31E+00
17	1	1238.54*	62	82	2.43	2477.98	5.80E-01	2.32E-03	35.6	7.29E-01
18	1	1765.19*	83	57	2.14	3532.33	4.55E-01	3.11E-03	28.2	1.15E+00

Flag: "*" = Peak area was modified by background subtraction

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/L	Decay Corr pCi/L	2-Sigma %Error
RA-226	186.21	23	3.28*	2.179E+00	1.064E+01	1.064E+01	533.40
TH-228	238.63	119	44.60*	1.938E+00	4.560E+00	4.575E+00	73.70
	240.98	210	3.95	1.923E+00	9.206E+01	9.236E+01	45.27
TH-232	583.14	11	30.25	1.040E+00	1.164E+00	1.164E+00	582.03
	911.07	------	27.70*	7.361E-01	------	Line Not Found	------
	969.11	20	16.60	7.014E-01	5.637E+00	5.637E+00	282.50
U-235	143.76	------	10.50*	2.278E+00	------	Line Not Found	------
	163.35	------	4.70	2.256E+00	------	Line Not Found	------
	185.71	23	54.00	2.179E+00	6.462E-01	6.462E-01	533.40
	205.31	------	4.70	2.093E+00	------	Line Not Found	------

Flag: "*" = Keyline

Summary of Nuclide Activity
Page : 2
Sample ID : 13L28973-2
Acquisition date : 16-JUN-2006 14:47:29

Total number of lines in spectrum	18	
Number of unidentified lines	13	
Number of lines tentatively identified by NID	5	27.78%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected pCi/L	Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-226	1600.00Y	1.00	1.064E+01	1.064E+01	5.674E+01	533.40	
TH-228	1.91Y	1.00	4.560E+00	4.575E+00	3.371E+00	73.70	
TH-232	1.41E+10Y	1.00	1.164E+00	1.164E+00	6.775E+00	582.03	K
U-235	7.04E+08Y	1.00	6.462E-01	6.462E-01	34.47E-01	533.40	K
			---	---			
	Total Activity :		1.701E+01	1.702E+01			

Grand Total Activity : 1.701E+01 1.702E+01

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Unidentified Energy Lines
Page : 3
Sample ID : 13L28973-2
Acquisition date : 16-JUN-2006 14:47:29

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	66.66	191	654	1.19	133.28	131	6	7.21E-03	44.9	8.41E-01	
2	77.07	215	818	1.09	154.12	142	21	8.11E-03	50.6	1.25E+00	
1	87.08	47	672	1.04	174.12	165	13	1.76E-03	****	1.58E+00	
1	139.73	252	1125	1.54	279.44	274	11	9.47E-03	56.1	2.27E+00	
1	198.31	277	687	1.45	396.60	392	9	1.04E-02	39.5	2.12E+00	
1	295.19	430	441	1.35	590.38	586	10	1.62E-02	22.9	1.70E+00	
1	351.90	571	471	1.11	703.81	698	12	2.15E-02	19.3	1.51E+00	
1	595.55	66	206	1.30	1191.26	1187	9	2.49E-03	82.1	1.02E+00	
1	609.18	601	211	1.45	1218.52	1213	11	2.26E-02	14.1	1.01E+00	
1	831.58	45	79	2.27	1663.51	1660	8	1.70E-03	76.5	7.91E-01	
1	1120.55	110	81	2.14	2241.82	2236	12	4.14E-03	47.1	6.26E-01	
1	1238.54	62	82	2.43	2477.98	2473	12	2.32E-03	71.1	5.80E-01	
1	1765.19	83	57	2.14	3532.33	3525	18	3.11E-03	56.5	4.55E-01	

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of lines in spectrum	18	
Number of unidentified lines	13	
Number of lines tentatively identified by NID	5	27.78%

Nuclide Type : natural

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/L	Wtd Mean Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-226	1600.00Y	1.00	1.064E+01	1.064E+01	5.674E+01	533.40	
TH-228	1.91Y	1.00	4.560E+00	4.575E+00	3.371E+00	73.70	
TH-232	1.41E+10Y	1.00	1.849E+00	1.849E+00	6.234E+00	337.07	
			---	---			
	Total Activity :		1.705E+01	1.706E+01			

Grand Total Activity : 1.705E+01 1.706E+01

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Interference Report

No interference correction performed

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/L)	Act error	MDA (pCi/L)	MDA error	Act/MDA
RA-226	1.064E+01	5.674E+01	7.492E+01	0.000E+00	0.142
TH-228	4.575E+00	3.371E+00	5.782E+00	0.000E+00	0.791
TH-232	1.849E+00	6.234E+00	1.341E+01	0.000E+00	0.138

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/L)	K.L. Ided	Act error	MDA (pCi/L)	MDA error	Act/MDA
BE-7	3.614E+00		1.756E+01	2.865E+01	0.000E+00	0.126
NA-24	-1.376E+02		8.131E+01	1.199E+02	0.000E+00	-1.148
K-40	2.407E+01		3.213E+01	5.725E+01	0.000E+00	0.420
CR-51	-6.635E+00		1.752E+01	2.890E+01	0.000E+00	-0.230
MN-54	5.691E-01		1.986E+00	3.303E+00	0.000E+00	0.172
CO-57	-9.082E-01		1.832E+00	2.972E+00	0.000E+00	-0.306
CO-58	-1.065E+00		2.039E+00	3.282E+00	0.000E+00	-0.324
FE-59	2.085E+00		3.948E+00	6.660E+00	0.000E+00	0.313
CO-60	1.207E+00		2.008E+00	3.436E+00	0.000E+00	0.351
ZN-65	1.180E+01		5.492E+00	8.649E+00	0.000E+00	1.365
SE-75	1.574E-01		2.650E+00	4.326E+00	0.000E+00	0.036
SR-85	1.864E+01		2.361E+00	4.621E+00	0.000E+00	4.034
Y-88	-2.295E+00		2.278E+00	3.470E+00	0.000E+00	-0.662
NB-94	-1.991E-01		1.976E+00	3.278E+00	0.000E+00	-0.061
NB-95	2.835E+00		2.035E+00	3.545E+00	0.000E+00	0.800
ZR-95	-1.002E+00		3.537E+00	5.787E+00	0.000E+00	-0.173
MO-99	1.312E+01		3.277E+01	5.522E+01	0.000E+00	0.238
RU-103	-2.692E-01		1.986E+00	3.289E+00	0.000E+00	-0.082
RU-106	-7.797E+00		1.832E+01	2.950E+01	0.000E+00	-0.264
AG-110m	-3.806E-01		1.976E+00	3.195E+00	0.000E+00	-0.119
SN-113	2.885E+00		2.559E+00	4.342E+00	0.000E+00	0.665
SB-124	-8.888E-01		4.500E+00	3.203E+00	0.000E+00	-0.277
SB-125	1.335E+00		5.652E+00	9.298E+00	0.000E+00	0.144
TE-129M	1.428E+01		2.270E+01	3.767E+01	0.000E+00	0.379
I-131	1.396E+00		2.575E+00	4.316E+00	0.000E+00	0.323
BA-133	7.038E+00		3.203E+00	4.883E+00	0.000E+00	1.441
CS-134	9.717E+00		3.315E+00	4.288E+00	0.000E+00	2.266
CS-136	-4.893E-01		2.306E+00	3.759E+00	0.000E+00	-0.130
CS-137	1.115E+00		2.344E+00	3.635E+00	0.000E+00	0.307
CE-139	1.777E+00		1.949E+00	3.200E+00	0.000E+00	0.555
BA-140	6.073E+00		8.053E+00	1.367E+01	0.000E+00	0.444
LA-140	3.885E+00		2.896E+00	5.089E+00	0.000E+00	0.763
CE-141	3.396E+00		3.896E+00	5.552E+00	0.000E+00	0.612
CE-144	7.049E+00		1.665E+01	2.355E+01	0.000E+00	0.299
EU-152	-1.110E+01		7.363E+00	9.761E+00	0.000E+00	-1.137
EU-154	2.418E+00		3.806E+00	6.312E+00	0.000E+00	0.383
AC-228	1.168E+00		9.104E+00	1.342E+01	0.000E+00	0.087
U-235	-9.405E+00		1.805E+01	2.376E+01	0.000E+00	-0.396
U-238	3.867E+01		2.433E+02	3.714E+02	0.000E+00	0.104
AM-241	-3.701E+01		1.744E+01	2.697E+01	0.000E+00	-1.372

```
A,13L28973-2       ,06/16/2006 22:10,06/13/2006 10:45,   3.062E+00,WG L28973-2 EX
B,13L28973-2       ,LIBD                ,06/13/2006 09:43,133L082404
C,RA-226   ,YES,   1.064E+01,   5.674E+01,   7.492E+01,,    0.142
C,TH-228   ,YES,   4.575E+00,   3.371E+00,   5.782E+00,,    0.791
C,TH-232   ,YES,   1.849E+00,   6.234E+00,   1.341E+01,,    0.138
C,BE-7     ,NO ,   3.614E+00,   1.756E+01,   2.865E+01,,    0.126
C,NA-24    ,NO ,  -1.376E+02,   8.131E+01,   1.199E+02,,   -1.148
C,K-40     ,NO ,   2.407E+01,   3.213E+01,   5.725E+01,,    0.420
C,CR-51    ,NO ,  -6.635E+00,   1.752E+01,   2.890E+01,,   -0.230
C,MN-54    ,NO ,   5.691E-01,   1.986E+00,   3.303E+00,,    0.172
C,CO-57    ,NO ,  -9.082E-01,   1.832E+00,   2.972E+00,,   -0.306
C,CO-58    ,NO ,  -1.065E+00,   2.039E+00,   3.282E+00,,   -0.324
C,FE-59    ,NO ,   2.085E+00,   3.948E+00,   6.660E+00,,    0.313
C,CO-60    ,NO ,   1.207E+00,   2.008E+00,   3.436E+00,,    0.351
C,ZN-65    ,NO ,   1.180E+01,   5.492E+00,   8.649E+00,,    1.365
C,SE-75    ,NO ,   1.574E-01,   2.650E+00,   4.326E+00,,    0.036
C,SR-85    ,NO ,   1.864E+01,   2.361E+00,   4.621E+00,,    4.034
C,Y-88     ,NO ,  -2.295E+00,   2.278E+00,   3.470E+00,,   -0.662
C,NB-94    ,NO ,  -1.991E-01,   1.976E+00,   3.278E+00,,   -0.061
C,NB-95    ,NO ,   2.835E+00,   2.035E+00,   3.545E+00,,    0.800
C,ZR-95    ,NO ,  -1.002E+00,   3.537E+00,   5.787E+00,,   -0.173
C,MO-99    ,NO ,   1.312E+01,   3.277E+01,   5.522E+01,,    0.238
C,RU-103   ,NO ,  -2.692E-01,   1.986E+00,   3.289E+00,,   -0.082
C,RU-106   ,NO ,  -7.797E+00,   1.832E+01,   2.950E+01,,   -0.264
C,AG-110m  ,NO ,  -3.806E-01,   1.976E+00,   3.195E+00,,   -0.119
C,SN-113   ,NO ,   2.885E+00,   2.559E+00,   4.342E+00,,    0.665
C,SB-124   ,NO ,  -8.888E-01,   4.500E+00,   3.203E+00,,   -0.277
C,SB-125   ,NO ,   1.335E+00,   5.652E+00,   9.298E+00,,    0.144
C,TE-129M  ,NO ,   1.428E+01,   2.270E+01,   3.767E+01,,    0.379
C,I-131    ,NO ,   1.396E+00,   2.575E+00,   4.316E+00,,    0.323
C,BA-133   ,NO ,   7.038E+00,   3.203E+00,   4.883E+00,,    1.441
C,CS-134   ,NO ,   9.717E+00,   3.315E+00,   4.288E+00,,    2.266
C,CS-136   ,NO ,  -4.893E-01,   2.306E+00,   3.759E+00,,   -0.130
C,CS-137   ,NO ,   1.115E+00,   2.344E+00,   3.635E+00,,    0.307
C,CE-139   ,NO ,   1.777E+00,   1.949E+00,   3.200E+00,,    0.555
C,BA-140   ,NO ,   6.073E+00,   8.053E+00,   1.367E+01,,    0.444
C,LA-140   ,NO ,   3.885E+00,   2.896E+00,   5.089E+00,,    0.763
C,CE-141   ,NO ,   3.396E+00,   3.896E+00,   5.552E+00,,    0.612
C,CE-144   ,NO ,   7.049E+00,   1.665E+01,   2.355E+01,,    0.299
C,EU-152   ,NO ,  -1.110E+01,   7.363E+00,   9.761E+00,,   -1.137
C,EU-154   ,NO ,   2.418E+00,   3.806E+00,   6.312E+00,,    0.383
C,AC-228   ,NO ,   1.168E+00,   9.104E+00,   1.342E+01,,    0.087
C,U-235    ,NO ,  -9.405E+00,   1.805E+01,   2.376E+01,,   -0.396
C,U-238    ,NO ,   3.867E+01,   2.433E+02,   3.714E+02,,    0.104
C,AM-241   ,NO ,  -3.701E+01,   1.744E+01,   2.697E+01,,   -1.372
```

Sec. Review: Analyst: LIMS: ✓

VAX/VMS Teledyne Brown Eng. Laboratory Gamma Report: 16-JUN-2006 22:11:46.89
TBE04 P-40312B HpGe ********** Aquisition Date/Time: 16-JUN-2006 15:11:32.32

LIMS No., Customer Name, Client ID: WG L28973-3 EXELON/TMI

Sample ID : 04L28973-3
Sample Type : WG
Quantity : 3.02120E+00 L
Start Channel : 90 Energy Tol : 1.00000
End Channel : 4090 Pk Srch Sens: 5.00000
MDA Constant : 0.00 Library Used: LIBD

Smple Date: 13-JUN-2006 14:00:00.
Geometry : 043L082004
BKGFILE : 04BG060306MT
Real Time : 0 07:00:04.65
Live time : 0 07:00:00.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	%Eff	Cts/Sec	%Err	Fit
1	1	66.46*	164	881	1.08	133.59	6.69E-01	6.52E-03	33.7	9.29E-01
2	1	74.94*	6	787	0.89	150.53	9.82E-01	2.20E-04	912.5	6.09E+00
3	1	77.15	234	742	0.77	154.95	1.06E+00	9.28E-03	20.4	1.25E+00
4	1	87.28*	86	318	1.06	175.19	1.39E+00	3.43E-03	37.6	2.84E+00
5	1	92.64*	24	507	1.00	185.92	1.53E+00	9.52E-04	181.5	
6	1	140.02	200	701	1.24	280.63	2.04E+00	7.94E-03	23.8	1.52E+00
7	1	198.68*	77	578	1.22	397.89	1.86E+00	3.07E-03	63.4	2.67E+00
8	1	239.01*	65	468	0.96	478.51	1.68E+00	2.58E-03	67.1	2.79E+00
9	1	242.26	278	382	1.08	485.01	1.66E+00	1.10E-02	13.1	9.23E-01
10	1	295.51	583	421	1.18	591.47	1.45E+00	2.31E-02	8.0	2.49E+00
11	1	352.31*	859	395	1.13	705.02	1.28E+00	3.41E-02	6.1	6.35E-01
12	1	583.65*	15	260	1.48	1167.53	8.77E-01	6.08E-04	246.1	1.70E+00
13	1	596.25	104	201	1.80	1192.71	8.63E-01	4.12E-03	29.9	2.01E+00
14	1	609.83*	793	181	1.59	1219.87	8.48E-01	3.15E-02	5.6	2.60E+00
15	1	1121.35	176	78	2.05	2242.64	5.27E-01	6.99E-03	13.2	1.78E+00
16	1	1239.19	95	44	2.89	2478.28	4.87E-01	3.76E-03	18.3	1.72E+00
17	1	1333.35	36	24	1.81	2666.58	4.60E-01	1.44E-03	29.1	3.92E+00
18	1	1461.63	133	64	2.68	2923.11	4.29E-01	5.28E-03	16.6	2.02E+00
19	1	1764.89*	137	31	2.23	3529.62	3.77E-01	5.42E-03	14.3	7.92E-01

Flag: "*" = Peak area was modified by background subtraction

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/L	Decay Corr pCi/L	2-Sigma %Error
K-40	1460.81	133	10.67*	4.294E-01	1.032E+02	1.032E+02	33.20
TH-228	238.63	65	44.60*	1.678E+00	3.088E+00	3.098E+00	134.21
	240.98	------	3.95	1.669E+00	------	Line Not Found	------

Nuclide Type: activation

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/L	Decay Corr pCi/L	2-Sigma %Error
CO-60	1173.22	------	100.00	5.085E-01	------	Line Not Found	------
	1332.49	36	100.00*	4.602E-01	2.792E+00	2.795E+00	58.22

Flag: "*" = Keyline

Summary of Nuclide Activity
Page : 2
Sample ID : 04L28973-3
Acquisition date : 16-JUN-2006 15:11:32

Total number of lines in spectrum	19	
Number of unidentified lines	15	
Number of lines tentatively identified by NID	4	21.05%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected pCi/L	Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	1.032E+02	1.032E+02	0.342E+02	33.20	
TH-228	1.91Y	1.00	3.088E+00	3.098E+00	4.158E+00	134.21	
			---	---			
	Total Activity :		1.063E+02	1.063E+02			

Nuclide Type : activation

Nuclide	Hlife	Decay	Uncorrected pCi/L	Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-60	5.27Y	1.00	2.792E+00	2.795E+00	1.627E+00	58.22	
			---	---			
	Total Activity :		2.792E+00	2.795E+00			

Grand Total Activity : 1.090E+02 1.091E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Unidentified Energy Lines
Page : 3
Sample ID : 04L28973-3
Acquisition date : 16-JUN-2006 15:11:32

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	66.46	164	881	1.08	133.59	130	8	6.52E-03	67.4	6.69E-01	
1	74.94	6	787	0.89	150.53	148	6	2.20E-04	****	9.82E-01	
1	77.15	234	742	0.77	154.95	153	7	9.28E-03	40.8	1.06E+00	
1	87.28	86	318	1.06	175.19	173	21	3.43E-03	75.2	1.39E+00	
1	92.64	24	507	1.00	185.92	173	21	9.52E-04	****	1.53E+00	
1	140.02	200	701	1.24	280.63	277	8	7.94E-03	47.6	2.04E+00	
1	198.68	77	578	1.22	397.89	394	8	3.07E-03	****	1.86E+00	
1	242.26	278	382	1.08	485.01	482	7	1.10E-02	26.3	1.66E+00	
1	295.51	583	421	1.18	591.47	587	11	2.31E-02	16.0	1.45E+00	
1	352.31	859	395	1.13	705.02	699	12	3.41E-02	12.2	1.28E+00	
1	583.65	15	260	1.48	1167.53	1162	15	6.08E-04	****	8.77E-01	T
1	596.25	104	201	1.80	1192.71	1188	13	4.12E-03	59.8	8.63E-01	
1	609.83	793	181	1.59	1219.87	1213	15	3.15E-02	11.3	8.48E-01	
1	1121.35	176	78	2.05	2242.64	2236	14	6.99E-03	26.5	5.27E-01	
1	1239.19	95	44	2.89	2478.28	2472	14	3.76E-03	36.7	4.87E-01	
1	1764.89	137	31	2.23	3529.62	3521	16	5.42E-03	28.6	3.77E-01	

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of lines in spectrum	19	
Number of unidentified lines	15	
Number of lines tentatively identified by NID	4	21.05%

Nuclide Type : natural

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/L	Wtd Mean Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	1.032E+02	1.032E+02	0.342E+02	33.20	
TH-228	1.91Y	1.00	3.088E+00	3.098E+00	4.158E+00	134.21	
		Total Activity :	1.063E+02	1.063E+02			

Nuclide Type : activation

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/L	Wtd Mean Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-60	5.27Y	1.00	2.792E+00	2.795E+00	1.627E+00	58.22	
		Total Activity :	2.792E+00	2.795E+00			

Grand Total Activity : 1.090E+02 1.091E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Interference Report

No interference correction performed

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/L)	Act error	MDA (pCi/L)	MDA error	Act/MDA
K-40	1.032E+02	3.425E+01	3.850E+01	0.000E+00	2.679
CO-60	2.795E+00	1.627E+00	3.996E+00	0.000E+00	0.700
TH-228	3.098E+00	4.158E+00	6.554E+00	0.000E+00	0.473

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/L)	K.L. Ided	Act error	MDA (pCi/L)	MDA error	Act/MDA
BE-7	6.700E+00		1.849E+01	3.100E+01	0.000E+00	0.216
NA-24	-9.368E+01		8.811E+01	1.336E+02	0.000E+00	-0.701
CR-51	-1.870E+00		1.983E+01	3.268E+01	0.000E+00	-0.057
MN-54	-8.361E-02		2.265E+00	3.675E+00	0.000E+00	-0.023
CO-57	1.258E+00		2.042E+00	3.373E+00	0.000E+00	0.373
CO-58	6.910E-01		2.381E+00	3.931E+00	0.000E+00	0.176
FE-59	2.213E+00		4.678E+00	7.802E+00	0.000E+00	0.284
ZN-65	1.227E+01		6.316E+00	1.002E+01	0.000E+00	1.225
SE-75	8.017E-01		3.045E+00	4.963E+00	0.000E+00	0.162
SR-85	1.888E+01		2.678E+00	5.218E+00	0.000E+00	3.619
Y-88	-3.631E+00		2.608E+00	3.827E+00	0.000E+00	-0.949
NB-94	1.059E-01		2.149E+00	3.549E+00	0.000E+00	0.030
NB-95	2.811E+00		2.327E+00	4.012E+00	0.000E+00	0.700
ZR-95	-1.243E+00		3.960E+00	6.391E+00	0.000E+00	-0.195
MO-99	-2.372E+01		3.673E+01	5.845E+01	0.000E+00	-0.406
RU-103	-2.991E-01		2.220E+00	3.643E+00	0.000E+00	-0.082
RU-106	1.146E-01		2.113E+01	3.321E+01	0.000E+00	0.003
AG-110m	-2.583E-02		2.150E+00	3.561E+00	0.000E+00	-0.007
SN-113	-1.625E-01		2.931E+00	4.767E+00	0.000E+00	-0.034
SB-124	-9.709E-01		5.144E+00	3.589E+00	0.000E+00	-0.271
SB-125	-1.640E+00		6.469E+00	1.070E+01	0.000E+00	-0.153
TE-129M	1.714E+01		2.538E+01	4.311E+01	0.000E+00	0.398
I-131	1.217E+00		2.945E+00	4.886E+00	0.000E+00	0.249
BA-133	3.238E+01		4.369E+00	7.609E+00	0.000E+00	4.255
CS-134	7.555E+00		5.147E+00	4.476E+00	0.000E+00	1.688
CS-136	1.911E-01		2.565E+00	4.191E+00	0.000E+00	0.046
CS-137	5.495E-01		2.373E+00	3.970E+00	0.000E+00	0.138
CE-139	2.793E-01		2.072E+00	3.462E+00	0.000E+00	0.081
BA-140	7.410E+00		9.159E+00	1.549E+01	0.000E+00	0.478
LA-140	1.733E+00		3.041E+00	5.191E+00	0.000E+00	0.334
CE-141	4.963E+00		4.458E+00	6.366E+00	0.000E+00	0.780
CE-144	6.642E+00		1.806E+01	2.642E+01	0.000E+00	0.251
EU-152	7.733E-01		8.274E+00	1.159E+01	0.000E+00	0.067
EU-154	4.621E-01		4.295E+00	7.018E+00	0.000E+00	0.066
RA-226	-3.895E+01		5.746E+01	8.803E+01	0.000E+00	-0.443
AC-228	7.320E+00		9.473E+00	1.528E+01	0.000E+00	0.479
TH-232	7.312E+00		9.463E+00	1.526E+01	0.000E+00	0.479
U-235	1.205E+00		1.960E+01	2.713E+01	0.000E+00	0.044
U-238	-2.119E+02		2.418E+02	3.765E+02	0.000E+00	-0.563
AM-241	-3.625E+01		2.301E+01	3.466E+01	0.000E+00	-1.046

```
A,04L28973-3       ,06/16/2006 22:11,06/13/2006 14:00,   3.021E+00,WG L28973-3 EX
B,04L28973-3       ,LIBD                ,06/13/2006 09:42,043L082004
C,K-40     ,YES,   1.032E+02,   3.425E+01,   3.850E+01,,    2.679
C,CO-60    ,YES,   2.795E+00,   1.627E+00,   3.996E+00,,    0.700
C,TH-228   ,YES,   3.098E+00,   4.158E+00,   6.554E+00,,    0.473
C,BE-7     ,NO ,   6.700E+00,   1.849E+01,   3.100E+01,,    0.216
C,NA-24    ,NO ,  -9.368E+01,   8.811E+01,   1.336E+02,,   -0.701
C,CR-51    ,NO ,  -1.870E+00,   1.983E+01,   3.268E+01,,   -0.057
C,MN-54    ,NO ,  -8.361E-02,   2.265E+00,   3.675E+00,,   -0.023
C,CO-57    ,NO ,   1.258E+00,   2.042E+00,   3.373E+00,,    0.373
C,CO-58    ,NO ,   6.910E-01,   2.381E+00,   3.931E+00,,    0.176
C,FE-59    ,NO ,   2.213E+00,   4.678E+00,   7.802E+00,,    0.284
C,ZN-65    ,NO ,   1.227E+01,   6.316E+00,   1.002E+01,,    1.225
C,SE-75    ,NO ,   8.017E-01,   3.045E+00,   4.963E+00,,    0.162
C,SR-85    ,NO ,   1.888E+01,   2.678E+00,   5.218E+00,,    3.619
C,Y-88     ,NO ,  -3.631E+00,   2.608E+00,   3.827E+00,,   -0.949
C,NB-94    ,NO ,   1.059E-01,   2.149E+00,   3.549E+00,,    0.030
C,NB-95    ,NO ,   2.811E+00,   2.327E+00,   4.012E+00,,    0.700
C,ZR-95    ,NO ,  -1.243E+00,   3.960E+00,   6.391E+00,,   -0.195
C,MO-99    ,NO ,  -2.372E+01,   3.673E+01,   5.845E+01,,   -0.406
C,RU-103   ,NO ,  -2.991E-01,   2.220E+00,   3.643E+00,,   -0.082
C,RU-106   ,NO ,   1.146E-01,   2.113E+01,   3.321E+01,,    0.003
C,AG-110m  ,NO ,  -2.583E-02,   2.150E+00,   3.561E+00,,   -0.007
C,SN-113   ,NO ,  -1.625E-01,   2.931E+00,   4.767E+00,,   -0.034
C,SB-124   ,NO ,  -9.709E-01,   5.144E+00,   3.589E+00,,   -0.271
C,SB-125   ,NO ,  -1.640E+00,   6.469E+00,   1.070E+01,,   -0.153
C,TE-129M  ,NO ,   1.714E+01,   2.538E+01,   4.311E+01,,    0.398
C,I-131    ,NO ,   1.217E+00,   2.945E+00,   4.886E+00,,    0.249
C,BA-133   ,NO ,   3.238E+01,   4.369E+00,   7.609E+00,,    4.255
C,CS-134   ,NO ,   7.555E+00,   5.147E+00,   4.476E+00,,    1.688
C,CS-136   ,NO ,   1.911E-01,   2.565E+00,   4.191E+00,,    0.046
C,CS-137   ,NO ,   5.495E-01,   2.373E+00,   3.970E+00,,    0.138
C,CE-139   ,NO ,   2.793E-01,   2.072E+00,   3.462E+00,,    0.081
C,BA-140   ,NO ,   7.410E+00,   9.159E+00,   1.549E+01,,    0.478
C,LA-140   ,NO ,   1.733E+00,   3.041E+00,   5.191E+00,,    0.334
C,CE-141   ,NO ,   4.963E+00,   4.458E+00,   6.366E+00,,    0.780
C,CE-144   ,NO ,   6.642E+00,   1.806E+01,   2.642E+01,,    0.251
C,EU-152   ,NO ,   7.733E-01,   8.274E+00,   1.159E+01,,    0.067
C,EU-154   ,NO ,   4.621E-01,   4.295E+00,   7.018E+00,,    0.066
C,RA-226   ,NO ,  -3.895E+01,   5.746E+01,   8.803E+01,,   -0.443
C,AC-228   ,NO ,   7.320E+00,   9.473E+00,   1.528E+01,,    0.479
C,TH-232   ,NO ,   7.312E+00,   9.463E+00,   1.526E+01,,    0.479
C,U-235    ,NO ,   1.205E+00,   1.960E+01,   2.713E+01,,    0.044
C,U-238    ,NO ,  -2.119E+02,   2.418E+02,   3.765E+02,,   -0.563
C,AM-241   ,NO ,  -3.625E+01,   2.301E+01,   3.466E+01,,   -1.046
```

Sec. Review: Analyst: LIMS: ✓

VAX/VMS Teledyne Brown Eng. Laboratory Gamma Report: 16-JUN-2006 22:11:54.81
TBE23 03017322 HpGe ********** Aquisition Date/Time: 16-JUN-2006 15:11:18.97

LIMS No., Customer Name, Client ID: WG L28973-4 EXELON/TMI

Sample ID : 23L28973-4
Sample Type : WG
Quantity : 3.10040E+00 L
Start Channel : 50 Energy Tol : 1.50000
End Channel : 4090 Pk Srch Sens: 5.00000
MDA Constant : 0.00 Library Used: LIBD

Smple Date: 13-JUN-2006 11:15:00.
Geometry : 233L082404
BKGFILE : 23BG060306MT
Real Time : 0 07:00:17.25
Live time : 0 07:00:00.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	%Eff	Cts/Sec	%Err	Fit
1	4	33.75*	109	39	1.08	67.84	8.20E-02	4.31E-03	27.6	5.14E+00
2	4	35.36*	74	206	1.76	71.05	1.08E-01	2.92E-03	69.4	
3	4	39.20*	5	359	1.39	78.73	1.86E-01	2.04E-04	817.8	
4	4	42.78*	4	546	1.75	85.87	2.81E-01	1.59E-04	*****	
5	0	64.73	295	1852	3.70	129.74	1.10E+00	1.17E-02	32.4	
6	0	77.03	111	753	0.91	154.31	1.53E+00	4.39E-03	40.5	
7	0	86.71	143	852	1.23	173.66	1.80E+00	5.66E-03	34.8	
8	0	139.38*	70	964	1.09	278.93	2.32E+00	2.79E-03	84.4	
9	0	185.35*	81	873	1.35	370.82	2.18E+00	3.22E-03	80.1	
10	0	198.03*	102	776	1.02	396.15	2.11E+00	4.07E-03	54.2	
11	2	238.34*	171	631	1.70	476.72	1.90E+00	6.77E-03	32.6	1.85E+00
12	2	241.74	100	529	1.41	483.51	1.88E+00	3.96E-03	40.8	
13	0	295.26*	124	572	0.94	590.49	1.64E+00	4.91E-03	41.6	
14	0	351.82*	307	399	1.23	703.55	1.43E+00	1.22E-02	15.7	
15	0	583.21*	2	276	1.55	1166.12	9.71E-01	9.15E-05	*****	
16	0	596.00	107	131	2.07	1191.68	9.56E-01	4.26E-03	22.2	
17	0	608.94*	205	208	1.38	1217.56	9.41E-01	8.13E-03	18.2	
18	0	1119.92*	58	92	1.69	2239.36	6.16E-01	2.30E-03	41.9	
19	0	1765.01*	65	29	2.96	3529.91	4.38E-01	2.60E-03	29.0	

Flag: "*" = Peak area was modified by background subtraction

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/L	Decay Corr pCi/L	2-Sigma %Error
RA-226	186.21	81	3.28*	2.176E+00	3.938E+01	3.938E+01	160.19
TH-228	238.63	171	44.60*	1.901E+00	6.958E+00	6.981E+00	65.11
	240.98	100	3.95	1.884E+00	4.632E+01	4.647E+01	81.61

Flag: "*" = Keyline

Summary of Nuclide Activity
Page : 2
Sample ID : 23L28973-4
Acquisition date : 16-JUN-2006 15:11:18

Total number of lines in spectrum	19	
Number of unidentified lines	15	
Number of lines tentatively identified by NID	4	21.05%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected pCi/L	Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-226	1600.00Y	1.00	3.938E+01	3.938E+01	6.308E+01	160.19	
TH-228	1.91Y	1.00	6.958E+00	6.981E+00	4.545E+00	65.11	
		Total Activity :	4.634E+01	4.636E+01			
		Grand Total Activity :	4.634E+01	4.636E+01			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Unidentified Energy Lines
Sample ID : 23L28973-4

Acquisition date : 16-JUN-2006 15:11:18

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
4	33.75	109	39	1.08	67.84	65	25	4.31E-03	55.2	8.20E-02	
4	35.36	74	206	1.76	71.05	65	25	2.92E-03	****	1.08E-01	
4	39.20	5	359	1.39	78.73	65	25	2.04E-04	****	1.86E-01	
4	42.78	4	546	1.75	85.87	65	25	1.59E-04	****	2.81E-01	
0	64.73	295	1852	3.70	129.74	121	15	1.17E-02	64.7	1.10E+00	
0	77.03	111	753	0.91	154.31	152	6	4.39E-03	80.9	1.53E+00	
0	86.71	143	852	1.23	173.66	171	7	5.66E-03	69.6	1.80E+00	
0	139.38	70	964	1.09	278.93	276	8	2.79E-03	****	2.32E+00	
0	198.03	102	776	1.02	396.15	392	9	4.07E-03	****	2.11E+00	
0	295.26	124	572	0.94	590.49	585	11	4.91E-03	83.1	1.64E+00	
0	351.82	307	399	1.23	703.55	698	12	1.22E-02	31.4	1.43E+00	
0	583.21	2	276	1.55	1166.12	1159	14	9.15E-05	****	9.71E-01	T
0	596.00	107	131	2.07	1191.68	1187	10	4.26E-03	44.4	9.56E-01	
0	608.94	205	208	1.38	1217.56	1212	12	8.13E-03	36.4	9.41E-01	
0	1119.92	58	92	1.69	2239.36	2233	13	2.30E-03	83.7	6.16E-01	
0	1765.01	65	29	2.96	3529.91	3522	18	2.60E-03	57.9	4.38E-01	

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of lines in spectrum	19	
Number of unidentified lines	15	
Number of lines tentatively identified by NID	4	21.05%

Nuclide Type : natural

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/L	Wtd Mean Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-226	1600.00Y	1.00	3.938E+01	3.938E+01	6.308E+01	160.19	
TH-228	1.91Y	1.00	7.515E+00	7.540E+00	4.513E+00	59.86	
		Total Activity :	4.689E+01	4.692E+01			

Grand Total Activity : 4.689E+01 4.692E+01

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Interference Report

No interference correction performed

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/L)	Act error	MDA (pCi/L)	MDA error	Act/MDA
RA-226	3.938E+01	6.308E+01	8.970E+01	0.000E+00	0.439

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/L)	K.L. Ided	Act error	MDA (pCi/L)	MDA error	Act/MDA
BE-7	-1.005E+01		1.744E+01	2.872E+01	0.000E+00	-0.350
NA-24	-8.694E+01		7.923E+01	1.271E+02	0.000E+00	-0.684
K-40	-2.748E+01		3.213E+01	5.865E+01	0.000E+00	-0.469
CR-51	-1.693E+01		1.888E+01	3.122E+01	0.000E+00	-0.542
MN-54	1.024E+00		1.917E+00	3.348E+00	0.000E+00	0.306
CO-57	3.627E-01		2.256E+00	3.782E+00	0.000E+00	0.096
CO-58	-1.124E+00		2.047E+00	3.400E+00	0.000E+00	-0.331
FE-59	5.690E-01		3.656E+00	6.388E+00	0.000E+00	0.089
CO-60	-4.427E-01		1.874E+00	3.197E+00	0.000E+00	-0.139
ZN-65	1.233E+01		4.921E+00	8.431E+00	0.000E+00	1.463
SE-75	-2.127E+00		2.939E+00	4.909E+00	0.000E+00	-0.433
SR-85	1.490E+01		2.380E+00	4.627E+00	0.000E+00	3.220
Y-88	-7.011E-01		2.337E+00	3.995E+00	0.000E+00	-0.175
NB-94	1.958E-01		1.956E+00	3.354E+00	0.000E+00	0.058
NB-95	2.347E+00		2.013E+00	3.601E+00	0.000E+00	0.652
ZR-95	-5.298E-01		3.600E+00	6.106E+00	0.000E+00	-0.087
MO-99	-2.859E+01		3.364E+01	5.534E+01	0.000E+00	-0.517
RU-103	1.431E-01		2.180E+00	3.665E+00	0.000E+00	0.039
RU-106	-9.619E+00		1.913E+01	3.217E+01	0.000E+00	-0.299
AG-110m	-9.035E-01		1.968E+00	3.309E+00	0.000E+00	-0.273
SN-113	1.817E+00		2.692E+00	4.632E+00	0.000E+00	0.392
SB-124	1.711E+00		4.229E+00	3.336E+00	0.000E+00	0.513
SB-125	-3.898E+00		5.916E+00	9.751E+00	0.000E+00	-0.400
TE-129M	6.781E+00		2.473E+01	4.195E+01	0.000E+00	0.162
I-131	9.597E-03		2.806E+00	4.739E+00	0.000E+00	0.002
BA-133	8.173E+00		3.500E+00	5.447E+00	0.000E+00	1.501
CS-134	1.011E+01		3.889E+00	4.364E+00	0.000E+00	2.316
CS-136	8.274E-01		2.217E+00	3.850E+00	0.000E+00	0.215
CS-137	1.582E+00		2.135E+00	3.766E+00	0.000E+00	0.420
CE-139	-6.570E-01		2.281E+00	3.773E+00	0.000E+00	-0.174
BA-140	-2.214E+00		8.594E+00	1.427E+01	0.000E+00	-0.155
LA-140	1.793E+00		2.756E+00	5.008E+00	0.000E+00	0.358
CE-141	-1.147E+00		4.863E+00	6.837E+00	0.000E+00	-0.168
CE-144	-2.388E+01		2.097E+01	2.893E+01	0.000E+00	-0.825
EU-152	-5.645E+00		7.991E+00	1.110E+01	0.000E+00	-0.508
EU-154	-1.224E+00		4.726E+00	7.871E+00	0.000E+00	-0.155
AC-228	-3.578E+00		8.571E+00	1.244E+01	0.000E+00	-0.288
TH-232	-3.574E+00		8.562E+00	1.243E+01	0.000E+00	-0.288
U-235	-7.412E-01		2.186E+01	2.971E+01	0.000E+00	-0.025
U-238	-3.438E+00		2.247E+02	3.600E+02	0.000E+00	-0.010
AM-241	6.009E+00		1.483E+01	2.090E+01	0.000E+00	0.287

```
A,23L28973-4       ,06/16/2006 22:11,06/13/2006 11:15,   3.100E+00,WG L28973-4 EX
B,23L28973-4       ,LIBD                ,06/01/2006 10:14,233L082404
C,RA-226   ,YES,   3.938E+01,   6.308E+01,   8.970E+01,,    0.439
C,TH-228   ,YES,   7.540E+00,   4.513E+00,   6.686E+00,,    1.128
C,BE-7     ,NO ,  -1.005E+01,   1.744E+01,   2.872E+01,,   -0.350
C,NA-24    ,NO ,  -8.694E+01,   7.923E+01,   1.271E+02,,   -0.684
C,K-40     ,NO ,  -2.748E+01,   3.213E+01,   5.865E+01,,   -0.469
C,CR-51    ,NO ,  -1.693E+01,   1.888E+01,   3.122E+01,,   -0.542
C,MN-54    ,NO ,   1.024E+00,   1.917E+00,   3.348E+00,,    0.306
C,CO-57    ,NO ,   3.627E-01,   2.256E+00,   3.782E+00,,    0.096
C,CO-58    ,NO ,  -1.124E+00,   2.047E+00,   3.400E+00,,   -0.331
C,FE-59    ,NO ,   5.690E-01,   3.656E+00,   6.388E+00,,    0.089
C,CO-60    ,NO ,  -4.427E-01,   1.874E+00,   3.197E+00,,   -0.139
C,ZN-65    ,NO ,   1.233E+01,   4.921E+00,   8.431E+00,,    1.463
C,SE-75    ,NO ,  -2.127E+00,   2.939E+00,   4.909E+00,,   -0.433
C,SR-85    ,NO ,   1.490E+01,   2.380E+00,   4.627E+00,,    3.220
C,Y-88     ,NO ,  -7.011E-01,   2.337E+00,   3.995E+00,,   -0.175
C,NB-94    ,NO ,   1.958E-01,   1.956E+00,   3.354E+00,,    0.058
C,NB-95    ,NO ,   2.347E+00,   2.013E+00,   3.601E+00,,    0.652
C,ZR-95    ,NO ,  -5.298E-01,   3.600E+00,   6.106E+00,,   -0.087
C,MO-99    ,NO ,  -2.859E+01,   3.364E+01,   5.534E+01,,   -0.517
C,RU-103   ,NO ,   1.431E-01,   2.180E+00,   3.665E+00,,    0.039
C,RU-106   ,NO ,  -9.619E+00,   1.913E+01,   3.217E+01,,   -0.299
C,AG-110m  ,NO ,  -9.035E-01,   1.968E+00,   3.309E+00,,   -0.273
C,SN-113   ,NO ,   1.817E+00,   2.692E+00,   4.632E+00,,    0.392
C,SB-124   ,NO ,   1.711E+00,   4.229E+00,   3.336E+00,,    0.513
C,SB-125   ,NO ,  -3.898E+00,   5.916E+00,   9.751E+00,,   -0.400
C,TE-129M  ,NO ,   6.781E+00,   2.473E+01,   4.195E+01,,    0.162
C,I-131    ,NO ,   9.597E-03,   2.806E+00,   4.739E+00,,    0.002
C,BA-133   ,NO ,   8.173E+00,   3.500E+00,   5.447E+00,,    1.501
C,CS-134   ,NO ,   1.011E+01,   3.889E+00,   4.364E+00,,    2.316
C,CS-136   ,NO ,   8.274E-01,   2.217E+00,   3.850E+00,,    0.215
C,CS-137   ,NO ,   1.582E+00,   2.135E+00,   3.766E+00,,    0.420
C,CE-139   ,NO ,  -6.570E-01,   2.281E+00,   3.773E+00,,   -0.174
C,BA-140   ,NO ,  -2.214E+00,   8.594E+00,   1.427E+01,,   -0.155
C,LA-140   ,NO ,   1.793E+00,   2.756E+00,   5.008E+00,,    0.358
C,CE-141   ,NO ,  -1.147E+00,   4.863E+00,   6.837E+00,,   -0.168
C,CE-144   ,NO ,  -2.388E+01,   2.097E+01,   2.893E+01,,   -0.825
C,EU-152   ,NO ,  -5.645E+00,   7.991E+00,   1.110E+01,,   -0.508
C,EU-154   ,NO ,  -1.224E+00,   4.726E+00,   7.871E+00,,   -0.155
C,AC-228   ,NO ,  -3.578E+00,   8.571E+00,   1.244E+01,,   -0.288
C,TH-232   ,NO ,  -3.574E+00,   8.562E+00,   1.243E+01,,   -0.288
C,U-235    ,NO ,  -7.412E-01,   2.186E+01,   2.971E+01,,   -0.025
C,U-238    ,NO ,  -3.438E+00,   2.247E+02,   3.600E+02,,   -0.010
C,AM-241   ,NO ,   6.009E+00,   1.483E+01,   2.090E+01,,    0.287
```

Sec. Review: Analyst: LIMS: ✓

==========

VAX/VMS Teledyne Brown Eng. Laboratory Gamma Report: 16-JUN-2006 22:20:58.12
TBE14 P-10933A HpGe ********** Aquisition Date/Time: 16-JUN-2006 15:20:47.65

LIMS No., Customer Name, Client ID: WG LL28973-5 EX/TIM

Sample ID : 14L28973-5
Sample Type : WG
Quantity : 3.07750E+00 L
Start Channel : 90 Energy Tol : 1.50000
End Channel : 4090 Pk Srch Sens: 5.00000
MDA Constant : 0.00 Library Used: LIBD

Smple Date: 13-JUN-2006 13:00:00.
Geometry : 143L082304
BKGFILE : 14BG060306MT
Real Time : 0 07:00:04.48
Live time : 0 07:00:00.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	%Eff	Cts/Sec	%Err	Fit
1	1	66.40	276	1028	1.63	133.95	5.14E-01	1.10E-02	21.9	5.60E-01
2	1	77.50	226	857	1.96	156.24	8.53E-01	8.96E-03	23.5	2.69E+00
3	1	92.81*	78	943	1.31	186.98	1.28E+00	3.11E-03	78.0	2.45E+00
4	1	139.98	177	783	1.27	281.67	1.89E+00	7.00E-03	28.4	5.03E-01
5	1	185.78*	68	1039	2.35	373.59	1.88E+00	2.69E-03	103.1	5.74E-01
6	1	198.34*	224	659	1.46	398.78	1.84E+00	8.90E-03	23.2	2.51E+00
7	2	238.83*	66	604	1.48	480.02	1.67E+00	2.62E-03	75.4	1.89E+00
8	2	242.31	299	588	1.57	486.99	1.66E+00	1.19E-02	15.8	
9	1	295.42	455	572	1.29	593.48	1.46E+00	1.81E-02	10.8	1.86E+00
10	1	352.15*	849	536	1.48	707.20	1.28E+00	3.37E-02	7.3	1.07E+00
11	1	583.22*	33	151	1.32	1169.83	8.62E-01	1.32E-03	85.4	1.26E+00
12	1	596.38	143	248	2.97	1196.14	8.47E-01	5.68E-03	26.2	1.12E+00
13	1	609.42*	633	329	1.53	1222.23	8.33E-01	2.51E-02	7.8	1.32E+00
14	1	768.02	64	226	2.35	1539.21	7.00E-01	2.55E-03	54.3	5.31E-01
15	1	1120.05*	139	91	1.88	2241.43	5.30E-01	5.50E-03	18.9	1.03E+00
16	1	1202.66	53	78	4.52	2405.93	5.03E-01	2.09E-03	38.9	3.35E+00
17	1	1238.33	86	77	2.62	2476.92	4.93E-01	3.41E-03	23.9	3.18E+00
18	1	1766.34*	117	62	3.33	3525.65	3.79E-01	4.66E-03	20.9	2.10E+00
19	1	1945.14	56	56	12.18	3879.81	3.53E-01	2.22E-03	37.3	2.35E+00

Flag: "*" = Peak area was modified by background subtraction

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/L	Decay Corr pCi/L	2-Sigma %Error
RA-226	186.21	68	3.28*	1.877E+00	3.837E+01	3.837E+01	206.13
TH-228	238.63	66	44.60*	1.674E+00	3.084E+00	3.094E+00	150.71
	240.98	299	3.95	1.660E+00	1.587E+02	1.592E+02	31.57
U-235	143.76	------	10.50*	1.907E+00	------	Line Not Found	------
	163.35	------	4.70	1.923E+00	------	Line Not Found	------
	185.71	68	54.00	1.877E+00	2.331E+00	2.331E+00	206.13
	205.31	------	4.70	1.809E+00	------	Line Not Found	------

Flag: "*" = Keyline

Summary of Nuclide Activity
Sample ID : 14L28973-5

Acquisition date : 16-JUN-2006 15:20:47

Total number of lines in spectrum	19	
Number of unidentified lines	15	
Number of lines tentatively identified by NID	4	21.05%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected pCi/L	Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-226	1600.00Y	1.00	3.837E+01	3.837E+01	7.910E+01	206.13	
TH-228	1.91Y	1.00	3.084E+00	3.094E+00	4.663E+00	150.71	
U-235	7.04E+08Y	1.00	2.331E+00	2.331E+00	4.804E+00	206.13	K
			---	---			
	Total Activity :		4.379E+01	4.380E+01			

Grand Total Activity : 4.379E+01 4.380E+01

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Unidentified Energy Lines
Sample ID : 14L28973-5

Acquisition date : 16-JUN-2006 15:20:47

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	66.40	276	1028	1.63	133.95	130	9	1.10E-02	43.7	5.14E-01	
1	77.50	226	857	1.96	156.24	153	8	8.96E-03	47.0	8.53E-01	
1	92.81	78	943	1.31	186.98	183	9	3.11E-03	****	1.28E+00	
1	139.98	177	783	1.27	281.67	279	8	7.00E-03	56.8	1.89E+00	
1	198.34	224	659	1.46	398.78	395	9	8.90E-03	46.4	1.84E+00	
1	295.42	455	572	1.29	593.48	589	10	1.81E-02	21.6	1.46E+00	
1	352.15	849	536	1.48	707.20	701	14	3.37E-02	14.5	1.28E+00	
1	583.22	33	151	1.32	1169.83	1166	8	1.32E-03	****	8.62E-01	T
1	596.38	143	248	2.97	1196.14	1187	16	5.68E-03	52.4	8.47E-01	
1	609.42	633	329	1.53	1222.23	1215	14	2.51E-02	15.6	8.33E-01	
1	768.02	64	226	2.35	1539.21	1533	16	2.55E-03	****	7.00E-01	
1	1120.05	139	91	1.88	2241.43	2235	13	5.50E-03	37.7	5.30E-01	
1	1202.66	53	78	4.52	2405.93	2398	15	2.09E-03	77.9	5.03E-01	
1	1238.33	86	77	2.62	2476.92	2470	14	3.41E-03	47.9	4.93E-01	
1	1766.34	117	62	3.33	3525.65	3514	20	4.66E-03	41.8	3.79E-01	
1	1945.14	56	56	12.18	3879.81	3867	25	2.22E-03	74.7	3.53E-01	

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of lines in spectrum	19	
Number of unidentified lines	15	
Number of lines tentatively identified by NID	4	21.05%

Nuclide Type : natural

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/L	Wtd Mean Decay Corr pCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
RA-226	1600.00Y	1.00	3.837E+01	3.837E+01	7.910E+01	206.13	
TH-228	1.91Y	1.00	3.084E+00	3.094E+00	4.663E+00	150.71	
		Total Activity :	4.146E+01	4.147E+01			

Grand Total Activity : 4.146E+01 4.147E+01

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Interference Report

No interference correction performed

Combined Activity-MDA Report

---- Identified Nuclides ----

Nuclide	Activity (pCi/L)	Act error	MDA (pCi/L)	MDA error	Act/MDA
RA-226	3.837E+01	7.910E+01	1.359E+02	0.000E+00	0.282
TH-228	3.094E+00	4.663E+00	9.449E+00	0.000E+00	0.327

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/L)	K.L. Ided	Act error	MDA (pCi/L)	MDA error	Act/MDA
BE-7	1.052E+01		2.680E+01	4.446E+01	0.000E+00	0.237
NA-24	-4.969E+01		1.140E+02	1.831E+02	0.000E+00	-0.271
K-40	-7.684E+00		3.898E+01	6.689E+01	0.000E+00	-0.115
CR-51	6.783E+00		2.888E+01	4.805E+01	0.000E+00	0.141
MN-54	1.567E+00		3.019E+00	5.051E+00	0.000E+00	0.310
CO-57	3.362E+00		3.443E+00	5.772E+00	0.000E+00	0.583
CO-58	2.001E+00		3.063E+00	5.153E+00	0.000E+00	0.388
FE-59	2.614E+00		5.594E+00	9.432E+00	0.000E+00	0.277
CO-60	-1.854E+00		2.948E+00	4.686E+00	0.000E+00	-0.396
ZN-65	2.051E+01		6.856E+00	1.253E+01	0.000E+00	1.637
SE-75	-2.354E+00		4.407E+00	7.136E+00	0.000E+00	-0.330
SR-85	2.013E+01		3.422E+00	6.310E+00	0.000E+00	3.190
Y-88	1.199E+00		3.078E+00	5.190E+00	0.000E+00	0.231
NB-94	5.370E-01		2.853E+00	4.741E+00	0.000E+00	0.113
NB-95	3.660E+00		3.135E+00	5.359E+00	0.000E+00	0.683
ZR-95	2.264E-01		6.484E+00	8.927E+00	0.000E+00	0.025
MO-99	-6.818E+01		5.126E+01	8.075E+01	0.000E+00	-0.844
RU-103	-2.134E+01		3.819E+00	5.422E+00	0.000E+00	-3.936
RU-106	-1.536E+01		3.304E+01	4.557E+01	0.000E+00	-0.337
AG-110m	-1.186E+00		3.007E+00	4.916E+00	0.000E+00	-0.241
SN-113	-1.368E+00		4.123E+00	6.752E+00	0.000E+00	-0.203
SB-124	2.986E+01		1.017E+01	7.790E+00	0.000E+00	3.833
SB-125	7.329E+00		9.175E+00	1.539E+01	0.000E+00	0.476
TE-129M	-7.440E-01		3.679E+01	6.044E+01	0.000E+00	-0.012
I-131	4.057E+00		4.862E+00	7.026E+00	0.000E+00	0.578
BA-133	4.379E+01		5.192E+00	9.755E+00	0.000E+00	4.489
CS-134	3.807E+01		4.207E+00	7.471E+00	0.000E+00	5.096
CS-136	-2.788E+00		3.524E+00	5.631E+00	0.000E+00	-0.495
CS-137	-6.801E-01		3.327E+00	5.470E+00	0.000E+00	-0.124
CE-139	-1.067E+00		3.363E+00	5.519E+00	0.000E+00	-0.193
BA-140	8.714E+00		1.310E+01	2.185E+01	0.000E+00	0.399
LA-140	-1.022E+00		3.566E+00	5.803E+00	0.000E+00	-0.176
CE-141	7.358E+00		6.002E+00	1.007E+01	0.000E+00	0.731
CE-144	-1.024E+01		3.142E+01	4.318E+01	0.000E+00	-0.237
EU-152	1.780E+01		1.243E+01	1.790E+01	0.000E+00	0.994
EU-154	8.085E+00		7.174E+00	1.205E+01	0.000E+00	0.671
AC-228	-3.260E+00		1.161E+01	1.826E+01	0.000E+00	-0.178
TH-232	-3.256E+00		1.160E+01	1.824E+01	0.000E+00	-0.178
U-235	4.828E+01		2.581E+01	4.367E+01	0.000E+00	1.105
U-238	-2.051E+02		3.190E+02	5.069E+02	0.000E+00	-0.405
AM-241	5.562E+01		5.471E+01	7.650E+01	0.000E+00	0.727

```
A,14L28973-5       ,06/16/2006 22:20,06/13/2006 13:00,   3.078E+00,WG LL28973-5 E
B,14L28973-5       ,LIBD             ,06/14/2006 10:50,143L082304
C,RA-226   ,YES,   3.837E+01,   7.910E+01,   1.359E+02,,    0.282
C,TH-228   ,YES,   3.094E+00,   4.663E+00,   9.449E+00,,    0.327
C,BE-7     ,NO ,   1.052E+01,   2.680E+01,   4.446E+01,,    0.237
C,NA-24    ,NO ,  -4.969E+01,   1.140E+02,   1.831E+02,,   -0.271
C,K-40     ,NO ,  -7.684E+00,   3.898E+01,   6.689E+01,,   -0.115
C,CR-51    ,NO ,   6.783E+00,   2.888E+01,   4.805E+01,,    0.141
C,MN-54    ,NO ,   1.567E+00,   3.019E+00,   5.051E+00,,    0.310
C,CO-57    ,NO ,   3.362E+00,   3.443E+00,   5.772E+00,,    0.583
C,CO-58    ,NO ,   2.001E+00,   3.063E+00,   5.153E+00,,    0.388
C,FE-59    ,NO ,   2.614E+00,   5.594E+00,   9.432E+00,,    0.277
C,CO-60    ,NO ,  -1.854E+00,   2.948E+00,   4.686E+00,,   -0.396
C,ZN-65    ,NO ,   2.051E+01,   6.856E+00,   1.253E+01,,    1.637
C,SE-75    ,NO ,  -2.354E+00,   4.407E+00,   7.136E+00,,   -0.330
C,SR-85    ,NO ,   2.013E+01,   3.422E+00,   6.310E+00,,    3.190
C,Y-88     ,NO ,   1.199E+00,   3.078E+00,   5.190E+00,,    0.231
C,NB-94    ,NO ,   5.370E-01,   2.853E+00,   4.741E+00,,    0.113
C,NB-95    ,NO ,   3.660E+00,   3.135E+00,   5.359E+00,,    0.683
C,ZR-95    ,NO ,   2.264E-01,   6.484E+00,   8.927E+00,,    0.025
C,MO-99    ,NO ,  -6.818E+01,   5.126E+01,   8.075E+01,,   -0.844
C,RU-103   ,NO ,  -2.134E+01,   3.819E+00,   5.422E+00,,   -3.936
C,RU-106   ,NO ,  -1.536E+01,   3.304E+01,   4.557E+01,,   -0.337
C,AG-110m  ,NO ,  -1.186E+00,   3.007E+00,   4.916E+00,,   -0.241
C,SN-113   ,NO ,  -1.368E+00,   4.123E+00,   6.752E+00,,   -0.203
C,SB-124   ,NO ,   2.986E+01,   1.017E+01,   7.790E+00,,    3.833
C,SB-125   ,NO ,   7.329E+00,   9.175E+00,   1.539E+01,,    0.476
C,TE-129M  ,NO ,  -7.440E-01,   3.679E+01,   6.044E+01,,   -0.012
C,I-131    ,NO ,   4.057E+00,   4.862E+00,   7.026E+00,,    0.578
C,BA-133   ,NO ,   4.379E+01,   5.192E+00,   9.755E+00,,    4.489
C,CS-134   ,NO ,   3.807E+01,   4.207E+00,   7.471E+00,,    5.096
C,CS-136   ,NO ,  -2.788E+00,   3.524E+00,   5.631E+00,,   -0.495
C,CS-137   ,NO ,  -6.801E-01,   3.327E+00,   5.470E+00,,   -0.124
C,CE-139   ,NO ,  -1.067E+00,   3.363E+00,   5.519E+00,,   -0.193
C,BA-140   ,NO ,   8.714E+00,   1.310E+01,   2.185E+01,,    0.399
C,LA-140   ,NO ,  -1.022E+00,   3.566E+00,   5.803E+00,,   -0.176
C,CE-141   ,NO ,   7.358E+00,   6.002E+00,   1.007E+01,,    0.731
C,CE-144   ,NO ,  -1.024E+01,   3.142E+01,   4.318E+01,,   -0.237
C,EU-152   ,NO ,   1.780E+01,   1.243E+01,   1.790E+01,,    0.994
C,EU-154   ,NO ,   8.085E+00,   7.174E+00,   1.205E+01,,    0.671
C,AC-228   ,NO ,  -3.260E+00,   1.161E+01,   1.826E+01,,   -0.178
C,TH-232   ,NO ,  -3.256E+00,   1.160E+01,   1.824E+01,,   -0.178
C,U-235    ,NO ,   4.828E+01,   2.581E+01,   4.367E+01,,    1.105
C,U-238    ,NO ,  -2.051E+02,   3.190E+02,   5.069E+02,,   -0.405
C,AM-241   ,NO ,   5.562E+01,   5.471E+01,   7.650E+01,,    0.727
```

Sec. Review: Analyst: LIMS: ✓

VAX/VMS Teledyne Brown Eng. Laboratory Gamma Report: 16-JUN-2006 22:17:33.76
TBE07 P-10768B HpGe ********** Aquisition Date/Time: 16-JUN-2006 15:47:16.55

LIMS No., Customer Name, Client ID: WG L28973-6 EXELON/TMI

Sample ID : 07L28973-6
Sample Type : WG
Quantity : 3.07080E+00 L
Start Channel : 40 Energy Tol : 1.00000
End Channel : 4090 Pk Srch Sens: 5.00000
MDA Constant : 0.00 Library Used: LIBD

Smple Date: 13-JUN-2006 13:10:00.
Geometry : 073L082504
BKGFILE : 07BG060306MT
Real Time : 0 06:30:04.98
Live time : 0 06:30:00.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	%Eff	Cts/Sec	%Err	Fit
1	1	66.55*	236	902	1.54	133.67	8.14E-01	1.01E-02	23.8	7.97E+00
2	1	77.20*	202	784	0.76	154.99	1.23E+00	8.64E-03	26.2	2.71E+00
3	1	139.92*	185	824	1.24	280.52	2.36E+00	7.89E-03	31.1	4.81E-01
4	1	198.62*	160	805	0.99	398.02	2.24E+00	6.84E-03	39.1	1.93E+00
5	1	242.07	377	524	1.34	484.97	2.04E+00	1.61E-02	12.2	1.66E+00
6	1	295.32*	632	518	1.12	591.54	1.81E+00	2.70E-02	8.2	2.05E+00
7	1	352.03*	998	338	1.09	705.03	1.61E+00	4.27E-02	5.1	8.52E-01
8	1	499.38	63	202	1.94	999.86	1.25E+00	2.70E-03	44.0	1.34E+00
9	1	596.18	94	201	2.38	1193.52	1.10E+00	4.02E-03	31.7	3.33E+00
10	1	609.40*	962	224	1.46	1219.97	1.09E+00	4.11E-02	5.0	8.77E-01
11	1	747.56	156	214	15.90	1496.37	9.38E-01	6.66E-03	25.2	1.53E+00
12	1	933.88	67	110	2.53	1869.03	8.00E-01	2.88E-03	33.3	2.81E+00
13	1	1120.40*	230	60	2.17	2242.03	7.03E-01	9.81E-03	10.6	2.10E+00
14	3	1238.56	129	44	2.67	2478.30	6.55E-01	5.53E-03	13.3	2.59E+00
15	3	1245.75	46	32	2.68	2492.67	6.52E-01	1.95E-03	24.5	
16	1	1376.97	89	125	4.63	2755.00	6.07E-01	3.79E-03	32.8	7.74E+00
17	1	1409.57	27	70	2.80	2820.19	5.98E-01	1.14E-03	78.6	1.77E+00
18	1	1509.86	31	83	2.25	3020.65	5.70E-01	1.34E-03	66.0	6.20E-01
19	3	1727.88	43	10	2.63	3456.40	5.19E-01	1.82E-03	21.8	2.84E+00
20	3	1729.98	69	17	2.86	3460.60	5.19E-01	2.94E-03	20.1	
21	1	1764.71*	147	36	2.48	3530.00	5.12E-01	6.30E-03	14.1	1.55E+00

Flag: "*" = Peak area was modified by background subtraction

Nuclide Line Activity Report

Flag: "*" = Keyline

Summary of Nuclide Activity
Page : 2
Sample ID : 07L28973-6
Acquisition date : 16-JUN-2006 15:47:16

Total number of lines in spectrum	21	
Number of unidentified lines	21	
Number of lines tentatively identified by NID	0	0.00%

**** There are no nuclides meeting summary criteria ****

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Unidentified Energy Lines
Sample ID : 07L28973-6

Acquisition date : 16-JUN-2006 15:47:16

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	66.55	236	902	1.54	133.67	130	8	1.01E-02	47.5	8.14E-01	
1	77.20	202	784	0.76	154.99	153	7	8.64E-03	52.4	1.23E+00	
1	139.92	185	824	1.24	280.52	277	9	7.89E-03	62.2	2.36E+00	
1	198.62	160	805	0.99	398.02	392	12	6.84E-03	78.2	2.24E+00	
1	242.07	377	524	1.34	484.97	482	9	1.61E-02	24.3	2.04E+00	
1	295.32	632	518	1.12	591.54	587	10	2.70E-02	16.4	1.81E+00	
1	352.03	998	338	1.09	705.03	700	9	4.27E-02	10.2	1.61E+00	
1	499.38	63	202	1.94	999.86	996	10	2.70E-03	87.9	1.25E+00	
1	596.18	94	201	2.38	1193.52	1187	12	4.02E-03	63.5	1.10E+00	
1	609.40	962	224	1.46	1219.97	1213	14	4.11E-02	10.0	1.09E+00	
1	747.56	156	214	15.90	1496.37	1492	23	6.66E-03	50.4	9.38E-01	
1	933.88	67	110	2.53	1869.03	1864	12	2.88E-03	66.7	8.00E-01	
1	1120.40	230	60	2.17	2242.03	2235	13	9.81E-03	21.3	7.03E-01	
3	1238.56	129	44	2.67	2478.30	2472	25	5.53E-03	26.6	6.55E-01	
3	1245.75	46	32	2.68	2492.67	2472	25	1.95E-03	49.0	6.52E-01	
1	1376.97	89	125	4.63	2755.00	2745	21	3.79E-03	65.6	6.07E-01	
1	1409.57	27	70	2.80	2820.19	2810	18	1.14E-03	****	5.98E-01	
1	1509.86	31	83	2.25	3020.65	3013	15	1.34E-03	****	5.70E-01	
3	1727.88	43	10	2.63	3456.40	3451	25	1.82E-03	43.5	5.19E-01	
3	1729.98	69	17	2.86	3460.60	3451	25	2.94E-03	40.2	5.19E-01	
1	1764.71	147	36	2.48	3530.00	3523	16	6.30E-03	28.3	5.12E-01	

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of lines in spectrum 21
Number of unidentified lines 21
Number of lines tentatively identified by NID 0 0.00%
**** There are no nuclides meeting summary criteria ****

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Interference Report

No interference correction performed

Combined Activity-MDA Report

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/L)	K.L. Ided	Act error	MDA (pCi/L)	MDA error	Act/MDA
BE-7	4.381E+00		2.039E+01	3.342E+01	0.000E+00	0.131
NA-24	-1.060E+01		1.022E+02	1.398E+02	0.000E+00	-0.076
K-40	2.606E+01		3.176E+01	5.405E+01	0.000E+00	0.482
CR-51	-1.676E+01		2.135E+01	3.414E+01	0.000E+00	-0.491
MN-54	-2.369E+00		2.432E+00	3.827E+00	0.000E+00	-0.619
CO-57	1.490E+00		2.325E+00	3.906E+00	0.000E+00	0.381
CO-58	-8.357E-01		2.377E+00	3.838E+00	0.000E+00	-0.218

FE-59	2.938E+00	4.437E+00	7.556E+00	0.000E+00	0.389
CO-60	-1.137E+00	2.312E+00	3.674E+00	0.000E+00	-0.310
ZN-65	2.078E+01	5.705E+00	1.061E+01	0.000E+00	1.958
SE-75	-1.968E+00	3.228E+00	5.246E+00	0.000E+00	-0.375
SR-85	2.160E+01	2.699E+00	5.152E+00	0.000E+00	4.193
Y-88	-2.132E+00	2.440E+00	3.773E+00	0.000E+00	-0.565
NB-94	9.984E-02	2.203E+00	3.645E+00	0.000E+00	0.027
NB-95	4.757E+00	2.617E+00	4.138E+00	0.000E+00	1.150
ZR-95	-1.042E+01	5.502E+00	6.780E+00	0.000E+00	-1.537
MO-99	-1.260E+01	4.637E+01	6.281E+01	0.000E+00	-0.201
RU-103	-3.348E+00	2.558E+00	4.086E+00	0.000E+00	-0.819
RU-106	-1.769E-01	2.404E+01	3.550E+01	0.000E+00	-0.005
AG-110m	-6.363E-01	2.323E+00	3.747E+00	0.000E+00	-0.170
SN-113	3.380E-01	3.132E+00	5.172E+00	0.000E+00	0.065
SB-124	1.390E+01	6.991E+00	5.365E+00	0.000E+00	2.590
SB-125	-5.857E-03	6.640E+00	1.088E+01	0.000E+00	-0.001
TE-129M	1.289E+01	2.752E+01	4.552E+01	0.000E+00	0.283
I-131	1.760E+00	3.284E+00	5.322E+00	0.000E+00	0.331
BA-133	4.508E+01	4.710E+00	8.219E+00	0.000E+00	5.485
CS-134	3.279E+01	6.993E+00	6.476E+00	0.000E+00	5.064
CS-136	6.787E-01	2.719E+00	4.489E+00	0.000E+00	0.151
CS-137	2.147E+00	2.516E+00	4.289E+00	0.000E+00	0.501
CE-139	-3.436E+00	2.422E+00	3.881E+00	0.000E+00	-0.885
BA-140	-2.671E+00	9.519E+00	1.556E+01	0.000E+00	-0.172
LA-140	4.337E-01	3.100E+00	5.109E+00	0.000E+00	0.085
CE-141	4.029E+00	5.017E+00	7.127E+00	0.000E+00	0.565
CE-144	1.684E+01	2.127E+01	3.035E+01	0.000E+00	0.555
EU-152	-1.559E+00	8.881E+00	1.230E+01	0.000E+00	-0.127
EU-154	1.778E+00	4.888E+00	8.173E+00	0.000E+00	0.218
RA-226	4.700E+00	6.360E+01	9.967E+01	0.000E+00	0.047
AC-228	-3.396E-01	9.280E+00	1.454E+01	0.000E+00	-0.023
TH-228	1.439E+01	5.675E+00	8.409E+00	0.000E+00	1.711
TH-232	-3.393E-01	9.270E+00	1.452E+01	0.000E+00	-0.023
U-235	3.874E+01	2.203E+01	3.200E+01	0.000E+00	1.210
U-238	-2.072E+01	2.482E+02	4.057E+02	0.000E+00	-0.051
AM-241	3.373E+01	2.547E+01	3.705E+01	0.000E+00	0.910

```
A,07L28973-6       ,06/16/2006 22:17,06/13/2006 13:10,   3.071E+00,WG L28973-6 EX
B,07L28973-6       ,LIBD                  ,06/07/2006 09:32,073L082504
C,BE-7     ,NO ,   4.381E+00,   2.039E+01,   3.342E+01,,    0.131
C,NA-24    ,NO ,  -1.060E+01,   1.022E+02,   1.398E+02,,   -0.076
C,K-40     ,NO ,   2.606E+01,   3.176E+01,   5.405E+01,,    0.482
C,CR-51    ,NO ,  -1.676E+01,   2.135E+01,   3.414E+01,,   -0.491
C,MN-54    ,NO ,  -2.369E+00,   2.432E+00,   3.827E+00,,   -0.619
C,CO-57    ,NO ,   1.490E+00,   2.325E+00,   3.906E+00,,    0.381
C,CO-58    ,NO ,  -8.357E-01,   2.377E+00,   3.838E+00,,   -0.218
C,FE-59    ,NO ,   2.938E+00,   4.437E+00,   7.556E+00,,    0.389
C,CO-60    ,NO ,  -1.137E+00,   2.312E+00,   3.674E+00,,   -0.310
C,ZN-65    ,NO ,   2.078E+01,   5.705E+00,   1.061E+01,,    1.958
C,SE-75    ,NO ,  -1.968E+00,   3.228E+00,   5.246E+00,,   -0.375
C,SR-85    ,NO ,   2.160E+01,   2.699E+00,   5.152E+00,,    4.193
C,Y-88     ,NO ,  -2.132E+00,   2.440E+00,   3.773E+00,,   -0.565
C,NB-94    ,NO ,   9.984E-02,   2.203E+00,   3.645E+00,,    0.027
C,NB-95    ,NO ,   4.757E+00,   2.617E+00,   4.138E+00,,    1.150
C,ZR-95    ,NO ,  -1.042E+01,   5.502E+00,   6.780E+00,,   -1.537
C,MO-99    ,NO ,  -1.260E+01,   4.637E+01,   6.281E+01,,   -0.201
C,RU-103   ,NO ,  -3.348E+00,   2.558E+00,   4.086E+00,,   -0.819
C,RU-106   ,NO ,  -1.769E-01,   2.404E+01,   3.550E+01,,   -0.005
C,AG-110m  ,NO ,  -6.363E-01,   2.323E+00,   3.747E+00,,   -0.170
C,SN-113   ,NO ,   3.380E-01,   3.132E+00,   5.172E+00,,    0.065
C,SB-124   ,NO ,   1.390E+01,   6.991E+00,   5.365E+00,,    2.590
C,SB-125   ,NO ,  -5.857E-03,   6.640E+00,   1.088E+01,,   -0.001
C,TE-129M  ,NO ,   1.289E+01,   2.752E+01,   4.552E+01,,    0.283
C,I-131    ,NO ,   1.760E+00,   3.284E+00,   5.322E+00,,    0.331
C,BA-133   ,NO ,   4.508E+01,   4.710E+00,   8.219E+00,,    5.485
C,CS-134   ,NO ,   3.279E+01,   6.993E+00,   6.476E+00,,    5.064
C,CS-136   ,NO ,   6.787E-01,   2.719E+00,   4.489E+00,,    0.151
C,CS-137   ,NO ,   2.147E+00,   2.516E+00,   4.289E+00,,    0.501
C,CE-139   ,NO ,  -3.436E+00,   2.422E+00,   3.881E+00,,   -0.885
C,BA-140   ,NO ,  -2.671E+00,   9.519E+00,   1.556E+01,,   -0.172
C,LA-140   ,NO ,   4.337E-01,   3.100E+00,   5.109E+00,,    0.085
C,CE-141   ,NO ,   4.029E+00,   5.017E+00,   7.127E+00,,    0.565
C,CE-144   ,NO ,   1.684E+01,   2.127E+01,   3.035E+01,,    0.555
C,EU-152   ,NO ,  -1.559E+00,   8.881E+00,   1.230E+01,,   -0.127
C,EU-154   ,NO ,   1.778E+00,   4.888E+00,   8.173E+00,,    0.218
C,RA-226   ,NO ,   4.700E+00,   6.360E+01,   9.967E+01,,    0.047
C,AC-228   ,NO ,  -3.396E-01,   9.280E+00,   1.454E+01,,   -0.023
C,TH-228   ,NO ,   1.439E+01,   5.675E+00,   8.409E+00,,    1.711
C,TH-232   ,NO ,  -3.393E-01,   9.270E+00,   1.452E+01,,   -0.023
C,U-235    ,NO ,   3.874E+01,   2.203E+01,   3.200E+01,,    1.210
C,U-238    ,NO ,  -2.072E+01,   2.482E+02,   4.057E+02,,   -0.051
C,AM-241   ,NO ,   3.373E+01,   2.547E+01,   3.705E+01,,    0.910
```

TELEDYNE
BROWN ENGINEERING
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931
865-690-6819 (Phone)

Work Order #: L28896

Exelon

June 20, 2006

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133

Kathy Shaw
Conestoga-Rovers & Associates
45 Farmington Valley Road
Plainville CT 06062

Case Narrative - L28896
EX001-3ESPTMI-06

06/20/2006 14:48

Sample Receipt

The following samples were received on June 10, 2006 in good condition, unless otherwise noted.

The IDs on the containers did not match the IDs on the Chain of Custody for the following samples:

COC	Container
RB-TMI-RB4-060606-JC-046	WG-TMI-RB4-060606-JC-046
RB-TMI-RB6-060806-JC-060	WG-TMI-RB6-060806-JC-060
WG-TMI-20-060706-EV-043	WG-TMI-20-060706-EV-047

CRA submitted revised COCs on 6/12/06

Cross Reference Table

Client ID	Laboratory ID	Station ID(if applicable)
RB-TMI-RB2-060106-JAS-026	L28896-1	
RB-TMI-RB4-060606-JC-046	L28896-2	
RB-TMI-RB6-060806-JC-060	L28896-3	
WG-TMI-14I-060706-JC-053	L28896-4	
WG-TMI-MS-20-060706-EV-047	L28896-5	
RB-TMI-RB-5-060706-JC-052	L28896-6	
WG-TMI-MS-3-060506-JC-032	L28896-7	
WG-TMI-MS-4-060706-JC-050	L28896-8	
WG-TMI-MS-22-060706-MMM-049	L28896-9	
WG-TMI-MS-21-060706-EV-048	L28896-10	
WG-TMI-MS-4-060706-JC-051	L28896-11	

Analytical Method Cross Reference Table

Radiological Parameter	TBE Knoxville Method	Reference Method
Gamma Spectrometry	TBE-2007	EPA 901.1
H-3	TBE-2010	EPA 906.0
TOTAL SR	TBE-2018	EPA 905.0

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133

Case Narrative - L28896
EX001-3ESPTMI-06

06/20/2006 14:48

Gamma Spectroscopy

Quality Control

Quality control samples were analyzed as WG4137.

Duplicate Sample

Duplicates were analyzed for the following samples. All duplicate results were within acceptance limits, unless otherwise noted.

Client ID	Laboratory ID	QC Sample #
RB-TMI-RB2060106-JAS-026	L28896-1	WG4137-1

H-3

Quality Control

Quality control samples were analyzed as WG4143.

Method Blank

All blanks were within acceptance limits, unless otherwise noted.

Laboratory Control Sample

All laboratory control samples were within acceptance limits, unless otherwise noted.

Duplicate Sample

Duplicates were analyzed for the following samples. All duplicate results were within acceptance limits, unless otherwise noted.

Client ID	Laboratory ID	QC Sample #
RB-TMI-RB2-060106-JAS-026	L28896-1	WG4143-3

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133

Case Narrative - L28896
EX001-3ESPTMI-06

06/20/2006 14:48

TOTAL SR

Quality Control

Quality control samples were analyzed as WG4149.

Method Blank
All blanks were within acceptance limits, unless otherwise noted.

Laboratory Control Sample
All laboratory control samples were within acceptance limits, unless otherwise noted.

Duplicate Sample
Duplicates were analyzed for the following samples. All duplicate results were within acceptance limits, unless otherwise noted.

Client ID	Laboratory ID	QC Sample #
RB-TMI-RB2-060106-JAS-026	L28896-1	WG4149-3

Certification

This is to certify that Teledyne Brown Engineering - Environmental Services, located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.

Keith Jeter
Operations Manager

Sample Receipt Summary

06/12/06 10:08

SR #: SR08823

Client: Exelon

Teledyne Brown Engineering
Sample Receipt Verification/Variance Report

Project #: EX001-3ESPTMI-06

LIMS #: L28896

Initiated By: PMARSHALL
Init Date: 06/12/06 Receive Date: 06/10/06

Notification of Variance

Person Notified: K. Shaw
Contacted By: L. Charles
Notify Date: ~~6/11/06~~ 6/12/06 6/12/06
Notify Method: email / w acknowledgement
Notify Comment:

Client Response

Person Responding: K Shaw
Response Date: 6/12/06
Response Method: email
Response Comment attached (Revised COC)

	Criteria	Yes No NA	Comment
1	Shipping container custody seals present and intact.	NA	
2	Sample container custody seals present and intact.	NA	
3	Sample containers received in good condition	Y	
4	Chain of custody received with samples	Y	
5	All samples listed on chain of custody received	Y	
6	Sample container labels present and legible.	Y	
7	Information on container labels correspond with chain of custody	N	
	RB-TMI-RB4-060606-JC-046		Container: WG-TMI-RB4-060606-JC-046
	RB-TMI-RB6-060806-JC-060		Container: WG-TMI-RB6-060806-JC-060
	WG-TMI-MS-20-060706-EV-043		Container: WG-TMI-MS-20-060706-EV-047
8	Sample(s) properly preserved and in appropriate container(s)	N	Gamma portion pH at or below 2
9	Other (Describe)	NA	

TELEDYNE BROWN ENGINEERING
2508 Quality Lane
Knoxville, TU 37931-3133

ACKNOWLEDGMENT
This is not an invoice

Kathy Shaw
Conestoga-Rovers & Associates
45 Farmington Valley Road
Plainville, CT 06062

June 12, 2006

The following sample(s) were received at Teledyne Brown Engineering Knoxville laboratory on June 10, 2006. The sample(s) have been scheduled for the analyses listed below and the report is scheduled for completion by June 17, 2006. Please review the following login information and pricing. Contact me if anything is incorrect or you have questions about the status of your sample(s).

Thank you for choosing Teledyne Brown Engineering for your analytical needs.

Sincerely,
Rebecca Charles
Project Manager
(865)934-0379

Project ID: EX001-3ESPTMI-06
P.O.#: 00411203
Release #:
Contract#: 00411203
Kathy Shaw, FAX#:860-747-1900, larry.walton@exeloncorp.com

Client ID, Station	Laboratory ID Analysis	Vol/Units Price	Start Collect Date/Time	End Collect Date/Time
RB-TMI-RB2-060106-JAS-026	L28896-1		06/01/06:1845	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
RB-TMI-RB4-060606-JC-046	L28896-2		06/06/06:1730	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
RB-TMI-RB6-060806-JC-060	L28896-3		06/08/06:1550	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-141-060706-JC-053	L28896-4		06/07/06:1530	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MS-20-060706-EV-043	L28896-5		06/07/06:1245	

Client ID/ Station	Laboratory ID Analysis	Vol/Units Price	Start Collect Date/Time	End Collect Date/Time
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-RB-5-060706-JC-052	L28896-6		06/07/06:1130	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MS-3-060506-JC-032	L28896-7		06/05/06:1605	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MS-4-060706-JC-050	L28896-8		06/07/06:1020	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MS-22-060706-MMM-049	L28896-9		06/07/06:1130	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MS-21-060706-MMM-EV-0	L28896-10		06/07/06:0940	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MS-4-060706-JC-051	L28896-11		06/07/06:1025	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		

End of document

TELEDYNE BROWN ENGINEERING
2508 Quality Lane
Knoxville, TN 37931-3133

ACKNOWLEDGMENT
This is not an invoice

Kathy Shaw
Conestoga-Rovers & Associates
45 Farmington Valley Road
Plainville, CT 06062

June 16, 2006

The following sample(s) were received at Teledyne Brown Engineering Knoxville laboratory on June 10, 2006. The sample(s) have been scheduled for the analyses listed below and the report is scheduled for completion by June 17, 2006. Please review the following login information and pricing. Contact me if anything is incorrect or you have questions about the status of your sample(s).

Thank you for choosing Teledyne Brown Engineering for your analytical needs.

Sincerely,
Rebecca Charles
Project Manager
(865)934-0379

Project ID: EX001-3ESPTMI-06
P.O. #: 00411203
Release #:
Contract#: 00411203
Kathy Shaw, FAX#:860-747-1900, larry.walton@exeloncorp.com

Client ID Station	Laboratory ID Analysis	Vol/Units Price	Start Collect Date/Time	End Collect Date/Time
RB-TMI-RB2-060106-JAS-026	L28896-1		06/01/06:1845	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
RB-TMI-RB4-060606-JC-046	L28896-2		06/06/06:1730	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
RB-TMI-RB6-060806-JC-060	L28896-3		06/08/06:1550	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TWI-141-060706-JC-053	L28896-4		06/07/06:1530	
WG	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG-TMI-MS-20 060706-EV- 047	L28896-5		06/07/06:1245	

Client ID/ Station	Laboratory ID Analysis	Vol/Units Price	Start Collect Date/Time	End Collect Date/Time
	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG				
RB-TMI-RB-5-060706-JC-052	L28896-6		06/07/06:1130	
	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG				
WG-TMI-MS-3-060506-JC-032	L28896-7		06/05/06:1605	
	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG				
WG-TMI-MS-4-060706-JC-050	L28896-8		06/07/06:1020	
	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG				
WG-TMI-MS-22-060706-MMM-049	L28896-9		06/07/06:1130	
	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG				
WG-TMI-MS-21-060706-EV-048	L28896-10		06/07/06:0940	
	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG				
WG-TMI-MS-4-060706-JC-051	L28896-11		06/07/06:1025	
	GELI	108.00		
WG	H-3	108.00		
WG	SR-90 (FAST)	140.00		
WG				

End of document

L28896

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE BROWN

REFERENCE NUMBER: 045136-29

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: JASON CLOSE, JOHN SKURAT, MARCIN RAPSET

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS: GAMMA EMITTERS	STRONTIUM 89/90	TRITIUM							REMARKS
	6/1/06	1845	RB-TMI-RB2-060106-JAS-026	AQU	2	X	X	X							18ml HNO_3
	6/1/06	1730	RB-TMI-RB4-060606-JC-046	AQU	2	X	X	X							
	6/8/06	1550	RB-TMI-RB6-060806-JC-060	AQU	2	X	X	X							

TOTAL NUMBER OF CONTAINERS: 6

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① [signature]	DATE: 6/9/06 TIME: 1415	RECEIVED BY: ① [signature] AMERGEN	DATE: 6/9/06 TIME: 1415
RELINQUISHED BY: ② [signature] AMERGEN	DATE: 6/9/06 TIME: 1416	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

WAY BILL No.

METHOD OF SHIPMENT:

White	–Fully Executed Copy
Yellow	–Receiving Laboratory Copy
Pink	–Shipper Copy
Goldenrod	–Sampler Copy

SAMPLE TEAM: J. CLOSE, J. SKURAT

RECEIVED FOR LABORATORY BY: Pat Marshall

DATE: 6/12/06 TIME: 1000

NO CRA 06211

1001 (D) APR 28/97(NF) REV. 0 (F-15)

L28896

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE BROWN

REFERENCE NUMBER: 045136-29

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: MARTIN MYLET

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS: Gamma Emitters	Strontium 89/90	Tritium							REMARKS
	6/7/06	1020	WG-TMI-MS-4-060706-JC-050	AQU	2	X	X	X							18ml HNO_3
	6/7/06	1130	WG-TMI-MS-22-060706-MMM-049		2	X	X	X							
	6/7/06	0940	WG-TMI-MS-21-060706-MMM-EV-048		2	X	X	X							
	6/7/06	1025	WG-TMI-MS-4-060706-MMM-JC-051		2	X	X	X							

TOTAL NUMBER OF CONTAINERS: 8

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
① [signature]	6/9/07	1345	① [signature] O-AMMEN GEN	6/9/06	1345
② [signature] O-AMMEN GEN	6/9/06	1346	②		
③			③		

WAY BILL No.

METHOD OF SHIPMENT:

White	–Fully Executed Copy
Yellow	–Receiving Laboratory Copy
Pink	–Shipper Copy
Goldenrod	–Sampler Copy

SAMPLE TEAM: M. MYLET, J. CLOSE, E. VARNAS

RECEIVED FOR LABORATORY BY: Pat Marshall DATE: 6/12/06 TIME: 1000

NO CRA 06207

1001 (D) APR 28/97(NF) REV. 0 (F-15)

L28896

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE BROWN

REFERENCE NUMBER: 045136-29

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: MARTIN MYLET

EVAN VARNAS

JASON CLOSE

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS: Cobalt 60, Cesium 137, Strontium 89/90, Tritium	REMARKS
	6/7/06	1530	WG-TMI-141-060706-JC-053	AQU	2		
	6/7/06	1245	WG-TMI-MS-20-060706-EV-043	AQU	2		
	6/7/06	1130	WG-TMI-RB-5-060706-JC-052	AQU	2		
	6/5/06	1605	WG-TMI-MS-3-060506-JC-032	AQU	2		

TOTAL NUMBER OF CONTAINERS: 8

HEALTH/CHEMICAL HAZARDS:

RELINQUISHED BY: ① [signature]	DATE: 6/9/06 TIME: 1325	RECEIVED BY: ① [signature] AMERIGEN	DATE: 6/9/06 TIME: 1325
RELINQUISHED BY: ② [signature] AMERIGEN	DATE: 6/9/06 TIME: 1326	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT:

WAY BILL No.

White	–Fully Executed Copy
Yellow	–Receiving Laboratory Copy
Pink	–Shipper Copy
Goldenrod	–Sampler Copy

SAMPLE TEAM: EVAN VARNAS, JASON CLOSE

RECEIVED FOR LABORATORY BY: Pat Marshall

DATE: 6/12/06 TIME: 1000

No CRA 06206

1001 (D) APR 28/97(NF) REV. 0 (F-15)

L28896

Charles, Rebecca

From: Shaw, Kathy [kshaw@craworld.com]
Sent: Monday, June 12, 2006 2:25 PM
To: Charles, Rebecca
Cc: Larry.Walton@exeloncorp.com
Subject: RE: Variance reports for Saturday receipts

Hi Rebecca,

Please see the attached revised COCs for corrections.

thanks,
Kathy

From: Charles, Rebecca [mailto:Rebecca.Charles@tbe.com]
Sent: Monday, June 12, 2006 11:21 AM
To: Shaw, Kathy
Cc: Larry.Walton@exeloncorp.com
Subject: Variance reports for Saturday receipts

Kathy,

Several of the IDs on the samples received Saturday did not match the IDs on the paperwork. Please see the attached Variance reports.

Rebecca Charles
Teledyne Brown Engineering
Project Manager
(865) 934-0379
(865) 934-0396 (fax)

This email and any of its attachments may contain Teledyne Brown Engineering proprietary information, which is privileged, confidential, or subject to copyright belong to Teledyne Brown Engineering. This e-mail is intended solely for the use of the individual or entity to which it is addressed. If you are not the intended recipient of this e-mail, you are hereby notified that any dissemination, distribution, copying, or action taken in relation to the contents and attachments to this e-mail is strictly prohibited and may be unlawful. If you have received this e-mail in error, please notify the sender immediately and permanently delete the original and any copy and printout of this e-mail. Thank You

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE BROWN

REFERENCE NUMBER: 045131-29

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: MARTIN MYLET

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS									REMARKS
	6/7/06	1530	WG-TMI-141-060706-JC-053 047	NOV	3										
	6/7/06	1245	WG-TMI-MS-20-060706-EV-043	NOV	3										
	6/7/06	1130	WG-TMI-RB-5-060706-JC-052	NOV	3										
	6/5/06	1605	WG-TMI-MS-3-060506-JC-032	NOV	3										

TOTAL NUMBER OF CONTAINERS: 4

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① [signature] DATE: 6/9/06 TIME: 1325

RECEIVED BY: ① [signature] DATE: [illegible] TIME: [illegible]

RELINQUISHED BY: ② [signature] DATE: [illegible] TIME: [illegible]

RECEIVED BY: ② DATE: TIME:

RELINQUISHED BY: ③ DATE: TIME:

RECEIVED BY: ③ DATE: TIME:

METHOD OF SHIPMENT:

WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: [illegible] [illegible]

RECEIVED FOR LABORATORY BY:

DATE: TIME:

No CRA 05206

1001 (D) APR 28/97(NF) REV. 0 (F-15)

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE BROWN

REFERENCE NUMBER: 045136-29

SAMPLER'S SIGNATURE: [illegible] PRINTED NAME: [illegible]

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS										REMARKS
	6/7/06	[illegible]	WG-TMI-MS-4-060706-JC-050	[illegible]	2		1	1	1							18 [illegible]
	6/7/06	1130	WG-TMI-MS-22-060706-MMM-049		2		1	1	1							
	6/7/06	0940	WG-TMI-MS-21-060706-MMEV-048		2		1	1	1							
	6/7/06	1025	WG-TMI-MS-4-060706-JC-051		2		1	1	1							

TOTAL NUMBER OF CONTAINERS: 7

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① [illegible]	DATE: 6/9/07 TIME: 1345	RECEIVED BY: ① [illegible]	DATE: 6/9/07 TIME: 1550
RELINQUISHED BY: ② [illegible]	DATE: [illegible] TIME: 1746	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT:

WAY BILL No.

White	–Fully Executed Copy
Yellow	–Receiving Laboratory Copy
Pink	–Shipper Copy
Goldenrod	–Sampler Copy

SAMPLE TEAM: [illegible]

RECEIVED FOR LABORATORY BY: DATE: TIME:

No CRA 06207

1001 (D) APR 28/97(NF) REV. 0 (F-15)

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name): TELEDYNE BROWN

REFERENCE NUMBER: 045136-29

SAMPLER'S SIGNATURE: [illegible] PRINTED NAME: [illegible]

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS										REMARKS
	6/6/06	1545	RB-TMI-RB2-060106-JAS-026	Air	2	X	X	X								[illegible]
	6/6/06	1730	RB-TMI-RB4-060606-JC-046	Air	2	X	X	X								
	6/6/06	1550	RB-TMI-RB6-060806-JC-060	Air	2	X	X	X								

TOTAL NUMBER OF CONTAINERS 6

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① [illegible]	DATE: [illegible] TIME: 1415	RECEIVED BY: ① [illegible]	DATE: [illegible] TIME: [illegible]
RELINQUISHED BY: ② [illegible]	DATE: [illegible] TIME: [illegible]	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

WAY BILL No.

METHOD OF SHIPMENT:

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: J. CLOSE, J. SAINT

RECEIVED FOR LABORATORY BY:

DATE: TIME:

NO CRA 06211

1001 (D) APR 28/97(NF) REV. 0 (F-15)

Internal Chain of Custody

06/20/06 13:55

Teledyne Brown Engineering
Internal Chain of Custody

****

Sample # L28896-1 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian

****

Sample # L28896-1 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian
06/12/2006 11:18	099999	030854	Donna Webb
06/12/2006 11:19	030854	029728	Lauren Larsen
06/12/2006 14:08	029728	030854	Donna Webb
06/12/2006 14:09	030854	099999	Sample Custodian

****

Sample # L28896-2 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian

****

Sample # L28896-2 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian
06/12/2006 11:18	099999	030854	Donna Webb
06/12/2006 11:19	030854	029728	Lauren Larsen
06/12/2006 14:08	029728	030854	Donna Webb
06/12/2006 14:09	030854	099999	Sample Custodian

****

Sample # L28896-3 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By

06/20/06 13:55

Teledyne Brown Engineering
Internal Chain of Custody

****
Sample # L28896-3 Containernum 1

Relinquish Date	Received By	Sample Custodian
06/12/2006 00:00	099999	

****
Sample # L28896-3 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	Sample Custodian
06/12/2006 00:00		099999	Donna Webb
06/12/2006 11:18	099999 Sample Custodian	030854	Lauren Larsen
06/12/2006 11:19	030854 Donna Webb	029728	Donna Webb
06/12/2006 14:08	029728 Lauren Larsen	030854	Sample Custodian
06/12/2006 14:09	030854 Donna Webb	099999	

****
Sample # L28896-4 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	Sample Custodian
06/12/2006 00:00		099999	

****
Sample # L28896-4 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	Sample Custodian
06/12/2006 00:00		099999	Donna Webb
06/12/2006 11:18	099999 Sample Custodian	030854	Lauren Larsen
06/12/2006 11:19	030854 Donna Webb	029728	Donna Webb
06/12/2006 14:08	029728 Lauren Larsen	030854	Sample Custodian
06/12/2006 14:09	030854 Donna Webb	099999	

****
Sample # L28896-5 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	Sample Custodian
06/12/2006 00:00		099999	

****
Sample # L28896-5 Containernum 2

Prod	Analyst
	EJ

06/20/06 13:55

Teledyne Brown Engineering
Internal Chain of Custody

****

Sample # L28896-5 Containernum 2

GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By		Received By	
06/12/2006 00:00			099999	Sample Custodian
06/12/2006 11:18	099999	Sample Custodian	030854	Donna Webb
06/12/2006 11:19	030854	Donna Webb	029728	Lauren Larsen
06/12/2006 14:08	029728	Lauren Larsen	030854	Donna Webb
06/12/2006 14:09	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28896-6 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By		Received By	
06/12/2006 00:00			099999	Sample Custodian

****

Sample # L28896-6 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By		Received By	
06/12/2006 00:00			099999	Sample Custodian
06/12/2006 11:18	099999	Sample Custodian	030854	Donna Webb
06/12/2006 11:19	030854	Donna Webb	029728	Lauren Larsen
06/12/2006 14:08	029728	Lauren Larsen	030854	Donna Webb
06/12/2006 14:09	030854	Donna Webb	099999	Sample Custodian

****

Sample # L28896-7 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By		Received By	
06/12/2006 00:00			099999	Sample Custodian

****

Sample # L28896-7 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By		Received By	
06/12/2006 00:00			099999	Sample Custodian

06/20/06 13:55

Teledyne Brown Engineering
Internal Chain of Custody

****

Sample # L28896-7 Containernum 2

Relinquish Date		Sample Custodian	Received By	
06/12/2006 11:18	099999	Donna Webb	030854	Donna Webb
06/12/2006 11:19	030854	Lauren Larsen	029728	Lauren Larsen
06/12/2006 14:08	029728	Donna Webb	030854	Donna Webb
06/12/2006 14:09	030854		099999	Sample Custodian

****

Sample # L28896-8 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian

****

Sample # L28896-8 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian
06/12/2006 11:18	099999	030854	Donna Webb
06/12/2006 11:19	030854	029728	Lauren Larsen
06/12/2006 14:08	029728	030854	Donna Webb
06/12/2006 14:09	030854	099999	Sample Custodian

****

Sample # L28896-9 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian

****

Sample # L28896-9 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian
06/12/2006 11:18	099999	030854	Donna Webb
06/12/2006 11:19	030854	029728	Lauren Larsen
06/12/2006 14:08	029728	030854	Donna Webb
06/12/2006 14:09	030854	099999	Sample Custodian

06/20/06 13:55

Teledyne Brown Engineering
Internal Chain of Custody

****

Sample # L28896-10 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian

****

Sample # L28896-10 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian
06/12/2006 11:18	099999 Sample Custodian	030854	Donna Webb
06/12/2006 11:19	030854 Donna Webb	029728	Lauren Larsen
06/12/2006 14:08	029728 Lauren Larsen	030854	Donna Webb
06/12/2006 14:09	030854 Donna Webb	099999	Sample Custodian

****

Sample # L28896-11 Containernum 1

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian

****

Sample # L28896-11 Containernum 2

Prod	Analyst
H-3	EJ
GELI	DW
SR-90 (FAST)	LCB

Relinquish Date	Relinquish By	Received By	
06/12/2006 00:00		099999	Sample Custodian
06/12/2006 11:18	099999 Sample Custodian	030854	Donna Webb
06/12/2006 11:19	030854 Donna Webb	029728	Lauren Larsen
06/12/2006 14:08	029728 Lauren Larsen	030854	Donna Webb
06/12/2006 14:09	030854 Donna Webb	099999	Sample Custodian

06/20/06

Teledyne Brown Engineering
Internal Chain of Custody
Supplemental Sheet

L28896

****

L28896-1 WG RB-TMI-RB2-060106-JAS-026

Process step	Prod	Analyst	Date
Login		RCHARLES	06/10/06
Aliquot	GELI	DW	06/12/06
Aliquot	H-3	EJ	06/13/06
Aliquot	SR-90 (FAST)	LCB	06/13/06
Count Room	GELI	KPW	06/15/06
Count Room	H-3	KOJ	06/14/06
Count Room	SR-90 (FAST)	KOJ	06/15/06

****

L28896-2 WG RB-TMI-RB4-060606-JC-046

Process step	Prod	Analyst	Date
Login		PMARSHALL	06/10/06
Aliquot	GELI	DW	06/12/06
Aliquot	H-3	EJ	06/13/06
Aliquot	SR-90 (FAST)	LCB	06/13/06
Count Room	GELI	KPW	06/15/06
Count Room	H-3	KOJ	06/14/06
Count Room	SR-90 (FAST)	KOJ	06/15/06

****

L28896-3 WG RB-TMI-RB6-060806-JC-060

Process step	Prod	Analyst	Date
Login		PMARSHALL	06/10/06
Aliquot	GELI	DW	06/12/06
Aliquot	H-3	EJ	06/13/06
Aliquot	SR-90 (FAST)	LCB	06/13/06
Count Room	GELI	KPW	06/15/06
Count Room	H-3	KOJ	06/14/06
Count Room	SR-90 (FAST)	KOJ	06/15/06

****

L28896-4 WG WG-TMI-14I-060706-JC-053

Process step	Prod	Analyst	Date
Login		PMARSHALL	06/10/06
Aliquot	GELI	DW	06/12/06
Aliquot	H-3	EJ	06/13/06
Aliquot	SR-90 (FAST)	LCB	06/13/06
Count Room	GELI	KPW	06/15/06
Count Room	H-3	KOJ	06/14/06
Count Room	SR-90 (FAST)	KOJ	06/15/06

****

L28896-5 WG WG-TMI-MS-20-060706-EV-047

Process step	Prod	Analyst	Date
Login		RCHARLES	06/10/06
Aliquot	GELI	DW	06/12/06
Aliquot	H-3	EJ	06/13/06
Aliquot	SR-90 (FAST)	LCB	06/13/06
Count Room	GELI	KPW	06/15/06

06/20/06

Teledyne Brown Engineering
Internal Chain of Custody
Supplemental Sheet

L28896

L28896-5	WG	WG-TMI-MS-20-060706-EV-047	KOJ	06/14/06
Count Room	H-3		KOJ	06/15/06
Count Room	SR-90 (FAST)			

****

L28896-6	WG	RB-TMI-RB-5-060706-JC-052		
Process step	Prod		Analyst	Date
Login			RCHARLES	06/10/06
Aliquot	GELI		DW	06/12/06
Aliquot	H-3		EJ	06/13/06
Aliquot	SR-90 (FAST)		LCB	06/13/06
Count Room	GELI		KPW	06/15/06
Count Room	H-3		KOJ	06/15/06
Count Room	SR-90 (FAST)		KOJ	06/15/06

****

L28896-7	WG	WG-TMI-MS-3-060506-JC-032		
Process step	Prod		Analyst	Date
Login			RCHARLES	06/10/06
Aliquot	GELI		DW	06/12/06
Aliquot	H-3		EJ	06/13/06
Aliquot	SR-90 (FAST)		LCB	06/13/06
Count Room	GELI		KOJ	06/15/06
Count Room	H-3		KOJ	06/15/06
Count Room	SR-90 (FAST)		KOJ	06/15/06

****

L28896-8	WG	WG-TMI-MS-4-060706-JC-050		
Process step	Prod		Analyst	Date
Login			PMARSHALL	06/10/06
Aliquot	GELI		DW	06/12/06
Aliquot	H-3		EJ	06/13/06
Aliquot	SR-90 (FAST)		LCB	06/13/06
Count Room	GELI		ILL	06/16/06
Count Room	H-3		KOJ	06/15/06
Count Room	SR-90 (FAST)		KOJ	06/15/06

****

L28896-9	WG	WG-TMI-MS-22-060706-MMM-049		
Process step	Prod		Analyst	Date
Login			RCHARLES	06/10/06
Aliquot	GELI		DW	06/12/06
Aliquot	H-3		EJ	06/13/06
Aliquot	SR-90 (FAST)		LCB	06/13/06
Count Room	GELI		ILL	06/16/06
Count Room	H-3		KOJ	06/15/06
Count Room	SR-90 (FAST)		KOJ	06/15/06

****

L28896-10	WG	WG-TMI-MS-21-060706-EV-048		
Process step	Prod		Analyst	Date
Login			RCHARLES	06/10/06

06/20/06

Teledyne Brown Engineering
Internal Chain of Custody
Supplemental Sheet

L28896

L28896-10	WG	WG-TMI-MS-21-060706-EV-048		
Aliquot	GELI		DW	06/12/06
Aliquot	H-3		EJ	06/13/06
Aliquot	SR-90 (FAST)		LCB	06/13/06
Count Room	GELI		ILL	06/16/06
Count Room	H-3		KOJ	06/15/06
Count Room	SR-90 (FAST)		KOJ	06/15/06

****

L28896-11	WG	WG-TMI-MS-4-060706-JC-051		
Process step	Prod		Analyst	Date
Login			PMARSHALL	06/10/06
Aliquot	GELI		DW	06/12/06
Aliquot	H-3		EJ	06/13/06
Aliquot	SR-90 (FAST)		LCB	06/13/06
Count Room	GELI		ILL	06/16/06
Count Room	H-3		KOJ	06/15/06
Count Room	SR-90 (FAST)		KOJ	06/15/06