ALTERNATIVE INTAKE TECHNOLOGIES FOR CWIS

EVALUATION & BUDGETARY COST ESTIMATE FOR MECHANICAL DRAFT COOLING TOWER OPTION

Salem Generating Station Units 1 & 2
PSEG Nuclear, LLC

Non-Safety Related
Project Number 11050-360
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Sargent & Lundy LLC

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I. PURPOSE/OBJECTIVE

PSEG Nuclear, LLC (PSEG) is evaluating several alternative intake technology solutions for the Salem Generating Station (Salem or Station) Circulating Water Intake Structure (CWIS) to reduce fish impingement mortality and entrainment, and to improve debris management. PSEG presented an evaluation of various fish protection alternatives in Appendix F of their New Jersey Pollutant Discharge Elimination System (NJPDES) permit application (Reference C.34) in 1999. Using a closed cycle cooling system was one of the options evaluated in the previous permit applications. The New Jersey Department of Environmental Protection (NJDEP) in the Fact Sheet for the 2001 NJPDES Permit identified that the estimated cost of closed-cycle is wholly disproportionate to the environmental benefit to be realized.

On July 9, 2004, the United States Environmental Protection Agency (USEPA) issued its "NPDES Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities" (the Phase II Rules). The Phase II Rules provide NJPDES applicants several options to demonstrate compliance. Determining the appropriate option or options through which an applicant would demonstrate compliance, as well as the requirements of some of those compliance options, requires an applicant to explore different technologies. As with the previous permit renewal, PSEG is evaluating closed cycle cooling as part of the Salem NJPDES permit renewal effort.

This report presents a conceptual design, a cost estimate, and a schedule estimate for converting the circulating water system (CWS) at Salem Generating Station (Salem or Station) from the current once through system, where cooling water is continuously withdrawn from the Delaware Estuary, to a closed cycle cooling system using Mechanical Draft Cooling Towers. Design parameters for proposed Mechanical Draft Cooling Towers at Salem, including the wet-bulb temperature, dry-bulb temperature and the relative humidity values, are location-dependent and were assumed to be the same as those used for the design of the Hope Creek natural draft cooling tower. The total heat load assumed for this design is defined in the Salem heat balances (References C. 24 through 28), and the Salem configuration baseline documentation (Reference C.6). The CWIS flowrate is dependent on the condenser design, the circulating water pumps, and the number and design of the towers that are used.

This report concludes that retrofitting Salem for closed cycle cooling would involve substantial new construction, demolition, and re-construction activities that would result in replacing, reinforcing, or abandoning all of the existing CWS. Implementation of this retrofit would require extended outages for each unit potentially leading to additional concerns during restart. This project would be unprecedented for a nuclear plant. Based on the results presented in this evaluation, the implementation of the Mechanical Draft Tower alternative would require $**814,844,200**, and a 66-month schedule to complete. Operational load is estimated to be 432,393,650 kWH per year and maintenance costs are estimated to be $4,371,784 per year. As presented in greater detail in this report, retrofitting cooling towers at Salem would be very difficult, and would impose significant permanent cost penalties, based on reductions in station output.

I. DESIGN INPUTS

A. The heat rejection rate of circulating water flow is 7.636 x 10^9 BTU/hr at 61.8° F (original CW inlet design temperature) as noted in DE-CB.CW-0028(Z) (Reference C.6), and 7.410 x 10^9 BTU/hr at 90° F as noted in the Alstom condenser proposal (Reference C.18).

B. The cold water outlet temperature of the tower shall be 90° F, based upon a design approach of 14° plus the ambient wet-bulb temperature. The hot water returning to the cooling tower inlet, is estimated to be 119° F, based on a range of 29°. (Reference C.23).

C. The ambient wet-bulb temperature is 76° F. The relative humidity is 60 percent. (Reference C.23).

D. The cooling towers would be designed to operate in ambient air temperatures ranging from 0° F to 100° F for the design heat load. (Reference C.23).

E. The replacement condenser tube bundles would be designed to fit the three existing condenser boxes in each unit. (Reference C.18).

F. Cooling tower drift eliminator efficiency is 0.0005% or better.

These Design Inputs are summarized below:

Inlet Water Flow	511,020 gpm (Reference C.18)
Inlet Water Temperature	119° F
Outlet Water Temperature	90° F
Ambient Wet Bulb	76° F
Relative Humidity	60%
Range	29° F
Approach	14° F
Drift Loss (% of CW flow)	0.0005%
Heat Rejection Rate of CW flow	7.636 x 10^9 BTU/hr.(61.8F orig. design) 7.410 x 10^9 BTU/hr (90F design)
Ambient Air Temperature Range	0° F to 100° F

II. CRITERIA FOR IMPLEMENTATION

The closed-cycle circulating water cooling alternative using mechanical draft cooling towers shall provide a solution to ensure the following:

1. Create no significant additional challenges to Station operation.
2. Must be technically feasible and have proven operational reliability.
3. Must be constructable for the estimates provided.
4. Should be available with required efficiency for operation during extreme winter and summer weather.
5. Should be able to maintain and manage cooling tower water quality.
6. Construction material should be suitable to assure reliable operation for the life of the plant. No asbestos fill or materials would be allowed.
7. Air emission efficiency should be maximized to reduce particulate air emissions, no air pollutants other than particulates shall be emitted from the cooling tower
8. The mechanical draft cooling tower shall be constructed of materials which would not impart any additional pollutants, e.g., CCA pressure-treated lumber is not acceptable.

The following objectives are also desirable in the solution:

1. Can be implemented on-line as much as possible, with minimal outage time required for completing the tie-ins to the existing system.
2. Minimize any new operator burdens.
3. Minimal plant impact and maximum flexibility for operation and implementation.

III. TECHNICAL EVALUATION

A. Introduction

The circulating water system is one of the major systems that are designed early in the plant design phase to allow an optimum layout of the plant structures, based on site conditions. The bases and configuration of many of the station's major systems and components are interrelated to the design parameters and performance of the circulating water system. Any subsequent changes to these design parameters for the CWS can have a significant impact on the plant's ability to perform as designed. Even minor changes to the circulating water supply (for example, a small increase in water temperature or a slight reduction of flow) may result in considerable reduction of the plant's rated capacity. The circulating water pipes and the CWIS require a significant area within the power block layout. Subsequent changes to the routing of the circulating water pipes, and/or installation of new circulating water pipes, needs to be carefully evaluated to identify the space available for installation of these large diameter pipes and the numerous interferences such as buried utilities and electrical duct banks.

B. Background

PSEG presented an evaluation of various fish protection alternatives in their NJPDES permit application (Reference C.29, C.31, and C.32) in 1999. Using a closed cycle cooling system was one of the options evaluated. The closed cycle cooling option may use either mechanical draft (MD) cooling towers or natural draft cooling towers. Previous reports have been prepared that evaluated the feasibility of retrofitting Salem with closed-cycle cooling using both Mechanical and Natural Draft Cooling Towers. The findings of these evaluations are summarized below:

Stone & Webster Engineering Corporation (SWEC) evaluated cooling tower alternatives during 1987, 1990 and 1993 (References VIII.C.29 and 30). The purpose of these reports was to evaluate the cost, schedule and technical feasibility of these alternatives at Salem. In these reports SWEC estimated the capital costs, operating & maintenance costs, and plant performance capacity derating and energy losses involved with closed cycle conversion using mechanical draft towers. SWEC concluded in 1990, and confirmed in 1993, that retrofitting Salem to closed cycle cooling using mechanical draft cooling towers would involve an unprecedented, complicated, wide scale and extensive construction effort. SWEC also determined that closed cycle cooling would reduce current power generation capacity. The reports identified that, besides the two MD cooling towers and associated piping and pump houses, the retrofit would also require installation of twelve new tube bundle modules for condensers, complex foundation structures for the new towers and piping, and a new major electrical power distribution system. In terms of the magnitude of the major construction activities, the SWEC report identified that the closed cycle conversion would involve demolition and/or abandonment of over 3 miles of the existing 7ft and 10ft diameter CW piping, installation of over 4 miles of new 7ft diameter reinforced concrete steel lined pipes, installation of more than 10,000 - 100ft deep concrete filled pipe piles, and excavation of over ¼ million cubic yards of soil.

In 1993, Sargent & Lundy (S&L) performed an independent engineering review of the SWEC report for Salem Units 1 & 2 (Reference C.36). S&L's review of the SWEC report provided additional information that evaluated closed cycle cooling water system designs and the associated capital cost estimates, schedules and operating requirements. Alternate locations for the cooling towers were also investigated by S&L in order to determine the acceptability of the conclusion of the SWEC report, that towers would need to be located far from the turbine building. S&L's independent assessment concluded that the technical solution and the schedule suggested by SWEC were reasonable and the differences between the S&L and the SWEC estimates were within the accuracy of a conceptual design estimate.

IV. DESIGN OVERVIEW

In a closed-cycle cooling water system using mechanical draft cooling towers, the warm water from the condensers is routed to the cooling tower in large diameter buried concrete pipes. The warm water enters the top of the cooling tower fill and is allowed to trickle down by gravity through the fill. The warm water on the fill transfers heat to the air and water vapor, which the motor driven fans remove out through the top of the cooling tower. Heat is transferred through both evaporation of and radiant heat transfer from the cooling tower water. The cold water is collected at the bottom of the towers and then pumped back to the condenser through large diameter concrete pipes.

Due to evaporation during the heat transfer, a portion of the circulating water is lost into the atmosphere. Water is also lost due to "drift", water particles entrained in the air leaving the cooling tower. Drift is minimized by the inclusion of drift eliminators that remove the water particles and allow, for this design, no more than 0.0005% drift rate. This loss of water increases the concentration of solids in the cooling water. Passing this water through the condensers can cause plating of solids in the condenser tubes and precipitation of solids in the less turbulent areas of the piping and condensers. Therefore, to balance the concentration of the solids in the cooling water, a portion of this water in the cooling tower is removed from the system as blow down water.

Additional water is added to the CW system using the make-up water system to replace the water that is lost from the system by blowdown, evaporation and drift.

In order to prevent scaling and corrosion, and control biological growth, the water quality of the closed-cycle cooling system water would require periodic verification, and the addition of treatment chemicals with a chemical treatment system.

The installation of a closed cycle cooling water system would involve the addition of new major piping and structures, and require significant modifications to existing station piping and structures, including the following:

1. The installation of two mechanical draft cooling towers with 24 cells on each tower and the associated cold water basin.
2. The installation of 6 pumps per unit and a pump house for pumping the cold water from the cooling towers to the condensers.
3. The installation of twelve new modular condenser tube bundles and the required extensive modifications to the Turbine Building area for access.
4. The installation of long runs of large diameter buried concrete pipes for the supply and the return water to and from the cooling towers.
5. Extensive construction efforts for the tie-in of the buried supply and discharge lines. The units would each require an extensive shutdown during the tie-in activities.
6. The installation of new makeup, blowdown, and chemical control systems, including de-chlorination.
7. The installation of two new electrical power distribution systems, deriving power from the Salem Switchyard's 500-kV Buses 1 and 2. These would each provide approximately 57 MVA of electric power to the new larger circulating water pumps, cooling tower fans, motor operated valves, and cooling tower ancillary loads, i.e. make-up water, blow-down, and chemical control systems.
8. Installation of a large number of piles under the cooling towers, pump houses and the large diameter cooling water pipes.

V. EVALUATION OF MECHANICAL DRAFT COOLING TOWERS

Ideally a cooling tower should be located as close to the condenser as possible to reduce the pumping head required for the circulating water system pumps, and to minimize the length of the large diameter cooling water supply and discharge pipes. However, the large size of the mechanical draft cooling towers dictates that they cannot be located close to the power block unless they are part of the original site layout design. The location of towers at Salem is governed by their proximity to the condensers, the space available for routing new large diameter circulating water pipes to and from the towers, the space available for installation of the towers, and a suitable route to allow for tie-in of the new circulating water pipes to the existing circulating water pipes.

Due to the lack of available open land space at the Salem site close to the power block, the tower locations selected are between the two main transmission lines as shown in Attachment 1, Figure 1. The minimum vertical clearance distance required by the National Electrical Safety Code, Table 234-1 from a 500 kV line to a tower is 17.9ft. However, larger clearances from the 500 kV lines have been provided to facilitate construction activities during installation of the cooling towers. Consideration of the space requirements between the cooling towers included the necessary distances to prevent impeding air flow to the adjacent cooling tower. This location for the mechanical draft towers limits the project to two banks of towers, and would affect the condenser design as described in Chapter VII below. The cost estimate and schedule estimate presented in this report are based on the tower locations shown in Attachment 1, Figure 1.

Different types of mechanical draft cooling tower construction are available within the industry. The options include using cooling towers made of reinforced concrete, towers made from wood, and towers made from fiberglass. Towers made from wood may present long term maintenance challenges as well as potential challenges to the fire protection program for a nuclear power plant and were eliminated from consideration. The towers proposed by GEA Power Cooling, Inc. (GEA) for Salem would be fiberglass towers (Reference C.19). Towers made from reinforced concrete are approximately twice as expensive as fiberglass towers according to GEA. Fiberglass towers are used for mechanical draft cooling towers throughout the power industry. Mechanical draft towers are categorized as either forced draft, on which the fans are located in the ambient air stream entering the tower, or induced draft, where a fan, located in the exiting air stream, draws air through the tower. Forced draft towers are characterized by high air entrance velocities and low air exit velocities. As such, they are extremely susceptible to recirculation (where the outlet air is drawn back into the inlet of the tower) and are considered to have less performance stability than induced draft towers. Forced draft fans can also become susceptible to severe icing problems in cold environments. Most large power plants that use mechanical draft towers use induced draft towers. The design parameters for the Hope Creek cooling tower were used as a basis of the design of the Salem mechanical draft cooling towers since there is significant operating experience with the Hope Creek cooling tower in the geographic location.

The design for closed-cycle cooling using a mechanical draft cooling tower would involve installing two banks of induced draft counter flow type mechanical draft towers, one bank for each Salem unit, with 24 cells per bank. Each mechanical draft cooling tower cell consists of an induced draft fan supported above the water distribution system and tower fill. Air enters the cooling tower at the sides, goes through the fill being exposed to the warm water, and exits by fan induction out the top of the tower.

The tower fill would be film type consisting of numerous honeycomb type tube bundles installed inside the cooling tower to allow the warm water to trickle down the surface area of the tubes. Hope Creek also utilizes film type fill using flat sheets. The flat sheet fill could be prone to clogging if the water contains debris. The honeycomb tube bundles are improved film type cellular fill that stretches droplets of water into a thin film as the water proceeds vertically downward through the cells, thereby maximizing the surface area and permitting to cool the entire droplet more rapidly. Film type fill causes the water to be spread into a thin film over large vertical areas, to promote maximum exposure to the air flow. It provides more effective cooling capacity within the same space then splash fill. Splash fill was used in early cooling tower designs; the earliest fill material was simple wood splash bars. With splash fill, the exchange area for cooling is provided by water droplets, and heat exchange occurs on the surface of these droplets. Due to surface tension, these droplets are nearly perfect spheres and therefore this type of fill does not provide maximum possible surface area. Significant improvements in evaporative heat transfer efficiency were realized with the invention of film fills. The tower fill is installed in a framework inside the cooling tower to allow the warm water to splash down onto the tubes, maximizing contact with the air for evaporation and sensible heat transfer. A warm water distribution system is installed above the fill to distribute the warm water over the top of the fill. The cooled water is collected in the cold water basin at the base of the tower and returned to the condenser using circulating water pumps (see Attachment 1, Figure 6, for the outline of the cold water basin).

The major factors that affect the design and performance of a mechanical draft cooling-tower are the wet-bulb temperature, dry-bulb temperature, the approach temperature, the relative humidity, the heat load, and the rate of flow of the warm water. The wet-bulb temperature, dry-bulb temperature and the relative humidity values are location dependent and were assumed to be the same as those used for the design of the Hope Creek natural draft cooling tower. The total heat load is defined in the Salem heat balances (References C.24 through 28) and the Salem configuration baseline documentation (Reference C.6). The CWS flowrate is dependent on the condenser design and circulating water flowrate, and determines the number of tower cells that are required.

The wet-bulb temperature is the lowest temperature at which evaporation can occur for the specific atmospheric conditions. The approach temperature of a tower is the difference between the temperature of the cold water discharged from the cooling tower and the wet-bulb temperature. The more efficient a tower is, the closer it "approaches" the wet-bulb temperature. However, the lower the approach, the bigger the tower would be. Cooling tower vendors would not design for an approach of less than 5° F. Typical good industry practice for tower design uses approach values of 12° F, 14° F, or 16° F. This provides an optimum tower size based on heat load, circulating water flowrate, and wet-bulb temperature. The Hope Creek cooling tower design used a 14° F approach. This was also considered an appropriate approach value for the design of towers for Salem. If a lower approach were used, the mechanical draft tower would require many more cells. The tower vendor GEA estimated 40 cells per unit for a 10° F approach.

A number of cooling tower vendors were investigated and two of them, GEA Power Cooling, Inc. and Marley Cooling Technologies Inc., were contacted with the Salem specific design inputs to provide a tower design and associated pricing information. The conceptual design and the pricing information from both cooling tower vendors are comparable, and the cost and scheduled developed were based on the equipment available from GEA Power Cooling. Based on the design information provided by GEA, a tower bank of 24 cells of induced draft counter flow mechanical draft towers would be used for each Salem unit.

Hot water would be returned to the tower using one 12ft. diameter concrete pipe for each unit. The cold water would be collected in a cold water basin at the base of the tower and channeled to the circulating water pump house.

The installation of the large cooling towers and their required clearances to minimize impact on other station equipment, such as the 500 kV switchyard and transmission lines, would require placing the towers approximately 2000ft east of the Turbine Building, between the two 500 kV transmission lines. The composition of the soil in this area would require careful investigation for the foundation structure design. The two top layers, consisting of dredge spoils and mechanically occurring sand, gravel and clay, are inadequate for supporting the structural load. The soil layer that can provide adequate support, called Vincentown Formation, is located approximately 70ft below the ground level (see Attachment 1, Figure 7). As a result, 100 ft deep steel pipe piles would be driven through the soil to the load bearing strata to provide adequate support for the towers, pump houses and the circulating pipes. An estimated 4,450 piles, 100ft. deep would be required to support the cooling tower foundations.

VI. EVALUATION OF NEW CONDENSERS

The existing condenser in each Salem unit is a single pass, divided waterbox, triple shell condenser with a total design flow per unit of 1.11 million gpm (Reference C.6). Each shell has divided waterboxes, on the inlet and the discharge of the single pass tube bundles. The design temperature for the inlet water from the river is 61.8° F; the discharge temperature is designed to a 14° F increase (Reference C.6).

A mechanical draft cooling tower designed to handle the flow rate of the existing CWS would require from 45 to 50 cells per Salem unit. There is insufficient space on site to install towers this large. The use of one (24 cell) mechanical draft tower per unit is feasible to construct, but would reduce the maximum flow available to the condenser to approximately 50% of the current flow. The reduced flow through the existing single pass condenser would not provide sufficient heat transfer for the design heat load. Also, the design pressure of the existing waterbox arrangement is insufficient for the pressure produced by the new circulating water pumps that would be needed to provide water to the condenser and return it to the cooling tower. The existing CW piping and waterboxes are designed for 20 psig. The new circulating water pumps for the towers would provide approximately 43 psig (100ft Total Developed Head [TDH]) water at the condenser tube inlets.

For these reasons, it is necessary that the existing condenser tubesheets and water boxes be replaced with a two pass tubesheet arrangement, and higher pressure rated waterboxes. This also requires a commensurate upgrade of the pressure rating of the CW piping (see Chapter X below) to allow the use of cooling towers at Salem.

Alstom Power Inc., Heat Exchanger Division, can provide the condenser modular tube bundle and waterbox replacements that would work within the physical constraints of the existing condenser shell arrangements. In order to maintain a single pass condenser the tubes would have to be 14 feet longer (7ft longer on each side of the shell), and there is inadequate space in the existing turbine buildings top accommodate this length increase. Even with these design conditions, the turbine backpressure would increase to 2.0 in Hg, due to the increase in the inlet water temperature from 61.5° F to 90° F, and would require 50-cell towers per unit. See Attachment 5, Chapter 6.1 and Chapter 6.2 for a discussion on the effects of the condenser and tower on the turbine backpressure and gross megawatt electrical output. To allow use of the existing condenser shell configuration with the cooling towers, a two pass tubesheet is required. The flow rate for the two pass tubesheet design would be 511,020 gpm per unit. The major design factors of the new two pass condenser tube bundles and the water boxes are as follows:

1. Six (6) two-pass condenser tubesheet replacement modules per unit with a total of 772,821 sq. ft. of effective condensing surface area. The modules would be completely shop assembled, and shipped to the site for installation in the condenser shells. Shop assembly would reduce the outage time required for installation.
2. The tubing would be 1" outside diameter and the tube material would be titanium B338, Gr 2.
3. The waterboxes are designed for 50 psig and hydrostatically tested to a pressure of 65 psig in the shop.
4. The turbine back pressure would increase to 4.24 in Hg, which would result in a loss of generation capability (see Attachment 5, Table 6.1 "Reduced CW Flow & New Two (2) Pass Condenser").

The new condenser arrangement would require extensive modifications to the circulating water piping to allow use of a two pass tube bundle arrangement, as described below in Chapter X.

VII. EVALUATION OF CIRCULATING WATER PUMP HOUSE & PUMPS

Each unit would have its own pump house adjacent to the cooling tower cold water basin for supplying the cooling water to the condensers. The configuration and location of the pump houses for Unit 1 and Unit 2 are shown in Attachment 1, Figure 1. The layout of the pump house is shown in Attachment 1, Figure 2. Water from the cold water basin is channeled to the pump house through a fixed screen to eliminate any large debris which enters the cold water basin.

A total of six vertical wet pit pumps, larger although similar in design to the existing circulating water pumps, would be installed for each unit to pump the cold water from the cooling tower to the condenser. This design, with vertical wet pit pumps, is highly efficient and very reliable. The new CW pumps would require a higher total developed head than the existing pumps due to the additional piping lengths and the two pass condenser. The new pumps would each be 110,000 gpm pumps with a 100ft total developed head (TDH). This arrangement for the pumps allows for normal operation of 5 out of 6 pumps at maximum heat load, and the possibility to operate fewer pumps in winter months. Attachment 1, Figure 3 details the Piping and Instrumentation Diagram (P&ID) for the CWS with mechanical draft towers.

The pump house structures would have reinforced concrete walls and foundation slab. The roof of the pump house would be made of metal decking supported by structural steel roof framing, with removable panels over the pumps to facilitate their removal.

IX. EVALUATION OF MAKEUP WATER & BLOWDOWN SYSTEMS

A significant amount of cooling water in a closed cycle cooling system is lost to evaporation and drift in the cooling tower during the heat transfer process. The water lost to evaporation is primarily fresh water. The loss of water from the system increases the concentration of solids in the cooling water. To control the concentration of solids in the circulating water system, a portion of the cooled water is discharged as blowdown from the circulating water system. The new blowdown system would consist of a weir box with a pipe that returns the water to the Delaware River by gravity. The weir box would be installed to discharge the required amount of water from the cold side of the circulating water system to the river. A dechlorination system would be installed in the blowdown system to meet the chlorine residual requirements of the NJPDES Permit. The blowdown line would have to be routed to extend beyond the waters edge, because of the cove. See Attachment 1, Figure 1.

It is estimated that approximately 31,000 gpm of water per unit is required to be added to the CW system to make up for evaporation, drift and blowdown. Approximately 11 to 16 million gallons per day would be lost to evaporation and drift, and the blowdown would be required to maintain the concentration of solids in the cold water basin to an increase of less than 30%. The makeup water would be taken from the Delaware River through the existing CWIS and added to the cooling tower basin. Two new 300 hp make-up water pumps per unit would run to pump the make up water from the CWIS to the cooling tower. Two makeup water pumps per unit would operate continuously, with a third pump per unit available as a spare. This would also require operating and maintaining the respective pumps bay existing traveling water screens and associated screen wash pumps for those intake bays. The outlet piping for the makeup pumps would be modified with connections to provide a 3ft diameter pipe that would be routed to the cooling tower for makeup (see Attachment 1, Figure 4).

X. EVALUATION OF CIRCULATING WATER PIPES & PIPE ROUTING

There are twelve, 7 ft diameter pipes that supply water to the existing condensers in Salem, six pipes per unit. Each waterbox is supplied by one 7 ft diameter pipe at the base of the waterbox. The circulating water passes through the condenser tube bundles to the outlet waterbox and is returned to the river through the CWS discharge pipes. Because of the cooling tower, the new condenser shells would require two pass tube bundles using approximately half of the cooling water used for the existing CWS system. The new water boxes would be divided waterboxes, with upper and lower chambers. The inlet nozzle would be on the top chamber, and the outlet nozzle would be on the bottom chamber. These nozzles would both be 5ft diameter. The existing discharge lines on the west side of the condenser would be abandoned and blanked off so that the Service Water System and other miscellaneous returns would still use the existing CWS discharge lines to the river.

Since the flow required for the new condenser is approximately half of the existing flow, six of the twelve existing condenser intake pipes would be used as new condenser intake pipes and the other six would be converted to be new condenser discharge pipes. The two dual waterboxes on each condenser shell would be supplied water from one of the existing 7 ft diameter inlet water pipes, and would discharge water to a converted 7 ft diameter return pipe. See the P&ID in Attachment 1, Figure 3. Each 7 ft inlet pipe would supply water to both of the waterboxes for that respective condenser shell, and each 7 ft outlet pipe would return water from both of the waterboxes for that respective condenser shell. The 7 ft inlet pipes would divide into two 5 ft diameter pipes to the upper waterbox inlet connections. Similarly, the waterbox return pipes from the lower waterbox connections would be 5 ft diameter pipes that merge to the 7 ft return pipe. Constructing the division to 5 ft pipes on the inlet and merge of 5 ft pipes for the outlet of the waterboxes is a major problem due to space constraints. The 7 ft pipes are approximately 10 feet underground, and encased in the turbine building foundation inside the building. The connections for the 5 ft pipes to the 7 ft pipes would have to be constructed outside of the turbine building; there is no room for the large 5 ft diameter pipe tee connections and pipe elbows inside the turbine building. On the Unit 2 side of the plant, the 5 ft tee connections would have to be made east of the existing

Condensate Polisher building. The 5 ft pipes to and from the waterboxes would then have to be routed over the Condensate Polisher building to get into and out of the turbine building. The temporary removal of one of the Main Generator Transformers may also be required on each unit to construct this piping. A considerable number of interferences inside the turbine building would have to be modified to allow the routing of the 5 ft pipes to and from the waterboxes. Attachment 4 of this report is a "Walkdown Report" that describes the interferences that are involved, and provides pictures taken during a plant walkdown. Chapter XI and Attachment 4 provide a review of interferences related to this work.

Similarly, the connections from the existing 7 ft piping to the new 12 ft piping for both inlet and outlet water, would require a major demolition/construction effort. These connections would be constructed approximately near the old gatehouse building. Attachment 1, Figure 1 shows the location of the connections, relative to the existing plant buildings. Attachment 1, Figure 5 shows the piping detail of the connections for Unit 2; Unit 1 would be similar. It would be necessary for two of the 7 ft pipes on each unit to "loop over" the other pipes, to make these connections. An additional thrust block may be required to support the pipes at this location. Because of the in ground layout of the piping and the connections, Unit 2 would need to be the lead unit for conversion to closed cycle, followed by Unit 1. This would allow separate tie in outages instead of a dual unit tie in outage.

Four 12 ft diameter steel lined reinforced concrete pipes would be used for the intake and discharge pipes to and from the two cooling towers. They would be routed in a common trench to the cooling towers pump house. The new CW pipes were sized as 12 ft diameter pipes because there is not enough space in the available corridor to the new cooling towers to accommodate twelve – 7 ft diameter pipes similar to the existing CW piping arrangement all the way out to the towers. Due to the location of the mechanical draft cooling towers, each section of new 12 ft diameter CW piping is approximately 2500 ft long (see Attachment 1, Figure 1). The pipe supports for the new 12 ft pipes would be constructed similar to the existing CW pipe supports, i.e., common supports for all four 12 ft pipes requiring approximately 1500 pipe piles buried 100 feet deep. The tie-in location for the new 12 ft. diameter pipes to the existing CWS intake pipes would be located such that there is enough clearance to excavate the soil around the points of tie-in and perform the installation.

Attachment 7 is the hydraulic analysis that confirms the size of the CW piping, both new and existing piping where re-used, and confirms the corresponding flow velocities for each of the piping sizes. It also provides a pipeline loss calculation to confirm the new CW pump total developed head requirement. The normal operating pressure for the existing 7 ft. diameter concrete intake pipes is 12 psig. The original pipe vendor data sheets indicate that the existing piping is designed for a normal internal pressure of 13 to 19 psig and a transient pressure of 28 to 36 psig. The new CWS piping would have a maximum operating pressure of 45 psig. The portion of the existing 7 ft pipes that would be reused, would require reinforcing by the installation of a steel lining to handle the increased pressure of the new CWS. Relining the existing 7 ft piping is a major construction task. New partially fabricated steel pipe with an overlapped, tack welded, axial seam has to be inserted into the existing concrete pipe shell, the tack welds ground down to release the overlap, then welded axially as well as section to section, and grouted in place. This process of relining the concrete pipe would reduce some of the internal pipe diameter (about 6 inches). The hydraulic analysis in Attachment 7 used 7 ft diameter pipe (since this is a conceptual design) to quantify the pipe line losses, the actual design would use the exact pipe ID for analysis.

Consideration was given to replacing the 7 ft pipe instead of relining it, however, the existing piping is encased in massive concrete thrust blocks at the 90 degree turns into the turbine building at each unit. Removal of those thrust blocks might extend the tie-in outages, and if not done correctly, render the support piers under the thrust blocks unusable and destabilize other structures. If that happened it is estimated that it could take another 6 months to install new support piers while the unit is out of service. For this reason, the cost estimate and schedule for this study is based on relining the existing 7 ft pipe where it would be reused.

A. Electrical, Control and Instrumentation Support Systems

The addition of new closed loop cooling water systems significantly effects the existing electrical distribution systems. Electrical loads for the CWS are essentially doubled, and the use of mechanical draft cooling towers at a different location on Station property requires the use of a physically different electrical power system.

Six makeup water pumps would be required, as would six of the existing twelve traveling water screens. Abandoning the CWIS as a source of cooling water results in the removal from service of the twelve 2,000 hp CWPs and six of the eight 150 hp screen wash pumps. Six new makeup water pumps would be used for providing make-up water to the two new mechanical draft cooling towers. Four of these pumps would normally be in operation, two per unit, while the third pump per unit remains available as a back-up. Because make-up water to the new cooling towers would be needed, six sets of traveling screens would also be kept in service, using two per unit in operation, while the third screen remains available with it's associated backup makeup water pump.

The net reduction in electrical power demand at existing CWIS substations 1SWGR1CWX and 2SWGR2CWX would be approximately 24 MVA. This reduction in power demand from the Station's 13 kV South Bus would enhance the operation of the Station's Vital Bus electrical power system, because the existing CWS distribution systems are powered from the same transformers as the safety related Vital Bus electrical distribution system.

However, offsetting the 24 MVA reduction in electrical demand is a large increase of approximately 57 MVA resulting from the new electrical loads required to support both units' mechanical draft cooling towers. Each cooling tower would have 24 cells, each of which includes a single speed fan powered by a 230 bhp motor. In addition, the adjacent pump house would contain six new 3,500 hp CWPs. The pumps are larger than the ones they replace at the CWIS because of differences in required discharge pressure (total developed head). Each pump discharge would have a motor operated valve (MOV), and each tower would be equipped with MOVs for make-up water, fill isolation for each individual cell, and by-pass water. Additional electrical power would be required for cooling tower lighting, and electrical equipment and pump room ancillary systems.

Along with the addition of two mechanical draft cooling towers is a commensurate modification of the turbine condensers. Existing condenser discharge MOVs would be replaced by valves and motor operators appropriate to their re-sized piping systems. It is assumed that the new motor operators would be comparably sized to their predecessors. Therefore the same power supplies would be used to power and control the new MOVs for the condenser discharge piping, with no appreciable change in electrical demand.

The existing CW electrical substations have insufficient available capacity to support the new cooling tower loads, thus new electrical distribution systems are required. Indeed, available capacity is in limited supply at the Station's other switchgear, both non-safety related Group Buses and safety related Vital Buses. Available capacity on the Unit 1 CW power system bus is approximately 8,400 kVA. With the above mentioned reduction, approximately 12,000 kVA per unit, there would be a total available capacity of 20,400 kVA, still less than the approximately 28,500 kVA required by each tower's cooling fan and water systems. The new CWP requirement for 3500 hp motors indicates a more appropriate motor voltage of 13.2 kV. The cooling towers are located approximately a half-mile from the CW power system. Potential voltage drop between the towers and the existing CW power systems would require substantially larger and more numerous electrical cables in the attempt to offset such voltage drops. In addition, the available capacity at the Station is typically provided by 4.16 kV systems, less desirable for such large CWP motors. In consideration of the lower available system voltages, potential voltage drops, and the lack of sufficient capacity, the use of the existing CWIS power systems is not practicable.

New sources of power would be derived from the Salem Switchyard. Two alternative sources of power were evaluated; from the 500 kV bus system, or from the two transformers located in the Salem switchyard's 13 kV North Ring Bus. Two transformers, 1SPT and 2SPT, currently supply power to the Station's non-safety related 4 kV Group Buses. Preliminary load estimates indicate that the loads associated with the new CWPs can cause the 13 kV North Ring Bus loads to exceed their existing 4000 A bus rating. Therefore, this evaluation addresses the addition of new transformers to the 500 kV bus system. Thus, the large load additions required by the new CWPs and the mechanical draft cooling towers would not adversely effect the 13 kV North Bus or the 13 kV South Bus.

The new cooling tower power sources would originate with connections made to the outdoor 500 kV Buses 1 and 2. These would be extended via new disconnecting switches, and SF_6 bus ducts, to two new 500 – 13.8 kV transformers, 100 MVA each, and to new sections of outdoor air insulated 13.8 kV bus work. See Attachment 1, Figure 4 – Mechanical Draft Cooling Tower Alternative - One Line Diagram, for an illustration of the suggested electrical distribution configuration for one unit. From each new section of 13.8 kV bus work, a feeder would be connected from a new 13.8 kV circuit breaker and run to its respective electrical equipment room at its respective mechanical draft cooling tower.

The existing 2000 hp CWPs would be removed and replaced with new make-up water pumps, rated at approximately 300 hp. These new pump motors would operate from the existing 4.16 kV CW substation buses. The same control switches and circuit breakers would be reused to power and control the new make-up water pumps. Electrical protection set points would be revised for proper protection of these smaller motors. Anticipated changes to the CW substations include the potential replacement of current transformers and protective relays. Existing power and control cables may be re-used.

An electrical equipment room would be located adjacent to each cooling tower pump room, housing all required switchgear, transformers, motor control centers (MCCs), panelboards, etc. The 13.8 kV power from the Salem Switchyard would be terminated to new 13.8 kV metal-clad switchgear. This 13.8 kV Switchgear would contain incoming main breakers, tie breakers, six circuit breakers used for CWP motor starting, and circuit breakers to power lower voltage switchgear and motor control centers. Four separate 480 V switchgear would be used to power the 24 - 230 bhp fans, and downstream motor control centers. Five 480 V MCCs would be used to power the CWP MOVs, 24 cell hot water intake MOVs, smaller pumps, cathodic protection systems, miscellaneous loads, and electrical equipment and pump room ancillary systems, such as lighting, ventilation, etc.

Control and monitoring of the CWS pumps, MOVs and cooling tower fans, and ancillary systems, such as make-up water, blow-down systems, etc., would be from each unit's main control room, with provisions for local test and control. Monitoring and control of new CWPs, cooling tower cell operation, and tower support systems would be managed by programmable logic controllers (PLCs), installed in each electrical equipment room. While automatic operation can be added in the future, the PLCs would initially operate to pass information and commands between the main control rooms and the switchgear, MCCs and instrumentation. Fiber optic cables would connect the two PLCs together, and connect each PLC to its respective control room. Touch screen controllers would be used to monitor system status and performance, and for control of all CWPs, cooling tower cell fans, MOVs and miscellaneous support systems. The existing condenser and CWS instrumentation systems would be replicated in the modified circulating water system.

XI. INTERFERENCE RELOCATION AND CONSTRUCTION FOR CLOSED CYCLE

A. Interference Relocation Activities

1. Existing electrical and instrumentation equipment in the paths of CW piping would have to be removed and temporarily or permanently relocated. Most relocation would be required on the 100ft and 110ft elevations of the Turbine Building. Unit 1 Panels 387, 666, 679, and 731, and Feed Water Analysis Panel 380 are in the paths of new Unit 1 CW piping. Unit 2 Panels 387, 730 and 731, and Feed Water Analysis Panel 380 are in the paths of new Unit 2 CW piping. Relocation of these panels would involve de-terminating existing electrical cabling

and disconnecting existing instrument tubing, and restoring these connections in newly identified locations, where the panels can be relocated. While the details of interference relocation would be determined during detailed engineering design, a budget has been included in the cost estimate of this evaluation for such work.

2. Installation of new CW piping and re-lining of existing CW piping would potentially require the temporary removal of one main generator step-up transformer at each unit. This would permit excavation around the piping and reduce the possibility of potential damage to transformer foundations. Such temporary relocation would require the services of a rigging subcontractor and appropriate lay-down space.

3. Mechanical equipment and structural support steel in the vicinity of new CW piping would have to be removed and temporarily or permanently relocated. The affected equipment for Unit 2 includes the temporary removal and replacement of the Feedwater Heater and Moisture Separator Re-heater Drain Tanks 2A, 2B, and 2C, including associated piping, and the temporary relocation and replacement of the No. 2 Gland Steam Condenser, and associated piping. The affected equipment for permanent relocation includes Vacuum Pumps No. 22, 23, 24, and 25, and associated piping. The affected equipment for Unit 1 is expected to be similar.

B. Construction Activities

1. The bulk of the electrical installation activities would take place at two locations. The new electrical equipment rooms at each cooling tower would have new medium and low voltage switchgear installed, along with the required control and instrumentation support systems. In addition, the 500 kV switchyard would have two main buses extended for the purpose of installing two new 100 MVA transformers to support operation of the new CWPs and cooling towers.
2. Additional new electrical construction would be performed on site for the installation of underground ductbanks.
3. The construction activity for the new cooling towers and basins, new pump houses, and new 12ft concrete pipe would be completed with minimal effect on plant operations. However, tie-in outages for each unit would require that each unit be out of service for 5 months, and would be coordinated with required refueling outages as shown in the Project Schedule in Attachment 3.

XII. EVALUATION OF UNIT DERATING & ENERGY LOSS

The existing turbine design was optimized to closely match the existing condenser performance using the temperature rise with a single pass tube bundle utilizing much colder circulating water from the river. Retrofitting a closed cycle cooling system at Salem would result in higher circulating water temperature to the condenser, which increases turbine exhaust pressure (backpressure), and consequently reduces the electrical output of the unit. Additionally, as the ambient wet-bulb temperature increases the unit capability is further degraded.

Based on the analysis performed by SWEC in 1993, and the S&L review of that analysis, the analysis performed by SWEC in 1999, and the analysis presented in Attachment 5 of this report, each unit's output would be reduced. There would be additional power required to operate the new circulating water pumps and mechanical draft cooling tower fans, which would reduce the net power output. With the design discussed above, an additional 26,400 kVA would be required to operate the electrical portion of each of the two new CWS and mechanical draft cooling towers (see Attachment 9 for the Estimated Load List). That, and the impact of a two pass condenser on turbine performance, would reduce each unit's output by approximately 6% (reference Attachment 5, Table 6-1). See Attachment 5 Chapter 6.1 and Chapter 6.2 for the Heat Balance Evaluation that delineates the effects on backpressure and gross power reduction.

XIII. RELATIVE ADVANTAGES OF THE MECHANICAL DRAFT COOLING TOWER OPTION

1. Using closed-cycle option would meet the USEPA performance standards.
2. Mechanical draft towers are less expensive to purchase and build than natural draft towers.
3. The thermal performance of mechanical draft cooling towers tends towards greater stability, and is affected by fewer psychometric variables. The fans provide a means for regulating airflow to compensate for changing atmospheric and load conditions.
4. A closed cycle cooling water system does not pose a challenge to navigation on the Delaware River.

XIV. RELATIVE DISADVANTAGES OF THE MECHANICAL DRAFT COOLING TOWER OPTION

1. The conversion of Salem to a closed cycle cooling system would present an unprecedented challenge. The Station was not designed to be modified in the manner that this project would require. Each portion of this project is a major construction effort: building the towers, replacing the condenser, routing 12,000 ft of 12 ft diameter piping, relining the existing piping are each a major construction project. Many of the equipment interference relocations would be major projects. Taken together, this would represent an unprecedented change to a nuclear power plant.
2. The conversion of Salem Station to a closed cycle cooling water system would require both upgrading the existing condenser and consequently, decreasing the station's electrical output.
3. An extended outage would be required for replacing the condenser and tie in of the discharge and the supply lines. The extended outage may require significant restart activities for other plant systems.
4. An extended outage increases risk for potential degradation of the plant systems, equipment, and components. The potential cost of avoiding such degradation or replacing degraded equipment could be significant and has not been quantified in this report.
5. An extensive effort is required for the tie-in of the buried supply and discharge lines,
6. Installation of new Condensers would involve extensive related modifications to the Turbine Building area to relocate interferences, some permanently, some temporarily.
7. Long runs of large diameter buried concrete pipes for the supply and the discharge water are required to and from the cooling towers.
8. The addition of new makeup, blow-down, and chemical control systems are required.
9. Increased electrical power would be required to run the CW pumps, cooling tower fans, and the newly added makeup, blow-down and chemical control systems.
10. Extensive interferences such as electrical duct banks, fuel oil pipelines, etc., may hinder installation and tie-in of the buried pipes.
11. The schedule prepared for this project is a 5 1/2 year long construction project with successive extended unit outages to tie-in the towers and new condenser.

This would present challenges for obtaining and maintaining qualified labor, for the length of time it would take to build a new plant.

12. The plume from the mechanical draft towers may present problems related to fogging and icing in certain weather conditions. The particulate air emissions from mechanical draft cooling towers are generally much higher than the emissions from an equivalent natural draft cooling tower (see Attachment 8).
13. Mechanical draft towers would produce more noise then natural draft towers.

XV. ASSUMPTIONS

1. The project schedule presented in Attachment 3 assumes that engineering and permitting begin as soon as the project is authorized, but that no equipment or services are procured and no construction or fabrication occurs until the required permits for the project are received. It also assumes successive tie-in outages concurrent with refueling outages for each unit.
2. All estimates assume non-outage work; a 40-hour week and no modifications to the existing intake structure.
3. 2005 Philadelphia PA, union wages.
4. Labor productivity reflects nuclear site work.
5. Escalation rates used are: Equipment 3.5%, Material 3.5%, Labor 3.5% and Indirects 3.5%.
6. Contingencies used are: Equipment 19%, Material 19%, Labor 19%, and Indirects 19%.
7. AFUDC Rate is not included.
8. Sales/Use Taxes are not included.
9. No estimate for relocation of the existing condensate polisher buildings has been included. It is assumed that the required piping changes would work around these buildings.
10. The existing power supplies to motor operated valves on the condenser discharge piping can and would be reused for the new valves required by the condenser modification.
11. The 500 kV Buses 1 and 2 have adequate additional capacity to support the CWPs, cooling tower fans, and ancillary cooling tower electrical loads.

XVI. COST EVALUATION AND O&M

A. Capital Costs

The total capital cost for this project is estimated to be **$ 814,844,200**. These costs do not include lost generation costs or replacement power costs.[1]

Description	Total Equipment Co	Total Material Cost	Total Labor Cost	Total Cost
Mechanical Draft Cooling Towers	$32,000,000	$9,762,000	$28,628,000	$70,390,000
CW Pumps & Structure	$38,800,000	---	$23,682,000	$62,482,000
Electrical	$3,390,000	$280,000	$1,256,000	$4,926,000
Pumphouse Electrical	$3,270,000	$2,360,000	$6,404,000	$12,034,000
CWIS Area Electrical	$36,000	$431,000	$1,281,000	$1,748,000
Turb. Building Electrical	---	$246,000	$589,000	$835,000
Cooling Tower Electrical	$420,000	$1,800,000	$4,662,000	$6,882,000
CW Piping	$24,265,000	$19,304,000	$59,091,000	$102,660,000
Makeup/Blowdown Sys.	$4,340,000	499,000	$5,678,000	$10,517,000
Security incl. Fencing	$250,000	---	$256,000	$506,000
Condenser Modif.	$38,600,000	$2,500,000	$66,695,000	$107,795,000
Chemical Control	$4,000,000		$5,233,000	$9,233,000
Environmental Permits			$727,200	$727,200
Construction Indirects			$50,863,000	$50,863,000
Total Const. Costs	$149,371,000	$37,182,000	$255,045,200	$441,598,200
Indirect Expenses w/o permitting	---	---	---	$131,912,000
Contingency	---	---	---	$111,233,000
Escalation	---	---	---	$130,101,000
Grand Total Cost	---	---	---	**$814,844,200**

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[1] The cost, schedule and outage times in this report are based on factors that are currently known. Delays due to weather conditions, relocation of unidentified underground utilities that are encountered around the power block, use of less effective methods of excavation due to nearby energized systems, and potential damage to the existing buried pipe during construction work may lead to additional cost and schedule duration. A prolonged unit outage may require additional start up activities and costs that are not included in the cost and schedule reported herein.

B. Operating kWH

The Operating kWH associated with the Mechanical Draft Cooling Tower are estimated to total **432,393,650 kWH** per year, as follows:

Load Description	Quantity	hp, kVA, kW	Total Running Load	Hours ON per Day	Days Operating per Year	kWH per Year
Circulating Water Pumps	10	3500	35000	24	365	306600000
Circ Wtr P MOVs (hp est)	12	100	1200	1	2	2400
Cooling Tower Fans (est bhp)	48	230	11040	24	365	96710400
Cooling Tower Cell Inlet MOV (hp est)	48	20	960	1	2	1920
Cooling Tower Make-Up Water MOV (hp est)	2	25	50	1	2	100
Cooling Tower Fill & By-Pass MOV (hp est)	2	25	50	1	2	100
Make-Up Water Pump (4 of 6 running)	4	300	1200	24	365	10512000
Traveling Screen Drive Motors (4 of 6 running)	4	15	60	24	365	525600
Screen Wash Pumps (2 running)	2	150	300	24	365	2628000
Screen Wash Strainer and Trash Rake	1	13.5	13.5	12	365	59130
Power Panel - Elec Equip & Pump Room	2	500	1000	24	365	8760000
Lighting & Receptacle Panel	2	150	300	24	365	2628000
Cathodic Protection - CWIS	2	5	10	24	365	87600
Cathodic Protection - Towers	8	50	400	24	365	3504000
Heat Trace - CWIS	2	30	60	24	60	86400
Heat Trace - Towers	4	50	200	24	60	288000
TOTAL ANNUAL RUNNING kW and OPERATING kWH			51,844			**432,393,650**

C. Maintenance Costs

The Maintenance costs associated with the Mechanical Draft Cooling Tower are estimated to total **$4,371,784** per year as follows:

Maintenance Item	Manhours / Year	$ / Manhour	Cost per Year
Tower Fill Repair / Replacement	----	3% of Capital Cost	$960,000
Tower Sludge Removal	1200 manhours / Year	$65.00 / manhour	$78,000
Chemical Control System	200 / Year	$75.00 / manhour	$15,000
- Caustic	----	----	$700,000
- Sodium Hypochlorite	----	----	$450,000
- Ammonium Bisulfate	----	----	$240,000
- Anti Scaling	----	----	$60,000
Periodic O&M Checks	1800 manhours / Year	$ 75.00 / Manhour	$135,000
Quarterly Oil Changes – Fan Gear Reducers	400 manhours / Year	$75.00 / manhour	$30,000
Circulating Water Pumps*	10 Pumps	$121,913 / pump	$1,219,130
Traveling Screens*	4 Operating	$80,611 / screen	$322,443
Screen Wash*	2 Operating	$16,957 / wash system	$33,914
Auxiliary Equipment*			$128,297
Total Cost per Year			**$4,371,784**

* Based on ratio from Attachment 6-11 of the Permit Application.

XVII. ENVIRONMENTAL PERMITTING

Attachment 8 of this report provides an analysis of permitting requirements for potential modifications to the CWIS, prepared by AKRF, Inc. Chapter III of the report provides a permitting review for mechanical draft cooling towers. According to this analysis, impacts to air quality from operation of mechanical draft cooling towers would be significant. Retrofitting of linear mechanical draft cooling towers would produce significant particulate impacts including significant impacts in the New Castle County, Delaware, non-attainment area. Such a retrofit would likely require installation of LAER particulate control technology and securing particulate offsets. The analysis goes on to conclude that this is a significant challenge for the assumed design, and measures to mitigate these impacts, including the use of alternative designs or dispersion models would be required before permitting could proceed. Attachment 8 identifies some of the alternative designs that would be considered and modeled to develop a refined design that would meet particulate air emission requirements.

The permitting is estimated to take 17 months to complete. The costs are identified in Table 2 of Attachment 8

XVIII. CONCLUSIONS

Based on the results of our evaluation, the implementation of the Mechanical Draft Tower alternative would require **$814,844,200** and a 66-month schedule to complete. Maintenance cost would be $4,371,784 per year. Retrofitting cooling towers at Salem would be very difficult, and would impose significant permanent cost penalties based on reductions in station output.

Retrofitting Salem for closed cycle cooling would not simply involve adding cooling towers to the existing cooling water system. It would involve substantial new construction, demolition, and re-construction activities that would result in replacing, reinforcing, or abandoning, all of the existing circulating water system. This project would be unprecedented for a nuclear plant and represent almost as much of an effort as building a small new power plant. Further, impacts to air quality resulting from operation of mechanical draft cooling towers would be significant. It is assumed in this evaluation that design parameters would be optimized in the detailed design development to identify the components or factors that can be modified to meet the particulate air emission requirements.

REFERENCE LIST

A. Calculations:

1. ES-8.003, Revision 1, “500 / 13.8 kV Transformer Sizing Calculation”.
2. S-C-CW-MDC-1496, Rev. 0 “Heat Balance at 90 F Condenser Water Inlet Temperature”.
3. ES-1.002(Q), Revision 1, “13.8 kV, 4.16 kV & LV Buses Short Circuit Calculation”.

B. Station Drawings:

None

C. PSEG/Vendor Documents & Design Standards:

1. SD-T800 Salem Circulating Water System Description.
2. S-C-MPOO-MGS-0001-SPS39 Salem Piping Schedule for Condenser Circulating Water.
3. RW-151831, Rev. F, Worthington Corp. 84” HiFlo Circulating Pump
4. American National Standard for Pump Intake Design, ANSI/HI 9.8-1998.
5. PSEG Nuclear Department Site Plan, Salem & Hope Creek Generating Stations, Block 26, Lots 4, 4.01, 5, 5.01 Sheet 1 of 3.
6. DE-CB.CW-0028(Z), Rev 0; PSEG Nuclear Department Configuration Baseline Documentation for CW System, Salem Generating Station Units 1 & 2.
7. Drawing 107855 Foster Wheeler Corporation – Outline of Condenser #13 - Salem.

REFERENCE LIST (CONT)

8. Drawing 107856 Foster Wheeler Corporation – Outline of Condenser #12 - Salem.
9. Drawing 107857 Foster Wheeler Corporation – Outline of Condenser #11 - Salem.
10. Drawing 119282 Foster Wheeler Corporation – Outline of Condenser #21 - Salem.
11. Drawing 119283 Foster Wheeler Corporation – Outline of Condenser #22 - Salem.
12. Drawing 119284 Foster Wheeler Corporation – Outline of Condenser #23 - Salem.
13. Drawing 108562 Foster Wheeler Corporation – Inlet Waterbox Detail - Salem.
14. Drawing 109587 Foster Wheeler Corporation – Lower Exhaust Neck Detail Condenser # 12 – Salem.
15. Drawing 108563 Foster Wheeler Corporation – Outlet Waterbox Detail - Salem.
16. Drawing 124977 Sheet 1 Foster Wheeler Corporation – Outlet Waterbox Detail - Salem.
17. Detail Specification No.78-6229 Removal & Installation of Surface Condenser Tubes, Rev 2. – Salem Station Unit 1.
18. Alstom Reference: 4209-05-168HT, "Proposal for Condenser Modular Replacement Salem Nuclear Generating Stations Units 1&2" dated 24 March 2005.
19. GEA – Tower Proposal Summary and Scope of Supply No. 1104 dated 23 February 2005.
20. GEA – Mechanical Draft Cooling Tower Drawing dated 1/21/05.
21. Marley Drawing # 05-23245 "General Arrangement, Class 800 Natural Draft Tower" dated 4/8/2005, Marley Cooling Technologies.
22. Sulzer Pump Performance Datasheet, 80THS dated 21 March 2005.
23. PSEG Specification 10855-M-015, "Technical Specification for Natural Draft Cooling Tower for the Hope Creek Generating Station Units 1&2" Rev. 5, dated 6/27/90.

REFERENCE LIST (CONT)

24. Siemens AG Power Generation, Salem # 1 – New HP & LP Turbine, 100% Load Heat Flow Diagram dated 26.02.2004.
25. Siemens AG Power Generation, Salem # 1 – New HP & LP Turbine, Valves Wide Open (VWO) Heat Flow Diagram dated 26.02.2004.
26. Siemens AG Power Generation, Salem # 1 – New HP & LP Turbine, 75% Load Heat Flow Diagram dated 26.02.2004.
27. Siemens AG Power Generation, Salem # 1 – New HP & LP Turbine, 50% Load Heat Flow Diagram dated 26.02.2004.
28. Siemens AG Power Generation, Salem # 1 – New HP & LP Turbine, 25% Load Heat Flow Diagram dated 26.02.2004.
29. 1991 Stone & Webster Cooling Tower Cash Flow and Schedule Estimate dated 5/22/91.
30. NJPDES Draft Permit, Permit No. NJ0005622 dated September 16, 1993 Appendix J&K.
31. Draft Salem Generating Station, 1993 Cooling Tower Evaluation Salem Units 1&2, Stone & Webster Corporation August 1993.
32. 7-93 Stone and Webster Cooling Tower Study – 1990.
33. Marley Cooling Tower Fundamentals, Second Edition, Marley Cooling Technologies.
34. PSEG Nuclear, LLC (PSEG 1999). Salem Permit Application NJPDES Permit No. NJ0005622, March 4, Appendix F. “Evaluation of Fish Protection Alternatives”.
35. Flowserve Budget Proposal Pricing for Makeup Water Pumps, dated 7-28-05.
36. Sargent & Lundy (1993). “Technical and Cost Aspects of Closed Cycle Cooling System for Salem Units 1 & 2”.

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Date:

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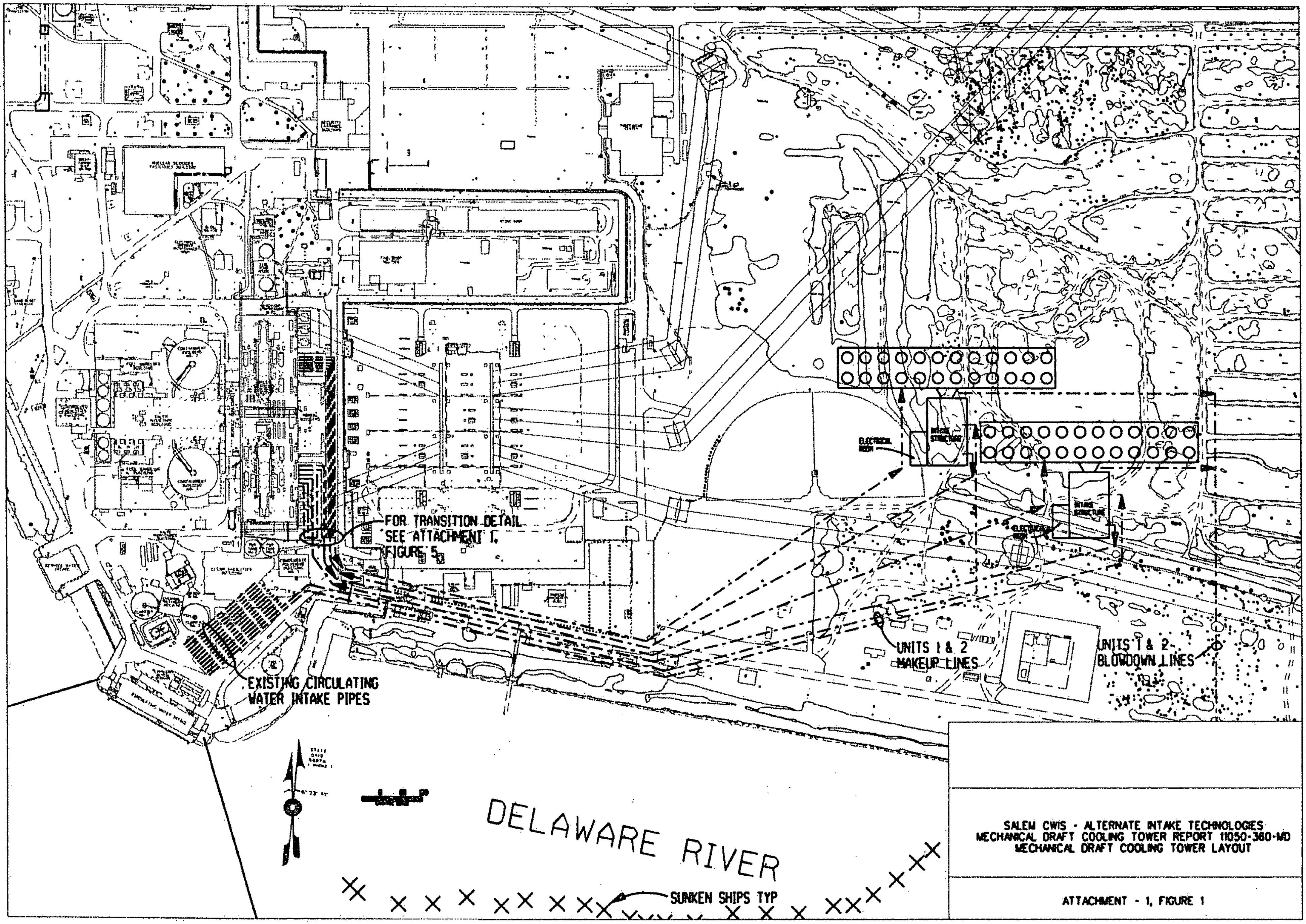
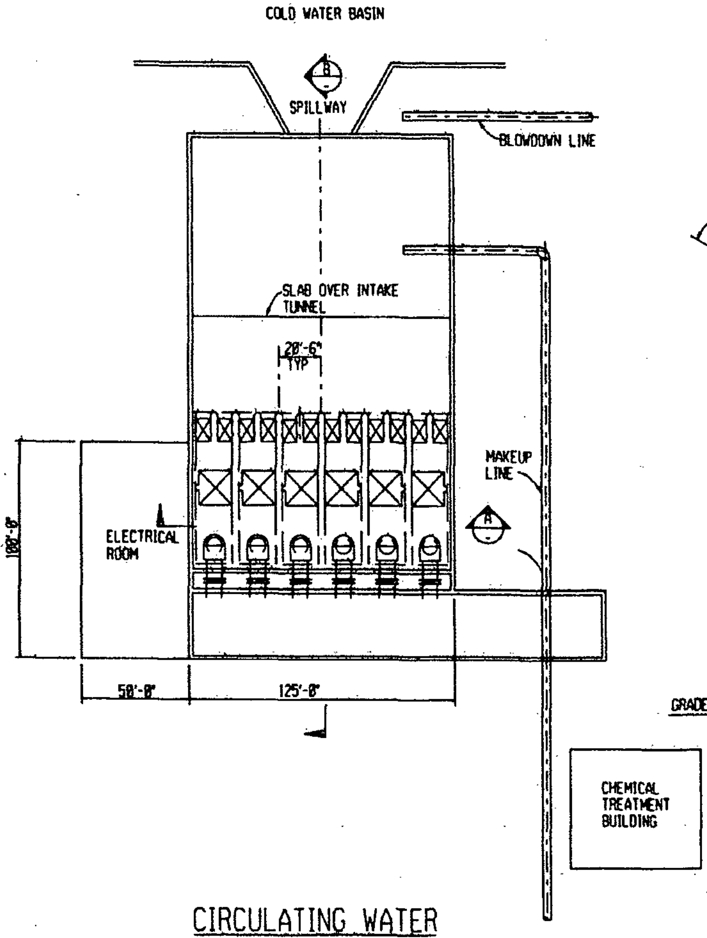
12/5/05
Date:

Attachment 1 - Conceptual Design Sketches

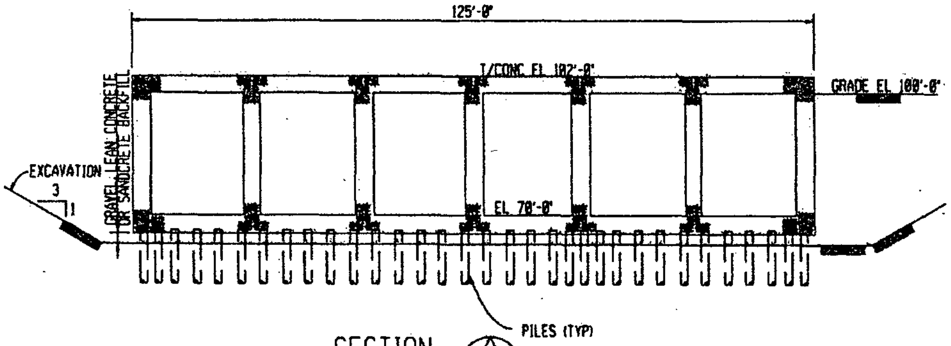


SALEM CWIS - ALTERNATE INTAKE TECHNOLOGIES
MECHANICAL DRAFT COOLING TOWER REPORT 11050-360-MD
MECHANICAL DRAFT COOLING TOWER LAYOUT

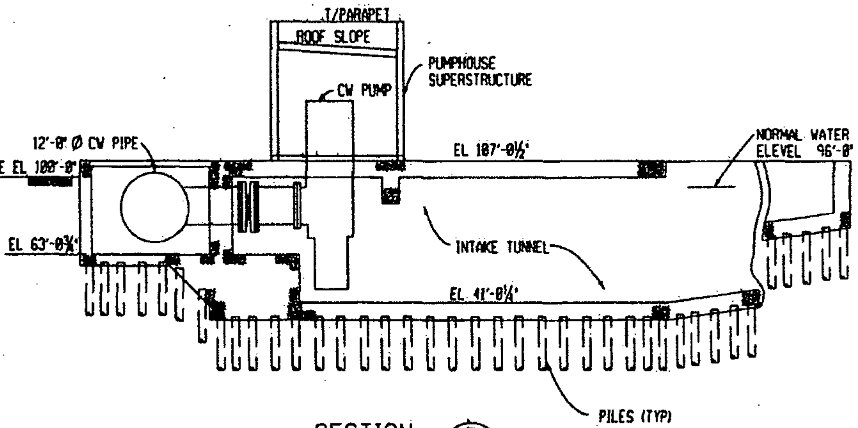
ATTACHMENT - 1, FIGURE 1



CIRCULATING WATER
PUMP STRUCTURE CONCEPTUAL PLAN



SECTION A

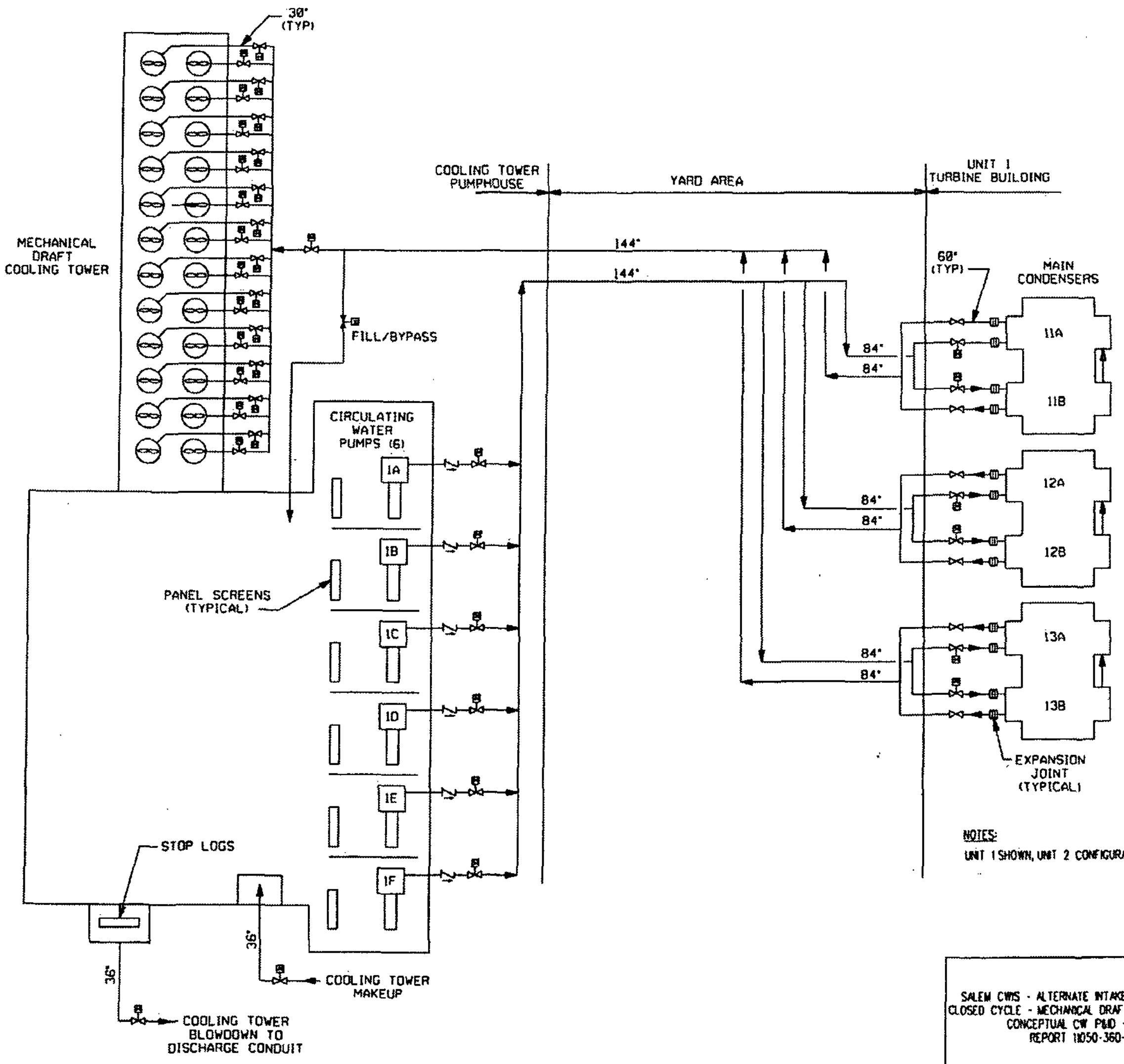


SECTION B

SALEM CWIS - ALTERNATE INTAKE TECHNOLOGIES
MECHANICAL DRAFT REPORT 11050-360-MD
CIRCULATING WATER PUMP STRUCTURE CONCEPTUAL PLAN

ATTACHMENT - 1, FIGURE 2

REVISION

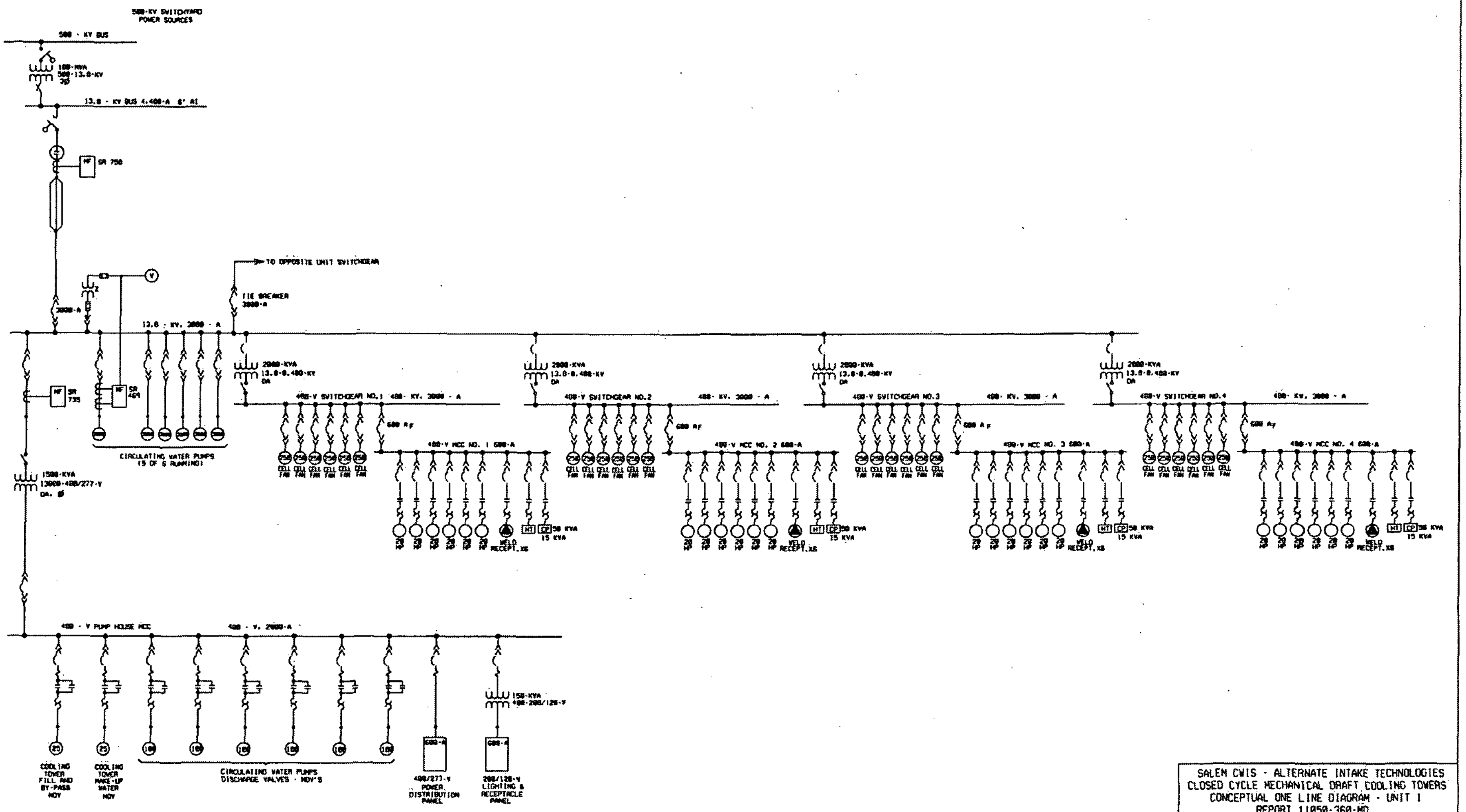


NOTES:

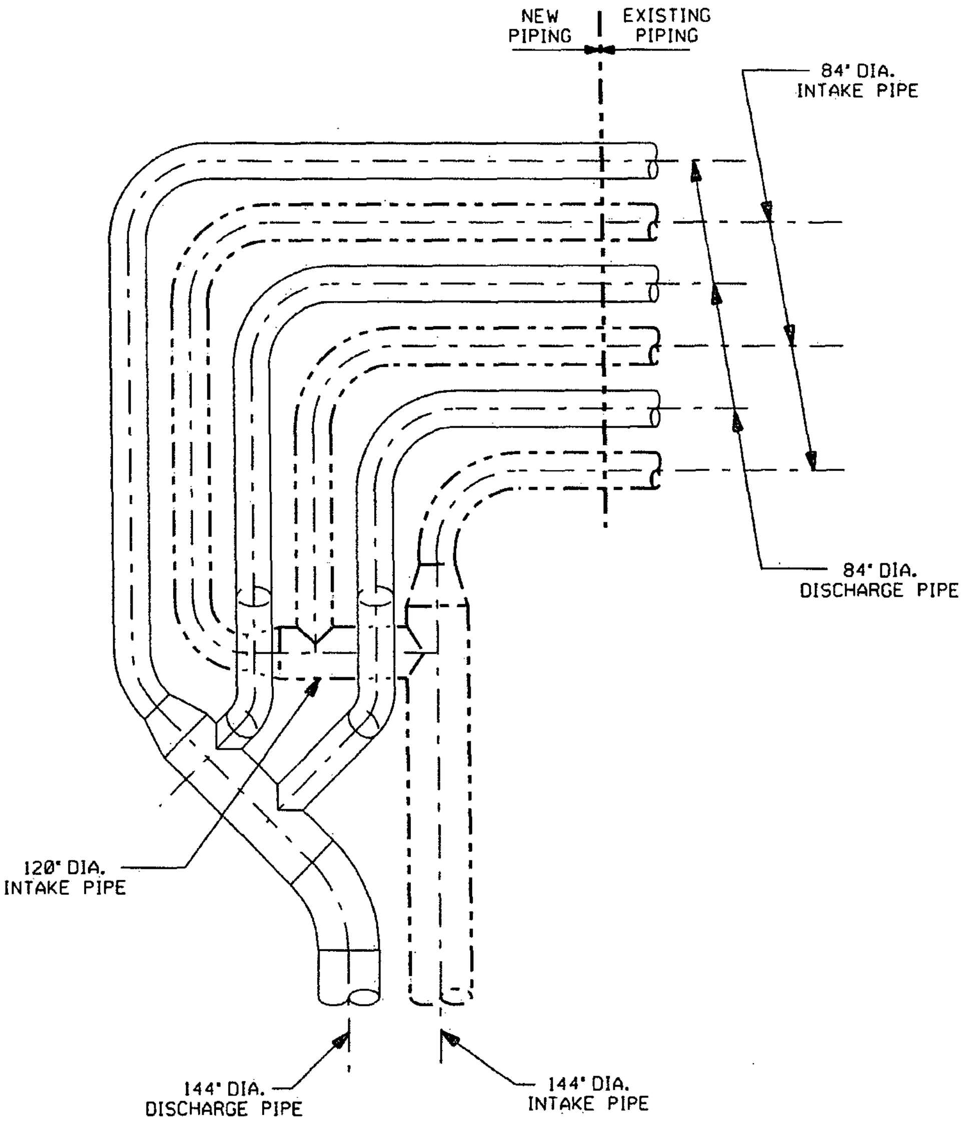
UNIT 1 SHOWN, UNIT 2 CONFIGURATION TYPICAL

SALEM CWIS - ALTERNATE INTAKES TECHNOLOGIES
CLOSED CYCLE - MECHANICAL DRAFT COOLING TOWERS
CONCEPTUAL CW P&ID - UNIT 1
REPORT 11050-360-MD

ATTACHMENT 1 FIGURE 3



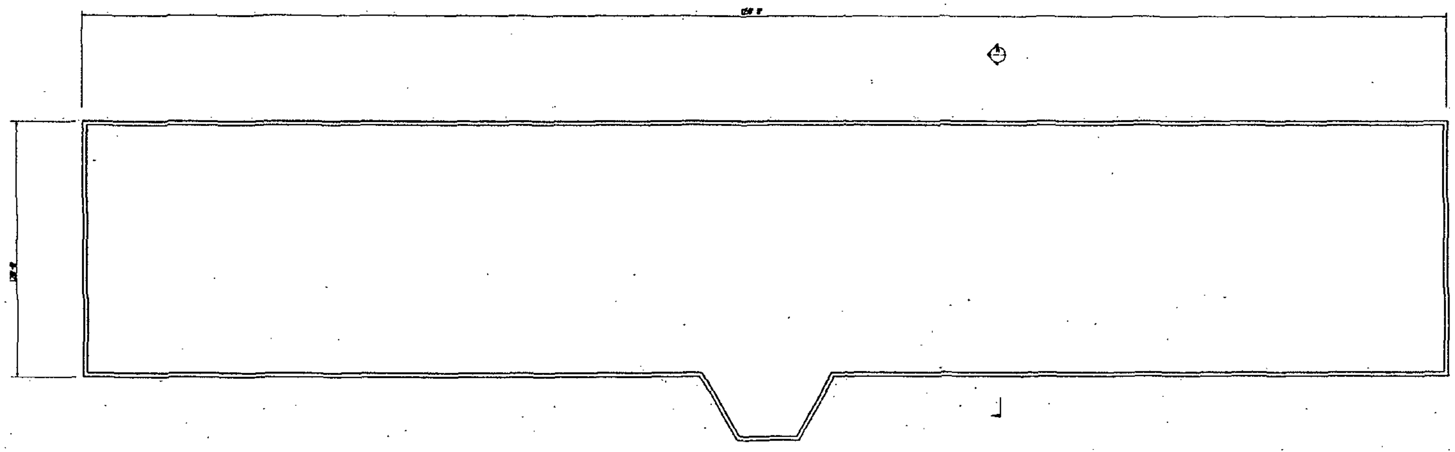
SALEM CWIS - ALTERNATE INTAKE TECHNOLOGIES
CLOSED CYCLE MECHANICAL DRAFT COOLING TOWERS
CONCEPTUAL ONE LINE DIAGRAM - UNIT 1
REPORT 11050-360-MD
ATTACHMENT 1 FIGURE 4



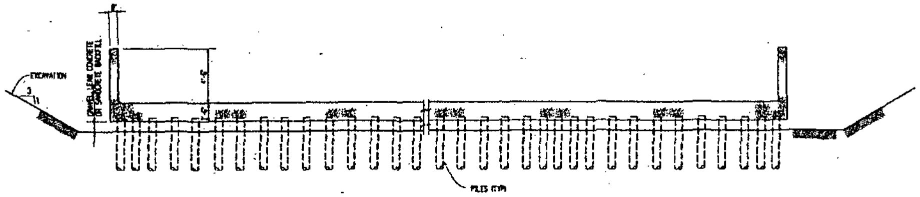
TYPICAL DETAIL
FOR CWIS TIE-IN

SALEM CWIS - ALTERNATE INTAKES TECHNOLOGIES
MECHANICAL DRAFT COOLING TOWER
REPORT 11050-360-MD

ATTACHMENT 1 FIGURE 5



COOL WATER BASIN CONCEPTUAL PLAN

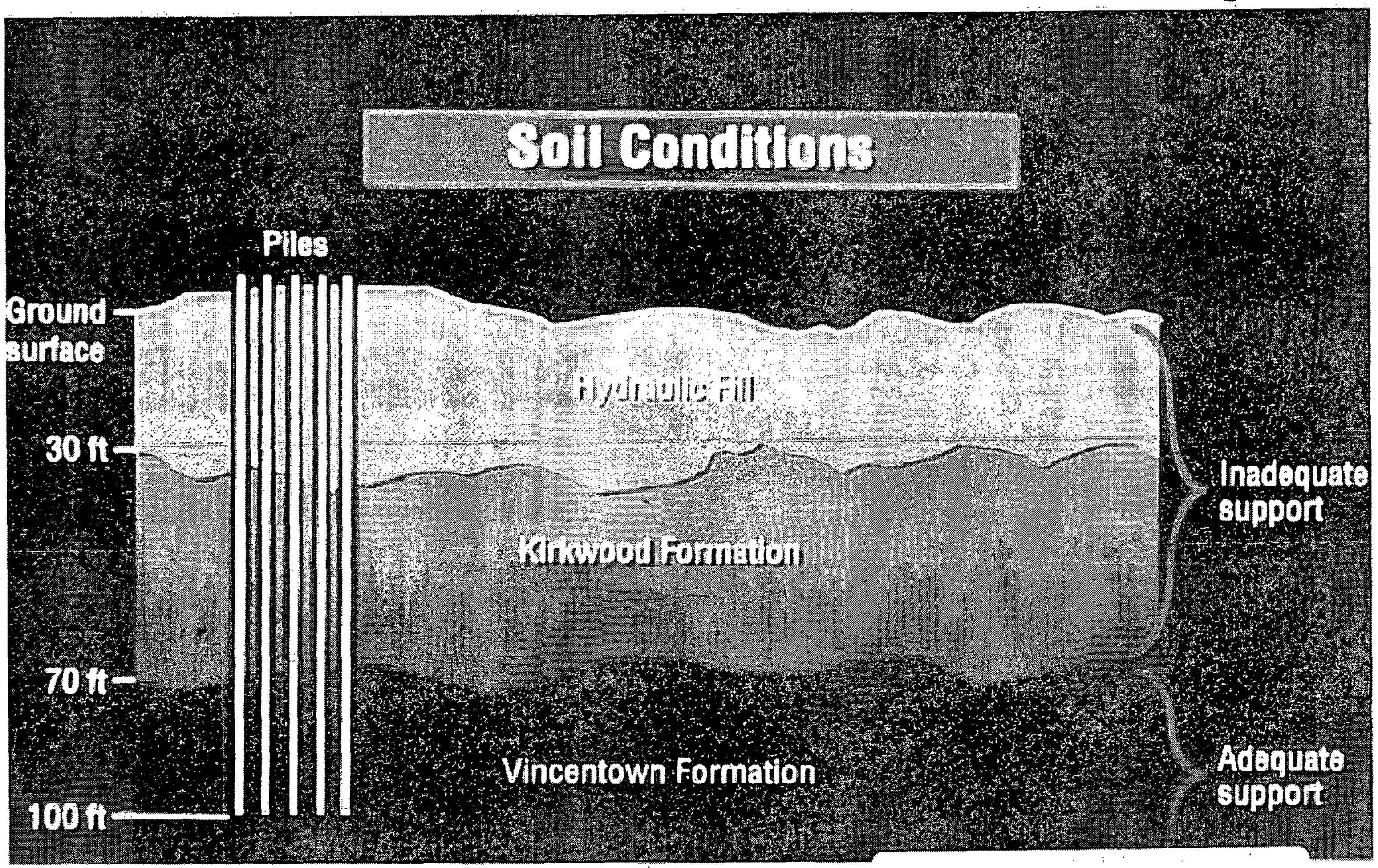


SECTION A

	SEE NOTE [illegible]			☒		
NO	DESCRIPTION	DWN	[illegible]	CHD	APD	DATE

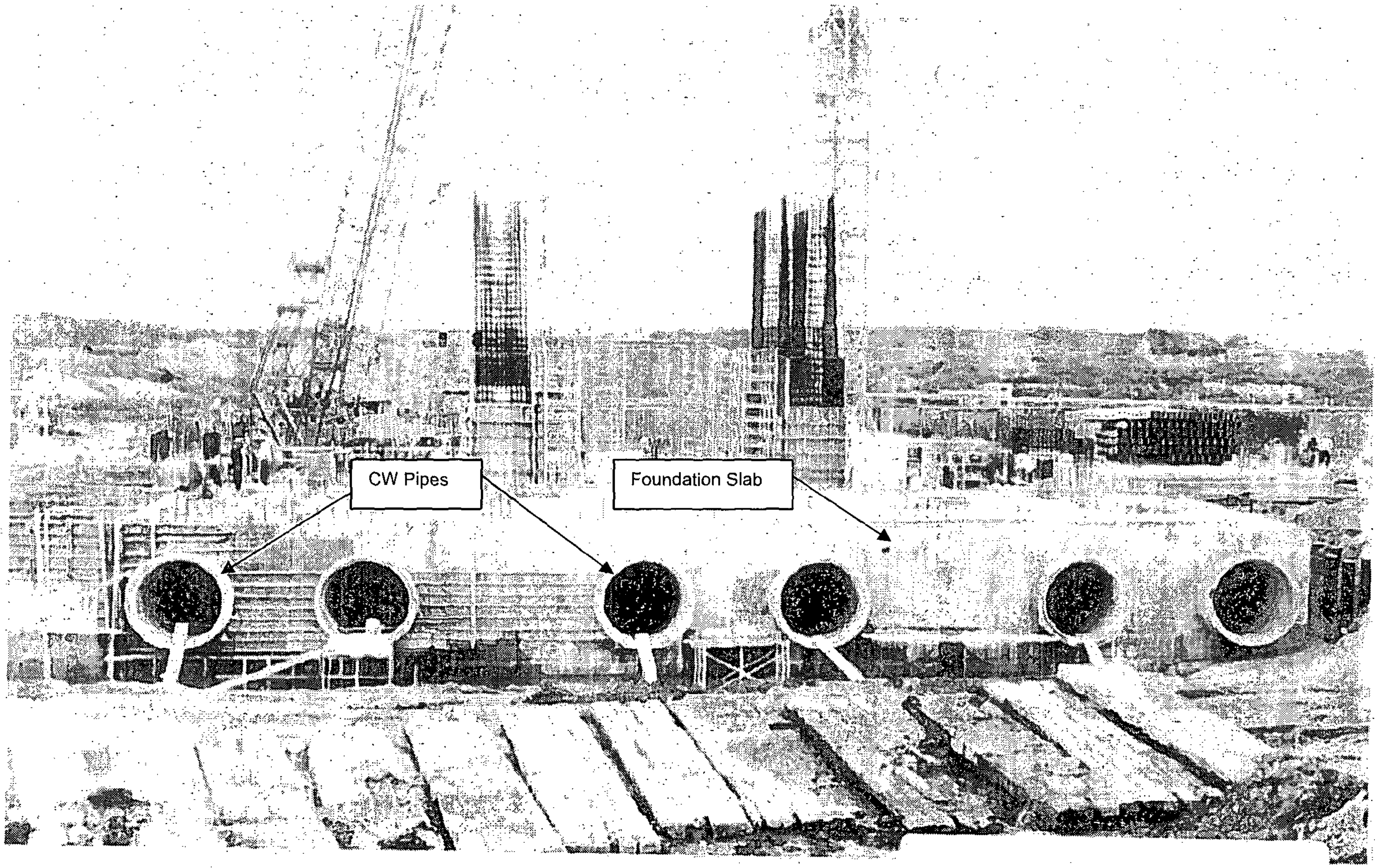
REVISION

SALEM CWIS - ALTERNATE INTAKE TECHNOLOGIES
MECHANICAL DRAFT REPORT 11050-360-MD
ATTACHMENT - 1, FIGURE 6
COOL WATER BASIN CONCEPTUAL PLAN

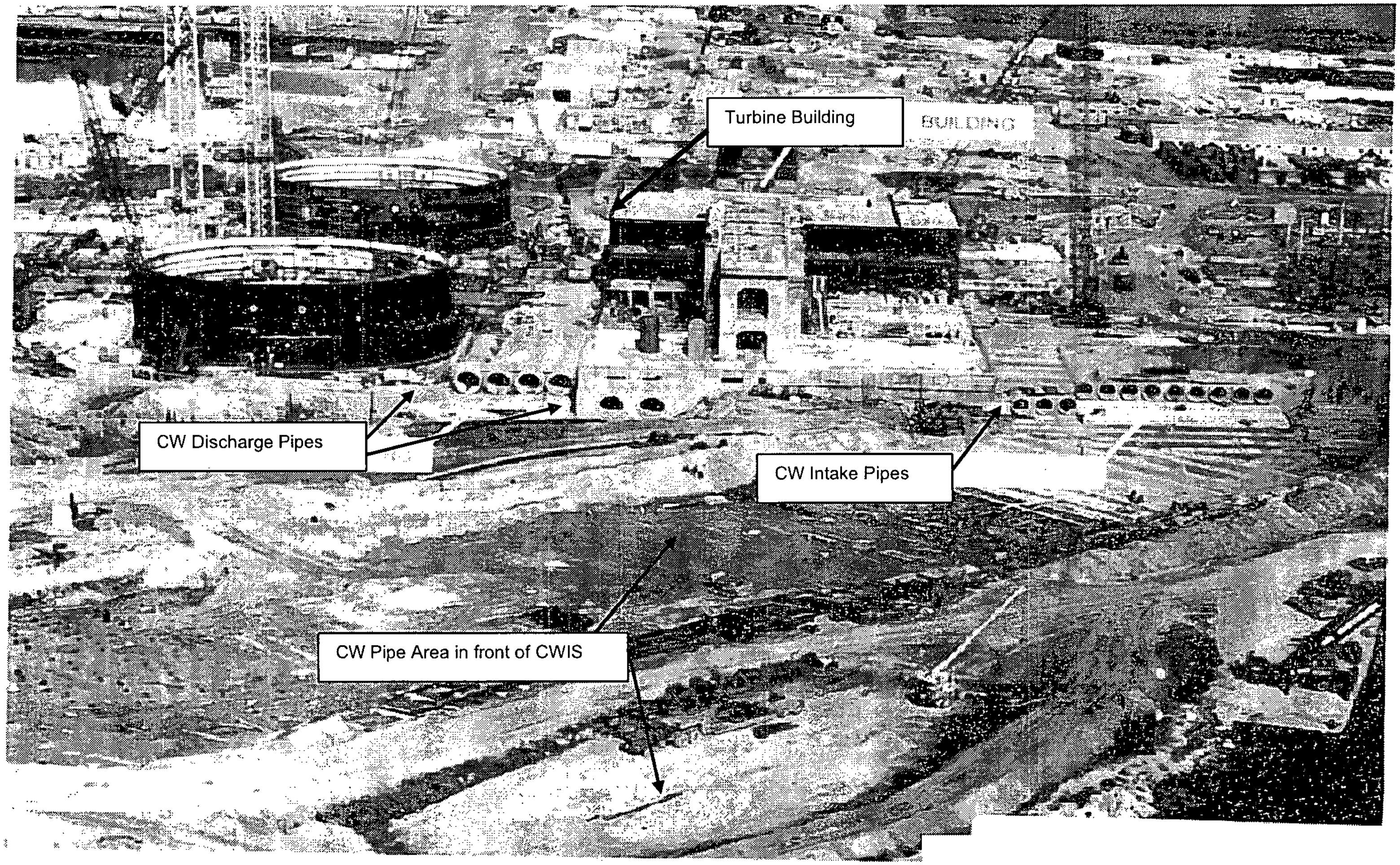


Salem Mechanical Draft Cooling Tower
Report 11050-360-MD
Attachment 1, Figure 7

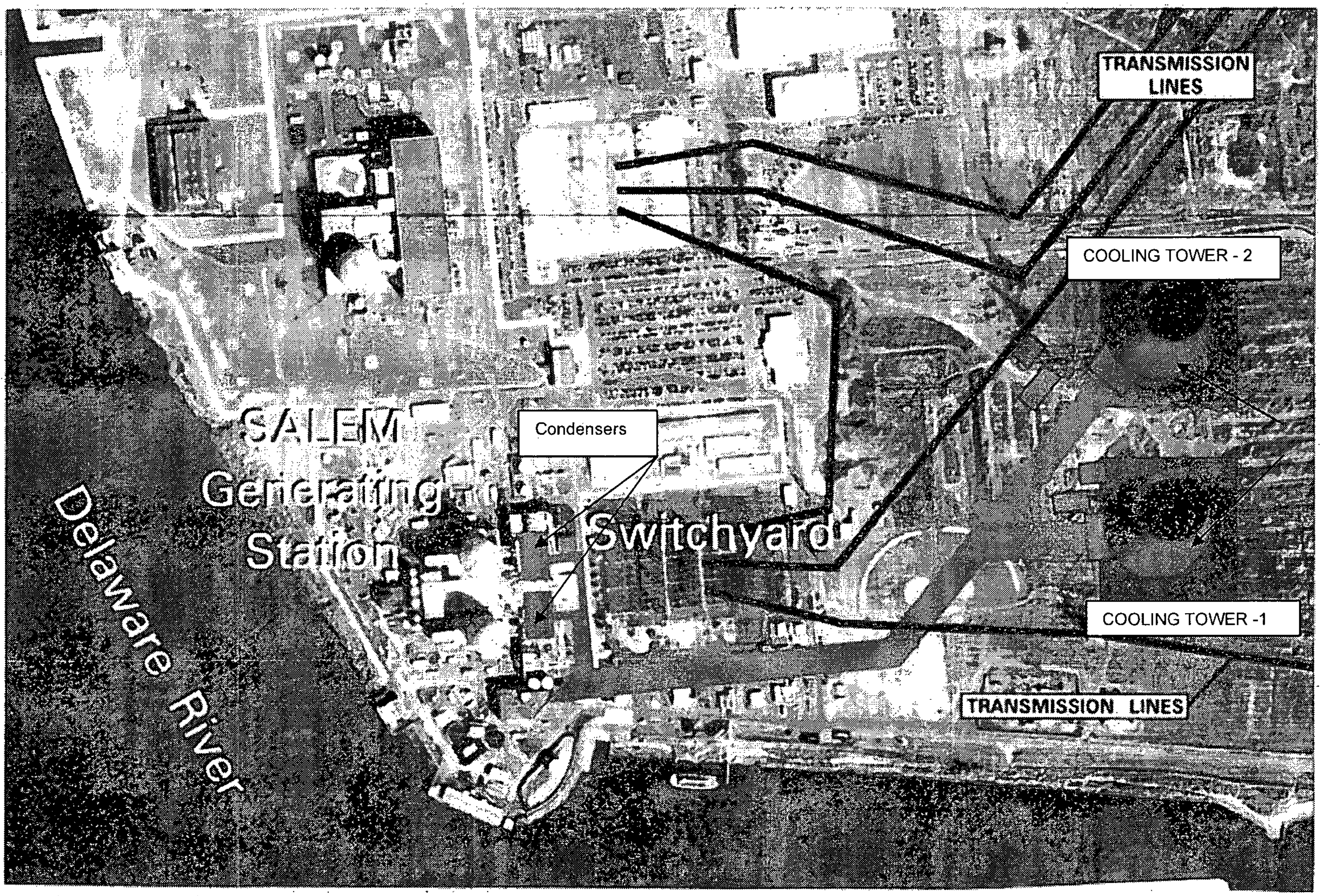
Soil Condition & Pile Depth to Support Foundation Load



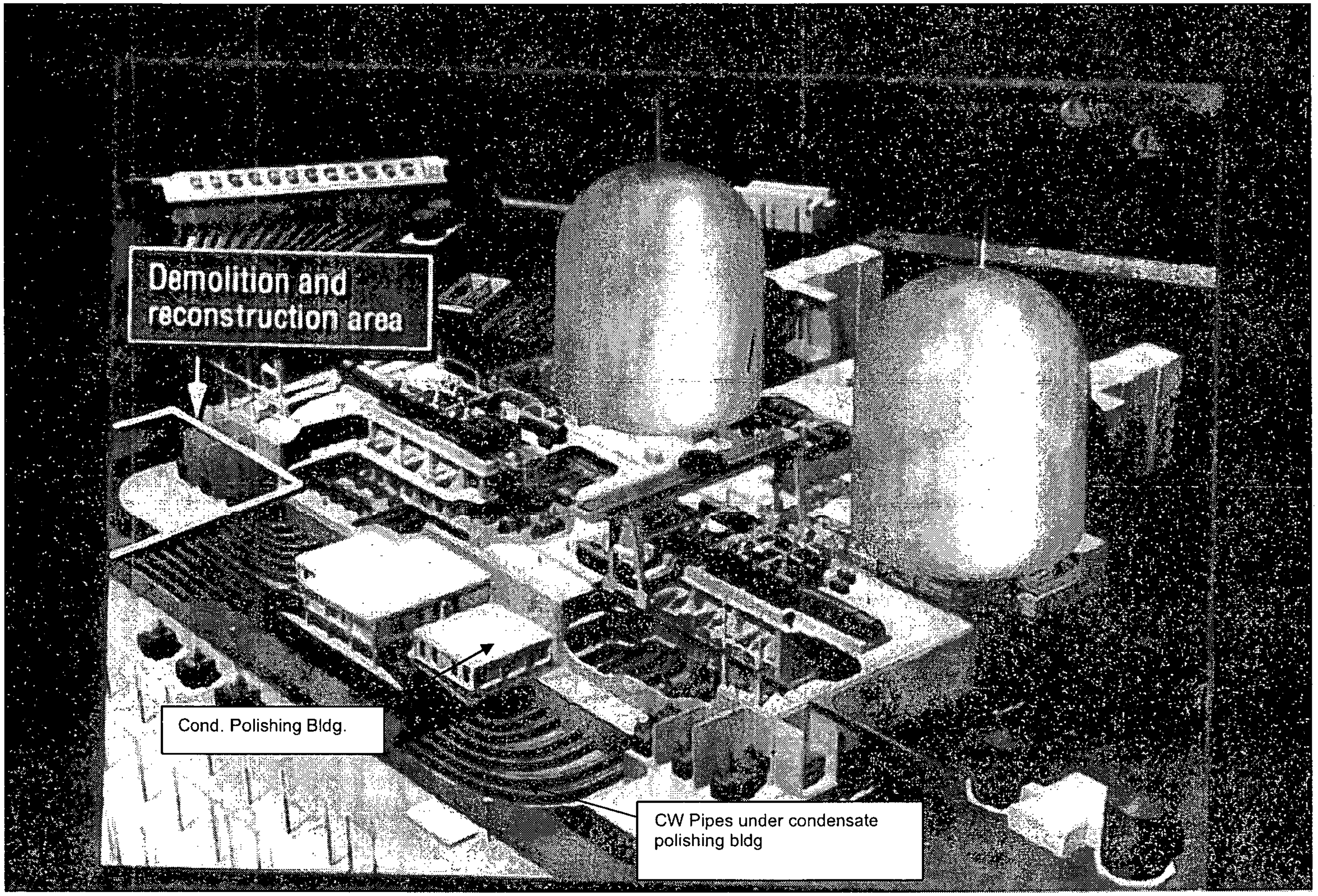
Salem Mechanical Draft Cooling Tower
Report 11050-360-MD
Attachment 1, Figure 8
CW Pipes Embedded in Turbine Bldg Slab Looking West



Salem Mechanical Draft Cooling Tower
Report 11050-360-MD
Attachment 1, Figure 9
CW Pipe Area near CWIS Looking North



Salem Mechanical Draft Cooling Tower
Report 11050-360-MD
Attachment 1, Figure 10
Conceptual Layout CW Pipe & Towers



Salem Mechanical Draft Cooling Tower
Report 11050-360-MD
Attachment 1, Figure 11
Model of Plant Showing CW Pipes & Condensate Polishing Bldg.

Attachment 2 – Conceptual Cost Estimate

Sargent & Lundy
Chicago

RUN DATE: 12/02/05
TIME: 07:45:00 AM

Price level: 2005

BASIS of ESTIMATE

PSEG
SALEM 1 & 2
CONCEPTUAL COST ESTIMATE
SALEM COOLING TOWER STUDY. - MECHANICAL DRAFT COOLING TOWERS

PROJECT START: JAN07; FINISH: MAY12
COMMERCIAL OPERATING DATE: MAY12

Page: 1
Estimate No: 21750D
Project No: 11050360
Prepared by: PAG/ /

Estimate Date: 31OCT05

Scope

THE MODIFICATION CONVERTS THE SALEM UNIT 1 AND UNIT 2 ONCE THROUGH CIRCULATING WATER SYSTEM TO A CLOSED LOOP CIRC. WATER SYSTEM WITH A MECHANICAL DRAFT COOLING TOWER FOR EACH UNIT.

THE MAKUP WATER SYSTEM INCLUDES 6 NEW PUMPS , ESTIMATE INCLUDES REMOVAL OF EXISTING 12 CW PUMPS.

THIS ESTIMATE INCLUDES A DETAILED MATERIAL TAKE-OFF FOR THE NEW CIRC. WATER PIPING BASED ON COOLING TOWER LOCATIONS ESTABLISHED BY S&L AND A DETAILED MATERIAL TAKE-OFF FOR THE CORRESPONDING, ELECTRICAL WORK REQUIRED FOR THE CIRCULATING WATER SYSTEM. THIS ESTIMATE IS BASED ON S&L ESTIMATED LABOR RATES FOR THE REQUIRED CRAFT AND S&L ESTIMATE OF CREWS, CONSTRUCTION EQUIPMENT AND PRODUCTIVITY PER TASK.

Technical Basis

ADDITIONAL INFORMATION RESULTING FROM A SITE VISIT AND FROM MEETINGS WITH THE OWNER IS INCLUDED.

Assumptions

UNIT I AND 2 CONDENSATE POLISHER REMAINS IN PLACE.

Commercial Basis

1. Equipment/Material Cost

   MECHANICAL DRAFT COOLING TOWER COST BASED ON BUDGETARY VENDOR QUOTE. EQUIPMENT/MATERIAL PRICES ARE AS ESTIMATED BY S&L.

2. Labor Wage Rates

   2005 PHILADELPHIA PA UNION WAGES.

3. Labor Crews

   S&L STANDARD CREWS FOR ESTIMATED PIPING AND ELECTRICAL WORK.

4. Productivity

   LABOR UNITS REFLECT NUCLEAR SITE WORK.

5. Quantity Sources

   SEE SCOPE DESCRIPTION.

6. Project Schedule

   PROJECT COMPLETE MAY 2012.

7. Indirect Expenses

   ENGINEERING, CONSTRUCTION MANAGEMENT AND OWNERS EXPENSE INCLUDING PERMITTING ARE PRORATED FROM THE DIRECT CONSTRUCTION COST AT 10%, 5% AND 15% RESPECTIVELY.

8. Escalation Rates (See Cost Summary for rates)

   INCLUDED

Commercial Basis continued

9. Sales/Use Taxes (See Cost Summary for rates)

NOT INCLUDED

10. Contingency (See Cost Summary for rates)

CONTINGENCY FOR EQUIPMENT, MATERIAL, LABOR AND INDIRECTS CALCULATED AT 19%, 19%, 19% AND 19% RESPECTIVELY.

11. AFUDC Rate (See Cost Summary for rates)

NONE

12. Accuracy

Sargent & Lundy
Chicago

RUN DATE: 12/02/05
TIME: 07:45:00 AM

Price level: 2005

COST SUMMARY REPORT

PSEG
SALEM 1 & 2
CONCEPTUAL COST ESTIMATE
SALEM COOLING TOWER STUDY. - MECHANICAL DRAFT COOLING TOWERS

PROJECT START: JAN07; FINISH: MAY12
COMMERCIAL OPERATING DATE: MAY12

Page: 3
Estimate No: 21750D
Project No: 11050360
Prepared by: PAG/ /

Estimate Date: 31OCT05

ACCT.NO.	DESCRIPTION	TOTAL EQUIPMENT COST	TOTAL MATERIAL COST	TOTAL LABOR COST	TOTAL COST
100	MECHANICAL DRAFT COOLING TOWERS	32,000,000	9,762,000	28,628,000	70,390,000
200	CIRCULATING WATER PUMPS AND STRUCTURE	38,800,000		23,682,000	62,482,000
230	ELECTRICAL	3,390,000	280,000	1,256,000	4,926,000
240	PUMPHOUSE AND COOLING TOWER ELECTRICAL	3,270,000	2,360,000	6,404,000	12,034,000
250	CWIS AREA ELECTRICAL	36,000	431,000	1,281,000	1,748,000
260	TURB BLDG ELECTRICAL		246,000	589,000	835,000
270	COOLING TOWER ELECTRICAL	420,000	1,800,000	4,662,000	6,882,000
300	CIRCULATING WATER	24,265,000	19,304,000	59,091,000	102,660,000
400	MAKEUP & BLOWDOWN SYSTEM	4,340,000	499,000	5,678,000	10,517,000
500	SECURITY INCL FENCING	250,000		256,000	506,000
600	TURBINE BUILDING CONDENSER MODIFICATION	38,600,000	2,500,000	66,695,000	107,795,000
700	CHEMICAL CONTROL	4,000,000		5,233,000	9,233,000
850	CONSTRUCTION INDIRECTS			50,863,000	50,863,000
	TOTAL CONSTRUCTION COSTS	149,371,000	37,182,000	254,318,000	440,871,000
	INDIRECT EXPENSES				132,639,200
	ESCALATION				111,233,000
	SALES/USE TAX				
	CONTINGENCY				130,101,000
	TOTAL PROJECT COST				814,844,200
	AFUDC				
	GRAND TOTAL COST				814,844,200

FINANCIAL ASSUMPTIONS:

ESCALATION RATES:	Equipment	3.500%
	Material	3.500%
	Labor	3.500%
	Indirects	3.500%

SALES/USE TAX RATES: Equipment 0.000% Material 0.000%
CONTINGENCY RATES: Equipment 19.0% Material 19.0% Labor 19.0% Indirects 19.0%

ent & Lundy
Chicago

RUN DATE: 12/02/05
TIME: 07:45:00 AM

Price level: 2005

SUMMARY CASH FLOW

PSEG
SALEM 1 & 2
CONCEPTUAL COST ESTIMATE
SALEM COOLING TOWER STUDY. - MECHANICAL DRAFT COOLING TOWERS

PROJECT START: JAN07; FINISH: MAY12
COMMERCIAL OPERATING DATE: MAY12

Page: 4
Estimate No: 21750D
Project No: 11050360
Prepared by: PAG/ /

Estimate Date: 31OCT05

Note: All costs are in thousands of dollars

Cash flow by Year

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TOTAL DIRECT AND	A	52772	18903	88589	128092	216910	68244						
INDIRECT COST	C	52772	71675	160264	288356	505266	573510						
ESCALATION COST	A	3759	2055	13069	24041	49728	18581						
	C	3759	5814	18883	42924	92652	111233						
CONTINGENCY	A	10741	3982	19315	28905	50661	16497						
	C	10741	14723	34038	62943	113604	130101						
TAXES	A	0	0	0	0	0	0						
	C	0	0	0	0	0	0						
TOTAL CASH FLOW	A	67272	24940	120973	181038	317299	103322						
	C	67272	92212	213185	394223	711522	814844						
AFUDC	A	0	0	0	0	0	0						
	C	0	0	0	0	0	0						
GRAND TOTAL COST	A	67272	24940	120973	181038	317299	103322						
	C	67272	92212	213185	394223	711522	814844						

ACCT.NO.	DESCRIPTION	TOTAL EQUIPMENT COST	TOTAL MATERIAL COST	TOTAL LABOR COST	TOTAL COST
100	MECHANICAL DRAFT COOLING TOWERS				
100.0	COOLING TOWER 24 CELLS PER UNIT	32,000,000	9,762,000	28,628,000	70,390,000
	TOTAL 100	32,000,000	9,762,000	28,628,000	70,390,000
200	CIRCULATING WATER PUMPS AND STRUCTURE				
200.1	STRUCTURES INCL BLDG SERVICES	22,000,000		22,641,000	44,641,000
200.2	CIRCULATING WATER PUMPS	16,800,000		1,041,000	17,841,000
	TOTAL 200	38,800,000		23,682,000	62,482,000
230.1	ELECTRICAL	3,390,000	280,000	1,256,000	4,926,000
240.1	PUMPHOUSE AND COOLING TOWER ELECTRICAL	3,270,000	2,360,000	6,404,000	12,034,000
250.1	CWIS AREA ELECTRICAL	36,000	431,000	1,281,000	1,748,000
260.1	TURB BLDG ELECTRICAL		246,000	589,000	835,000
270.1	COOLING TOWER ELECTRICAL	420,000	1,800,000	4,662,000	6,882,000
300.	CIRCULATING WATER				
300.0	PIPE SADDLES (INCL. EXCAVATION & BACKFILL)	15,705,000	11,549,000	43,525,000	70,779,000
300.1	VALVE PITS	8,560,000	3,875,000	12,067,000	24,502,000
300.4	REINFORCEMENT OF EXISTING PIPE		1,800,000	2,108,000	3,908,000
300.5	COOLING TOWER RISERS AND DISTRIBUTION		2,080,000	1,391,000	3,471,000
	TOTAL 300	24,265,000	19,304,000	59,091,000	102,660,000
400	MAKEUP & BLOWDOWN SYSTEM				
400.1	DISCONNECT AND REMOVE ELECTRICAL FOR 12 CW PUMPS			250,000	250,000
400.2	DISCONNECT AND REMOVE PIPING FOR 12 CW PUMPS			528,000	528,000

ACCT.NO.	DESCRIPTION	TOTAL EQUIPMENT COST	TOTAL MATERIAL COST	TOTAL LABOR COST	TOTAL COST
400.3	REMOVE 12 CW PUMPS 3500HP EA			250,000	250,000
400.4	INSTALL 6 MUW PUMPS 300HP	1,590,000		250,000	1,840,000
400.5	INSTALL PIPING FOR MUW PUMPS		78,000	198,000	276,000
400.6	INSTALL ELECTRICAL FOR 6 MUW PUMPS		241,000	302,000	543,000
400.7	UNDERGROUND PIPING	2,750,000		3,689,000	6,439,000
400.8	MODIFY STRUCTURES FOR MUW PUMPS		180,000	211,000	391,000
	TOTAL 400	4,340,000	499,000	5,678,000	10,517,000
500	SECURITY INCL FENCING	250,000		256,000	506,000
600	TURBINE BUILDING CONDENSER MODIFICATION				
600.1	CONDENSER	30,000,000		43,360,000	73,360,000
600.2	CONDENSER STRUCTURE MODS	900,000		1,995,000	2,895,000
600.3	LARGE PIPE MODS	2,700,000		5,497,000	8,197,000
600.4	SMALL PIPE MODS	700,000		1,832,000	2,532,000
600.5	C&I	700,000		1,514,000	2,214,000
600.6	SUPPORTS & PENETRATIONS	900,000		1,832,000	2,732,000
600.7	RIGGING/REINFORCEMENTS	2,700,000		2,602,000	5,302,000
600.8	REMOVAL AND RELOCATION OF EXISTING STRUCTURES AND EQUIPMENT		2,500,000	8,063,000	10,563,000
	TOTAL 600	38,600,000	2,500,000	66,695,000	107,795,000
700	CHEMICAL CONTROL				
700.1	REROUTE RADWASTE TO CW DISCHARGE	500,000		1,099,000	1,599,000
700.2	REROUTE CW INLET TO DISCHARGE	500,000		1,099,000	1,599,000
700.3	CHEMICAL CONTROL SYSTEM	3,000,000		3,035,000	6,035,000
	TOTAL 700	4,000,000		5,233,000	9,233,000
850	CONSTRUCTION INDIRECTS				
850.1	GENERAL AND ADMINISTRATIVE			50,863,000	50,863,000
	TOTAL 850			50,863,000	50,863,000

MAJOR ACCOUNT REPORT

ACCT.NO.	DESCRIPTION	TOTAL EQUIPMENT COST	TOTAL MATERIAL COST	TOTAL LABOR COST	TOTAL COST
900	*INDIRECTS*				
900.1	INDIRECTS			132,639,200	132,639,200
	TOTAL 900			132,639,200	132,639,200
	TOTAL DIRECT & INDIRECT COSTS	149,371,000	37,182,000	386,957,200	573,510,200

Sargent & Lundy
Chicago

RUN DATE: 12/02/05
TIME: 07:45:00 AM

Price level: 2005

E S T I M A T E   W O R K S H E E T

PSEG
SALEM 1 & 2
CONCEPTUAL COST ESTIMATE
SALEM COOLING TOWER STUDY. - MECHANICAL DRAFT COOLING TOWERS

PROJECT START: JAN07; FINISH: MAY12
COMMERCIAL OPERATING DATE: MAY12

Page: 8
Estimate No: 21750D
Project No: 11050360
Prepared by: PAG/ /

Estimate Date: 31OCT05

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
100		MECHANICAL DRAFT COOLING TOWERS										
100.01		COOLING TOWER 24 CELLS PER UNIT	2	EA	16000000	32,000,000		115000	230000	86.72 MECH	19,946,000	51,946,000
100.02		COOLING TOWER BASIN PILE CAP										
100.021		SUBSTRUCTURE										
100.0211		EARTHWORK										
100.02111		ADDITIONAL EXCAVATION	17600	CY				0.075	1320	74.45 EXFD	98,000	98,000
100.02112		ADDITIONAL BACKFILL	17600	CY				0.075	1320	74.45 EXFD	98,000	98,000
100.02113		DISPOSAL							NOT REQUIRED			
.0212		CONCRETE STRUCTURE										
100.02121		CONCRETE	12500	CY	87.75		1,097,000	0.150	1875	67.76 COND	127,000	1,224,000
100.02122		REINFORCING	900	TN	810.00		729,000	25.000	22500	95.11 REIN	2,140,000	2,869,000
100.02123		FORMWORK	17380	SF	2.03		35,000	0.150	2607	92.38 FORM	241,000	276,000
100.02124		MISCELLANEOUS EMBEDDED STEEL							NOT REQUIRED			
100.02125		WATERSTOPS							NOT REQUIRED			
100.02126		BEARING PILES	2890	EA	2733.75		7,901,000	20.000	57800	103.42 PILE	5,978,000	13,879,000
		SUB TOTAL 100.02					9,762,000		87,422		8,682,000	18,444,000
		SUB TOTAL 100.0				32,000,000	9,762,000		317,422		28,628,000	70,390,000
		TOTAL 100				32,000,000	9,762,000		317,422		28,628,000	70,390,000

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
200		CIRCULATING WATER PUMPS AND STRUCTURE										
200.1		STRUCTURES INCL BLDG SERVICES	2	EA	11000000	22,000,000		150000	300000	75.47 CONP	22,641,000	44,641,000
200.2		CIRCULATING WATER PUMPS	12	EA	1400000	16,800,000		1000.000	12000	86.72 MECH	1,041,000	17,841,000
		TOTAL 200				38,800,000			312,000		23,682,000	62,482,000

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL		***	*** LABOR			***	
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
230.1		ELECTRICAL										
230.10		MAIN FEEDERS										
230.101	--- FE-ELECT	60/75/100 MVA -500KVx15KV OA/FA/FA UAT FOR COOLING TOWERS	2	EA	950000	1,900,000		1100.000	2200	83.90 EHEC	185,000	2,085,000
230.102	--- FE-ELECT	500KV AND 15KV SWITCHYARD EQUIPMENT	1	LT	370000	370,000		1800.000	1800	83.90 EHEC	151,000	521,000
230.103	--- FE-ELECT	SWITCHYARD BUSSESS 500KV AND 15KV	1	LT	920000	920,000		4400.000	4400	83.90 EHEC	369,000	1,289,000
230.104	--- FE-ELECT	PROTECTION AND RELAY PANELS	1	LT	200000	200,000		250.000	250	83.90 EHEC	21,000	221,000
230.105	--- FE-ELECT	BALANCE OF PLANT WIRING, CONDUITS, GROUNDING, LIGHTING	1	LT	200000		200,000	2200.000	2200	96.92 WIRE	213,000	413,000
230.106	--- FE-ELECT	STRUCTURES AND FOUNDATIONS	1	LT	80000		80,000	1100.000	1100	111.96 STST	123,000	203,000
230.107	--- FE-ELECT	TESTING	1	LT				2000.000	2000	96.92 WIRE	194,000	194,000
		SUB TOTAL 230.10				3,390,000	280,000		13,950		1,256,000	4,926,000
		SUB TOTAL 230.1				3,390,000	280,000		13,950		1,256,000	4,926,000
		TOTAL 230				3,390,000	280,000		13,950		1,256,000	4,926,000

Note: Extended costs are rounded up to next thousand dollars

ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	*** MATERIAL MATERIAL RATE	EQUIPMENT COST	MATERIAL COST ***	*** LABOR MNHR RATE	MNHRS	WAGE RATE	LABOR COST ***	TOTAL COST
240.10		PUMPHOUSE AND COOLING TOWER ELECTRICAL										
240.101	--- FE-ELECT	MV AND LV DISTRIBUTION EQUIPMENT	1	LT	3150000	3,150,000		11600	11600	83.90 EHEC	973,000	4,123,000
240.102	--- FE-ELECT	DC DISRIBUTION EQPT	1	LT	120000	120,000		250.000	250	83.90 EHEC	21,000	141,000
240.103	--- FE-ELECT	WIRING	1	LT	710000		710,000	16800	16800	96.92 WIRE	1,628,000	2,338,000
240.105	--- FE-ELECT	WIRING CONTAINERS	1	LT	900000		900,000	36200	36200	76.05 ECND	2,753,000	3,653,000
240.106	--- FE-ELECT	MISC INCLUDING COMMUNICATIONS, CATHODIC PROT., HEAT TRACING	1	LT	650000		650,000	9200.000	9200	76.05 ECND	700,000	1,350,000
240.107	--- FE-ELECT	LIGHTING I/D, O/D, RECEPT	1	LT	100000		100,000	500.000	500	76.05 ECND	38,000	138,000
240.108	--- FE-ELECT	TESTING	1	LT				3000.000	3000	96.92 WIRE	291,000	291,000
		SUB TOTAL 240.10				3,270,000	2,360,000		77,550		6,404,000	12,034,000
		SUB TOTAL 240.1				3,270,000	2,360,000		77,550		6,404,000	12,034,0[illegible]
		TOTAL 240				3,270,000	2,360,000		77,550		6,404,000	12,034,0[illegible]

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
250.10		CWIS AREA ELECTRICAL										
250.101	--- FE-ELECT	MV AND LV DISTRIBUTION EQUIPMENT	1	LT	36000	36,000		300.000	300	83.90 EHEC	25,000	61,000
250.102	--- FE-ELECT	DC DISRIBUTION EQPT	1	LT						EHEC		
250.103	--- FE-ELECT	WIRING	1	LT	65000		65,000	2600.000	2600	96.92 WIRE	252,000	317,000
250.105	--- FE-ELECT	WIRING CONTAINERS	1	LT	264000		264,000	12000	12000	76.05 ECND	913,000	1,177,000
250.106	--- FE-ELECT	MISC INCLUDING COMMUNICATIONS, CATHODIC PROT., HEAT TRACING	1	LT	102000		102,000	170.000	170	76.05 ECND	13,000	115,000
250.107	--- FE-ELECT	LIGHTING I/D, O/D, RECEPT	1	LT						ECND		
250.108	--- FE-ELECT	TESTING	1	LT				800.000	800	96.92 WIRE	78,000	78,000
		SUB TOTAL 250.10				36,000	431,000		15,870		1,281,000	1,748,000
		SUB TOTAL 250.1				36,000	431,000		15,870		1,281,000	1,748,000
		TOTAL 250				36,000	431,000		15,870		1,281,000	1,748,000

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
260.10		TURB BLDG ELECTRICAL										
260.101	--- FE-ELECT	MV AND LV DISTRIBUTION EQUIPMENT	1	LT						EHEC		
260.102	--- FE-ELECT	DC DISRIBUTION EQPT	1	LT					250	83.90 EHEC	21,000	21,000
260.103	--- FE-ELECT	WIRING	1	LT	33000		33,000	650.000	650	96.92 WIRE	63,000	96,000
260.105	--- FE-ELECT	WIRING CONTAINERS	1	LT	77000		77,000	3350.000	3350	76.05 ECND	255,000	332,000
260.106	--- FE-ELECT	MISC INCLUDING COMMUNICATIONS, CATHODIC PROT., HEAT TRACING	1	LT	100000		100,000	160.000	160	76.05 ECND	12,000	112,000
260.107	--- FE-ELECT	DEMO / RELOCATION	1	LT	36000		36,000	2500.000	2500	76.05 ECND	190,000	226,000
260.108	--- FE-ELECT	TESTING	1	LT				500.000	500	96.92 WIRE	48,000	48,000
		SUB TOTAL 260.10					246,000		7,410		589,000	835,000
		SUB TOTAL 260.1					246,000		7,410		589,000	835,000
		TOTAL 260					246,000		7,410		589,000	835,000

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
270.10		COOLING TOWER ELECTRICAL										
270.101	--- FE-ELECT	MV AND LV DISTRIBUTION EQUIPMENT	1	LT	300000	300,000		1000.000	1000	83.90 EHEC	84,000	384,000
270.102	--- FE-ELECT	DC DISRIBUTION EQPT	1	LT	120000	120,000		250.000	250	83.90 EHEC	21,000	141,000
270.103	--- FE-ELECT	WIRING	1	LT	430000		430,000	20000	20000	96.92 WIRE	1,938,000	2,368,000
270.105	--- FE-ELECT	WIRING CONTAINERS	1	LT	640000		640,000	22000	22000	76.05 ECND	1,673,000	2,313,000
270.106	--- FE-ELECT	MISC INCLUDING COMMUNICATIONS, CATHODIC PROT., HEAT TRACING	1	LT	640000		640,000	9000.000	9000	76.05 ECND	684,000	1,324,00
270.107	--- FE-ELECT	LIGHTING I/D, O/D, RECEPT	1	LT	90000		90,000	900.000	900	76.05 ECND	68,000	158,00
270.108	--- FE-ELECT	TESTING	1	LT				2000.000	2000	96.92 WIRE	194,000	194,00
		SUB TOTAL 270.10				420,000	1,800,000		55,150		4,662,000	6,882,00
		SUB TOTAL 270.1				420,000	1,800,000		55,150		4,662,000	6,882,00
		TOTAL 270				420,000	1,800,000		55,150		4,662,000	6,882,00

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
300.		CIRCULATING WATER										
300.01		PIPE SADDLES (INCL. EXCAVATION & BACKFILL)										
300.011		EXCAVATION	363000	CY	4.73		1,717,000	0.129	46827	151.74 ETWK	7,106,000	8,823,000
300.012		BACKFILL	240000	CY	4.73		1,135,000	0.129	30960	151.74 ETWK	4,698,000	5,833,000
300.013		GRANNULAR MATERIAL (BETWEEN PILE CAPS)	22000	CY	11.48		253,000	0.313	6886	151.74 ETWK	1,045,000	1,298,000
300.014		SADDLES	10140	CY	3.38		34,000	9.200	93288	67.76 COND	6,321,000	6,355,000
300.015		BEARING PILES	1560	EA	1350.00		2,106,000	10.080	15725	103.42 PILE	1,626,000	3,732,000
300.017		KICK BLOCK CONCRETE	900	CY	337.50		304,000	9.777	8799	67.76 COND	596,000	900,000
		SUB TOTAL 300.01					5,549,000		202,485		21,392,000	26,941,000
300.02		CIVIL WORK INTERFERENCES	1	LT	9720000	9,720,000						9,720,000
300.03		CONCRETE PIPE										
300.031		REINFORCED CONCRETE PIPE	12000	LF	500.00		6,000,000	12.000	144000	87.83 YDPP	12,648,000	18,648,000
300.032		BENDS AND REDUCERS	60	EA				46.000	2760	87.83 YDPP	242,000	242,000
		SUB TOTAL 300.03					6,000,000		146,760		12,890,000	18,890,000
300.04		PIPE ROUTING INTERFERENCES	1	LT	4000000	4,000,000		90000	90000	87.83 YDPP	7,905,000	11,905,000
300.05		MOD'S TO EXISTING YARD PIPING	1	LT	350000	350,000		8500.000	8500	87.83 YDPP	747,000	1,097,000
300.06		CIRC. WATER VALVES 12 5FT BUTTF VS,7 4FT BUTTF VS, 6 3FT CHECK VS, 1 12FT BUTTF VA.	1	LT	1500000	1,500,000		5000.000	5000	87.83 YDPP	439,000	1,939,000
300.07		REMOVE OLD GUARDHOUSE						INCLUDED IN 300.02				
300.08		SITE CONSTRUCTION DRAINAGE	1	LT		135,000		1000.000	1000	151.74 ETWK	152,000	287,000
300.09		MASTER PLAN								AFI ONLY		
		SUB TOTAL 300.0				15,705,000	11,549,000		453,745		43,525,000	70,779,000
300.10		VALVE PITS								INCL. IN AFI		
300.109		OFFSITE SOIL DISPOSAL	1	LT			3,375,000	23000	23000	151.74 ETWK	3,490,000	6,865,000

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL	***		*** LABOR	***			
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
		SUB TOTAL 300.10					3,375,000		23,000		3,490,000	6,865,000
300.11		LIFT STATIONS	1	LT	1000000	1,000,000		3000.000	3000	86.72 MECH	260,000	1,260,000
300.12		ROAD REPAIRS	1	LT	500000		500,000	12000	12000	83.17 PBIT	998,000	1,498,000
300.13		DEWATERING	1	LT		7,560,000		100000	100000	73.19 CARP	7,319,000	14,879,000
300.14		AFFECTS OF DEWATERING								AFI ONLY		
		SUB TOTAL 300.1				8,560,000	3,875,000		138,000		12,067,000	24,502,000
300.4		REINFORCEMENT OF EXISTING PIPE										
300.41		REINFORCEMENT BY SPECIALTY CONTRACTOR	6000	LF	300.00		1,800,000	4.000	24000	87.83 YDPP	2,108,000	3,908,000
		SUB TOTAL 300.4					1,800,000		24,000		2,108,000	3,908,000
300.52		COOLING TOWER RISERS AND DISTRIBUTION	4000	LF	160.00		640,000	3.000	12000	87.83 YDPP	1,054,000	1,694,000
[illegible]53		COOLING TOWER VALVES	48	EA	30000		1,440,000	80.000	3840	87.83 YDPP	337,000	1,777,000
		SUB TOTAL 300.5					2,080,000		15,840		1,391,000	3,471,000
		TOTAL 300				24,265,000	19,304,000		631,585		59,091,000	102,660,000

Note: Extended costs are rounded up to next thousand dollars

				*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
400		MAKEUP & BLOWDOWN SYSTEM									
400.1		DISCONNECT AND REMOVE ELECTRICAL FOR 12 CW PUMPS									
400.11		DISCONECT AND REMOVE WIRING FOR 12 CW PUMPS	12 EA				120.000	1440	96.92 WIRE	140,000	140,000
400.12		DISCONECT AND REMOVE CONDUITS FOR 12 CW PUMPS	12 EA				120.000	1440	76.05 ECND	110,000	110,000
		SUB TOTAL 400.1						2,880		250,000	250,000
400.2		DISCONNECT AND REMOVE PIPING FOR 12 CW PUMPS									
400.21		DISCONECT AND REMOVE PIPING FOR 12 CW PUMPS	12 EA				240.000	2880	91.62 SPNG	264,000	264,000
400.22		DISCONECT AND REMOVE SUPPORTS FOR 12 CW PUMPS	12 EA				240.000	2880	91.62 SPNG	264,000	264,000
		SUB TOTAL 400.2						5,760		528,000	528,000
400.3		REMOVE 12 CW PUMPS 3500HP EA									
400.31		REMOVE 12 CW PUMPS AND MOTORS	12 EA				240.000	2880	86.72 MECH	250,000	250,0[illegible]
		SUB TOTAL 400.3						2,880		250,000	250,000
400.4		INSTALL 6 MUW PUMPS 300HP									
400.41		INSTALL 6MUW PUMPS AND MOTORS	6 EA	265000	1,590,000		480.000	2880	86.72 MECH	250,000	1,840,000
		SUB TOTAL 400.4			1,590,000			2,880		250,000	1,840,000
400.5		INSTALL PIPING FOR MUW PUMPS									
400.51		INSTALL PIPING SUPPORTS	24 EA	250.00		6,000	40.000	960	91.62 SPNG	88,000	94,000
400.52		INSTALL PIPING	240 LF	300.00		72,000	4.000	960	91.62 SPNG	88,000	160,000
400.53		TESTING PIPING	6 LT				40.000	240	91.62 SPNG	22,000	22,000
		SUB TOTAL 400.5				78,000		2,160		198,000	276,000
400.6		INSTALL ELECTRICAL FOR 6 MUW PUMPS									
400.60		INSTALL CONTROL AND INSTRUMENTATION	6 LT	30000		180,000	120.000	720	89.06 INEL	64,000	244,000

E S T I M A T E   W O R K S H E E T

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL		***	*** LABOR			***	
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
400.61		INSTALL CONDUITS FOR 6 MUW PUMPS	1200	LF	20.00		24,000	1.200	1440	76.05 ECND	110,000	134,000
400.62		INSTALL WIRING FOR 6 MUW PUMPS	1200	LF	30.00		36,000	0.800	960	96.92 WIRE	93,000	129,000
400.63		GROUNDING	6	LT	200.00		1,000	20.000	120	96.92 WIRE	12,000	13,000
400.64		TESTING	6	LT				40.000	240	96.92 WIRE	23,000	23,000
		SUB TOTAL 400.6					241,000		3,480		302,000	543,000
400.7		UNDERGROUND PIPING										
400.71		PIPE SADDLES, INCL CIVIL WORK	1	LT	500000	500,000		6000.000	6000	87.83 YDPP	527,000	1,027,000
400.72		PIPING	1	LT	1500000	1,500,000		18000	18000	87.83 YDPP	1,581,000	3,081,000
400.73		MODS TO XSTG PIPING/INTERFERENCES	1	LT	750000	750,000		18000	18000	87.83 YDPP	1,581,000	2,331,000
400.74		FOULING CONTROL PROGRAM										
		SUB TOTAL 400.7				2,750,000			42,000		3,689,000	6,439,000
400.8		MODIFY STRUCTURES FOR MUW PUMPS										
400.81		FABR AND INSTALL MUW PUMP SUPPORT STEEL	12	EA	10000		120,000	120.000	1440	97.80 GALL	141,000	261,000
400.82		FABR AND INSTALL MUW PUMP GRATING	12	EA	5000.00		60,000	60.000	720	97.80 GALL	70,000	130,000
		SUB TOTAL 400.8					180,000		2,160		211,000	391,000
		TOTAL 400				4,340,000	499,000		64,200		5,678,000	10,517,000

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
500		SECURITY INCL FENCING	1	LT	250000	250,000		4500.000	4500	56.95 LAND	256,000	506,000

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	*** MATERIAL *** MATERIAL RATE	EQUIPMENT COST	MATERIAL COST ***	*** LABOR *** MNHR RATE	MNHRS	WAGE RATE	LABOR COST ***	TOTAL COST
600		TURBINE BUILDING CONDENSER MODIFICATION										
600.1		CONDENSER	1	LT	30000000	30,000,000		500000	50 0000	86.72 MECH	43,360,000	73,360,000
600.2		CONDENSER STRUCTURE MODS	1	LT	900000	900,000		23000	2 3000	86.72 MECH	1,995,000	2,895,000
600.3		LARGE PIPE MODS	1	LT	2700000	2,700,000		60000	6 0000	91.62 SPNG	5,497,000	8,197,000
600.4		SMALL PIPE MODS	1	LT	700000	700,000		20000	2 0000	91.62 SPNG	1,832,000	2,532,000
600.5		C&I	1	LT	700000	700,000		17000	1 7000	89.06 INEL	1,514,000	2,214,000
600.6		SUPPORTS & PENETRATIONS	1	LT	900000	900,000		20000	2 0000	91.62 SPNG	1,832,000	2,732,000
600.7		RIGGING/REINFORCEMENTS	1	LT		2,700,000		30000	3 0000	86.72 MECH	2,602,000	5,302,000
600.8		REMOVAL AND RELOCATION OF EXISTING STRUCTURES AND EQUIPMENT										
.81		PIPE RACK FOR CW PIPE	120	TN	2000.00		240,000	80.000	9600	111.96 STST	1,075,000	1,315,000
00.82		PIPE RACK FOUNDATIONS	1	LT	10000		10,000	160.000	160	75.47 CONP	12,000	22,000
00.84		TEMP REMOVAL ANR REINSTLN OF EQPT INLC. 6 FWH , MOIST SEP AND PIPING, 2 GL STM COND AND PIPIN	1	LT	250000		250,000	24000	24 000	86.72 MECH	2,081,000	2,331,000
00.85		RELOCATION OF EQPT INCL. 6 VAC PUS AND PIPING, 6 CONTROL PNLS AND WIRING CONDENSER	1	LT	500000		500,000	28000	28 000	86.72 MECH	2,428,000	2,928,000
00.86		INSTALLATION OF STEEL PLATFORMS FOR RELOCATED EQUIPMENT AND ACCESSORIES AROUND CONDENSER	1	LT	1000000		1,000,000	15000	15 000	97.80 GALL	1,467,000	2,467,000
00.87		RELOCATION OF PIPING, HVAC, ELECTRICAL FOR NEW CIRC WATER LINES	1	LT	500000		500,000				1,000,000	1,500,000
		SUB TOTAL 600.8					2,500,000		76, 760		8,063,000	10,563,000
		TOTAL 600				38,600,000	2,500,000		746, 760		66,695,000	107,795,000

ESTIMATE WORKSHEET

Note: Extended costs are rounded up to next thousand dollars

				*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
700		CHEMICAL CONTROL									
700.1		REROUTE RADWASTE TO CW DISCHARGE	1 LT	500000	500,000		12000	12000	91.62 SPNG	1,099,000	1,599,000
700.2		REROUTE CW INLET TO DISCHARGE	1 LT	500000	500,000		12000	12000	91.62 SPNG	1,099,000	1,599,000
700.3		CHEMICAL CONTROL SYSTEM	1 LT	3000000	3,000,000		35000	35000	86.72 MECH	3,035,000	6,035,000
		TOTAL 700			4,000,000			59,000		5,233,000	9,233,000

Note: Extended costs are rounded up to next thousand dollars

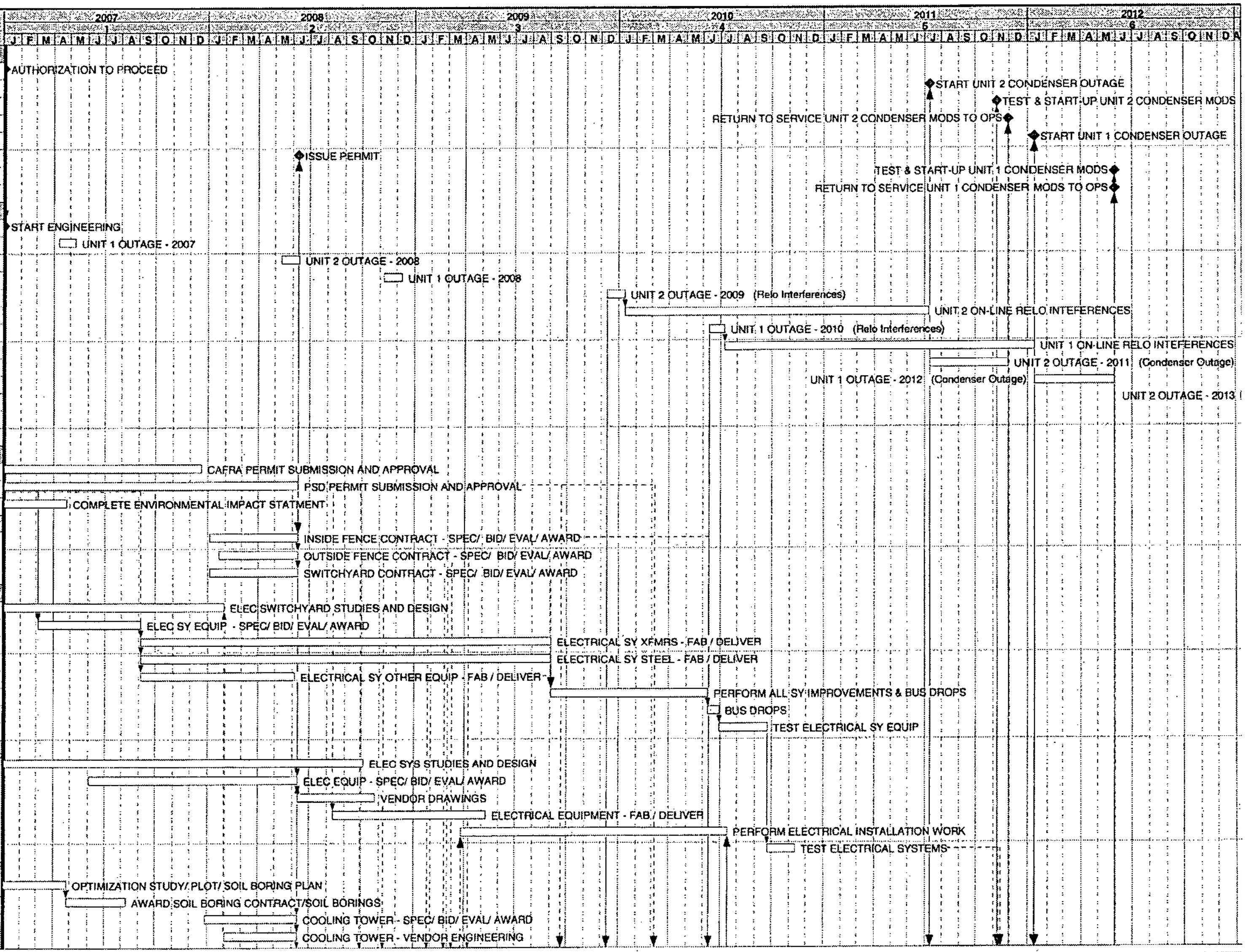
					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
850		CONSTRUCTION INDIRECTS										
850.11		GENERAL AND ADMINISTRATIVE	1	LT							30,517,000	30,517,000
850.12		PROFIT	1	LT							20,346,000	20,346,000
		SUB TOTAL 850.1									50,863,000	50,863,000
		TOTAL 850									50,863,000	50,863,000

Note: Extended costs are rounded up to next thousand dollars

					*** MATERIAL ***			*** LABOR ***				
ACCOUNT NO.	WORK PACKAGE	DESCRIPTION	QTY	UM	MATERIAL RATE	EQUIPMENT COST	MATERIAL COST	MNHR RATE	MNHRS	WAGE RATE	LABOR COST	TOTAL COST
900		INDIRECTS										
900.1		INDIRECTS	1	LT								
900.11		ENGINEERING	1	LT							44,087,000	44,087,000
900.12		CONSTRUCTION MANAGEMENT	1	LT							22,044,000	22,044,000
900.13		ENVIRONMENTAL PERMITTING AND STUDIES	1	LT							727,200	727,200
900.14		OWNERS EXPENSES INCLUDES PROJECT ADMIN, PERMITS, ETC	1	LT							65,781,000	65,781,000
		SUB TOTAL 900.1									132,639,200	132,639,200
		TOTAL 900									132,639,200	132,639,200
		TOTAL DIRECT & INDIRECT COSTS				149,371,000	37,182,000		2,305,397		386,957,200	573,510,200

Attachment 3 – Schedule for Installation

Activity ID	Activity Description	Rem Dur	%
MAJOR PROJECT MILESTONES			
0-010	AUTHORIZATION TO PROCEED	0	0
0-042	START UNIT 2 CONDENSER OUTAGE	0	0
0-043	TEST & START-UP UNIT 2 CONDENSER MODS	0	0
0-044	RETURN TO SERVICE UNIT 2 CONDENSER MODS TO OPS	0	0
0-049	START UNIT 1 CONDENSER OUTAGE	0	0
0-050	ISSUE PERMIT	0	0
0-054	TEST & START-UP UNIT 1 CONDENSER MODS	0	0
0-059	RETURN TO SERVICE UNIT 1 CONDENSER MODS TO OPS	0	0
PROJECT MILESTONES			
0-005	START ENGINEERING	0	0
0-015	UNIT 1 OUTAGE - 2007	29	0
0-020	UNIT 2 OUTAGE - 2008	32	0
0-025	UNIT 1 OUTAGE - 2008	31	0
0-030	UNIT 2 OUTAGE - 2009 (Relo Interferences)	32	0
0-031	UNIT 2 ON-LINE RELO INTEFERENCES	399	0
0-035	UNIT 1 OUTAGE - 2010 (Relo Interferences)	29	0
0-036	UNIT 1 ON-LINE RELO INTEFERENCES	402	0
0-040	UNIT 2 OUTAGE - 2011 (Condenser Outage)	140	0
0-045	UNIT 1 OUTAGE - 2012 (Condenser Outage)	140	0
0-065	UNIT 2 OUTAGE - 2013	32	0
0-070	UNIT 2 OUTAGE - 2014	32	0
0-075	UNIT 1 OUTAGE - 2014	29	0
PERMITTING			
1-025	CAFRA PERMIT SUBMISSION AND APPROVAL	260	0
1-030	PSD PERMIT SUBMISSION AND APPROVAL	390	0
1-035	COMPLETE ENVIRONMENTAL IMPACT STATMENT	85	0
CONSTRUCTION CONTRACTS			
2-040	INSIDE FENCE CONTRACT - SPEC/ BID/ EVAL/ AWARD	120	0
2-045	OUTSIDE FENCE CONTRACT - SPEC/ BID/ EVAL/ AWARD	108	0
2-050	SWITCHYARD CONTRACT - SPEC/ BID/ EVAL/ AWARD	120	0
ELECTRICAL SWITCHYARD			
6-220	ELEC SWITCHYARD STUDIES AND DESIGN	289	0
6-225	ELEC SY EQUIP - SPEC/ BID/ EVAL/ AWARD	139	0
6-230	ELECTRICAL SY XFMRS - FAB / DELIVER	540	0
6-232	ELECTRICAL SY STEEL - FAB / DELIVER	540	0
6-234	ELECTRICAL SY OTHER EQUIP - FAB / DELIVER	204	0
6-235	PERFORM ALL SY IMPROVEMENTS & BUS DROPS	210	0
6-237	BUS DROPS	20	0
6-240	TEST ELECTRICAL SY EQUIP	65	0
ELECTRICAL SYSTEMS			
6-190	ELEC SYS STUDIES AND DESIGN	475	0
6-195	ELEC EQUIP - SPEC/ BID/ EVAL/ AWARD	274	0
6-200	VENDOR DRAWINGS	100	0
6-205	ELECTRICAL EQUIPMENT - FAB / DELIVER	204	0
6-210	PERFORM ELECTRICAL INSTALLATION WORK	360	0
6-215	TEST ELECTRICAL SYSTEMS	37	0
MECHANICAL DRAFT COOLING TOWERS			
4-090	OPTIMIZATION STUDY/ PLOT/ SOIL BORING PLAN	85	0
4-095	AWARD SOIL BORING CONTRACT/SOIL BORINGS	80	0
4-100	COOLING TOWER - SPEC/ BID/ EVAL/ AWARD	125	0
4-105	COOLING TOWER - VENDOR ENGINEERING	100	0



▭ Early Bar
▬ Progress Bar

MD01

Sheet 1 of 3

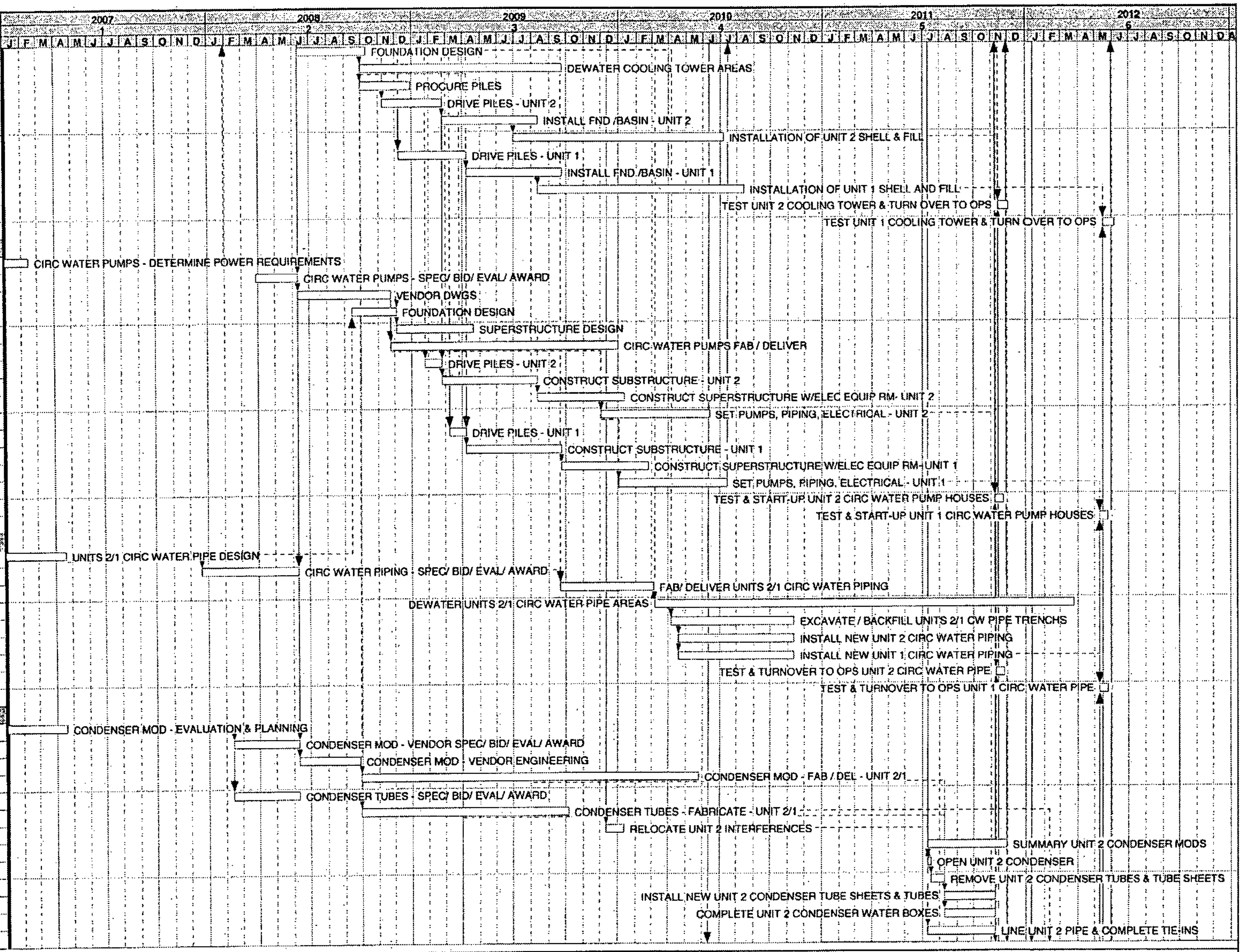
SALEM CWIS ALTERNATE INTAKE TECHNOLOGIES

MECHANICAL
COOLING TOWER REPORT 11050-360-MD

ATTACHMENT 3

Date	Revision	Checked	Approved

Activity ID	Activity Description	Rem Dur	%
4-110	FOUNDATION DESIGN	90	0
4-115	DEWATER COOLING TOWER AREAS	266	0
4-120	PROCURE PILES	75	0
4-125	DRIVE PILES - UNIT 2	86	0
4-130	INSTALL FND /BASIN - UNIT 2	120	0
4-135	INSTALLATION OF UNIT 2 SHELL & FILL	283	0
4-140	DRIVE PILES - UNIT 1	86	0
4-145	INSTALL FND /BASIN - UNIT 1	120	0
4-150	INSTALLATION OF UNIT 1 SHELL AND FILL	283	0
4-155	TEST UNIT 2 COOLING TOWER & TURN OVER TO OPS	20	0
4-160	TEST UNIT 1 COOLING TOWER & TURN OVER TO OPS	20	0
CIRCULATING WATER PUMPHOUSES			
7-210	CIRC WATER PUMPS - DETERMINE POWER	30	0
7-215	CIRC WATER PUMPS - SPEC/ BID/ EVAL/ AWARD	60	0
7-220	VENDOR DWGS	125	0
7-225	FOUNDATION DESIGN	65	0
7-230	SUPERSTRUCTURE DESIGN	100	0
7-235	CIRC WATER PUMPS FAB / DELIVER	300	0
7-240	DRIVE PILES - UNIT 2	22	0
7-245	CONSTRUCT SUBSTRUCTURE - UNIT 2	120	0
7-250	CONSTRUCT SUPERSTRUCTURE W/ELEC EQUIP RM- UNIT	120	0
7-255	SET PUMPS, PIPING, ELECTRICAL - UNIT 2	150	0
7-260	DRIVE PILES - UNIT 1	22	0
7-265	CONSTRUCT SUBSTRUCTURE - UNIT 1	120	0
7-270	CONSTRUCT SUPERSTRUCTURE W/ELEC EQUIP RM- UNIT	120	0
7-275	SET PUMPS, PIPING, ELECTRICAL - UNIT 1	150	0
7-280	TEST & START-UP UNIT 2 CIRC WATER PUMP HOUSES	15	0
7-285	TEST & START-UP UNIT 1 CIRC WATER PUMP HOUSES	15	0
NEW CIRCULATING WATER PIPE			
5-155	UNITS 2/1 CIRC WATER PIPE DESIGN	80	0
5-160	CIRC WATER PIPING - SPEC/ BID/ EVAL/ AWARD	130	0
5-165	FAB/ DELIVER UNITS 2/1 CIRC WATER PIPING	130	0
5-170	DEWATER UNITS 2/1 CIRC WATER PIPE AREAS	560	0
5-175	EXCAVATE / BACKFILL UNITS 2/1 CW PIPE TRENCHS	170	0
5-180	INSTALL NEW UNIT 2 CIRC WATER PIPING	160	0
5-185	INSTALL NEW UNIT 1 CIRC WATER PIPING	160	0
5-190	TEST & TURNOVER TO OPS UNIT 2 CIRC WATER PIPE	15	0
5-195	TEST & TURNOVER TO OPS UNIT 1 CIRC WATER PIPE	15	0
CONDENSER MODIFICATIONS			
3-050	CONDENSER MOD - EVALUATION & PLANNING	80	0
3-055	CONDENSER MOD - VENDOR SPEC/ BID/ EVAL/ AWARD	90	0
3-060	CONDENSER MOD - VENDOR ENGINEERING	80	0
3-065	CONDENSER MOD - FAB / DEL - UNIT 2/1	450	0
3-070	CONDENSER TUBES - SPEC/ BID/ EVAL/ AWARD	90	0
3-075	CONDENSER TUBES - FABRICATE - UNIT 2/1	275	0
3-080	RELOCATE UNIT 2 INTERFERENCES	32	0
3-083	SUMMARY UNIT 2 CONDENSER MODS	140*	0
3-085	OPEN UNIT 2 CONDENSER	5	0
3-090	REMOVE UNIT 2 CONDENSER TUBES & TUBE SHEETS	25	0
3-095	INSTALL NEW UNIT 2 CONDENSER TUBE SHEETS & TUBES	90	0
3-100	COMPLETE UNIT 2 CONDENSER WATER BOXES	90	0
3-105	LINE UNIT 2 PIPE & COMPLETE TIE-INS	120	0



Early Bar
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MD01

Sheet 2 of 3

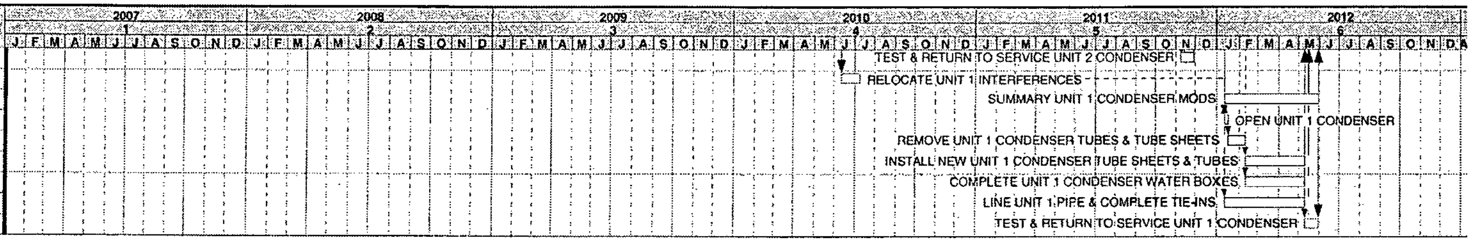
SALEM CWIS ALTERNATE INTAKE TECHNOLOGIES

MECHANICAL
COOLING TOWER REPORT 11050-360-MD

ATTACHMENT 3

Date	Revision	Checked	Approved

Activity ID	Activity Description	Rem Dur	%
3-110	TEST & RETURN TO SERVICE UNIT 2 CONDENSER	20	0
3-145	RELOCATE UNIT 1 INTERFERENCES	29	0
3-147	SUMMARY UNIT 1 CONDENSER MODS	140*	0
3-150	OPEN UNIT 1 CONDENSER	5	0
3-155	REMOVE UNIT 1 CONDENSER TUBES & TUBE SHEETS	25	0
3-160	INSTALL NEW UNIT 1 CONDENSER TUBE SHEETS & TUBES	90	0
3-165	COMPLETE UNIT 1 CONDENSER WATER BOXES	90	0
3-170	LINE UNIT 1 PIPE & COMPLETE TIE-INS	120	0
3-175	TEST & RETURN TO SERVICE UNIT 1 CONDENSER	20	0



☐ Early Bar
▬ Progress Bar

MD01

Sheet 3 of 3

SALEM CWIS ALTERNATE INTAKE TECHNOLOGIES

MECHANICAL
COOLING TOWER REPORT 11050-360-MD

ATTACHMENT 3

Date	Revision	Checked	Approved

Attachment 4 – Walkdown Report

PSEG Nuclear
Salem Nuclear Generating Station

Alternative Intake Technologies for CWIS
Walkdown Report for the Natural Draft Tower and Mechanical Draft Tower
Reports. Walkdown held 04/26/05.

Those Present:

E. Keating	(PSEG)
D. Blount	(S&L)
R. Hameetman	(S&L)
A. Sengupta	(S&L)

1. Purpose:

The purpose of this walkdown was to identify possible interferences and determine the feasibility and/or difficulty for installation of the following items for the closed cycle alternative for circulating water intake:

- Condenser tube bundle replacement
- Verify access path for the new tube bundles
- Identify interferences for the proposed circulating water piping changes on the east side of the condenser
- Verify the approximate locations and layout of the proposed mechanical and natural draft towers on site.

2. Condenser Tube Bundle Replacement & Access Path:

The west side of the condenser is the area of the plant designated for tube removal space as shown in the general arrangement drawings. The area is relatively clean and it was determined that only minor interferences have to be temporarily removed to transport the tube bundles and the outlet waterboxes. The west wall of the turbine building has removable siding at the waterbox locations (Photo 2) that will be removed to provide access for the 12' x 18' x 45' long new condenser tube bundles. It was also observed that there is enough space in the yard area outside the turbine building west wall (Photo 4) to maneuver the tube bundle assembly. It was determined during the walkdown that removal of the existing tube bundles and installation of the new tube bundles can be accomplished.

Photos 1 through 4 show the removal path for the tube bundles, the interferences on the west side of the condenser and the outside yard area west of the building. The main steam pipes and the pipe support structure, other than the two diagonal braces, will not interfere with the removal and replacement of the tube bundles. The two braces will be temporarily removed, and replaced after the condenser work is completed.

3. East Side Condenser Waterbox Walkdown:

The inlet waterboxes on the eastside of the condenser will require replacement to convert to the new two-pass condenser that is necessary for the cooling tower addition. The circulating water piping in the inlet side will also require significant modification to accommodate the inlet and discharge pipe configuration for a two-pass condenser.

The cold water is supplied to the existing waterbox via. 7 ft diameter concrete pipes, that are buried. The buried concrete pipe penetrates the concrete floor at the turbine building base slab as a riser that is attached to the bottom of the condenser water box using an expansion joint (see Photo # 5). The space around the existing concrete inlet pipe is limited, for any reconfiguration of these pipes that will be required. The walkdown identified numerous interferences, some of which may be very difficult to relocate (see Photos 6 through 8). The walkdown also determined that due to limited space on the inlet side of the existing condenser and the numerous large and small diameter pipes, pumps, and electrical panels that fill the area, condenser upgrade will be very difficult. The existing large diameter condensate pipes (Photo 6) may require relocation to accommodate the new CW inlet piping. The inlet side was not configured for the type of changes required. The condenser was designed to remove the tube bundles from the discharge (west) side. The attached Photos 6 through 8 identify the interferences on the east side of the condenser.

Subsequent to the walkdown, a review of the walkdown photos and the plant general arrangement drawings for unit 2 determined that the FW MSR reheater drain tanks No. 2A, 2B, and 2C (and associated piping) and the No. 2 Gland Steam Condenser (and associated piping) will have to be temporarily relocated to install the new CW inlet and return piping. This review also identified that the Vacuum Pump Nos. 22, 23, 24, and 25 (and associated piping) as well as electrical panel Nos. 730, 380, and 385 will have to be permanently relocated, to install the new CW inlet and return piping. The equipment requiring relocation for unit 1 is expected to be similar.

4. East Wall - Outside Turbine Building:

The area outside the turbine building wall directly east of the condenser waterboxes was observed for obstructions to circulating water piping modifications. The Unit 2 Condensate Polishing Building is directly over the circulating water piping (Photo 9). The Condensate Polishing Building has pipes and a concrete subbasement under the floor slab that were determined to require significant demolition and reinstallation activity, if the building were to be relocated. Therefore, the new inlet piping for Unit 2 condenser will be modified east of the condensate polishing building, routed over the condensate polishing building, and through the outside concrete panel wall of the Turbine Building. See Photos 9 through 11.

5. Outside Area near the Old Guardhouse:

The outside area near the old guardhouse (outside the southwest corner of the turbine building) was observed. This location will be where the circulating water main piping runs from the towers will connect with the existing circulating water piping. Interference's exist with the Unit 1 Condensate Polishing building and potentially with the "B" building (offices) and the buildings may have to be partially demolished.

6 Tower Locations east of the Plant Switchyard:

The outside area east of the switchyard, selected for the tower locations was observed. The area is clear, with few obstructions or interferences. The towers have been located with consideration for an allowance for clearance during construction. However, if later review during actual design determines that additional clearance is needed for construction, towers can be moved further east from the location shown in the Figure 1 in Attachment 1. An alternate location, shown in Figure 2, Attachment 1, was walked to determine its acceptability. It appears there may be enough space to locate the towers per Figure 2, which would considerably reduce the length of new supply and discharge piping to the condenser. However, due to limited space, acceptability of this option can only be verified during design phase, after the final tower sizes, and required construction clearances are confirmed. Photo12 shows the proposed tower locations between the transmission lines.

Prepared By: A. Sengupta

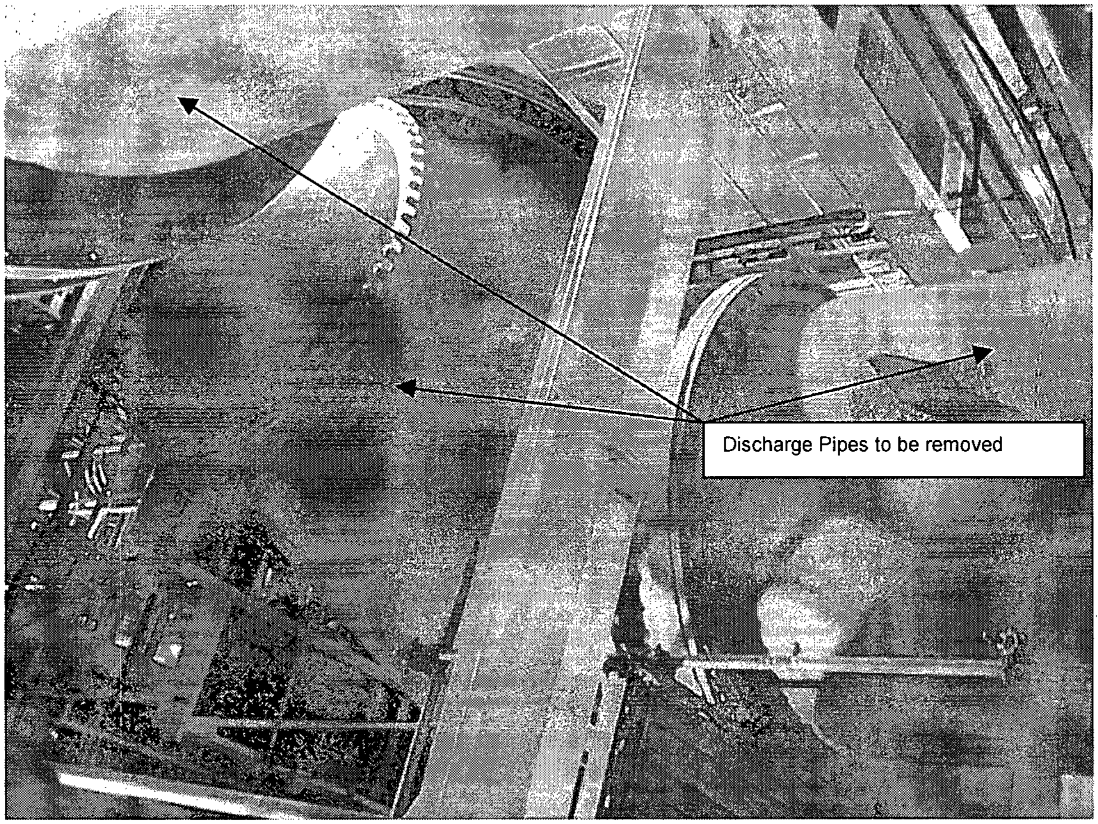
Reviewed By: R. Hameetman

Attachment – Photos 1 through 12

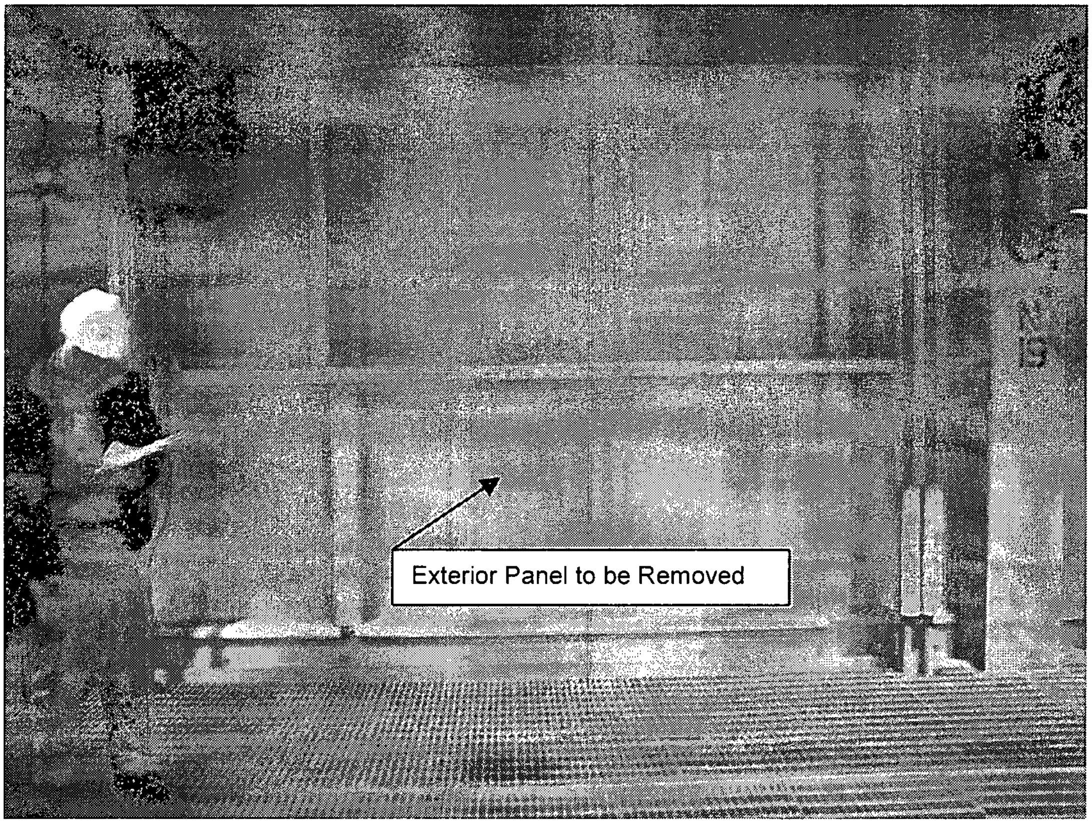
Copies:

All Attendees
J. Gelston
P. Garza

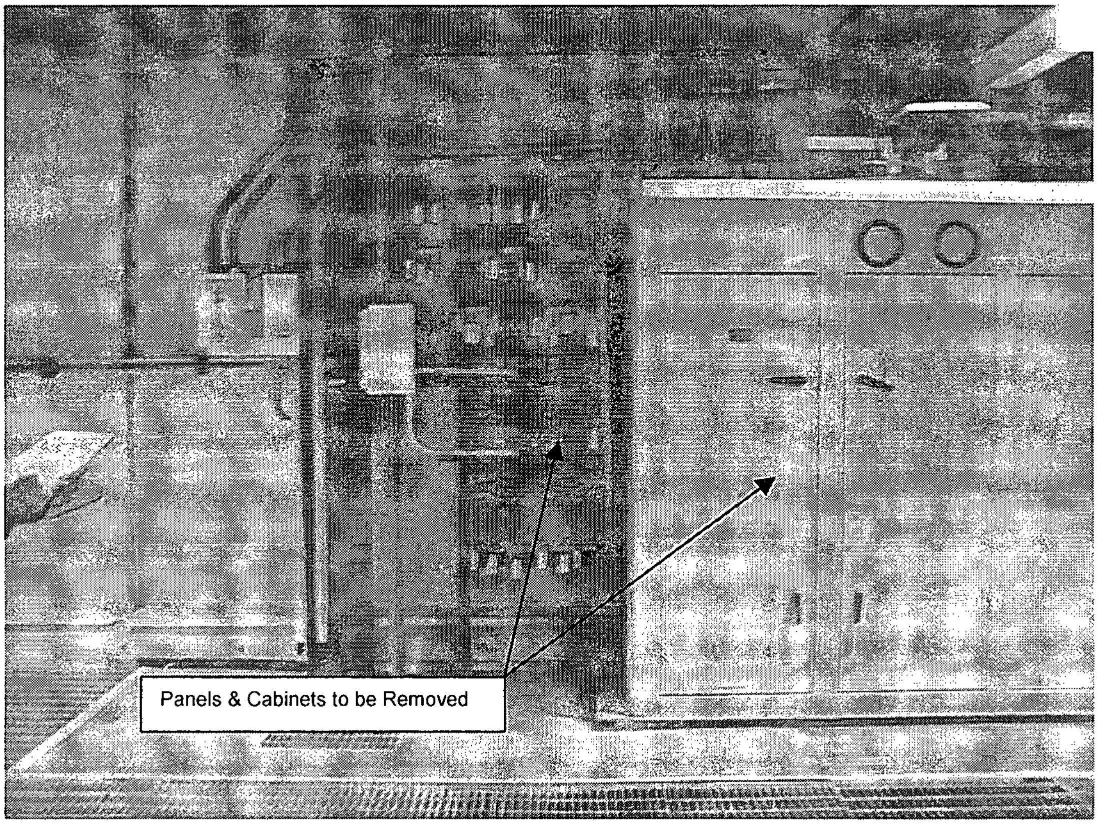
Walkdown Pictures



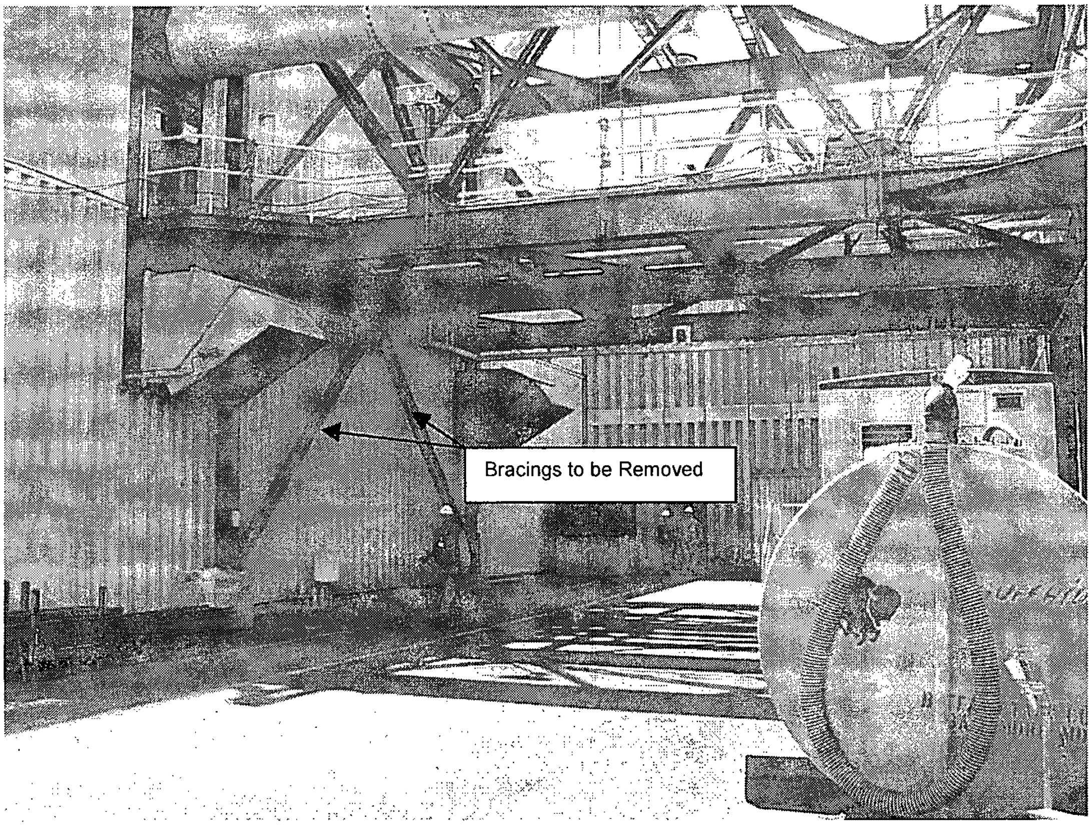
Natural Draft Cooling Tower Report
CW Discharge Pipes on West Side of Waterbox
Attachment 4, Photo # 1



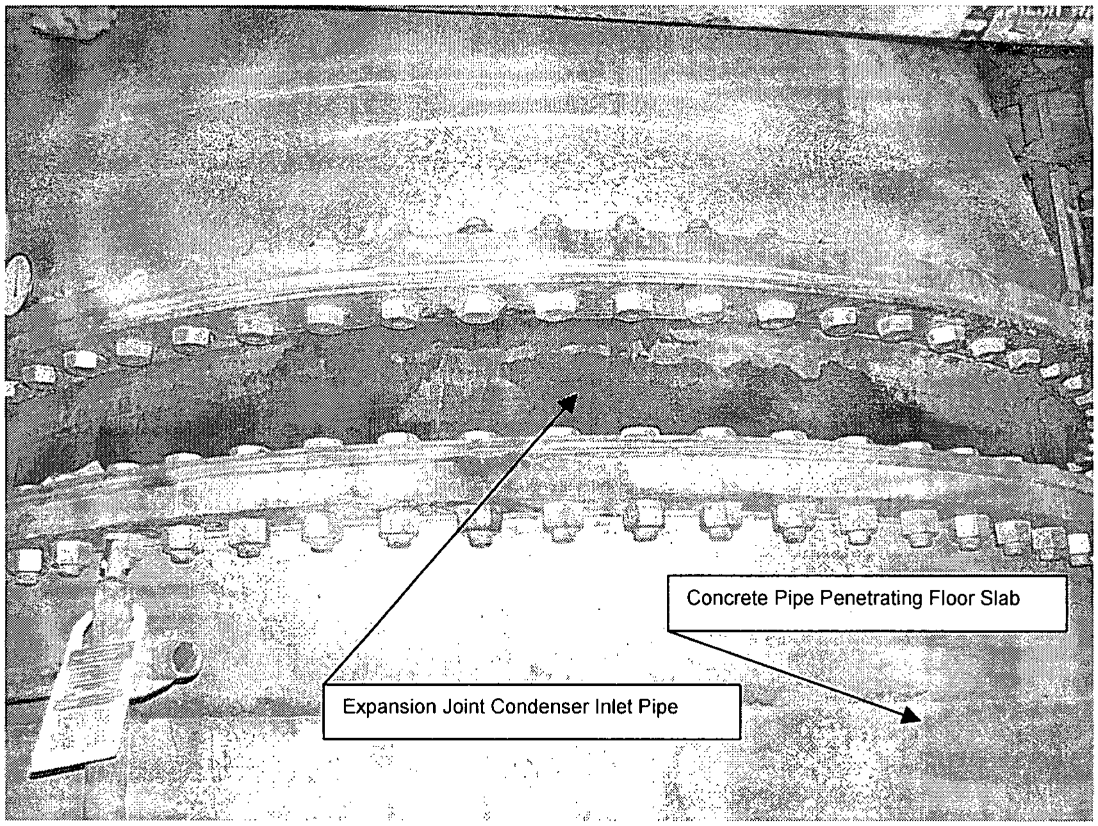
Natural Draft Cooling Tower Report
Removal Path for Condenser Parts
Attachment 4, Photo_2



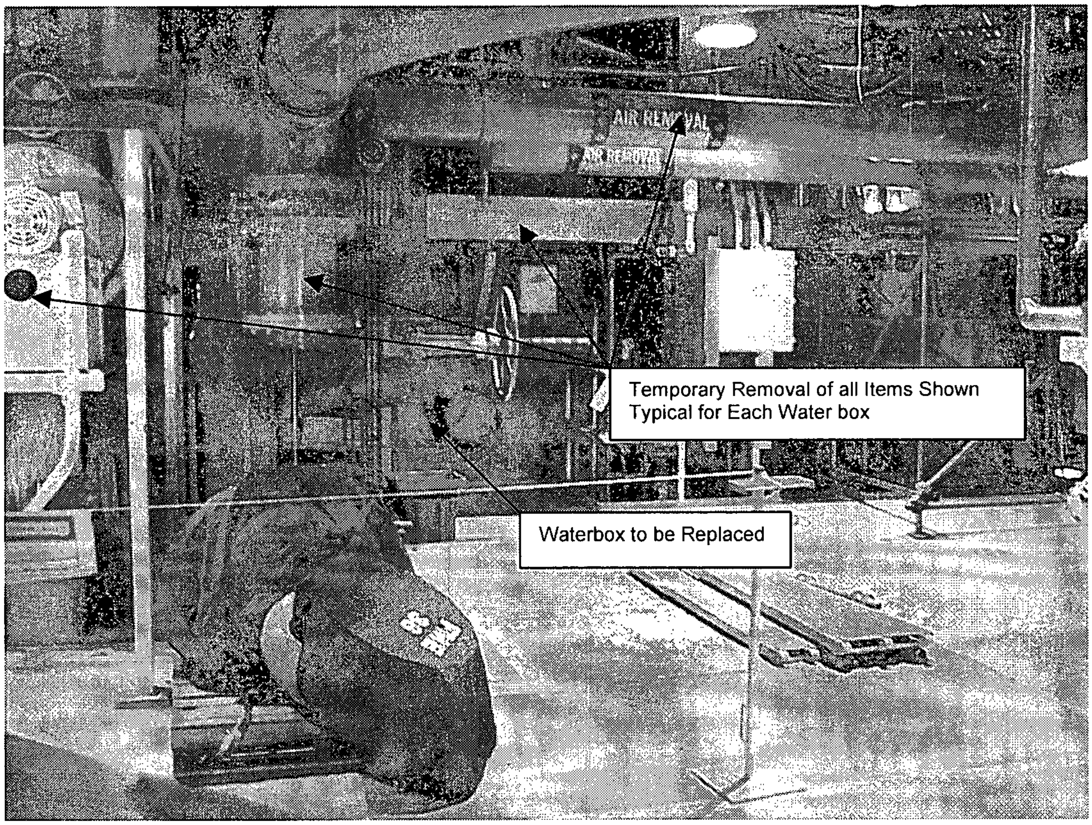
Natural Draft Cooling Tower Report
Interference in Removal Path for Condenser Parts
Attachment 4, Photo_3



Natural Draft Cooling Tower Report
Interference in Removal Path for Condenser Parts
Attachment 4, Photo_4



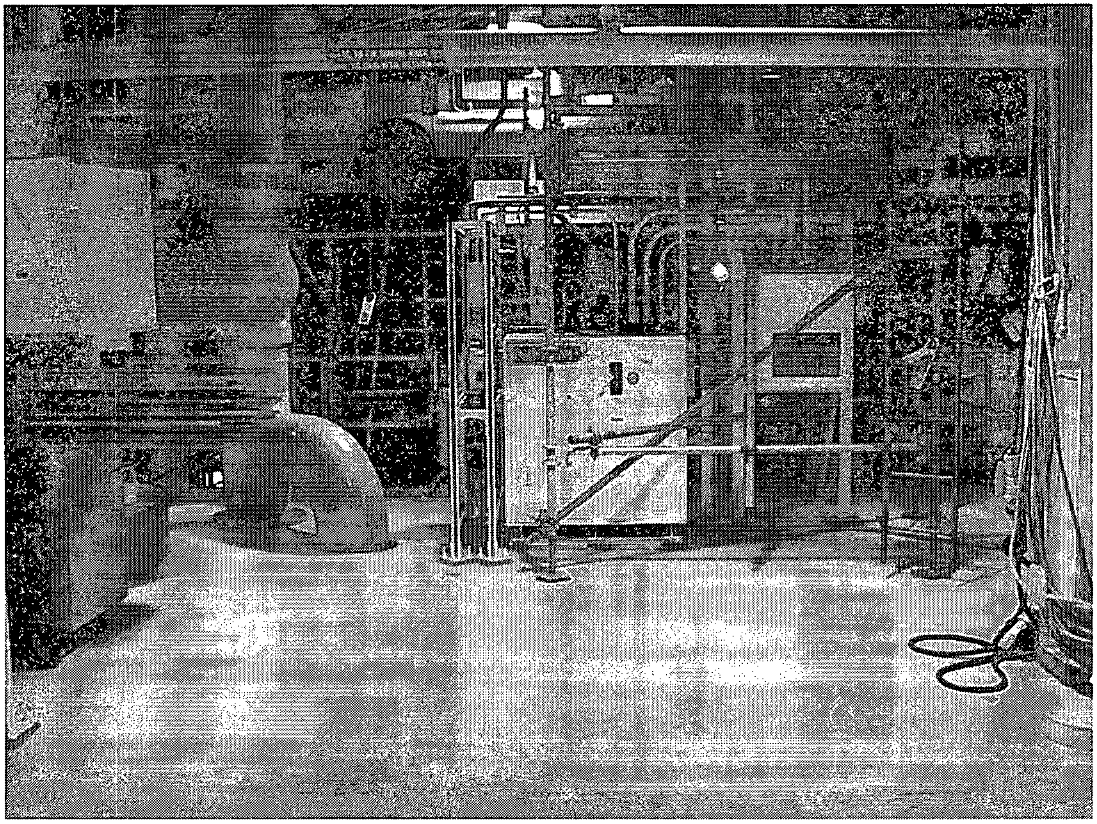
Natural Draft Cooling Tower Report
Attachment 4, Photo_5



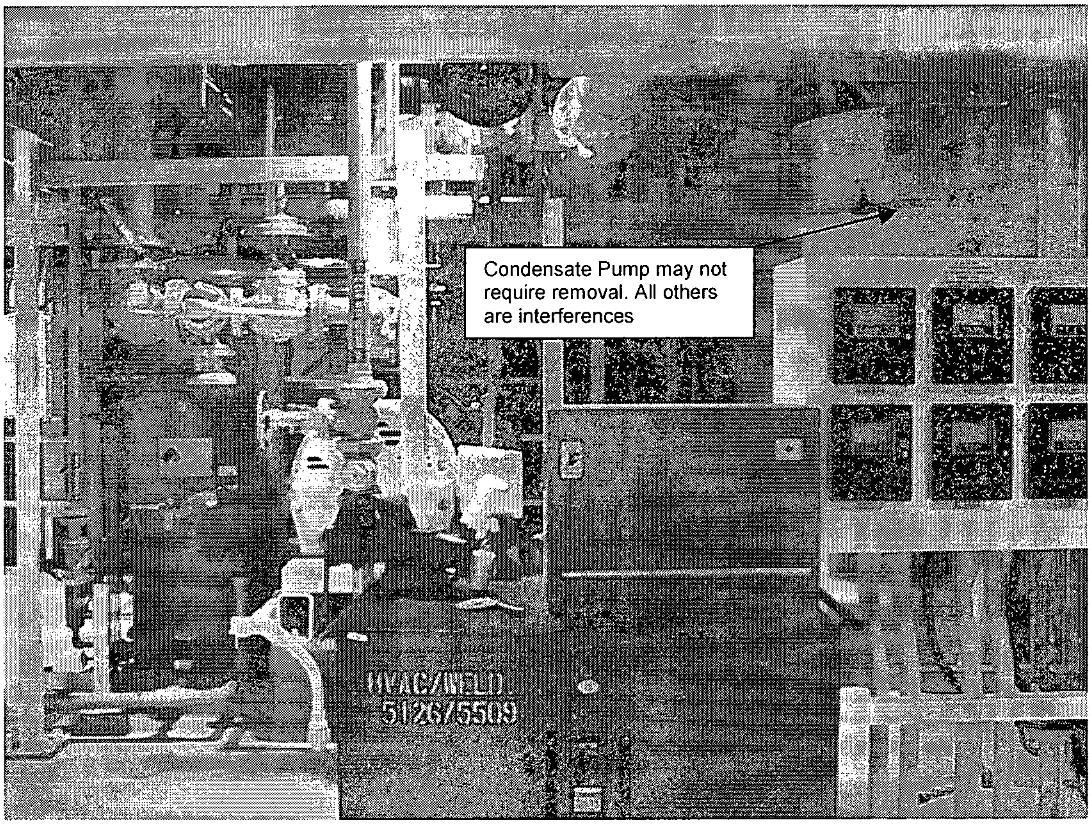
Temporary Removal of all Items Shown
Typical for Each Water box

Waterbox to be Replaced

Natural Draft Cooling Tower Report
Typical Interference on East Side of Condenser
Attachment 4, Photo_6

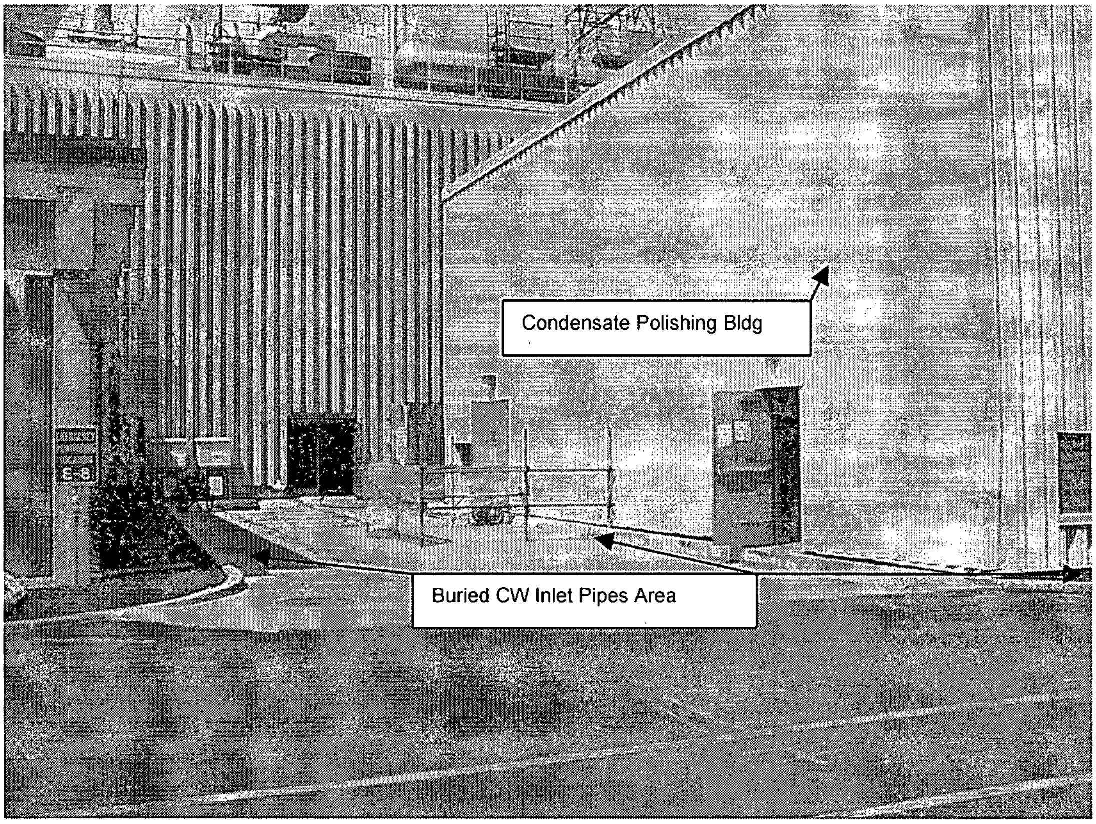


Natural Draft Cooling Tower Report
El 100' Interferences Requiring Removal
Attachment 4, Photo_7

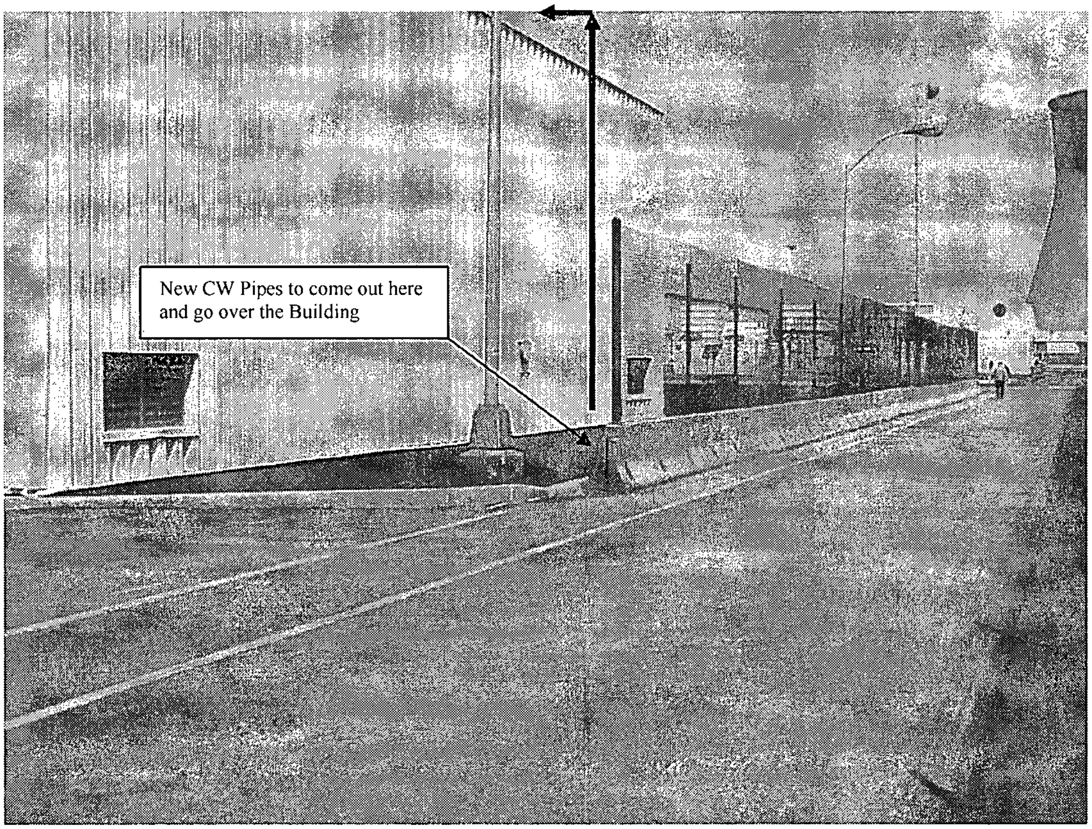


Condensate Pump may not require removal. All others are interferences

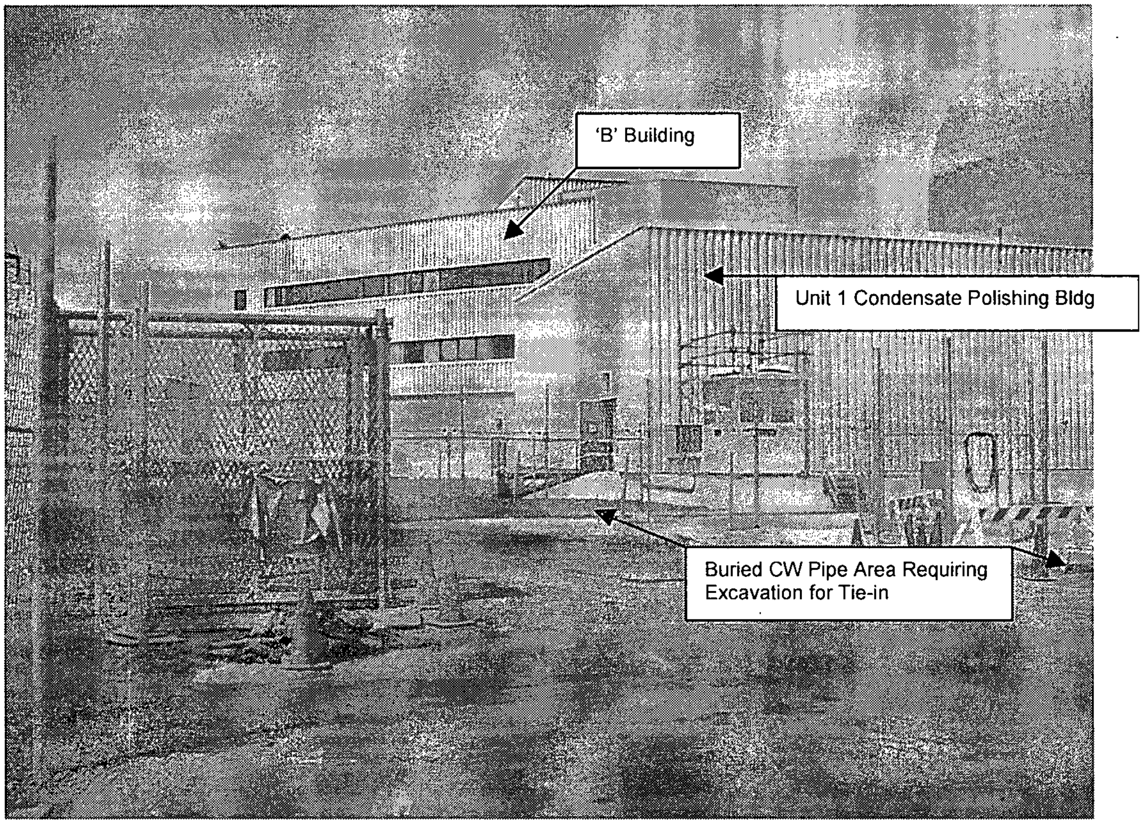
Natural Draft Cooling Tower Report
El 100' Interferences Requiring Removal
Attachment 4, Photo_8



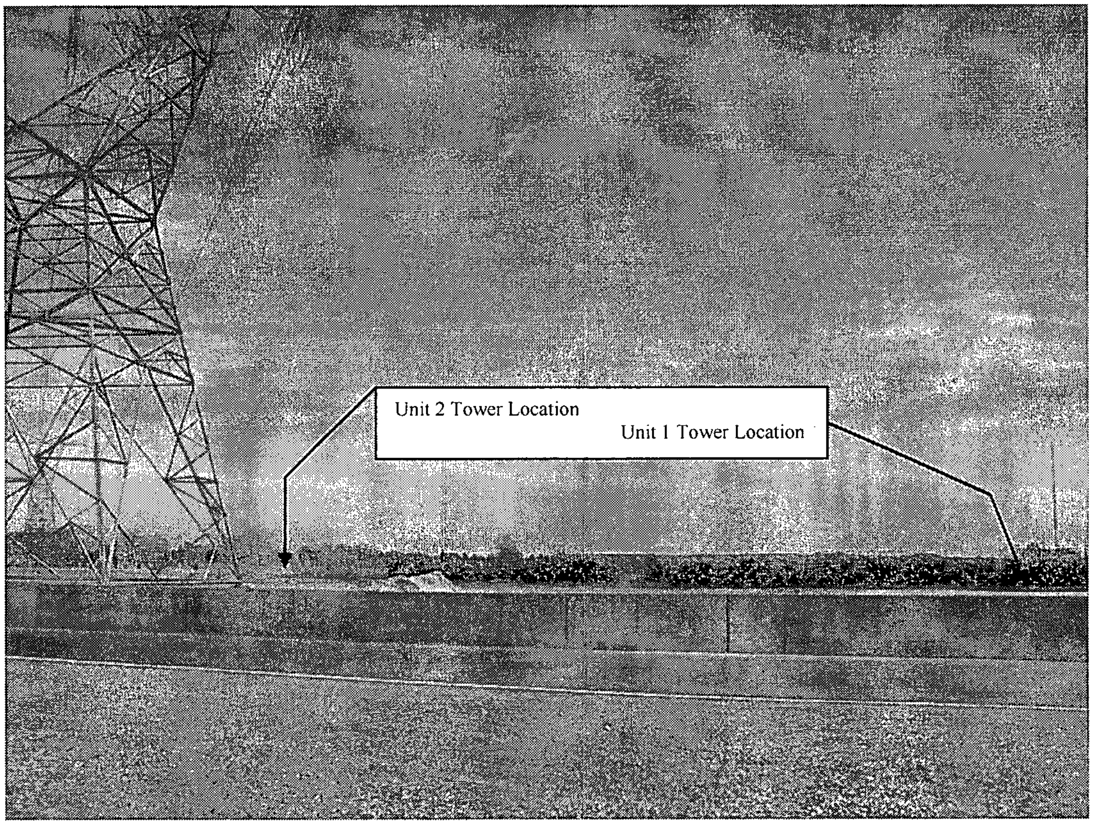
Natural Draft Cooling Tower Report
El 100' East Side of Turbine Building
Attachment 4, Photo_9



Natural Draft Cooling Tower Report
Attachment 4, Photo_10



Natural Draft Cooling Tower Report
Attachment 4, Photo_11



Natural Draft Cooling Tower Report
Proposed Tower Locations
Attachment 4, Photo_12

Attachment 5 – Salem MD Tower Heat Balance Evaluation

ATTACHMENT 5

SALEM – HEAT BALANCE EVALUATION

Heat Balance Evaluation with Various CW Temperatures, New Cooling Tower Option, and New Two (2) Pass Condenser Option

Prepared: ______________________ Date 11-17-2005
Pawel Kut - Sargent & Lundy^{LLC}

Reviewed: ______________________ Date 11/17/05
Sangeet Gupta - Sargent & Lundy^{LLC}

1. PURPOSE

The purpose of this attachment is to document the anticipated Gross Plant Output and Condenser Backpressure as a function of Circulating Water (CW) inlet temperature with the existing plant configuration, new Cooling Tower (CT) option (reduced CW flow), and new Two (2) Pass Condenser option along with new Cooling Tower option. Additionally, the anticipated average yearly Gross Plant Output is evaluated for each option based on the 1999 and 2000 average monthly River Intake and Wet Bulb Temperatures.

2. METHODOLOGY

2.1 Heat Balance Cases

The previously developed PEPSE^{TM} Heat Balance model (PEPSE^{TM} Set 30 "100% Load, Summer, SGBD to Condenser") [Ref 5.1] is utilized to prepare the following three sets of parametric runs with various CW inlet temperatures:

All runs are prepared at 100% Load with Steam Generator Blowdown (SGBD) to the Condenser

- First set of five runs utilizes the existing plant configuration with CW temperature ranging from 32 to 95°F with current CW flow as documented in PEPSE^{TM} Model [Ref. 5.1]. Note, per Paragraph 3.2

that the CW inlet temperature is 90°F; the model was run at 95°F to bound all expected conditions.

- Second set of five runs reduces the CW flow to 511,020 gpm (the reduced flow is for the new Cooling Tower option based on the design flow for the new Condenser [Ref. 5.2]) with CW temperature ranging from 32 to 95°F.
- Third set of five runs utilizes the new Two (2) Pass Condenser option along with the reduced CW flow of 511,020 gpm (new Cooling Tower option) and with CW temperature ranging from 32 to 95°F.

Table 2-1 below summarizes all PEPSE runs performed in this Attachment.

Table 2-1: Case Descriptions

Case	PEPSE™ Set	Description	CW Inlet Temp	New CT option	New Two (2) pass Condenser option
1A	30	100% Load, 95°F, Current CW Flow	95°F	-	-
1B	31	100% Load, 70°F, Current CW Flow	70°F	-	-
1C	32	100% Load, 61°F, Current CW Flow	61°F	-	-
1D	33	100% Load, 50°F, Current CW Flow	50°F	-	-
1E	34	100% Load, 32°F, Current CW Flow	32°F	-	-
2A	35	100% Load, 95°F, Reduced CW Flow	95°F	Yes	-
2B	36	100% Load, 70°F, Reduced CW Flow	70°F	Yes	-
2C	37	100% Load, 61°F, Reduced CW Flow	61°F	Yes	-
2D	38	100% Load, 50°F, Reduced CW Flow	50°F	Yes	-
2E	39	100% Load, 32°F, Reduced CW Flow	32°F	Yes	-
3A	40	100% Load, 95°F, Reduced CW Flow, New Condenser	95°F	Yes	Yes
3B	41	100% Load, 70°F, Reduced CW Flow, New Condenser	70°F	Yes	Yes
3C	42	100% Load, 61°F, Reduced CW Flow, New Condenser	61°F	Yes	Yes
3D	43	100% Load, 50°F, Reduced CW Flow, New Condenser	50°F	Yes	Yes
3E	44	100% Load, 32°F, Reduced CW Flow, New Condenser	32°F	Yes	Yes

2.2 PEPSE^{TM} Software

Heat balance models are created using PEPSE^{TM}, developed by Scientech, Inc. [Ref. 4.3]. PEPSE^{TM} is a computer code which simulates the secondary plant by modular representation of the plant's component hardware in the steady state. It evaluates the thermal performance of individual components and of the entire plant power train by performing steady-state heat balances on fluid systems. PEPSE^{TM} has been validated under Sargent & Lundy's (S&L) quality assurance program, and is executed under S&L Program No. 03.7.551-6.6. The computer runs were made on the S&L PC No. PC9001.

3. INPUTS

3.1 PEPSE^{TM} Heat Balance Model and Diagram from Heat Balance Calculation [Ref. 5.1]

Sgbd.mdl	685KB	8/19/04	8:56 AM
Sgbd_Diagram.mdl	178KB	10/6/04	3:33 PM

3.2 New Condenser Design Information as obtained from data sheet {Ref. 5.2].

Condenser Guaranteed Backpressure:	3.85 inches HgA at Duty of 7,410.5 x 10^6 Btu/hr.
Tube Material :	B338, Gr. 2 Titanium
Tube Outside diameter:	1 inch
Tube BWG:	25

Number of Tubes: 65,904

Effective Tube length: 537.5 inches

Tube Cleanliness: 90%

CW Flow: 511,020 gpm

CW Inlet Temperature: 90°F

Number of Water Passes: 2

3.3 CW River Intake Temperature (°F) presented below is obtained as a monthly average based on an average of two years (1999 & 2000) per Reference 5.4.

Table 3-1: CW River Intake Temperature (°F)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
38.6	39.3	45.6	54.8	65.8	75.7	81.5	80.8	74.6	63.9	53.9	43.1

3.4 Wet Bulb Temperature (°F) presented below is obtained as a monthly average based on an average of two years (1999 & 2000) per Reference 5.5.

Table 3-2: Wet Bulb Temperature (°F)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
32.6	35.0	38.7	46.3	58.5	66.1	69.5	68.6	62.8	52.3	43.1	31.9

3.5 The original design CW inlet temperature is 61.8°F per Reference 5.2.

4. ASSUMPTIONS

4.1 The Cooling Tower approach temperature is assumed to be 14°F based on a typical cooling tower design (see Section V,D of the main report).

4.2 For the purpose of estimating the average yearly gross power generation for various options analyzed, the plant is assumed 100% operational for 365 days in a year.

5. REFERENCES

5.1 Calculation S-1-GB-MDC-2032, Rev. 0IR0, "PEPSE Model for Salem Generating Station 1 – Steam Generator Blowdown Modification".

(Note: This Calculation was prepared and reviewed by Sargent & Lundy LLC, however it has not yet been validated by PSEG. For the purposes of this conceptual design and estimate this PSEG validation is not required as stated in PSEG email [Ref. 5.6].

5.2 New Alstom Condenser Data Sheet and Table A, 24 March 2005, Ref: 4209-05-168HT, (presented in Section 8 of this Attachment).

5.3 PEPSE^{TM} Version 66.2 and associated Users Manual and Reference Manual (S&L Program No. 03.7.551-6.6). Controlled File Path: \\SNL1B\SYS3\OPS$\PEP55166\.

5.4 E-mail transmitting River Inlet Temp, e-mail dated 5 May, 2005, from E. Keating (PSEG) to R. Hameetman (Sargent & Lundy), Subject: Intake Temperatures, (presented in Section 8 of this Attachment).

5.5 E-mail transmitting Average Wet Bulb Temp, e-mail dated 16 May, 2005, from R. Hameetman (Sargent & Lundy) to P. Kut (Sargent & Lundy), Subject: Cooling Tower Temperatures, (presented in Section 8 of this Attachment).

5.6 E-mail documenting acceptability of usage of the PEPSE Model from Reference 5.1 , e-mail dated 11 August, 2005 from E. Keating (PSEG) to R. Hameetman (Sargent & Lundy), Subject: PEPSE Model, (presented in Section 8 of this Attachment).

6. RESULTS

6.1 Heat Balance Results

Results of the heat balance analyses are presented in Table 6-1 below. Heat Balance Diagrams are presented in Section 7.

Table 6-1: Heat Balance Results

CW Inlet Temp	Current Design (Case 1)		Reduced CW Flow (511,020 gpm, Cooling Tower Option, Case 2)		Reduced CW Flow (511,020 gpm) and New Two (2) pass Condenser (Case 3)	
	Gross Output (Mwe)	Condenser Backpressure (inches HgA)	Gross Output (Mwe)	Condenser Backpressure (inches HgA)	Gross Output (Mwe)	Condenser Backpressure (inches HgA)
95°F	1163.2	3.59	1103.4	5.89	1131.7	4.72
90°F	1178.1[1]	3.23[2]	1122.1[1]	5.32[2]	1149.7[1]	4.24[2]
70°F	1217.2	1.78	1180	3.03	1201.6	2.34
61.8°F	1224.8[1]	1.43[2]	1196.8[1]	2.49[2]	1214.6[1]	1.87[2]
61°F	1225.3	1.4	1198.5	2.44	1216.1	1.82
50°F	1230.1	1.05	1213.9	1.91	1225.9	1.36
32°F	1229.2	0.69	1225.9	1.36	1230.4	0.86

1. Values obtained using equations from curve fits in Figures 6-1 through 6-3.
2. Values obtained using linear interpolation.

The results of this analysis show that the effects of conversion to a closed cycle cooling system, will produce a significant loss of gross MWe output.

The first case titled "Current Design" (Case 1), shows the effect of increasing the temperature of the condenser inlet cooling water. The condenser backpressure increases from 1.43 in Hga at the original design inlet water temperature of 61.8°F, to 3.23 in Hga at the new design inlet temperature of 90°F. This results in a loss of gross generation of 46.7 MWe, from 1224.8 MWe down to 1178.1 MWe or ~4% of the existing generation, just due to the change in water temperature for closed cycle cooling.

The second case titled "Reduced CW Flow " (Case 2), shows the effect of installing a cooling tower, which requires reducing the flow by approximately half to 511,020 gpm. At 90°F the backpressure will 5.32 in Hga. This results in a loss of gross generation of 102.7 MWe from the current design, from 1224.8 MWe down to 1122.1 MWe, or ~8% of the existing generation.

The final case titled "Reduced CW Flow and New Condenser" (Case 3), shows the effect of converting to a cooling tower and changing out the condenser tubes. Some efficiency is gained by a more efficient arrangement of the condenser tubes, and better tube material that provides a better heat transfer rate. The CW flowrate is 511,020 gpm for this case. The increased efficiency of the new condenser provides some improvement in gross generation vs. Case 2. Table 6-1 shows that the condenser backpressure is 4.24 in Hga. This results in a lost generation of 75.1 MWe from the current design, from 1224.8 MWe down to 1149.7 MWe, or ~6 %.

The PEPSE^{TM} results as given in Table 6-1 are then utilized by Excel to develop functions of Gross Output vs. CW Temperature for each set of cases as shown in Figures 6-1 through 6-3. These equations can be later used to predict the Gross Output at any CW temperature between 32 and 95°F for the three sets of runs presented in this Attachment.

Figure 6-1, Current Design (Case 1)

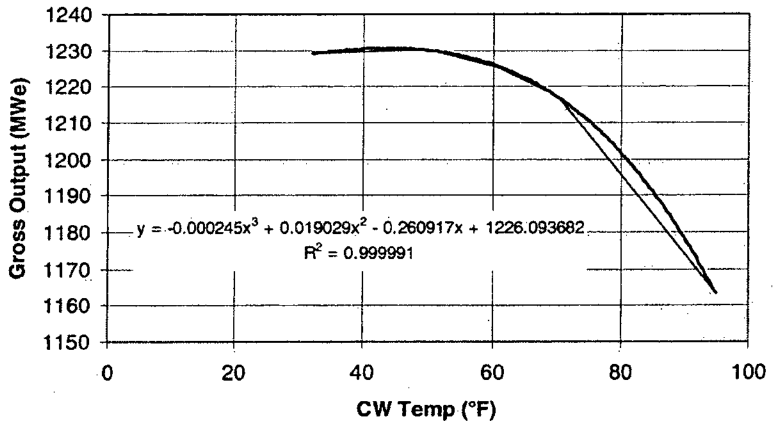


Figure 6-2, Reduced CW Flow (Case 2)

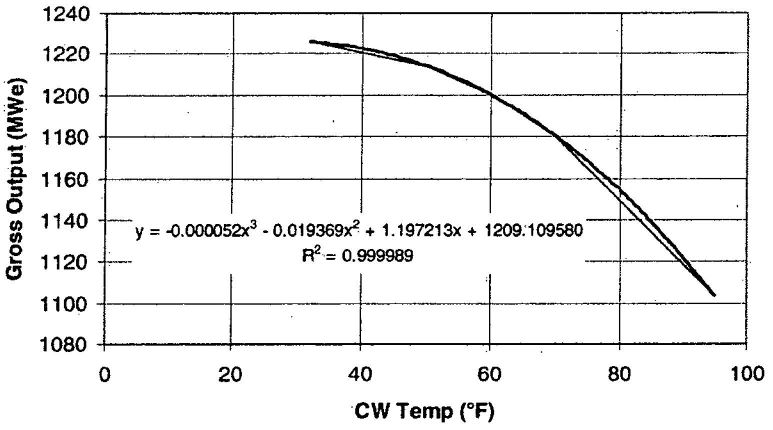
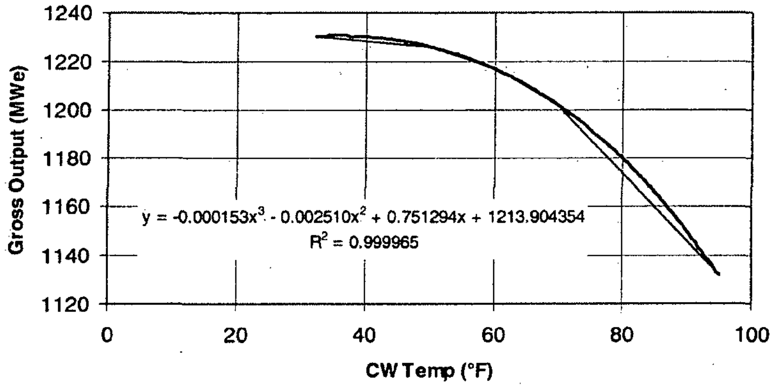


Figure 6-3, Reduced CW Flow and New Condenser (Case 3)



6.2 Gross Plant Output Prediction

The anticipated average yearly Gross Plant Output is presented in Tables 6-1 through 6-3 for each option based on the 1999 and 2000 average monthly River Intake and Wet Bulb Temperatures and 100% load plant operation for 365 days a year.

Table 6-1: Average Yearly Generation for Current Design

Month	Average River Temp	Average Gross Power	Number of Days per Month	Average Monthly Generation
	°F	MW		MW-hours
Jan	38.6	1230.3	31	915,331
Feb	39.3	1230.4	28	826,801
Mar	45.6	1230.5	31	915,517
Apr	54.8	1228.6	30	884,607
May	65.8	1221.5	31	908,808
Jun	75.7	1209.1	30	870,557
Jul	81.5	1198.6	31	891,755
Aug	80.8	1200.0	31	892,803
Sep	74.6	1210.8	30	871,786
Oct	63.9	1223.2	31	910,058
Nov	53.9	1228.9	30	884,843
Dec	43.1	1230.6	31	915,552
Total				10,688,419

Table 6-2: Average Yearly Generation for New Cooling Tower

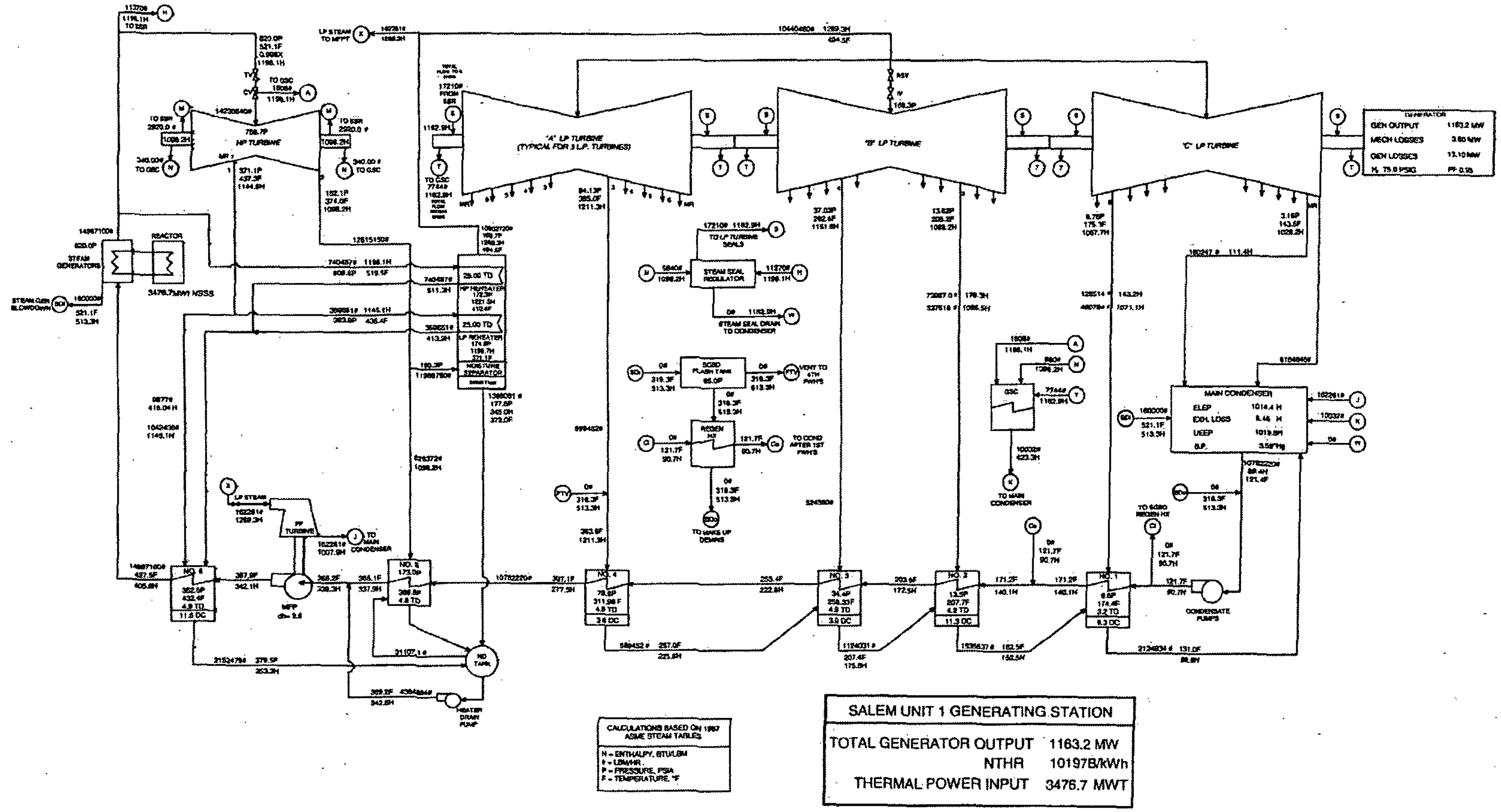
Month	Average WB Temp	CT Approach	Average CW Inlet Temp	Average Gross Power	Number of Days per Month	Average Monthly Generation
	°F	°F	°F	MW		MW-hours
Jan	32.6	14	46.6	1217.6	31	**905,877**
Feb	35	14	49	1215.2	28	**816,581**
Mar	38.7	14	52.7	1210.8	31	**900,834**
Apr	46.3	14	60.3	1199.5	30	**863,620**
May	58.5	14	72.5	1174.3	31	**873,667**
Jun	66.1	14	80.1	1154.0	30	**830,888**
Jul	69.5	14	83.5	1143.8	31	**850,956**
Aug	68.6	14	82.6	1146.5	31	**853,029**
Sep	62.8	14	76.8	1163.3	30	**837,545**
Oct	52.3	14	66.3	1188.2	31	**884,013**
Nov	43.1	14	57.1	1204.6	30	**867,340**
Dec	31.9	14	45.9	1218.2	31	**906,360**
Total						**10,390,711**

Table 6-3: Average Yearly Generation for New Cooling Tower and New Two (2) Pass Condenser

Month	Average WB Temp	CT Approach	Average CW Inlet Temp	Average Gross Power	Number of Days per Month	Average Monthly Generation
	°F	°F	°F	MW		MW-hours
Jan	32.6	14	46.6	1228.0	31	**913,618**
Feb	35.0	14	49	1226.7	28	**824,336**
Mar	38.7	14	52.7	1224.1	31	**910,755**
Apr	46.3	14	60.3	1216.5	30	**875,905**
May	58.5	14	72.5	1196.9	31	**890,475**
Jun	66.1	14	80.1	1179.3	30	**849,131**
Jul	69.5	14	83.5	1170.1	31	**870,527**
Aug	68.6	14	82.6	1172.6	31	**872,423**
Sep	62.8	14	76.8	1187.5	30	**854,995**
Oct	52.3	14	66.3	1208.1	31	**898,821**
Nov	43.1	14	57.1	1220.1	30	**878,498**
Dec	31.9	14	45.9	1228.3	31	**913,859**
Total						**10,553,342**

7. HEAT BALANCE DIAGRAMS

Case 1A - 100% Load, 95°F, Current CW flow



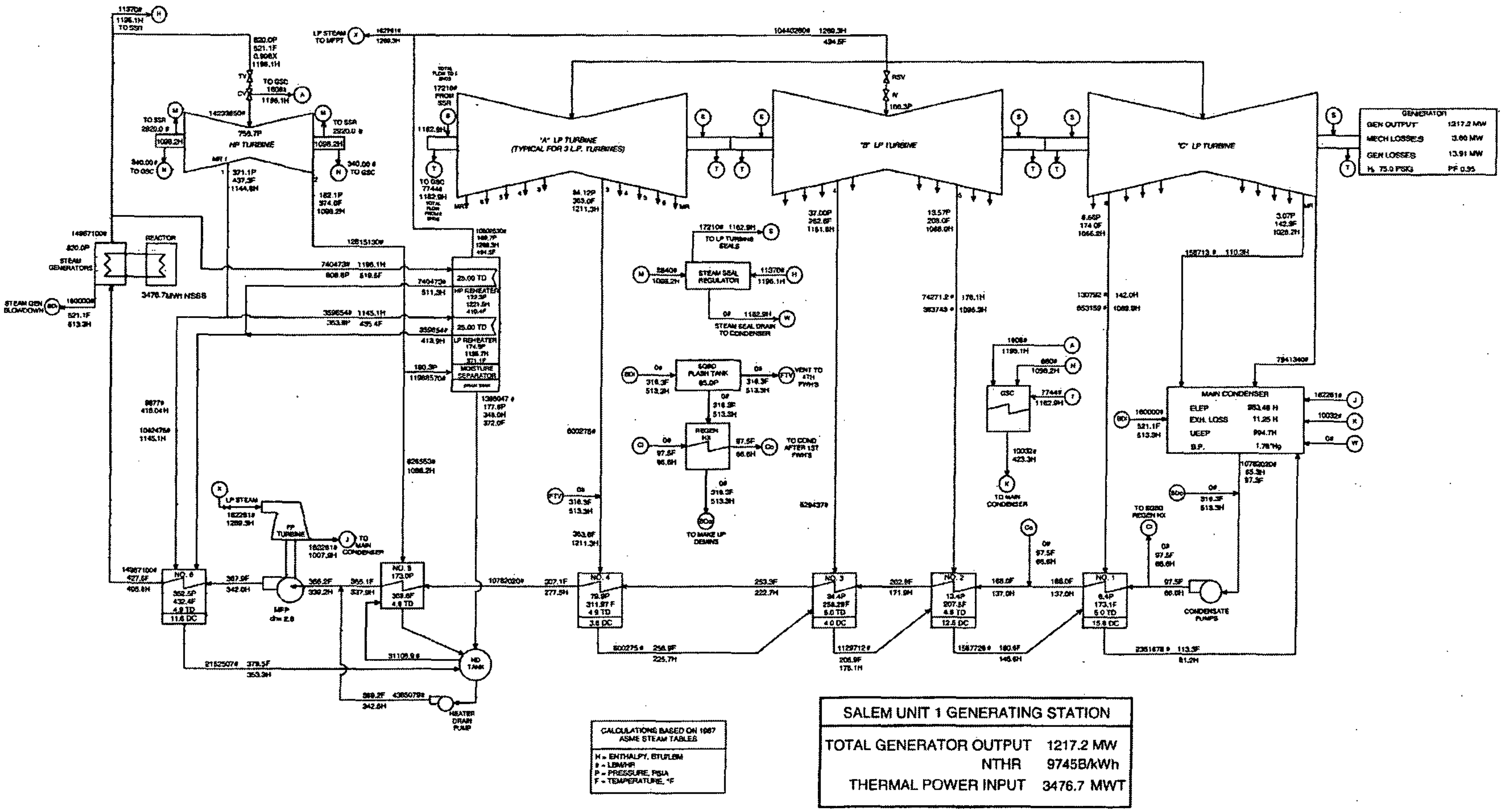
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR.
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1163.2 MW
NTHR	10197B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 1B - 100% Load, 70°F, Current CW flow



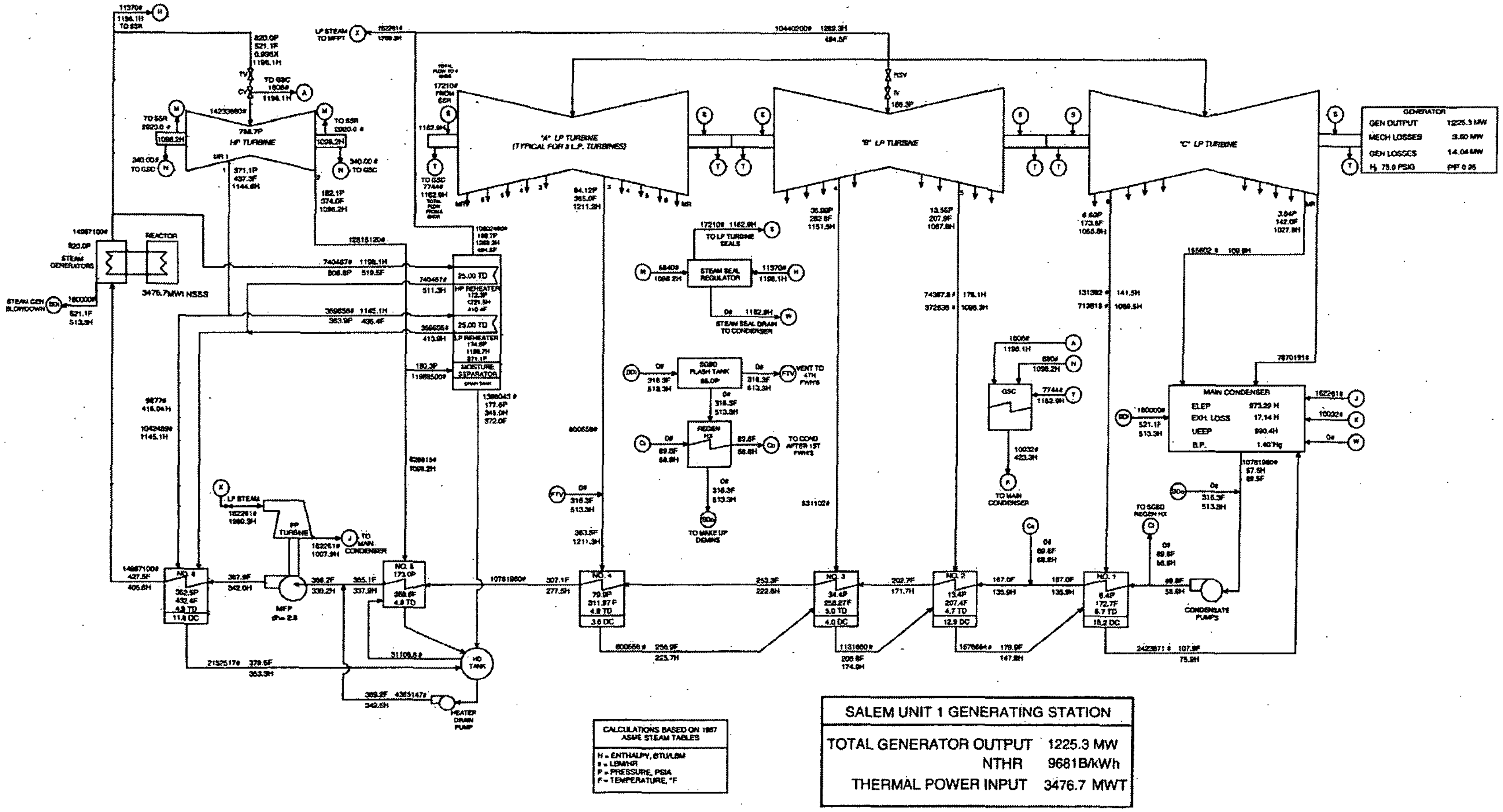
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

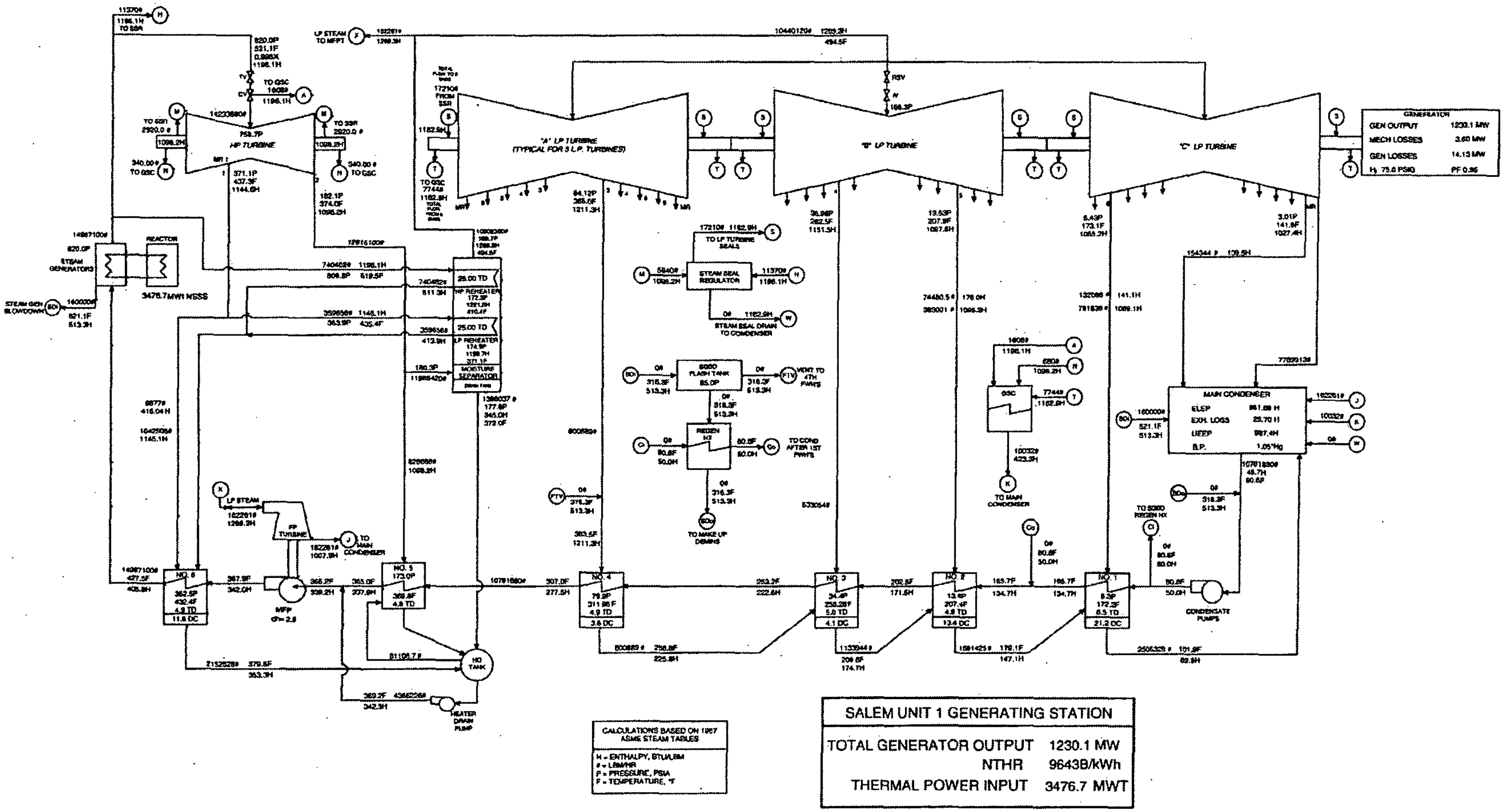
SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1217.2 MW
NTHR	9745B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 1C - 100% Load, 61°F, Current CW flow



Case 1D - 100% Load, 50°F, Current CW flow



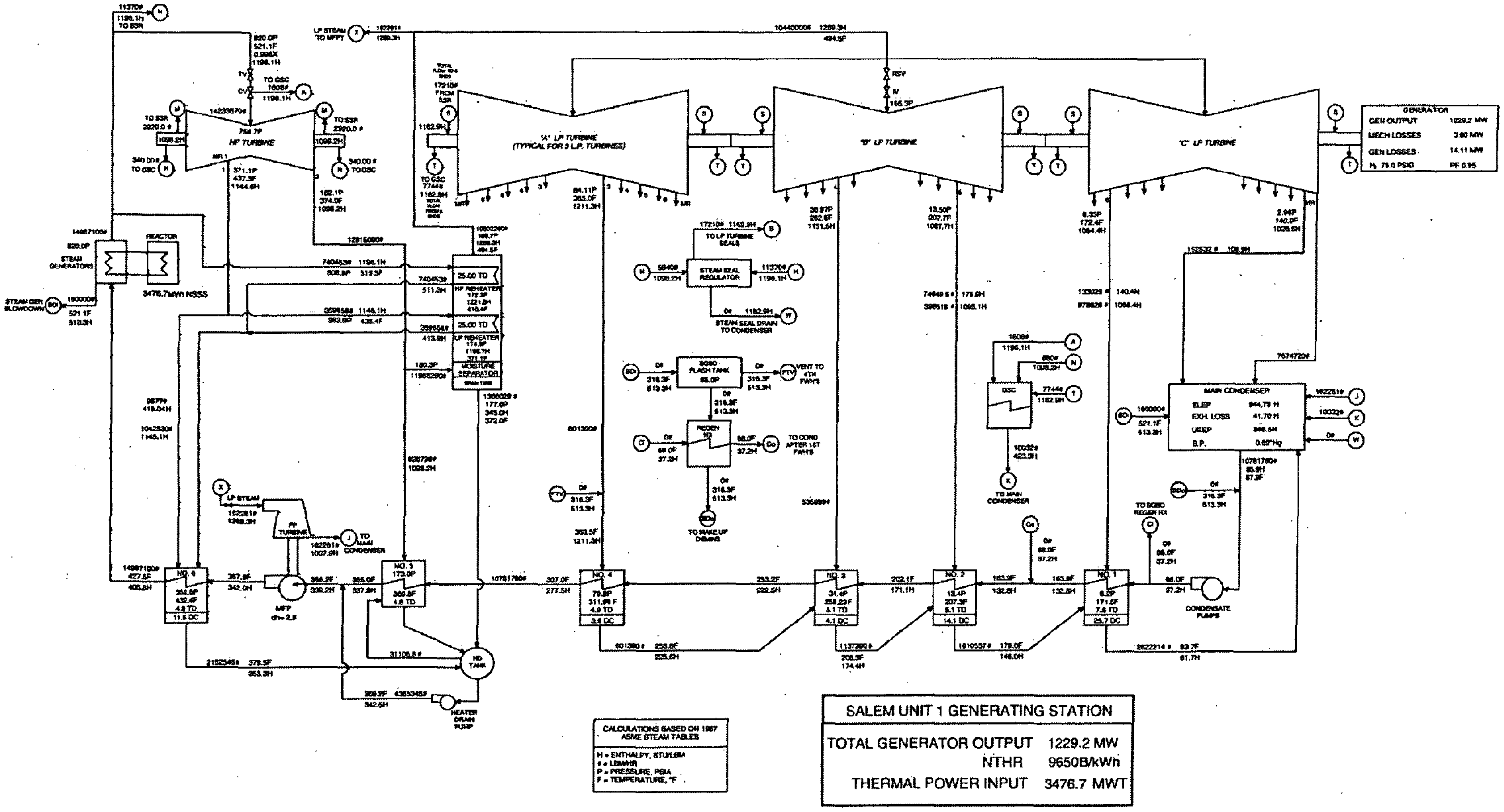
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H - ENTHALPY, BTU/LBM
- LBM/HR
P - PRESSURE, PSIA
F - TEMPERATURE, °F

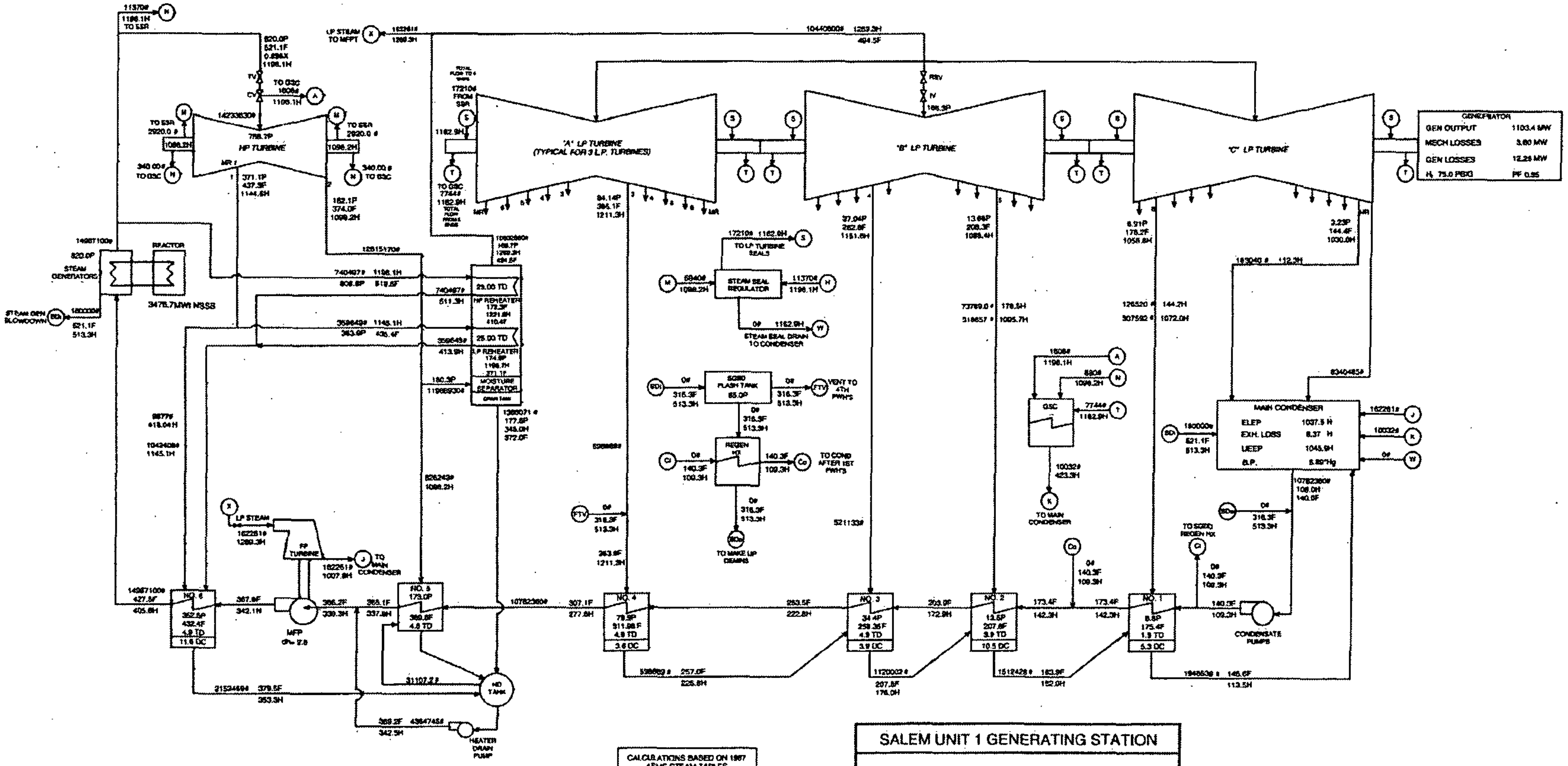
SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1230.1 MW
NTHR	9643B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 1E - 100% Load, 32°F, Current CW flow



Case 2A - 100% Load, 95°F, Reduced CW flow

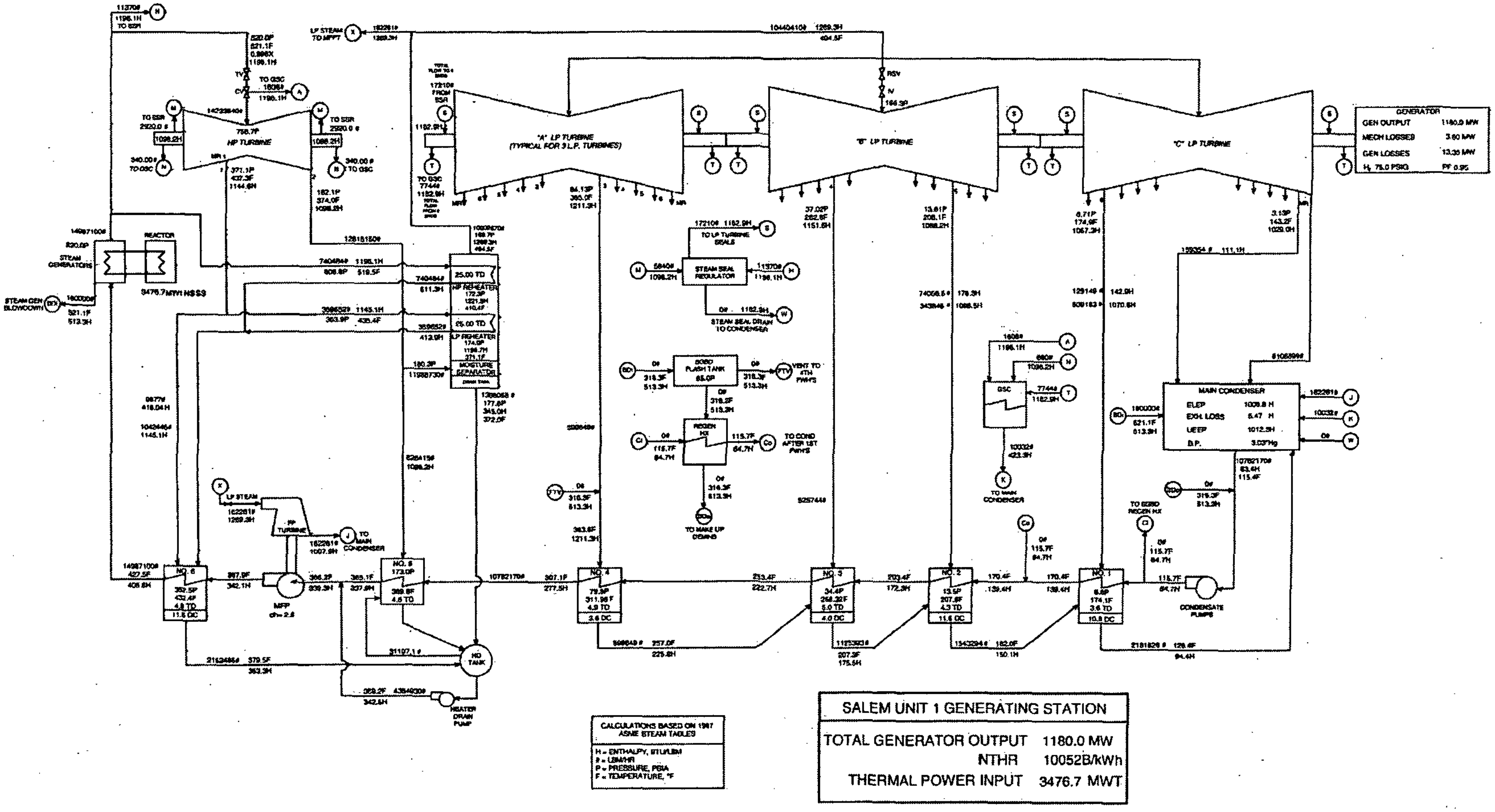


CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION	
TOTAL GENERATOR OUTPUT	1103.4 MW
NTHR	10750B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 2B - 100% Load, 70°F, Reduced CW flow



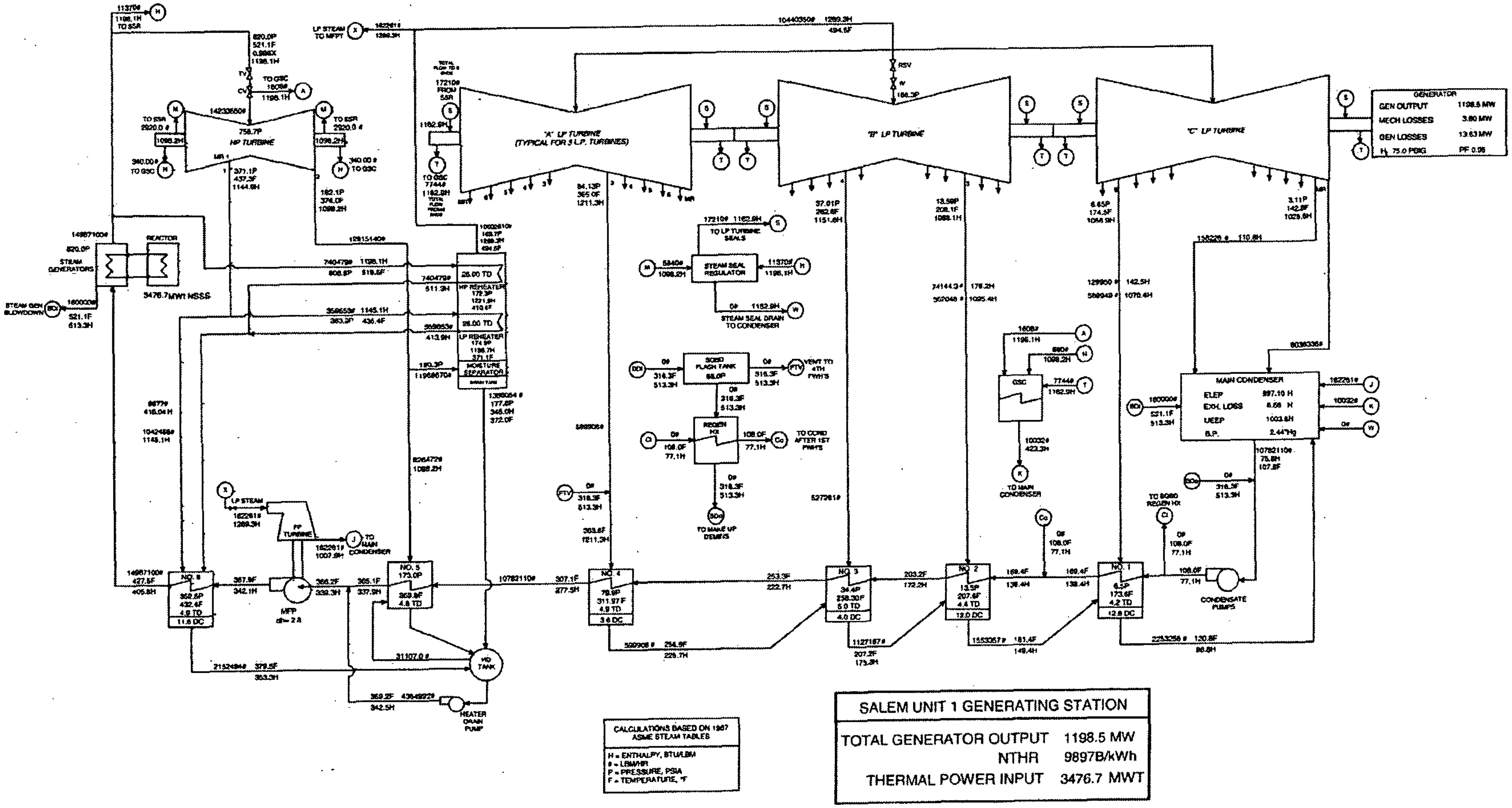
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1180.0 MW
NTHR	10052B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 2C - 100% Load, 61°F, Reduced CW flow



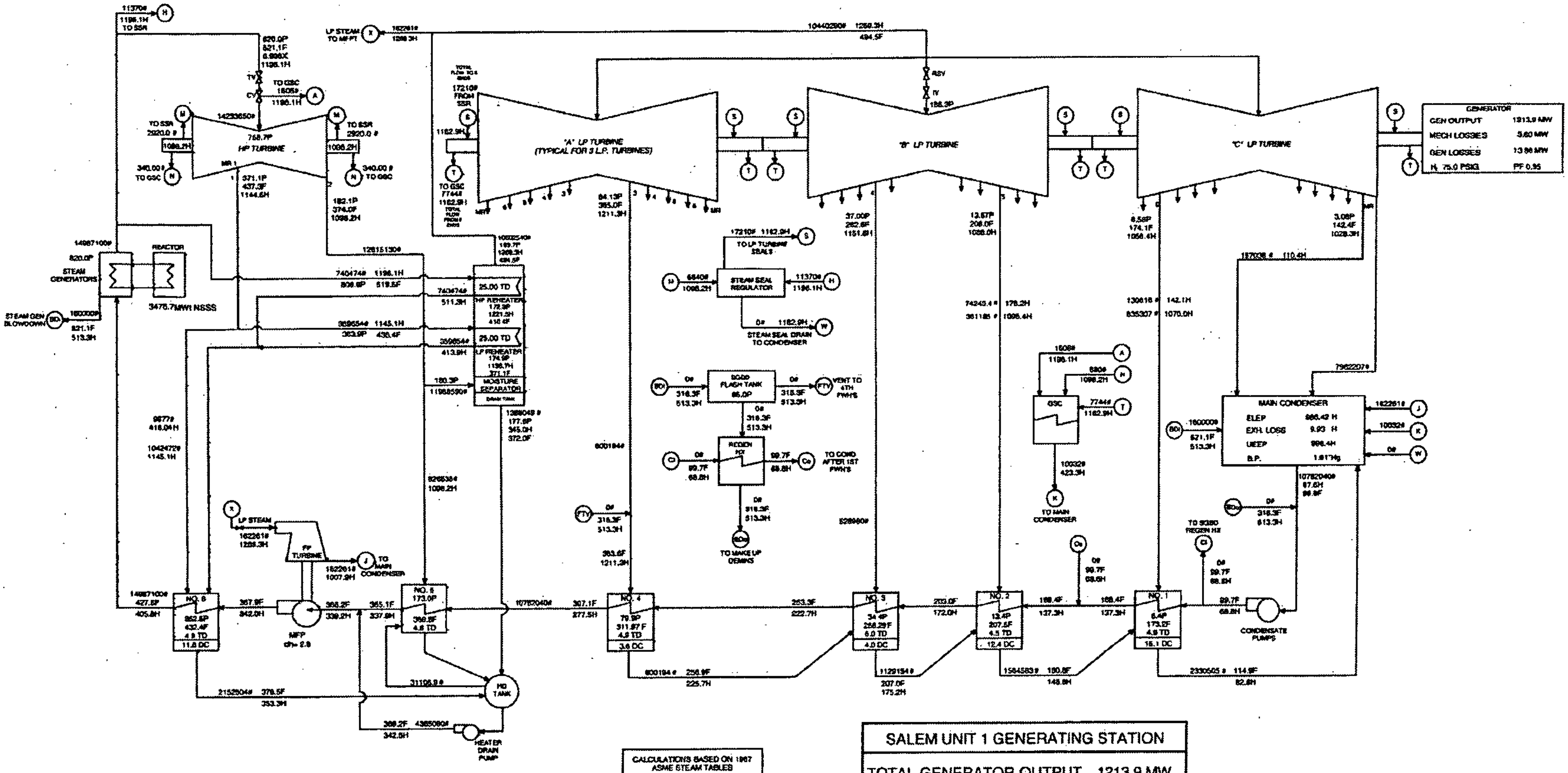
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1198.5 MW
NTHR	9897B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 2D - 100% Load, 50°F, Reduced CW flow



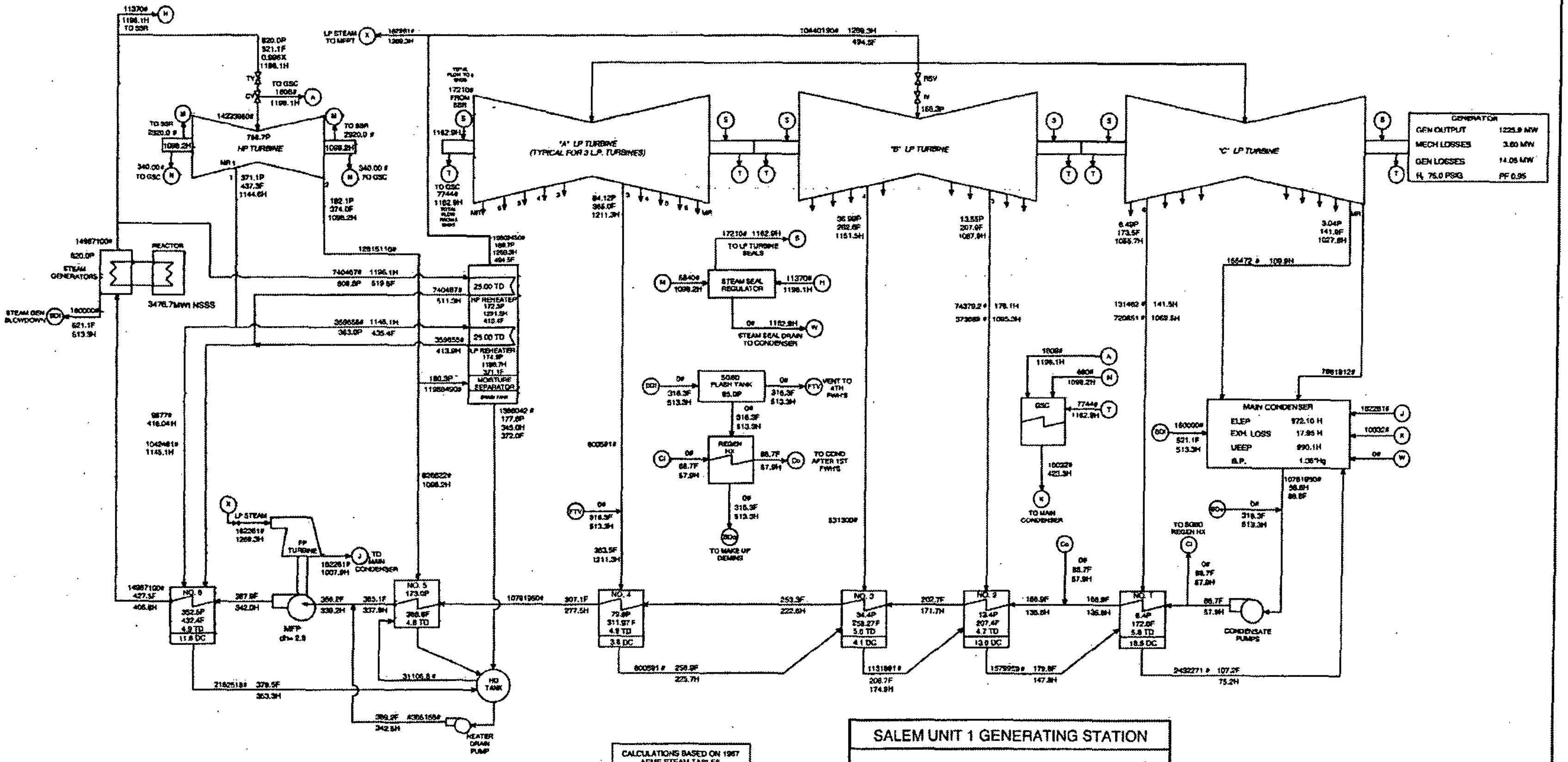
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1213.9 MW
NTHR	9771B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 2E - 100% Load, 32°F, Reduced CW flow



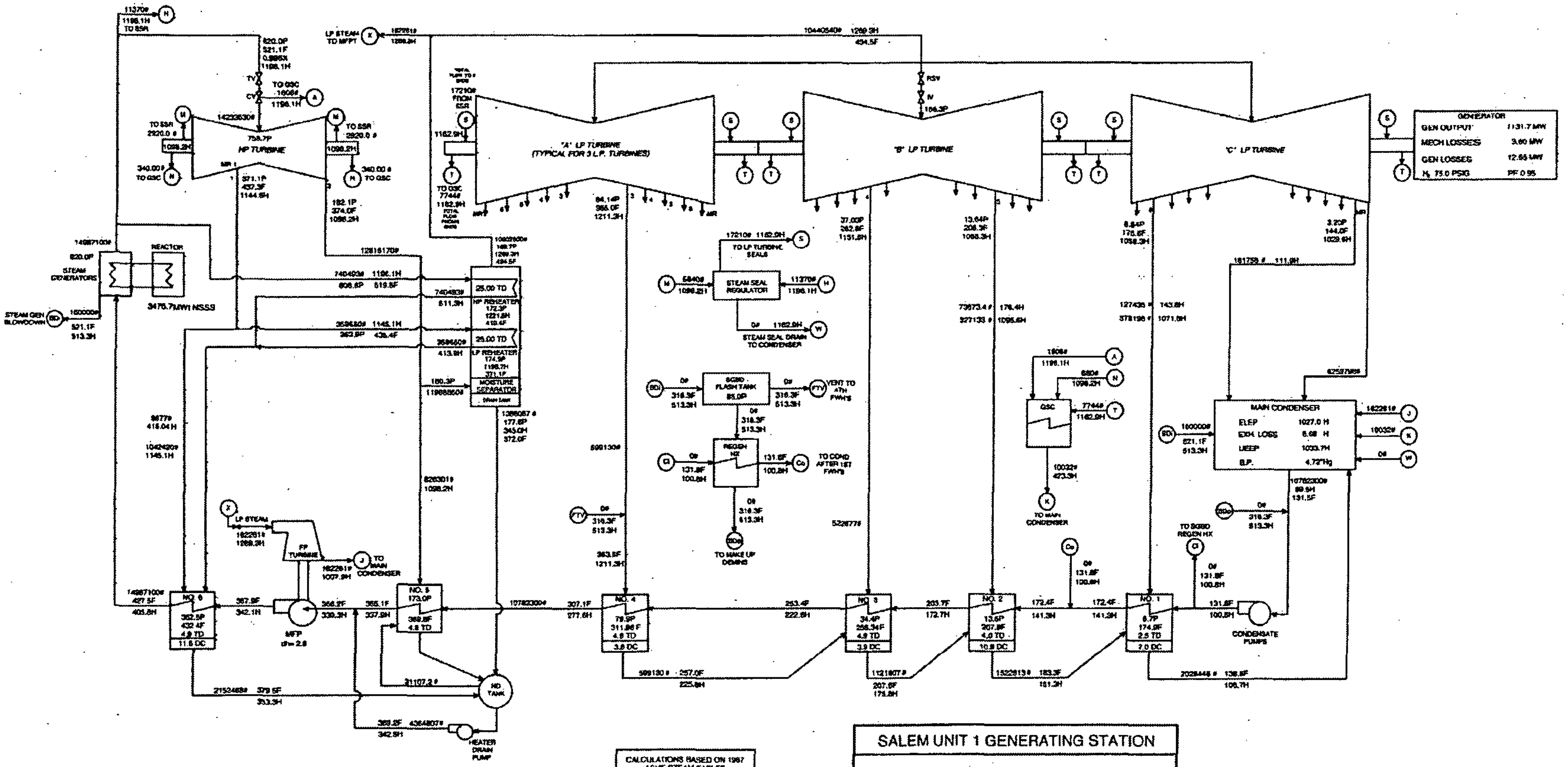
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1225.9 MW
NTHR	9676B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 3A - 100% Load, 95°F, Reduced CW flow, New Condenser



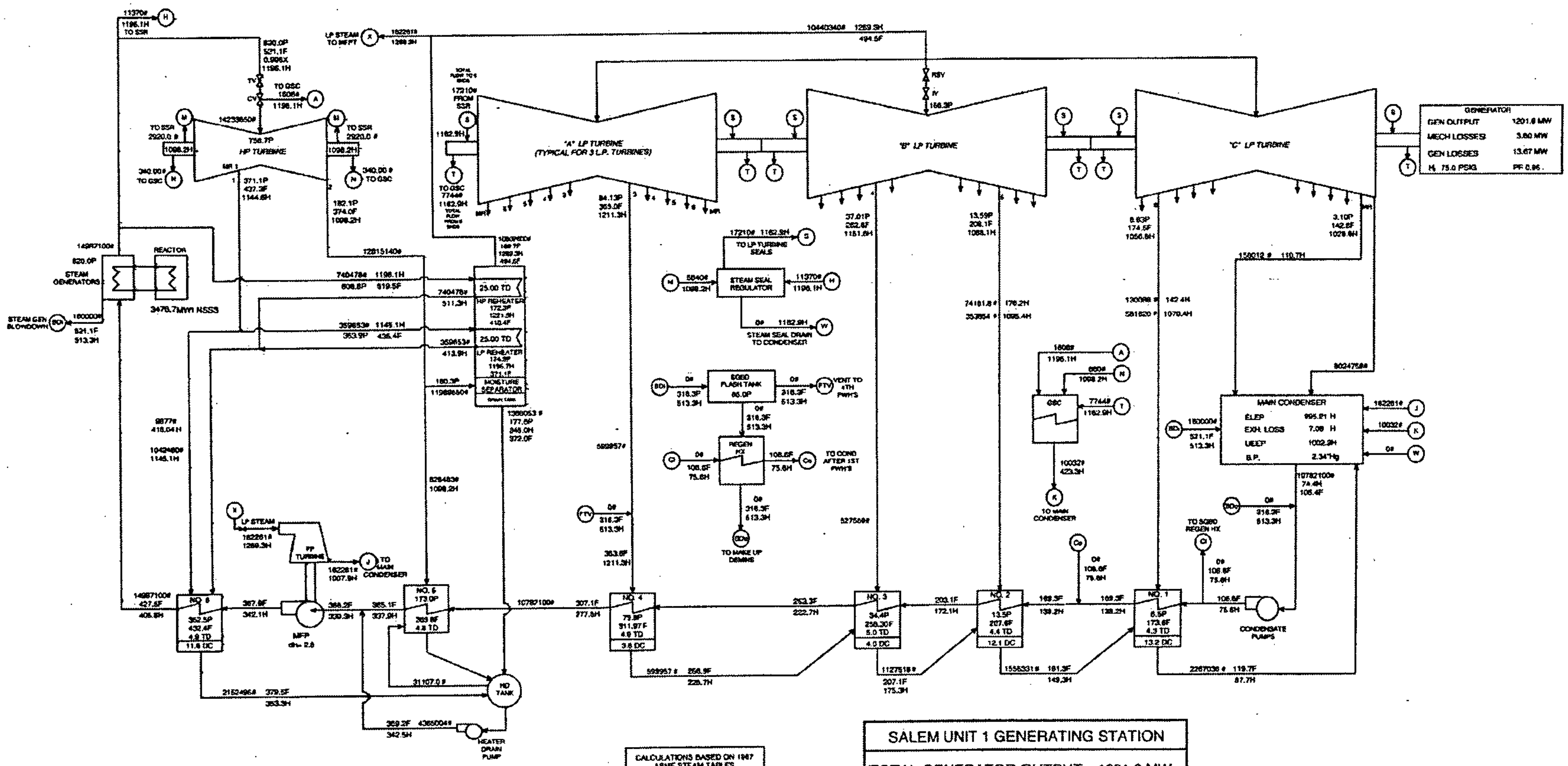
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1131.7 MW
NTHR	10481B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 3B - 100% Load, 70°F, Reduced CW flow, New Condenser

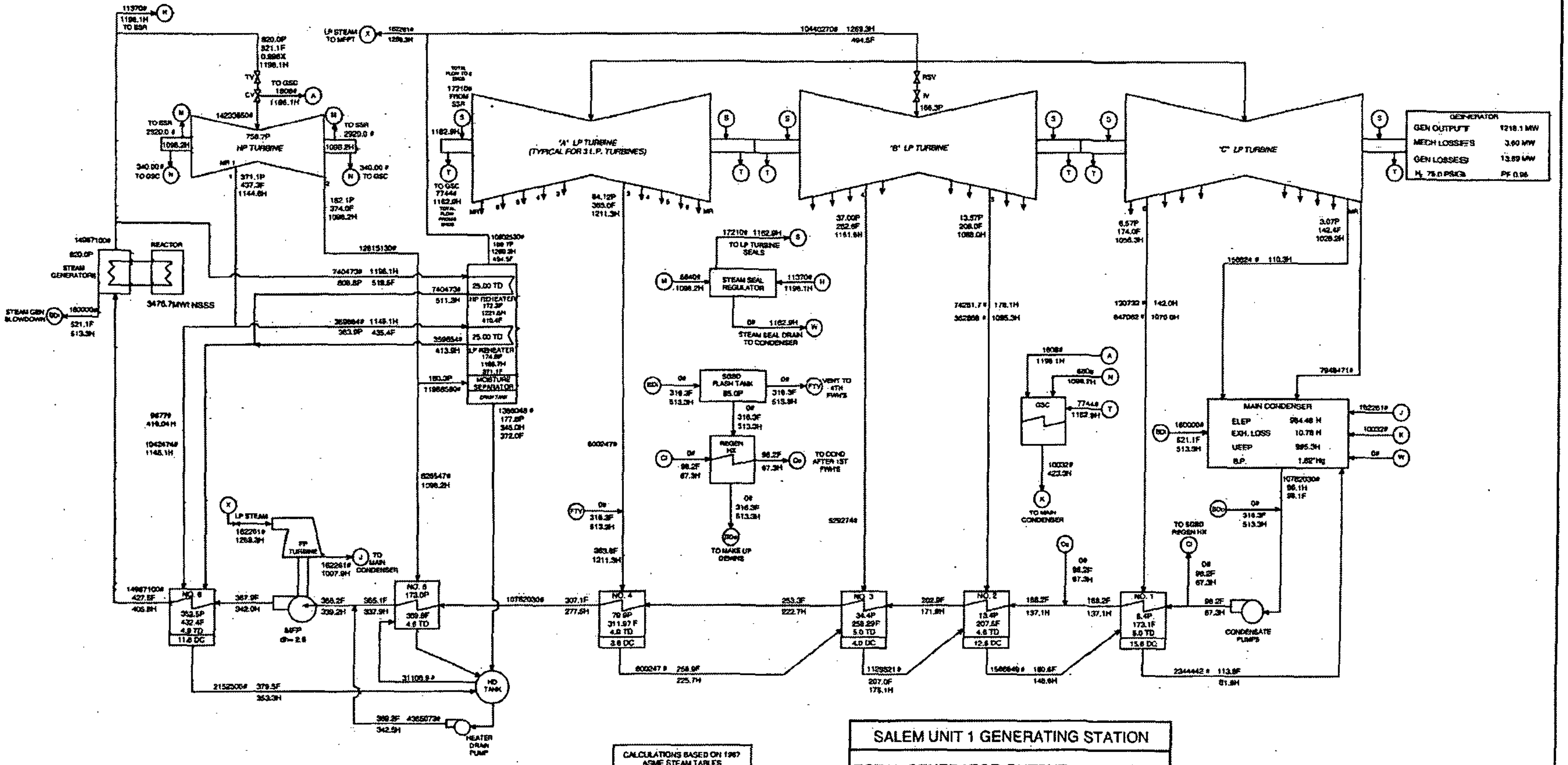


CALCULATIONS BASED ON 1967
ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION	
TOTAL GENERATOR OUTPUT	1201.6 MW
NTHR	9872B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 3C - 100% Load, 61°F, Reduced CW flow, New Condenser



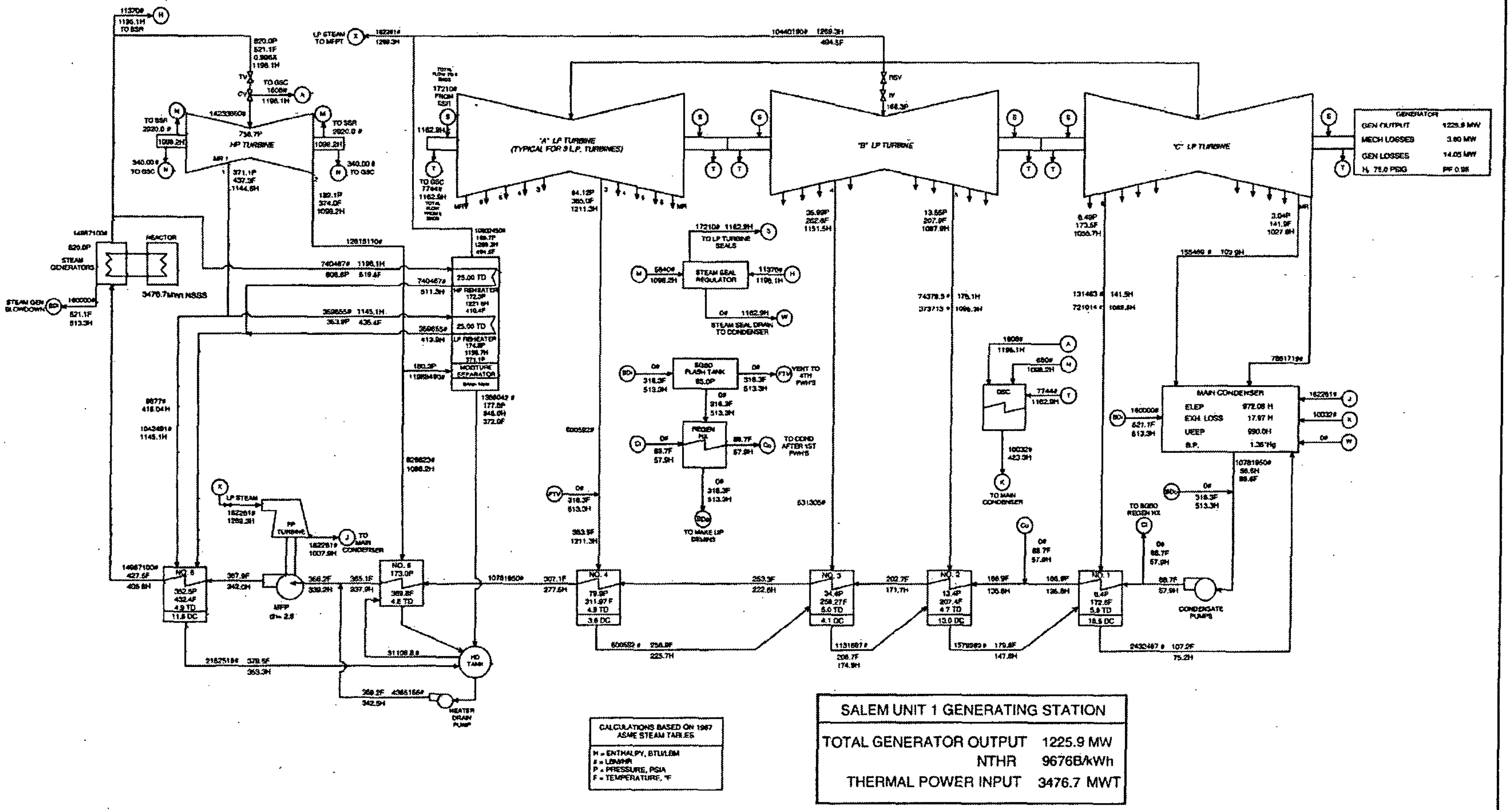
CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1216.1 MW
NTHR	9754B/kWh
THERMAL POWER INPUT	3476.7 MWT

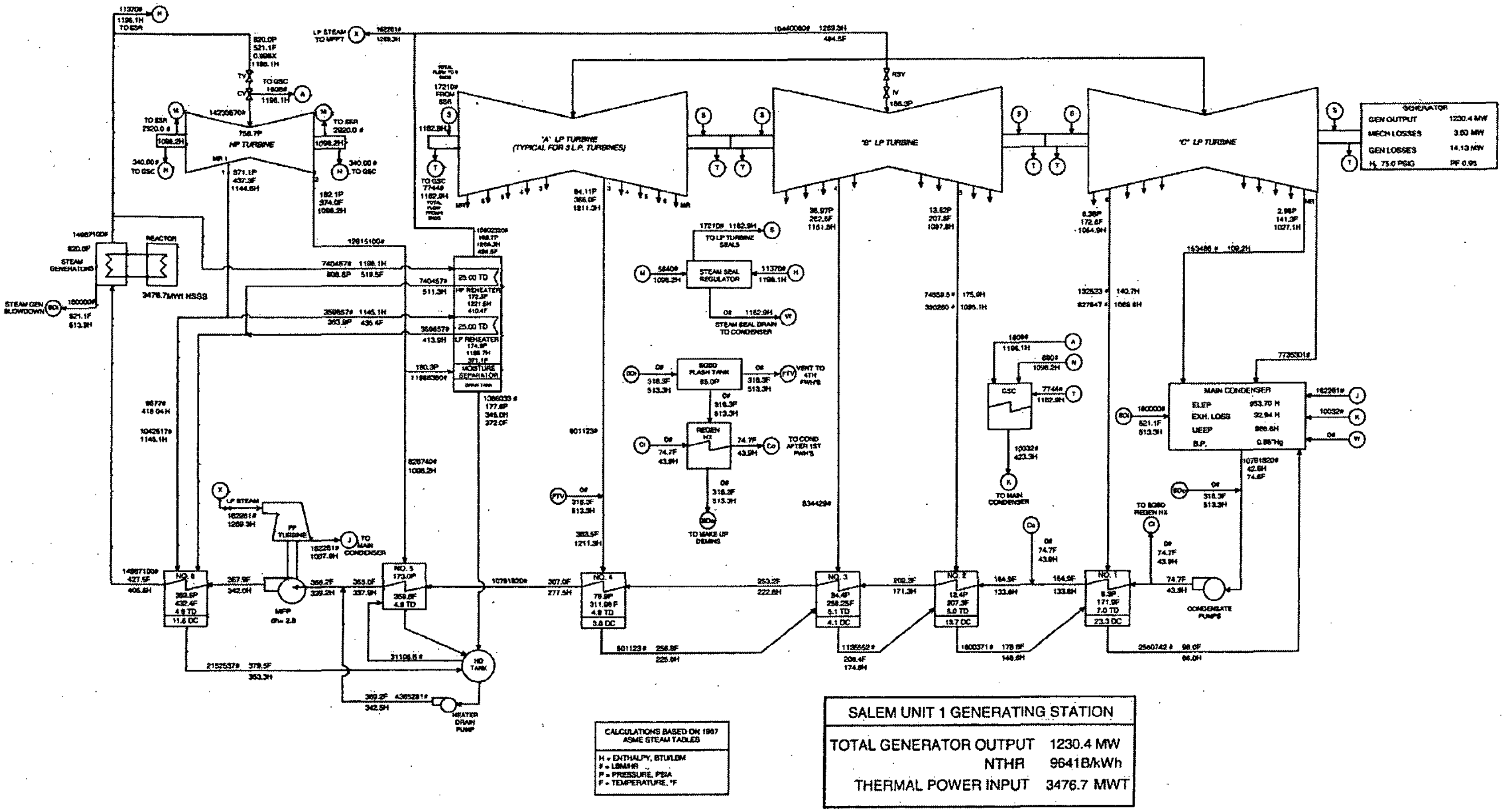
Case 3D - 100% Load, 50°F, Reduced CW flow, New Condenser



SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1225.9 MW
NTHR	9676B/kWh
THERMAL POWER INPUT	3476.7 MWT

Case 3E - 100% Load, 32°F, Reduced CW flow, New Condenser



CALCULATIONS BASED ON 1967 ASME STEAM TABLES

H = ENTHALPY, BTU/LBM
# = LBM/HR
P = PRESSURE, PSIA
F = TEMPERATURE, °F

SALEM UNIT 1 GENERATING STATION

TOTAL GENERATOR OUTPUT	1230.4 MW
NTHR	9641B/kWh
THERMAL POWER INPUT	3476.7 MWT

8. SUPPORTING INFORMATION

Sargent & Lundy / Salem Units 1 & 2
24 March 2005
Our Ref: 4209-05-168HT

ALSTOM

CONDENSER DATA SHEET

Location of manufacturing site	Easton, PA, USA
Guarantee Conditions at Heat Balance as Indicated:	
Guaranteed Condenser Pressure, in. HgA	3.85
Guaranteed Dissolved Oxygen in Condensate, cc/l	0.005 or less at design conditions per HEI
Circulating water velocity in tubes, ft/sec	6.87
Inlet water temperature, °F	90.0
Tube Technical Data	
Tube Cleanliness	90%
Clean Overall Heat Transfer Coefficient, Btu/hr-sq ft-F	704.2
In Service Overall Heat Transfer Coefficient, Btu/hr-sq ft-F	633.8
Condenser Surface Area, sq. ft.	772,821
Duty (net heat rejected to circulating water) Btu/hr X 10^6	7,410.5
Circulating water quantity, gpm	511,020
Temperature Rise, F	29.0 °F
Method of Fixing Tubes to Tube Sheet	Roller Expanded & Seal Welded
Tubes	
Material	B338, Gr. 2 Titanium
OD, inches	1.0
BWG (Average Wall) main part of bundle	25
BWG (Average Wall) impingement	22
Number of tubes per circuit and total for condenser (Main + Imp.)	10,984 / 65,904
Number of modules/shell	2
Overall tube length, ft.-in.	45’- 0”
Effective tube length, ft.-in.	44’- 9½”
Furnished by	ALSTOM Power
Number of tube support plates	12 Main / 13 Intermediate
Thickness, inches	5/8” Main / ½” Intermediate
Material	A285 Grade C, Carbon Steel
Support plate spacing, in. (MID / END)	Later
Tubesheet Material	Titanium-Clad
Total Thickness, inches	1.25
Method of Attachment to Shell	Welded
Method of Attachment to New Waterboxes	Bolted
Dimensions of:	
Tubesheets, H x W	11’-6” W x 18’-6” H
Weight of:	
Modules (as installed), lbs.	Later
Shipping Components, lbs.	Later
Heaviest piece to erect, lbs.	Tube Bundle @

Sargent & Lundy / Salem Units 1 & 2
24 March 2005
Our Ref: 4209-05-168HT

ALSTOM

TABLE A
SUMMARY OF POTENTIAL DESIGN CASES
(Page 1 of 1)

	EXISTING DESIGN w/ AL-6XN TUBES @ 61.8°F (Original CW Inlet Design Temp)	MODULAR REPLACEMENT TITANIUM @ 90.0°F CW Inlet Temp
Condenser Heat Duty (BTU/hr x 10^6)	7,636.0	7,410.5
Back Pressure ("HgA)	1.50	3.85
Tube Diameter (inch)	1.0	1.0
Main Tube Gauge (BWG)	22	25
Tube Material	AL-6XN	Titanium
Tube Count	68,226	65,904
Tube Effective Length	44'-9½"	44'-9½"
Cleanliness Factor (%)	77.5	90.0
Surface Area (ft^2)	800,000	772,821
Cooling Water Flow (GPM)	1,110,000	511,020
Initial Temperature Difference (°F)	29.8	34.0
Temperature Rise (°F)	13.76	29.0
Number of Water Passes	1	2
Velocity of Water in Tubes (ft/sec)	7.46	6.87
Cooling Water Head Loss (ft. of H_2O)	12.8	19.4

NOTE: All performance data shown above is based upon the latest edition of the HEI (9th Edition). Modular replacement performance based on inlet circulating water temperature of 90°F and conditions as shown on Siemens 100% Load HBD # 10587-S312-WM000-1.

"Keating, Edward J."
<Edward.Keating@pseg.com>
05/05/05 08:05 AM

To: "Bob Hameetman \(E-mail\)" <robert.a.hameetman@sargentlundy.com>
cc:
Subject: Intake Temperatures

Bob,
Attached is a spreadsheet if the intake temperatures at Salem for 1999 through 2004. Let me know if you need more information on the river temperatures.

Take care,
Ed

<<Salem Intake Temp 99-04.XLS>>

Ed Keating

Phone - 856-878-6927
Fax - 856-878-1206

130 Money Island Road
Salem, NJ 08079

Salem Intake Temp 99-04.Xl

ROBERT A HAMEETMAN
05/16/05 08:33 AM

To: PAWEL KUT/Sargentlundy@Sargentlundy
cc:
Subject: Cooling Tower Temperatures

Pawel: The average wet bulb temperatures for the Salem site location were placed on the S&L ftp site by Ed Keating of PSEG for use in the effects on the Salem Natural Draft Tower Backpressure and Gross MWe review. The location of the files is: ftp://slftp1.sargentlundy.com/pub/anyone/Salem/AlternateIntakes. The 3 files are:

AIMetData84-90forSalemAnalysis.xls
AIMetData91-97forSalemAnalysis.xls
AIMetData98-01forSalemAnalysis.xls

Bob

----- Forwarded by ROBERT A HAMEETMAN/Sargentlundy on 05/16/05 08:31 AM -----

"Keating, Edward J." <Edward.Keating@pseg.com>
05/16/05 06:20 AM

To: "Bob Hameetman \(E-mail\)" <robert.a.hameetman@sargentlundy.com>
cc:
Subject: Cooling Tower Temperatures

Bob,
I have placed the wet and dry bulb temperatures on the FTP site for use in the cooling tower calculations.

Ed

Ed Keating

Phone - 856-878-6927
Fax - 856-878-1206

130 Money Island Road
Salem, NJ 08079

"Keating, Edward J."
<Edward.KeatingJr@pseg.com>
08/11/05 11:38 AM

To "Bob Hameetman \(E-mail\)" <robert.a.hameetman@sargentlundy.com>
cc
bcc
Subject PEPSE Model

History: This message has been forwarded.

Hi Bob,
S&L performed PEPSE analyses to determine gross power output and backpressure effects of installing cooling towers. The PEPSE analyses were performed in accordance with calculation S-1-GB--MDC-2032, Rev.01R0, using PEPSE Version 66.2 and the controlled plant data file provided by Salem Station. This model and methodology has been validated by S&L's quality assurance program and is the same as that performed for PSEG Nuclear for other purposes when evaluation the Salem Station.

I understand that the PSEG Nuclear protocol includes an additional Station validation step. For the purposes of these conceptual designs and estimates, the PSEG Nuclear validation step is not required. The quality assurance and best professional judgment of S&L are adequate to ensure the data is representative of the information required.

If you have any questions please contact me.

Thanks,
Ed

Ed Keating

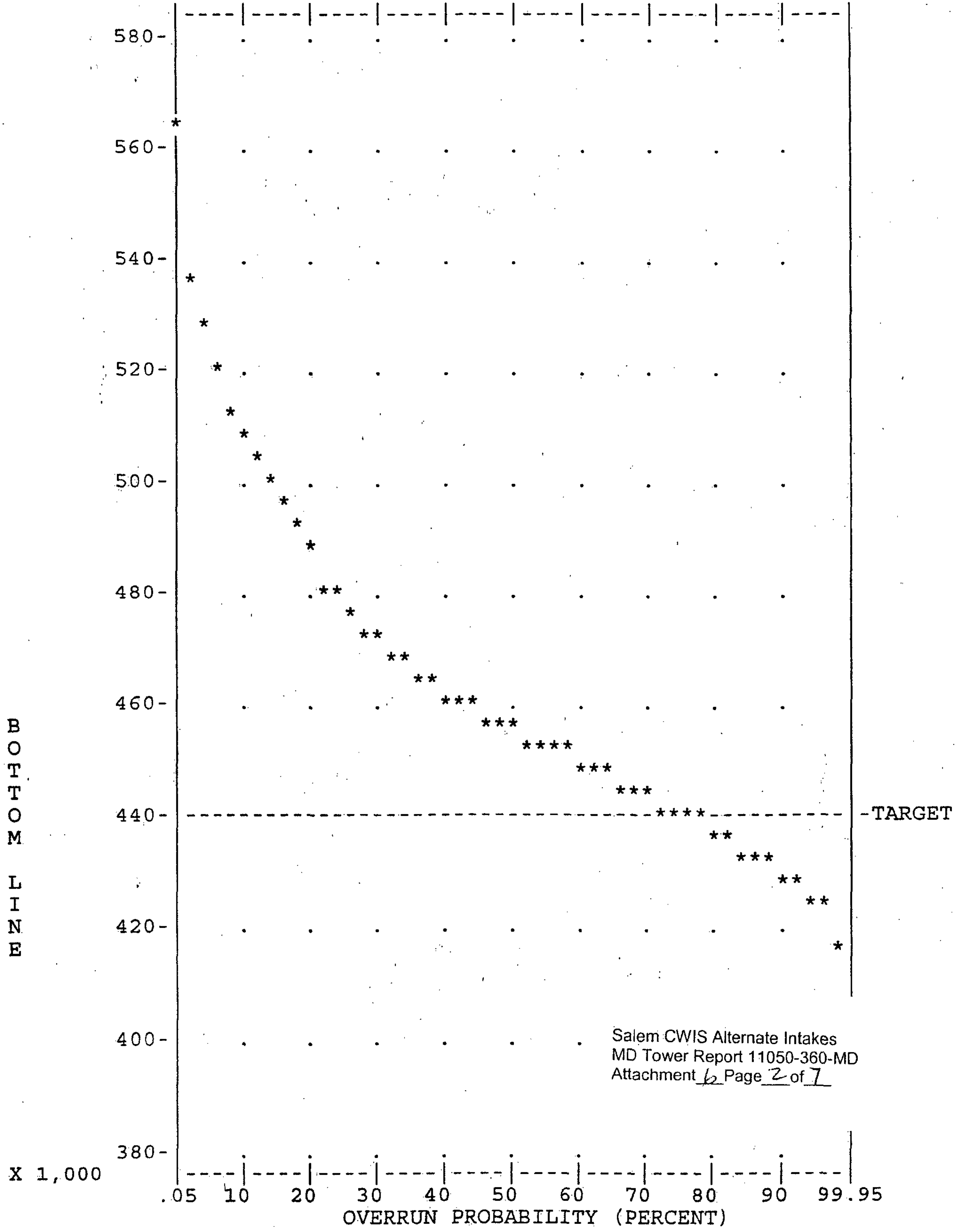
Phone - 856-878-6927
Fax - 856-878-1206

130 Money Island Road
Salem, NJ 08079

Attachment 6 – Range Estimate

```
REP/PC (Ver 4.0) - MGMT REPORT 1            RANGE ESTIMATE : 11-10-05

               DATA  : SALEM MECHANICAL DRAFT COOLING
               MODEL : BASIC MODEL (SUMMATION)

NUM ELEMENT                           UNIT  TARGET PROB+  LOW     HIGH

  1 MECH DRAFT COOLING TOWERS          LT    51946  50    49349   59738
  2 COOL TWR AND CW PUMP BOP           LT    81740  50    69479  106262
  3 CIR WATER PUMPS                    LT    16800  50    15960   19320
  4 CW PIPING AND ELECT BOP            LT    56922  50    48384   73999
  5 CW PIPING BOP AND COND BOP         LT   152600  50   129710  244160
  6 CONDENSER                          LT    30000  50    28500   39000
  7 CONSTRUCTION INDIRECTS             LT    50863  50    43234   73751

    TOTAL EXPENSE (INPUT TO REP/PC)         440871       384615  616230
                                                        (THEORETICALS)

  + PROBABILITY THAT ACTUAL VALUE WILL BE EQUAL TO OR LESS THAN TARGET
```

```
REP/PC (Ver 4.0) - MGMT REPORT 2  GRAPHICAL OVERRUN PROFILE : 11-10-05
          DATA  : SALEM MECHANICAL DRAFT COOLING
          MODEL : BASIC MODEL (SUMMATION)
```



Salem CWIS Alternate Intakes
MD Tower Report 11050-360-MD
Attachment 6 Page 2 of 7

```
REP/PC (Ver 4.0) - MGMT REPORT 3 GRAPHICAL PRIORITY PROFILE : 11-10-05

               DATA  : SALEM MECHANICAL DRAFT COOLING
               MODEL : BASIC MODEL (SUMMATION)

               TOTAL    PROB OF             NET EFFECT OF
             EXPENSE    OVERRUN            FROZEN ELEMENTS

               440871    73 PCT              0 =    .0 PCT

NUM ELEMENT                           UNIT     CORRECT       PROTECT

  5 CW PIPING BOP AND COND BOP        LT    -------------|+++
  2 COOL TWR AND CW PUMP BOP          LT              ---|++
  7 CONSTRUCTION INDIRECTS            LT              ---|+
  4 CW PIPING AND ELECT BOP           LT               --|+
  6 CONDENSER                         LT                -|
  1 MECH DRAFT COOLING TOWERS         LT                -|
  3 CIR WATER PUMPS                   LT                 |
    NET EFFECT OF FROZEN ELEMENTS                        |
```

```
REP/PC (Ver 4.0) - MGMT REPORT 4        CONTINGENCY PROFILE : 11-10-05

               DATA   : SALEM MECHANICAL DRAFT COOLING
               MODEL  : BASIC MODEL (SUMMATION)

             TO BE THIS CONFIDENT OF      ADD THIS CONTINGENCY
             NOT HAVING COST OVERRUN      ABSOLUTE     RELATIVE

                 100     PCT               175359     39.8 PCT

                  99.95   "                121210     27.5  "

                  95      "                 83401     18.9  "

                  90      "                 65915     15.0  "

                  85      "                 54943     12.5  "

                  80      "                 46457     10.5  "

                  75      "                 37160      8.4  "

                  70      "                 29876      6.8  "

                  65      "                 25512      5.8  "

                  60      "                 20864      4.7  "

                  55      "                 17113      3.9  "

                  50      "                 13170      3.0  "

                  45      "                 10414      2.4  "

                  40      "                  8214      1.9  "

                  35      "                  4560      1.0  "

                  30      "                  1946       .4  "

                  25      "                 -1131      -.3  "

                  20      "                 -4661     -1.1  "

                  15      "                 -8544     -1.9  "

                  10      "                -11534     -2.6  "

                   5      "                -16586     -3.8  "

                   0.05   "                -45621    -10.3  "

                   0      "                -56256    -12.8  "

            (ABOVE RESULTS DERIVED FROM 1000 SIMULATIONS)
```

```
REP/PC (Ver 4.0) - MGMT REPORT 5     CONTINGENCY ALLOCATION : 11-10-05

             DATA  : SALEM MECHANICAL DRAFT COOLING
             MODEL : BASIC MODEL (SUMMATION)

   TARGET      CONFIDENCE      REQUIRED    NEEDS THIS    TARGET WITH
  ESTIMATE   OF NO OVERRUN   CONFIDENCE   CONTINGENCY   CONTINGENCY

   440871        27 PCT        90 PCT        65915         506786

                                               ALLOCATION OF CONTINGENCY
NUM ELEMENT                          RANK       PCT    ADD THIS    UNIT

  5 CW PIPING BOP AND COND BOP         1        57.3   37769.70     LT
  2 COOL TWR AND CW PUMP BOP           2         9.8    6459.81     LT
  7 CONSTRUCTION INDIRECTS             3        13.3    8766.93     LT
  4 CW PIPING AND ELECT BOP            4         7.7    5075.07     LT
  6 CONDENSER                          5         6.3    4152.83     LT
  1 MECH DRAFT COOLING TOWERS          6         4.2    2768.55     LT
  3 CIR WATER PUMPS                    7         1.4     922.85     LT
    TOTAL                                      100.0

    UNALLOCATED DUE TO ROUNDING (BOTTOM LINE UNITS)          -.75
```

```
REP/PC (Ver 4.0) - MGMT REPORT 6            PRICE LOCALIZER : 11-10-05

                 DATA  : SALEM MECHANICAL DRAFT COOLING
                 MODEL : BASIC MODEL (SUMMATION)

-------MINIMUM PROFIT FOR VARIOUS LEVELS OF CONFIDENCE-------
   10        30        50        70        90      99.95      100     PRICE
  PCT       PCT       PCT       PCT       PCT       PCT       PCT   REQUIRED

 246893    233413    222189    205483    169444    114149     60000    676230

 240893    227413    216189    199483    163444    108149     54000    670230

 234893    221413    210189    193483    157444    102149     48000    664230

 228893    215413    204189    187483    151444     96149     42000    658230

 222893    209413    198189    181483    145444     90149     36000    652230

 216893    203413    192189    175483    139444     84149     30000    646230

 210893    197413    186189    169483    133444     78149     24000    640230

 204893    191413    180189    163483    127444     72149     18000    634230

 198893    185413    174189    157483    121444     66149     12000    628230

 192893    179413    168189    151483    115444     60149      6000    622230

 186893    173413    162189    145483    109444     54149         0    616230

 132744    119264    108040     91334     55295         0    -54149    562081

  77449     63969     52745     36039         0    -55295   -109444    506786

  41410     27930     16706         0    -36039    -91334   -145483    470747

  24704     11224         0    -16706    -52745   -108040   -162189    454041

  13480         0    -11224    -27930    -63969   -119264   -173413    442817

      0    -13480    -24704    -41410    -77449   -132744   -186893    429337
```

Range Estimating Program for Personal Computers - REP/PC (Ver 4.0)

DECISION SCIENCES CORP.
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St. Louis, MO 63123 U.S.A.

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Attachment 7 – Salem MD Tower Hydraulic Evaluation

ATTACHMENT 7

SALEM – HYDRAULIC EVALUATION

Hydraulic Evaluation for the New Cooling Tower Option, and New Two (2) Pass Condenser Option

Prepared: _______________ Date 8-11-05
G. Purciarello- Sargent & Lundy^{LLC}

Reviewed: Robert H. Hameetman Date 8/11/05
Robert Hameetman - Sargent & Lundy^{LLC}

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1.0 PURPOSE AND SCOPE

The purpose of this calculation is to perform a basic hydraulic analysis of a conceptual design of a circulating water (CW) system with a mechanical draft cooling tower. The CW system is for the Salem Generating Station. The calculation will approximate CW pump and pipe sizing so that a budgetary estimate for the system can be performed.

2.0 DESIGN INPUT

2.1 The nominal circulating water flow to the condenser is 511,020 gpm from reference 7.1.

2.2 The absolute roughness (ε) of concrete pipe is .003 feet per A-23 of reference 7.4

2.3 The length of large bore 12 ft DIA concrete pipe for the Unit 2 cooling tower with added length for design margin is approximately 5100 feet from Attachment 1, Figure 1 of reference 7.3.

2.4 The length of the 84" steel-lined pipe from the concrete supply pipe to each section of the condenser with added length for design margin is approximately 1400 feet from Attachment 1, Figure 1 of reference 7.3.

2.5 The absolute roughness (ε) of commercial steel pipe is .00015 feet per A-23 of reference 7.4

2.6 The condenser head loss from reference 7.2 is:

Head Loss (feet)	Flow Rate (feet/sec)	Connection Size
19.4	6.9	72 inch
20.6	9.9	60 inch

2.7 The design pressure of the condenser is 50 psig with a hydrostatic test pressure of 65 psig from reference 2.1.

2.8 Friction loss and K values for pipes, valves and fittings are taken from internal programming in reference 7.5.

2.9 The elevation difference between the circulating water headers and cooling tower spray is approximately 35 feet. Thirty-five feet is the approximate elevation difference between the CW header and cooling tower spray. The value is reasonable and an exact value is not required for conceptual design. The GEA proposal (Attachment D gives a distribution header height of 23 feet. The supply pipe will be buried about 10 feet for a total height difference of about 33 feet, or about 35 feet

3.0 ASSUMPTIONS

3.1 The length of 60" DIA steel-lined pipe to and from each section of the condenser is approximately 200 feet based on engineering judgement.

<u>Technical Justification</u>: This number is reasonable and is based on 50 feet of pipe to and from each waterbox. An exact value is not critical to the output of the calculation.

3.2 The pressure provided to the spray nozzles of the cooling tower shall assumed to be 10 psig.

<u>Technical Justification</u>: The type of cooling tower spray has not been chosen for this conceptual design. The spray nozzles could be gravity fed or pressure fed. 10 psig was chosen as a conservative value.

4.0 METHODOLOGY AND ACCEPTANCE CRITERIA

4.1 AFT Fathom Model and Computer Program

A hydraulic model was developed using reference 7.3 Attachment 1 Figures 1 and 4. The hydraulic model was created using AFT Fathom^{TM} Version 6.0 developed by Applied Flow Technology. Fathom^{TM} is a graphical computer platform for modeling incompressible flow in pipe networks. The program performs steady state and transient flow analysis of thermal- hydraulic systems and is validated for use at Sargent & Lundy. For this calculation, Fathom^{TM} was run on S&L PC No. ZL 1099 under the Windows XP operating system.

4.2 The output of the AFT Fathom calculation is described in Attachment C.

4.3 Flow velocities in all pipes downstream of the CW pumps shall be between 8 and 14 feet/second per reference 7.6.

4.4 Pressure at the condenser shall not exceed the design pressure of 50 psig as stated in design input 2.7.

4.5 The flow and nodal diagram is shown in Attachment A.

5.0 CALCULATIONS AND ANALYSIS

5.1 The output tables of the Fathom computer run is in Attachment C. All pipe velocities downstream of the CW pumps are between 8 and 14 fps.

5.2 Attachment C lists the inlet pressure to the condensers as 55.80 psia or 41.10 psig. This pressure value is less than the design pressure as stated in design input 2.7

5.3 Each of the 5 operational pumps develops 38.75 psid or 89.83 feet TDH.

6.0 RESULTS

The flow velocity in the 12ft DIA concrete is 10.067 ft/sec. The flow velocity in the 84-inch DIA steel lined pipe is 9.855 ft/sec. The flow velocity in the 60-inch DIA steel pipe is 9.633 ft/sec. Each of the above listed flow velocities meets the requirements of reference 7.6 and thus the pipe sizes in the model are correct.

The sizing of each CW pump for this conceptual design is 511,020 / 5 = 102,204 gpm with a developed head of approximately 90 feet TDH.

7.0 REFERENCES

7.1 ALSTOM Power Heat Exchange Information Package to Sargent & Lundy for Replacement Titanium Condenser Tube Modules and Accessories Salem Nuclear Generating Station Units 1 & 2

7.2 Email: phil.finelli@power.alstom.com to robert.a.hameetman@sargentlundy.com dated 5/3/05

7.3 Salem CWIS-Alternate Intake Technologies Natural Draft Cooling Tower Report 11050-360-MD.

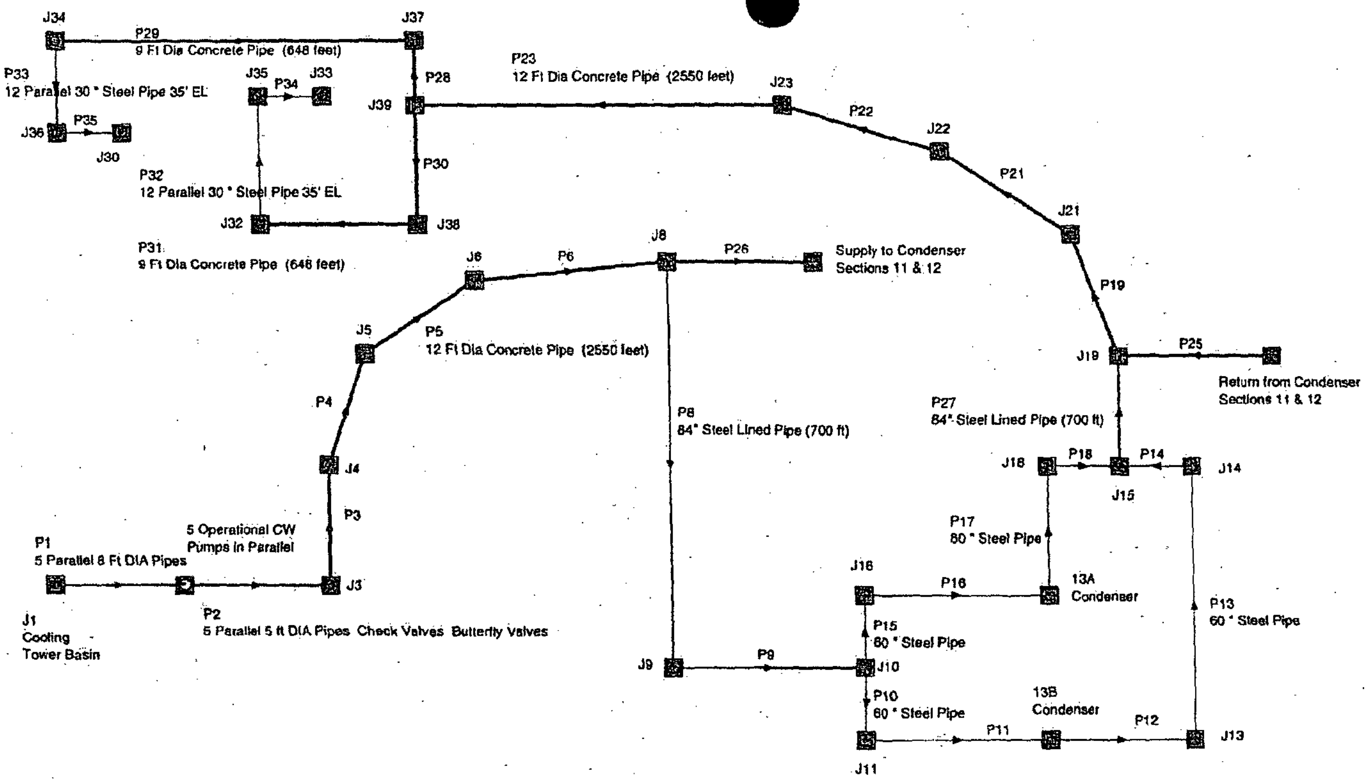
7.4 Crane Technical Paper No. 410, Flow of Fluids Through Valves, Fittings, and Pipe, Twentieth Printing, 1981

7.5 AFT Fathom^{TM}, Version 6.0, Computer Software for Modeling Incompressible Flow in Pipe Networks (S&L Program No. 03.7.721-6.0)

7.6 Sargent & Lundy Mechanical Engineering Standard (MES) 2.11

Attachment A

Fathom^{TM} Hydraulic Model Nodal Diagram


J34
P29
9 Ft Dia Concrete Pipe (648 feet)
J37
P33
12 Parallel 30 " Steel Pipe 35' EL
J35
P34
J33
P28
J39
P23
12 Ft Dia Concrete Pipe (2550 feet)
J23
J36
P35
J30
P22
J22
P30
P21
P32
12 Parallel 30 " Steel Pipe 35' EL
J32
J38
J21
P31
9 Ft Dia Concrete Pipe (648 feet)
J8
J6
P6
P26
Supply to Condenser
Sections 11 & 12
P19
J5
P5
12 Ft Dia Concrete Pipe (2550 feet)
J19
P25
Return from Condenser
Sections 11 & 12
P4
P8
84" Steel Lined Pipe (700 ft)
P27
84" Steel Lined Pipe (700 ft)
J18
P18
P14
J14
J4
J15
P3
P17
60 " Steel Pipe
5 Operational CW
Pumps in Parallel
P1
5 Parallel 8 Ft DIA Pipes
J16
P16
13A
Condenser
J3
P13
60 " Steel Pipe
J1
Cooling
Tower Basin
P2
5 Parallel 5 ft DIA Pipes Check Valves Butterfly Valves
P15
60 " Steel Pipe
J9
P9
J10
P10
60 " Steel Pipe
13B
Condenser
P11
P12
J13
J11

ATTACHMENT B
PIPING TAKEOFFS

Pipe	Pipe Inside Diameter	Elevation Inlet (feet)	Elevation Outlet (feet)	Length (feet)	Junctions (Up, Down)	Pipe Material
1*	8 ft	1	0	10	1, 2	Steel
2**	5 ft	0	0	10	2, 3	Steel
3	12 ft	0	0	625	3, 4	Concrete
4	12 ft	0	0	625	4, 5	Concrete
5	12 ft	0	0	625	5, 6	Concrete
6	12 ft	0	0	675	6, 8	Concrete
8	7 ft	0	0	690	8, 9	Steel Lined
9	7 ft	0	0	10	9, 10	Steel Lined
10	5 ft	0	0	20	10, 11	Steel
11	5 ft	0	0	20	11, 12	Steel
12	5 ft	0	0	20	12, 13	Steel
13	5 ft	0	0	20	13, 14	Steel
14	5 ft	0	0	20	14, 15	Steel
15	5 ft	0	0	25	10, 16	Steel
16	5 ft	0	0	25	16, 17	Steel
17	5 ft	0	0	25	17, 18	Steel
18	5 ft	0	0	25	18, 15	Steel
19	12 ft	0	0	625	19, 21	Concrete
21	12 ft	0	0	625	21, 22	Concrete
22	12 ft	0	0	625	22, 23	Concrete
23	12 ft	0	0	675	23, 39	Concrete
25	12 ft	0	0	1	26, 19	Concrete
26	12 ft	0	0	1	8, 27	Concrete
27	7 ft	0	0	700	15, 19	Steel Lined
28	9 ft	0	0	12	39, 37	Concrete
29	9 ft	0	0	648	37, 34	Concrete
30	9 ft	0	0	12	39, 38	Concrete
31	9 ft	0	0	648	38, 32	Concrete
32	30 in	0	35	35	32, 35	Steel
33	30 in	0	35	35	34, 36	Steel
34	30 in	35	35	20	35, 33	Steel
35	30 in	35	35	74	36, 30	Steel

* Five parallel pipes for 5 pumps

** Five parallel pipes, check valves and butterfly valves

ATTACHMENT B
PIPING TAKE-OFFS

Jct	Name	Loss Factor (K)	Elevation Inlet (feet)	Pipes (+ = In, - = Out)
1	Cooling Tower Basin	0	20	-1
2	5 Operational CW Pumps in Parallel	0	0	1,-2
3	Branch	0	0	2,-3
4	Bend	0.18	0	3,-4
5	Bend	0.18	0	4,-5
6	Bend	0.18	0	5,-6
8	Tee or Wye	Fathom Std	0	6,-26,-8
9	Bend	0.168	0	8,-9
10	Tee or Wye	Fathom Std	0	-15,-10,9
11	Bend	0.168	0	10,-11
12	13B Condenser	14.1924	0	11,-12
13	Bend	0.168	0	12,-13
14	Bend	0.168	0	13,-14
15	Tee or Wye	Fathom Std	0	14,18,-27
16	Bend	0.168	0	15,-16
17	13A Condenser	14.1924	0	16,-17
18	Bend	0.168	0	17,-18
19	Tee or Wye	Fathom Std	0	-19,25,27
21	Bend	0.18	0	19,-21
22	Bend	0.18	0	21,-22
23	Bend	0.18	0	22,-23
26	Return from Condenser Sections 11 & 12	0	0	-25
27	Supply to Condenser Sections 11 & 12	0	0	26
30	Assigned Pressure	0	35	35
32	Branch	0	0	31,-32
33	Assigned Pressure	0	35	34
34	Branch	0	0	29,-33
35	Branch	0	35	32,-34
36	Branch	0	35	33,-35
37	Bend	0.168	0	28,-29
38	Bend	0.168	0	30,-31
39	Tee or Wye	Fathom Std	0	-30,-28,23

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```
General

Title: AFT Fathom Model
Analysis run on: 5/19/2005 4:09:54 PM
Application version: AFT Fathom Version 6.0 (2004.06.29)
Input File: D:\0h9029\Salem\Mechanical Draft Cooling Tower.fth
Scenario: Base Scenario/With 650 ft headers

Execution Time= 0.09 seconds
Total Number Of Head/Pressure Iterations= 66
Total Number Of Flow Iterations= 7
Total Number Of Temperature Iterations= 0
Number Of Pipes= 32
Number Of Junctions= 32
Matrix Method= Gaussian Elimination
Workspace labels

Pressure/Head Tolerance= 0.0001 relative change
Flow Rate Tolerance= 0.0001 relative change
Flow Relaxation= (Automatic)
Pressure Relaxation= (Automatic)

Constant Fluid Property Model
Fluid Database: AFT Standard
Fluid: Water at 1 atm
Max Fluid Temperature Data= 212 deg. F
Min Fluid Temperature Data= 32 deg. F
Temperature= 90 deg. F
Density= 62.12054 lbm/ft3
Viscosity= 1.82692 lbm/hr-ft
Vapor Pressure= 0.70387 psia
Viscosity Model= Newtonian

Atmospheric Pressure= 1 atm
Gravitational Acceleration= 1 g
Turbulent Flow Above Reynolds Number= 4000
Laminar Flow Below Reynolds Number= 2300

Total Inflow= 851,823 gal/min
Total Outflow= 851,823 gal/min
Maximum Pressure is 61.64 psia at Junction 2 Outlet
Minimum Pressure is 22.89 psia at Junction 1 Outlet


Pump Summary
```

Jct	Name	Vol. Flow (gal/min)	Mass Flow (lbm/sec)	DP (psid)	DH (feet)	Overall Efficiency (Percent)	Overall Power (hp)	Number of Pumps
2	5 Operational CW Pumps in Parallel	511,020	70,728	38.75	89.83	100.0	11,550	5 parallel

Reservoir Summary

Jct	Name	Liq. Height (feet)	Liq. Elevation (feet)	Surface Pressure (psia)	Liquid Volume (feet3)	Liquid Mass (lbm)	Net Vol. Flow (gal/min)	Net Mass Flow (lbm/sec)
1	Cooling Tower Basin	N/A	20.00	14.70	N/A	N/A	-511,020	-70,728

Pipe Output Table

Pipe	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	Elevation Inlet (feet)	Elevation Outlet (feet)	dP Static Total (psid)	dH (feet)	P Static In (psia)	P Static Out (psia)	Length (feet)	Junctions (Up, Down)	K	f	fL/D	Dyn. Pres. (psid)
1	511,020	4.530	1.000	0.00	-0.4296531	0.0040324	22.75	23.18	10.000	1, 2	0.0000	0.010116	0.0126453	0.1376
2	511,020	8.054	0.000	0.00	0.2421725	0.5613738	61.64	61.40	10.000	2, 3	0.5400	0.010159	0.0169324	0.4348
3	511,020	10.067	0.000	0.00	0.5104661	1.1832981	61.15	60.64	625.000	3, 4	0.0000	0.014425	0.7513191	0.6794
4	511,020	10.067	0.000	0.00	0.5104661	1.1832981	60.52	60.01	625.000	4, 5	0.0000	0.014425	0.7513191	0.6794
5	511,020	10.067	0.000	0.00	0.5104661	1.1832981	59.89	59.38	625.000	5, 6	0.0000	0.014425	0.7513191	0.6794
6	511,020	10.067	0.000	0.00	0.5513034	1.2779619	59.25	58.70	675.000	6, 8	0.0000	0.014425	0.8114246	0.6794
8	170,219	9.855	0.000	0.00	0.6275036	1.4545997	57.58	56.95	690.000	8, 9	0.0000	0.009778	0.9638305	0.6511
9	170,219	9.855	0.000	0.00	0.0090943	0.0210813	56.84	56.83	10.000	9, 10	0.0000	0.009778	0.0139686	0.6511
10	84,883	9.632	0.000	0.00	0.0257854	0.0597724	56.14	56.12	20.000	10, 11	0.0000	0.010365	0.0414587	0.6220
11	84,883	9.632	0.000	0.00	0.2123711	0.4922920	56.01	55.80	20.000	11, 12	0.3000	0.010365	0.0414587	0.6220
12	84,883	9.632	0.000	0.00	0.2123711	0.4922920	46.98	46.76	20.000	12, 13	0.3000	0.010365	0.0414587	0.6220
13	84,883	9.632	0.000	0.00	0.0257854	0.0597724	46.66	46.63	20.000	13, 14	0.0000	0.010365	0.0414587	0.6220
14	84,883	9.632	0.000	0.00	0.0257863	0.0597745	46.53	46.50	20.000	14, 15	0.0000	0.010365	0.0414587	0.6220
15	85,336	9.683	0.000	0.00	0.0325659	0.0754901	56.14	56.10	25.000	10, 16	0.0000	0.010361	0.0518073	0.6286
16	85,336	9.683	0.000	0.00	0.2211449	0.5126303	56.00	55.78	25.000	16, 17	0.3000	0.010361	0.0518073	0.6286
17	85,336	9.683	0.000	0.00	0.2211449	0.5126303	46.86	46.63	25.000	17, 18	0.3000	0.010361	0.0518073	0.6286
18	85,336	9.683	0.000	0.00	0.0325646	0.0754872	46.53	46.50	25.000	18, 15	0.0000	0.010361	0.0518073	0.6286
19	511,020	10.067	0.000	0.00	0.5104661	1.1832981	44.66	44.15	625.000	19, 21	0.0000	0.014425	0.7513191	0.6794
21	511,020	10.067	0.000	0.00	0.5104661	1.1832981	44.03	43.52	625.000	21, 22	0.0000	0.014425	0.7513191	0.6794
22	511,020	10.067	0.000	0.00	0.5104661	1.1832981	43.39	42.88	625.000	22, 23	0.0000	0.014425	0.7513191	0.6794
23	511,020	10.067	0.000	0.00	0.5513034	1.2779619	42.76	42.21	675.000	23, 39	0.0000	0.014425	0.8114246	0.6794
25	340,801	6.714	0.000	0.00	0.0002045	0.0004741	45.31	45.31	1.000	26, 19	0.0000	0.008122	0.0006769	0.3022
26	340,801	6.714	0.000	0.00	0.0002045	0.0004741	59.05	59.05	1.000	8, 27	0.0000	0.008122	0.0006769	0.3022

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Pipe	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	Elevation Inlet (feet)	Elevation Outlet (feet)	dP Static Total (psid)	dH (feet)	P Static In (psia)	P Static Out (psia)	Length (feet)	Junctions (Up, Down)	K	f	fL/D	Dyn. Pres. (psid)
27	170,219	9.855	0.000	0.00	0.6365979	1.4756808	46.05	45.41	700.000	15, 19	0.0000	0.009778	0.9777990	0.6511
28	250,871	8.786	0.000	0.00	0.0105845	0.0245356	41.63	41.62	12.000	39, 37	0.0000	0.015339	0.0204525	0.5175
29	250,871	8.786	0.000	0.00	0.7578666	1.7567907	41.54	40.78	648.000	37, 34	0.3600	0.015339	1.1044326	0.5175
30	260,150	9.111	0.000	0.00	0.0113799	0.0263795	41.58	41.57	12.000	39, 38	0.0000	0.015337	0.0204489	0.5565
31	260,150	9.111	0.000	0.00	0.8148592	1.8889036	41.48	40.66	648.000	38, 32	0.3600	0.015337	1.1042390	0.5565
32	260,150	10.351	0.000	35.00	15.4782257	0.8796690	40.50	25.02	35.000	32, 35	0.3600	0.011722	0.1683141	0.7183
33	250,871	9.982	0.000	35.00	15.4518728	0.8185829	40.63	25.18	35.000	34, 36	0.3600	0.011746	0.1686677	0.6680
34	260,150	10.351	35.000	35.00	0.3263558	0.7565168	25.02	24.70	20.000	35, 33	0.3600	0.011722	0.0961795	0.7183
35	250,871	9.982	35.000	35.00	0.4798996	1.1124428	25.18	24.70	74.000	36, 30	0.3600	0.011746	0.3566116	0.6680

Pipe	Reynolds No.	Roughness
1	4.436E+06	0.00015
2	5.915E+06	0.00015
3	1.479E+07	0.003
4	1.479E+07	0.003
5	1.479E+07	0.003
6	1.479E+07	0.003
8	8.444E+06	0.00015
9	8.444E+06	0.00015
10	5.895E+06	0.00015
11	5.895E+06	0.00015
12	5.895E+06	0.00015
13	5.895E+06	0.00015
14	5.895E+06	0.00015
15	5.927E+06	0.00015
16	5.927E+06	0.00015
17	5.927E+06	0.00015
18	5.927E+06	0.00015
19	1.479E+07	0.003
21	1.479E+07	0.003
22	1.479E+07	0.003
23	1.479E+07	0.003
25	9.862E+06	0
26	9.862E+06	0
27	8.444E+06	0.00015
28	9.680E+06	0.003

Pipe	Reynolds No.	Roughness
29	9.680E+06	0.003
30	1.004E+07	0.003
31	1.004E+07	0.003
32	3.088E+06	0.00015
33	2.978E+06	0.00015
34	3.088E+06	0.0018
35	2.978E+06	0.0018

All Junction Table

Jct	Name	P Static In (psia)	P Static Out (psia)	Vol. Flow Rate Thru Jct (gal/min)	Mass Flow Rate Thru Jct (lbm/sec)	Loss Factor (K)	Elevation Inlet (feet)	Pipes (+ = In, - = Out)
1	Cooling Tower Basin	14.70	22.89	511,020	70,728	0.0000	20.00	-1
2	5 Operational CW Pumps in Parallel	23.18	61.64	511,020	70,728	0.0000	0.00	1,-2
3	Branch	61.40	61.15	511,020	70,728	0.0000	0.00	2,-3
4	Bend	60.64	60.52	511,020	70,728	0.1800	0.00	3,-4
5	Bend	60.01	59.89	511,020	70,728	0.1800	0.00	4,-5
6	Bend	59.38	59.25	511,020	70,728	0.1800	0.00	5,-6
8	Tee or Wye	58.85	58.85	N/A	N/A	See Losses	0.00	6,-26,-8
9	Bend	56.95	56.84	170,219	23,559	0.1680	0.00	8,-9
10	Tee or Wye	56.85	56.85	N/A	N/A	See Losses	0.00	-15,-10,9
11	Bend	56.12	56.01	84,883	11,748	0.1680	0.00	10,-11
12	13B Condenser	55.80	46.98	84,883	11,748	14.1924	0.00	11,-12
13	Bend	46.76	46.66	84,883	11,748	0.1680	0.00	12,-13
14	Bend	46.63	46.53	84,883	11,748	0.1680	0.00	13,-14
15	Tee or Wye	46.07	46.07	N/A	N/A	See Losses	0.00	14,18,-27
16	Bend	56.10	56.00	85,336	11,811	0.1680	0.00	15,-16
17	13A Condenser	55.78	46.86	85,336	11,811	14.1924	0.00	16,-17
18	Bend	46.63	46.53	85,336	11,811	0.1680	0.00	17,-18
19	Tee or Wye	44.81	44.81	N/A	N/A	See Losses	0.00	-19,25,27
21	Bend	44.15	44.03	511,020	70,728	0.1800	0.00	19,-21
22	Bend	43.52	43.39	511,020	70,728	0.1800	0.00	21,-22
23	Bend	42.88	42.76	511,020	70,728	0.1800	0.00	22,-23
26	Return from Condenser Sections 11 & 12	45.31	45.31	340,801	47,169	0.0000	0.00	-25
27	Supply to Condenser Sections 11 & 12	59.05	59.05	340,801	47,169	0.0000	0.00	26
30	Assigned Pressure	24.70	24.70	250,871	34,722	0.0000	35.00	35

Jct	Name	P Static In (psia)	P Static Out (psia)	Vol. Flow Rate Thru Jct (gal/min)	Mass Flow Rate Thru Jct (lbm/sec)	Loss Factor (K)	Elevation Inlet (feet)	Pipes (+ = In, - = Out)
32	Branch	40.66	40.50	260,150	36,006	0.0000	0.00	31,-32
33	Assigned Pressure	24.70	24.70	260,150	36,006	0.0000	35.00	34
34	Branch	40.78	40.63	250,871	34,722	0.0000	0.00	29,-33
35	Branch	25.02	25.02	260,150	36,006	0.0000	35.00	32,-34
36	Branch	25.18	25.18	250,871	34,722	0.0000	35.00	33,-35
37	Bend	41.62	41.54	250,871	34,722	0.1680	0.00	28,-29
38	Bend	41.57	41.48	260,150	36,006	0.1680	0.00	30,-31
39	Tee or Wye	42.31	42.31	N/A	N/A	See Losses	0.00	-30,-28,23

Junction Loss Table

Jct	Pipe #	Pipe Dir.	Loss Factor (K)
8	P6	In	0.000
	P26	Out	0.09979
	P8	Out	1.771
10	P15	Out	1.140
	P10	Out	1.149
	P9	In	0.000
15	P14	In	0.6800
	P18	In	0.6743
	P27	Out	0.000
19	P19	Out	0.000
	P25	In	0.9114
	P27	In	1.115
39	P30	Out	1.349
	P28	Out	1.426
	P23	In	0.000

GEA Power Cooling, Inc.
143 Union Blvd., Suite 400
Lakewood, Colorado 80228
Telephone: (303) 987-0123
Facsimile: (303) 987-0101

COOLING TOWER PROPOSAL SUMMARY & SCOPE OF SUPPLY

Sargent & Lundy – Salem Harbor Project 8 April 2005
GEA PROPOSAL NO: 1104 Rev. 1

DESIGN CONDITIONS (EACH UNIT)

CIRCULATING WATER FLOW, GPM	511,000
HOT WATER TEMP, F	104.4
COLD WATER TEMP, F	90.0
INLET WET BULB TEMP, F	76.0
FAN MOTOR OUTPUT POWER PER FAN, BHP	230.0
TOTAL FAN MOTOR OUTPUT POWER, BHP	5,520
PUMP HEAD FROM BASIN CURB, FT	29.0

DIMENSIONAL INFORMATION (EACH UNIT)

TYPE OF TOWER	COUNTERFLOW
NUMBER OF CELLS	24
CELL ARRANGEMENT	INLINE
CELL DIMENSIONS (LxWxH), FT	54.0 x 54.0 x 39.0
OVERALL TOWER DIMENSIONS	1,296.0 x 54.0 x 49.0
BASIN INSIDE DIMENSIONS	1,298.0 x 60.0 x 4.0
FAN DIAMETER, FT	32.8
FAN STACK HEIGHT, FT	10.0

MATERIAL SUMMARY

STRUCTURE	FIBERGLASS
HARDWARE	SILICON BRONZE
MOTOR	1 SPEED / 1800 RPM
FILL TYPE	NF-20 SPLASH
DISTRIBUTION TYPE	DOWNSPRAY

COMMERCIAL SUMMARY (TWO UNITS)

MATERIAL PRICE	$15,000,000
FREIGHT TO JOBSITE	$1,000,000
INSTALLATION LABOR (UNION)	$10,000,000
TOTAL PRICE	$26,000,000

Freight Terms: FOB Jobsite

Optional Items: None

All terms and conditions to be mutually agreed. Taxes and duties not included.

Energy Technology Division

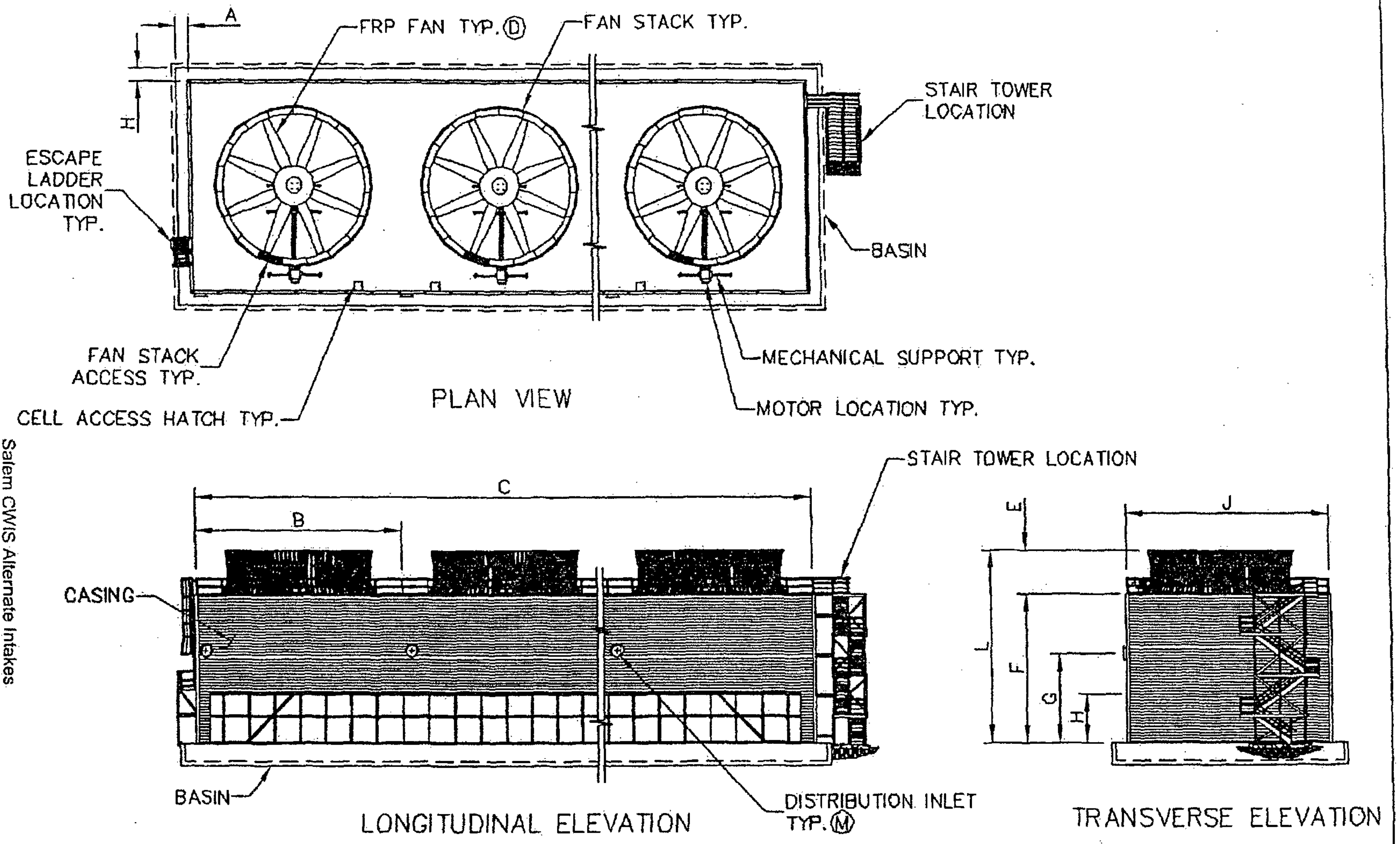
GEA Power Cooling, Inc.

COUNTERFLOW TOWER DIMENSIONS

Job Name: Salem Nuclear Station
Proposal Number: 1104
Revision: 0
Model Number: 545439-24I-33-FCS
Date: 2/21/2005 12:52 PM

Number of Cells: 24

Item	Drawing AP-006 Reference Symbol	English
Cell Length:	B	54 ft
Cell Width:	J	54 ft
Tower Length:	C	1296 ft
Tower Width:	K	54 ft
Fan Deck Height:	F	39 ft
Fan Stack Height:	E	10 ft
Air Inlet Height:	H	14 ft
Distribution Inlet Height:	G	23 ft
Overall Tower Height:	L	~~49 ft~~
Fan Diameter:	D	32.8 ft
Transverse Basin Extension:	I	3 ft
Longitudinal Basin Extension:	A	1 ft
Distribution Inlet Diameter:	M	36 in



PLAN VIEW

LONGITUDINAL ELEVATION

TRANSVERSE ELEVATION

Salem CWIS Alternate Intakes
MD Tower Report 11050-360-MD
Attachment 7 Page 17 of 17

POWER COOLING INC.

DWN	REB
CHK	
ENG	
PM	
DATE	1-21-05

DWG NAME
WOOD OR FIBERGALSS STRUCTURE
COUNTER FLOW DESIGN TOWER
GENERAL ARRANGEMENT

SCALE	DWG NO	REV
NTS		

Attachment 8 - MD Tower – Analysis of Permitting Requirements

AKRF

Environmental and Planning Consultants

100 Centre Boulevard
North Marlton Crossing, Suite 106J
Marlton, New Jersey 08053

ANALYSIS OF PERMITTING REQUIREMENTS FOR POTENTIAL MODIFICATIONS TO SALEM GENERATING STATION'S COOLING WATER SYSTEM OR COOLING WATER INTAKE STRUCTURE

PREPARED FOR
PSEG SERVICES CORPORATION

PREPARED BY
AKRF, INC.

December 6, 2005

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TABLES

ATTACHMENTS

I. INTRODUCTION

PSEG Nuclear LLC ("PSEG") has requested that AKRF, Inc. ("AKRF") evaluate the permitting requirements, schedule implications, and permitting cost considerations if PSEG were to make certain modifications to the once-through cooling water system ("OTCWS") and/or the cooling water intake structure ("CWIS") at its Salem Generating Station ("Salem" or the "Station"). The options being considered as modifications include: (1) retrofitting Salem's existing OTCWS to operate as a closed cycle cooling system with natural draft cooling towers; (2) retrofitting Salem's existing OTCWS to operate with a closed cycle cooling system with mechanical draft cooling towers; (3) modifying Salem's existing on-shore CWIS to operate with wedgewire screens; and (4) modifying Salem's existing on-shore CWIS to operate with a dual-flow entry screen system equipped with fine mesh screen panels. This report addresses permits or approvals promulgated and/or implemented by the New Jersey Department of Environmental Protection ("NJDEP") through its Title V program, New Jersey Pollutant Discharge Elimination System ("NJPDES") program, Treatment Works Approval ("TWA") process, Land Use Regulation Program ("LURP") program including Waterfront Development, Coastal Wetland, Coastal Area Facilities Review Act ("CAFRA"), Freshwater Wetlands, and Tidelands; the United States Army Corps of Engineers ("USACOE") through its Section 404 and Section 10 Programs, the New Jersey Department of Community Affairs ("DCA"); the Salem County Soil Conservation District; the Delaware River Basin Commission ("DRBC"), the Federal Aviation Administration; and Lower Alloways Creek Township local approvals.

Salem currently operates pursuant to various environmental permits or approvals including an NJPDES permit (NJ0005622), DRBC dockets, and air permits issued under Subchapter 22 of the New Jersey Air Pollution Control Regulations (N.J.A.C. 7:27-22). Implementation of any of the four modifications could require modifications to these existing operating permits. The construction or installation of these modifications would also trigger the need for a variety of other permits.

This report provides a summary of the assumptions AKRF made with respect to the activities that affect permitting for each of the modifications. It describes each modification in the context of the relative regulatory programs, the schedule implications and, any special concerns or studies, beyond those already contemplated or in progress by PSEG, that may be required by the given regulatory program. A summary of each modification is provided that discusses the potential obstacles and costs to obtain the referenced permits.

II. NATURAL DRAFT COOLING TOWERS

A. Regulatory Evaluation of Alternative

1. Assumptions

AKRF's analysis of the natural draft cooling tower modification is based upon the following assumptions including an the analysis of construction from the Sargent & Lundy report (S&L 2005a).

- PSEG would install two natural draft cooling towers that would be similar in size and design to the natural draft cooling tower presently operating at PSEG's Hope Creek Generating Station, as described in the S&L report;
- In order to assess potential regulatory implications, preliminary dispersion modeling is required. Modeling assumed:
    1. Natural draft cooling towers would be similar in size and operating conditions to the Hope Creek natural draft cooling tower. The existing Hope Creek cooling tower is very similar to a conceptual design of the natural draft retrofit alternative for Salem Generating Station Units 1 and 2 performed by Sargent & Lundy;
    2. Emissions are conservatively estimated using information from the Hope Creek Generating permitting process;
- PSEG would need to construct: two cooling tower basins; some structure(s) or building(s) for mechanical components (e.g., pumps, electrical equipment) and treatment systems (e.g., chlorination and/or de-chlorination systems, sodium hypochlorite and caustic ammonium bisulfite treatment, and NJPDES-required monitoring equipment);
- PSEG would be required to install new piping for transporting the re-circulating cooling water between the condensers and the towers, for make-up water and for the discharge of cooling tower blowdown;
- PSEG would be required to site the cooling towers beyond the existing security fence;
- PSEG would be required to modify the existing CWIS (by replacing some of the pumps and piping) to accommodate the substantially reduced intake withdrawals;
- PSEG would be required to install two new discharge pipes to accommodate blowdown from the towers. The six existing discharge pipes required for the existing once through cooling system would remain as discharge for service water;
- The site layout would be based on the site plan from the S&Lreport (Attachment 1, Figure 1); and

- The analysis in this evaluation is limited to the facility location and operation, and does not include potential construction permits (e.g., batch plant, diesel construction equipment).

A depiction of the conceptual layout for the natural draft cooling towers is provided in Attachment 1 of the S&L report.

2. Applicable Regulatory Programs

a. Air quality

1. Title V

(a). Regulatory Evaluation

The Salem-Hope Creek Facility is currently operating under an approved Title V Operating Permit[1]. N.J.A.C. 7:27-22.24 requires that the construction or installation of any new significant source operation shall be made as a significant modification if a source is, among other things, subject to PSD regulations at 40 CFR 52. Because the retrofit project will be subject to PSD regulations, a Title V Operating Permit Significant Modification would be required.

N.J.A.C. 7:27-18 (Subchapter 18) applies, in part, to major facilities or major modifications which will cause a "significant net emission increase" in a non-attainment area (or that will significantly impact a non-attainment area, N.J.A.C. 7:27-18.2(b). A significant net emission increase occurs when facility-wide emission increases during the "contemporaneous period" (time period between five years prior to initiation of construction and initial source operation) exceed the significant net emission increase thresholds (N.J.A.C. 7:27-18.2(c)). Facilities which exceed a significant net emission increase threshold for a non-attainment pollutant are required to demonstrate Lowest Achievable Emission Rate (LAER), and must include an emission offset plan and an air quality impact analysis to demonstrate compliance with the regulation for the non-attainment pollutant (N.J.A.C. 7:27-18.3).

The Salem-Hope Creek facility is a major facility and the retrofit project would cause a significant net emissions increase of total suspended particulates ("TSP"), PM_{10} and $PM_{2.5}$.[2] As a result, Subchapter 18 requirements would apply to the project if the facility

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[1] The Salem and Hope Creek Generating Stations are considered to be a single source under EPA and NJDEP air permitting regulations.

[2] The PSD significance thresholds are 25 tons per year (tpy) for total suspended particulates and 15 tpy for PM_{10}. Both cooling tower designs would have annual particulate emissions exceeding 25 tpy. Therefore, both designs would be subject to PSD review.

is located in a TSP, PM_{10} or $PM_{2.5}$ non-attainment area <u>or</u> if the retrofit project significantly impacts a non-attainment area. The facility is located in Salem County which is currently designated as attainment for TSP, PM_{10} and $PM_{2.5}$, but it is located only about 2100 meters from the border of New Castle County, Delaware. New Castle County is a $PM_{2.5}$ non-attainment area. Therefore, there is the potential that $PM_{2.5}$ impacts from the retrofit project may significantly impact a non-attainment area.

Preliminary modeling of the natural draft tower design shows all predicted impacts below the $PM_{2.5}$ air quality impact significance levels and, as a result, the natural draft retrofit design would not be subject to Subchapter 18 non-attainment requirements. In addition, N.J.A.C. 7:27-6 limits particulate emissions from source operations associated with manufacturing processes as defined at N.J.A.C. 7:27-6.1. Per N.J.A.C. 7:27-6.2(a) the maximum allowable particulate emission rates for an affected source are determined based upon a maximum particulate concentration of 0.02 grains ("gr") per standard cubic foot ("scf") in the source exhaust flow. N.J.A.C. 7:27-6.2(a) limits the maximum allowable particulate emission rate to 30.0 lbs/hr because the gas flow is greater than 175,000 standard cubic feet per minute ("scfm"). Recognizing that technology limitations could prevent compliance with the requirements of N.J.A.C. 7:27-6.2(a), the Department included provisions for variances which are found in N.J.A.C.7:27-6.5. However, the variance provisions in N.J.A.C. 7:27-6.5, were expressly rejected by EPA when EPA approved Subchapter 6 as part of New Jersey's State Implementation Plan (SIP). Therefore, NJDEP believes it is not possible to issue such a variance.

In April 2004 PSEG requested that NJDEP revise Subchapter 6 to allow PM emission rates above 30 lb/hr for the Hope Creek cooling tower, which may periodically result from the Hope Creek Extended Power Uprate ("EPU") project. The changes to Subchapter 6 have not as of this date been proposed and it is unclear when, or if, NJDEP will amend the regulations. Although EPA must approve the revised Subchapter 6 as a SIP change, NJDEP believes that they can issue permits under the revised Subchapter 6 after its adoption on a state level.

If the Subchapter 6 revisions are adopted before any air permitting work begins on the retrofit project, then the current Subchapter 6 limitations are not expected to affect the permitting of the retrofit project. If Subchapter 6 is not revised, then particulate emissions from each cooling tower would be limited to 30 lb/hr. This limit on particulate matter emissions is impractical for the presumed cooling tower design and operational characteristics because of periodic naturally-occurring meteorological and river flow conditions that can yield high circulating water system TDS concentrations. Given currently available technology, the exceedance would preclude the use of natural draft cooling towers, absent a change in the applicable regulations or a modification to the design of the cooling tower.

Two future regulatory initiatives through a 5-year horizon (2010) have been identified which could affect the permitting of the natural draft cooling systems. These are implementation of the ambient air quality standard for $PM_{2.5}$ and the U.S. Environmental Protection Agency's (EPA's) statutory review of the particulate matter National Ambient Air Quality Standards (NAAQS).

EPA announced a proposed $PM_{2.5}$ Implementation Rule ("Implementation Rule") in September 2005. The Implementation Rule is anticipated to be finalized in the Fall of 2006. This rule will affect the nonattainment New Source Review and PSD treatment of $PM_{2.5}$ and thus could affect the permitting of the closed-cycle systems. EPA has not released sufficient information in the Implementation Rule to determine the precise effect on the hypothetical cooling tower retrofit.

EPA's review of the particulate NAAQS may result in a change to the particulate standards toward even greater stringency. However, if EPA promulgates revised PM standards in September 2006 (under a court ordered deadline), it is likely that new source review requirements for the revised standards will not become effective before 2010.

(b) Schedule Considerations

The installation of natural draft cooling towers will require a major modification to the existing Salem-Hope Creek Title V permit and a PSD permit. In New Jersey the application to modify the Title V permit also acts as the application for a PSD permit; therefore, only a single application would need to be prepared and submitted to the NJDEP. Both the major modification to the Title V permit and the PSD permit are considered "pre-construction" permits which means that the project could not commence any project-related construction activities prior to both the Title V modification and the PSD permit receiving final approval. Prior to final approval, the modification to the Title V permit will be subject to a mandatory 45 day review period for EPA Region II. EPA Region II will also have the opportunity to review and comment on the supporting dispersion modeling analysis prior to final approval by NJDEP.

The natural draft tower design would most likely have insignificant impacts and would not be required to perform a multi-source modeling analysis. The permitting time frame for the Title V process is expected to take 11 months.

(c) Special Studies and/or Concerns

An assessment of ambient air quality impacts from construction activities related to the retrofit project will most likely be required as part of the environmental impact statement for the project. Because the large site affords a significant buffer between the activities and the fence-line, the ambient impacts from the construction activities are not expected to cause or contribute to any exceedance of applicable standards. Given the site layout, it is likely that this aspect of the permit application can be handled qualitatively.

It has been demonstrated that particulate emissions from the existing Hope Creek tower do not cause significant impacts for particulates in either short-term or annual averaging periods. This study shows a maximum ground level short-term (24-hour average) impact of 0.25 $\mu g/m^3$ and a maximum annual average impact of 0.004 $\mu g/m^3$. These levels are sufficiently low that even if two additional similar towers were added to the site for the Salem generating stations, significant impacts for particulate matter would not occur. This is an important conclusion in that it:

- Eliminates the need for a multi-source modeling analysis including other Salem and Hope Creek sources (combustion turbines, emergency diesels, auxiliary boilers, etc.) thereby reducing the permitting risk to non-project equipment and operations;
- Eliminates any possibility of significant impacts in the nearby non-attainment area (New Castle County, Delaware);
- Reduces the permitting costs; and,
- Improves the permitting schedule

Fogging and/or icing can occur when the condensed plume from the cooling tower is transported/diffused down to ground level. The natural draft tower design will have only a very small potential of producing a plume which could be carried intact to ground level since the exit height will be over 500 feet above grade elevation. The natural draft tower design would not be expected to have any significant icing or fogging impacts and would probably escape the NJDEP impact modeling requirement.

The particulate emissions from the proposed Salem cooling towers will mainly consist of salt particles contained in the cooling tower drift emissions. The deposition of these salt particles in the surrounding area will need to be evaluated for its potential effects on soils and plants in the area. The natural draft tower design for Salem, with its elevated release height of over 500 feet, would be expected to have very limited deposition impacts within the surrounding area.

NJDEP's Title V public comment requirements [7:27-22.11(k)] dictate that, before publishing notice of a draft operating permit that includes a significant modification, NJDEP must also give notice to the head of the designated air pollution control agency of any "affected state." An affected state is any state contiguous to New Jersey or is located within 50 miles of the facility which is the subject of the permit [7:27-22.1]. In the case of the Salem-Hope Creek Facility the affected states are Delaware, Maryland, and Pennsylvania.

b. Discharges to Surface Water and CWISs

1. NJPDES

(a) Regulatory Evaluation

- PSEG expects to demonstrate that the blowdown from Salem will be essentially similar in nature to the cooling tower blowdown effluent stream from Hope Creek. The Hope Creek effluent stream currently meets applicable effluent standards.

- PSEG would be required to request a determination that any new or modified discharge is consistent with the Water Quality Management Plan ("WQMP Determination")[3] since it must submit proof with its Application that PSEG received, or requested, a WQMP Determination (N.J.A.C. 7:14A-4.3(a)12.).

- In the event that any of the non-thermal pollutants present in the effluent stream were to exceed applicable surface water quality standards or any water-quality based effluent limitation that may be established, PSEG would be required to install additional treatment technologies to achieve compliance or seek a variance as identified at N.J.A.C. 7:14A-11.7 and the provisions of N.J.A.C. 7:9B-1.8 or 1.9. Based on the operation of the Hope Creek facility, exceedance of the standards from non-thermal pollutants is not anticipated.

- Since heat is a regulated pollutant, PSEG would need to assess whether the thermal plume associated with the cooling tower blowdown ("CTB") would be in compliance with the DRBC's[4] thermal SWQS. If the plume were not in compliance, PSEG would be required to request a variance pursuant to §316(a) of the federal Clean Water Act, and N.J.A.C. 7:14A-11.7(a)(2). The §316(a) Demonstration would require that PSEG provide a description of the thermal plume and an assessment of the impacts of the thermal plume on the aquatic biota of the Delaware Estuary. This assessment would also consider the synergistic effect of heat on other pollutants present in the thermal plume.

PSEG has successfully demonstrated that the thermal discharge from Salem's discharge is consistent with the maintenance and propagation of a balanced indigenous community of fish, shellfish and wildlife in and on the Estuary, the standard for granting a variance under §316(a). It is expected that PSEG would be able to meet the thermal water quality standards for the CTB discharge and no §316(a) variance would be required. The Hope Creek facility meets the thermal water quality standard; the thermal

---

[3] N.J.A.C. 7:15-3.1(b) prohibits the NJDEP's Division of Water Quality from issuing any permit for a new discharge before a formal consistency determination has been made.

[4] The DRBC developed SWQS (including SWQS for heat and temperature) for the Delaware, which NJDEP has incorporated by reference into its SWQS.

plume from the Salem facility would be similar to that from the Hope Creek facility; and the two discharge points for the CTB would be far enough apart to avoid an additive impact (based on a preliminary analysis of the S&L 2005a).

(b) Schedule Considerations

NJDEP must determine whether an application is administratively complete within 30 days of receiving an application; however, there are no regulatory time limits on when NJDEP must act to issue a draft or final permit. Once a draft permit is issued, NJDEP is required to provide USEPA Region II and other interested agencies with a copy of the draft permit documents and to provide a 30-day period for public review and comment. At the end of the comment period, NJDEP must then prepare a final permit and a response to comments document.

(c) Special Studies and/or Concerns

No special studies should be necessary to obtain the data required to submit a permit application. Existing data should suffice to support a permit application.

2. §316(b) Regulations

(a) Regulatory Evaluation

Pursuant to EPA's recently-adopted NPDES Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities ("Phase II Rules"), PSEG would be deemed in compliance with §316(b) if it were to install closed cycle cooling. PSEG would only be required to comply with the provisions of §122.21(r), which requires permittees to provide supplemental information about the cooling water intake structure, the source water body, and the cooling system. PSEG would not be required to prepare and submit a comprehensive demonstration study required pursuant to 40 CFR §125.95(b) and would not be required to complete any verification monitoring.

(b) Schedule Considerations

There are no significant schedule concerns or obstacles for §316(b) permit related activities associated with natural draft cooling towers.

(c) Special Studies and/or Concerns

There are no special studies or concerns relative to §316(b) permit related activities associated with natural draft cooling towers.

3. Treatment Works Approval ("TWA")

(a) Regulatory Evaluation

PSEG would be required to obtain treatment works approvals for the cooling towers and any new treatment systems required to treat the cooling tower blowdown prior to discharge pursuant to the TWA regulations at N.J.A.C 7:14A-22 and potentially Technical Requirements for TWA Applications at N.J.A.C. 7:14A-23.

(b) Schedule Considerations

A valid NJPDES permit for the discharge is a prerequisite to applying for a General Industrial TWA, pursuant to N.J.A.C. 7:14A-22.6(d). This has implications with respect to the timing of the NJPDES application, which is required to be submitted at least 180 days in advance of the proposed date of discharge. PSEG would have to obtain permit approval from NJDEP to insure the issuance of a TWA corresponded with the issuance of an NJPDES permit.

Per N.J.A.C. 7:14A-22.5(l), the submittal requirements for a General Industrial TWA are administrative in nature. Within 30 days of the receipt of a complete application, NJDEP will either issue the General Industrial TWA or notify the applicant that an individual TWA will be required (due to a potentially significant health risk, environmental impact, or past facility performance).[5]

(c) Special Studies and/or Concerns

The factors considered in making a determination for TWA approval are the potential for a significant health risk or environmental impact, or past performance of the facility. Currently available data suggest that there should be no impediment to obtaining a TWA for a closed cycle cooling system.

4. DRBC

(a) Regulatory Evaluation

The DRBC's Rules of Practice and Procedure ("DRBC Rules") require that activities that have or may have a substantial effect upon the Delaware River Basin must comply with the "Project Review" procedures in Article 3 of the DRBC's Rules to determine that the Project is in conformance with the Comprehensive Plan ("CP"). Upon approval, DRBC

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[5] According to N.J.A.C. 7:14A-22.4(b)3(ii), a treatment works approval or general industrial treatment works approval is not required for "cooling towers for non-contact water/heat exchange units and necessary associated appurtenances." However, NJDEP has not allowed the adjacent Hope Creek cooling tower to operate without the TWA. A specific determination of the TWA requirement for Salem should be presented to NJDEP for consideration.

issues dockets that authorize a proposed project in the DRBC's CP. PSEG has a Docket for Salem that authorizes the Station to operate with its current OTCWS and CWIS. Any substantial modifications to the OTCWS or CWIS or a change in the consumptive water use at the Station would require that an application for a Project Change be filed with the DRBC.

(b) Schedule Considerations

Under the Administrative Agreement between the DRBC and the NJDEP, the NJDEP will act first on all issues addressed under the NJDEP's NJPDES program. Subsequent to the NJDEP's issuing a final permit, the DRBC will act on PSEG's request for a modification to the Salem Docket. NJDEP is to receive all applications for review and approval of a reviewable project, provide a technical review, and then notify DRBC of such applications. The DRBC Executive Director will then make a determination of "substantiality" under the DRBC regulations and requires further action. Although the DRBC's Rules contemplate that NJDEP could simply refer the matter to the DRBC pursuant to the Administrative Agreement between NJDEP and DRBC, DRBC has always required PSEG to file a separate application.

(c) Special Studies and/or Concerns

The DRBC's regulations do not include a provision analogous to the §316(a) variance provision in the NJPDES program. If the thermal discharge from natural cooling tower modifications is not in conformance with the DRBC's thermal surface water quality standard, PSEG's application must include a demonstration that the thermal discharge does not interfere with the designated uses for Zone 5 of the Delaware (Sections 3.10.2, 3.10.3B, 4.30.6.G, and 5.10.3 of the DRBC Water Quality Regulations). Based on the operating conditions at the Hope Creek facility and given the comparable design for the Salem facility (as shown in S&L 2005a), it is highly likely that PSEG would meet the DRBC, and consequently the NJDEP, thermal water quality standards for the cooling tower blowdown discharge. For the most part, additional studies are not required; the information used in to support the NJPDES Permit Application can be utilized to comply with the DRBC's regulatory structure. Some additional depictions of the thermal discharge may be required since DRBC has previously required that PSEG provide dimensions for the thermal mixing zone in both summer and non-summer periods.

5. Stormwater Control Permit for Construction Activities

(a) Regulatory Evaluation

Construction activities that disturb five or more acres of land must apply for General NJPDES Discharge to Surface Water ("DSW") Permit No. NJ0088323 for stormwater discharges associated with construction activities. Based on the S&L conceptual plans

(S&L 2005a), construction activities for natural draft cooling towers would disturb more Hthan five acres. General NJPDES DSW Permit NJ0088323 is issued by the local Soil Conservation District when a soil erosion and sediment control certification is obtained.

(b) Schedule Considerations

Applicants must submit a Request for Authorization Form to the Salem County Soil Conservation District at least thirty (30) days before any land disturbance activities begin.

(c) Special Studies and/or Concerns

No special studies are required and there are no identifiable obstacles to obtaining this permit.

c. Activities in Wetlands, Waterways, or Coastal Zones

1. U.S. Army Corps of Engineers Section 404/Section 10 permits

(a) Regulatory Evaluation

The USACOE Section 404 Permit regulates discharge of dredged or fill materials into waters of the United States. Based on the conceptual layout in the S&L report and wetland delineations provided by PSEG for the Salem and Hope Creek generating sites (July 30, 2004), the discharge pipes for the blowdown lines would cross a small (less than three-acre) area of wetlands adjacent to the Delaware River and within Section 404 jurisdiction. The area of direct impact would be less than 0.1 acre. Because the majority of the site is within 1,000 feet of a tidal water body, the USACOE regulates any wetland (i.e. tidal or freshwater) within that zone. Therefore, a Section 404 permit from the USACOE would be required.

The USACOE Section 10 Permit regulates work (e.g., construction, excavation, dredging) in or over navigable waters of the United States, including wetlands. A Section 10 permit from the USACOE would be required for the two new discharge pipes because they would be installed below the mean high water mark.

(b) Schedule Considerations

The estimated time frame for obtaining a Section 10/Section 404 permit is approximately 16 months. Normally, the time frame for obtaining Section10/Section 404 permits ranges from 3 – 6 months. Given the need for authorization of a new/revised NJPDES and the other permit considerations associated with a modification to a closed water cooling system, the permitting time frame has been expanded to 16 months.

(c) Special Studies and/or Concerns

As part of prior regulatory compliance activities, freshwater wetlands have been delineated throughout the site (PSEG Nuclear LLC, Salem & Hope Creek Generating Stations, Municipal Site Plan, July 2004). The estimated impact to freshwater wetlands would likely qualify for a Nationwide Permit in the absence of other USACOE permitting requirements. However, it is likely that the USACOE would process the Section 404 and Section 10 permits together as an individual permit. Mitigation for the impact to freshwater wetlands would be required.

Any special studies that may be required for the ACOE Section 10 permitting effort will be covered by the evaluation of the proposed discharge for the NJPDES permit.

No decommissioning of the existing outfalls or intake structures is anticipated. Therefore, no permits or special studies related to decommissioning would be required.

2. NJDEP Land Use Regulation Program Permits ("LURP")

(a) Regulatory Evaluation

There are four distinct LURP regulatory programs that may have jurisdiction over the construction of natural draft cooling towers including *CAFRA*, *Waterfront Development*, *Freshwater Wetlands* and *Coastal Wetlands*. Given that each of these permits is managed by the same program within NJDEP, the applicant can apply for the needed regulatory approvals as part of one permit application. The Freshwater and Coastal Wetlands regulatory elements are similar to the description provided under the Section 404 discussion above.

Construction of natural draft cooling towers will require a CAFRA permit because Salem falls within the statutorily-defined boundaries of CAFRA's jurisdiction. The CAFRA permit will require an accompanying Compliance Statement and supporting documentation, most of which will be available from other regulatory initiatives related to air permitting and NJPDES support documentation.

Similar to USACOE Section 10 permitting requirements, any work completed below the mean high water line will require a Waterfront Development Permit. Specifically improvements to the CWIS and any needed discharge pipes will be subject to Waterfront Development compliance. As part of the Waterfront Development requirements, PSEG will be required to demonstrate that a Tidelands approval (in the form of a license, grant, lease or other acceptable contract) be in place for the area in which the Waterfront Development permit is applicable. PSEG currently has a Tidelands approval for areas of the waterfront. The engineering improvements would have to be evaluated in the context of the existing Tidelands approval to determine whether the affected areas are within the contract area.

Given the level of design detail available at this point, it is unclear whether modification to the existing Tidelands approval would be required. Based on the S&L plans (S&L 2005a), it is assumed that any required modification to the existing Tidelands approval would be covered by a license rather than a grant. A grant requires that a deed be signed by the governor, and requires significantly more time to obtain than a license.

(b) Schedule Considerations

As noted, CAFRA, Waterfront Development, Freshwater Wetlands and Coastal Wetlands permits can be processed and issued concurrently. The approval process is dictated by the 90 Day Construction guidelines found at NJAC 7:1C. Typically, the process from submittal to completion should take from six to nine months. The time frame can vary depending upon the complexity of the project and the public interest in the project.

(c) Special Studies and/or Concerns

Many of the special studies (e.g., threatened and endangered species and historical and archeological resources) typically required for LURP related permits will have been completed as part of other permitting requirements, e.g. air quality impacts and wastewater discharge. Accordingly, no additional special studies are anticipated as part of the LURP process.

d. Local Approvals

1. Lower Alloways Creek Zoning Board Approval

(a) Regulatory Evaluation

Site plan approval will be required for the construction of natural draft cooling towers. Because a height variance request would be required to exceed the current limit of 45 feet, the project will be heard before the Zoning Board of Adjustment. The Zoning Board approval requires 5 endorsements from the board, regardless of the number of members of the board (the full board is comprised of 7 voting members) that are present at the meeting. The Zoning Board of Adjustment approval can be difficult to obtain because of the number of affirmative votes required.

Public notice is required as part of the submission process. The site plan approval conducted through the Zoning Board of Adjustment process requires the submission of a site plan and appropriate documentation signed and sealed by a professional engineer. A public hearing is a required element of the review process. Members of the public are permitted to testify in support of and in opposition to the application.

(b) Schedule Considerations

The typical process for site plan approval takes approximately 30 – 60 days from the time of submittal. There are no approvals required from other regulatory bodies required prior to submittal to the Township. Other approvals, particularly those issued by the NJDEP LURP and Soil Conservation District, will be required as conditions of any approval issued by the Township.

(c) Special Studies and/or Concerns

It is unlikely that there will be any special studies required by the Township that have not been completed in other regulatory submittals. Typically, professional studies are not needed, but a study (e.g. lighting and shading impacts on adjacent properties, noise studies) could be requested if so desired by the Township.

2. Salem County Soil Conservation District

(a) Regulatory Evaluation

The Salem County Soil Conservation District ("SCD") is required to certify a Soil Erosion and Sediment Control Plan for any ground disturbance greater than 5,000 square feet. The Soil Erosion and Sediment Control Plan must meet the standards promulgated by the Department of Agriculture, State Soil Conservation Committee (N.J.S.A. 4:24-39 et seq.).

(b) Schedule Considerations

The SCD is required to certify the plan within 30 days of submittal. The critical path construction schedule will only be affected when significant changes to the plans are made immediately prior to construction, requiring re-certification by the District.

(c) Special Studies and/or Concerns

There are no special studies or concerns associated with Soil Conservation District Certification.

e. Other Approvals

1. New Jersey Department of Community Affairs ("DCA")

(a) Regulatory Evaluation

All plans for structures at electrical generating stations and substations including nuclear generating stations must be approved (including utilities, exterior/interior building, plumbing, mechanical, electrical, fire protection, elevators and barrier free access) by the DCA (N.J.A.C. 5:23-3.11). For purposes of this analysis, the cooling towers are considered to be "process equipment," and therefore exempt from DCA permit requirements. However, the foundations and support building(s) would be reviewed by DCA.[6]

(b) Schedule Considerations

PSEG can apply for a complete release to proceed if all plans, specifications and fees are presented to DCA with the original submission or a partial release to proceed if only components of the overall application are complete at the time of submission. DCA will advise PSEG within 20 business days of receiving a complete application whether the Project Plans have been released or rejected.

(c) Special Studies and/or Concerns

As long as appropriate engineering design is completed, DCA typically does not require special studies as long as an applicant submits a complete application. Typically, DCA approval becomes a critical path schedule item as final engineering modifications are made as a result of other permit conditions or changes dictated by internal review. The schedule delays are readily resolvable by quality assurance procedures during the design phase of the project.

2. FAA

(a) Regulatory Evaluation

Per Federal Aviation Regulations (FAR) Part 77, new construction requires that the FAA be notified if the structure is, among other things, (1) more than 200' tall or (2) is of a certain height and is within 20,000 feet of a public-use or military airport with at least one runway of more than 3,200 feet (14 CFR 77.13). Notification is made through Form 7460-1.

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[6] The ultimate decision as to whether the cooling towers are "structures" for purposes of permitting rests with DCA.

The FAA conducts an aeronautical study based on the information in the notice. If the FAA finds that the structure would not present a hazard to navigable airspace, the FAA issues a Determination of No Hazard to Air Navigation. The Determination can include conditions such as marking and lighting requirements (FAA Obstruction Evaluation/ Airport Airspace Analysis web site, www.oeaaa.faa.gov).

If the FAA finds that the structure exceeds obstruction standards and/or could result in a hazard to navigable airspace, the FAA issues a Determination of Presumed Hazard. Such a determination triggers changes in the structure design and/or public review and comment. Given that the Hope Creek natural draft cooling tower is already present nearby and that there are not any public-use or military airports in the vicinity, it is assumed that a Determination of No Hazard can be made.

(b) Schedule Considerations

Form 7460-1 must be filed with FAA a minimum of 30 days prior to the start of construction. Once the Determination of No Hazard is made, the Applicant must submit Form 7460-2 at the start of construction.

(c) Special Studies and/or Concerns

Advisory Circular 70/7460-2K, Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace, provides information to persons proposing to erect or alter an object that may affect the navigable airspace. Advisory Circular 70/7460-1K, Obstruction Marking and Lighting, describes the standards for marking and lighting structures such as cooling towers.

The requirements for FAA approval are slightly different from other permits that are required by this alternative. Accordingly some new information may be required to support the permit application including but not limited to type of obstruction marking/lighting required (lighting/marking is required for all structures over 500'), relationship of structure to roads, airports, prominent terrain, existing structures, etc.

B. Regulatory Feasibility

The NJDEP is on record as supporting closed cycle cooling. Air quality regulations and local zoning and planning approvals are the critical regulatory factors associated with this alternative. If the Subchapter 6 limit on hourly particulate emissions is not changed, potential exceedance of the limit would preclude the use of natural draft cooling towers as currently designed. Preliminary studies conducted as part of this evaluation do not indicate any other significant air quality issues associated with this alternative. The extent of regulatory requirements necessary to implement this alternative is significant. It is probable that minor regulatory issues will arise during the permitting process. However, assuming the particulate emissions limit can be resolved, then, based on the conceptual information available at this time to support this alternative, there does not appear to be any fatal flaw or significant obstacle to obtaining the necessary approvals.

C. Regulatory Schedule

The Title V permitting, USACOE Section 404 permitting, and the NJDEP LURP permitting have the longest lead-times associated with the regulatory processes required prior to construction activity. Given that final design may not be completed until the referenced regulatory processes are final, there will be a period of time after issuance of the Title V, USACOE, and LURP permits for securing construction permits from the Department of Community Affairs and any local construction permits that may be needed. All other permits can run concurrently with the Title V, USACOE, and LURP processes. The estimated permitting process time from permit preparation to construction start is expected to be 16 to 18 months.

D. Regulatory Costs

Table 1

Required Permits, Regulatory Costs and Schedule for Natural Draft Cooling Tower Modifications[7]

Permit	Regulatory Fees and Preparation Costs	Support Studies	Schedule	Year 1 Costs	Year 2 Costs
Title V	$50,000	$70,000	11 months	$120,000	$0
NJPDES	Fee at NJDEP discretion; permit prep costs $50,000	$100,000	10 months	$120,000 + fees	$30,000
316(b)	Fee at NJDEP discretion; permit prep costs $50,000	$100,000	10 months	$120,000 + fees	$30,000
Treatment Works Approval	Fee at NJDEP discretion; permit prep costs $10,000	$25,000	6 months	$35,000 + fees	$0
Stormwater Control	$200.00	$0	2 months	$200.00	$0
DRBC	Fee per DRBC formula; permit prep costs $2,500	$2,000	6 months	$4,500	$0
USACOE Section 10/404	$25,000	$15,000	16 months	$30,000	$10,000
NJ LURP	$30,000	$40,000	16 months	$60,000	$10,000
NJ Tidelands	$5,000	$10,000	6 months	$15,000	$0
Dept. of Community Affairs	Fee % of construction costs; permit prep $10,000	$0	1 month	$10,000 + Permit fees	$0
Salem County SCD	$2,500	$0	2 months	$2,500	$0
LAC Planning or Zoning Board	$40,000	$20,000	5 months	$60,000	$0
FAA	$0	$5,000	2 months	$5,000	$0

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[7] The fee schedule provided herein does not include engineering design costs and relate studies. Costs included herein are limited to special studies, environmental impact statements, compliance statements and other studies specifically required by the regulatory program. Because such costs can be a function of specific issues raised by both the regulator and public comment, cost estimates provided herein may vary significantly depending upon the level of review by the respective regulatory agency.

III. MECHANICAL DRAFT COOLING TOWER

A. Regulatory Evaluation of Alternatives

1. Assumptions

AKRF's analysis of the mechanical draft cooling tower modification is based upon the following assumptions and based on the analysis of construction from the Sargent & Lundy report (S&L 2005b):

- PSEG would install two mechanical draft cooling towers, housing 24 cells each, as described in the S&L report;
- PSEG would also need to construct: a system of pipes or conduits between the mechanical draft towers, some structure(s) or building(s) for mechanical components (e.g., pumps, electrical equipment) and treatment systems (e.g., chlorination and/or de-chlorination systems, sodium hypochlorite and caustic ammonium bisulfite treatment, and NJPDES-required monitoring equipment);
- PSEG would be required to install new piping for transporting the re-circulating cooling water between the condensers and the towers, for make-up water and for the discharge of cooling tower blowdown;
- PSEG would be required to site the cooling towers beyond the existing security fence;
- PSEG would be required to modify the existing CWIS (by replacing some of the pumps and piping) to accommodate the substantially reduced intake withdrawals;
- PSEG would be required to install two new discharge pipes to accommodate blowdown from the towers. The six existing pipes would remain as discharge for service water;
- The site layout would be based on the site plan from the S&Lreport (Attachment 1, Figure 1); and
- The analysis in this evaluation is limited to the facility location and operation, and does not include potential construction permits (e.g., batch plant, diesel construction equipment).

A depiction of the layout and other conceptual plans for the mechanical draft cooling towers is provided in Attachment 1 of the S&L report.

2. *Applicable Regulatory Programs*

a. *Air quality*

1. *Title V*

(a) Regulatory Evaluation

The Salem-Hope Creek Facility is currently operating under an approved Title V Operating Permit.[8] N.J.A.C. 7:27-22.24 requires that the construction or installation of any new significant source operation shall be made as a significant modification if a source is, among other things, subject to PSD regulations at 40 CFR 52. Because the retrofit project will be subject to PSD regulations, a Title V Operating Permit Significant Modification would be required.

N.J.A.C. 7:27-18 (Subchapter 18) applies, in part, to major facilities or major modifications which will cause a "significant net emission increase" in a non-attainment area (or that will significantly impact a non-attainment area, N.J.A.C. 7:27-18.2(b)). A significant net emission increase occurs when facility-wide emission increases during the "contemporaneous period" (time period between five years prior to initiation of construction and initial source operation) exceed the significant net emission increase thresholds (N.J.A.C. 7:27-18.2(c)). Facilities which exceed a significant net emission increase threshold for a non-attainment pollutant are required to demonstrate Lowest Achievable Emission Rate (LAER), and must include an emission offset plan and an air quality impact analysis to demonstrate compliance with the regulation for the non-attainment pollutant (N.J.A.C. 7:27-18.3).

The Salem-Hope Creek facility is a major facility and the retrofit project would cause a significant net emissions increase of total suspended particulates ("TSP"), PM_{10} and $PM_{2.5}$.[9] As a result, Subchapter 18 requirements would apply to the project if the facility is located in a TSP, PM_{10} or $PM_{2.5}$ non-attainment area or if the retrofit project significantly impacts a non-attainment area. The facility is located in Salem County which is currently designated as attainment for TSP, PM_{10} and $PM_{2.5}$, but it is located only about 2100 meters from the border of New Castle County, Delaware. New Castle County is a $PM_{2.5}$ non-attainment area. Therefore, there is the potential that $PM_{2.5}$ impacts from the retrofit project may significantly impact a non-attainment area.

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[8] The Salem and Hope Creek Generating Stations are considered to be a single source under EPA and NJDEP air permitting regulations.

[9] The PSD significance thresholds are 25 tons per year (tpy) for total suspended particulates and 15 tpy for PM_{10}. Both cooling tower designs would have annual particulate emissions exceeding 25 tpy. Therefore, both designs would be subject to PSD review.

The preliminary modeling of the assumed mechanical draft tower design does show impacts exceeding both the 24-hour and annual $PM_{2.5}$ air quality significant impact levels within the New Castle County non-attainment area and, as a result, the mechanical draft retrofit design would be subject to Subchapter 18 non-attainment requirements. The two most significant aspects of the applicability of Subchapter 18 will be (1) the demonstration that the $PM_{2.5}$ control technology for the mechanical draft towers represents LAER and (2) acquiring emissions reductions (offsets) from other facilities within the non-attainment area.

Any cooling tower retrofits installed at Salem presumably will be subject to N.J.A.C. 7:27-6 as a “source operation” as defined under N.J.A.C. 7:27-6.1. In addition, N.J.A.C. 7:27-6.2(a) limits the maximum allowable particulate emission rate to 30.0 lbs/hr. This limit does not recognize technology limitations or source size that could prevent compliance with the Subchapter 6 requirement, and NJDEP previously made provision in the regulations for a variance mechanism. However, the variance provision has been rejected by EPA and NJDEP believes that it is not possible to issue a variance.

In April 2004, PSEG requested that NJDEP revise Subchapter 6 to allow PM emission rates above 30 lb/hr for the Hope Creek cooling tower; these higher rates may periodically result from the Hope Creek Extended Power Uprate ("EPU") project. NJDEP staff has indicated that the regulations would be amended. However, the changes to Subchapter 6 have not been proposed as of this date and it is unclear when, or if, NJDEP will amend the regulations. Although EPA must approve the revised Subchapter 6 as a State Implementation Plan (“SIP”) change, NJDEP believes that they can issue permits under the revised Subchapter 6 after its adoption on a state level.

If the Subchapter 6 revisions are adopted before any air permitting work begins on the retrofit project, then the current Subchapter 6 limitations are not expected to affect the permitting of the retrofit project. If Subchapter 6 is not revised, then particulate emissions from each cooling tower would be limited to 30 lb/hr. This limit on particulate matter emissions is impractical for the presumed cooling tower design and operational characteristics because of periodic naturally-occurring meteorological and river flow conditions that can yield high circulating water system total dissolved solids (“TDS”) concentrations. Given currently available technology, the exceedance would preclude the use of mechanical draft cooling towers, absent a change in the applicable regulations or a redesign of the cooling towers.

Two future regulatory initiatives through a 5-year horizon (2010) have been identified which could affect the permitting of the mechanical draft cooling systems. These are implementation of the ambient air quality standard for $PM_{2.5}$ and the U.S. Environmental Protection Agency’s (EPA’s) statutory review of the particulate matter National Ambient Air Quality Standards (NAAQS).

EPA announced a proposed $PM_{2.5}$ Implementation Rule (Implementation Rule) in September 2005. The Implementation Rule is anticipated to be finalized in the Fall of 2006. This rule will affect the nonattainment New Source Review and PSD treatment of $PM_{2.5}$ and thus could affect the permitting of the closed-cycle systems. EPA has not released sufficient information in the Implementation Rule to determine the precise effect on the hypothetical cooling tower retrofit.

EPA's review of the particulate NAAQS may result in a change to the particulate standards toward even greater stringency. However, if EPA promulgates revised PM standards in September 2006 (under a court ordered deadline), it is likely that new source review requirements for the revised standards will not become effective before 2010.

(b) Schedule Considerations

The mechanical draft tower design will produce significant impacts and would be required to perform a multi-source analysis. The multi-source analysis would include modeling of other particulate sources within the Salem-Hope Creek facility as well as all other major particulate sources within 50-60 km of the facility. The multi-source modeling analysis would add significant cost to the permitting as well as adding an additional 4-6 months to the permitting schedule. It is assumed, for cost and schedule purposes that the Seasonal and Annual Cooling Tower Impacts ("SACTI") model will need to be run as part of the refined modeling analysis for the mechanical draft scenario to assess fogging/icing potential.

The permitting time frame for the Title V process is expected to be approximately 17 months. Given the issues regarding particulates noted below, however, there would be a significant likelihood of rejection of the mechanical draft option.

(c) Special Studies and/or Concerns

An assessment of ambient air quality impacts from construction activities related to the retrofit project will most likely be required as part of the environmental impact statement for the project. Because the large site affords a significant buffer between the activities and the fence-line, the ambient impacts from the construction activities are not expected to cause or contribute to any exceedance of applicable standards. Given the site layout, it is likely that this aspect of the permit application can be handled qualitatively.

For particulate emissions, there are extensive areas where predicted impacts would exceed the 24-hour significance level of 2.2 $\mu g/m^3$. The full extent of this area is undefined in the present analysis since impacts exceeding the $PM_{2.5}$ significance threshold extend to the edge of the modeling domain (at least 10 km) in all directions. This is important, as the Delaware border is only about 2 km to the west and southwest of the Salem site. The significant impacts for $PM_{2.5}$, therefore, reach well into New

Castle County, which has been designated non-attainment for fine particulates. From a permitting standpoint this then triggers New Jersey Subchapter 18 requirements for LAER and offsets. It is unlikely that any New Jersey non-attainment area would be significantly impacted since the nearest non-attainment area in New Jersey is Gloucester County, at a distance of approximately 30 km.

NJDEP's Title V public comment requirements [7:27-22.11(k)] dictate that, before publishing notice of a draft operating permit that includes a significant modification, NJDEP must also give notice to the head of the designated air pollution control agency of any "affected state." An affected state is any state contiguous to New Jersey or is located within 50 miles of the facility which is the subject of the permit [7:27-22.1]. In the case of the Salem-Hope Creek Facility the affected states are Delaware, Maryland, and Pennsylvania.

In addition to the non-attainment issue, there area two areas nearby to the fence line which are predicted to exceed the 30 μg/m^3 24-hour PSD increment level for PM_{10} by as much as 34.7% (evidenced by the maximum predicted 24-hour concentration of 40.40 μg/m^3).

Exceedance of a PSD increment would be a fatal permitting flaw and must be corrected through changes to the presumed design and/or operational characteristics. Use of the newer air quality dispersion model (AERMOD), when allowed by EPA, will predict impacts that could be higher or lower than those stated herein and this avenue could be investigated as an alternative method for meeting PSD requirements. Additional areas of possible investigation to reduce impacts would include characterizing the equivalent aerodynamic diameter of the particulate to determine whether a fraction can be excluded from consideration as $PM_{2.5}$ emissions and exploring use of the "circular mechanical" tower configuration which enhances plume rise and thereby reduces ground level particulate concentrations. It may require a combination of such actions to successfully address the issue. It is also possible that no technically and economically feasible action or combination of actions can be found that successfully mitigates the problem because of the constraints imposed by the characteristics of high makeup water TDS concentrations and local site meteorology. In any event, permitting cannot proceed unless compliance with the PSD increments can be demonstrated or the cooling tower design is modified.

Significant annual impacts are also predicted but the extent is less than with the short-term analysis. Impacts exceeding the assumed annual $PM_{2.5}$ significance level of 0.3 μg/m^3 extend approximately 7.5 km from the Site, with a maximum concentration of 4.19 μg/m^3. This maximum impact is approximately 24.6% of the annual PM_{10} PSD increment standard of 17 μg/m^3. However, addition of the Gibbstown annual background concentration of 13.8 μg/m^3 to the predicted value of 4.19 μg/m^3 results in a total concentration exceeding the NAAQS of 15 μg/m^3 for fine particulate. This also constitutes a potential fatal flaw for the mechanical draft option, which must be remedied prior to proceeding with permitting.

The mechanical draft tower's exit height will only be approximately 49 feet above grade and plumes from these towers will have a greater probability of causing significant fogging/icing near the tower. The frequency and duration of fogging and icing impacts will decrease as distance away from the tower increases. A modeling evaluation of the potential to cause significant visibility reductions on the waterway would be required. There are no critical offsite public highways, bridges, or other infrastructure in the area that would appear to be near enough to be adversely impacted by the mechanical draft cooling tower plume icing or fogging.

In order to preliminarily assess potential fogging and icing impacts, a previous SACTI study on mechanical draft cooling towers conducted by PSEG (for Linden Generating Station) was examined. While the Linden study was conducted using northeastern New Jersey (Newark Airport) meteorological conditions, it evaluated the same tower design as assumed for the Salem closed-cycle mechanical draft tower retrofit option and therefore is useful to provide an "order of magnitude" assessment for the Salem / Hope Creek Site. The maximum distance to which at least one hour per year of icing was predicted was approximately 1200 m southwest of the towers, while fogging impacts extend as far as 2 km toward the southwest. For onsite impacts, the greatest number of hours of predicted impacts occurs within 200 meters of the cooling towers. Onsite fogging impacts are predicted to occur approximately 202 hours/year while icing impacts are predicted approximately 35.6 hours/year. The predominant directions for fogging/icing impacts are to the south and west of the towers, due to the previously mentioned adverse meteorological conditions commonly associated with easterly component winds which promote long plumes and plume touchdown. It should be noted that impacts from mechanical draft towers installed for Salem would be expected to be more severe than those impacts modeled for the Linden Generating Station because of the greater heat and moisture release.

The mechanical draft design has a height of approximately 49 feet and, as a result, has a higher chance of causing adverse salt deposition impacts in the surrounding area. It should be noted, however, that substantial naturally occurring salt deposition probably already occurs in the area due to the proximity of Delaware Bay.

b. Discharges to Surface Water and CWISs

1. NJPDES

(a) Regulatory Evaluation

Construction and operation of mechanical draft cooling towers will significantly reduce discharges of non-contact cooling water. The reduction in discharge will not preclude the need for NJPDES compliance. Accordingly a revised or new NJPDES permit will be required. NJPDES permit considerations for mechanical draft cooling towers include:

- PSEG expects to demonstrate that the blowdown from Salem will be essentially similar in nature to the cooling tower blowdown effluent stream from Hope Creek. The Hope Creek effluent stream currently meets applicable effluent standards.

- PSEG would be required to request a determination ("Request") that any new or modified discharge is consistent with the Water Quality Management Plan ("WQMP Determination")[10] since it must submit proof with its Application that PSEG received, or requested, a WQMP Determination (N.J.A.C. 7:14A-4.3(a)12.).

- In the event that any of the non-thermal pollutants present in the effluent stream were to exceed applicable surface water quality standards ("SWQS") or any water-quality based effluent limitation ("WQBEL") that may be established, PSEG would be required to install additional treatment technologies to achieve compliance or seek a variance as identified at N.J.A.C. 7:14A-11.7 and the provisions of N.J.A.C. 7:9B-1.8 or 1.9. Based on the operation of the Hope Creek Facility, exceedance of the standards from non-thermal pollutants is not anticipated.

- Since heat is a regulated pollutant, PSEG would need to assess whether the thermal plume associated with the CTB would be in compliance with the DRBC's[11] thermal SWQS. If the plume were not in compliance, PSEG would be required to request a variance pursuant to §316(a) of the federal Clean Water Act, and N.J.A.C. 7:14A-11.7(a)(2). The §316(a) Demonstration would require that PSEG provide a description of the thermal plume and an assessment of the impacts of the thermal plume on the aquatic biota of the Delaware Estuary. This assessment would also consider the synergistic effect of heat on other pollutants present in the thermal plume.

  PSEG has successfully demonstrated that the thermal discharge from Salem's discharge is consistent with the maintenance and propagation of a balanced

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[10] N.J.A.C. 7:15-3.1(b) prohibits the NJDEP's Division of Water Quality from issuing any permit for a new discharge before a formal consistency determination has been made.

[11] *The DRBC developed SWQS (including SWQS for heat and temperature) for the Delaware, which* NJDEP has incorporated by reference into its SWQS.

indigenous community of fish, shellfish and wildlife in and on the Estuary, the standard for granting a variance under §316(a). It is expected that PSEG would be able to meet the thermal water quality standards for the CTB discharge and no §316(a) variance would be required. The Hope Creek facility meets the thermal water quality standard; the thermal plume from the Salem facility would be similar to that from the Hope Creek facility; and the two discharge points for the CTB would be far enough apart to avoid an additive impact (based on a preliminary analysis of the S&L reports).

(b) Schedule Considerations

NJDEP must determine whether an application is administratively complete within 30 days of receiving an application; however, there are no regulatory time limits on when NJDEP must act to issue a draft or final permit. Once a draft permit is issued, NJDEP is required to provide USEPA Region II and other interested agencies with a copy of the draft permit documents and to provide a 30 day period for public review and comment. At the end of the comment period, NJDEP must then prepare a final permit and a response to comments document.

(c) Special Studies and/or Concerns

No special studies should be necessary to obtain the data required to submit a permit application. Existing data should suffice to support a permit application.

2. *§316(b) Regulations*

(a) Regulatory Evaluation

Pursuant to EPA's recently-adopted NPDES Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities ("Phase II Rules"), PSEG would be deemed in compliance with §316(b) if it were to install closed cycle cooling. PSEG would only be required to comply with the provisions of §122.21(r), which requires permittees to provide supplemental information about the cooling water intake structure, the source water body, and the cooling system. PSEG would not be required to prepare and submit a comprehensive demonstration study required pursuant to 40 CFR §125.95(b) and would not be required to complete any verification monitoring.

(b) Schedule Considerations

There are no significant schedule concerns or obstacles for §316(b) permit related activities associated with mechanical draft cooling towers.

(c) Special Studies and/or Concerns

There are no special studies or concerns relative to §316(b) permit related activities associated with mechanical draft cooling towers.

3. Treatment Works Approval ("TWA")

(a) Regulatory Evaluation

PSEG would be required to obtain treatment works approvals for the cooling towers and any new treatment systems required to treat the cooling tower blowdown prior to discharge pursuant to the TWA regulations at N.J.A.C 7:14A-22 and potentially Technical Requirements for TWA Applications at N.J.A.C. 7:14A-23.

(b) Schedule Considerations

A valid NJPDES permit for the discharge is a prerequisite to applying for a General Industrial TWA, pursuant to N.J.A.C. 7:14A-22.6(d). This has implications with respect to the timing of the NJPDES application, which is required to be submitted at least 180 days in advance of the proposed date of discharge. PSEG would have to obtain permit approval from NJDEP to insure the issuance of a TWA corresponded with the issuance of an NJPDES permit.

Per N.J.A.C. 7:14A-22.5(l), the submittal requirements for a General Industrial TWA are administrative in nature. Within 30 days of the receipt of a complete application, NJDEP will either issue the General Industrial TWA or notify the applicant that an individual TWA will be required (due to a potentially significant health risk, environmental impact, or past facility performance).[12]

(c) Special Studies and/or Concerns

The factors considered in making a determination for TWA approval are the potential for a significant health risk or environmental impact, or past performance of the facility. Currently available data suggest that there should be no impediment to obtaining a TWA.

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[12] According to N.J.A.C. 7:14A-22.4(b)3(ii), a treatment works approval or general industrial treatment works approval is not required for "cooling towers for non-contact water/heat exchange units and necessary associated appurtenances." However, NJDEP has not allowed the adjacent Hope Creek cooling tower to operate without the TWA. A specific determination of the TWA requirement for Salem should be presented to NJDEP for consideration.

4. *DRBC*

(a) Regulatory Evaluation

The DRBC's Rules of Practice and Procedure ("DRBC Rules") require that activities that have or may have a substantial effect upon the Basin must comply with the "Project Review" procedures in Article 3 of the DRBC's Rules to determine that the Project is in conformance with the Comprehensive Plan. The DRBC issues dockets that authorize activities found to be in conformance with the DRBC's Comprehensive Plan. PSEG has a Docket for Salem that authorizes the Station to operate with its current OTCWS and CWIS. The Docket concludes that the Station's operation in conformance with the terms and conditions of its NJPDES permit is in conformance with the Comprehensive Plan. Any substantial modifications to the OTCWS or CWIS or a change in the consumptive water use at the Station would require that an application for a Project Change be filed with the DRBC.

(b) Schedule Considerations

Under the Administrative Agreement between the DRBC and the NJDEP, the NJDEP will act first on all issues addressed under the NJDEP's NJPDES program. Subsequent to the NJDEP's issuing a final permit, the DRBC will act on PSEG's request for a modification to the Salem Docket. NJDEP is to receive all applications for review and approval of a reviewable project, provide a technical review, and then notify DRBC of such applications. The DRBC Executive Director will then make a determination of "substantiality" under the DRBC regulations and requires further action. Although the DRBC's Rules contemplate that NJDEP could simply refer the matter to the DRBC pursuant to the Administrative Agreement between NJDEP and DRBC, DRBC has always required PSEG to file a separate application.

(c) Special Studies and/or Concerns

The DRBC's regulations do not include a provision analogous to the §316(a) variance provision in the NJPDES program. If the thermal discharge from mechanical cooling tower modifications is not in conformance with the DRBC's thermal SWQS, PSEG's application must include a demonstration that the thermal discharge does not interfere with the designated uses for Zone 5 of the Delaware (Sections 3.10.2, 3.10.3B, 4.30.6.G, and 5.10.3 of the DRBC Water Quality Regulations).

Based on the operating conditions at the Hope Creek facility and given the comparable design for the Salem facility (as shown in S&L 2005b), it is highly likely that PSEG would meet the DRBC, and consequently the NJDEP, thermal water quality standards. For the most part, additional studies are not required; the information used in to support the NJPDES Permit Application can be utilized to comply with the DRBC's regulatory structure. Some additional depictions of the thermal discharge may be required since

DRBC has previously required that PSEG provide dimensions for the thermal mixing zone in both summer and non-summer periods.

5. Stormwater Control Permit for Construction Activities

(a) Regulatory Evaluation

Construction activities that disturb five or more acres of land must apply for General NJPDES DSW Permit No. NJ0088323 for stormwater discharges associated with construction activities. Based on the S&L conceptual plans (S&L 2005b), construction activities for mechanical draft cooling towers would disturb more than five acres. General NJPDES DSW Permit NJ0088323 is issued by the local Soil Conservation District when a soil erosion and sediment control certification is obtained.

(b) Schedule Considerations

Applicants must submit a Request for Authorization ("RFA") Form to the county Soil Conservation District ("SCD") at least thirty (30) days before any land disturbance activities begin.

(c) Special Studies and/or Concerns

No special studies are required and there are no identifiable obstacles to obtaining this permit.

c. Activities in Wetlands, Waterways, or Coastal Zones

1. U.S. Army Corps of Engineers Section 404/Section 10 permits

(a) Regulatory Evaluation

The USACOE Section 404 Permit regulates discharge of dredged or fill materials into waters of the United States. Based on the conceptual layout in the S&L report and wetland delineations provided by PSEG (July 7, 2004) for the Salem and Hope Creek generating sites, the discharge pipes for the blowdown lines would cross a small (less than three-acre) area of wetlands adjacent to the Delaware River and within Section 404 jurisdiction. The area of direct impact would be less than 0.1 acre. Because the majority of the site is within 1,000 feet of a tidal water body, the USACOE regulates any wetland (i.e. tidal or freshwater) within that zone. Therefore, a Section 404 permit from the USACOE would be required.

The USACOE Section 10 Permit regulates work (e.g., construction, excavation, dredging) in or over navigable waters of the United States, including wetlands. A

Section 10 permit from the USACOE would be required for the two new discharge pipes because they would be installed below the mean high water mark.

(b) Schedule Considerations

The estimated time frame for obtaining a Section 10/ Section 404 permit is approximately 16 months. Normally, the time frame for obtaining Section10/Section 404 permits ranges from 3 – 6 months. Given the need for authorization of a new/revised NJPDES and the other permit considerations associated with a modification to a closed water cooling system, the permitting time frame has been expanded to 16 months.

(c) Special Studies and/or Concerns

As part of prior regulatory compliance activities, freshwater wetlands have been delineated throughout the site (PSEG Nuclear LLC, Salem & Hope Creek Generating Stations, Municipal Site Plan, July 2004). The estimated impact to freshwater wetlands would likely qualify for a Nationwide Permit in the absence of other USACOE permitting requirements. However, it is likely that the USACOE would process the Section 404 and Section 10 permits together as an individual permit. Mitigation for the impact to freshwater wetlands would be required.

Any special studies that may be required for the ACOE Section 10 permitting effort will be covered by the evaluation of the proposed discharge for the NJPDES permit.

No decommissioning of the existing outfalls or intake structures is anticipated. Therefore, no permits or special studies related to decommissioning would be required.

2. NJDEP Land Use Regulation Program Permits ("LURP")

(a) Regulatory Evaluation

There are four distinct LURP regulatory programs that may have jurisdiction over the construction of mechanical draft cooling towers including *CAFRA*, *Waterfront Development*, *Freshwater Wetlands* and *Coastal Wetlands.* Given that each of these permits is managed by the same program within NJDEP, the applicant can apply for the needed regulatory approvals as part of one permit application. The Freshwater and Coastal Wetlands regulatory elements are similar to the description provided under the Section 404 discussion above.

Construction of mechanical draft cooling towers will require a CAFRA permit because Salem falls within the statutorily-defined boundaries of CAFRA's jurisdiction. The CAFRA permit will require an accompanying Compliance Statement and supporting documentation, most of which will be available from other regulatory initiatives related to air permitting and NJPDES support documentation.

Similar to USACOE Section 10 permitting requirements, any work completed below the mean high water line will require a Waterfront Development Permit. Specifically improvements to the CWIS and any needed discharge pipes will be subject to Waterfront Development compliance. As part of the Waterfront Development requirements, PSEG will be required to demonstrate that a Tidelands approval (in the form of a license, grant, lease or other acceptable contract) be in place for the area in which the Waterfront Development permit is applicable. PSEG currently has a Tidelands approval for areas of the waterfront. The engineering improvements would have to be evaluated in the context of the existing Tidelands approval to determine whether the affected areas are within the contract area.

Given the level of design detail available at this point, it is unclear whether modification to the existing Tidelands approval would be required. Based on the preliminary S&L report (S&L 2005b), it is assumed that any required modification to the existing Tidelands approval would be covered by a license rather than a grant. A grant requires that a deed be signed by the governor, and requires significantly more time to obtain than a license.

(b) Schedule Considerations

As noted, CAFRA, Waterfront Development, Freshwater Wetlands and Coastal Wetlands permits can be processed and issued concurrently. The approval process is dictated by the 90 Day Construction guidelines found at NJAC 7:1C. Typically, the process from submittal to completion should take from six to nine months. The time frame can vary depending upon the complexity of the project and the public interest in the project.

(c) Special Studies and/or Concerns

Many of the special studies (e.g., threatened and endangered species and historical and archeological resources) typically required for LURP related permits have been completed as part of other permitting completed for project at the site. Other special studies that may be necessitated as part of any submitted LURP applications will consist of data submitted to other agencies related to air quality impacts and wastewater discharge. Accordingly, no additional special studies are anticipated as part of the LURP process.

d. Local Approvals

1. Lower Alloways Creek Zoning Board Approval

(a) Regulatory Evaluation

Site plan approval will be required for the construction of mechanical draft cooling towers. Because a height variance request would be required to exceed the current limit of 45 feet, the project will be heard before the Zoning Board of Adjustment. The Zoning Board approval requires 5 endorsements from the board, regardless of the number of members of the board (the full board is comprised of 7 voting members) that are present at the meeting. The Zoning Board of Adjustment approval can be difficult to obtain because of the number of affirmative votes required.

Public notice is required as part of the submission process. The site plan approval process requires the submission of a site plan and appropriate documentation signed and sealed by a professional engineer. A public hearing is a required element of the review process. Members of the public are permitted to testify in support of and in opposition to the application.

(b) Schedule Considerations

The typical process for site plan approval takes approximately 30 – 60 days from the time of submittal. There are no approvals required from other regulatory bodies required prior to submittal to the Township. Other approvals, particularly those issued by the NJDEP LURP and Soil Conservation District will be required as conditions of any approval issued by the Township.

(c) Special Studies and/or Concerns

It is unlikely that there will be any special studies required by the Township that have not been completed in other regulatory submittals. Typically, professional studies are not needed, but a study (e.g. lighting and shading impacts on adjacent properties, noise studies) could be requested if so desired by the Township.

2. Salem County Soil Conservation District

(a) Regulatory Evaluation

The Salem County Soil Conservation District ("SCD") is required to certify a Soil Erosion and Sediment Control Plan for any ground disturbance greater than 5,000 square feet. The Soil Erosion and Sediment Control Plan must meet the standards promulgated by the Department of Agriculture, State Soil Conservation Committee (N.J.S.A. 4:24-39 et seq.).

(b) Schedule Considerations

The SCD is required to certify the plan within 30 days of submittal. The critical path construction schedule will only be affected when significant changes to the plans are made immediately prior to construction, requiring re-certification by the District.

(c) Special Studies and/or Concerns

There are no special studies or concerns associated with Soil Conservation District Certification.

e. Other Approvals

1. New Jersey Department of Community Affairs ("DCA")

(a) Regulatory Evaluation

All plans for structures at electrical generating stations and substations including nuclear generating stations must be approved (including utilities, exterior/interior building, plumbing, mechanical, electrical, fire protection, elevators and barrier free access) by the DCA (N.J.A.C. 5:23). For purposes of this analysis, the mechanical cooling towers are considered to be "process equipment," and therefore exempt from DCA permit requirements. However, the foundations and support building(s) would be reviewed by DCA.[13]

(b) Schedule Considerations

PSEG can apply for a complete release to proceed if all plans, specifications and fees are presented to DCA with the original submission or a partial release to proceed if only components of the overall application are complete at the time of submission. DCA will advise PSEG within 20 working days of receiving a complete application (including all required fees) for either release or partial release whether the Project Plans have been released or rejected.

(c) Special Studies and/or Concerns

As long as appropriate engineering design is completed, DCA typically does not require any special studies as long as an applicant submits a complete application. Typically, DCA approval becomes a critical path schedule item as final engineering modifications

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[13] The ultimate decision as to whether the cooling towers are "structures" for purposes of permitting rests with DCA

are made as a result of other permit conditions or changes dictated by internal review. The schedule delays are readily resolvable by quality assurance procedures during the design phase of the project.

2. FAA

(a) Regulatory Evaluation

Per FAR Part 77, new construction requires that the FAA be notified if the structure is, among other things, (1) more than 200' tall or (2) is of a certain height and is within 20,000 feet of a public-use or military airport with at least one runway of more than 3,200 feet (14 CFR 77.13). Notification is made through Form 7460-1. The mechanical draft towers are only 49 feet in height, and are not within 20,000 feet of any public-use or military airports. Therefore, FAA approval would not be required.

B. Regulatory Feasibility

The NJDEP is on record as supporting closed cycle cooling. While the mechanical draft cooling towers meet the closed cycle objective, the impacts to air quality from operation of the towers could be significant. Retrofit of linear mechanical draft cooling towers will produce significant particulate impacts including significant impacts in the New Castle County, Delaware non-attainment area. A retrofit employing this tower type will likely require installation of LAER particulate control technology and securing particulate offsets. The cost and availability of such offsets is not presently known. Preliminary dispersion modeling of the linear mechanical draft towers shows that, for the assumed design, the Prevention of Significant Deterioration (PSD) $PM_{2.5}$[14] increment is predicted to be exceeded. This is a fatal permitting flaw for the assumed design and measures to mitigate these impacts through use of a different design and/or alternative dispersion model would be required before permitting could proceed. In addition, if the Subchapter 6 limit on hourly particulate emissions is not changed, potential exceedance of the limit would preclude the use of mechanical draft cooling towers.

There do not appear to be any other significant regulatory obstacles identifiable at this time to prevent implementation of mechanical draft cooling towers. However, the air quality permitting process may preclude implementation of this modification unless there is either a significant change in the conceptual design of the system, changes in the ambient air quality conditions in the region, or changes in the current regulatory programs that govern air quality.

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[14] Particulate matter having an equivalent aerodynamic diameter of 2.5 microns or less.

C. Regulatory Schedule

The Title V permitting will be the long lead time regulatory processes required prior to construction activity. Given that final design may not be completed until this process is complete, there will be a period of time after issuance of the permits for securing construction permits from the Department of Community Affairs and any local construction permits that may be needed. All other permits can run concurrently with the Title V, USACOE, and LURP processes. The estimated permitting process time from permit preparation to construction start is expected to be 20 to 24 months.

D. Regulatory Costs

Table 2

Required Permits, Regulatory Costs and Schedule for Mechanical Draft Cooling Tower Modifications[15]

Permit	Regulatory Fees and Preparation Costs	Support Studies	Schedule	Year 1 Costs	Year 2 Costs
Title V	$60,000	.$125,000	17 months	$120,000	$65,000
NJPDES	Fee at NJDEP discretion; permit prep costs $50,000	$100,000	10 months	$120,000 + fees	$30,000
316(b)	Fee at NJDEP discretion; permit prep costs $50,000	$100,000	10 months	$120,000 + fees	$30,000
Treatment Works Approval	Fee at NJDEP discretion; permit prep costs $10,000	$25,000	6 months	$35,000 + fees	$0
Stormwater Control	$200.00	$0	2 months	$200.00	$0
DRBC	Fee per DRBC formula; permit prep costs $2,500	$2,000	6 months	$4,500	$0
USACOE Section 10/404	$25,000	$15,000	16 months	$30,000	$10,000
NJ LURP	$30,000	$40,000	16 months	$60,000	$10,000
NJ Tidelands	$5,000	$10,000	6 months	$15,000	$0
Dept. of Community Affairs	Fee % of construction costs; permit prep $10,000	$0	1 month	$10,000 + Permit fees	$0
Salem County SCD	$2,500	$0	2 months	$2,500	$0
LAC Planning or Zoning Board	$40,000	$20,000	5 months	$60,000	$0
FAA	$0	$5,000	2 months	$5,000	$0

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[15] The fee schedule provided herein does not include engineering design costs and relate studies. Costs included herein are limited to special studies, environmental impact statements, compliance statements and other studies specifically required by the regulatory program. Because such costs can be a function of specific issues raised by both the regulator and public comment, cost estimates provided herein may vary significantly depending upon the level of review by the respective regulatory agency.

IV. WEDGEWIRE SCREEN MODIFICATION

A. Regulatory Evaluation of Alternatives

1. Assumptions

AKRF's analysis of the wedgewire screen modification is based upon the following assumptions and based on the analysis of construction from the Sargent & Lundy report (S&L 2005c):

- PSEG would install a total of eighty (80) cylindrical wedgewire screen assemblies, and each assembly would be seven (7) feet in diameter and 28 feet in length;
- the wedgewire screens would be attached to eight partially buried steel-reinforced, concrete pipes measuring twelve (12) feet in diameter;
- the concrete pipes would extend into the Delaware River;
- the screens would occupy an area of approximately 150 feet by 325 feet or 1.12 acres;
- a new intake plenum would be constructed between the wedgewire screens and the existing CWIS that would be 325 feet by 40 feet and occupy an area of 0.30 acres;
- each Salem unit would be equipped with an air backwash system that would include an air compressor, a receiver, and controls, a 6,000-gallon receiver tank;
- the design flow would be based upon the capacity of the existing circulating water pumps (185,000 gpm) and the total intake flow would be 2.2 million gpm for both units;
- The site layout would be based on the conceptual plan the S&L report; Attachment 1, Figure 1); and,
- The analysis in this evaluation is limited to the facility location and operation, and does not include potential construction permits (e.g., batch plant, diesel construction equipment).

A depiction of the layout and other conceptual plans for the wedgewire screens is provided in Attachment 1 of the S&L report.

2. Applicable Regulatory Programs

a. Air quality

1. Title V

(a) Regulatory Evaluation

The wedgewire screen alternative should have little or no impact on existing Title V permits for Salem. Based on the current S&L report, Title V considerations will not impact the regulatory feasibility of the wedgewire screen alternative.

(b) Schedule Considerations

There are no schedule implications associated with Title V permitting for the wedgewire screen alternative.

(c) Special Studies and/or Concerns

No special studies will be required to support air quality permitting for the wedgewire screen alternative.

b. Discharges to Surface Water and CWISs

1. NJPDES

(a) Regulatory Evaluation

Implementation of a wedgewire screen modification will not significantly affect existing discharge characteristics from the facility. Discharge quantities and characteristics will remain essentially the same. However, there will be a significant change to the 316(b) component of any NJPDES application, discussed below. A revised or new NJPDES permit will be required to support the wedgewire screen alternative.

(b) Schedule Considerations

NJDEP must determine whether an application is administratively complete within 30 days of receiving an application; however, there are no regulatory time limits on when NJDEP must act to issue a draft or final permit. Once a draft permit is issued, NJDEP is required to provide USEPA Region II and other interested agencies with a copy of the draft permit documents and to provide a 30-day period for public review and comment.

At the end of the comment period, NJDEP must then prepare a final permit and a response to comments document.

(c) Special Studies and/or Concerns

There are no major obstacles to obtaining any of the required information for effluent streams for the wedgewire screen alternative.

2. §316(b) Regulations

(a) Regulatory Evaluation

Pursuant to the Phase II Rule, PSEG will have to demonstrate that the installation of wedgewire screens, in addition to existing and/or other proposed technologies, operational measures and/or restoration measures meets the national performance standards for impingement mortality and entrainment. (40 CFR 125.94(a)(3)) The national performance standards in the Phase II Rule are the reduction of impingement mortality by 80% to 95% and the reduction of entrainment by 60% to 90%.

In the alternative, PSEG may propose that it has met a site-specific standard, as approved by the State Director, that the wedgewire screens, in addition to existing and/or other proposed technologies, operational measures and/or restoration measures, are the best technology available for minimizing adverse environmental impact. In that case, the State Director would establish a site-specific standard based upon new and/or existing technologies, operational measures and/or restoration measures that achieves an efficacy that is as close to practicable to the performance standards without resulting in costs that are significantly greater than one of two benchmarks: the costs considered by the EPA Administrator for a facility like Salem in establishing the national performance standards (40 CFR 125.94(a)(5)(i)); or the benefits of meeting the performance standard. (40 CFR 125.94(a)(5)(ii)).

PSEG would be required to submit the information required under §122.21(r) as well as a permit modification that included an updated Comprehensive Demonstration Study ("CDS"), pursuant to §125.95(b). The CDS for the wedgewire screen modifications would include, at a minimum, an Impingement Mortality and Entrainment Characterization Study ("IMECS"), a Design and Construction Technology Plan ("DCTP"), a Technology Installation and Operations Plan ("TIOP") and a Verification Monitoring Plan ("VMP"). In addition, if PSEG were to attempt to establish a site-specific standard, PSEG would also have to submit information to support a site-specific determination, including a Comprehensive Cost Evaluation Study, a Benefits Valuation Study (if a cost-benefit analysis is to be performed), and a Site-Specific Technology Plan. PSEG would likely take the position that it was not necessary to update its Restoration Plan ("RP"), since the Modification would not cause any changes to the RP PSEG will include as part of the 2006 renewal application. PSEG would also likely take the position that it was not necessary to submit a Proposal for Information Collection ("PIC"), because the 2004 PIC refers to wedgewire screens as a technology that will be considered in the 2006 permit renewal.

If the decision were made to install wedgewire screens, PSEG would be required to prepare a DCTP and a TIOP designed to demonstrate that the proposed modification would be capable of being installed and operated at the Station and would achieve compliance with the applicable performance standards. In the DCTP, PSEG would be required to provide the capacity utilization factor for Salem, a description of the proposed modification and its operations, an estimate of the reductions in impingement mortality and entrainment from the calculation baseline that would be achieved by installing the modification, and information to support that it would be capable of installation and operation at Salem, and engineering drawings and calculations for the modification. PSEG would likely be required to conduct an in situ pilot study to determine if the screen modifications are feasible. In the TIOP, PSEG would be required to provide the schedule for the installation and for the operation and maintenance of the modification, and identify the activities that PSEG would undertake to ensure that the efficacy of the modification would be achieved on an ongoing basis. PSEG would also be required to prepare a VMP, proposing a two year monitoring plan to demonstrate post-installation compliance with the performance standards.

(b) Schedule Considerations

Schedule considerations would be similar to that described for the NJPDES permit considerations.

(c) Special Studies and/or Concerns

PSEG previously analyzed wedgewire screens as part of its prior two NJPDES renewals and concluded that wedgewire screen modifications are not feasible for installation at Salem. NJDEP's experts reviewing both applications, Versar, Inc. and ESSA Technologies, LTD., confirmed PSEG's analysis that wedgewire screens are not appropriate for installation at Salem, and NJDEP determined in 1994 and in 2001 that none of the wedgewire screen modifications represent BTA for the Station. The S&L report identifies that wedgewire screens are still not feasible for installation at Salem. Given the established record, PSEG would have to develop new information that would explain why the wedgewire screen modifications are now feasible from an installation and operations perspective and biologically efficacious. Since the wedgewire screens have not been implemented at a facility similar in size or location to Salem, PSEG may be required to implement costly studies to prove that the technologies would work.

3. Treatment Works Approval ("TWA")

(a) Regulatory Evaluation

The wedgewire screen alternative, as described in the S&L report, should not result in a change to the wastewater treatment process for the facility. Accordingly, a Treatment Works Approval would not be required for this alternative.

(b) Schedule Considerations

There are no TWA schedule implications associated with the wedgewire screen alternative.

(c) Special Studies and/or Concerns

Because a Treatment Works Approval is not required as part of this alternative, no supporting special studies are required.

4. DRBC

(a) Regulatory Evaluation

The DRBC's Rules of Practice and Procedure ("DRBC Rules") require that activities that have or may have a substantial effect upon the Basin must comply with the "Project Review" procedures in Article 3 of the DRBC's Rules to determine that the Project is in conformance with the Comprehensive Plan ("CP"). Upon approval, DRBC issues dockets that authorize a proposed project in the DRBC's Comprehensive Plan CP. PSEG has a Docket for Salem that authorizes the Station to operate with its current OTCWS and CWIS. The Docket concludes that the Station's operation in conformance with the terms and conditions of its NJPDES permit is in conformance with the CP. Any substantial modifications to the OTCWS or CWIS or a change in the consumptive water use at the Station would require that an application for a Project Change be filed with the DRBC.

(b) Schedule Considerations

Under the Administrative Agreement between the DRBC and the NJDEP, the NJDEP will act first on all issues addressed under the NJDEP's NJPDES program. Subsequent to the NJDEP's issuing a final permit, the DRBC will act on PSEG's request for a modification to the Salem Docket. NJDEP is to receive all applications for review and approval of a reviewable project, provide a technical review, and then notify DRBC of such applications. The DRBC Executive Director will then make a determination of "substantiality" under the DRBC regulations and requires further action. Although the DRBC's Rules contemplate that NJDEP could simply refer the matter to the DRBC pursuant to the Administrative Agreement between NJDEP and DRBC, DRBC has always required PSEG to file a separate application.

(c) Special Studies and/or Concerns

If PSEG were to decide to implement the wedgewire screen modifications, the information that PSEG provided to NJDEP in support of the CWIS modifications could be resubmitted to the DRBC without substantial modification.

5. Stormwater Control Permit for Construction Activities

(a) Regulatory Evaluation

Construction activities that disturb five or more acres of land must apply for General NJPDES DSW Permit No. NJ0088323 for stormwater discharges associated with construction activities. General NJPDES DSW Permit NJ0088323 is issued by the local Soil Conservation District when a soil erosion and sediment control certification is obtained.

It does not appear that the non-water support infrastructure construction would exceed five acres and therefore a Stormwater Control Permit for Construction Activities would not be required.

(b) Schedule Considerations

There are no Stormwater Control Permit schedule implications associated with the wedgewire screen alternative.

(c) Special Studies and/or Concerns

Because a Stormwater Control Permit for Construction Activities is not required as part of this alternative, no supporting special studies are required.

c. Activities in Wetlands, Waterways, or Coastal Zones

1. U.S. Army Corps of Engineers Section 404/Section 10 permits

(a) Regulatory Evaluation

The USACOE Section 10 Permit regulates work (e.g., construction, excavation, dredging) in or over navigable waters of the U.S. A Nationwide permit ("NWP") may be obtained for "minor" projects, while an individual permit would be required for "major" projects. Because of the magnitude of in-water structures associated with this alternative an individual permit application under the Section 10 program will be required. The USACOE is required to notify and solicit comments from other federal agencies, including the U.S. Fish and Wildlife Service ("USFWS"), USEPA and National Marine Fisheries Service ("NMFS").

(b) Schedule Considerations

Individual permit applications generally parallel NJDEP's approval through the Land Use Regulation Program. For a project of this magnitude, it is likely that the review process will take a minimum of six to twelve months upon submittal of the application. There are a number of issues that are likely to arise during the review process that will tend to drive the permitting schedule to a longer than normal review cycle.

(c) Special Studies and/or Concerns

The USACOE will have notable concerns associated with an application for wedgewire screens including but not limited to:

- Impacts of dredging on release of toxic sediments from the river bottom – Dredging issues have been an ongoing issue for activities in the Delaware River.

- Impacts to anadromous fish populations – Any permit issued by the USACOE is very likely to have significant seasonal restrictions (based on prior permitting experience) on in-water construction to prevent impacts to anadromous fish populations. Such restrictions are likely to limit construction activities during the March to July time frame.

- The USFWS and NMFS will review a proposed wedgewire screen alternative with a critical eye. The Section 10 permitting process will enable both agencies to have a formal regulatory review oversight on both the immediate construction impacts to the River and surrounding environs of the wedgewire screens but also the efficacy of the alternative in terms of entrainment and impingement losses at the facility.

- Impacts to navigation – The impacts of the project to navigation will be a critical consideration associated with this alternative. The U.S. Coast Guard will weigh in heavily on the impacts of this alternative on navigable waterways.

2. NJDEP Land Use Regulation Program Permits ("LURP")

(a) Regulatory Evaluation

There are four distinct LURP regulatory programs that may have jurisdiction over the wedgewire screen alternative including *CAFRA*, *Waterfront Development*; *Freshwater Wetlands* and *Coastal Wetlands*. Given that each of these permits is managed by the same program within NJDEP, the applicant can apply for the needed regulatory approvals as part of one permit application. Based on the current S&L report, the Freshwater and Coastal Wetlands regulatory elements would not be applicable to this alternative. The primary structures associated with the wedgewire screen alternative would be placed within the water, and they would be connected to the abutments of the existing intake system, also in the water. Should an upland support structure be required, it would be small, and could be located outside any delineated areas. Therefore, it is unlikely that either of the wetland regulatory programs would have jurisdiction. CAFRA and Waterfront Development regulations will be applicable.

As part of the Waterfront Development requirements, PSEG will be required to demonstrate that a *Tidelands* grant (in the form of a license, grant, lease or other acceptable contract) be in place for the area in which the Waterfront Development permit is applicable. PSEG currently has a Tidelands approval for areas of the waterfront. The engineering improvements would have to be evaluated in the context of the existing approval to determine whether the impacted areas are covered by the existing license.

Given the level of design detail available at this point, it is unclear whether modification to the existing Tidelands approval would be required. Based on the preliminary S&L report, it is assumed that any required modification to the existing Tidelands approval would be covered by a license rather than a grant. A grant requires that a deed be signed by the governor, and requires significant more time to obtain than a license.

(b) Schedule Considerations

As noted, CAFRA and Waterfront Development permits can be processed and issued concurrently. The approval process is dictated by the 90 Day Construction guidelines found at NJAC 7:1C. Typically, the process from submittal to completion should take from six to nine months. The time frame can vary depending upon the complexity of the project and the public interest in the project. As noted under the Section 10 permitting analysis, the complexity of issues associated with improvements of the magnitude required by wedgewire screens will require close scrutiny by NJDEP. Accordingly, the normal six to nine month review process could be extended by several months.

(c) Special Studies and/or Concerns

The issues addressed under the Section 10 description will also be applicable during the LURP review. Concerns related to release of toxic material during dredging operations, impacts to anadromous fish, and efficacy of the wedgewire screens to reduce impingement mortality and entrainment will contribute to the regulatory review process. While public hearings are not necessarily required for each CAFRA and/or Waterfront Development permit review, it is likely that there may be requests for such a hearing, or that NJDEP may establish a hearing on its own volition. The final decision on LURP related permits will most likely follow the decision path of the NJPDES process.

d. Local Approvals

1. Lower Alloways Creek Planning Board Approval

(a) Regulatory Evaluation

The primary structures associated with the wedgewire screen alternative would be placed within the water, and they would be connected to the abutments of the existing intake system, also in the water. Therefore, local Planning Board approval of these structures is not required. However, information presentations would be expected.

Construction of new equipment housing buildings and other support infrastructure on upland portions of the site (if needed) will require site plan approval from the local planning board. Unlike the cooling tower alternatives, approval for this alternative can be heard by the Planning Board.

(b) Schedule Considerations

Should a site plan approval be required, the typical process for site plan approval takes approximately 30 – 60 days from the time of submittal. There are no approvals required from other regulatory bodies required prior to submittal to the Township.

(c) Special Studies and/or Concerns

Should a site plan approval be required, it is unlikely that there will be any Special Studies required by the Township that have not been completed in other regulatory submittals. Typically, professional studies are not needed, but a study (e.g. lighting and shading impacts on adjacent properties, noise studies) could be requested if so desired by the Township.

2. *Salem County Soil Conservation District*

(a) Regulatory Evaluation

The Salem County Soil Conservation District is required to certify a Soil Erosion and Sediment Control Plan for any ground disturbance greater than 5,000 square feet. Based on the October S&L report, the primary structures needed for the wedgewire screen alternative would be placed within the water. However, there could be upland support facilities that would require disturbance beyond the regulatory threshold. The Soil Erosion and Sediment Control Plan must meet the standards promulgated by the Department of Agriculture, State Soil Conservation Committee (N.J.S.A. 4:24-39 et seq.).

(b) Schedule Considerations

The SCD is required to certify the plan within 30 days of submittal. The only instance when this approval could become part of the critical path schedule for implementation is when significant changes to the plans are made immediately prior to construction that require recertification by the District.

(c) Special Studies and/or Concerns

There are no special studies or concerns associated with Soil Conservation District Certification.

e. *Other Approvals*

1. *New Jersey Department of Community Affairs ("DCA")*

(a) Regulatory Evaluation

The DCA will have regulatory approval over any structures required to support the wedgewire screen alternative including any buildings and or foundations that may be required (N.J.A.C. 5:23). DCA may also review construction plans for walkways to the screen areas. Typically, any construction related to "process equipment" is exempt from Department review. For purposes of this analysis, the wedgewire screens are considered to be "process equipment," and therefore exempt from DCA permit requirements. However, any structures on top of the wedgewire screens and any support building(s) would be reviewed by DCA.

(b) Schedule Considerations

PSEG can apply for a complete release to proceed if all plans, specifications and fees are presented to DCA with the original submission or a partial release to proceed if only components of the overall application are complete at the time of submission. DCA will advise PSEG within 20 days of receiving a complete application (including all required fees) for either release or partial release whether the Project Plans have been released or rejected.

(c) Special Studies and/or Concerns

As long as appropriate engineering design is completed, DCA typically does not require special studies as long as an applicant submits a complete application. Typically, DCA approval becomes a critical path schedule item as engineering modifications are made; the review time may delay construction. The problem is readily resolvable by quality assurance procedures during the design phase of the project.

2. *FAA*

(a) Regulatory Evaluation

There are no components of the wedegwire screen alternative of sufficient height to trigger FAA review.

B. Regulatory Feasibility

PSEG previously concluded that wedgewire screen modifications are not feasible for installation at Salem. NJDEP's experts, Versar, Inc. and ESSA Technologies, LTD., have confirmed this conclusion, and NJDEP determined in 1994 and in 2001 that none of the wedgewire screen modifications represent BTA for the Station. The S&L report identifies that wedgewire screens are still not feasible for installation at Salem. Given the established record, PSEG would have to develop new information that would explain why the wedgewire screen modifications are now feasible from an installation and operations perspective and biologically efficacious. Since the wedgewire screens have not been implemented at a facility similar in size or location to Salem, PSEG may be required to implement costly studies to prove that the technologies would work.

Regulatory impediments are not limited to NJPDES related programs. The enormity of the water area impacted by this modification will raise significant environmental issues with both NJDEP LURP and USACOE Section 10 permitting. Issues related to release of toxic materials resulting from dredging operations, construction impacts to anadromous fish, navigational impacts and the efficacy of the system to reduce impingement and entrainment losses in lieu of the referenced construction impacts will complicate the approval process.

C. Regulatory Schedule

The NJPDES/316(b) permitting will be the long lead time regulatory process. It is possible that the permitting time frame for this modification could extend beyond two years, given the complexity of the modification, public input and the myriad of regulatory issues arising from this design.

D. Regulatory Costs

Table 3

Required Permits, Regulatory Costs and Schedule for Wedgewire Screen Modifications[16]

Permit	Regulatory Fees and Preparation Costs	Support Studies	Schedule	Year 1 Costs	Year 2 Costs
Title V	$0	$0	N/A	$0	$0
NJPDES	Fee at NJDEP discretion; permit prep costs $50,000	$250,000	2 years	$250,000	$50,000
316(b)	Fee at NJDEP discretion; permit prep costs $50,000	$1,000,000	2 years	$750,000	$300,000
Treatment Works Approval	N/A	N/A	N/A	N/A	N/A
Stormwater Control	$0	$0	N/A	$0	$0
DRBC	Fee per DRBC formula; permit prep costs $2,500	$50,000	6 months	$2,500 + fees	$50,000
USACOE Section 10/404	$25,000	$100,000	16 months	$100,000	$25,000
NJ LURP	$30,000	$100,000	16 months	$100,000	$30,000
NJ Tidelands	$5,000	$40,000	6 months	$0	$45,000
Dept. of Community Affairs	Fee % of construction costs; permit prep $10,000	$0	1 month	$10,000	Permit fees
Salem County SCD	$2,500	$0	2 months	$0	$2500
LAC Planning or Zoning Board	$10,000	$5,000	5 months	$0	$15,000
FAA	N/A	N/A	N/A	N/A	N/A

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[16] The fee schedule provided herein does not include engineering design costs and relate studies. Costs included herein are limited to special studies, environmental impact statements, compliance statements and other studies specifically required by the regulatory program. Because such costs can be a function of specific issues raised by both the regulator and public comment, cost estimates provided herein may vary significantly depending upon the level of review by the respective regulatory agency.

V. DUAL FLOW FINE MESH SCREEN MODIFICATION

A. Regulatory Evaluation of Alternative

1. Assumptions

AKRF's analysis of the dual flow fine mesh screen modification is based upon the following assumptions and based on the analysis of construction from the Sargent & Lundy report (S&L 2005d):

- fifty-four (54) dual flow screen units would be installed in the channel of the Delaware Estuary;
- a new concrete structure would be constructed 380 feet offshore in front of the existing intake bays;
- the new structure would encompass an area 750 feet by 380 feet or 6.54 acres;
- the through screen velocity would be less than or equal to 0.5 fps;
- the screens would be equipped with 0.5 mm mesh panels and with baskets to hold fish and other aquatic organisms washed from the screens;
- the screens would be equipped with both high and low pressure spray wash systems to remove debris and aquatic organisms, respectively, from the screens;
- the screen system would be equipped with separate debris and fish return troughs that would return impinged organisms and debris to the Estuary;
- the design flow would be based upon the capacity of the existing circulating water pumps (185,000 gpm) and the total intake flow would be 2.2 million gpm for both units;
- The site layout would be based on the site plan from the S&L report (Attachment 1, Figure 1); and
- The analysis in this evaluation is limited to the facility location and operation, and does not include potential construction permits (e.g., batch plant, diesel construction equipment).

A depiction of the layout and other conceptual plans for the dual flow fine mesh screens is provided in Attachment 1 of the S&L report.

2. *Applicable Regulatory Programs*

a. *Air quality*

1. *Title V*

(a) Regulatory Evaluation

The dual flow screen alternative should have little or no impact on existing Title V permits for Salem. Based on the current S&L report, Title V considerations will not impact the regulatory feasibility of the dual flow screen alternative.

(b) Schedule Considerations

There are no schedule implications associated with Title V permitting for the dual flow screen alternative.

(c) Special Studies and/or Concerns

No special studies will be required to support air quality permitting to support the dual flow screen alternative.

b. *Discharges to Surface Water and CWISs*

1. *NJPDES*

(a) Regulatory Evaluation

Implementation of a dual flow fine mesh screen modification will not significantly affect existing discharge characteristics from the facility. Discharge quantities and characteristics will remain essentially the same. However, there will be a significant change to the 316(b) component of any NJPDES application, discussed below. A revised or new NJPDES permit will be required to support the dual flow fine mesh screen alternative. The dual flow fine mesh screen system would include fish and debris return troughs that must be included in the NJPDES permit.

(b) Schedule Considerations

NJDEP must determine whether an application is administratively complete within 30 days of receiving an application; however, there are no regulatory time limits on when NJDEP must act to issue a draft or final permit. Once a draft permit is issued, NJDEP is required to provide USEPA Region II and other interested agencies with a copy of the draft permit documents and to provide a 30 day period for public review and comment. At the end of the comment period, NJDEP must then prepare a final permit and a response to comments document.

(c) Special Studies and/or Concerns

There are no major obstacles to obtaining any of the required information for effluent streams.

2. *§316(b) Regulations*

(a) Regulatory Evaluation

Pursuant to the Phase II Rule, PSEG will have to demonstrate that the installation of dual flow fine mesh screens, in addition to existing and/or other proposed technologies, operational measures and/or restoration measures meets the national performance standards for impingement mortality and entrainment. (40 CFR 125.94(a)(3)) The national performance standards in the Phase II Rule are the reduction of impingement mortality by 80% to 95% and the reduction of entrainment by 60% to 90%.

In the alternative, PSEG may propose that it has met a site-specific standard, as approved by the State Director, that the dual flow screens, in addition to existing and/or other proposed technologies, operational measures and/or restoration measures, are the best technology available for minimizing adverse environmental impact. In that case, the State Director would establish a site-specific standard based upon new and/or existing technologies, operational measures and/or restoration measures that achieves an efficacy that is as close to practicable to the performance standards without resulting in costs that are significantly greater than one of two benchmarks: the costs considered by the EPA Administrator for a facility like Salem in establishing the national performance standards (40 CFR 125.94(a)(5)(i)); or the benefits of meeting the performance standard (40 CFR 125.94(a)(5)(ii)).

PSEG would be required to submit the information required under §122.21(r) as well as a permit modification that would include an updated CDS, pursuant to §125.95(b). The CDS for the dual flow fine mesh screen modifications would include, at a minimum, a Proposal for Information Collection ("PIC"), an Impingement Mortality and Entrainment Characterization Study ("IMECS"), a Design and Construction Technology Plan ("DCTP"), a Technology Installation and Operations Plan ("TIOP") and a Verification Monitoring Plan ("VMP"). In addition, if PSEG were to attempt to establish a site-specific standard, PSEG would also have to submit information to support a site-specific determination, including a Comprehensive Cost Evaluation Study, a Benefits Valuation Study (if a cost-benefit analysis is to be performed), and a Site-Specific Technology Plan.

PSEG would likely take the position that it was not necessary to update its RP, since the modification would not cause any changes to the RP PSEG included as part of the 2006 renewal Application.

Although PSEG submitted a PIC for Salem in 2004 and will submit an IMECS in 2006, NJDEP may still require PSEG to submit a PIC and IMECS. If PSEG were to be required to submit a PIC, PSEG would be required to identify the technologies (i.e., dual flow fine mesh screens) it wanted to study, to describe prior studies, and to summarize consultations with natural resource protection agencies. If PSEG were to be required to submit an IMECS, PSEG would be required to describe all life stages of fish and shellfish, including threatened or endangered ('T&E") species, in the vicinity of the CWIS and characterize their annual, seasonal and diel abundance and distribution, quantify current impingement mortality and entrainment, and provide estimates of the calculation baseline losses.

If the decision were made to install dual flow fine mesh screens, PSEG would be required to prepare a DCTP and a TIOP designed to demonstrate that the proposed modification would be capable of being installed and operated at the Station and would achieve compliance with the applicable performance standards. In the DCTP, PSEG would be required to provide the capacity utilization factor for Salem, a description of the proposed modification and its operations, an estimate of the reductions in IM and E from the calculation baseline that would be achieved by installing the modification, and information to support that it would be capable of installation and operation at Salem, and engineering drawings and calculations for the modification. PSEG would likely be required to conduct an in situ pilot study to determine if the screen modifications are feasible. In the TIOP, PSEG would be required to provide the schedule for the installation and for the operation and maintenance of the modification, and identify the activities that PSEG would undertake to ensure that the efficacy of the modification would be achieved on an ongoing basis. PSEG would also be required to prepare a VMP, proposing a two year monitoring plan to demonstrate post-installation compliance with the performance standards.

(b) Schedule Considerations

Schedule considerations would be similar to that described for the NJPDES permit considerations.

(c) Special Studies and/or Concerns

PSEG previously analyzed dual flow fine mesh screens as part of its prior two NJPDES renewals and concluded that dual flow fine mesh screen modifications are not appropriate for installation at Salem. NJDEP's experts reviewing both applications, Versar, Inc. and ESSA Technologies, LTD., confirmed PSEG's analysis that dual flow fine mesh screens are not appropriate for installation at Salem, and NJDEP determined in 1994 and in 2001 that the dual flow fine mesh screen modifications do not represent BTA for the Station. Given the established record, PSEG would have to develop new information that would explain why the dual flow fine mesh screen modifications are now appropriate from an installation and operations perspective and biologically efficacious. Since the dual flow fine mesh screens have not been implemented at a facility similar in size or location to Salem, PSEG may be required to implement costly studies to prove that the technologies would work.

3. Treatment Works Approval ("TWA")

(a) Regulatory Evaluation

The dual flow fine mesh screen alternative, as described in the S&L report, should not result in a change to the wastewater treatment process for the facility. Accordingly, a Treatment Works Approval would not be required for this alternative.

(b) Schedule Considerations

There are no TWA schedule implications associated with the dual flow fine mesh screen alternative.

(c) Special Studies and/or Concerns

Because a Treatment Works Approval is not required as part of this alternative, no supporting special studies are required.

4. DRBC

(a) Regulatory Evaluation

The DRBC's Rules of Practice and Procedure ("DRBC Rules") require that activities that have or may have a substantial effect upon the Basin must comply with the "Project Review" procedures in Article 3 of the DRBC's Rules to determine that the Project is in conformance with the Comprehensive Plan ("CP"). Upon approval, DRBC issues dockets that authorize a proposed project in the DRBC's Comprehensive Plan ("CP"). PSEG has a Docket for Salem that authorizes the Station to operate with its current OTCWS and CWIS. The Docket concludes that the Station's operation in conformance with the terms and conditions of its NJPDES permit is in conformance with the CP. Any substantial modifications to the OTCWS or CWIS or a change in the consumptive water use at the Station would require that an application for a Project Change be filed with the DRBC.

(b) Schedule Considerations

Under the Administrative Agreement between the DRBC and the NJDEP, the NJDEP will act first on all issues addressed under the NJDEP's NJPDES program. Subsequent to the NJDEP's issuing a final permit, the DRBC will act on PSEG's request for a modification to the Salem Docket. NJDEP is to receive all applications for review and approval of a reviewable project, provide a technical review, and then notify DRBC of such applications. The DRBC Executive Director will then make a determination of "substantiality" under the DRBC regulations and requires further action. Although the DRBC's Rules contemplate that NJDEP could simply refer the matter to the DRBC pursuant to the Administrative Agreement between NJDEP and DRBC, DRBC has always required PSEG to file a separate application.

(c) Special Studies and/or Concerns

If PSEG were to decide to implement the dual flow fine mesh screen modifications, the information that PSEG provided to NJDEP in support of the CWIS modifications could be resubmitted to the DRBC without substantial modification.

5. Stormwater Control Permit for Construction Activities

(a) Regulatory Evaluation

Construction activities that disturb five or more acres of land must apply for General NJPDES DSW Permit No. NJ0088323 for stormwater discharges associated with construction activities. General NJPDES DSW Permit NJ0088323 is issued by the local Soil Conservation District when a soil erosion and sediment control certification is obtained.

It does not appear that the non-water support infrastructure construction would exceed five acres and therefore a Stormwater Control Permit for Construction Activities would not be required.

(b) Schedule Considerations

There are no Stormwater Control Permit schedule implications associated with the dual flow fine mesh screen alternative.

(c) Special Studies and/or Concerns

Because a Stormwater Control Permit for Construction Activities is not required as part of this alternative, no supporting special studies are required.

c. *Activities in Wetlands, Waterways, or Coastal Zones*

1. U.S. Army Corps of Engineers Section 404/Section 10 permits

(a) Regulatory Evaluation

The USACOE Section 10 Permit regulates work (e.g., construction, excavation, dredging) in or over navigable waters of the U.S. A Nationwide permit ("NWP") may be obtained for "minor" projects, while an individual permit would be required for "major" projects. Because of the magnitude of in-water structures associated with this alternative an individual permit application under the Section 10 program will be required. The USACOE is required to notify and solicit comments from other federal agencies, including the U.S. Fish and Wildlife Service ("USFWS"), USEPA and National Marine Fisheries Service ("NMFS").

(b) Schedule Considerations

Individual permit applications generally parallel NJDEP's approval through the Land Use Regulation Program. For a project of this magnitude, it is likely that the review process will take a minimum of six to twelve months upon submittal of the application. There are a number of issues that are likely to arise during the review process that will tend to drive the permitting schedule to a longer than normal review cycle.

(c) Special Studies and/or Concerns

The USACOE will have notable concerns associated with an application for dual flow fine mesh screens including but not limited to:

- Impacts of dredging on release of toxic sediments from the river bottom – Dredging issues have been an ongoing issue for activities in the Delaware River.

- Impacts to anadromous fish populations – Any permit issued by the USACOE is very likely to have significant seasonal restrictions (based on prior permitting experience) on in-water construction to prevent impacts to anadromous fish populations. Such restrictions are likely to limit construction activities during the March to July time frame.

- The USFWS and NMFS will review a proposed dual flow fine mesh screen alternative with a critical eye. The Section 10 permitting process will enable both agencies to have a formal regulatory review oversight on both the immediate construction impacts to the River and surrounding environs of the dual flow fine mesh screens but also the efficacy of the alternative in terms of entrainment and impingement losses at the facility.

- Impacts to navigation – The impacts of the project to navigation will be a critical consideration associated with this alternative. The U.S. Coast Guard will weigh in heavily on the impacts of this alternative on navigable waterways.

2. NJDEP Land Use Regulation Program Permits ("LURP")

(a) Regulatory Evaluation

There are four distinct LURP regulatory programs that may have jurisdiction over the dual flow fine mesh screen alternative including *CAFRA*, *Waterfront Development*, *Freshwater Wetlands* and *Coastal Wetlands*. Given that each of these permits is managed by the same program within NJDEP, the applicant can apply for the needed regulatory approvals as part of one permit application. Based on the current S&L report, the Freshwater and Coastal Wetlands regulatory elements would not be applicable to this alternative. The primary structures associated with the dual flow fine mesh screen alternative would be placed within the water, and they would be connected to the abutments of the existing intake system, also in the water. Should an upland support structure be required, it would be small, and could be located outside any delineated areas. Therefore, it is unlikely that either of the wetland regulatory programs would have jurisdiction. CAFRA and Waterfront Development regulations will be applicable.

As part of the Waterfront Development requirements, PSEG will be required to demonstrate that a *Tidelands* grant (in the form of a license, grant, lease or other acceptable contract) be in place for the area in which the Waterfront Development permit is applicable. PSEG currently has a Tidelands approval for areas of the waterfront. The engineering improvements would have to be evaluated in the context of the existing approval to determine whether the impacted areas are covered by the existing license.

Given the level of design detail available at this point, it is unclear whether modification to the existing Tidelands approval would be required. Based on the S&L report, it is assumed that any required modification to the existing Tidelands approval would be covered by a license rather than a grant. A grant requires that a deed be signed by the governor, and requires significantly more time to obtain than a license.

(b) Schedule Considerations

As noted, CAFRA and Waterfront Development permits can be processed and issued concurrently. The approval process is dictated by the 90 Day Construction guidelines found at NJAC 7:1C. Typically, the process from submittal to completion should take from six to nine months. The time frame can vary depending upon the complexity of the project and the public interest in the project. As noted under the Section 10 permitting analysis, the complexity of issues associated with improvements of the magnitude required by dual flow fine mesh screens will require close scrutiny by NJDEP. Accordingly, the normal six to nine month review process could be extended by several months.

(c) Special Studies and/or Concerns

The issues addressed under the Section 10 description will also be applicable during the LURP review. Concerns related to release of toxic material during dredging operations, impacts to anadromous fish, and efficacy of the dual flow fine mesh screens to reduce impingement and entrainment will contribute to the regulatory review process. While public hearings are not necessarily required for each CAFRA and/or Waterfront Development permit review, it is likely that there may be requests for such a hearing, or that NJDEP may establish a hearing on its own volition. The final decision on LURP related permits will most likely follow the decision path of the NJPDES process.

d. Local Approvals

1. Lower Alloways Creek Planning Board Approval

(a) Regulatory Evaluation

The primary structures associated with the dual flow fine mesh screen alternative would be placed within the water, and they would be connected to the abutments of the existing intake system, also in the water. Local approval is not required for these structures, however, information presentations would be expected.

Construction of new equipment housing buildings and other support infrastructure on upland portions of the site (if needed) will require site plan approval from the local planning board.

(b) Schedule Considerations

Should a site plan approval be required, the typical process for site plan approval takes approximately 30 – 60 days from the time of submittal. There are no approvals required from other regulatory bodies required prior to submittal to the Township.

(c) Special Studies and/or Concerns

Should a site plan approval be required, it is unlikely that there will be any Special Studies required by the Township that have not been completed in other regulatory submittals. Typically, professional studies are not needed, but a study (e.g. lighting and shading impacts on adjacent properties, noise studies) could be requested if so desired by the Township.

2. *Salem County Soil Conservation District*

(a) Regulatory Evaluation

The Salem County Soil Conservation District is required to certify a Soil Erosion and Sediment Control Plan for any ground disturbance greater than 5,000 square feet. Based on the S&L report, the primary structures needed for the dual flow fine mesh screen alternative would be placed within the water. However, there could be upland support facilities that would require disturbance beyond the regulatory threshold. The Soil Erosion and Sediment Control Plan must meet the standards promulgated by the Department of Agriculture, State Soil Conservation Committee (N.J.S.A. 4:24-39 et seq.).

(b) Schedule Considerations

The SCD is required to certify the plan within 30 days of submittal. The only instance when this approval could become part of the critical path schedule for implementation is when significant changes to the plans are made immediately prior to construction that require recertification by the District.

(c) Special Studies and/or Concerns

There are no special studies or concerns associated with Soil Conservation District Certification.

e. *Other Approvals*

1. *New Jersey Department of Community Affairs ("DCA")*

(a) Regulatory Evaluation

The DCA will have regulatory approval over any structures required to support the dual flow fine mesh screen alternative including any buildings and or foundations that may be required. DCA may also review construction plans for walkways to the screen areas. Typically, any construction related to "process equipment" is exempt from Department review. For purposes of this analysis, the dual flow fine mesh screens are considered to be "process equipment," and therefore exempt from DCA permit requirements. However, any structures on top of the dual flow fine mesh screens and any support building(s) would be reviewed by DCA.

(b) Schedule Considerations

PSEG can apply for a complete release to proceed if all plans, specifications and fees are presented to DCA with the original submission or a partial release to proceed if only components of the overall application are complete at the time of submission. DCA will advise PSEG within 20 days of receiving a complete application (including all required fees) for either release or partial release whether the Project Plans have been released or rejected.

(c) Special Studies and/or Concerns

As long as appropriate engineering design is completed, DCA typically does not require special studies as long as an applicant submits a complete application. Typically, DCA approval becomes a critical path schedule item as engineering modifications are made; the review time may delay construction. The problem is readily resolvable by quality assurance procedures during the design phase of the project.

2. *FAA*

(a) Regulatory Evaluation

There are no components of the dual flow fine mesh screen alternative of sufficient height to trigger FAA review.

B. Regulatory Feasibility

PSEG previously concluded that dual flow fine mesh screen modifications addressed in this report are not applicable for installation at Salem. NJDEP's experts, Versar, Inc. and ESSA Technologies, LTD., have confirmed this conclusion, and NJDEP determined in 1994 and in 2001 that none of the dual flow fine mesh screen modifications represent BTA for the Station. Given the established record, PSEG would have to develop new information that would explain why the dual flow fine mesh screen modifications are now feasible from an installation and operations perspective and biologically efficacious. Since the dual flow fine mesh screens have not been implemented at a facility similar in size or location to Salem, PSEG may be required to implement costly studies to prove that the technologies would work.

Regulatory impediments are not limited to NJPDES related programs. The enormity of the water area impacted by this modification will raise significant environmental issues with both NJDEP LURP and USACOE Section 10 permitting. Issues related to release of toxic materials resulting from dredging operations, construction impacts to anadromous fish, navigational impacts and the efficacy of the system to reduce impingement and entrainments losses in lieu of the referenced construction impacts will complicate the approval process.

C. Regulatory Schedule

The NJPDES/316(b) permitting will be the long lead time regulatory process. It is possible that the permitting time frame for this modification could extend beyond two years, given the complexity of the modification, public input and the myriad of regulatory issues arising from this design.

D. Regulatory Costs

Table 4

Required Permits, Regulatory Costs and Schedule for the Dual Flow Fine Mesh Screen Modifications[17]

Permit	Regulatory Fees and Preparation Costs	Support Studies	Schedule	Year 1 Costs	Year 2 Costs
Title V	$0	$0	N/A	$0	$0
NJPDES	Fee at NJDEP discretion; permit prep costs $50,000	$250,000	2 years	$250,000	$50,000
316(b)	Fee at NJDEP discretion; permit prep costs $50,000	$1,000,000	2 years	$750,000	$300,000
Treatment Works Approval	N/A	N/A	N/A	N/A	N/A
Stormwater Control	$0	$0	N/A	$0	$0
DRBC	Fee per DRBC formula; permit prep costs $2,500	$50,000	6 months	$2,500 + fees	$50,000
USACOE Section 10/404	$25,000	$100,000	16 months	$100,000	$25,000
NJ LURP	$30,000	$100,000	16 months	$100,000	$30,000
NJ Tidelands	$5,000	$40,000	6 months	$0	$45,000
Dept. of Community Affairs	Fee % of construction costs; permit prep $10,000	$0	1 month	$10,000	Permit fees
Salem County SCD	$2,500	$0	2 months	$0	$2500
LAC Planning or Zoning Board	$10,000	$5,000	5 months	$0	$15,000
FAA	N/A	N/A	N/A	N/A	N/A

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[17] The fee schedule provided herein does not include engineering design costs and relate studies. Costs included herein are limited to special studies, environmental impact statements, compliance statements and other studies specifically required by the regulatory program. Because such costs can be a function of specific issues raised by both the regulator and public comment, cost estimates provided herein may vary significantly depending upon the level of review by the respective regulatory agency.

REFERENCES

S&L, 2005a. Sargent & Lundy LLC, Alternative Intake Technologies for CWIS, Evaluation & Budgetary Cost Estimate for Natural Draft Cooling Tower Option, October 2005 Draft (Attachment 6-9 to this Application).

S&L, 2005b. Sargent & Lundy LLC, Alternative Intake Technologies for CWIS, Evaluation & Budgetary Cost Estimate for Mechanical Draft Cooling Tower Option, October 2005 Draft (Attachment 6-10 to this Application).

S&L, 2005c. Sargent & Lundy LLC, Alternative Intake Technologies for CWIS, Evaluation & Budgetary Cost Estimate for Wedgewire Screen Option, October 2005 Draft (Attachment 6-3 to this Application).

S&L, 2005d. Sargent & Lundy LLC, Alternative Intake Technologies for CWIS, Evaluation & Budgetary Cost Estimate for the Dual Flow Screen Option, October 2005 Draft (Attachment 6-4 to this Application).

PSEG Salem Generating Station
Units 1 and 2

Evaluation of Air Quality Permitting Requirements and Potential Obstacles
for
Retrofit of Closed-Cycle Cooling

Study Report

Prepared for:

AKRF, Inc.

Prepared by:

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June 17, 2005
Revised December 6, 2005

EnviroMet Project No. 70502

Executive Summary

The air quality permitting requirements and potential permitting obstacles for a hypothetical retrofit of a closed-cycle cooling system to Salem Generating Station Units 1 and 2 have been identified and evaluated with respect to permitting feasibility. Heat rejection using either natural draft or mechanical draft towers has been evaluated.

Because complete preliminary engineering / design information is not presently available, a cooling tower design has been assumed for purposes of determining regulatory program applicability, permitting obstacles, and permitting schedule. The natural draft option is based upon the design of the Hope Creek cooling tower and the mechanical draft option is based upon a conceptual design provided by Sargent and Lundy but with air flows estimated based upon cooling towers studied at other PSEG generating stations. Particulate emissions from the towers – a result of the emission of drift droplets containing dissolved solids – are based upon the conceptual tower design provided by Sargent and Lundy as well as studies performed for the Hope Creek cooling tower in support of the Extended Power Uprate project.

Preliminary dispersion modeling of the mechanical draft option and review of previously performed dispersion modeling of the Hope Creek cooling tower as well as a fogging and icing study previously performed for the PSEG Linden Generating Station cooling towers yields the following conclusions:

- Retrofit of natural draft towers is unlikely to produce significant particulate impacts on a non-attainment area and therefore is not likely to trigger Subchapter 18 requirements to obtain emissions offsets and install Lowest Achievable Emission Rate (LAER) technology.
- Retrofit of natural draft towers is unlikely to produce significant fogging, icing, or salt deposition problems onsite or offsite, which will expedite permitting.
- Retrofit of linear mechanical draft cooling towers will produce significant particulate impacts including significant impacts in the New Castle County, Delaware non-attainment area. A retrofit employing this tower type will likely require installation of LAER particulate control technology and securing particulate offsets. The cost and availability of such offsets is not presently known.
- Preliminary dispersion modeling of the assumed design for the linear mechanical draft towers shows that the Prevention of Significant Deterioration (PSD) PM_{10}[1] increment is predicted to be exceeded. This is considered a fatal permitting flaw for the presumed design and measures to mitigate these impacts through use of a different design and/or alternative dispersion model would be required before permitting could proceed. It may be possible to successfully mitigate this problem through additional drift control, increased make-up to reduce basin TDS

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[1] Particulate matter having an equivalent aerodynamic diameter of 10 microns or less.

concentrations, taller fan stacks, or more sophisticated dispersion modeling techniques – all at additional costs to the project.
- Linear mechanical draft towers are likely to produce significant fogging and perhaps some limited icing conditions close to the towers. The potential for fogging interference with river navigation would require a more detailed modeling assessment. It may be possible to mitigate fogging through use of a wet-dry tower design at substantial additional cost.
- Linear mechanical draft towers are much more likely to produce operationally troublesome salt deposition on plant high voltage equipment than natural draft towers.

Both the mechanical and natural draft tower design options will emit significant quantities of particulate matter, which becomes a potential confounding factor and the factor triggering New Jersey permitting requirements. The New Jersey Air Pollution Control regulations at N.J.A.C 7:27-6 limit particulate emissions to 30 lb/hr. The anticipated maximum hourly particulate emissions from both the mechanical and natural draft tower designs exceed this regulatory limit, thereby precluding their use absent a change in the presumed engineering or operation of the towers or a change to the applicable regulations. A PSD pre-construction permit would be required under 40 CFR 52 (federal PSD regulations). A major modification to the Hope Creek Generating Station / Salem Generating Station Title V operating permit would be required under N.J.A.C. 7:27-22.24 since the project would be subject to 40 CFR 52. Subchapter 18 (N.J.A.C. 7:27-18) non-attainment requirements, including the application of LAER and emissions offsets, are likely to be required for the mechanical draft design <u>only.</u> This results from predicted significant impacts in the New Castle County, Delaware non-attainment area, which extends to the northern tip of Artificial Island. The PSD and Title V major modification permits must be finalized before construction can begin.

Two future regulatory initiatives through a 5-year horizon (2010) have been identified which could affect the permitting of either the natural draft or the mechanical draft closed-cycle cooling systems. These are implementation of the ambient air quality standard for $PM_{2.5}$ and the U.S. Environmental Protection Agency's (EPA's) statutory review of the particulate matter National Ambient Air Quality Standards (NAAQS).

EPA announced a proposed $PM_{2.5}$ Implementation Rule (Implementation Rule) in September 2005. The Implementation Rule is scheduled to be finalized in the Fall of 2006. This rule will affect the nonattainment New Source Review and PSD treatment of $PM_{2.5}$ and thus could affect the permitting of the closed-cycle systems. EPA has not released sufficient information in the Implementation Rule to determine the precise effect on the hypothetical cooling tower retrofit.

EPA's review of the particulate NAAQS may result in a change to the particulate standards toward even greater stringency. However, if EPA promulgates revised PM standards in

September 2006 (under a court ordered deadline), it is likely that new source review requirements for the revised standards will not become effective before 2010.

Assuming the regulatory hurdles can be overcome; permitting of the natural draft option is estimated to require 11 months while permitting of the mechanical draft option is estimated to require 17 months. The longer schedule for the mechanical draft option is related to Subchapter 18 applicability and the greater air quality impacts produced by that design.

The estimated permitting budget requirement for the natural draft option is $120,000 while the estimated budget requirement for the mechanical draft option is $185,000. The difference is, again, a result of Subchapter 18 applicability and the significantly greater environmental impacts expected from the mechanical draft towers.

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1.0 INTRODUCTION AND BACKGROUND INFORMATION

Salem Generating Station (Salem) is an electric generating facility consisting of two nuclear-powered pressurized water reactors each with a licensed rating of 3,423 megawatts-thermal (MWt), and ancillary equipment. Ancillary equipment includes one steam turbine / generator set per unit, each with an electrical output of approximately 1200 megawatts-electric (MWe).

Salem Unit 1 commenced commercial operation in 1977 with Unit 2 following in 1981. Units 1 and 2 are treated as identical units for purposes of this study. The adjacent Hope Creek Generating Station ("Hope Creek") commenced commercial operation of a single unit in 1986. Hope Creek Unit 1 is similar in thermal and electrical energy production to the Salem units. Hope Creek employs a single natural draft tower to dissipate excess heat from the steam cycle. The two Salem units are cooled using open-cycle cooling.

The NJDEP has issued a Title V air permit considering Salem and Hope Creek as a single "facility". The air permit includes the natural draft cooling tower associated with Hope Creek. This permit limits the maximum hourly emission rate of particulate matter (PM) from the Hope Creek cooling tower to 29.4 lb/hr and the annual emission rate of PM to 128.8 tons per year (tpy).

This study examines certain air quality-related aspects of retrofitting closed-cycle cooling systems to both Salem Units. Closed-cycle cooling systems would reject excess heat directly to the atmosphere rather than to the Delaware Estuary. Heat would be dissipated primarily through the evaporation of cooling water. The heat dissipation process results in emissions of PM to the atmosphere and therefore triggers certain regulatory requirements for permitting and impact analysis.

1.1 Purpose of Study

The purpose of this study is to determine the air permitting requirements, evaluate the air permitting feasibility and estimate schedule implications for retrofitting closed-cycle cooling systems to Salem Units 1 and 2. Both natural draft and mechanical draft towers are considered in the study since differences will exist in the impact characteristics and permitting requirements.

Since air quality permitting requirements, cost and schedule are strongly dependent upon the magnitude and type of emission and whether or not significant ambient impacts are predicted through dispersion modeling, it is necessary to assume some aspects of cooling system design to achieve the purposes of this study. In essence, the study assumes the following:

- A natural draft retrofit tower would be similar in size and operating characteristics to the Hope Creek cooling tower, already in operation at the site. The existing Hope Creek cooling tower is very similar to a conceptual design of the natural draft retrofit alternative for Salem Generating Station Units 1 and 2 performed by Sargent and Lundy (Reference 1-1).
- A conceptual design of the mechanical draft option has been performed by Sargent and Lundy (Reference 1-2) and is used as the basis for the mechanical draft option impact evaluation.
- Emissions from either option are conservatively estimated using information developed for the Hope Creek Extended Power Uprate (EPU) permitting.
- The cooling towers for either option would be located to the east of the Salem containment, turbine structures and switchyard.

1.2 Description of Salem / Hope Creek Generating Stations

The Salem and Hope Creek Generating Stations are located on adjacent sites on Artificial Island in the Delaware Estuary (River Mile 50) in Lower Alloways Creek Township, Salem County, New Jersey. The location of Salem and Hope Creek, as depicted on the United States Geological Survey (USGS) quadrangle of Taylor's Bridge, Del-N.J. is shown in Figure 1-1, and on an aerial photograph in Figure 1-2. Together, Hope Creek and Salem occupy about 740 acres.

Currently, cooling water for the Salem Units 1 and 2 condensers is obtained from the Delaware Estuary. If closed-cycle cooling systems were retrofit to these units, the source of make-up water would also likely be the Delaware Estuary[2]. Freshwater flows into the Estuary and other ambient conditions determine the quality of the make-up (i.e. the concentration of salinity plus other dissolved solids). Periods of lower salinity typically occur during prolonged periods of high freshwater flow. Periods of higher salinity typically occur during extended periods of drought and low freshwater flow.

NJDEP currently considers Salem and Hope Creek to be a single facility with respect to implementation of state and federal air permitting regulations. At the time this determination was made, the two stations were both owned (majority share) and operated by the same parent company (PSEG). This fact, plus the fact that the

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[2] Previous studies of alternative sources of make-up water for closed-cycle cooling systems at the site have demonstrated that the only feasible make-up water source is the Delaware Estuary. See References 1-1 and 1-2.

stations are on adjacent parcels and share the same Standard Industrial Classification (SIC) code led the New Jersey Department of Environmental Protection (NJDEP) to combine both stations into a single facility for air permitting purposes. A single Title V permit has been issued covering both stations.

1.3 Description of Surrounding Region

The Hope Creek and Salem site is located on Artificial Island in the southwestern portion of Salem County. The site is bordered by water on the west and south sides and by lowland marshes on the north and east sides (refer to Figure 1-2). The formation of Artificial Island began early in the twentieth century when the U.S. Army Corps of Engineers disposed of hydraulic dredging spoils within a diked area established around a natural bar projecting into the Delaware River. The "island" is not a true island as it is connected to the mainland of New Jersey. The approximate grade of Artificial Island is 9 feet above Mean Sea Level (MSL), however most plant structures are at a base elevation a few feet higher.

The site is located approximately 18 miles south of Wilmington, DE; 30 miles southwest of Philadelphia, PA; and 7.5 miles southwest of Salem, NJ. Land use in the surrounding area (for air quality analysis purposes) is classified as rural consisting of natural covers, water bodies, and agricultural uses. Terrain elevations within New Jersey are essentially flat within 10 km. There are some low elevation (50 foot) terrain features within this distance in Delaware to the west and southwest of the site.

While the Hope Creek and Salem Generating Station structures are located within the state of New Jersey, the border between New Jersey and Delaware is nearby, running northward from Delaware Bay in the middle of the River but then cutting eastward to the edge of the New Jersey shore across the northernmost portion of Artificial Island (see Figure 1-3 for political boundaries). The very close proximity of the site to the State of Delaware is important to air quality permitting issues as will be discussed in Section 4.

1.4 Considerations Regarding Environmental and Equipment Impacts

Expected air pollutant emissions from any retrofit closed-cycle cooling systems will consist primarily of materials and compounds present in the make-up water. The most notable constituent is dissolved solids (essentially sea salts). In addition, settleable solids, and small quantities of volatile organic compounds are present in the make-up water drawn from the Estuary. The dissolved solids will be present in the liquid drift droplets emitted from the retrofitted cooling towers in the same concentration found in the cooling tower basin and circulating water system. The concentration within the circulating water system (and therefore the drift droplets) will vary continuously as a function of makeup Total Dissolved Solids (TDS) concentration, heat load and meteorological conditions. The drift droplets will evaporate (under non-saturated atmospheric conditions) leaving a small particle. These particles are considered a pollutant (TSP, PM_{10} and $PM_{2.5}$)[3] under the regulations of the State of New Jersey. However, in the context of the environmental significance of this emission, the particles are comprised essentially of sea salt.

A review of available information, including the Operating License Environmental Report for Hope Creek (where a natural draft tower was evaluated) discovered no particularly sensitive offsite receptors for airborne sea salt.

The operation of mechanical draft cooling towers can result in offsite fogging and, in winter, icing. There are no rail lines or major public roadways or bridges close enough to the site to be affected by these phenomena. Modern cooling tower design limits drift rates to the degree that significant offsite icing is not likely to be important. However, the potential to affect Delaware River channel shipping by fogging from mechanical draft towers must be considered.

The area surrounding the site is "in-attainment" for PM_{10}. The US Environmental Protection Agency (EPA) has recently determined that Salem County is "in-attainment" for $PM_{2.5}$; however, New Castle County Delaware is in a non-attainment status for this pollutant and is in very close proximity to the site. The attainment status of the site and the close proximity of a non-attainment area will affect the air permitting of the retrofit closed-cycle systems.

In addition to the offsite environmental considerations of salt emissions, the onsite impact upon plant equipment must also be considered. The degree of potential impact is strongly dependent upon the type of cooling tower installed and the proximity to electrical equipment, especially high voltage equipment. Salt deposition on insulators is a known cause of flashover. Airborne salt emissions from mechanical draft towers are of special concern. With respect to icing, the low drift rates of state-of-the-art cooling tower designs limits liquid water emissions typically to a few gallons per minute (gpm) which limits ice accretion rates to the degree that significant icing of plant equipment is not likely to occur.

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[3] TSP is "Total Suspended Particulate"; PM_{10} is Particulate Matter having an equivalent aerodynamic diameter of $\underline{10\mu}$ or less; and $PM_{2.5}$ is Particulate Matter having an equivalent aerodynamic diameter of $\underline{2.5\mu}$ or less. $PM_{2.5}$ is also known as "Fine Particulate"

Figure 1-1

Location of Salem and Hope Creek Generating Stations

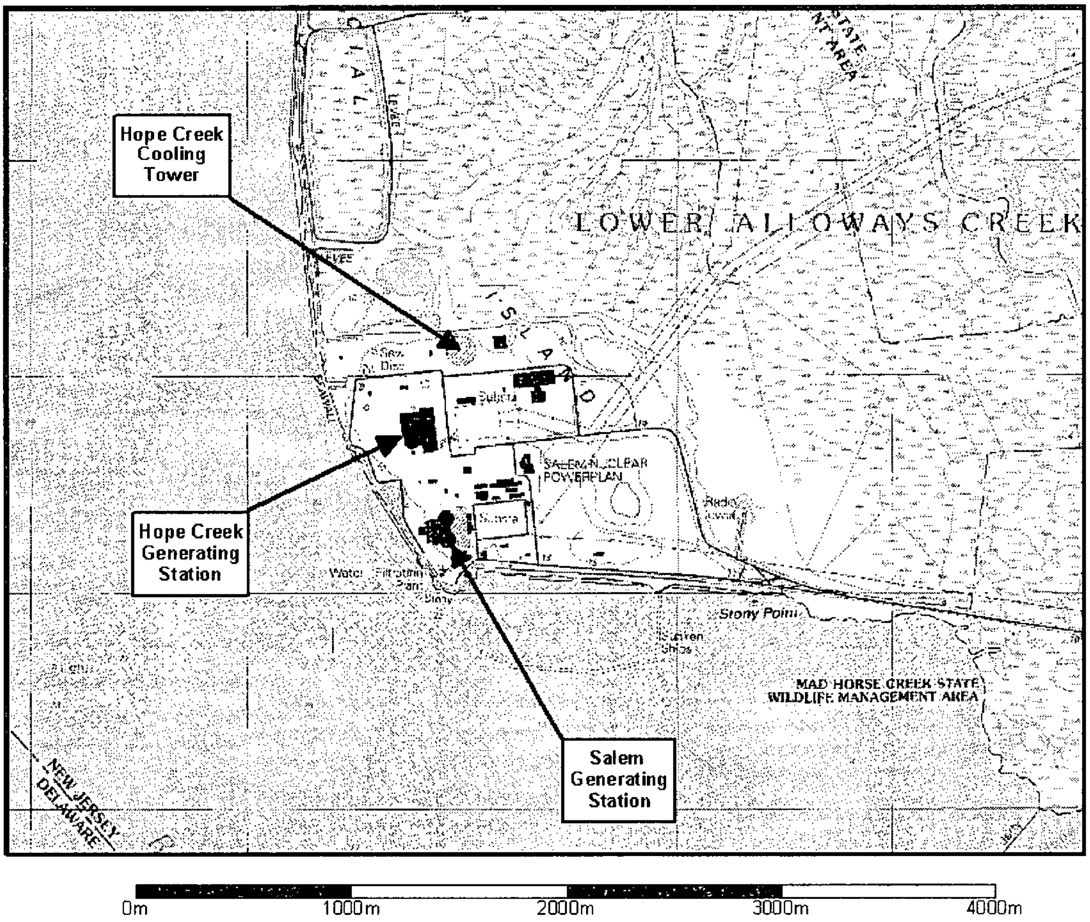
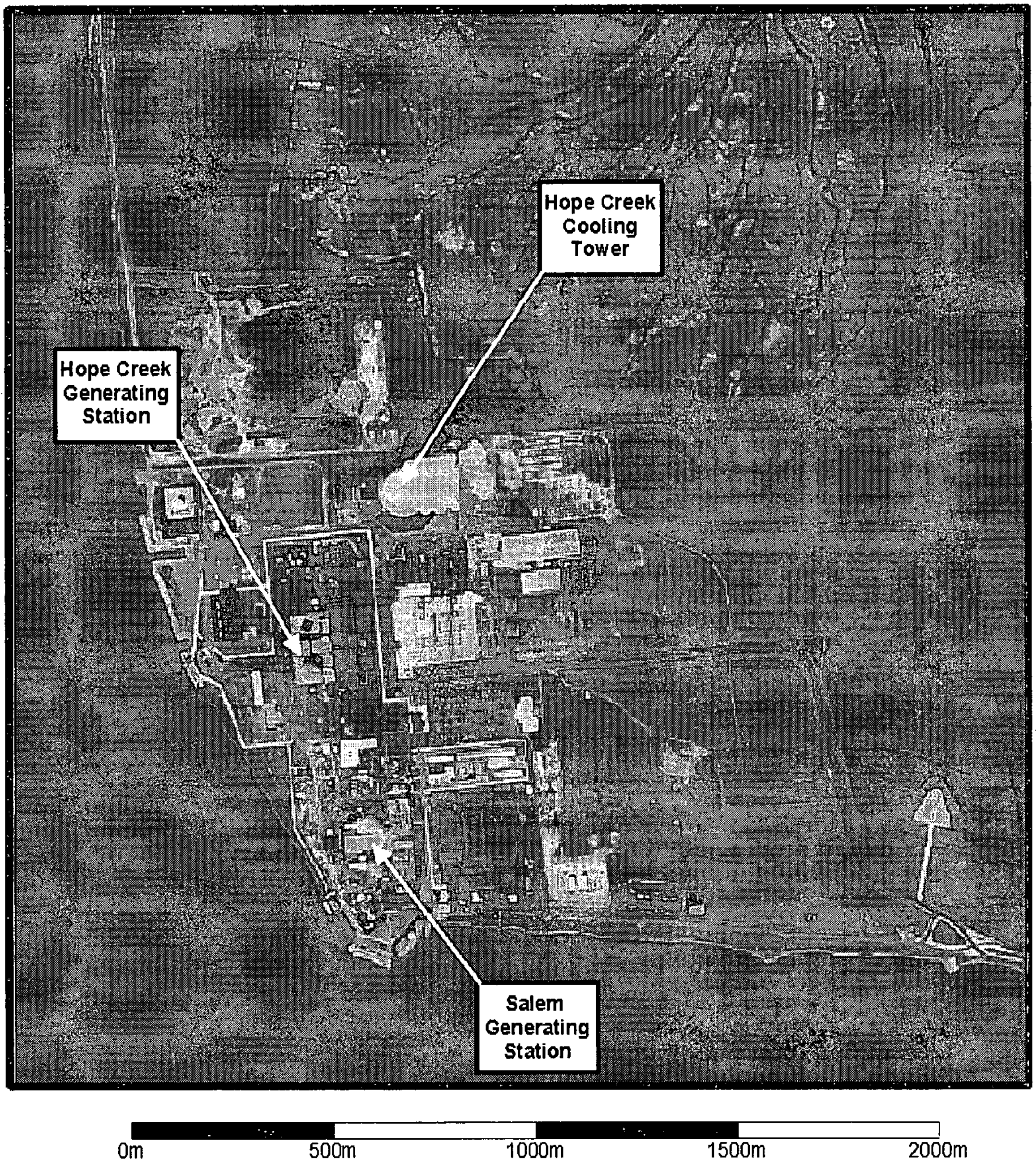


Figure 1-2

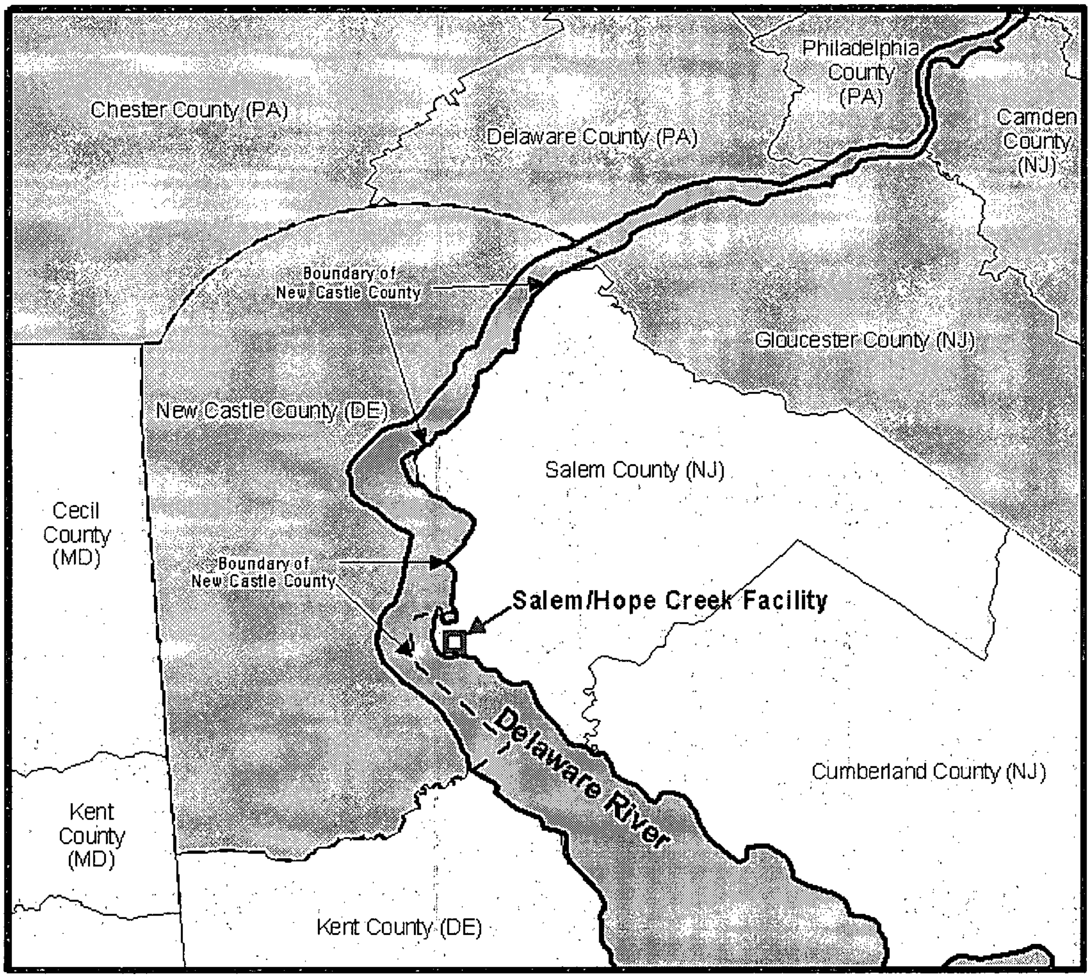
Aerial Photo of Salem and Hope Creek Generating Stations Site



North is at the top of the figure.

Figure 1-3

Regional Political Boundaries and PM$_{2.5}$ Attainment Status in the Vicinity of Salem Generating Station



☐ Attainment (or Unclassifiable) Areas

▨ Nonattainment Areas

2.0 DESIGN ASSUMPTIONS FOR CLOSED CYCLE COOLING RETROFIT

A nuclear generating station's heat dissipation system accepts heat rejected from certain auxiliary equipment as well as the main condenser, and transfers this heat to either a water body ("open-cycle cooling") or the atmosphere ("closed-cycle cooling") for dissipation. The focus of this study is a potential conversion of the present open-cycle system at Salem to a closed-cycle system.

In a closed-cycle system, the transfer of excess heat to the atmosphere is accomplished primarily by evaporation of circulating water within a cooling tower. Two major options exist with respect to the type of cooling tower for this use: natural draft and mechanical draft. In a natural draft tower, the air within the tower is heated by the circulating water and becomes buoyant with respect to the surrounding atmosphere. (Being warmer, it is less dense than the surrounding air.) Natural, gravity-driven buoyancy processes induce the required airflow upwards through the tower. In order to optimally achieve this effect, natural draft towers are designed as tall structures, having a hyperbolic vertical cross-section. Typically, for a large natural draft tower, the warm, saturated air and drift droplets are emitted at an elevation of approximately 500 feet above ground level. In mechanical draft towers, the required airflow is achieved by fans, which draw air through the tower to cool the circulating water. These towers are much shorter than natural draft towers and therefore emit the warm, saturated air and drift droplets closer to ground level. Both tower designs are evaluated in this report.

2.1 Natural Draft Cooling Tower Retrofit

Because of the similarity in electric generating capacity, steam cycle design, design heat rejection, and other factors between each of the Salem units and the single Hope Creek unit, it is instructive to first examine the natural draft cooling tower already installed at the adjacent Hope Creek Generating Station.

Hope Creek presently employs a closed-cycle cooling system including a "counter-flow" hyperbolic natural draft tower in which air moving upward in the tower contacts heated circulating water flowing downward. The evaporation saturates and warms the surrounding air and cools the water. The warm-moist air rises to the top of the tower because its density is less than the cooler and drier ambient air outside the tower. The resulting air pressure within the base of the tower is slightly lower than atmospheric which causes the cooler ambient air to be drawn into the tower base. In operation, a continuous stream of cooler ambient air is drawn in at the base, warmed by the circulating water, rises through the tower, and emerges from the top of the tower.

The Hope Creek cooling tower is equipped with drift eliminators that are designed to limit drift losses to 0.0005% of the circulating water flow rate. The results of testing conducted on the Hope Creek cooling tower determined that an even greater drift reduction, to a level of 0.00041%, was being achieved (Reference 2-1). For purposes of the present study, the design value of 0.0005% will be assumed.

Hope Creek Unit 1 is very similar in thermal and electrical production to each of Salem Units 1 and 2. The major design parameters of the Hope Creek cooling tower, therefore, will be assumed to apply to a retrofit of closed-cycle cooling through natural draft cooling towers at Salem. Emissions will be conservatively scaled upward from the Hope Creek cooling tower, however, based on differences in drift rates, which are discussed within this section. The design parameters for the Hope Creek cooling tower important to air permitting issues are provided in Table 2-1. It should be noted that the actual circulating water flow rate measured in the Hope Creek circulating water system is 612,000 gpm yet that system (including the cooling tower) was designed for a flow of 552,000 gpm. The circulating water flow rate affects the PM emissions since drift is a percentage of circulating water flow. The 612,000 gpm value has been used in all recent emissions calculations for regulatory purposes. A recent study conducted by Sargent and Lundy (Reference 1-1) calculated that a circulating water flow rate of approximately 511,000 gpm would be required for each of the Salem units if closed-cycle operation were to be employed. Application of the Hope Creek cooling tower particulate emissions to a Salem natural draft tower retrofit will be conservative in this regard and allows for the same variance in "as built" circulating water system conditions as has occurred at Hope Creek by applying Hope Creek's actual circulating water flow rate.

The same Sargent and Lundy study (Reference 1-1) shows that the location of the two retrofit natural draft towers (one per Salem unit) would be the east of the major station structures on a portion of the site that is currently undeveloped. Figure 2-1, taken from Reference 1-1, shows the location as a sketch (no scale).

The thermal duty and make-up characteristics of any retrofit natural draft cooling tower for each of the Salem units will be essentially the same as for the Hope Creek cooling tower. The particulate emissions estimated for the Hope Creek cooling tower will therefore be assumed to apply to each of the two Salem retrofit towers with one adjustment: For purposes of this study, the 42 lb/hr particulate emission rate recently applied-for in conjunction with the EPU project at Hope Creek will be conservatively adjusted upwards by the ratio of the design drift rate (0.0005%) over the measured drift rate (0.00041%). The increased thermal loading associated with the Hope Creek EPU results in increased evaporation of the circulating water and a resulting further concentration of the TDS. This effect will be allowed to remain in the emissions estimation for the Salem towers as a contingency since an actual preliminary design has not yet been done for Salem. It should be noted that the 42 lb/hr value is also based upon a make-up water TDS concentration which is conservative in that it represents an "outlier" maximum measurement of make-up TDS. Applying the 0.0005/0.00041 ratio to the Hope Creek cooling tower emission results in a particulate emission of 51.22 lb/hr per unit (tower). The New Jersey Air Pollution Control regulations at N.J.A.C 7:27-6 limit particulate emissions to 30 lb/hr. The maximum hourly particulate emissions from each of the natural draft towers as designed exceeds this regulatory limit, thereby precluding their use absent a change in the presumed engineering or operation of the towers or a change to the applicable regulations.

The annual emission will be assumed to be 128 tons/year per natural draft tower. This is the same value permitted for the Hope Creek cooling tower under the existing Title V Operating Permit and contains considerable margin. The above emission value assumptions form the basis for determining the permitting requirements and evaluating the ambient impact for particulate described later in this report.

The retrofit natural draft cooling tower design assumed for the Salem units is summarized in Table 2-1 with a comparison to the Hope Creek cooling tower also provided in that table. Except for the emission rate and drift rate, the assumed design is identical to the Hope Creek cooling tower which allows dispersion modeling of particulates performed in support of the Hope Creek EPU to be used as the basis for estimation of impacts for the natural draft tower alternative studied here for the Salem Generating Station. The small differences between the Sargent and Lundy conceptual design in Reference 1-1 and the natural draft tower assumed in the analysis presented in this report are inconsequential with respect to the conclusions reached herein.

2.2 Mechanical Draft Cooling Tower Retrofit

Unlike the natural draft tower case, a site- and unit-specific design surrogate is not available for the mechanical draft option. Mechanical draft towers are available in a wide variety of configurations and a retrofit must be optimized to the heat rejection duty, the site meteorology, to avoid interference and recirculation, and to consider the location and type of existing plant equipment, especially high voltage components. A recent report issued by Sargent and Lundy estimated that a single 24-cell tower would be required for each Salem unit for a total of 48 cells for both units (Reference 1-2). The location of the towers would be east of the major station structures on a part of the site that is currently undeveloped. Figure 2-2, taken from Reference 1-2, shows the location as a sketch (no scale).

Information on the mechanical tower design used to evaluate air permitting issues was obtained from the GEA Power Cooling, Inc. mechanical tower specifications provided in Attachment 7 of the Sargent and Lundy Mechanical Draft Tower Report (Reference 1-2). The towers specified in Reference 1-2 are 2x12 linear mechanical draft towers (twenty four cells arranged in two rows of 12 in each tower).

The cooling tower design includes drift eliminators capable of limiting drift to a rate of 0.0005% of the circulating water flow, the same as assumed for the natural draft tower retrofit. The exit flow for each cell was not provided in the Sargent and Lundy report and was estimated based on the air flow to circulating water ratios from PSEG's Linden 2 and Bergen 4 Mechanical draft towers. An emission rate of 42.72 lb/hr/unit is assumed evenly divided among the 24 cells per unit giving a particulate emission rate of 1.78 lb/hr per cell. The New Jersey Air Pollution Control regulations at N.J.A.C 7:27-6 limit particulate emissions to 30 lb/hr. The maximum hourly particulate emissions from each of the two mechanical draft towers as designed exceeds this regulatory limit, thereby precluding their use absent a change in the presumed engineering or operation of the towers or a change to the applicable regulations.

Table 2-2 presents the mechanical draft tower design information assumed for the present study. Figure 2-3 shows the assumed location of the linear mechanical draft towers on the Salem site.

Table 2-1

Salem Generating Station
Assumed Design for Natural Draft Towers with Comparison to Existing Hope Creek Generating Station Natural Draft Tower

Parameter	Hope Creek Cooling Tower (As Built / With EPU)	Salem Generating Station Retrofit Cooling Towers (each of two)
Tower Base Elevation	11 feet above MSL	11 feet above MSL
Tower Height	512 feet	512 feet (see note 1)
Tower Exit Diameter	271 feet	271 feet
Tower Exit Temperature	106.2°F	106.2°F
Circulating Water Flow	612,000 gpm	612,000 gpm (see note 2)
Drift Rate	0.00041% (measured)	0.0005% (conceptual design)
Maximum Basin TDS	33,306 mg/l	33,306 mg/l
Maximum Short-term Emission Rate (PM)	42 lb/hr	51.2 lb/hr
Maximum Annual Emission Rate (PM)	128 tons/yr	128 tons/yr

Notes:

(1) The Sargent and Lundy design in Reference 1-1 differs very slightly from the design assumed here, being 500 feet high, however, this very small difference is immaterial to the analysis and conclusions.

(2) The conceptual Sargent and Lundy design is for a circulating water flow rate of 511,000 gpm, however, the Hope Creek flow rate of 612,000 is used for conservatism. See text in section 2.1 for further explanation. Impact analysis conclusions are unaffected by this assumption.

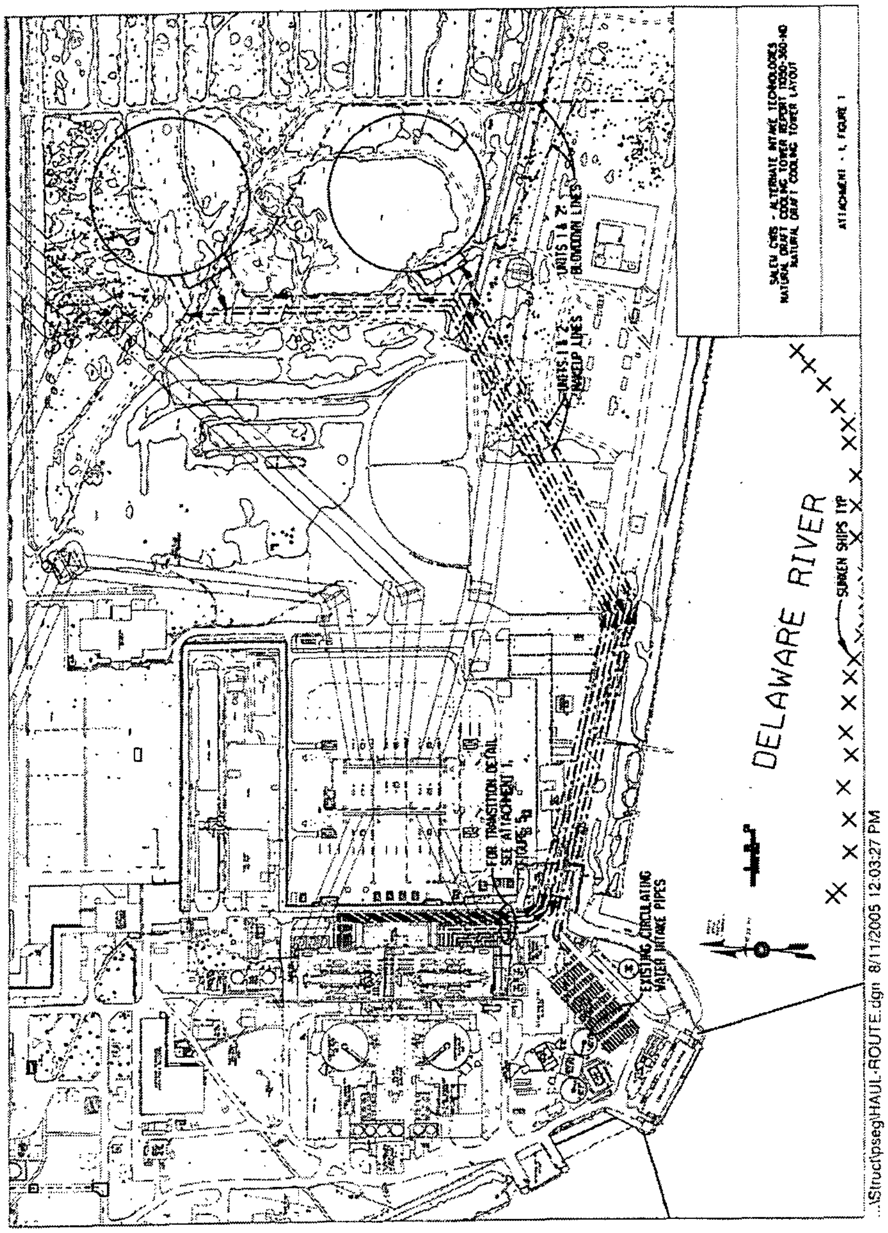
Table 2-2

Salem Generating Station
Assumed Design for Mechanical Draft Cooling Towers
Design Assumptions Based On GEA Power Cooling, Inc Specifications

Parameter	Value
Number of Cooling Tower Cells	48 (24 for each unit)
Number of Cells/Tower	24 (12x2 arrangement)
Tower Height	39 feet
Tower Width	108 feet
Tower Length	648 feet
Cell Diameter	54 feet
Cell Fan Stack Height	49 feet
Exit Temperature	97.2°F
Cell Exit Flow	1,490,854 acfm (estimated)
Maximum Hourly PM Emissions	1.78 lb/hr/cell
Maximum Annual PM Emissions	1.22 lb/hr/cell

Figure 2-1

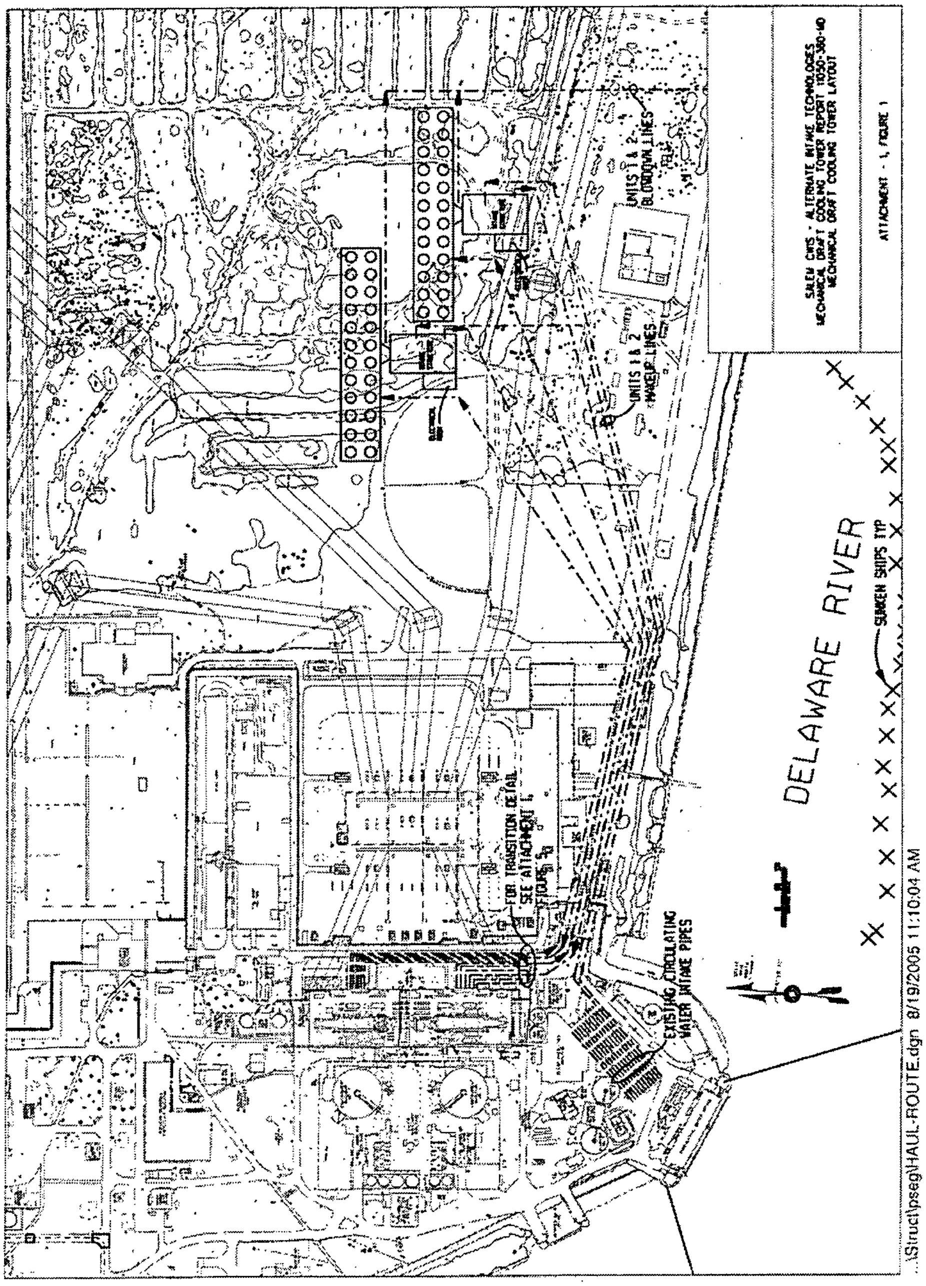
Sketch of Potential Natural Draft Cooling Tower Location
Salem Generating Station



Source: Figure 1 of Attachment 1 (Sargent and Lundy Alternative Intake Technologies for CWIS – Natural Draft Tower Option Report No. 11050-360-ND.)

Figure 2-2

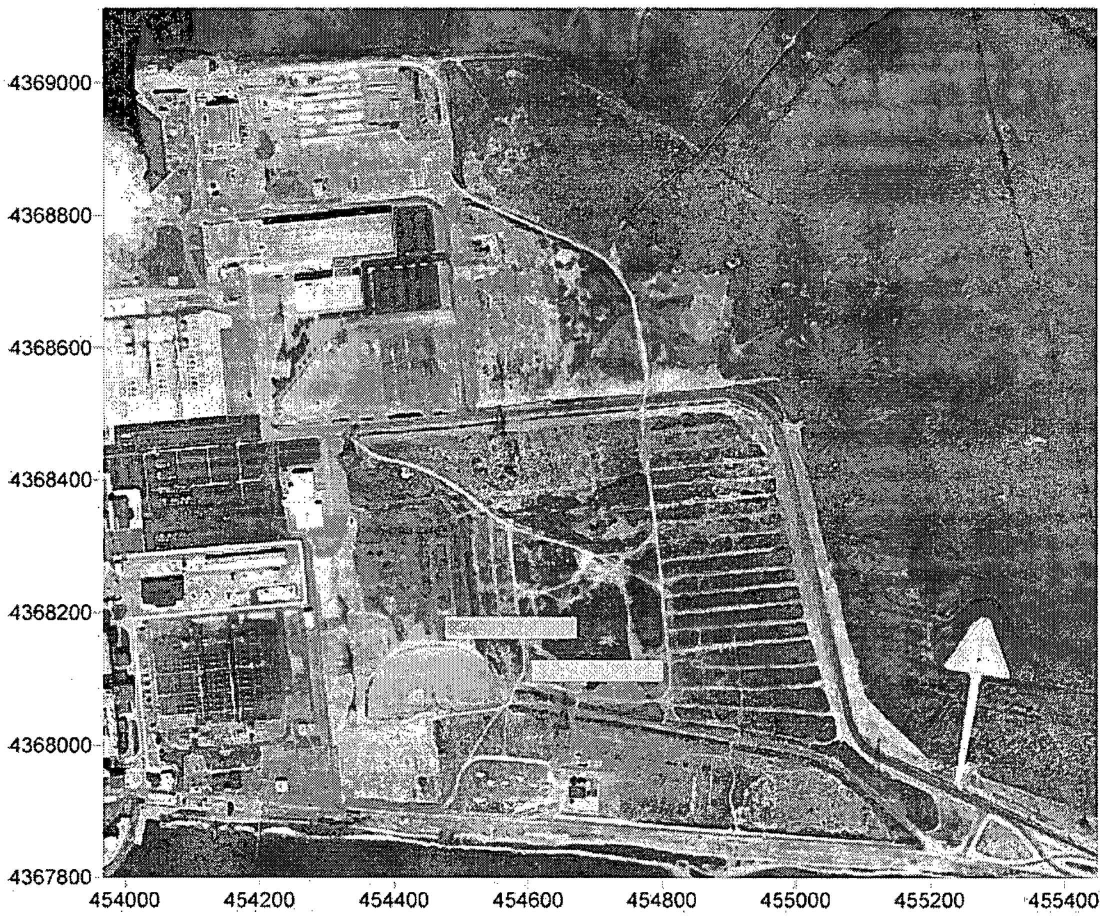
Sketch of Potential Mechanical Draft Cooling Tower Location
Salem Generating Station



Source: Figure 1 of Attachment 1 (Sargent and Lundy Alternative Intake Technologies for CWIS – Mechanical Tower Option Report No. 11050-360-MD.)

Figure 2-3

Assumed Location of Linear (12x2) Mechanical Draft Towers On Salem Generating Station Site



Coordinates are in UTM system. North is towards top.

3.0 Air Quality (Particulate) Environmental Setting

The Salem site is located in southwestern Salem County. Nearby air pollution sources are limited primarily to transportation, agricultural activities, and combustion sources at both Salem and Hope Creek (emergency generators, auxiliary boilers, and combustion turbines). There are heavily industrialized portions of both the Delaware and New Jersey banks of the Delaware River farther upstream but little significant industrial activity in the immediate vicinity of the site. Most particulate in Salem County's air has been transported to the County from emissions of particulate and precursors elsewhere.

Salem County is in attainment of both the PM_{10} and $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS). PM_{10} is classified as "attainment" in neighboring counties and in New Castle County, Delaware, as well. Neighboring Cumberland County and New Castle County, Delaware, however, are classified as "non-attainment" for $PM_{2.5}$. Figure 1-3 shows the $PM_{2.5}$ attainment status of Salem and surrounding counties.

Background air quality monitoring is conducted by the NJDEP in Gibbstown, Gloucester County. Monitored air quality for PM_{10} and $PM_{2.5}$ is shown in Table 3-1 for the years 2002 through 2004 (2003 and 2004 data are from the EPA Aerometric Information Retrieval System (AIRS) which may differ slightly in value from that to be eventually officially provided by the NJDEP.)

Table 3-1
Criteria Pollutant Background Concentrations ($\mu g/m^3$)

Pollutant	Averaging Period	Station Location	Distance from Salem (km)	Direction from Salem (deg)	2002[(b)]	2003[(c)]	2004[(c)]	Ambient Standard
PM_{10}	24-Hour	Camden Lab	62.8	36	56	52	49	150
	Annual	Camden Lab	62.8	36	24.4	27.0	22.0	50
$PM_{2.5}$	24-Hour	Gibbstown	45.1	27	35.7[(a)]	35.3	33.0	65
	Annual	Gibbstown	45.1	27	13.0	13.8	12.4	15

Notes:

(a) 24-Hour data for year 2002 reflects the exclusion of the single day monitored values of July 7, 2002 during a forest fire event. This event gave the single highest 24-hour $PM_{2.5}$ value ever recorded at Gibbstown (96.9 $\mu g/m^3$). This value is included in the annual average.

(b) Data for 2002 were provided by the NJDEP Bureau of Air Monitoring in (Reference 3-1)

(c) Data for 2003 and 2004 were provided by the EPA AIRS website (Reference 3-2).

4.0 CURRENT AND REQUIRED AIR QUALITY PERMITS

4.1 Current Air Quality Permit

The Salem and Hope Creek Generating Stations are considered to be a single source (or "facility") under the EPA and NJDEP air permitting regulations. The two stations are combined into a single source for air permitting purposes because the two stations are adjacent to one another and, at the time of determination, both were owned (majority share) and operated by the same parent company. The criteria for determining whether a facility is a minor or major source for air permitting purposes are based on the facility's potential to emit certain criteria pollutants. A facility is considered a "major" facility if it has the potential to emit pollutants that exceed the "Threshold (tpy)" amounts listed in the following table:

Major Source Applicability Thresholds

Air Contaminant	Threshold (tpy)
Any Hazardous Air Pollutant (HAP)	10
Combination of HAPs	25
Carbon Monoxide (CO)	100
PM_{10}	100
TSP	100
Sulfur Dioxide (SO_2)	100
Oxides of Nitrogen (NO_x)	25
Volatile Organic Compounds (VOC)	25
Lead (Pb)	10
Any Other Air Contaminant	100

The Salem-Hope Creek facility is considered a "major" source because its potential emissions exceed one or more of the threshold levels. As a result, the Salem-Hope Creek facility is subject to NJDEP's Title V operating permit regulations as contained in N.J.A.C. 7:27-22.

The Salem-Hope Creek facility received an approved Title V operating permit from NJDEP on February 15, 2005. The Title V permit contains emissions limits, regulatory requirements, monitoring and recordkeeping provisions and reporting requirements for all potential emissions sources at the Salem-Hope Creek facility. Included in the approved Title V permit is the existing Hope Creek natural draft cooling tower. The cooling tower is currently limited to a maximum hourly particulate emission rate of 29.4 lbs/hr and annual particulate emissions of 128 tpy. In addition to the particulate emission limits, the permit also requires bi-weekly sampling of the TDS concentration in the circulating water and an annual report detailing the calculated hourly and annual particulate emissions resulting from the TDS sampling. There is also a limitation on the type and quantity of chemical additives that may be added to the circulating water.

4.2 Regulatory Applicability (Natural Draft and Mechanical Draft)

This section provides a brief analysis of the applicability of the New Jersey and Federal air pollution control regulations of particular relevance to a closed-cycle retrofit project at the Salem Generating Station.

4.2.1 New Jersey Air Pollution Control Regulations

N.J.A.C. 7:27-6 **Control and Prohibition of Particles from Manufacturing Processes**

N.J.A.C. 7:27-6 limits particulate emissions from source operations associated with manufacturing processes. Any cooling tower retrofits installed at Salem presumably will be subject to N.J.A.C. 7:27-6 as a "source operation" under N.J.A.C. 7:27-6.1. Per N.J.A.C. 7:27-6.2(a) the maximum allowable particulate emission rates for an affected source are determined based upon a maximum particulate concentration of 0.02 grains (gr) per standard cubic foot (scf) in the source exhaust flow. N.J.A.C. 7:27-6.2(a) limits the maximum allowable particulate emission rate to 30.0 lbs/hr by not making explicit provisions for sources having a gas flow greater than 175,000 standard cubic feet per minute (scfm). Recognizing that technology limitations could prevent compliance with the requirements of N.J.A.C. 7:27-6.2(a) and/or that the size of some sources could exceed the 175,000 scfm value, the Department made provision for a variance mechanism which is found in N.J.A.C.7:27-6.5. However, the variance provisions in N.J.A.C. 7:27-6.5, were expressly rejected by EPA when EPA approved Subchapter 6 as part of New Jersey's State Implementation Plan (SIP). Therefore, NJDEP believes it is not possible to issue such a variance.

In April 2004 PSEG requested that NJDEP revise Subchapter 6 to allow PM emission rates above 30 lb/hr for the Hope Creek cooling tower, which may periodically result from the Hope Creek EPU project. NJDEP had stated to EnviroMet (Reference 4-1) that changes to Subchapter 6 are being drafted for adoption on a state level.. The changes to Subchapter 6 were not proposed by the the date of this report and it is thereby unclear when NJDEP will amend the regulations. Although EPA must approve the revised Subchapter 6 as a SIP change, NJDEP believes that they can issue permits under the revised Subchapter 6 after its adoption on a state level.

If the Subchapter 6 revisions are adopted before any air permitting work begins on the retrofit project, then the current Subchapter 6 limitations are not expected to affect the permitting of the retrofit project. If Subchapter 6 is not revised, then particulate emissions from each cooling tower would be limited to 30 lb/hr. This limit on particulate matter emissions is impractical for the presumed cooling tower design and operational characteristics because of periodic naturally-occurring meteorological and river flow conditions that can yield high circulating water system TDS concentrations. The plant operator has no control over these factors.

N.J.A.C. 7:27-22 Operating Permits

The Salem-Hope Creek Facility is currently operating under an approved Title V Operating Permit. N.J.A.C. 7:27-22.24 requires that the construction or installation of any new *significant source operation* shall be made as a *significant modification if a source is* subject to the PSD regulations at 40 CFR 52. Because the retrofit project will be subject to PSD regulations, a Title V Operating Permit Significant Modification would be required.

NJDEP's Title V public comment requirements [7:27-22.11(k)] dictate that, before publishing notice of a draft operating permit that includes a significant modification, NJDEP must also give notice to the head of the designated air pollution control agency of any "affected state". An affected state is any state contiguous to New Jersey or is located within 50 miles of the facility which is the subject of the permit [7:27-22.1]. In the case of the Salem-Hope Creek Facility the affected states are Delaware, Maryland, Pennsylvania, and New York. The regulations state that NJDEP will accept and consider any comments which are received from the affected state prior to the close of the public comment period. If NJDEP does not accept any recommendation by an affected state during the public comment period, NJDEP will inform the affected state and EPA in writing, setting forth NJDEP's reasons for not accepting the recommendation.

NJDEP regulations [7:27-22.12(g)] state that if EPA does not object to the proposed operating permit within its 45 day comment period, "any person" (presumably the affected state) may petition the EPA during the 60 days after the expiration of EPA's 45 day comment period, and may request that EPA object to the proposed operating permit.

The Clean Air Act prescribes that, if EPA denies the petition for review, then EPA's denial is then subject to judicial review.

N.J.A.C. 7:27-18 Control and Prohibition of Air Pollution from New or Altered Sources Affecting National Ambient Air Quality Standards (Emissions Offset Rule)

N.J.A.C. 7:27-18 (Subchapter 18) applies to major facilities or major modifications which will cause a "significant net emission increase" in a non-attainment area (or that will significantly impact a non-attainment area). A significant net emission increase occurs when facility-wide emission increases during the "contemporaneous period" (time period between five years prior to initiation of construction and initial source operation) exceed the significant net emission increase thresholds. Facilities which exceed a significant net emission increase threshold for a non-attainment pollutant are required to demonstrate Lowest Achievable Emission Rate (LAER), and include an emission offset plan and an air quality impact analysis to demonstrate compliance with the regulation for the non-attainment pollutant.

The Salem-Hope Creek facility is a major facility and the retrofit project will cause a significant net emissions increase of TSP, PM_{10} and $PM_{2.5}$. As a result, Subchapter 18 requirements would apply to the project if the facility is located in a TSP, PM_{10} or $PM_{2.5}$ non-attainment area <u>or</u> if the retrofit project significantly impacts a non-attainment area. The facility is located in Salem County which is currently designated as attainment for TSP, PM_{10} and $PM_{2.5}$ but it is located only about 2100 meters from the border of New Castle County, Delaware. New Castle County is a $PM_{2.5}$ non-attainment area. Therefore, there is the potential that $PM_{2.5}$ emissions from the retrofit project may significantly impact a non-attainment area.

Since Subchapter 18 is applicable, dispersion modeling will be required. Preliminary modeling of the natural draft tower design (as presented in Section 5 of this report) shows all predicted impacts below the $PM_{2.5}$ significance levels and, as a result, the natural draft retrofit design would not be subject to Subchapter 18 non-attainment requirements.

The preliminary modeling of the assumed mechanical draft tower design shows impacts exceeding both the 24-hour and annual $PM_{2.5}$ significant impact levels within the New Castle County non-attainment area and, as a result, the mechanical draft retrofit design would be subject to Subchapter 18 non-attainment requirements. The two most significant aspects of the applicability of Subchapter 18 will be (1) the demonstration that the $PM_{2.5}$ control technology for the mechanical draft towers represents LAER and (2) acquiring emissions reductions (offsets) from other facilities within the non-attainment area.

It is expected that the proposed drift rate of 0.0005% for the mechanical draft towers would satisfy the demonstration of LAER control technology. The procurement of $PM_{2.5}$ emissions offsets is much more problematic. Final implementation of the $PM_{2.5}$ standard will specify required offset ratios. Current interim guidance (Reference 4-2) requires only a 1:1 ratio. Depending on the timing of the project, PSEG would be expected to secure between 1 and 2 tpy of offset emissions per ton of emission increase. If it were assumed that the project would be permitted for an increase of 256 tpy of $PM_{2.5}$ it will need to acquire between 256 and 512 tpy of $PM_{2.5}$ offsets from sources in the non-attainment area. The cost and availability of these emissions offsets is unknown at this time since the area only recently became designated as non-attainment and EPA has not yet issued guidance on how to implement the requirements for $PM_{2.5}$ non-attainment areas.

4.2.2 Federal Air Pollution Control Regulations

Prevention of Significant Deterioration

PSD regulations require new major stationary sources and major modifications to stationary sources located in attainment and unclassified areas to:

- conduct a Best Available Control Technology (BACT) analysis and install BACT
- demonstrate compliance with PSD air quality increments and the NAAQS
- demonstrate compliance with ambient air quality standards
- determine project impacts on soils, vegetation, growth and visibility

The determination of whether or not a source is subject to PSD review, and to what extent the review must be conducted, is based upon a comparison of source emissions and impacts to pollutant thresholds specified in the PSD regulations. Applicability to PSD regulations is required to be determined under the final rule published on December 31, 2002 PSD and Non-attainment New Source Review (NSR), however this rule remains a matter of dispute between NJDEP and the EPA. Because the particular issues of this dispute do not touch on matters that would affect the PSD requirements for a closed-cycle cooling retrofit at Salem, it is assumed that the dispute will not affect permitting level of effort or schedule.

The Salem-Hope Creek facility is currently considered an existing major source as defined under the PSD regulations. Therefore, in order to determine whether the retrofit project would trigger PSD review (PSD applicability), the potential emission increases from either scenario must be compared against the PSD "significant net emission increase" thresholds for each of the criteria pollutants for which the area is in attainment (i.e., NO_x, CO, SO_2, TSP, PM_{10}, Pb). If the proposed emission increase associated with the project "by itself" is less than the significant net emissions increase threshold, the project is not subject to PSD review. If the proposed emission increase, by itself, is greater than the significant emissions increase, a netting analysis is conducted, taking into account all contemporaneous creditable emission decreases and increases at the facility. If the emission increases from the netting analysis are above the significant net emission increase thresholds for any pollutant, then that pollutant is subject to PSD review. For the purposes of this study, it has been assumed that the only contemporaneous emission increase will be from the recently proposed change to the Hope Creek cooling tower (EPU Project).

The installation of new cooling towers at Salem would only be expected to affect emissions of particulate. The PSD significant increase thresholds for TSP and PM_{10} are 25 tpy and 15 tpy, respectively[4]. Both cooling tower designs being considered will have potential annual particulate emissions exceeding 25 tpy and therefore would be subject to PSD review.

The PSD permit is a "pre-construction" permit. Most construction activities related to the project cannot begin until the permit is final.

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[4] PSD Significant increase thresholds for $PM_{2.5}$ have not yet been established; EPA is relying upon the PM_{10} thresholds in this interim period prior to promulgation of new guidance (Reference 4-2).

5.0 AIR QUALITY IMPACT OF CLOSED-CYCLE COOLING

An applicant for a PSD permit is required to conduct an air quality modeling analysis to assess the ambient impacts associated with the construction and operation of the proposed source. The retrofit project (either design) will require a PSD permit and therefore will require an air quality analysis to be performed to assess the ambient impacts of the project. The main purpose of an air quality analysis under the PSD program is to determine whether the emissions from the project will cause or significantly contribute to a NAAQS or PSD increment violation.

Because this is such an important hurdle to cross in the actual permitting process, a cursory modeling study of the mechanical draft retrofit option has been performed as part of the present study. It was not necessary to model the natural draft option for study purposes as explained later.

5.1 Construction

An assessment of ambient air quality impacts from construction activities related to the retrofit project will most likely be required as part of the environmental impact statement for the project. Because the large site affords a significant buffer between the activities and the property boundary, the ambient impacts from the construction activities are not expected to cause or contribute to an exceedance of applicable standards. Given the site layout, it is likely that this aspect of the permit application can be handled qualitatively.

5.2 Operation

5.2.1 Particulate Emissions

For PSD projects, assessing the air quality impacts from operation of the retrofit project requires the use of an EPA-recommended mathematical dispersion model. For the present study, the model chosen for use is the EPA's Industrial Source Complex Model with Plume Rise Model Enhancement (ISC-PRIME) (Reference 5-1)[5].

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[5] ISCST PRIME was chosen for this study to be reasonably compatible with previous work on the Hope Creek cooling tower (the previous work used ISC with Huber-Snyder algorithms) and to utilize the latest downwash algorithms (PRIME algorithms) since downwash will be significant for the mechanical draft towers. ISCST is presently the EPA-recommended model for analyses such as this cooling tower study. However, EPA is in the process of replacing the ISCST model with the

This model predicts both short-term and annual ambient concentrations of emitted airborne pollutants for comparison with existing environmental thresholds and standards. For cooling tower emissions subject to PSD regulation in the State of New Jersey, these thresholds and standards consist of (in order of decreasing impact stringency) Significant Impact Levels (SILS), PSD increments, New Jersey Ambient Air Quality Standards (NJAAQS), and the NAAQS for TSP, PM_{10}, and $PM_{2.5}$ (as applicable).

Predicted impacts for any modeled pollutant are calculated at ground level. The buoyancy of mechanical draft tower plumes is less than that of the natural draft tower plumes since the total heat rejected is emitted across a substantial horizontal distance compared with the more concentrated emission of the natural draft design. Mechanical draft tower plumes are also severely affected by aerodynamic downwash under certain meteorological conditions. Since the mechanical draft towers emit a plume subject to downwash effects at a height of only approximately 49 feet above grade, dispersion of plume material downward to ground level is expected to occur quickly under many meteorological conditions. Conversely, a natural draft cooling tower plume experiences a significantly greater amount of dilution before reaching ground level because its exit height is about 500 feet above grade. This greater diffusion would be expected to lead to much smaller predicted impacts for the natural draft tower than for the mechanical draft tower.

Natural Draft Cooling Towers

From previous modeling studies (Reference 5-2) completed for the nearby Hope Creek cooling tower in support of the EPU project, it was conclusively shown that particulate emissions from the tower do not cause significant impacts for particulates in either short-term or annual averaging periods. This study shows a maximum ground level short-term (24-hour average) impact of 0.25 $\mu g/m^3$ and a maximum annual average impact of 0.004 $\mu g/m^3$. These levels are sufficiently low that even if two additional similar towers were added to the site for Salem Units 1 and 2, significant impacts for particulate matter would not occur. This is an important conclusion in that it:

- Eliminates the need for a multisource modeling analysis which would include other Salem and Hope Creek sources (combustion turbines, emergency diesels, auxiliary boilers, etc.) thereby reducing the permitting risk to non-project equipment and operations
- Eliminates any possibility of significant impacts in the nearby non-attainment area (New Castle County, Delaware)
- Reduces the permitting costs
- Improves the permitting schedule

AERMOD model for regulatory purposes. Once the promulgation of AERMOD is completed, PSD analyses will be required (absent a demonstration otherwise) to use AERMOD for impact analysis.

Mechanical Draft Cooling Towers

In order to estimate the impacts of mechanical draft cooling towers at the Salem / Hope Creek site, preliminary dispersion modeling was conducted using the design assumptions provided in Table 2-2.

To provide basic consistency with the previously modeled natural draft tower impacts, the same base model, receptor field, and meteorological data (surface station - Wilmington, DE; upper-air station – Sterling, VA; data years 1991-1995) are used here for mechanical draft modeling as were employed for the previous Hope Creek cooling tower modeling supporting the EPU. The only notable difference from the previous modeling of the Hope Creek cooling tower was the use of the PRIME downwash algorithms for simulating downwash processes for the mechanical draft towers.

Using the above-described methodology, and accounting for aerodynamic downwash from the structures depicted in Figure 5-1 (the existing Hope Creek cooling tower and the hypothetical Salem Units 1 and 2 mechanical draft tower structures), 24-hour short-term and annual particulate impacts were predicted for the area within 10 km of the Salem / Hope Creek site. As with the Hope Creek cooling tower modeling, all particulate impacts are assumed to be 100% TSP, PM_{10} and $PM_{2.5}$, and these impacts are compared to the most stringent existing significance level and PSD increment for determination of any significant impact area or increment exceedance. For 24-hour and annual impacts, the most stringent significance levels are for $PM_{2.5}$. For this pollutant, the NJDEP Bureau of Air Quality Evaluation (BAQEv) has been applying 2.2 $\mu g/m^3$ on a 24-hour basis and 0.3 $\mu g/m^3$ on an annual basis, absent formal guidance from EPA (Reference 5-2). For PSD increment, the most restrictive is for PM_{10}, with increments of 30 $\mu g/m^3$ and 17 $\mu g/m^3$ for 24-hour and annual impact thresholds. PSD increments for $PM_{2.5}$ have not yet been established.

Figure 5-2 classifies the maximum 24-hour concentration (occurring in 1995) predicted at each of the 5512 receptors within the modeling domain, highlighting those receptors which exceed either the $PM_{2.5}$ significant impact level (2.2 $\mu g/m^3$) or have predicted impacts greater than the PSD increment of 30 $\mu g/m^3$ for PM_{10}. Figure 5-3 similarly depicts the maximum annual impact (year 1994), with similar comparisons to the annual significant impact level of 0.3 $\mu g/m^3$ ($PM_{2.5}$) and PSD increment of 17 $\mu g/m^3$ (PM_{10}) for an annual average concentration.

As can be seen in Figure 5-2, there are extensive areas where predicted impacts exceed the 24-hour significance level. The full extent of this area is undefined in the present analysis since impacts exceeding the $PM_{2.5}$ significance threshold extend to the edge of the modeling domain (at least 10 km) in all directions. This is important, as the Delaware border is only about 2 km to the west and southwest of the Salem site. The significant impacts for $PM_{2.5}$, therefore, reach well into New Castle County, which has been designated non-attainment for fine particulates (as seen in Figure 1-3). From a permitting standpoint this then triggers New Jersey Subchapter 18 requirements for LAER and offsets, as outlined in Section 4. It is unlikely that any New Jersey non-attainment area would be significantly impacted since the nearest non-attainment area in New Jersey is Gloucester County, at a distance of approximately 30 km.

In addition to the non-attainment issue, Figure 5-2 shows two areas nearby to the fenceline which are predicted to exceed the 30 $\mu g/m^3$ 24-hour PSD increment level for PM_{10} by as much as 34.7% (evidenced by the maximum predicted 24-hour concentration of 40.40 $\mu g/m^3$).

Exceedance of a PSD increment would be a fatal permitting flaw and must be corrected through changes from the presumed design and/or operational characteristics. Use of the newer air quality dispersion model (AERMOD) when allowed by EPA, will predict impacts that could be higher or lower than those stated here and this avenue could be investigated. Additional areas of possible investigation to reduce impacts would include characterizing the equivalent aerodynamic diameter of the particulate to determine whether a fraction can be excluded from consideration as $PM_{2.5}$ emissions and exploring use of the "circular mechanical" tower configuration which enhances plume rise and thereby reduces ground level particulate concentrations. It may require a combination of such actions to successfully address the issue. It is also possible that no technically and economically feasible action or combination of actions can be found that successfully mitigates the problem because of the constraints imposed by the characteristics of high makeup water TDS concentrations and local site meteorology. In any event, permitting cannot proceed unless compliance with the PSD increments can be demonstrated.

Figure 5-3 shows significant annual impacts are also predicted but the extent is less than with the short-term analysis. Impacts exceeding the assumed annual $PM_{2.5}$ significance level of 0.3 $\mu g/m^3$ extend approximately 7.5 km from the Site, with a maximum concentration of 4.19 $\mu g/m^3$. This maximum impact is approximately 24.6% of the annual PM_{10} PSD increment standard of 17 $\mu g/m^3$. However, addition of the Gibbstown annual background concentration of 13.8 $\mu g/m^3$ to the predicted value of 4.19 $\mu g/m^3$ results in a total concentration exceeding the NAAQS of 15 $\mu g/m^3$ for fine particulate. This also constitutes a potential fatal flaw for the mechanical draft option, which must be remedied prior to proceeding with permitting.

5.2.2 Potential for Adverse Fogging, Icing, and Salt Deposition Impacts

Fogging and Icing Potential

NJDEP Technical Manual 1002 - Guidance on Preparing an Air Quality Modeling Protocol (Reference 5-3) requires that the permit applicant evaluate the potential for cooling tower fogging/icing impacts on offsite critical areas. Assessment of these potential cooling tower plume impacts requires the use of a mathematical computer model. Although somewhat dated, the most commonly used model for this purpose in New Jersey is still the Seasonal and Annual Cooling Tower Impacts (SACTI) model. The model is used for the prediction of seasonal/annual physical impacts of cooling tower plumes including fogging, icing and shadowing. The model was developed by EPRI for the express purpose of evaluating impacts from power plant cooling towers (Reference 5-4).

Fogging and / or icing can occur when the condensed plume from the cooling tower is transported / diffused down to ground level. The natural draft tower design will have only a very small potential of producing a plume which could be carried intact to ground level since the exit height will be over 500 feet above grade elevation. The natural draft tower design would not be expected to have any significant icing or fogging impacts and would probably escape the NJDEP impact modeling requirement.

The mechanical draft tower's exit height will only be approximately 49 feet above grade and plumes from these towers will have a greater probability of causing significant fogging/icing near the tower. The frequency and duration of fogging and icing impacts will decrease as distance away from the tower increases. The assumed location for mechanical draft towers is approximately 2.5 km from the Delaware River shipping channel and less than 500 meters from the water's edge. Additionally, the tower plume would be transported toward the River under the typical adverse meteorological condition (easterly component winds, cool to cold temperatures and a nearly saturated atmosphere). A modeling evaluation of the potential to cause significant visibility reductions on the waterway would be required. There are no critical offsite public highways, bridges, or other infrastructure in the area that would appear to be near enough to be adversely impacted by the mechanical draft cooling tower plume icing or fogging.

Fogging and icing impacts are, of course, possible onsite but the potential of these impacts to seriously interfere with plant operation is deemed relatively small. Because of the high efficiency drift eliminators, the primary type of ice deposition would be rime and accrual would be very slow. Onsite fogging is likely under certain meteorological conditions.

In order to preliminarily assess potential fogging and icing impacts, model runs supporting a previous New Jersey SACTI study on similar mechanical draft cooling towers conducted by PSEG (for Linden Generating Station) were examined (Reference 5-5). While the Linden study was conducted using northeastern New Jersey (Newark Airport) meteorological conditions, it evaluated essentially the same generic tower design as assumed for the Salem closed-cycle mechanical draft tower retrofit option and therefore is useful to provide an "order of magnitude" assessment for the Salem / Hope Creek Site. The maximum distance to which at least one hour per year of icing was predicted was approximately 1700 m southwest of the towers. For onsite impacts, the greatest number of hours of predicted impacts occurs within 200 meters of the cooling towers. Onsite fogging impacts are predicted to occur approximately 200 hours/year while icing impacts are predicted approximately 35 hours/year. The predominant directions for fogging/icing impacts are to the south and west of the towers, due to the previously mentioned adverse meteorological conditions commonly associated with easterly component winds which promote long plumes and plume touchdown. It should be noted that impacts from mechanical draft towers installed for Salem would be expected to be more severe than those impacts modeled for the Linden Generating Station because of the greater heat and moisture release.

Potential for Adverse Salt Deposition Impacts

One of the PSD permit application requirements is performance of a study of the effects of the new emissions on the soils, vegetation, and sensitive species in the impact area. The analysis would be based on the guidance and details provided by EPA in the *Additional Impact Analysis Chapter of the Draft NSR Workshop Manual* (Reference 5-6), and in the 1980 EPA document *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (Reference 5-7).

The particulate emissions from the proposed Salem cooling towers will mainly consist of salt particles contained in the cooling tower drift emissions. The deposition of these salt particles in the surrounding area will need to be evaluated for its potential effects on soils and plants in the area. The natural draft tower design for Salem, with its elevated release height of 500 feet, would be expected to have very limited deposition impacts within the surrounding area.

The mechanical draft design has a much lower release height of approximately 49 feet and, as a result, has a higher chance of causing adverse salt deposition impacts in the surrounding area. It should be noted, however, that substantial naturally occurring salt deposition probably already occurs in the area due to the proximity of Delaware Bay.

5.2.3 Impact on Brigantine Class I area

The retrofit project will be a major modification subject to PSD and, therefore, could potentially be required to demonstrate that emissions from cooling towers would not adversely impact the nearest Class I area.

The Salem-Hope Creek facility is located approximately 90 km from the Brigantine Division of the Edwin B. Forsythe National Wildlife Refuge (formerly the Brigantine National Wildlife Refuge). The Brigantine Class I Area constitutes about 6,600 acres of the more than 42,000 acres of Edwin B. Forsythe NWR. The Federal Land Manager (FLM) of each Class I area is charged with protecting that area's unique attributes, expressed generically as Air Quality Related Values (AQRVs). The FLM is responsible for defining specific AQRVs for an area and for establishing the criteria used to determine if air pollution is having an adverse impact on the AQRVs. The FLM for the Brigantine Class I area is the U.S. Fish & Wildlife Service (FWS).

The vast majority of the particulate emissions from the proposed cooling towers will be salt particles derived from the drift released by the towers. The Brigantine Class I area is located in a coastal environment that has a naturally elevated level of salt particles in the air due to the close proximity to the Atlantic Ocean. As a result, it is not anticipated that the FWS will require an analysis of visibility impacts from the salt particles emitted by the proposed cooling towers. The FWS has also previously stated that deposition impacts need not be analyzed for the Brigantine Class I Area because of the buffering effect of the coastal environment.

Figure 5-1

Salem Generating Station / Hope Creek Generating Station Site Dispersion Modeling for Mechanical Draft Tower Option

Structures Included for Downwash Evaluation

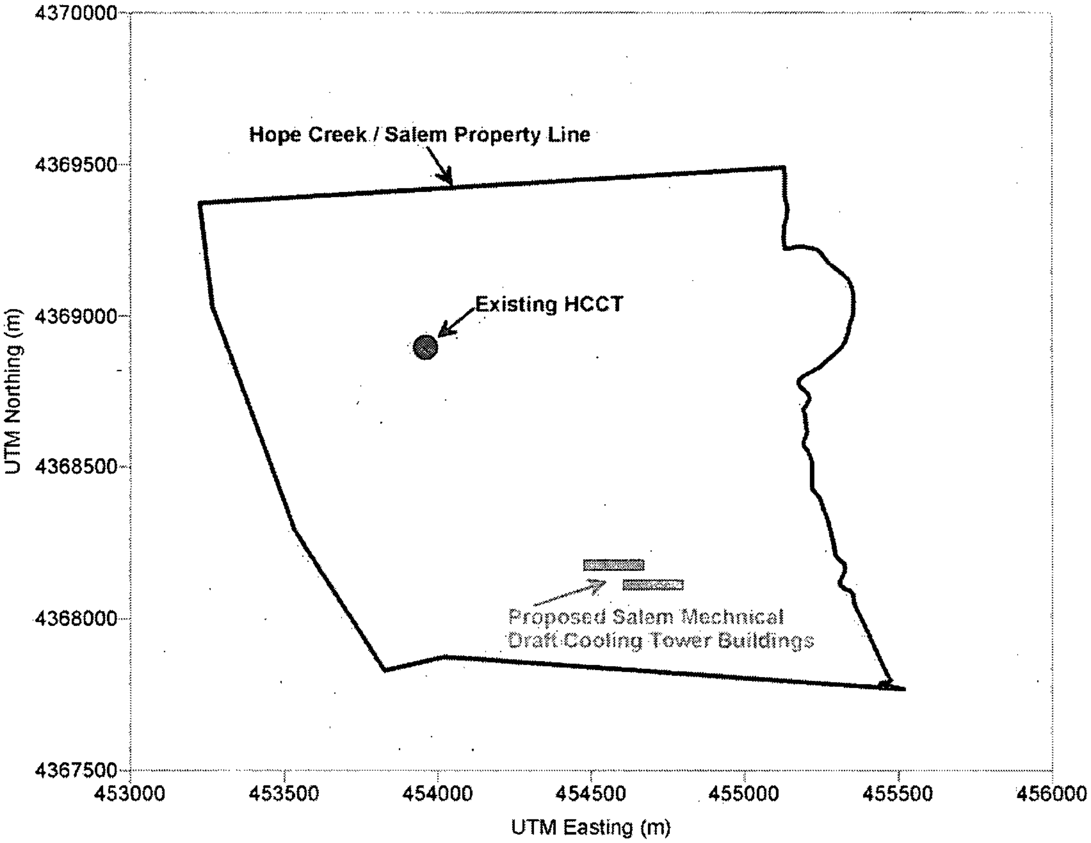


Figure 5-2

ISC-PRIME -- Predicted 24-Hour Maximum Particulate Impacts from Salem Mechanical Draft Cooling Tower Scenario

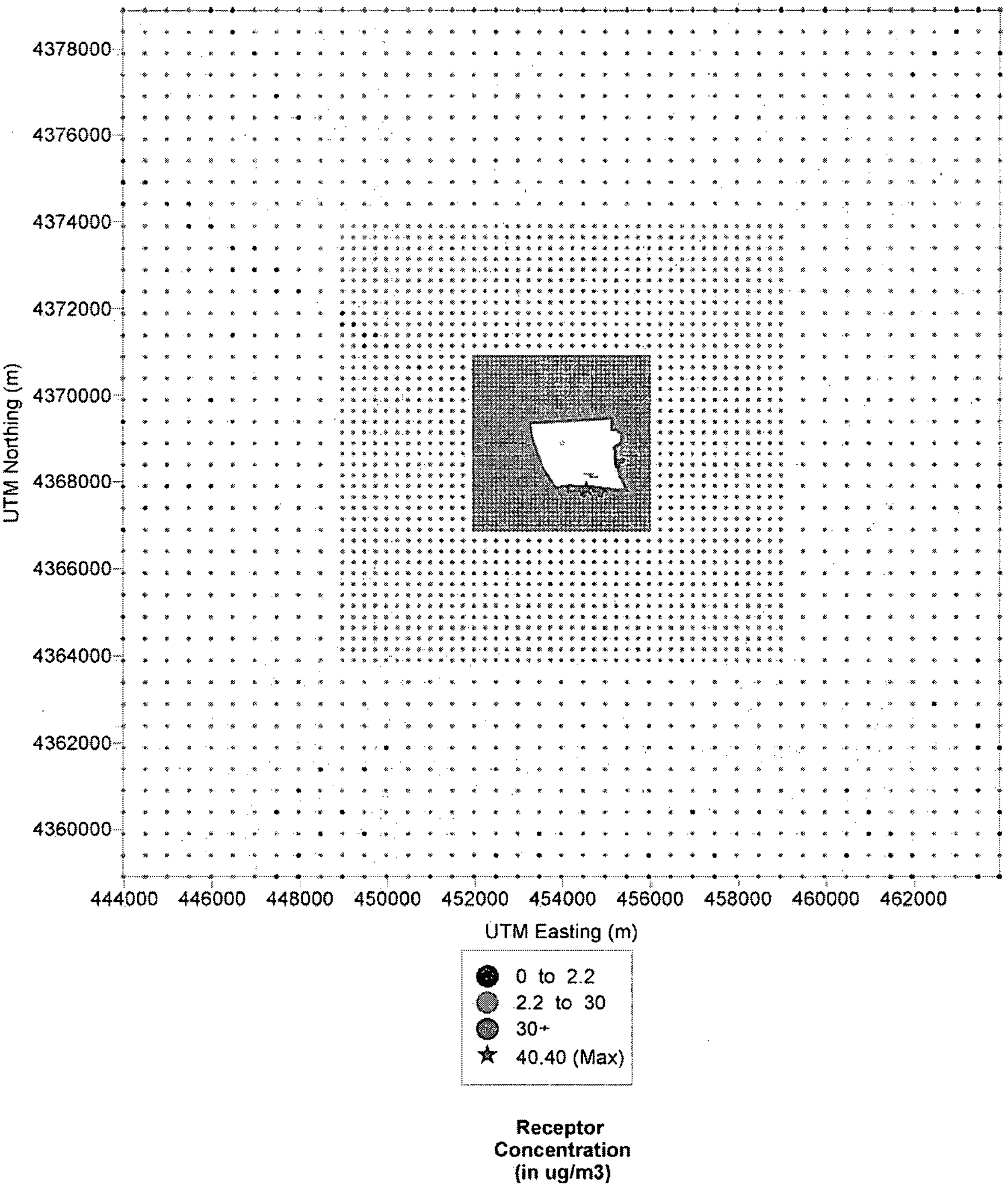
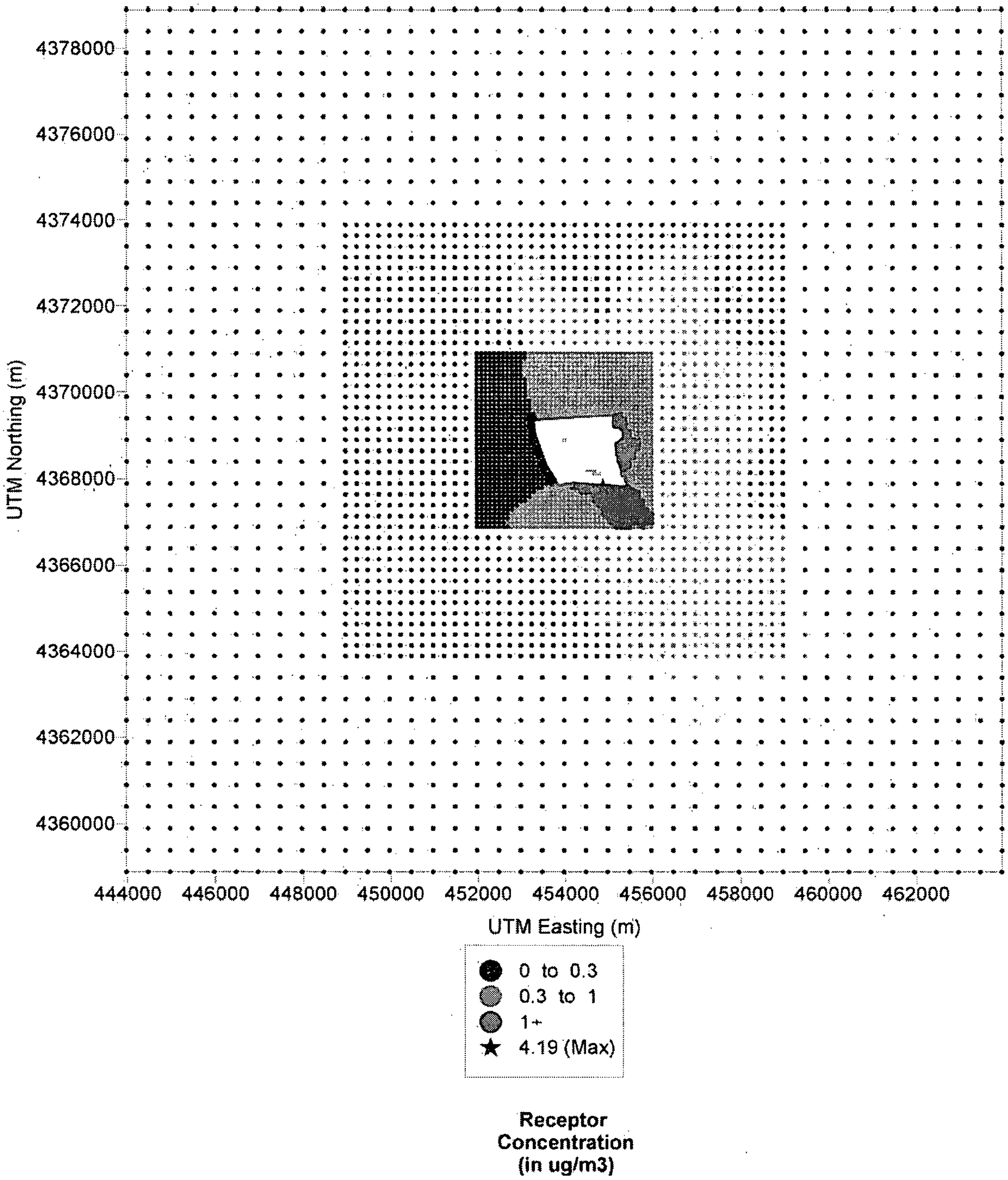


Figure 5-3

ISC-PRIME -- Predicted Maximum Annual Particulate Impacts from Salem Mechanical Draft Cooling Tower Scenario



6.0 PERMITTING SCHEDULE AND COSTS

The installation of either natural draft or mechanical draft cooling towers will require a major modification to the existing Salem-Hope Creek Title V permit and a PSD permit. In New Jersey the application to modify the Title V permit also acts as the application for a PSD permit, therefore; only a single application would need to be prepared and submitted to the NJDEP. Both the major modification to the Title V permit and the PSD permit are considered "pre-construction" permits which means that the project could not commence any project-related construction activities prior to both the Title V modification and the PSD permit receiving final approval. Prior to final approval, the modification to the Title V permit will be subject to a mandatory 45-day review period for EPA Region II. EPA Region II will also have the opportunity to review and comment on the supporting dispersion modeling analysis prior to final approval by NJDEP.

The major differences in permitting schedule and cost between the two cooling tower designs is related to (1) the triggering of NJ Subchapter 18 requirements for the mechanical draft design and (2) the complexity of the dispersion modeling analysis that would be required for a particular design. The natural draft tower design is expected to have insignificant impacts and would not be required to perform a multisource modeling analysis. The mechanical draft tower design will produce significant impacts and would be required to perform a multisource analysis. The multisource analysis would include modeling of other particulate sources within the Salem-Hope Creek facility as well as all other major particulate sources within 50-60 km of the facility. The multisource modeling analysis would add significant cost to the permitting as well as an additional 4-6 months to the permitting schedule. It is assumed, for cost and schedule purposes, that the SACTI model will need to be run as part of the refined modeling analysis for both scenarios to assess fogging/icing potential, however, the mechanical draft option would require considerably more study than the natural draft option.

Figure 6-1 provides an estimated air permitting schedule for the natural draft cooling tower design and Figure 6-2 provides an estimated schedule for the mechanical draft design.

The following tables list the estimated costs for permitting each cooling tower design:

Estimate of Labor Hours and Costs
Permitting of New Natural Draft Cooling Towers

	Estimated Labor Hours	Estimated Cost
Permit Application Preparation	560	$50,000
Impact Analyses	800	$70,000
TOTAL		**$120,000**

Estimate of Labor Hours and Costs
Permitting of New Mechanical Draft Cooling Towers

	Estimated Labor Hours	Estimated Cost
Permit Application Preparation	660	$60,000
Impact Analyses	1400	$125,000
TOTAL		**$185,000**

Figure 6-1
Schedule Estimate

Air Permitting of Closed-Cycle Cooling Retrofit
Salem Generating Station Units No. 1 and 2

Natural Draft Cooling Tower Design

Task	Day	0	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510
Submit Title V Permit Modification/PSD Permit Application Submit PSD Dispersion Modeling Protocol	--	▼																	
PSD Modeling Protocol Approved	90				▼														
Submit PSD Refined Modeling Analysis	135					▼													
PSD Refined Modeling Approved	210								▼										
Draft Title V modification/PSD Permit Issued	270										▼								
Final Title V modification/PSD Permit Issued	330												▼						

Figure 6-2
Schedule Estimate

Air Permitting of Closed-Cycle Cooling Retrofit Salem Generating Station Units No. 1 and 2

Mechanical Draft Cooling Tower Design

Task	Day	0	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510
Submit Title V Permit Modification/PSD Permit Application Submit PSD Dispersion Modeling Protocol	---	▼																	
PSD Modeling Protocol Approved	90				▼														
Submit PSD Refined Modeling Analysis	150						▼												
PSD Refined Modeling Approved	240									▼									
Submit PSD Multisource Modeling Protocol	270										▼								
PSD Multisource Modeling Protocol Approved	315											▼							
Submit PSD Multisource Modeling Analysis	360													▼					
PSD Multisource Modeling Approved	420															▼			
Draft Title V modification/PSD Permit Issued	450																▼		
Final Title V modification/PSD Permit Issued	510																		▼

7.0 ASSESSMENT OF FUTURE REGULATORY INITIATIVES

This section addresses future regulatory initiatives that may affect the air permitting of the closed-cycle cooling retrofit. State and federal regulatory and policy initiatives and the anticipated schedule for these initiatives are addressed.

7.1 Federal and State Regulatory Initiatives

Major State and federal regulatory initiatives that may impact air permitting of the closed-cycle cooling tower retrofit can be limited to those involving particulate matter because emissions of all other pollutants will be inconsequential. A six-year horizon (through 2010) was analyzed because it was assumed that the retrofit will not become operational before then.

7.1.1 Federal

There are two major regulatory initiatives at the federal level that may affect the Salem closed-cycle cooling tower retrofit during the regulatory analysis timeframe extending through 2010: implementation of the ambient air quality standard for $PM_{2.5}$ and EPA's review of the particulate matter NAAQS. Each of these is discussed separately below.

It is very unlikely that the closed-cycle cooling tower retrofit air permitting will be affected by EPA's regional haze rule because the particulate emissions from the cooling towers would mainly be salt and because the drift eliminators that would be installed would constitute the best control technology available for controlling particulate matter from the towers.

Implementation of $PM_{2.5}$ Standard

In effect, $PM_{2.5}$ must be addressed in air permits before EPA has issued concrete guidance on how this is to be done. This approach makes it difficult for the States and industrial sources to determine how implementation of the $PM_{2.5}$ standard will affect their project - addressing both PSD and nonattainment NSR (NNSR) requirements. This is the case with the Salem closed-cycle cooling retrofit.

EPA issued official designations as to which areas of the country attain and which do not attain the $PM_{2.5}$ NAAQS. Salem County is designated attainment for $PM_{2.5}$ but $PM_{2.5}$ several nonattainment areas are nearby. As discussed in Section 4.2.1, the

New Castle County, Delaware $PM_{2.5}$ nonattainment area is located only about 2100 meters from the facility (see Figure 1-3) and the preliminary modeling of the assumed mechanical draft tower design shows impacts exceeding both the 24-hour and annual $PM_{2.5}$ significant impact levels within this non-attainment area. As a result, the mechanical draft retrofit design would be subject to Subchapter 18 non-attainment requirements.

The $PM_{2.5}$ designations became effective on April 5, 2005. Because the $PM_{2.5}$ nonattainment designations are now effective, States are required to issue major NSR permits that address nonattainment major NSR requirements for $PM_{2.5}$. Sources subject to PSD were required to address PSD requirements for $PM_{2.5}$ upon the effective date of the $PM_{2.5}$ NAAQS (September 16, 1997).

EPA believes that the $PM_{2.5}$ nonattainment problem has a substantial regional component because the formation and transport of secondarily formed particles, such as sulfates and nitrates, extends over hundreds of miles. The regional nature of $PM_{2.5}$ is in contrast to the more localized nature of PM_{10}.

EPA has issued interim guidance to address NSR permitting in $PM_{2.5}$ nonattainment and attainment/unclassifiable (PSD) areas. On the date that the $PM_{2.5}$ nonattainment designations took effect (April 5, 2005), EPA issued a memo entitled *Implementation of New Source Review Requirements in PM-2.5 Non-attainment Areas (Reference 4-2)* pending the development of an implementation rule for $PM_{2.5}$. In that April 5, 2005 memo EPA discusses NSR requirements in $PM_{2.5}$ nonattainment areas and re-affirms a 1997 memo (Reference 7-1) that applies in PSD areas. Both memos recommend that the States use PM_{10} requirements as a surrogate for $PM_{2.5}$ permitting in nonattainment and PSD areas. PM_{10} impacts and permitting relating to PM_{10} are addressed fully in this document.

On September 8, 2005 EPA released its *Proposed Rule to Implement the Fine Particle National Ambient Air Quality Standards*. This $PM_{2.5}$ Implementation Rule (Implementation Rule) is expected to be published in the Federal Register on November 1, 2005. The latest EPA schedule shows that the Implementation Rule will be finalized by the Fall of 2006.

Within the Implementation Rule EPA generally does not propose a single approach for each aspect of $PM_{2.5}$ NAAQS implementation , rather, they provide several options for consideration and comment. Consequently concrete $PM_{2.5}$ guidance (even proposed concrete guidance) is not available from EPA's proposal.

The Implementation Rule proposal addresses changes to the NSR program as well as the following topics:

- Classifications and attainment dates

- Modeling and attainment demonstrations
- Precursor emissions coverage
- $PM_{2.5}$ test methods
- Emission inventories

NJDEP must submit its $PM_{2.5}$ State Implementation Plans to EPA Region II by April 5, 2008. This plan will contain all of the NJDEP regulations necessary to ensure that all areas of the New Jersey eventually attain the $PM_{2.5}$ standard.

Under the proposed EPA approach, NJDEP will be required to submit an attainment demonstration for each nonattainment area proposing an attainment date that is as expeditious as practicable for each area. The initial attainment date for $PM_{2.5}$ areas would be no later than April 2010. For an area with an attainment date of April 2010, EPA would determine whether it had attained the standard by evaluating air quality data from the three previous calendar years (i.e., 2007, 2008, and 2009).

EPA may extend the attainment date for a $PM_{2.5}$ nonattainment area for a period not greater than 10 years from the date of designation (i.e., no later than April 2015), taking into account the severity of the nonattainment problem in the area, and the availability and feasibility of pollution control measures. Alternatively, areas may also qualify for two 1-year attainment date extensions.

NJDEP may also submit a SIP demonstrating that it is impracticable to attain the $PM_{2.5}$ standard in a nonattainment area by April 2010.

Because the Salem / Hope Creek facility is located in a $PM_{2.5}$ attainment area, an important effect that the Implementation Rule will have on the retrofit project will be to the PSD permitting program, specifically:

- $PM_{2.5}$ significant emission rate levels
- $PM_{2.5}$ ambient air significance levels
- $PM_{2.5}$ increment levels
- Changes in air quality modeling procedures to address $PM_{2.5}$
- Revised emission estimation procedures

EPA is proposing a $PM_{2.5}$ significant emission rate level of 10 tons/year in the Implementation Rule. EPA does not provide any concrete proposal on any of the other aspects listed above.

A specific assessment of how implementation of the $PM_{2.5}$ standard will affect the retrofit project is not possible until EPA finalizes the Implementation Rule in 2006.

EPA Review of Particulate Matter NAAQS

Particulate matter (PM) is one of six "criteria" air pollutants under the Clean Air Act (CAA) for which EPA has established National Ambient Air Quality Standards. The CAA requires the EPA to periodically (every 5 years) review and revise, if appropriate, the criteria and NAAQS for a given criteria pollutant. EPA documents its review of the scientific basis for the standards by preparing an Air Quality Criteria Document (Criteria Document). EPA issued the latest Criteria Document for PM in October 2004 (Reference 7-2)

The schedule for completion of EPA's review of the PM NAAQS is governed by a modified consent decree, entered by a court on December 16, 2004. It provides that EPA will sign for publication a notice of proposed rulemaking concerning its review of the PM NAAQS no later than December 20, 2005. EPA must sign a notice of final rulemaking no later than September 27, 2006.

The original NAAQS for PM were issued in 1971 for TSP. The NAAQS were revised in 1987 to focus on protecting against human health effects associated with exposure to ambient PM less than 10 microns (PM_{10}).

Taking into account information and assessments presented in the 1996 PM Criteria Document and EPA "Staff Papers", the EPA Administrator promulgated significant revisions to the PM NAAQS in July 1997. Special attention was given to several size-specific classes of particles, including PM_{10} and the principal fractions of PM_{10}, referred to as the fine ($PM_{2.5}$) and coarse ($PM_{10-2.5}$) fractions. The Administrator decided that the PM NAAQS should continue to focus on particles less than or equal to 10 μm in diameter, however it was also determined that the fine and coarse fractions of PM_{10} should be considered separately. New standards were added, using $PM_{2.5}$ as the indicator for fine particles and PM_{10} standards were retained for the purpose of regulating coarse-fraction particles. Two new $PM_{2.5}$ standards were set: an annual standard of 15 $\mu g/m^3$ and a 24-hour average standard of 65 $\mu g/m^3$. To continue to address coarse-fraction particles, the annual PM_{10} standard was retained, and the form, but not the level, of the 24-hour PM_{10} standard was revised to be based on the 99th percentile of 24-hr PM_{10} concentrations at each monitor in an area.

In a May 1999 ruling a court found that PM_{10} was not an appropriate indicator for coarse particles ($PM_{10-2.5}$). Consequently, the court vacated the revisions to the 1987 PM_{10} standards on the basis of PM_{10} being a "poorly matched indicator for coarse particulate pollution" because PM_{10} includes fine particles. As a result of this aspect of the court's ruling, the 1987 PM_{10} standards remain in effect.

EPA assessed PM health effects and documented the results in a second draft Staff Paper (Staff Paper) released by EPA on February 1, 2005 (Reference 7-3)

The Staff Paper is intended to help bridge the gap between the scientific review contained in the Criteria Document and the practical judgments required by the EPA Administrator in determining whether it is appropriate to revise the PM NAAQS.

The EPA's Clean Air Scientific Advisory Committee (CASAC) review of the second draft Staff Paper was released on June 10, 2005 (Reference 7-4). The panel endorsed an Environmental Protection Agency staff recommendation to significantly tighten the air quality standards for fine particulate matter.

On July 1, 2005 EPA released the final staff paper (Reference 7-5). The final staff paper provides two alternative approaches to tightening the standard: 1) retain annual $PM_{2.5}$ standard at 15 micrograms per cubic meter (μg/m3), together with a revised 24-hour $PM_{2.5}$ standard in the range of 35 to 25 μg/m3, or 2) revise annual $PM_{2.5}$ standard, within the range of 14 to 12 μg/m3, together with a revised 24-hour $PM_{2.5}$ standard in the range of 30 to 40 μg/m3, with either the annual or the 24-hour standard, or both, at the middle to lower end of these ranges. The staff paper also recommended that EPA continue to regulate PM_{10} but revise the current PM_{10} standards with a new health-based standard for particles known as "thoracic coarse" particles – particles between 2.5 and 10 micrometers in diameter that can be deeply inhaled. Staff recommended that such a standard apply to more toxic urban coarse particles, thus denominated as UPM10-2.5. The staff paper recommends consideration of a 24-hour UPM10-2.5 standard with a level in the range of approximately 50 to 70 μg/m3, 98th percentile form, or approximately 60 to 85 μg/m3, 99th percentile form.

Given that EPA staff is currently recommending tighter PM air quality standards, EPA will face major opposition to the standards from industry groups. However, should EPA eventually decide to keep the PM NAAQS at current levels there will likely be major opposition from environmental and health advocacy groups (e.g., the American Lung Association). This opposition will certainly lead to legal action that will delay the final resolution of whether the PM standards must be modified and, if so, to what levels.

As an example of the extended timeframe between an EPA decision to change the standards and the eventual point where those standards actually impact source owners, we can consider the delay in implementing the current $PM_{2.5}$ NAAQS. Following promulgation of the revised PM NAAQS in 1997, legal challenges were filed by a large number of parties, addressing a broad range of issues. It is important to note that a concurrent review of the ozone NAAQS occurred along with the review for the PM NAAQS.

The $PM_{2.5}$ implementation timeline was as follows:

Final PM Criteria Document	April 1996
PM NAAQS Proposed	December 1996
PM NAAQS Finalized	July 1997
U.S. Court of Appeals Ruling	May 1999
U.S. Supreme Court Ruling	February 2001
U.S. Court of Appeals Reject All Remaining Challenges	March 2002
EPA Responds To State-Proposed $PM_{2.5}$ Designations	June 28, 2004
EPA Finalizes $PM_{2.5}$ Designations	January 5, 2005
$PM_{2.5}$ Designations Effective	April 5, 2005
EPA $PM_{2.5}$ Implementation Guidance Proposed	Summer,2005 (scheduled)
EPA $PM_{2.5}$ Implementation Guidance Finalized	March,2006 (scheduled)
$PM_{2.5}$ SIPs due to EPA	April 5, 2008

There is no guarantee that the EPA will tighten the PM NAAQS, and if it does, that the litigation over any revised standards will not take as long as it did the last time the PM NAAQS were revised. It will have taken approximately 8 years for the $PM_{2.5}$ designations (and accompanying new source review requirements) to become effective from the time that the $PM_{2.5}$ standards were promulgated in mid-1997 and, given the current schedule, an elapsed time of almost 12 years before SIPs are due to EPA for review.

For purposes of the potential retrofit of closed-cycle cooling systems at the Salem Generating Station, it is safe to assume that, should EPA promulgate revised PM standards in September 2006 under the court ordered deadline, the new source review requirements for the revised standards will not become effective before 2010. If an air permit is obtained prior to 2010, it can be assumed that EPA's revisions of the PM NAAQS will not affect the air permitting of the retrofit project.

It is useful to compare current $PM_{2.5}$ levels near the Salem Generating Station to EPA's current thinking regarding to what levels the $PM_{2.5}$ standards may be revised.

Figure 7-1 shows the maximum 24-hour and annual average $PM_{2.5}$ levels measured by the NJDEP at the $PM_{2.5}$ monitoring site nearest to the Salem Generating Station, i.e., NJDEP's Gibbstown monitor. The figure also shows the lower end of the range of $PM_{2.5}$ standards EPA staff discusses in the Staff Paper.

Use of the lower ends of the NAAQS standard ranges currently considered by EPA is conservative but Table 7-1 shows that Salem County may be a non-attainment area for the revised $PM_{2.5}$ standards in the future. However, if the closed-cycle cooling tower retrofit is in operation at that time, it is doubtful that NJDEP would require additional control requirements given the nature of the emission source.

Planned revisions to NJDEP Subchapter 6 regarding process particulate emissions were discussed in Section 4.2.1. No other NJDEP regulatory initiatives, other than those associated with implementing the $PM_{2.5}$ standard, are expected to affect the retrofit project air permitting.

7.1.2 NESCAUM

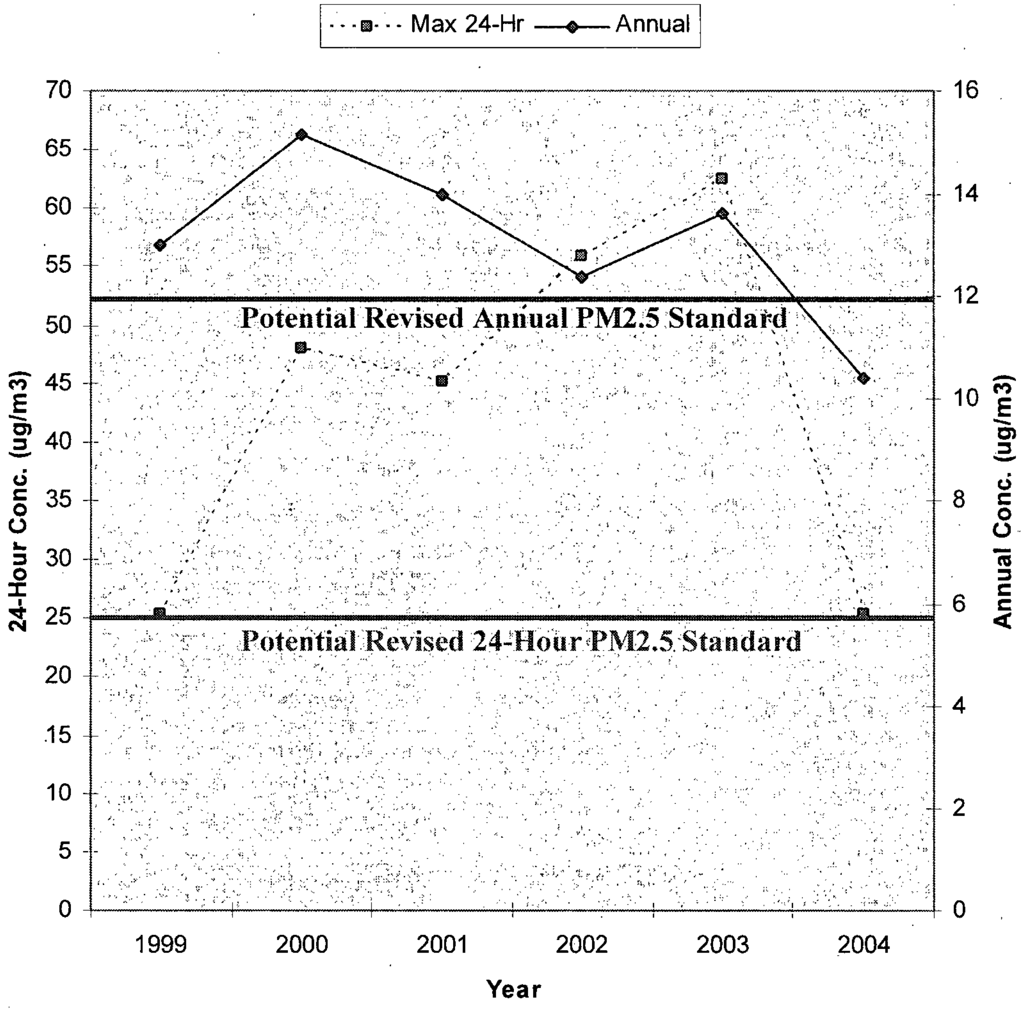
New Jersey is part of Northeast States for Coordinated Air Use Management (NESCAUM), an interstate association of air quality control divisions in the Northeast states. One of NESCAUM's purposes is to promote cooperation and coordination of technical and policy issues regarding air quality control among the member states.

There are no NESCAUM initiatives presently underway that would affect the closed-cycle cooling retrofit through 2010.

Figure 7-1

Ambient $PM_{2.5}$ Monitoring Results
Maximum 24-Hour and Annual Average Values

NJDEP Gibbstown Monitor



Source: U.S. EPA AirData web site, www.epa.gov/air/data/index.html

8.0 SUMMARY OF RESULTS

The air quality permitting requirements and potential permitting obstacles for a hypothetical retrofit of a closed-cycle cooling system to Salem Generating Station Units 1 and 2 have been identified and evaluated with respect to permitting feasibility. Heat rejection using either natural draft or mechanical draft towers has been evaluated.

Permitting costs, schedule, and difficulty are a function of the magnitude of the ground level particulate matter impact. Table 8-1 provides an overview of study results.

Table 8-1 (Sheet 1 of 3)

Salem Generating Station
Evaluation of Air Permitting Issues for Closed-Cycle Cooling Retrofit
Summary of Study Results

Factor	Natural Draft Retrofit	Mechanical Draft Retrofit	Comments
Air Quality Impacts			
$PM_{2.5}$ significant impact	None	Yes	(Comparison performed against NJDEP interim policy levels used for Hope Creek EPU)
Extent of $PM_{2.5}$ significant impacts	None	Extensive	Extends at least 10 km beyond the site boundary
Significant impact in non-attainment area	No	Yes	Would require application of LAER and purchase / generation of offsets
PM_{10} significant impact	None	Yes	Requires multisource modeling during permitting. Invites NJDEP modeling scrutiny of other Salem / Hope Creek emissions sources
Extent of PM_{10} significant impacts	None	Extensive	Extends at least 10 km beyond the site boundary for mechanical draft. Complicates permitting analyses.
Compliance with PSD increment (PM_{10})	Yes	Exceeds increment for configuration assumed in study	Exceedance of increment requires design/emissions changes from those assumed (otherwise constitutes a fatal flaw for mechanical towers)
Compliance with NAAQS for $PM_{2.5}$	Yes	Exceeds for annual average	Exceedance of NAAQS requires design/emissions changes or modeling changes from those assumed (otherwise constitutes a fatal flaw for mechanical towers)

Table 8-1 (Sheet 2 of 3)
Salem Generating Station
Evaluation of Air Permitting Issues for Closed-Cycle Cooling Retrofit
Summary of Study Results

Factor	Natural Draft Retrofit	Mechanical Draft Retrofit	Comments
Fogging / Icing Impacts			
Onsite fogging	Negligible	Frequent during adverse meteorology	All fogging, icing and salt deposition findings are based on studies at other facilities and professional judgment
Onsite icing	Negligible	Slight	
Offsite fogging/impact on transportation systems	Negligible	Moderate – could affect marine transportation systems under adverse meteorological conditions.	
Offsite icing / impact on transportation systems	Negligible	Negligible to slight	
Onsite salt deposition impact on HV equipment	Negligible	Depends upon placement and orientation of towers – could be significant	
Future Regulatory Developments			
Fine particulate implementation	Depends upon implementation guidance that has yet to be finalized.	Depends upon implementation guidance that has yet to be finalized.	While the specifics will not be known until the guidance is finalized, the risk of adverse effects is greater for the mechanical draft towers because of their much higher impacts.
Revised NAAQS	Not likely to be impacted during time horizon of study	Not likely to be impacted during time horizon of study	Time horizon is through 2010

Table 8-1 (Sheet 3 of 3)

Salem Generating Station
Evaluation of Air Permitting Issues for Closed-Cycle Cooling Retrofit
Summary of Study Results

Factor	Natural Draft Retrofit	Mechanical Draft Retrofit	Comments
Estimated Air Permitting Costs			
Permit application preparation costs	$50,000	$60,000	Mechanical draft option would require LAER analysis while natural draft would not
Impact analysis costs	$70,000	$125,000	Mechanical draft option would require multisource modeling and, potentially, Class I impact analysis while natural draft would not
Total permitting costs	$120,000	$185,000	
Estimated Air Permitting Schedule			
Overall permitting schedule	11 months	17 months	Longer mechanical draft schedule is due to more extensive impact analysis and additional interaction with NJDEP

9.0 REFERENCES

1-1 Sargent and Lundy, LLC (S&L 2005a). Alternative Intake Technologies for CWIS – Natural Draft Tower Option Report No. 11050-360-ND; Sargent and Lundy, LLC 2005.

1-2 Sargent and Lundy, LLC (S&L 2005b). Alternative Intake Technologies for CWIS – Mechanical Draft Tower Option Report No. 11050-360-MD; Sargent and Lundy, LLC 2005.

2-1 PSEG Nuclear LLC (PSEG 2004a). Hope Creek Generating Station – Air Pollution Permit Application – (Permit Revision) for Extended Power Uprate; Submitted to: New Jersey Department of Environmental Protection Bureau of Air Quality Engineering; February 2004

2-2 PSEG Nuclear, LLC (PSEG 1999). Salem Permit Application NJPDES Permit No. NJ0005622, March 4, Appendix F.

3-1 NJDEP. 2002 Air Quality Report; NJDEP Bureau of Air Quality Monitoring; http://www.state.nj.us/dep/airmon/02rpt.htm

3-2 EPA AirData website; http://www.epa.gov/air/data/index.html

4-1 Personal Conversation; Call From: Rich Langbein – NJDEP – AQPP-BOP; Call To: George McComb – EnviroMet; May 25, 2005;

4-2 USEPA. "Implementation of New Source Review Requirements in PM-2,5 Non-attainment Areas"; Memorandum from Stephen D. Page, Director, USEPA OAQPS; dated April 5, 2005

5-1 EPRI. Addendum to ISC3 User's Guide – The PRIME Plume Rise and Building Downwash Model; Electric Power Research Institute; November 1997; http://www.epa.gov/scram001/tt26.htm#iscprime

5-2 PSEG Nuclear LLC (PSEG 2004b)Hope Creek Generating Station Refined Modeling Analysis For Extended Power Uprate; Submitted to: New Jersey Department of Environmental Protection, Bureau of Air Quality Evaluation; July 2004

5-3 NJDEP. Guidance on Preparing an Air Quality Modeling Protocol; Technical Manual 1002; New Jersey Department of Environmental Protection and Energy; August 1997

5-4 EPRI. User's Manual: Cooling-Tower Plume Prediction Code (Revision 1); Engineering and Environmental Science, Champaign, IS; September 1987; Prepared for: Electric Power Research Institute, Palo Alto, California 94304 (Seasonal – Annual Cooling Tower Impacts Model (SACTI))

5-5 Public Service Electric & Gas (PSE&G).Linden Station – Seasonal And Annual Cooling Tower Impact (SACTI) Model Results – Draft; EnviroMet, LLC; May 3, 2001

5-6 USEPA-OAQPS. New Source Review Workshop Manual; Prevention of Significant Deterioration and Non-attainment Area Permitting; USEPA-OAQPS; Draft; October 1990

5-7 USEPA. A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals; USEPA; 1980

7-1 USEPA OAQPS. "Interim Implementation of New Source Review Requirements for PM2.5"; Memorandum from John S. Seitz, Director, USEPA OAQPS; dated October 24, 1997.

7-2 USEPA. Air Quality Criteria for Particulate Matter, U.S. Environmental Protection Agency, EPA/600/P-99/002aF, October 2004; http://cfpub.epa.gov/ncea/cfm/partmatt.cfm

7-3 USEPA. Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper – Second Draft; U.S. Environmental Protection Agency – EPA-452/D-05-001; January 2005; http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_cr_sp.html

7-4 USEPA. EPA's Review of the National Ambient Air Quality Standards for Particulate Matter (Second Draft PM Staff Paper, January 2005); A Review by the Particulate Matter Review Panel of the EPA Clean Air Scientific Advisory Committee ; EPA Science Advisory Board (1400F); Environmental Protection Agency Washington, DC EPA-SAB-CASAC-05-007; June 2005; http://www.epa.gov/sab/pdf/casac-05-007.pdf

7-5 USEPA. Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper; U.S. Environmental Protection Agency – EPA-452/R-05-005; June 2005; http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_cr_sp.html

Attachment 9 - MD Tower Estimated Load List

Mechanical Draft Cooling Tower
Estimated Load List

Salem Generating Station
Alternate Intake Technologies
for CWIS

	Existing CWIS Elec Sys				**Modified CWIS Elec Sys**				**Mechanical Draft Cooling Tower**			
Voltage Level	*Load Description*	*Quantity*	*hp, kVA, kW*	*Total Assumed Running Load*	*Load Description*	*Quantity*	*hp, kVA, kW*	*Total Running Load*	*Load Description*	*Quantity*	*hp, kVA, kW*	*Total Connected Load*
13.8									Circulating Water Pumps (10 of 12 Run, 2 are back-up)	12	3500	42000
									Leave 12 running on list for conservative load estimate			
4.16	Existing Circ Water Pumps	12	2000	24000	Remaining Circ Water / Make-Up Water Pumps (removed)	0	2000	0				
					Make-Up Water Pumps (4 of 6 running)	4	300	1200				
480									Cooling Tower Fans (est bhp)	48	230	11040
480									Cooling Tower Cell Inlet MOV (hp est)	48	20	960
480									Circ Wtr P MOVs (hp est)	12	100	1200
480									Cooling Tower Make-Up Water MOV (hp est)	2	25	50
480									Cooling Tower Fill & By-Pass MOV (hp est)	2	25	50
480									Power Panel - Elec Equip & Pump Room	2	500	1000
480									Lighting & Receptacle Panel	2	150	300
480	Traveling Screen Drive	12	15	180	Traveling Screen Drive (4 of 6 running)	4	15	60				
480	Screen Wash Pump	8	150	1200	Screen Wash Pump (2 running)	2	150	300				
480	Screen Wash Strainer	8	0.75	6	Screen Wash Strainer (2 of 8 running)	2	0.75	1.5				
480	Trash Rake (1 lot various motors)	2	12	24	Trash Rake (1 lot various motors)	1	12	12				
480	Heat Trace Panel (Estimate)	2	30	60	Heat Trace Panel (Estimate)	2	30	60	Heat Trace Panel	4	50	200
	Cathodic Protection (Estimate)	2	?	0	Cathodic Protection (Estimate)	2	5	10	Cathodic Protection	8	50	400
	TOTAL			25,470			Running	1,644			Connected	57,200
											Running	50,200
	NEW CW AND MD TWR SYSTEM TOTAL CONNECTED LOAD Kw					58,844						
	NEW CW AND MD TWR SYSTEM RUNNING LOAD Kw					51,844						
	NET INCREASE IN RUNNING KW					26,374						

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: ENV-91 **Category:** Water / Groundwater

Statement of Question: Please provide the following documents that were made available during the Salem and HCGS License Renewal Environmental Audit.

> NEI RGGP [sic] [(Radiological Groundwater Protection Initiative)] inspection (TI) Report [issued by NRC]

Response: The NRC completed an integrated inspection at the Salem Nuclear Generating Station on March 31, 2009. The inspection examined activities conducted under the NRC operating licenses for Units 1 and 2, including an assessment of PSEG's groundwater protection program to verify, in accordance with NRC Inspection Manual Temporary Instruction (TI) 2515/173, that PSEG implemented the voluntary industry Ground Water Protection Initiative (GPI) approved by the Nuclear Energy Institute (NEI). The results of the inspection were reported as item 4OA5.2 in NRC Integrated Inspection Report 05000272/2009002 and 05000311/2009002, which is being provided.

List Attachments Provided:

> U.S. Nuclear Regulatory Commission. "Salem Nuclear Generating Station, Unit Nos. 1 and 2, Inspection Report 05000272/2009002 and 05000311/2009002." Enclosure to Letter from NRC (A. Burritt) to PSEG Nuclear LLC (T. Joyce). 4/29/2009.

NON-PSEG

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

April 29, 2009

Mr. Thomas Joyce
President and Chief Nuclear Officer
PSEG Nuclear LLC - N09
P.O. Box 236
Hancock's Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 - NRC INTEGRATED INSPECTION REPORT 05000272/2009002 and 05000311/2009002

Dear Mr. Joyce:

On March 31, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at the Salem Nuclear Generating Station, Unit Nos. 1 and 2. The enclosed inspection report documents the inspection results discussed on April 3, 2009, with Mr. Braun and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, no findings of significance were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Arthur L. Burritt, Chief
Projects Branch 3
Division of Reactor Projects

Docket Nos: 50-272; 50-311
License Nos: DPR-70; DPR-75

Enclosure: Inspection Report 05000272/2009002 and 05000311/2009002
w/Attachment: Supplemental Information

cc w/encl:
W. Levis, President and Chief Operating Officer, PSEG Power
R. Braun, Site Vice President
P. Davison, Director of Nuclear Oversight
E. Johnson, Director of Finance
G. Gellrich, Salem Plant Manager
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N. Cohen, Coordinator - Unplug Salem Campaign
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SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 - NRC INTEGRATED INSPECTION REPORT 05000272/2009002 and 05000311/2009002

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Sincerely,
/RA/
Arthur L. Burritt, Chief
Projects Branch 3
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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos:	50-272, 50-311
License Nos:	DPR-70, DPR-75
Report No:	05000272/2009002 and 05000311/2009002
Licensee:	PSEG Nuclear LLC (PSEG)
Facility:	Salem Nuclear Generating Station, Unit Nos. 1 and 2
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Dates:	January 1, 2009 through March 31, 2009
Inspectors:	D. Schroeder, Senior Resident Inspector H. Balian, Resident Inspector J. Furia, Senior Health Physicist J. Schoppy, Senior Reactor Inspector S. Barr, Senior Emergency Preparedness Specialist J. Bream, Project Engineer A. Turilin, Project Engineer
Approved By:	Arthur L. Burritt, Chief Projects Branch 3 Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000272/2009002, 05000311/2009002; 01/01/2009 - 03/31/2009; Salem Nuclear Generating Station Unit Nos. 1 and 2; Routine Integrated Report.

The report covered a three-month period of inspection by resident inspectors and announced inspections by regional specialist inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

No findings of significance were identified.

REPORT DETAILS

Summary of Plant Status

Salem Nuclear Generating Station Unit No. 1 (Unit 1) began the period at full power. On March 27, operators lowered Unit 1 to three percent power due to a condensate polishing system malfunction that required the turbine generator to be taken off line. Operators returned Unit 1 to full power on March 31.

Salem Nuclear Generating Station Unit No. 2 (Unit 2) began the period at full power. Unit 2 operated at full power for the duration of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity and Emergency Preparedness

1R01 Adverse Weather Protection (71111.01 - 1 sample)

.1 Evaluate Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors completed one impending adverse weather inspection sample for the onset of high levels of river detritus. The inspectors reviewed PSEG's weather preparation activities related to the potential for river grass intrusion conditions. Inspectors assessed implementation of PSEG's grassing readiness plan through plant walk downs, corrective action program review, and discussions with cognizant managers and engineers. Documents reviewed by inspectors are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04 - 4 samples)

.1 Partial Walk down

a. Inspection Scope

The inspectors completed four partial system walk down inspection samples. The inspectors walked down the applicable systems to verify the operability of redundant or diverse trains and components when safety equipment was inoperable. The inspectors focused their review on potential discrepancies that could impact the function of the system and increase plant risk. The inspectors reviewed applicable operating procedures, walked down control systems components, and verified that selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors also verified that PSEG properly utilized its corrective action program to identify and resolve equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers. Documents reviewed are listed in the Attachment. The inspectors walked down the systems listed below:

- Unit 1 1A and 1B Emergency Diesel Generators (EDGs), 11 and 12 auxiliary feedwater (AFW) pumps when 13 AFW pump was unavailable on February 9;
- Unit 2 Service water screens, pumps, and strainers during grassing season on March 19;
- Unit 2 2B and 2C EDGs when 2A EDG was out of service for planned maintenance on January 29; and
- Unit 2 heating systems for the refueling water storage tank (RWST), auxiliary feedwater storage tank (AFWST) and pure water storage tank (PWST) during extreme cold weather on January 20.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05Q - 4 samples, 71111.05A – 1 sample)

.1 Fire Protection - Tours

a. Inspection Scope

The inspectors completed four fire protection quarterly walkdown inspection samples. The inspectors performed walk downs to assess the material condition and operational status of fire protection features. The inspectors verified that combustibles and ignition sources were controlled in accordance with PSEG's administrative procedures; fire detection and suppression equipment was available for use; that passive fire barriers were maintained in good material condition; and that compensatory measures for out-of-service, degraded, or inoperable fire protection equipment were implemented in accordance with PSEG's fire plan. Documents reviewed are listed in the Attachment. The inspectors evaluated the fire protection areas listed below:

- Unit 1 and 2 AFW pump areas; and
- Unit 1 and 2 spent fuel and component cooling areas.

b. Findings

No findings of significance were identified.

.2 Fire Protection - Drill Observation

a. Inspection Scope

The inspectors completed one fire drill observation inspection sample. The inspectors observed an unannounced fire drill conducted in the 2B emergency diesel generator room. The inspectors observed the drill to evaluate the readiness of the plant fire brigade to fight fires. The inspectors verified that PSEG staff identified deficiencies; openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were: proper wearing of turnout gear and self-contained breathing apparatus; proper use and layout of fire hoses; employment of appropriate fire fighting techniques; sufficient fire fighting equipment brought to the scene; effectiveness of fire brigade leader communications, command, and control; search for victims and propagation of the fire into other plant areas; smoke removal operations; utilization of pre-planned strategies; adherence to the pre-planned drill scenario; and drill objectives.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06 - 1 sample)

a. Inspection Scope

The inspectors completed one flood protection measures inspection sample. The inspectors evaluated flood protection measures for the Unit 1 and Unit 2 auxiliary buildings. The inspectors walked down the areas to assess operational readiness of various features in place to protect redundant safety-related components and vital electric power systems from internal flooding. These features included plant drains, flood barrier curbs, and wall penetration seals. The inspectors also reviewed the results of flood barrier penetration seal inspections, flooding evaluations, preventive maintenance history, and corrective action notifications associated with flood protection measures. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11Q - 1 sample)

.1 Requalification Activities Review by Resident Staff.

a. Inspection Scope

The inspectors completed one quarterly licensed operator requalification program inspection sample. Specifically, the inspectors observed simulator training administered to a single crew on March 3, 2009. The scenario involved biofouling of the circulating water and turbine area cooling systems, loss of two circulating water pumps, a reactor coolant leak that transitioned into a loss of coolant accident requiring a reactor trip and safety injection. This training scenario was developed and administered as a corrective action to a reactor coolant draining incident that occurred in the fourth quarter of 2008. The original issue is discussed in inspection reports 05000272/2008009 and 05000272/2008005. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q - 2 samples)

a. Inspection Scope

The inspectors completed two quarterly maintenance effectiveness inspection samples. The inspectors reviewed performance monitoring and maintenance effectiveness issues for two systems. The inspectors reviewed PSEG's process for monitoring equipment performance and assessing preventive maintenance effectiveness. The inspectors verified that systems and components were monitored in accordance with the maintenance rule program requirements. The inspectors compared documented functional failure determinations and unavailability hours to those being tracked by PSEG to evaluate the effectiveness of PSEG's condition monitoring activities and to determine whether performance goals were being met. The inspectors reviewed applicable work orders, corrective action notifications, and preventive maintenance tasks. The documents reviewed are listed in the Attachment. The inspectors evaluated the systems listed below:

- Unit 1 and Unit 2 steam driven AFW pumps; and
- Unit 1 and Unit 2 vital instrument bus inverters.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 - 5 samples)

a. Inspection Scope

The inspectors completed five maintenance risk assessment and emergent work control inspection samples. The inspectors reviewed the applicable maintenance activities to verify that the appropriate risk assessments were performed as specified by 10 CFR 50.65(a)(4) prior to removing equipment for work. The inspectors reviewed the applicable risk evaluations, work schedules and control room logs for these configurations. PSEG's risk management actions were reviewed during shift turnover meetings, control room tours, and plant walk downs. The inspectors also used PSEG's on-line risk monitor (Equipment Out-Of-Service workstation) to gain insights into the risk associated with these plant configurations. The inspectors reviewed notifications documenting problems associated with risk assessments and emergent work evaluations. Documents reviewed are listed in the Attachment. For this inspection the inspectors assessed the plant configurations listed below:

- Unit 2 performance of pressurizer pressure functional test on February 3, 2009, which closed both Power Operated Relief Valve (PORV) block valves, 2PR6 and 2PR7;
- Unit 1 unplanned unavailability of the 13 AFW pump concurrent with maintenance on the 5023 offsite power line on February 9, 2009;
- Unit 2 planned unavailability of the 21 component cooling heat exchanger (CCHX) concurrent with unavailability of the 23 service water pump and automatic operation of pressurizer PORV 2PR1 on January 19;
- Unit 2 unplanned unavailability of the 26 service water pump concurrent with planned unavailability of the 23 service water pump and subsequent emergent unavailability of the 25 service water pump on February 20 and 21; and
- Unit 2 planned unavailability of the 21 CCHX and 26 SWP on February 25.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15 - 8 samples)

a. Inspection Scope

The inspectors completed eight operability evaluation inspection samples. The inspectors reviewed the operability determinations for degraded or non-conforming conditions associated with:

- 13 charging pump speed control linkage found in the low pressure position during plant power operations;
- 23 chiller low discharge pressure due to the 23SW102 valve failure to close on demand;
- Unit 1 containment integrity given degradation of containment spray valve 12CS2;
- Unit 2 AFW system performance due to degradation of 22 AFW pump minimum recirculation flow control valve 22AF40;
- Unit 1 reactor coolant leak detection given degradation of containment fan coil unit condensate collection system;
- Unit 2 service water system during concurrent planned and unplanned unavailability of up to three service water pumps;
- Unit 1 overhead annunciator system during failure of the annunciator verification system (AVS); and
- Unit 2 solid state protection system (SSPS) given degradation of a time delay relay in the train A test circuitry.

The inspectors reviewed the technical adequacy of the operability determinations to ensure the conclusions were justified. The inspectors also walked down accessible equipment to corroborate the adequacy of PSEG's operability determinations. Additionally, the inspectors reviewed other PSEG identified safety-related equipment deficiencies during this report period and assessed the adequacy of their operability screenings. Documents reviewed are listed in the Attachment.

a. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18 - 1 sample)

.1 Temporary Modification

a. Inspection Scope

The inspectors completed one plant modification inspection sample. The inspectors reviewed a temporary modification for Unit 1 SSPS train A test circuitry. Two leads were lifted to stop a relay in the circuit from chattering. The lifted leads were left in place to facilitate the replacement of a time delay relay in the SSPS train A cabinet. The inspectors reviewed the temporary modification documentation and verified that the modification did not affect system functionality. Following replacement of the time delay relay, inspectors verified that the temporary modification was removed and that the original system configuration was restored.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19 - 7 samples)

a. Inspection Scope

The inspectors completed seven post-maintenance testing inspection samples. The inspectors observed portions of and/or reviewed the results of the post-maintenance test activities. The inspectors verified that the effect of testing on the plant was adequately addressed by control room and engineering personnel; testing was adequate for the maintenance performed; acceptance criteria were clear, demonstrated operational readiness and were consistent with design and licensing basis documentation; test instrumentation was calibrated, and the appropriate range and accuracy for the application; tests were performed, as written with applicable prerequisites satisfied; and equipment was returned to an operational status and ready to perform its safety function. Documents reviewed are listed in the Attachment. The inspectors evaluated the post-maintenance tests for the following maintenance items listed below:

- Work Order (WO) 50118530, replacement of the 13 AFW pump speed control governor;
- WO 30175773, repair of the 23SW102 pressure control valve on the 23 chiller;
- WO 60081161, adjustment and repair of 21SW122 flow control valve;
- WO 30060411, replacement of 2A EDG starting air solenoid operated valves;
- WO 60079798, rotation of the pressurizer PORV 2PR2;
- WO 30095033, replacement of the 26 service water pump; and
- WO 60081911, oil change of the 23 AFW pump speed control governor.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22 - 7 samples)

a. Inspection Scope

The inspectors completed seven surveillance testing inspection samples. The inspectors observed portions of and/or reviewed results for the surveillance tests to verify, as appropriate, whether the applicable system requirements for operability were adequately incorporated into the procedures and that test acceptance criteria were consistent with procedure requirements, the technical specification requirements, the UFSAR, and ASME Section XI for pump and valve testing. Documents reviewed are listed in the Attachment. The inspectors evaluated the surveillance tests listed below:

- S2.IC-FT.RCP-0018, “2PT-456 Pressurizer Pressure Protection Channel II;”

- S1.OP-ST.DG-0003, "1C Diesel Generator Surveillance Test;"
- S2.OP-ST.SW-0006, "Inservice Testing, 26 Service Water Pump;"
- S2.IC-CC.RCP-0028, "2FT-512 #21 Steam Generator Steam Flow Protection Channel I;"
- SC.OP-PT.CA-0001, "SBO Diesel Control Air Compressor Test;"
- S2.OP-ST.AF-0003, "Inservice Testing – 23 Auxiliary Feedwater Pump;" and
- S2.OP-ST.CVC-0006, "Inservice Testing Chemical and Volume Control Valves Modes 1-6."

b. Findings

No findings of significance were identified.

1EP2 Alert and Notification System (ANS) Evaluation (71114.02 - 1 sample)

a. Inspection Scope

An onsite review was conducted to assess the maintenance and testing of the Salem and Hope Creek ANS. During this inspection, the inspectors interviewed Emergency Preparedness (EP) staff responsible for implementation of the ANS testing and maintenance and reviewed corrective action program notifications pertaining to the ANS for causes, trends, and PSEG's corrective actions. The inspector reviewed the ANS procedures and the ANS design report to ensure PSEG's compliance with system maintenance and testing commitments. The inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment .02. Planning Standard, 10 CFR 50.47(b) (5) and the related requirements of 10 CFR 50, Appendix E, were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP3 Emergency Response Organization (ERO) Staffing and Augmentation System (71114.03 - 1 sample)

a. Inspection Scope

The inspectors conducted a review of Salem/Hope Creeks' ERO augmentation staffing requirements and the process for notifying and augmenting the ERO. This was performed to ensure the readiness of key staff for responding to an event and to ensure timely facility activation. The inspectors reviewed the ERO roster, training records, applicable procedures, drill reports for augmentation, quarterly EP drills and corrective action program notifications related to the ERO staffing augmentation system. The inspectors also reviewed the implementation of the change in the ERO augmentation time from 60 to 90 minutes. The inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment .03. Planning Standard, 10 CFR 50.47(b)(2) and related requirements of 10 CFR 50, Appendix E, were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP4 Emergency Action Level (EAL) and Emergency Plan Changes (71114.04 - 1 sample)

a. Inspection Scope

Prior to this inspection, the NRC had received and acknowledged changes made to the Salem/Hope Creek Emergency Plan and its implementing procedures. PSEG developed these changes in accordance with 10 CFR 50.54(q), and determined that the changes did not result in a decrease in effectiveness of the Plan. PSEG also determined that the Plan continued to meet the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR 50. During this inspection, the inspectors conducted a review of Salem's and Hope Creek's 10 CFR 50.54(q) screenings for all changes made to the EALs, and for a sample of the changes made to the Plan, from May 2008 through March 2009, that could have potentially resulted in a decrease in effectiveness. This review of the EAL, Plan, and EPIP changes did not constitute NRC approval of the changes and, as such, the changes remain subject to future NRC inspection. In addition, the inspectors reviewed notifications written related to this area. The inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment .04. The requirements in 10 CFR 50.54(q) were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP5 Correction of Emergency Preparedness Weaknesses (71114.05 - 1 sample)

a. Inspection Scope

The inspectors reviewed a sampling of self-assessment procedures and reports to assess PSEG's ability to evaluate their EP performance and programs. The inspectors reviewed a sampling of notifications written between January 2008 and March 2009 that were initiated by PSEG at Salem and Hope Creek for issues identified during drills, self-assessments and audits. Additionally, the inspectors reviewed: Nuclear Oversight audits; the event report for the August 2008 Unusual Event declaration at Hope Creek; and, the 2007 and 2008 50.54(t) audit reports. This inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment .05. Planning Standard, 10 CFR 50.47(b) (14) and the related requirements of 10 CFR 50 Appendix E were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation

a. Inspection Scope (71114.06 - 1 sample)

The inspectors completed one drill evaluation inspection sample. On March 17, 2009, the inspectors observed the drill from the control room simulator, the technical support center (TSC) and the emergency offsite facility (EOF). The inspectors attended the drill debrief to ensure that PSEG captured drill deficiencies in their critique. The inspectors evaluated the drill performance relative to developing event classifications and notifications. The inspectors reviewed the Salem Event Classification Guides and Emergency Plans. The inspectors referenced Nuclear Energy Institute 99-02, "Regulatory Assessment Performance Indicator (PI) Guideline," Revision 5, and verified that PSEG correctly counted the drill's contribution to the NRC PI for drill and exercise performance.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01 - 6 samples)

a. Inspection Scope

The inspectors identified exposure significant work areas (about 2-3) within radiation areas, high radiation areas (<1 R/hr), or airborne radioactivity areas in the plant and reviewed associated PSEG controls and surveys of these areas to verify that controls (e.g., surveys, postings, barricades) were acceptable.

With a survey instrument, the inspectors walked down these areas or their perimeters to verify that prescribed radiation work permits, procedure, and engineering controls were in place, PSEG surveys and postings were complete and accurate, and air samplers were properly located.

The inspectors reviewed radiation work permits used to access these and other high radiation areas and identify what work control instructions or control barriers were specified. The inspectors used plant-specific technical specification high radiation area requirements as the standard for the necessary barriers. The inspectors reviewed electronic personal dosimeter alarm set points (both integrated dose and dose rate) for conformity with survey indications and plant policy. The inspectors verified that workers knew what actions were required when their electronic personal dosimeter malfunctioned or alarmed.

The inspectors verified adequate posting and locking of all entrances to high dose rate-high radiation areas and very high radiation areas.

The inspectors discussed with the Radiation Protection Manager high dose rate-high radiation area and very high radiation area controls and procedures. The inspectors reviewed procedural changes completed since the last inspection. The inspectors verified that changes to PSEG procedures did not substantially reduce the effectiveness and level of worker protection.

The inspectors discussed with health physics supervisors the controls in place for special areas that have the potential to become very high radiation areas during certain plant operations. The inspectors verified that communication with the health physics group was required prior to these plant operations to allow proper posting and control of radiation hazards.

The inspectors evaluated PSEG performance in this area against the requirements contained in 10 CFR 20, and Technical Specification 6.12.

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls (71121.02 - 4 samples)

a. Inspection Scope

Utilizing PSEG records, the inspectors reviewed the historical trends and current status of tracked plant source terms. The inspectors verified that PSEG made allowances or developed contingency plans for expected changes in the source term due to changes in plant fuel performance issues or changes in plant primary chemistry.

The inspectors compared the person-hour estimates provided by maintenance planning and other groups to the radiation protection group with the actual work activity time requirements and evaluated the accuracy of these time estimates.

The inspectors verified that PSEG developed an understanding of the plant source term, including knowledge of input mechanisms to reduce the source term. The inspectors also verified that PSEG had a source-term control strategy in place.

The inspectors reviewed specific sources identified by PSEG for exposure reduction actions and the associated priorities PSEG established for implementation of these actions. The inspectors reviewed results achieved for these priorities since the last refueling cycle. During the previous 12 month assessment period, the inspectors verified that source reduction evaluations were completed and actions taken to reduce the overall source-term compared to the previous year.

The inspectors evaluated PSEG performance in this area against the requirements contained in 10 CFR 20.1101.

b. Findings

No findings of significance were identified.

2OS3 Radiation Monitoring Instrumentation and Protective Equipment (71121.03 - 1 sample)

a. Inspection Scope

The inspectors reviewed the qualification documentation for onsite personnel designated to perform maintenance on the vendor-designated vital components and the vital component maintenance records for three self-contained breathing apparatus (SCBA) units currently designated as "ready for service." For the same three units, the inspectors ensured that the required periodic air cylinder hydrostatic testing was documented and up to date and the DOT required retest air cylinder markings were in place. The inspectors reviewed the onsite maintenance procedures governing vital component work and verified agreement between PSEG procedures and the SCBA manufacturer's recommended practices.

The inspectors evaluated PSEG performance in this area against the requirements contained in 10 CFR 20.1501, 10 CFR 20.1703 and 10 CFR 20.1704.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification (71151 - 9 samples)

a. Inspection Scope

The inspectors reviewed PSEG submittals for the Unit 1 and Unit 2 Mitigating Systems cornerstone PIs and the Unit 1 and Unit 2 Barrier Integrity cornerstone PIs discussed below. Data reviewed was for all four quarters of calendar year 2008. Emergency preparedness PI data was reviewed from the second through the fourth quarters of 2008. To verify the accuracy of the PI data reported during this period the data was compared to the PI definition and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Indicator Guideline," Revision 5.

Cornerstone: Mitigating Systems

- Unit 1 and 2 Safety System Functional Failures

Cornerstone: Barrier Integrity

- Unit 1 and 2 Reactor Coolant System (RCS) Unidentified Leak Rate; and
- Unit 1 and 2 RCS Specific Activity

The inspectors reviewed main control room logs and were familiar with leak rate data through plant status reviews required by NRC Inspection Manual Chapter 2515, Appendix D, "Plant Status."

Cornerstone: Emergency Preparedness

- Drill and Exercise Performance (DEP)
- ERO Drill Participation; and
- ANS Reliability.

For the PIs listed above to verify the accuracy of the reported data the inspectors reviewed the PI data, supporting documentation, and the information PSEG reported, from the second quarter through the fourth quarter of 2008.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program:

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of all items entered into PSEG's corrective action program. This was accomplished by reviewing the description of each new notification and attending daily management review committee meetings.

4OA3 Event Followup (71153 - 1 sample)

.1 (Closed) LER 05000272/2008002-00, Missed Containment Spray Valve Surveillance per Technical Specification 4.0.5

On December 9, 2008, with Salem Unit 1 in Mode 1, it was identified that containment spray pressure relief (vacuum breaker) valve 1CS12 could not be located to perform a required post removal as-found surveillance test in accordance with the requirements of the technical specifications (TS) and the ASME OMa-1988, Part 1, Requirements for Inservice Performance Testing of Nuclear Power Plant pressure Relief Devices. The inability to perform the test because of the loss of the 1CS12 resulted in a conservative determination that the valve would not have passed the TS surveillance pressure test.

The valve misplacement was attributed to failure to follow work order instructions to properly retain the valve for testing. The valve testing scope was expanded to the second redundant valve on the tank. The test of the redundant valve concluded that the valve would have performed its function. All pressure relief valves on the containment spray additive tank were replaced with new valves. The failure to comply with TS 4.0.5, "Surveillance Requirements for Inservice Inspection," constituted a violation of minor significance not subject to enforcement action in accordance with NRC's Enforcement Policy. The inspectors reviewed this LER and identified no additional findings of significance or violations of NRC requirements. PSEG documented the cause and corrective actions for this failure in notification 20394390. This LER is closed.

4OA5 Other Activities

.1 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted observations of security force personnel and activities to ensure that the activities were consistent with PSEG security procedures and regulatory requirements related to nuclear plant security. These observations took place during both normal and off-normal plant working hours. These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings of significance were identified.

.2 TI 2515/173, Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative

a. Inspection Scope

On March 9-13, 2009, the inspectors assessed PSEG's ground water protection program to verify that PSEG implemented the voluntary industry Ground Water Protection Initiative (GPI). The GPI was unanimously approved by a formal vote of the Nuclear Energy Institute member utility chief nuclear officers. This established the industry's commitment to implement the initiative. The GPI identifies the actions the industry deemed necessary for implementation of a timely and effective ground water protection program.

The inspectors verified that the following objectives for the GPI were contained in PSEG's program:

1.1 Site Hydrology and Geology
1.2 Site Risk Management
1.3 On-Site Ground Water Monitoring
1.4 Remediation Process
1.5 Record Keeping
2.1 Stakeholder Briefing
2.2 Voluntary Communication
2.3 Thirty-Day Reports
2.4 Annual Reporting
3.1 Perform a Self-Assessment
3.2 Review the Program Under the Auspices of NEI

Unit 1 Tritium Ground Water Monitoring

The inspectors reviewed PSEG actions regarding the tritium in ground water from the Unit 1 fuel pool, first identified in 2002. The inspectors discussed with PSEG current activity levels of tritium, historical trends, remediation activities and future plans regarding this issue.

b. Findings

No findings of significance were identified.

.3 World Association of Nuclear Operators (WANO) Plant Assessment Report Review

The inspectors reviewed the final report for the WANO plant assessment of the Salem Generating Station, August 2008 evaluation, dated March 2009. No new safety issues were identified.

.4 Emergency Response Organization, Drill/Exercise PI, Program Review

The inspectors performed NRC Temporary Instruction (TI) 2515/175, ensured the completeness of PSEG's completed Attachment 1 from the TI, and forwarded that data to NRC Headquarters.

4OA6 Meetings, Including Exit

On April 3, 2009, the resident inspectors presented the inspection results to Mr. Braun. PSEG acknowledged that none of the information reviewed by the inspectors during the inspection period was proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel:

H. Berrick, Senior Engineer Nuclear, Regulatory Assurance
L. Cataldo, Nuclear Technical Supervisor, Chemistry
R. Gary, Radiation Protection Manager
G. Gellrich, Plant Manager
M. Gwirtz, Director Operations
E. Keating, Environmental Manager, Regulatory Affairs
D. McCollum, Component Maintenance Organization
E. Villar, Licensing Engineer
H. Miller, Technical Support Specialist
G. Rich, Chemist
T. Davis, Environmental Specialist
L. Rajkowski, Design Engineering Manager
L. Oberembt, NSSS Systems Manager
M. Rahmani, Electrical Systems Engineer
A. Garcia, BoP Systems Engineer
G. Pawha, Programs Engineer
P. Quick, Salem EP Manager
P. Williams, LOR Instructor
J. Gebely, Fire Department Shift Supervisor
D. Burgin, Manager Emergency Preparedness
D. Kabachinski, D&E Coordinator
C. Banner, Emergency Preparedness Coordinator
B. Vondrasek, Emergency Preparedness Training Coordinator
C. Simmermon, Emergency Preparedness Facility and Equipment Coordinator

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened/Closed

05000272/2008002-00	LER	Missed Containment Spray Valve Surveillance per Technical Specification 4.0.5 (Section 4OA3.1)

Discussed

None

LIST OF DOCUMENTS REVIEWED

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records:

Section 1R01: Adverse Weather Protection

Procedures
WC-AA-107, Seasonal Readiness, Rev. 8
EN-SA-403-1001, Salem Rivergrass Predictive Methodology, Rev. 0

Notification
20399054

Section 1R04: Equipment Alignment

Procedure
S2.OP-SO.DG-0002, 2A Diesel Generation Operation, Rev. 33

Drawings
205334 205336

Notification
20398093

Section 1R05: Fire Protection

Procedures
FRS-II-432, Spent Fuel / Component Cooling Heat Exchanger & Pump Area, Elevation: 84' – 0", Rev. 5
FRS-II-433, Auxiliary Feedwater Pumps Area, Elevation: 84' – 0", Rev. 6
FRS-II-445, Diesel Generator Area, Elevations: 100' & 122', Rev. 11

Other Document
Controller/Observer Drill Evaluation Form for fire drill conducted March 17, 2009

Section 1R06: Flood Protection Measures

Other Documents
S-C-ZZ-SDC-1203, Moderate Energy Break Analysis (Reconstitution), Rev. 3
VTD 317095, Safe Shutdown Equipment List, Salem Generating Station Unit 2, Rev. 1
S-C-ZZ-MDC-0572, Design Pressure Criteria for Salem Generating Station Barriers, Rev. 8
S-C-ZZ-SDC-1419, Salem Generating Station Environmental Design Criteria, Rev. 3

Section 1R11: Licensed Operator Requalification Program

Procedures

OP-AA-101-111-1003, Use of Procedures, Rev. 1
2-EOP-TRIP-1, Reactor Trip or Safety Injection, Rev. 27
2-EOP-TRIP-2, Reactor Trip Response, Rev. 27
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Section 2OS3: Radiation Monitoring Instrumentation

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LIST OF ACRONYMS

AFW	Auxiliary Feedwater
AFWST	Auxiliary Feedwater Storage Tank
ANS	Alert and Notification System
ASME	American Society of Mechanical Engineers
AVS	Annunciator Verification System
CCHX	Component Cooling Heat Exchanger
CFR	Code of Federal Regulations
CS	Containment Spray
DEP	Drill and Exercise Performance
EAL	Emergency Action Level
EDGs	Emergency Diesel Generators
EOF	Emergency Offsite Facility
EP	Emergency Preparedness
EPIP	Emergency Plan Implementing Procedure
ERO	Emergency Response Organization
GPI	Ground Water Protection Initiative
IMC	Inspection Manual Chapter
IR	Incident Report
LER	Licensee Event Report
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PI	Performance Indicator
PORV	Power Operated Relief Valve
PS	Planning Standard
PSEG	Public Service Enterprise Group Nuclear LLC
PWST	Pure Water Storage Tank
RCS	Reactor Coolant System
RWST	Refueling Water Storage Tank
SCBA	Self-Contained Breathing Apparatus
SSPS	Solid State Protection System
SW	Service Water
SWP	Service Water Pump
TI	Temporary Instruction
TS	Technical Specification
TSC	Technical Support Center
WANO	World Association of Nuclear Operations
WO	Work Order

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: ENV-92 **Category:** Water / Groundwater

Statement of Question: Please provide the following documents that were made available during the Salem and HCGS License Renewal Environmental Audit.

A Copy of Most recently available Diesel Fuel Oil remediation report

B Copy of Diesel Fuel Oil remediation action work plan

Response: The documents requested are being provided.

List Attachments Provided:

A Letter from PSEG Nuclear LLC (M. Pyle) to NJDEP (L. Range) (with enclosures) regarding "Semi-Annual Diesel Remedial Action Progress Report, July 2009 through December 2009, PSEG Nuclear LLC, Salem Generating Station, NJDEP Case 04-08-02-2350-16" (concerning a diesel fuel release first observed on August 2, 2004). March 2010.

B Arcadis G&M, Inc. *Remedial Investigation and Interim Remedial Action Report, Incident No. 04-08-02-2350-16.* Prepared for PSEG Services Corporation. June 2005.

PSEG Nuclear L.L.C.
P.O. Box 236, Hancocks Bridge, NJ 08302

PSEG
Nuclear L.L.C.

SCH10-035

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
ARTICLE NUMBER 7008 0150 0000 5749 3867

New Jersey Department of Environmental Protection
Division of Remediation Management and Response
Southern Bureau of Field Operations
P.O. Box 407
Trenton, New Jersey 08625-0407

Attention: Ms. Linda S. Range

SEMI-ANNUAL DIESEL REMEDIAL ACTION PROGRESS REPORT, JULY 2009 THROUGH DECEMBER 2009, PSEG NUCLEAR LLC, SALEM GENERATING STATION, NJDEP CASE 04-08-02-2350-16

Dear Ms. Range:

Please find enclosed the Semi-Annual Remedial Action Progress Report (RAPR) that covers groundwater remediation activities completed at Salem Generating Station between July 2009 and December 2009 for NJDEP Case Number 04-08-02-2350-16.

PSEG proposes the following new actions for the upcoming reporting period January – June 2010:

- PSEG will continue to collect groundwater samples on a semiannual basis with the next event to be conducted in June 2010. Groundwater monitoring will continue to consist of the collection and analysis of groundwater samples from those wells not indicating the presence of separate phase product. Groundwater samples will be analyzed for VOCs and SVOCs to evaluate the extent, if any, of dissolved phase constituents of concern. In addition, product recovery efforts will remain ongoing. Semiannual Remedial Action Progress Reports will continue to be prepared to update the NJDEP with the status of product recovery efforts and groundwater analytical results;

- Following completion of the product recovery efforts (i.e., measurable separate phase product is no longer detected) eight consecutive rounds of quarterly sampling will be completed (assuming concentrations of constituents of concern are above applicable GWQC) as required by the Mann-Whitney U-Test. The analytical results from these sampling events will be evaluated to determine if there are decreasing analytical trends; and,

- Following completion of the eight consecutive rounds of quarterly sampling, PSEG will either: 1) propose no further action for groundwater if groundwater analytical results continue to be below applicable GWQC; or, 2) establish a classification exception area and prepare a Remedial Action Work Plan that proposes a groundwater remediation strategy.

Refer to the attached report for details.

If you have any questions or comments regarding the contents of the attached report, please do not hesitate to contact Luis Cataldo of my staff at (856) 339-2307.

Sincerely,

Mark D. Pyle

Mark Pyle
Chemistry, Radwaste & Environmental Manager
Salem Generating Station
PSEG Nuclear, LLC

\wgb
Enclosures (1 original report binder and 2 copies)

CC:	Richard Blackman	T17	with attached copy of report binder
	Ed Eilola	S05	with attached copy of report binder
	Helen Gregory	N21	with attached copy of report binder
	Edward Keating	N21	with attached copy of report binder
	Christine Neely	N21	with attached copy of report binder
	Eric Svensen	T17A	with attached copy of report binder
	John Valeri Jr.	T5C	with attached copy of report binder
	File 8.1.4		

EXTERNAL

Peter Milionis, ARCADIS	w/o attachments
Bradley Pierce, ARCADIS	w/o attachments
Scott Potter, PhD., ARCADIS	w/o attachments

Remedial Action Progress Report July through December 2009

PSEG Nuclear, LLC
Salem Generating Station
Hancock's Bridge, New Jersey
Incident No. 04-08-02-2350-16

March 2010

ARCADIS

Jonathan Shafer for Glenn Palmer

Glenn C. Palmer
Staff Scientist

Bradley Pierce

Bradley D. Pierce
Project Manager

Remedial Action Progress July through December 2009

PSEG Nuclear, LLC
Salem Generating Station
Hancock's Bridge, New Jersey
Incident No. 04-08-02-2350-16

Prepared for:
PSEG Nuclear, LLC
Salem Generating Station
Alloway Creek Neck Road
Hancock's Bridge, New Jersey 08038

Prepared by:
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Suite 300
Newtown
Pennsylvania 18940
Tel 267.685.1800
Fax 267.685.1801

Our Ref.:
NP000603.0007

Date:
March 2010

Tables

Figures

Appendices

1. Introduction

ARCADIS U.S., Inc. (ARCADIS), on behalf of PSEG Nuclear LLC (PSEG), has prepared this Remedial Action Progress Report (RAPR) to present the details and results of ongoing groundwater monitoring and product recovery activities being conducted at the PSEG Nuclear, LLC Salem Generating Station (the Station). The Station is located on Artificial Island in Lower Alloways Creek Township, Salem County, New Jersey. The Station location and layout are depicted on **Figures 1** and **2**, respectively.

Groundwater monitoring and product recovery activities are being conducted in accordance with the scope of work proposed in the Remedial Investigation Report (RIR) that was submitted to the New Jersey Department of Environmental Protection (NJDEP) in June 2005. The remedial investigation was conducted to determine the extent of constituents of concern in soil and groundwater associated with a release of diesel fuel (Incident Number 04-08-02-2350-16).This RAPR includes activities completed at the Station from July 2009 through December 2009 including the completion of the semiannual groundwater monitoring activities conducted in December 2009 and the ongoing operation of the separate phase product recovery systems in Wells AU and AW. Additionally described is a September 2009 soil sampling event used to horizontally delineate separate phase product in the vicinity of the Fuel Handling Building. These activities are discussed in Sections 3, 4, 5, and 6 respectively, followed by the proposed schedule for subsequent reporting periods.

2. Project Background

On August 2, 2004, PSEG personnel observed a diesel fuel odor in a catch basin associated with the storm water collection system just to the south of the Salem Unit 1 Auxiliary Building. Investigation of the catch basin, which is identified as "Catch Basin 27" on **Figure 2**, revealed the presence of a red-dyed diesel fuel (the red-dye is more typical of a recent release of diesel fuel). At this time, PSEG notified the NJDEP through its spill hotline.

Investigations into the source of the diesel fuel focused on the underground piping adjacent to Catch Basin 27 that supplies diesel fuel from the bulk storage tanks to diesel/generator storage tanks located within the Auxiliary Building and to the service water and circulating water boilers. The location of the underground piping is shown on **Figure 2**. PSEG performed a pressure test on this underground piping. The results revealed the leak was in an approximate 300-foot section of the piping extending south from the Auxiliary Building. To pinpoint the location of the leak along this 300-foot section of piping, PSEG subcontracted Praxair Services, Inc. to perform a "Tracer Tight" gas analysis. The results of this test showed that the location of the leak was directly adjacent to Catch Basin 27. The results of the Tracer Tight gas analysis indicated that there were no other leaks along the 300-foot section of piping.

Excavation in the area of the leaking underground piping was initiated on August 23, 2004 by PSEG with the support of Clean Harbors, Inc. to repair the piping. During the excavation process, residual diesel fuel was observed on soil excavated from below the piping (approximately six feet below ground surface (bgs)). Separate-phase diesel fuel was observed on standing water within the excavation. Prior to backfilling, approximately 150 gallons of diesel fuel were recovered from the excavation.

In November 2004, PSEG initiated remedial investigation and interim product recovery activities. As presented in the Remedial Investigation Work Plan (RIWP) submitted to the NJDEP in January 2005, soil borings were advanced at locations down gradient of the source area to delineate the horizontal extent of diesel related constituents of concern in soil. Due to the presence of extensive, facility-critical infrastructure within the area of investigation, the boring locations were limited. Soil samples collected from the borings were submitted for total petroleum hydrocarbons (TPHC) analysis. Analytical results of the soil samples did not indicate concentrations of TPHC above laboratory detection limits. Results of the soil investigation indicated that the release of diesel fuel had not migrated a significant distance beyond the source area and that diesel related constituents of concern in soil were likely limited to the source area and the "smear-zone" where separate phase diesel had migrated.

The soil borings were converted to monitoring/product recovery wells to facilitate the collection of groundwater samples and for the recovery of separate-phase diesel, if present. Water-level and product gauging and groundwater sampling were completed following installation of the wells. These activities utilized six monitoring wells (the five newly installed wells, and one previously existing monitoring well). The locations of the monitoring wells are shown on **Figure 2**. Water-level and product measurements indicated that the extent of measurable product is limited to the area of Well AU, located at the source area, and Well AW, located down gradient of the source area along the service water pipes. Measurable product was detected during a single gauging event in Well AZ. In April 2009, separate phase product was also observed in Well AI. This well is not sampled as part of the diesel remediation and investigation program. Investigation and recovery activities are further discussed in Section 4.

The extent to which product has migrated is controlled by the significant facility-related subsurface infrastructure. The foundation for the primary water storage tank located to the west of Well AU has prevented the migration of separate phase product in this direction. The service water piping that runs to the south from Well AU provided a preferential pathway for the migration of separate phase product towards Well AW. To delineate the extent of separate phase product to the south of Well AW along the service water piping, an additional monitoring well, Well BV, was installed in December 2006, as required by the NJDEP. Product recovery efforts completed to date have included the installation of a Spill Buster® Unit in Wells AU and/or AW, the installation and operation of a passive skimmer in Well AW, and the installation of sorbent socks within Wells AZ and AU. Details regarding the ongoing product recovery efforts are presented in Section 4.

Groundwater monitoring activities have been completed on a quarterly basis since the installation of the monitoring wells through December 2007. However, in the Remedial Action Progress Report dated February 2008 PSEG recommended moving from quarterly groundwater sampling to semiannual sampling. In a March 24, 2008 letter, NJDEP approved reducing groundwater monitoring to semi-annual events, completed in June and December. During the sampling events, groundwater samples are collected from wells that do not indicate the presence of separate phase product. The groundwater samples are submitted to a laboratory and are analyzed for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The details of groundwater monitoring activities completed during the reporting period and the results of groundwater monitoring activities completed to date are presented in Section 3 and Section 4.

3. December 2009 Semiannual Groundwater Monitoring

On December 8, 2009, semi-annual groundwater monitoring activities were conducted. Details regarding the sampling activities are presented in **Table 1**. The monitoring well network associated with the semi-annual gauging and sampling activities consists of the following seven monitoring wells: Well X, Well AU, Well AV, Well AW, Well AY, Well AZ, and Well BV. A summary table of well construction details for these wells is presented in **Table 2**. Semiannual groundwater monitoring activities consist of the gauging of groundwater and separate-phase product levels and the collection and analysis of groundwater samples from those wells that do not contain separate-phase product. The following sections provide the details and results of the gauging and sampling activities.

3.1 Water Level and Separate-Phase Product Measurements

Prior to the initiation of groundwater sampling activities, water-level and separate phase product measurements were obtained from each monitoring well using an electronic oil/water interface probe. Water-level and separate phase product measurements were also collected during routine maintenance of the product recovery systems. A summary of historic product gauging and groundwater elevation data is presented in **Table 3**. With the exception of a onetime detection of product in Well AZ and a recent detection in Well AI (Section 4), measurable product is limited to the area of Well AU and down gradient towards Well AW, consistent with the previous reporting period. The extent to which product has migrated to date has been generally controlled by the subsurface infrastructure located within the investigation area. With the repair of the diesel fuel underground piping, the ongoing product recovery efforts being conducted in Well AU and Well AW, when in operation (see Section 4), are successfully preventing further migration of product. Separate phase product measurements obtained from Well AY, located to the south and down gradient of Well AW along the service water pipes, provide delineation of the extent of separate phase product.

3.2 Monitoring Well Sampling

As discussed above, semiannual groundwater monitoring activities were completed in December 2009. During this sampling event, groundwater samples were only collected from monitoring wells that did not indicate a measurable thickness (i.e., greater than 0.01 feet) of separate-phase product. For this reason, Wells AU and AW were not sampled during the reporting period. Well AV was not sampled this period because it was inaccessible due to site operation related construction activities occurring adjacent to the monitoring well.

Due to the nature of the analytes being monitored and to ensure the quality of the groundwater data, groundwater samples are collected utilizing low-flow sampling methodology. Due to insufficient water in the wells and slow recharge rates, select wells need to be sampled with a disposable bailer to enable collection of sufficient sample volumes. Wells AY and X were sampled with a bailer during the December 2009 event. Sample collection procedures, as well as quality assurance/quality control (QA/QC) sampling requirements, were completed in accordance with the Quality Assurance Project Plan (QAPP) presented in the January 2005 RIWP. Groundwater sampling logs for the samples collected during the reporting period are included in **Appendix A**. Groundwater samples were submitted to Accutest Laboratories of

Dayton, New Jersey. The groundwater samples were analyzed for priority pollutant list VOCs and SVOCs including a library search. Laboratory reports and HazSite deliverables for the groundwater monitoring events are included as **Appendix B**. Analytical results of the groundwater samples collected during the reporting period, as well as analytical results of groundwater samples collected since the initiation of investigation activities, are discussed in the following section.

3.3 Analytical Results

Table 4 and **5** presents groundwater analytical results for VOCs and SVOCs obtained since December 2004 from monitoring wells utilize in the diesel investigation. **Figure 3** shows all constituent detections during the December 2009 sampling event. The following summary compares analytical results to the NJDEP Groundwater Quality Standards (GWQS) listed at New Jersey Administrative Code (N.J.A.C.) 7:9C. Analytical results of these samples indicate the following:

- Concentrations of VOCs and SVOCs were not detected in Wells AZ, AY and BV.
- Concentrations of VOCs and SVOCs consistent with a diesel release were detected in Well X at concentrations above laboratory detection limits, but below GWQS.
- Analytical results for groundwater monitoring activities completed to date continue to indicate that impacts associated with the release of diesel fuel from the bulk storage tanks are limited to the area of separate phase product, which extends down gradient from the source area to Well AW.

4. Ongoing Product Recovery

Separate phase product recovery continues at Well AU, installed within the source area, and Well AW, installed immediately down gradient of the source area along the service water piping. Separate phase product recovery includes the operation and maintenance of the Spill Buster® product recovery system, the operation of a passive skimmer, and the use of sorbent socks. Use of these methods has resulted in the recovery of approximately 705.9 gallons of separate phase product to date. During the reporting period, approximately 6.2 gallons of separate-phase product were recovered.

5. Product Recovery at Well AI

During routine monitoring of the tritium well system in April 2009, separate phase product was observed in Well AI. The presence of separate phase product in this well is attributed to the pumping activity at Well AO, associated with the tritium investigation and remediation. Over the six month period of Well AO pumping, a gradient was created for separate phase product to flow, causing the diesel product to be pulled in the direction of Well AO and flowing into Well AI. On May 28, 2009, separate phase product recovery was initiated at Well AI. Subsequent monitoring events have shown a decrease of observable separate phase product. Since June 2009, separate phase product has not been observed in Well AI. PSEG continues to monitor Well AI for separate phase product during monthly recovery activities.

6. Fuel Handling Investigation

During construction activities for an unrelated project, a soft dig crew was employing vacuum extraction within the immediate area of the diesel project location (**Figure 2**). Their task was to soft dig a trench on either side of the asphalt from the Salem #1 Fuel Handling Building to a depth of 5 feet bgs. During their activities, soil was encountered that had an odor and groundwater was observed in the trench with a noticeable sheen. On June 12, 2009, ARCADIS was contacted to assist with sample collection activities from the trench. Results of the June 2009 sampling event were reported in *Remedial Action Progress Report January through June 2009* (ARCADIS 2009).

On September 22, 2009, ARCADIS was contacted to assist with additional sampling associated with the trenching activities. Samples were collected to characterize soil in three test pits where soils expected of containing diesel related constituents were encountered. **Figure 4** identifies the location of the three test pits (TP-10, TP-11 and TP-12) and analytical results from samples collected from the test pits. Test pits were advanced to 2.5 feet bgs. ARCADIS screened excavated soil using a photoionization detector (PID). Soil samples were biased to areas showing the highest PID readings.

Analytical results of the soil samples collected from the perimeter of the test pits indicate that the concentrations are below the applicable NJDEP Unrestricted Use (residential) Soil Remedial Standards. Samples were collected for analysis of diesel range organic (DRO) extractable hydrocarbons (EPH) and contingent samples for SVOC analysis via USEPA SW846 Method 8015.

Analytical data in **Table 5** indicate that detected concentrations of DRO EPH range between 3,710 milligrams per kilogram (mg/kg) at TP-10 to 12.4 mg/kg at TP-12. Additionally, detections of SVOCs in contingency sample TP-10 were not detected or detected at concentrations less than the NJDEP Unrestricted Use (residential) Soil Remedial Standards.

7. Proposed Actions

Based on the results of investigation activities and interim remedial actions completed to date, the following actions are proposed for the upcoming reporting period, January 2010 through June 2010:

- PSEG will continue to collect groundwater samples on a semiannual basis with the next event to be conducted in June 2010. Groundwater monitoring will continue to consist of the collection and analysis of groundwater samples from those wells not indicating the presence of separate phase product. Groundwater samples will be analyzed for VOCs and SVOCs to evaluate the extent, if any, of dissolved phase constituents of concern. In addition, product recovery efforts will remain ongoing.

- Semiannual Remedial Action Progress Reports will continue to be prepared to update the NJDEP with the status of product recovery efforts and groundwater analytical results;

- Following completion of the product recovery efforts (i.e., measurable separate phase product is no longer detected) eight consecutive rounds of quarterly sampling will be completed (assuming concentrations of constituents of concern are above applicable GWQC) as required by the Mann-Whitney U-Test. The analytical results from these sampling events will be evaluated to determine if there are decreasing analytical trends; and,

- Following completion of the eight consecutive rounds of quarterly sampling, PSEG will either: 1) propose no further action for groundwater if groundwater analytical results continue to be below applicable GWQC; or, 2) establish a classification exception area and prepare a Remedial Action Work Plan that proposes a groundwater remediation strategy.

8. Groundwater Monitoring Program Details and Schedule

Following completion of the next semiannual groundwater monitoring event, currently scheduled for June 2010, groundwater analytical results and the results of product recovery efforts will be reported in Remedial Action Progress Report January through June 2010. The anticipated schedule for the groundwater monitoring program through the next reporting period is summarized below.

Groundwater Monitoring:

Semiannual event (VOCs and SVOCs)	June 2010

Reporting:

Remedial Action Progress Report January 2010 through June 2010	September 31, 2010

Table 01. *Summary of Sampling Activities Completed During the Reporting Period* (Semiannual, December 2009), PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey.

Sampling Event	Wells Sampled*	Wells Not Sampled
December-09	MW-AY MW-AZ MW-BV MW-X	MW-AU MW-AW MW-AV

Notes

* Groundwater samples were submitted to laboratory for VOCs and SVOC analysis using methods 8260b and 8270c, respectively.

Table 02. Well Construction Details, PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey.

Well ID	Installation Date	Well Permit Number	Well Purpose	Construction Materials	Diameter (inches)	GS Elevation (feet amsl)	MP Elevation (feet amsl)	Northing (NAD 83)	Easting (NAD 83)	Total Depth (feet bgs)	Monitoring Interval (feet bgs)	Monitoring Interval (feet amsl)
Well X	06/11/03	3400007018	Monitoring	Sch-40 PVC	1.0	9.47	12.00	230,851	199,547	10.0	2.0 to 10.0	7.5 to -0.5
Well AU	11/09/04	3400007375	Product Recovery	Sch-40 PVC	6.0	9.44	8.46	230,868	199,525	7.0	4.0 to 7.0	5.4 to 2.4
Well AV	11/08/04	3400007370	Monitoring	Sch-40 PVC	4.0	9.17	8.82	230,831	199,469	10.0	3.0 to 10.0	6.2 to -0.8
Well AW	11/08/04	3400007372	Product Recovery	Sch-40 PVC	4.0	9.48	9.16	230,837	199,516	9.0	3.0 to 9.0	6.5 to 0.5
Well AY	11/08/04	3400007373	Monitoring	Sch-40 PVC	4.0	9.40	9.04	230,805	199,521	8.0	3.0 to 8.0	6.4 to 1.4
Well AZ	11/08/04	3400007374	Monitoring	Sch-40 PVC	4.0	9.33	8.66	230,764	199,551	9.0	3.0 to 9.0	6.3 to 0.3
Well BV	12/05/06	3400007816	Monitoring	Sch-40 PVC	4.0	9.32	8.85	230,768	199,526	10.0	3.0 to 10.0	6.3 to -0.7

Notes:

GS	Ground Surface
MP	Measuring Point
bgs	Below ground surface
amsl	Feet above mean sea level (NAVD88)

Table 03. Groundwater Elevations and Product Thickness, PSEG Salem Generating Station, Hancock's Bridge, New Jersey.

Well Identification	Date of Measurement	Reference Point Elevation (NGVD 1988)	Depth to Product (ft btoc)	Depth to Water (ft btoc)	Product Thickness (feet)	Water-Level Elevation (ft amsl)	Corrected Water Level Elevation (ft amsl)
Well X	12/07/04	12.00	–	7.16	–	4.84	–
	12/10/04	12.00	–	6.36	–	5.64	–
	12/13/04	12.00	–	6.68	–	5.32	–
	12/22/04	12.00	NM	NM	NM	NM	NM
	1/13/05	12.00	–	7.66	–	4.34	–
	1/27/05	12.00	–	8.11	–	3.89	–
	2/10/05	12.00	–	7.70	–	4.30	–
	2/23/05	12.00	Sheen	7.47	<0.01	4.53	–
	3/24/05	12.00	–	7.81	–	4.19	–
	4/8/05	12.00	–	6.78	–	5.22	–
	4/26/05	12.00	–	7.65	–	4.35	–
	6/28/05	12.00	–	8.57	–	3.43	–
	7/20/05	12.00	–	8.01	–	3.99	–
	8/17/05	12.00	–	7.60	–	4.40	–
	9/13/05	12.00	–	8.45	–	3.55	–
	10/3/05	12.00	–	9.46	–	2.54	–
	12/15/05	12.00	–	9.28	–	2.72	–
	3/28/06	12.00	Dry	Dry	–	–	–
	9/26/06	12.00	–	8.74	–	3.26	–
	12/4/06	12.00	–	8.09	–	3.91	–
	3/6/07	12.00	–	8.81	–	3.19	–
	6/12/07	12.00	–	8.16	–	3.84	–
	9/25/07	12.00	–	9.98	–	2.02	–
	12/10/07	12.00	–	9.08	–	2.92	–
	6/26/08	12.00	–	7.88	–	4.12	–
	12/15/08	*12.00*	–	*8.20*	–	*3.80*	–
	6/1/09	12.00	–	8.02	–	3.98	–
	12/7/09	12.00	–	6.77	–	5.23	–
Well AU	12/07/04	8.46	NM	NM	NM	NM	NM
	12/10/04	8.46	1.84	2.29	0.45	6.17	6.50
	12/13/04	8.46	2.84	3.35	0.51	5.11	5.49
	12/22/04	8.46	4.22	5.45	1.23	3.01	3.92
	1/13/05	8.46	3.68	5.44	1.76	3.02	4.32
	*1/17/05**	*9.81*	*4.15*	*4.40*	*0.25*	*5.41*	*5.60*
	1/24/05	9.81	5.40	5.50	0.10	4.31	4.38
	1/26/05	9.81	4.90	5.10	0.20	4.71	4.86
	1/27/05	9.81	5.50	5.69	0.19	4.12	4.26
	1/31/05	9.81	5.45	5.50	0.05	4.31	4.35
	2/4/05	9.81	5.40	5.60	0.20	4.21	4.36
	2/8/05	9.81	5.15	5.40	0.25	4.41	4.60
	2/10/05	9.81	5.34	5.68	0.34	4.13	4.38
	2/16/05	9.81	3.90	4.30	0.40	5.51	5.81
	2/22/05	9.81	4.60	4.80	0.20	5.01	5.16
	2/23/05	9.81	4.96	5.12	0.16	4.69	4.81
	2/28/05	9.81	4.60	4.78	0.18	5.03	5.16
	3/7/05	9.81	4.74	5.00	0.26	4.81	5.00
	3/14/05	9.81	5.16	5.48	0.32	4.33	4.57
	3/21/05	9.81	5.40	5.70	0.30	4.11	4.33
	3/24/05	9.81	3.41	3.42	0.01	6.39	6.40
	3/29/05	9.81	3.10	3.70	0.60	6.11	6.55
	4/5/05	9.81	4.00	4.10	0.10	5.71	5.78
	4/8/05	9.81	2.87	2.91	0.04	6.90	6.93
	4/26/05	9.81	4.35	4.55	0.20	5.26	5.41
	6/28/05	9.81	5.66	5.74	0.08	4.07	4.13
	7/8/05	9.81	1.10	1.20	0.10	8.61	8.68
	7/20/05	9.81	5.25	5.60	0.35	4.21	4.47
	7/25/05	9.81	4.78	5.05	0.27	4.76	4.96
	7/28/05	9.81	3.08	3.55	0.47	6.26	6.61
	8/1/05	9.81	5.08	5.30	0.22	4.51	4.67
	8/5/05	9.81	5.50	5.85	0.35	3.96	4.22
	8/8/05	9.81	5.35	5.60	0.25	4.21	4.40
	8/12/05	9.81	4.75	4.85	0.10	4.96	5.03
	8/16/05	9.81	4.60	4.70	0.10	5.11	5.18

Notes: See Last Page for Notes.

Table 03. Groundwater Elevations and Product Thickness, PSEG Salem Generating Station, Hancock's Bridge, New Jersey.

Well AU (continued)	8/17/05	9.81	3.36	3.38	0.02	6.43	6.44
	8/19/05	9.81	4.05	4.20	0.15	5.61	5.72
	8/22/05	9.81	5.65	5.85	0.20	3.96	4.11
	8/26/05	9.81	5.35	5.55	0.20	4.26	4.41
	8/29/05	9.81	4.75	5.15	0.40	4.66	4.96
	9/2/05	9.81	4.75	5.10	0.35	4.71	4.97
	9/6/05	9.81	5.50	5.75	0.25	4.06	4.25
	9/9/05	9.81	5.55	5.65	0.10	4.16	4.23
	9/12/05	9.81	5.70	6.00	0.30	3.81	4.03
	10/3/05	9.81	6.34	NA	NA	NA	NA
	10/10/05	9.81	3.35	4.70	1.35	5.11	6.11
	10/14/05	9.81	3.05	3.35	0.30	6.46	6.68
	10/28/05	9.81	4.00	4.20	0.20	5.61	5.76
	10/19/05	9.81	4.86	5.65	0.79	4.16	4.74
	10/31/05	9.81	4.60	5.20	0.60	4.61	5.05
	11/4/05	9.81	5.45	5.55	0.10	4.26	4.33
	11/7/05	9.81	5.90	6.15	0.25	3.66	3.85
	11/11/05	9.81	6.01	6.58	0.57	3.23	3.65
	11/15/05	9.81	6.30	NA	NA	NA	NA
	11/18/05	9.81	5.58	6.40	0.82	3.41	4.02
	11/28/05	9.81	5.86	6.45	0.59	3.36	3.80
	12/2/05	9.81	4.20	5.60	1.40	4.21	5.25
	12/5/05	9.81	5.40	5.50	0.10	4.31	4.38
	12/8/05	9.81	6.05	6.58	0.53	3.23	3.62
	12/12/05	9.81	5.20	6.58	1.38	3.23	4.25
	12/15/05	9.81	5.99	6.06	0.07	3.75	3.80
	12/16/05	9.81	3.20	6.58	3.38	3.23	5.73
	12/23/05	9.81	5.95	6.58	0.63	3.23	3.70
	12/27/05	9.81	5.85	6.58	0.73	3.23	3.77
	12/30/05	9.81	4.10	4.25	0.15	5.56	5.67
	1/3/06	9.81	3.35	3.45	0.10	6.36	6.43
	1/6/06	9.81	4.55	4.75	0.20	5.06	5.21
	1/10/06	9.81	5.90	6.05	0.15	3.76	3.87
	1/12/06	9.81	5.95	6.00	0.05	3.81	3.85
	1/16/06	9.81	5.80	6.25	0.45	3.56	3.89
	1/16/06	9.81	6.15	6.25	0.10	3.56	3.63
	1/19/06	9.81	4.25	4.30	0.05	5.51	5.55
	1/23/06	9.81	2.20	2.40	0.20	7.41	7.56
	1/30/06	9.81	5.15	5.25	0.10	4.56	4.63
	2/3/06	9.81	5.75	5.85	0.10	3.96	4.03
	2/6/06	9.81	5.45	5.55	0.10	4.26	4.33
	2/9/06	9.81	5.95	6.05	0.10	3.76	3.83
	2/13/06	9.81	4.50	5.20	0.70	4.61	5.13
	2/17/06	9.81	4.70	4.90	0.20	4.91	5.06
	2/21/06	9.81	5.60	5.75	0.15	4.06	4.17
	2/24/06	9.81	5.95	6.05	0.10	3.76	3.83
	2/27/06	9.81	6.20	6.35	0.15	3.46	3.57
	3/3/06	9.81	6.30	6.55	0.25	3.26	3.45
	3/6/06	9.81	6.40	NA	NA	NA	NA
	3/10/06	9.81	6.53	NA	NA	NA	NA
	3/13/06	9.81	Dry	Dry	Dry	Dry	Dry
	3/20/06	9.81	Dry	Dry	Dry	Dry	Dry
	3/24/06	9.81	Dry	Dry	Dry	Dry	Dry
	3/28/06	9.81	Dry	Dry	Dry	Dry	Dry
	3/29/06	9.81	Dry	Dry	Dry	Dry	Dry

Notes: See Last Page for Notes.

Table 03. Groundwater Elevations and Product Thickness, PSEG Salem Generating Station, Hancock's Bridge, New Jersey.

Well AU (continued)	4/4/06	9.81	Dry	Dry	Dry	Dry	Dry
	4/10/06	9.81	6.38	6.40	0.02	3.41	3.42
	4/17/06	9.81	Dry	Dry	Dry	Dry	Dry
	4/24/06	9.81	3.15	3.60	0.45	6.21	6.54
	4/28/06	9.81	4.70	4.80	0.10	5.01	5.08
	5/1/06	9.81	5.85	5.90	0.05	3.91	3.95
	5/5/06	9.81	6.10	6.20	0.10	3.61	3.68
	5/9/06	9.81	6.28	NA	NA	NA	NA
	5/12/06	9.81	5.44	6.15	0.71	3.66	4.19
	5/12/06	9.81	5.92	6.00	0.08	3.81	3.87
	5/15/06	9.81	4.60	4.70	0.10	5.11	5.18
	5/19/06	9.81	5.80	5.90	0.10	3.91	3.98
	5/22/06	9.81	6.25	6.38	0.13	3.43	3.53
	5/30/06	9.81	Dry	Dry	Dry	Dry	Dry
	6/6/06	9.81	4.30	4.90	0.60	4.91	5.35
	6/16/06	9.81	5.10	5.25	0.15	4.56	4.67
	6/22/06	9.81	5.50	5.70	0.20	4.11	4.26
	6/23/06	9.81	5.70	5.80	0.10	4.01	4.08
	6/30/06	9.81	3.08	3.15	0.07	6.66	6.71
	7/5/06	9.81	2.25	2.35	0.10	7.46	7.53
	7/10/06	9.81	3.40	3.50	0.10	6.31	6.38
	7/14/06	9.81	3.65	3.75	0.10	6.06	6.13
	7/17/06	9.81	4.07	4.25	0.18	5.56	5.69
	7/21/06	9.81	4.35	4.50	0.15	5.31	5.42
	7/24/06	9.81	2.55	2.70	0.15	7.11	7.22
	7/28/06	9.81	3.35	3.45	0.10	6.36	6.43
	7/31/06	9.81	3.55	3.60	0.05	6.21	6.25
	8/3/06	9.81	3.70	3.75	0.05	6.06	6.10
	8/7/06	9.81	4.20	4.25	0.05	5.56	5.60
	8/11/06	9.81	4.55	4.60	0.05	5.21	5.25
	8/14/06	9.81	5.00	5.05	0.05	4.76	4.80
	8/18/06	9.81	5.45	5.55	0.10	4.26	4.33
	8/21/06	9.81	5.45	5.55	0.10	4.26	4.33
	8/28/06	9.81	3.15	3.20	0.05	6.61	6.65
	8/31/06	9.81	3.90	3.95	0.05	5.86	5.90
	9/5/06	9.81	3.55	3.60	0.05	6.21	6.25
	9/8/06	9.81	3.75	3.80	0.05	6.01	6.05
	9/11/06	9.81	4.40	4.45	0.05	5.36	5.40
	9/14/06	9.81	4.90	4.95	0.05	4.86	4.90
	9/22/06	9.81	4.40	4.45	0.05	5.36	5.40
	9/25/06	9.81	4.60	4.65	0.05	5.16	5.20
	10/2/06	9.81	4.50	4.65	0.15	5.16	5.27
	10/5/06	9.81	5.05	5.10	0.05	4.71	4.75
	10/9/06	9.81	3.80	3.90	0.10	5.91	5.98
	10/12/06	9.81	2.65	2.70	0.05	7.11	7.15
	10/17/06	9.81	4.35	4.40	0.05	5.41	5.45
	10/20/06	9.81	1.85	1.90	0.05	7.91	7.95
	10/23/06	9.81	3.85	3.90	0.05	5.91	5.95
	10/31/06	9.81	3.80	3.85	0.05	5.96	6.00
	11/6/06	9.81	5.45	5.50	0.05	4.31	4.35
	11/10/06	9.81	3.25	3.30	0.05	6.51	6.55
	11/13/06	9.81	2.60	2.65	0.05	7.16	7.20
	11/20/06	9.81	3.65	3.70	0.05	6.11	6.15
	11/27/06	9.81	4.10	4.15	0.05	5.66	5.70
	12/4/06	9.81	5.05	5.10	0.05	4.71	4.75
	12/8/06	9.81	5.80	5.85	0.05	3.96	4.00
	12/11/06	9.81	6.00	6.05	0.05	3.76	3.80
	9/25/07	9.81	–	5.15	–	4.66	–
	12/10/07	9.81	3.75	4.02	0.27	5.79	5.99
	6/25/08	9.81	3.46	3.62	0.16	6.19	6.31
	7/21/08	9.81	3.50	3.62	0.12	6.19	6.28
	8/15/08	9.81	3.25	3.42	0.17	6.39	6.52
	9/11/08	9.81	3.05	3.20	0.15	6.61	6.72
	10/8/08	9.81	4.21	4.45	0.24	5.36	5.54
	11/4/08	9.81	4.36	5.30	0.94	4.51	5.21
	12/15/08	9.81	3.31	3.90	0.59	5.91	6.35
	1/14/09	9.81	6.15	6.24	0.09	3.57	3.64
	2/12/09	9.81	5.81	5.83	0.02	3.98	3.99
	3/9/09	9.81	–	7.20	–	2.61	–
	3/30/09	9.81	6.78	6.80	0.02	3.01	3.02
	5/28/09	9.81	5.55	5.90	0.35	3.91	4.17
	6/1/09	9.81	4.76	4.81	0.05	5.00	5.04
	6/30/09	9.81	4.65	4.67	0.02	5.14	5.15
	7/28/09	9.81	5.65	5.71	0.06	4.10	4.14
	8/24/09	9.81	3.23	3.24	0.01	6.57	6.58
	9/17/09	9.81	4.25	4.27	0.02	5.54	5.55
	10/13/09	9.81	6.17	6.20	0.03	3.61	3.63
	11/6/09	9.81	5.07	5.46	0.39	4.35	4.64
	12/7/09	9.81	4.55	4.61	0.06	5.20	5.24

Notes: See Last Page for Notes.

Table 03. Groundwater Elevations and Product Thickness, PSEG Salem Generating Station, Hancock's Bridge, New Jersey.

Well AV	12/07/04	8.82	–	4.85	–	3.97	–
	12/10/04	8.82	–	4.60	–	4.22	–
	12/13/04	8.82	–	4.55	–	4.27	–
	12/22/04	8.82	–	5.11	–	3.71	–
	1/13/05	8.82	–	5.09	–	3.73	–
	2/10/05	8.82	–	4.86	–	3.96	–
	2/23/05	8.82	–	4.69	–	4.13	–
	3/24/05	8.82	–	4.83	–	3.99	–
	4/8/05	8.82	–	4.20	–	4.62	–
	4/26/05	8.82	–	4.72	–	4.10	–
	6/28/05	8.82	–	5.07	–	3.75	–
	7/20/05	8.82	–	4.81	–	4.01	–
	8/17/05	8.82	–	5.10	–	3.72	–
	9/13/05	8.82	–	5.21	–	3.61	–
	10/3/05	8.82	–	5.89	–	2.93	–
	12/15/05	8.82	–	6.14	–	2.68	–
	3/28/06	8.82	–	7.04	–	1.78	–
	6/22/06	8.82	–	5.86	–	2.96	–
	9/26/06	8.82	–	5.44	–	3.38	–
	12/4/06	8.82	–	5.28	–	3.54	–
	3/6/07	8.82	–	6.07	–	2.75	–
	6/12/07	8.82	–	4.90	–	3.92	–
	9/25/07	8.82	–	6.21	–	2.61	–
	12/10/07	8.82	–	5.88	–	2.94	–
	6/26/08	8.82	–	4.63	–	4.19	–
	12/15/08	8.82	–	5.17	–	3.65	–
	6/1/09	8.82	–	4.67	–	4.15	–
	12/7/09	8.82	–	3.70	–	5.12	–
Well AW	12/07/04	9.16	4.14	4.17	0.03	4.99	5.01
	12/10/04	9.16	3.71	5.83	2.12	3.33	4.90
	12/13/04	9.16	3.99	7.06	3.07	2.10	4.37
	12/22/04*	10.10	6.06	6.16	0.10	3.94	4.01
	12/27/04*	10.10	6.70	6.75	0.05	3.35	3.39
	1/3/05*	10.10	6.30	6.50	0.20	3.60	3.75
	1/10/05*	10.10	5.90	6.00	0.10	4.10	4.17
	1/13/05*	10.10	6.95	7.01	0.06	3.09	3.13
	1/27/05	9.16	5.37	6.12	0.75	3.04	3.60
	2/10/05	9.16	5.11	6.11	1.00	3.05	3.79
	2/23/05	9.16	4.78	6.11	1.33	3.05	4.03
	3/24/05	9.16	4.44	6.25	1.81	2.91	4.25
	4/8/05	9.16	3.66	6.05	2.39	3.11	4.88
	4/26/05	9.16	4.72	6.85	2.13	2.31	3.89
	6/28/05	9.16	5.31	7.29	1.98	1.87	3.34
	7/20/05	9.16	4.78	6.84	2.06	2.32	3.84
	8/17/05	9.16	4.69	6.33	1.64	2.83	4.04
	9/9/05	9.16	5.40	7.20	1.80	1.96	3.29
	9/13/05	9.16	5.57	7.41	1.84	1.75	3.11
	10/3/05	9.16	6.12	7.49	1.37	1.67	2.68
	12/12/05	9.16	5.90	6.90	1.00	2.26	3.00
	12/15/005	9.16	5.92	6.97	1.05	2.19	2.97
	2/17/06	9.16	5.70	5.90	0.20	3.26	3.41
	3/3/06	9.16	6.25	7.00	0.75	2.16	2.72
	3/10/06	9.16	6.40	7.05	0.65	2.11	2.59
	3/28/06	9.16	7.01	7.65	0.64	1.51	1.98
	5/15/06	9.16	7.50	7.85	0.35	1.31	1.57
	6/22/06	9.16	5.90	6.15	0.25	3.01	3.20
	8/21/06	9.16	5.80	6.45	0.65	2.71	3.19
	12/4/06	9.16	5.97	6.41	0.44	2.75	3.08
	3/6/07	9.16	7.00	7.02	0.02	2.14	2.15
	6/12/07	9.16	6.13	6.51	0.38	2.65	2.93
	9/25/07	9.16	6.72	6.87	0.15	2.29	2.40
	12/10/07	9.16	6.30	6.40	0.10	2.76	2.83
	6/25/08	9.16	5.61	6.61	1.00	2.55	3.29
	7/21/08	9.16	6.65	7.71	1.06	1.45	2.23
	8/15/08	9.16	6.35	7.25	0.90	1.91	2.58
	9/11/08	9.16	6.08	6.81	0.73	2.35	2.89
	10/8/08	9.16	6.78	6.90	0.12	2.26	2.35
	11/4/08	9.16	7.16	7.21	0.05	1.95	1.99
	12/15/08	9.16	6.42	6.45	0.03	2.71	2.73
	1/14/09	9.16	5.70	5.80	0.10	3.36	3.43
	2/12/09	9.16	–	6.71	–	2.45	–
	3/9/09	9.16	–	6.85	–	2.31	–
	3/30/09	9.16	–	6.81	–	2.35	–
	5/28/09	9.16	5.54	5.75	0.21	3.41	3.57
	6/1/09	9.16	5.51	5.62	0.11	3.54	3.62
	6/30/09	9.16	4.81	5.25	0.44	3.91	4.24
	9/17/09	9.16	4.22	4.41	0.19	4.75	4.89
	10/13/09	9.16	5.36	6.19	0.83	2.97	3.58
	11/6/09	9.16	5.00	5.65	0.65	3.51	3.99
	12/7/09	9.16	4.15	4.70	0.55	4.46	4.87

Notes: See Last Page for Notes.

Table 03. Groundwater Elevations and Product Thickness, PSEG Salem Generating Station, Hancock's Bridge, New Jersey.

Well AY	12/07/04	9.04	–	4.68	–	4.36	–
	12/10/04	9.04	–	4.35	–	4.69	–
	12/13/04	9.04	–	4.43	–	4.61	–
	12/22/04	9.04	–	5.13	–	3.91	–
	1/13/05	9.04	–	5.08	–	3.96	–
	1/27/05	9.04	–	5.29	–	3.75	–
	2/23/05	9.04	–	4.82	–	4.22	–
	3/24/05	9.04	–	4.82	–	4.22	–
	4/8/05	9.04	–	4.03	–	5.01	–
	4/26/05	9.04	–	4.77	–	4.27	–
	6/28/05	9.04	–	5.51	–	3.53	–
	7/20/05	9.04	–	5.04	–	4.00	–
	8/17/05	9.04	–	5.10	–	3.94	–
	9/13/05	9.04	–	5.57	–	3.47	–
	10/3/05	9.04	–	6.18	–	2.86	–
	12/15/05	9.04	–	6.12	–	2.92	–
	3/28/06	9.04	–	6.76	–	2.28	–
	6/23/06	9.04	–	5.97	–	3.07	–
	9/26/06	9.04	–	5.58	–	3.46	–
	12/4/06	9.04	–	5.35	–	3.69	–
	3/6/07	9.04	–	6.84	–	2.20	–
	6/12/07	9.04	–	5.32	–	3.72	–
	9/25/07	9.04	–	6.51	–	2.53	–
	12/10/07	9.04	–	6.34	–	2.70	–
	6/26/08	9.04	–	6.95	–	2.09	–
	12/15/08	9.04	–	6.57	–	2.47	–
	6/1/09	9.04	–	5.95	–	3.09	–
	12/7/09	9.04	–	4.07	–	4.97	–
Well AZ	12/07/04	8.66	–	4.45	–	4.21	–
	12/10/04	8.66	–	4.09	–	4.57	–
	12/13/04	8.66	–	4.08	–	4.58	–
	12/22/04	8.66	–	4.69	–	3.97	–
	1/13/05	8.66	–	4.70	–	3.96	–
	1/27/05	8.66	–	4.91	–	3.75	–
	2/10/05	8.66	–	4.69	–	3.97	–
	2/23/05	8.66	–	4.46	–	4.20	–
	3/24/2005**	8.66	4.66	4.75	0.09	3.91	3.98
	4/8/05	8.66	–	3.78	–	4.88	–
	4/26/05	8.66	–	4.74	–	3.92	–
	6/28/05	8.66	–	5.42	–	3.24	–
	7/20/05	8.66	–	5.10	–	3.56	–
	8/17/05	8.66	–	5.41	–	3.25	–
	9/13/05	8.66	–	5.46	–	3.20	–
	10/3/05	8.66	–	6.11	–	2.55	–
	12/15/05	8.66	–	6.05	–	2.61	–
	3/28/06	8.66	–	6.59	–	2.07	–
	6/22/2006	8.66	–	5.99	–	2.67	–
	9/26/2006	8.66	–	5.66	–	3.00	–
	12/4/2006	8.66	–	5.21	–	3.45	–
	1/2/2007	8.66	–	5.51	–	3.15	–
	3/6/07	8.66	–	6.09	–	2.57	–
	6/12/07	8.66	–	5.20	–	3.46	–
	9/25/07	8.66	–	6.31	–	2.35	–
	12/10/07	8.66	–	6.50	–	2.16	–
	6/26/08	8.66	–	4.62	–	4.04	–
	12/15/08	8.66	–	5.16	–	3.50	–
	6/1/09	8.66	–	4.85	–	3.81	–
	12/7/09	8.66	–	4.23	–	4.43	–
Well BV	3/6/07	8.85	–	5.95	–	2.90	–
	6/12/07	8.85	–	5.12	–	3.73	–
	9/25/07	8.85	–	6.23	–	2.62	–
	12/10/07	8.85	–	6.00	–	2.85	–
	6/26/08	8.85	–	4.66	–	4.19	–
	12/15/08	8.85	–	5.33	–	3.52	–
	6/1/09	8.85	–	4.74	–	4.11	–
	12/7/09	8.85	–	4.21	–	4.64	–

Notes

–	Separate-phase product was not detected in well at time of measurement.
NM	Measurement not collected.
NAVD 1988	North American Vertical Datum established in 1988.
ft btoc	Feet below the top of the well casing.
ft amsl	Feet above mean sea level (NAVD 1988).
*	A PVC riser was added to top of wellhead to facilitate installation of Spillbuster unit, accounting for change in wellhead elevation
**	Due to the operation of a groundwater extraction well (Well AO) in the vicinity of Well AZ, separate-phase product migrated in the direction of this well. Following the detection of separate-phase product in Well AZ, groundwater extraction from Well AO was discontinued.

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AV									
	Sample Date	12/13/2004	3/15/2005		8/17/2005		10/4/2005	3/28/2006		6/22/2006	
	Sample Type Code	N	FD	N	FD	N	N	FD	N	FD	N
	GWQC (ug/L)										
1,1,1-Trichloroethane	30	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2,2-Tetrachloroethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2-Trichloroethane	3	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	50	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethane	2	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethene (total)	---										
1,2-Dichloropropane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2-Butanone (MEK)	300	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	**7.9 J**	**7.9 J**
2-Hexanone	---	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Methyl-2-pentanone(MIBK)	---	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Acetone	6000	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	**11.8**	**8.1 J**
Benzene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromodichloromethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromoform	4	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U
Bromomethane	10	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon disulfide	700	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon tetrachloride	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chlorobenzene	50	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroethane	---	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroform	70	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloromethane	---	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	70	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromochloromethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	700	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Methylene chloride	3	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Styrene	100	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Tetrachloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	100	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

Notes:
(see last page)

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AV									
	Sample Date	9/27/2006		12/4/2006		9/26/2007		12/11/2007		6/26/2008	
	Sample Type Code	FD	N	FD	N	FD	N	FD	N	FD	N
	GWQC (ug/L)										
1,1,1-Trichloroethane	30	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2,2-Tetrachloroethane	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2-Trichloroethane	3	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	50	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethane	2	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethene (total)	---							< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloropropane	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2-Butanone (MEK)	300	< 10	< 10	< 10	< 10	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
2-Hexanone	---	< 5	< 5	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Methyl-2-pentanone(MIBK)	---	< 5	< 5	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Acetone	6000	< 10	< 10	< 10	< 10	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
Benzene	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromodichloromethane	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromoform	4	< 4	< 4	< 4	< 4	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U
Bromomethane	10	< 2	< 2	< 2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon disulfide	700	< 2	< 2	< 2	< 2	**0.26 J**	**0.25 J**	< 2 U	< 2 U	< 2 U	< 2 U
Carbon tetrachloride	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chlorobenzene	50	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroethane	---	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroform	70	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloromethane	---	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	70	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,3-Dichloropropene	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromochloromethane	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Methylene chloride	3	< 2	< 2	< 2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Styrene	100	< 5	< 5	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Tetrachloroethene	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	1000	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	100	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,3-Dichloropropene	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	1	< 1	< 1	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	1000	< 1	< 1	< 1	**0.43**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

Notes:
(see last page)

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AV				WELL-AY					
	Sample Date	12/16/2008		6/2/2009		12/13/2004	7/21/2005	10/4/2005	3/29/2006	6/23/2006	9/27/2006
	Sample Type Code	N	FD	FD	N	N	N	N	N	N	N
	GWQC (ug/L)										
1,1,1-Trichloroethane	30	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
1,1,2,2-Tetrachloroethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
1,1,2-Trichloroethane	3	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
1,1-Dichloroethane	50	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
1,1-Dichloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
1,2-Dichloroethane	2	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
1,2-Dichloroethene (total)	---	< 1 U	< 1 U	< 1 U	< 1 U						
1,2-Dichloropropane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
2-Butanone (MEK)	300	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10
2-Hexanone	---	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5
4-Methyl-2-pentanone(MIBK)	---	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5
Acetone	6000	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10
Benzene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Bromodichloromethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Bromoform	4	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4
Bromomethane	10	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2
Carbon disulfide	700	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2
Carbon tetrachloride	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Chlorobenzene	50	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Chloroethane	---	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Chloroform	70	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Chloromethane	---	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
cis-1,2-Dichloroethene	70	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
cis-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Dibromochloromethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Ethylbenzene	700	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	**2**	< 1 U	< 1
Methylene chloride	3	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2
Styrene	100	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5
Tetrachloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Toluene	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
trans-1,2-Dichloroethene	100	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
trans-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Trichloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Vinyl chloride	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1
Xylene (total)	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	**1.2**	< 1 U	< 1

Notes:
(see last page)

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AY								WELL-AZ		
	Sample Date	12/5/2006	9/27/2007	12/12/2007	6/27/2008	12/17/2008	6/3/2009	12/8/2009	12/8/2009	12/10/2004	8/17/2005	10/4/2005
	Sample Type Code	N	N	N	N	N	N	FD	N	N	N	N
	GWQC (ug/L)											
1,1,1-Trichloroethane	30	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2,2-Tetrachloroethane	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2-Trichloroethane	3	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	50	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethane	2	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethene (total)	---			< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U			
1,2-Dichloropropane	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2-Butanone (MEK)	300	< 10	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
2-Hexanone	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Methyl-2-pentanone(MIBK)	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Acetone	6000	< 10	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
Benzene	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromodichloromethane	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromoform	4	< 4	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U
Bromomethane	10	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon disulfide	700	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon tetrachloride	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chlorobenzene	50	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroethane	---	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroform	70	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloromethane	---	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	70	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,3-Dichloropropene	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromochloromethane	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	700	< 1	< 1 U	**2**	< 1 U	**1.2**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Methylene chloride	3	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Styrene	100	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Tetrachloroethene	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	1000	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	100	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,3-Dichloropropene	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	1000	< 1	< 1 U	**2.7**	< 1 U	**2.5**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

Notes:
(see last page)

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AZ									
	Sample Date	3/28/2006	6/22/2006	9/27/2006	12/5/2006	9/26/2007	12/11/2007	6/26/2008	12/16/2008	6/2/2009	6/2/2009
	Sample Type Code	N	N	N	N	N	N	N	N	N	N
	GWQC (ug/L)										
1,1,1-Trichloroethane	30	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2,2-Tetrachloroethane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2-Trichloroethane	3	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	50	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethane	2	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethene (total)	---						< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloropropane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2-Butanone (MEK)	300	< 10 U	< 10 U	< 10	< 10	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
2-Hexanone	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Methyl-2-pentanone(MIBK)	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Acetone	6000	< 10 U	< 10 U	< 10	< 10	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
Benzene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	**0.42 J**	< 1 U	< 1 U
Bromodichloromethane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromoform	4	< 4 U	< 4 U	< 4	< 4	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U
Bromomethane	10	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon disulfide	700	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon tetrachloride	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chlorobenzene	50	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroethane	---	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroform	70	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloromethane	---	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	70	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromochloromethane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	700	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Methylene chloride	3	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Styrene	100	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Tetrachloroethene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	1000	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	100	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	1000	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

Notes:
(see last page)

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-BV					WELL-X		
	Sample Date	12/8/2009	12/12/2007	6/26/2008	12/17/2008	6/2/2009	12/13/2004		3/15/2005
	Sample Type Code	N	N	N	N	N	FD	N	N
	GWQC (ug/L)								
1,1,1-Trichloroethane	30	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2,2-Tetrachloroethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2-Trichloroethane	3	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	50	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethane	2	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethene (total)	---	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U			
1,2-Dichloropropane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2-Butanone (MEK)	300	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
2-Hexanone	---	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Methyl-2-pentanone(MIBK)	---	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Acetone	6000	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
Benzene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromodichloromethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromoform	4	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U
Bromomethane	10	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon disulfide	700	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon tetrachloride	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chlorobenzene	50	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroethane	---	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroform	70	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloromethane	---	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	70	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromochloromethane	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	700	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	**0.83 J**
Methylene chloride	3	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Styrene	100	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Tetrachloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	**0.87 J**	< 1 U
Toluene	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	100	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

Notes:
(see last page)

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-X								
	Sample Date	7/21/2005	10/4/2005	9/27/2006	12/5/2006	12/12/2007	6/27/2008	12/16/2008	6/3/2009	12/8/2009
	Sample Type Code	N	N	N	N	N	N	N	N	N
	GWQC (ug/L)									
1,1,1-Trichloroethane	30	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2,2-Tetrachloroethane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2-Trichloroethane	3	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	50	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethane	2	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethene (total)	---					< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloropropane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2-Butanone (MEK)	300	< 10 U	< 10 U	< 10	< 10	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
2-Hexanone	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Methyl-2-pentanone(MIBK)	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Acetone	6000	< 10 U	< 10 U	< 10	< 10	< 10 U	**44.8**	< 10 U	**15.2**	< 10 U
Benzene	1	**2.3**	< 1 U	**10.2**	**6.9**	**5.2**	**0.92 J**	< 1 U	**0.38 J**	< 1 U
Bromodichloromethane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromoform	4	< 4 U	< 4 U	< 4	< 4	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U
Bromomethane	10	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbon disulfide	700	< 2 U	< 2 U	< 2	< 2	**1.2 J**	< 2 U	< 2 U	< 2 U	< 2 U
Carbon tetrachloride	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chlorobenzene	50	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroethane	---	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroform	70	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloromethane	---	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	70	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromochloromethane	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	700	< 1 U	< 1 U	< 1	**0.58**	**0.94 J**	< 1 U	< 1 U	< 1 U	< 1 U
Methylene chloride	3	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Styrene	100	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Tetrachloroethene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	1000	< 1 U	< 1 U	< 1	< 1	< 1 U	**0.41 J**	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	100	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,3-Dichloropropene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	1	< 1 U	< 1 U	< 1	< 1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	1000	< 1 U	< 1 U	< 1	**1**	**1.4**	< 1 U	< 1 U	< 1 U	**0.54 J**

Notes:
(see last page)

Table 4. Summary of Historic Groundwater Analytical Results, Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Notes:

GWQC	New Jersey Groundwater Quality Criteria for Class IIA aquifers
ug/L	Micrograms per liter (equivalent to parts per billion)
2.3	Bold value indicates concentration is above the method detection limit.
2.3	Bold and shaded concentrations are above the applicable New Jersey Groundwater Quality Criteria for Class IIA aquifers.
U	The compound was not detected at the indicated concentration.
J	Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.
--	No standard published
NA	Not analyzed
N	Normal environmental sample
FD	Blind field duplicate

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AV						
	Sample Date	12/13/2004	3/15/2005		8/17/2005		10/4/2005	1/3/2006
	Sample Type Code	N	FD	N	FD	N	N	N
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2,4,6-Trichlorophenol	20	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2,4-Dichlorophenol	20	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2,4-Dimethylphenol	100	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2,4-Dinitrophenol	40	< 22 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2-Chlorophenol	40	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2-Methylnaphthalene	---	**1.8 J**	**2.3**	**2**	**7.6**	**8**	**4.6**	**2**
2-Methylphenol	---	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2-Nitroaniline	---	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
2-Nitrophenol	---	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
3&4-Methylphenol	---	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
3,3'-Dichlorobenzidine	30	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
3-Nitroaniline	---	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
4,6-Dinitro-o-cresol	---	< 22 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
4-Chloroaniline	30	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
4-Chlorophenyl phenyl ether	---	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
4-Nitroaniline	---	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
4-Nitrophenol	---	< 22 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Acenaphthene	400	**0.64 J**	**5.1**	**5**	**1.7 J**	**1.8 J**	**1.5 J**	**1.1 J**
Acenaphthylene	---	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Anthracene	2000	< 2.2 U	**0.97 J**	**0.95 J**	< 2 U	< 2 U	**0.54 J**	**0.53 J**
Benzo(a)anthracene	0.1	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	**1 J**
Butyl benzyl phthalate	100	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbazole	---	< 2.2 U	**10**	**9.9**	< 2 U	< 2 U	< 2 U	< 2 U
Chrysene	5	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Dibenzofuran	---	**0.71 J**	**2.7 J**	**2.7 J**	**2.1 J**	**2.2 J**	**1.3 J**	**1.1 J**
Diethyl phthalate	6000	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Dimethyl phthalate	---	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Fluoranthene	300	**1 J**	**1.4 J**	**1.4 J**	**0.84 J**	**0.86 J**	**1.2 J**	**0.96 J**
Fluorene	300	**1.4 J**	**4.7**	**4.4**	**3.3**	**3.5**	**2.4**	**2**
Hexachlorobenzene	0.02	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Hexachlorobutadiene	1	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 22 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Hexachloroethane	7	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
Indeno(1,2,3-cd)pyrene	.2	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Isophorone	40	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Naphthalene	300	**3.9**	**4.6**	**4.3**	**5.5**	**5.6**	**3.1**	**2.3**
Nitrobenzene	6	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2.2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
Pentachlorophenol	0.3	< 22 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Phenanthrene	---	< 2.2 U	**5.6**	**5.3**	**2.3**	**2.5**	**2.7**	**1 J**
Phenol	2000	< 5.6 U	< 5 U	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5 U
Pyrene	200	**0.96 J**	**0.97 J**	**0.94 J**	**0.74 J**	**0.74 J**	**1 J**	**1 J**

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AV						
	Sample Date	3/28/2006		6/22/2006		9/27/2006		12/4/
	Sample Type Code	FD	N	FD	N	FD	N	FD
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
1,2-Dichlorobenzene	600	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
1,3-Dichlorobenzene	600	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
1,4-Dichlorobenzene	75	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
2,4,5-Trichlorophenol	700	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2,4,6-Trichlorophenol	20	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2,4-Dichlorophenol	20	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2,4-Dimethylphenol	100	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2,4-Dinitrophenol	40	< 20 U	< 20 U	< 20 U	< 21 U	< 20	< 20	< 20
2,4-Dinitrotoluene	10	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
2,6-Dinitrotoluene	10	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
2-Chloronaphthalene	600	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2-Chlorophenol	40	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2-Methylnaphthalene	---	**1.2 J**	**0.84 J**	< 2 U	< 2.1 U	**2.7**	**2.2**	**1.2**
2-Methylphenol	---	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2-Nitroaniline	---	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
2-Nitrophenol	---	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
3&4-Methylphenol	---	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
3,3'-Dichlorobenzidine	30	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
3-Nitroaniline	---	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
4,6-Dinitro-o-cresol	---	< 20 U	< 20 U	< 20 U	< 21 U	< 20	< 20	< 20
4-Bromophenyl phenyl ether	---	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
4-Chloro-3-methyl phenol	---	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
4-Chloroaniline	30	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
4-Chlorophenyl phenyl ether	---	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
4-Nitroaniline	---	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
4-Nitrophenol	---	< 20 U	< 20 U	< 20 U	< 21 U	< 20	< 20	< 20
Acenaphthene	400	**3.3**	**2.4**	**2.5**	**2.3**	**1.3**	**1.1**	**0.93**
Acenaphthylene	---	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Anthracene	2000	**1.1 J**	**0.92 J**	**0.62 J**	**0.5 J**	**0.54**	**0.44**	< 2
Benzo(a)anthracene	0.1	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Benzo(a)pyrene	0.1	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Benzo(b)fluoranthene	0.2	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Benzo(g,h,i)perylene	---	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Benzo(k)fluoranthene	0.5	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
bis(2-Chloroethoxy)methane	---	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
bis(2-Chloroethyl)ether	7	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
bis(2-Chloroisopropyl)ether	300	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
bis(2-Ethylhexyl)phthalate	3	< 2 U	**1.1 J**	< 2 U	< 2.1 U	< 2	< 2	**1.1**
Butyl benzyl phthalate	100	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Carbazole	---	**1.2 J**	**0.87 J**	< 2 U	< 2.1 U	< 2	< 2	< 2
Chrysene	5	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Dibenzo(a,h)anthracene	0.3	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Dibenzofuran	---	**2 J**	**1.7 J**	**2 J**	**1.8 J**	< 5	< 5	**0.97**
Diethyl phthalate	6000	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Dimethyl phthalate	---	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Di-n-butyl phthalate	700	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Di-n-octyl phthalate	100	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Fluoranthene	300	**1.1 J**	**1.1 J**	**1.2 J**	**1.2 J**	**1.1**	**1.1**	**0.88**
Fluorene	300	**3**	**2.4**	**3.5**	**3.1**	**2.6**	**2.4**	**2.3**
Hexachlorobenzene	0.02	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Hexachlorobutadiene	1	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Hexachlorocyclopentadiene	40	< 20 U	< 20 U	< 20 U	< 21 U	< 20	< 20	< 20
Hexachloroethane	7	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
Indeno(1,2,3-cd)pyrene	.2	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Isophorone	40	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
Naphthalene	300	**1.3 J**	**1.2 J**	**1.8 J**	**1.6 J**	**2.5**	**2.1**	**1.9**
Nitrobenzene	6	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
N-Nitroso-di-n-propylamine	10	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2	< 2	< 2
N-Nitrosodiphenylamine	10	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
Pentachlorophenol	0.3	< 20 U	< 20 U	< 20 U	< 21 U	< 20	< 20	< 20
Phenanthrene	---	**1.9 J**	**1.7 J**	**1.3 J**	**1.2 J**	**0.86**	**0.75**	**0.68**
Phenol	2000	< 5 U	< 5 U	< 5 U	< 5.2 U	< 5	< 5	< 5
Pyrene	200	**0.64 J**	**0.65 J**	**1.4 J**	**1.3 J**	**0.99**	**1**	**0.63**

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AV						
	Sample Date	2006	9/26/2007		12/11/2007		6/26/2008	
	Sample Type Code	N	FD	N	FD	N	FD	N
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
2,4,6-Trichlorophenol	20	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
2,4-Dichlorophenol	20	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
2,4-Dimethylphenol	100	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
2,4-Dinitrophenol	40	< 20	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
2-Chlorophenol	40	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
2-Methylnaphthalene	---	**1.3**	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	**1 J**
2-Methylphenol	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 2 U	< 2 U
2-Nitroaniline	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
2-Nitrophenol	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
3&4-Methylphenol	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	**6.7**	**9.1**
3,3'-Dichlorobenzidine	30	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
3-Nitroaniline	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4,6-Dinitro-o-cresol	---	< 20	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Chloroaniline	30	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Chlorophenyl phenyl ether	---	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
4-Nitroaniline	---	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
4-Nitrophenol	---	< 20	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Acenaphthene	400	**1.1**	**1.1 J**	**1.1 J**	< 2 U	< 2 U	**0.62 J**	**0.44 J**
Acenaphthylene	---	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Anthracene	2000	< 2	**0.61 J**	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(a)anthracene	0.1	**0.43**	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	**1.8 J**
Butyl benzyl phthalate	100	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Carbazole	---	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Chrysene	5	**0.42**	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Dibenzofuran	---	**0.93**	**0.97 J**	**0.95 J**	**0.66 J**	**0.56 J**	**0.89 J**	**0.76 J**
Diethyl phthalate	6000	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Dimethyl phthalate	---	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Fluoranthene	300	**1.1**	**2.7**	**3**	< 2 U	< 2 U	< 2 U	**0.36 J**
Fluorene	300	**2**	**2.3**	**2**	**0.99 J**	**0.81 J**	**1.6 J**	**1.6 J**
Hexachlorobenzene	0.02	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Hexachlorobutadiene	1	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 20	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Hexachloroethane	7	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Indeno(1,2,3-cd)pyrene	.2	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Isophorone	40	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Naphthalene	300	**2**	**0.44 J**	< 2 U	**0.68 J**	**0.61 J**	**0.89 J**	**1.3 J**
Nitrobenzene	6	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U
Pentachlorophenol	0.3	< 20	< 20 U	< 20 U	< 20 U	< 20 U	< 10 U	< 10 U
Phenanthrene	---	**0.69**	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	**0.62 J**
Phenol	2000	< 5	< 5 U	< 5 U	< 5 U	< 5 U	< 2 U	< 2 U
Pyrene	200	**0.86**	**2.1**	**2.4**	**0.42 J**	**0.41 J**	< 2 U	**0.46 J**

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AV				WEL		
	Sample Date	12/16/2008		6/2/2009		12/13/2004	3/15/2005	7/21/2005
	Sample Type Code	N	FD	FD	N	N	N	N
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
2,4,6-Trichlorophenol	20	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
2,4-Dichlorophenol	20	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
2,4-Dimethylphenol	100	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
2,4-Dinitrophenol	40	< 21 U	< 21 U	< 20 U	< 20 U	< 21 U	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
2-Chlorophenol	40	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
2-Methylnaphthalene	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2-Methylphenol	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 5.3 U	< 5 U	< 5 U
2-Nitroaniline	---	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
2-Nitrophenol	---	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
3&4-Methylphenol	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 5.3 U	< 5 U	< 5 U
3,3'-Dichlorobenzidine	30	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
3-Nitroaniline	---	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
4,6-Dinitro-o-cresol	---	< 21 U	< 21 U	< 20 U	< 20 U	< 21 U	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
4-Chloroaniline	30	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
4-Chlorophenyl phenyl ether	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
4-Nitroaniline	---	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
4-Nitrophenol	---	< 10 U	< 11 U	< 10 U	< 10 U	< 21 U	< 20 U	< 20 U
Acenaphthene	400	< 1 U	< 1.1 U	**0.58 J**	**0.4 J**	< 2.1 U	< 2 U	< 2 U
Acenaphthylene	---	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Anthracene	2000	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Benzo(a)anthracene	0.1	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2.1 U	**1.4 J**	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Butyl benzyl phthalate	100	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Carbazole	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Chrysene	5	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Dibenzofuran	---	< 5.2 U	< 5.3 U	**0.64 J**	**0.45 J**	< 5.3 U	< 5 U	< 5 U
Diethyl phthalate	6000	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Dimethyl phthalate	---	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Fluoranthene	300	< 1 U	< 1.1 U	**0.39 J**	< 1 U	< 2.1 U	< 2 U	< 2 U
Fluorene	300	< 1 U	< 1.1 U	**1.2**	**0.88 J**	< 2.1 U	< 2 U	< 2 U
Hexachlorobenzene	0.02	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Hexachlorobutadiene	1	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 21 U	< 21 U	< 20 U	< 20 U	< 21 U	< 20 U	< 20 U
Hexachloroethane	7	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
Indeno(1,2,3-cd)pyrene	.2	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Isophorone	40	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Naphthalene	300	< 1 U	< 1.1 U	**0.67 J**	**0.5 J**	< 2.1 U	< 2 U	< 2 U
Nitrobenzene	6	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5.2 U	< 5.3 U	< 5 U	< 5 U	< 5.3 U	< 5 U	< 5 U
Pentachlorophenol	0.3	< 10 U	< 11 U	< 10 U	< 10 U	< 21 U	< 20 U	< 20 U
Phenanthrene	---	< 1 U	< 1.1 U	< 1 U	< 1 U	< 2.1 U	< 2 U	< 2 U
Phenol	2000	< 2.1 U	< 2.1 U	< 2 U	< 2 U	< 5.3 U	< 5 U	< 5 U
Pyrene	200	< 1 U	< 1.1 U	**0.47 J**	< 1 U	< 2.1 U	< 2 U	< 2 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	L-AY			WELL-AY			
	Sample Date	10/4/2005	3/29/2006	6/23/2006	9/27/2006	12/5/2006	9/27/2007	12/12/2007
	Sample Type Code	N	N	N	N	N	N	N
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
1,2-Dichlorobenzene	600	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
1,3-Dichlorobenzene	600	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
1,4-Dichlorobenzene	75	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
2,4,5-Trichlorophenol	700	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2,4,6-Trichlorophenol	20	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2,4-Dichlorophenol	20	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2,4-Dimethylphenol	100	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2,4-Dinitrophenol	40	< 20 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 22 U
2,4-Dinitrotoluene	10	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
2,6-Dinitrotoluene	10	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
2-Chloronaphthalene	600	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2-Chlorophenol	40	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2-Methylnaphthalene	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
2-Methylphenol	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2-Nitroaniline	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
2-Nitrophenol	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
3&4-Methylphenol	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
3,3'-Dichlorobenzidine	30	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
3-Nitroaniline	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
4,6-Dinitro-o-cresol	---	< 20 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 22 U
4-Bromophenyl phenyl ether	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
4-Chloro-3-methyl phenol	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
4-Chloroaniline	30	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
4-Chlorophenyl phenyl ether	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
4-Nitroaniline	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
4-Nitrophenol	---	< 20 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 22 U
Acenaphthene	400	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Acenaphthylene	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Anthracene	2000	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Benzo(a)anthracene	0.1	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Benzo(a)pyrene	0.1	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Benzo(b)fluoranthene	0.2	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Benzo(g,h,i)perylene	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Benzo(k)fluoranthene	0.5	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
bis(2-Chloroethoxy)methane	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
bis(2-Chloroethyl)ether	7	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
bis(2-Chloroisopropyl)ether	300	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
bis(2-Ethylhexyl)phthalate	3	**2.7**	**1.3 J**	< 2 U	**2.2**	< 2	< 2 U	< 2.2 U
Butyl benzyl phthalate	100	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Carbazole	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Chrysene	5	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Dibenzo(a,h)anthracene	0.3	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Dibenzofuran	---	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
Diethyl phthalate	6000	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Dimethyl phthalate	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Di-n-butyl phthalate	700	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Di-n-octyl phthalate	100	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Fluoranthene	300	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Fluorene	300	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Hexachlorobenzene	0.02	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Hexachlorobutadiene	1	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Hexachlorocyclopentadiene	40	< 20 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 22 U
Hexachloroethane	7	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
Indeno(1,2,3-cd)pyrene	.2	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Isophorone	40	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Naphthalene	300	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Nitrobenzene	6	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
N-Nitroso-di-n-propylamine	10	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
N-Nitrosodiphenylamine	10	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
Pentachlorophenol	0.3	< 20 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 22 U
Phenanthrene	---	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U
Phenol	2000	< 5 U	< 5 U	< 5 U	< 5.1	< 5	< 5 U	< 5.5 U
Pyrene	200	< 2 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2.2 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID			WELL-AY			WELL-AZ	
	Sample Date	6/27/2008	12/17/2008	6/3/2009	12/8/1009	12/08/1009	12/10/2004	8/17/2005
	Sample Type Code	N	N	N	FD	N	N	N
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
2,4,6-Trichlorophenol	20	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
2,4-Dichlorophenol	20	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
2,4-Dimethylphenol	100	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
2,4-Dinitrophenol	40	< 20 U	< 20 U	< 20 U	< 20 U	< 21 U	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
2-Chlorophenol	40	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
2-Methylnaphthalene	---	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
2-Methylphenol	---	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 5 U	< 5.1 U
2-Nitroaniline	---	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
2-Nitrophenol	---	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
3&4-Methylphenol	---	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 5 U	< 5.1 U
3,3'-Dichlorobenzidine	30	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
3-Nitroaniline	---	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
4,6-Dinitro-o-cresol	---	< 20 U	< 20 U	< 20 U	< 20 U	< 21 U	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
4-Chloroaniline	30	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
4-Chlorophenyl phenyl ether	---	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
4-Nitroaniline	---	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
4-Nitrophenol	---	< 20 U	< 10 U	< 10 U	< 10 U	< 11 U	< 20 U	< 20 U
Acenaphthene	400	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Acenaphthylene	---	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Anthracene	2000	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Benzo(a)anthracene	0.1	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Butyl benzyl phthalate	100	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Carbazole	---	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Chrysene	5	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Dibenzofuran	---	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
Diethyl phthalate	6000	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Dimethyl phthalate	---	< 2 U	< 2 U	**2.4**	< 2 U	< 2.1 U	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Fluoranthene	300	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Fluorene	300	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Hexachlorobenzene	0.02	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Hexachlorobutadiene	1	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 20 U	< 20 U	< 20 U	< 20 U	< 21 U	< 20 U	< 20 U
Hexachloroethane	7	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
Indeno(1,2,3-cd)pyrene	.2	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Isophorone	40	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
Naphthalene	300	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Nitrobenzene	6	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5 U	< 5 U	< 5.1 U	< 5 U	< 5.3 U	< 5 U	< 5.1 U
Pentachlorophenol	0.3	< 10 U	< 10 U	< 10 U	< 10 U	< 11 U	< 20 U	< 20 U
Phenanthrene	---	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U
Phenol	2000	< 2 U	< 2 U	< 2 U	< 2 U	< 2.1 U	< 5 U	< 5.1 U
Pyrene	200	< 2 U	< 1 U	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID		WELL-AZ					
	Sample Date	10/4/2005	3/28/2006	6/22/2006	9/27/2006	12/5/2006	9/26/2007	12/11/2007
	Sample Type Code	N	N	N	N	N	N	N
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2,4,6-Trichlorophenol	20	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2,4-Dichlorophenol	20	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2,4-Dimethylphenol	100	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2,4-Dinitrophenol	40	< 21 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2-Chlorophenol	40	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2-Methylnaphthalene	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
2-Methylphenol	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2-Nitroaniline	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
2-Nitrophenol	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
3&4-Methylphenol	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
3,3'-Dichlorobenzidine	30	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
3-Nitroaniline	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
4,6-Dinitro-o-cresol	---	< 21 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
4-Chloroaniline	30	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
4-Chlorophenyl phenyl ether	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
4-Nitroaniline	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
4-Nitrophenol	---	< 21 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
Acenaphthene	400	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Acenaphthylene	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Anthracene	2000	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(a)anthracene	0.1	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2.1 U	< 2 U	< 2 U	**1.3**	< 2	< 2 U	< 2 U
Butyl benzyl phthalate	100	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Carbazole	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Chrysene	5	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Dibenzofuran	---	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
Diethyl phthalate	6000	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Dimethyl phthalate	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Fluoranthene	300	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Fluorene	300	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Hexachlorobenzene	0.02	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Hexachlorobutadiene	1	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 21 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
Hexachloroethane	7	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
Indeno(1,2,3-cd)pyrene	.2	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Isophorone	40	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Naphthalene	300	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Nitrobenzene	6	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
Pentachlorophenol	0.3	< 21 U	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
Phenanthrene	---	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Phenol	2000	< 5.2 U	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5.1 U
Pyrene	200	< 2.1 U	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-AZ				WELL-BV		
	Sample Date	6/26/2008	12/16/2008	6/2/2009	12/8/2009	9/27/2007	12/12/2007	6/26/2008
	Sample Type Code	N	N	N	N	N	N	N
	GWQC (ug/L)							
1,2,4-Trichlorobenzene	9	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
2,4,6-Trichlorophenol	20	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
2,4-Dichlorophenol	20	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
2,4-Dimethylphenol	100	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
2,4-Dinitrophenol	40	< 20 U	< 22 U	< 20 U	< 22 U	< 20 U	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
2-Chlorophenol	40	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
2-Methylnaphthalene	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2-Methylphenol	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 5 U	< 5 U	< 2 U
2-Nitroaniline	---	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
2-Nitrophenol	---	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
3&4-Methylphenol	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 5 U	< 5 U	< 2 U
3,3'-Dichlorobenzidine	30	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
3-Nitroaniline	---	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
4,6-Dinitro-o-cresol	---	< 20 U	< 22 U	< 20 U	< 22 U	< 20 U	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
4-Chloroaniline	30	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
4-Chlorophenyl phenyl ether	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
4-Nitroaniline	---	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
4-Nitrophenol	---	< 20 U	< 11 U	< 10 U	< 11 U	< 20 U	< 20 U	< 20 U
Acenaphthene	400	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Acenaphthylene	---	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Anthracene	2000	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(a)anthracene	0.1	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2 U	**1.4 J**	< 2 U	< 2.2 U	< 2 U	< 2 U	**2**
Butyl benzyl phthalate	100	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Carbazole	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Chrysene	5	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Dibenzofuran	---	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
Diethyl phthalate	6000	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Dimethyl phthalate	---	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Fluoranthene	300	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Fluorene	300	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Hexachlorobenzene	0.02	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Hexachlorobutadiene	1	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 20 U	< 22 U	< 20 U	< 22 U	< 20 U	< 20 U	< 20 U
Hexachloroethane	7	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
Indeno(1,2,3-cd)pyrene	.2	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Isophorone	40	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Naphthalene	300	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Nitrobenzene	6	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5 U	< 5.4 U	< 5.1 U	< 5.6 U	< 5 U	< 5 U	< 5 U
Pentachlorophenol	0.3	< 10 U	< 11 U	< 10 U	< 11 U	< 20 U	< 20 U	< 10 U
Phenanthrene	---	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Phenol	2000	< 2 U	< 2.2 U	< 2 U	< 2.2 U	< 5 U	< 5 U	< 2 U
Pyrene	200	< 2 U	< 1.1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-BV			WELL-X		
	Sample Date	12/17/2008	6/2/2009	12/8/2009	12/13/2004		3/15/2005
	Sample Type Code	N	N	N	FD	N	N
	GWQC (ug/L)						
1,2,4-Trichlorobenzene	9	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
2,4,6-Trichlorophenol	20	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
2,4-Dichlorophenol	20	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
2,4-Dimethylphenol	100	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
2,4-Dinitrophenol	40	< 21 U	< 20 U	< 22 U	< 20 U	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
2-Chlorophenol	40	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
2-Methylnaphthalene	---	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
2-Methylphenol	---	< 2.1 U	< 2 U	< 2.2 U	< 5 U	< 5 U	< 5.1 U
2-Nitroaniline	---	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
2-Nitrophenol	---	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
3&4-Methylphenol	---	< 2.1 U	< 2 U	< 2.2 U	< 5 U	< 5 U	< 5.1 U
3,3'-Dichlorobenzidine	30	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
3-Nitroaniline	---	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
4,6-Dinitro-o-cresol	---	< 21 U	< 20 U	< 22 U	< 20 U	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
4-Chloroaniline	30	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
4-Chlorophenyl phenyl ether	---	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
4-Nitroaniline	---	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
4-Nitrophenol	---	< 10 U	< 10 U	< 11 U	< 20 U	< 20 U	< 20 U
Acenaphthene	400	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Acenaphthylene	---	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Anthracene	2000	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(a)anthracene	0.1	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Butyl benzyl phthalate	100	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Carbazole	---	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Chrysene	5	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Dibenzofuran	---	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
Diethyl phthalate	6000	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Dimethyl phthalate	---	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Fluoranthene	300	< 1 U	**0.24 J**	< 1.1 U	< 2 U	< 2 U	< 2 U
Fluorene	300	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Hexachlorobenzene	0.02	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Hexachlorobutadiene	1	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 21 U	< 20 U	< 22 U	< 20 U	< 20 U	< 20 U
Hexachloroethane	7	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
Indeno(1,2,3-cd)pyrene	.2	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Isophorone	40	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
Naphthalene	300	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Nitrobenzene	6	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2.1 U	< 2 U	< 2.2 U	< 2 U	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5.1 U	< 5 U	< 5.6 U	< 5 U	< 5 U	< 5.1 U
Pentachlorophenol	0.3	< 10 U	< 10 U	< 11 U	< 20 U	< 20 U	< 20 U
Phenanthrene	---	< 1 U	< 1 U	< 1.1 U	< 2 U	< 2 U	< 2 U
Phenol	2000	< 2.1 U	< 2 U	< 2.2 U	< 5 U	< 5 U	< 5.1 U
Pyrene	200	< 1 U	**0.25 J**	< 1.1 U	< 2 U	< 2 U	< 2 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-X					
	Sample Date	7/21/2005	10/4/2005	9/27/2006	12/5/2006	12/12/2007	6/27/2008
	Sample Type Code	N	N	N	N	N	N
	GWQC (ug/L)						
1,2,4-Trichlorobenzene	9	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
1,2-Dichlorobenzene	600	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
1,3-Dichlorobenzene	600	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
1,4-Dichlorobenzene	75	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
2,4,5-Trichlorophenol	700	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
2,4,6-Trichlorophenol	20	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
2,4-Dichlorophenol	20	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
2,4-Dimethylphenol	100	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
2,4-Dinitrophenol	40	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
2,4-Dinitrotoluene	10	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
2,6-Dinitrotoluene	10	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
2-Chloronaphthalene	600	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
2-Chlorophenol	40	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
2-Methylnaphthalene	---	< 2 U	< 2 U	< 2	< 2	**1.7 J**	< 2 U
2-Methylphenol	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 2 U
2-Nitroaniline	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
2-Nitrophenol	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
3&4-Methylphenol	---	< 5 U	< 5 U	< 5	< 5	**4.4 J**	**25.4**
3,3'-Dichlorobenzidine	30	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
3-Nitroaniline	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
4,6-Dinitro-o-cresol	---	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
4-Bromophenyl phenyl ether	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
4-Chloro-3-methyl phenol	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
4-Chloroaniline	30	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
4-Chlorophenyl phenyl ether	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
4-Nitroaniline	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
4-Nitrophenol	---	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
Acenaphthene	400	< 2 U	< 2 U	< 2	**1.6**	< 2 U	< 2 U
Acenaphthylene	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Anthracene	2000	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(a)anthracene	0.1	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(a)pyrene	0.1	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(b)fluoranthene	0.2	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(g,h,i)perylene	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Benzo(k)fluoranthene	0.5	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Chloroethoxy)methane	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Chloroethyl)ether	7	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Chloroisopropyl)ether	300	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
bis(2-Ethylhexyl)phthalate	3	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Butyl benzyl phthalate	100	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Carbazole	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Chrysene	5	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Dibenzo(a,h)anthracene	0.3	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Dibenzofuran	---	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
Diethyl phthalate	6000	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Dimethyl phthalate	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Di-n-butyl phthalate	700	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Di-n-octyl phthalate	100	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Fluoranthene	300	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Fluorene	300	< 2 U	**0.74 J**	< 2	< 2	**0.38 J**	< 2 U
Hexachlorobenzene	0.02	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Hexachlorobutadiene	1	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Hexachlorocyclopentadiene	40	< 20 U	< 20 U	< 20	< 20	< 20 U	< 20 U
Hexachloroethane	7	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
Indeno(1,2,3-cd)pyrene	.2	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Isophorone	40	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Naphthalene	300	< 2 U	< 2 U	< 2	**1.5**	**0.85 J**	< 2 U
Nitrobenzene	6	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
N-Nitroso-di-n-propylamine	10	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
N-Nitrosodiphenylamine	10	< 5 U	< 5 U	< 5	< 5	< 5 U	< 5 U
Pentachlorophenol	0.3	< 20 U	< 20 U	< 20	< 20	< 20 U	< 10 U
Phenanthrene	---	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U
Phenol	2000	< 5 U	< 5 U	< 5	< 5	< 5 U	< 2 U
Pyrene	200	< 2 U	< 2 U	< 2	< 2	< 2 U	< 2 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Constituent of Concern	Location ID	WELL-X		
	Sample Date	12/16/2008	6/3/2009	12/8/2009
	Sample Type Code	N	N	N
	GWQC (ug/L)			
1,2,4-Trichlorobenzene	9	< 2.1 U	< 2 U	< 2.1 U
1,2-Dichlorobenzene	600	< 2.1 U	< 2 U	< 2.1 U
1,3-Dichlorobenzene	600	< 2.1 U	< 2 U	< 2.1 U
1,4-Dichlorobenzene	75	< 2.1 U	< 2 U	< 2.1 U
2,4,5-Trichlorophenol	700	< 5.2 U	< 5 U	< 5.3 U
2,4,6-Trichlorophenol	20	< 5.2 U	< 5 U	< 5.3 U
2,4-Dichlorophenol	20	< 5.2 U	< 5 U	< 5.3 U
2,4-Dimethylphenol	100	< 5.2 U	< 5 U	< 5.3 U
2,4-Dinitrophenol	40	< 21 U	< 20 U	< 21 U
2,4-Dinitrotoluene	10	< 2.1 U	< 2 U	< 2.1 U
2,6-Dinitrotoluene	10	< 2.1 U	< 2 U	< 2.1 U
2-Chloronaphthalene	600	< 5.2 U	< 5 U	< 5.3 U
2-Chlorophenol	40	< 5.2 U	< 5 U	< 5.3 U
2-Methylnaphthalene	---	< 2.1 U	< 2 U	**1.9 J**
2-Methylphenol	---	< 2.1 U	< 2 U	< 2.1 U
2-Nitroaniline	---	< 5.2 U	< 5 U	< 5.3 U
2-Nitrophenol	---	< 5.2 U	< 5 U	< 5.3 U
3&4-Methylphenol	---	< 2.1 U	< 2 U	< 2.1 U
3,3'-Dichlorobenzidine	30	< 5.2 U	< 5 U	< 5.3 U
3-Nitroaniline	---	< 5.2 U	< 5 U	< 5.3 U
4,6-Dinitro-o-cresol	---	< 21 U	< 20 U	< 21 U
4-Bromophenyl phenyl ether	---	< 2.1 U	< 2 U	< 2.1 U
4-Chloro-3-methyl phenol	---	< 5.2 U	< 5 U	< 5.3 U
4-Chloroaniline	30	< 5.2 U	< 5 U	< 5.3 U
4-Chlorophenyl phenyl ether	---	< 2.1 U	< 2 U	< 2.1 U
4-Nitroaniline	---	< 5.2 U	< 5 U	< 5.3 U
4-Nitrophenol	---	< 10 U	< 10 U	< 11 U
Acenaphthene	400	< 1 U	< 1 U	**0.64 J**
Acenaphthylene	---	< 1 U	< 1 U	< 1.1 U
Anthracene	2000	< 1 U	< 1 U	**0.73 J**
Benzo(a)anthracene	0.1	< 1 U	< 1 U	< 1.1 U
Benzo(a)pyrene	0.1	< 1 U	< 1 U	< 1.1 U
Benzo(b)fluoranthene	0.2	< 1 U	< 1 U	< 1.1 U
Benzo(g,h,i)perylene	---	< 1 U	< 1 U	< 1.1 U
Benzo(k)fluoranthene	0.5	< 1 U	< 1 U	< 1.1 U
bis(2-Chloroethoxy)methane	---	< 2.1 U	< 2 U	< 2.1 U
bis(2-Chloroethyl)ether	7	< 2.1 U	< 2 U	< 2.1 U
bis(2-Chloroisopropyl)ether	300	< 2.1 U	< 2 U	< 2.1 U
bis(2-Ethylhexyl)phthalate	3	**2 J**	< 2 U	< 2.1 U
Butyl benzyl phthalate	100	< 2.1 U	< 2 U	< 2.1 U
Carbazole	---	< 2.1 U	< 2 U	**0.51 J**
Chrysene	5	< 1 U	< 1 U	< 1.1 U
Dibenzo(a,h)anthracene	0.3	< 1 U	< 1 U	< 1.1 U
Dibenzofuran	---	< 5.2 U	< 5 U	< 5.3 U
Diethyl phthalate	6000	< 2.1 U	< 2 U	< 2.1 U
Dimethyl phthalate	---	< 2.1 U	< 2 U	< 2.1 U
Di-n-butyl phthalate	700	< 2.1 U	< 2 U	< 2.1 U
Di-n-octyl phthalate	100	< 2.1 U	< 2 U	< 2.1 U
Fluoranthene	300	< 1 U	< 1 U	< 1.1 U
Fluorene	300	< 1 U	**0.42 J**	**0.81 J**
Hexachlorobenzene	0.02	< 2.1 U	< 2 U	< 2.1 U
Hexachlorobutadiene	1	< 1 U	< 1 U	< 1.1 U
Hexachlorocyclopentadiene	40	< 21 U	< 20 U	< 21 U
Hexachloroethane	7	< 5.2 U	< 5 U	< 5.3 U
Indeno(1,2,3-cd)pyrene	.2	< 1 U	< 1 U	< 1.1 U
Isophorone	40	< 2.1 U	< 2 U	< 2.1 U
Naphthalene	300	< 1 U	**0.89 J**	< 1.1 U
Nitrobenzene	6	< 2.1 U	< 2 U	< 2.1 U
N-Nitroso-di-n-propylamine	10	< 2.1 U	< 2 U	< 2.1 U
N-Nitrosodiphenylamine	10	< 5.2 U	< 5 U	< 5.3 U
Pentachlorophenol	0.3	< 10 U	< 10 U	< 11 U
Phenanthrene	---	< 1 U	< 1 U	**1.3**
Phenol	2000	< 2.1 U	< 2 U	**3.2**
Pyrene	200	< 1 U	< 1 U	< 1.1 U

Notes:
(see last page)

Table 5. Summary of Historic Groundwater Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey

Notes:

GWQC	New Jersey *Groundwater Quality Criteria for Class IIA aquifers.*
ug/L	Micrograms per liter (equivalent to parts per billion)
5.0	Bold value indicates concentration is above the method detection limit.
27.0	Bold and shaded concentrations are above the applicable New Jersey Groundwater Quality Criteria for Class IIA aquifers.
U	The compound was not detected at the indicated concentration.
J	Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.
---	No standard published
N	Normal environmental sample
FD	Blind field duplicate

Table 6. Summary of Soil Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC,Salem Generating Station, Hancock's Bridge, New Jersey

Table 06. Summary of Soil Analytical Results, Semi-Volatile Organic Compounds,
PSEG Nuclear, LLC, Salem Generating Station, Hancock's Bridge, New Jersey.

Constituent of Concern			Location ID	TP-10	TP-11	TP-12
			Sample Date	9/22/2009	9/22/2009	9/22/2009
			Depth Interval	2 - 2.5	2 - 2.5	1 - 1.5
			Sample Type Code	**N**	**N**	**N**
	to Groundwater SRS (mg/kg)	2008 Residential Direct Contact SRS (mg/kg)	2008 Non-Residential Direct Contact SRS (mg/kg)			
Petroleum Hydrocarbons						
TPH-DRO	---	5100	5100	**3710**	**2620**	**12.4**
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	0.4	73	820	< 0.06 U	NA	NA
1,2-Dichlorobenzene	11	5300	59000	< 0.06 U	NA	NA
1,3-Dichlorobenzene	12	5300	59000	< 0.06 U	NA	NA
1,4-Dichlorobenzene	1	5	13	< 0.06 U	NA	NA
2,4-Dinitrotoluene	---	0.7	3	< 0.06 U	NA	NA
2,6-Dinitrotoluene	---	0.7	3	< 0.06 U	NA	NA
2-Chloronaphthalene	---	---	---	< 0.06 U	NA	NA
2-Methylnaphthalene	5	230	2400	**1.66**	NA	NA
2-Nitroaniline	---	39	23000	< 0.15 U	NA	NA
3,3'-Dichlorobenzidine	0.2	1	4	< 0.15 U	NA	NA
3-Nitroaniline	---	---	---	< 0.15 U	NA	NA
4-Bromophenyl phenyl ether	---	---	---	< 0.06 U	NA	NA
4-Chloroaniline	---	---	---	< 0.15 U	NA	NA
4-Chlorophenyl phenyl ether	---	---	---	< 0.06 U	NA	NA
4-Nitroaniline	---	---	---	< 0.15 U	NA	NA
Acenaphthene	74	3400	37000	**0.162**	NA	NA
Acenaphthylene	---	---	300000	< 0.03 U	NA	NA
Anthracene	---	17000	30000	< 0.03 U	NA	NA
Benzo(a)anthracene	---	0.6	2	< 0.03 U	NA	NA
Benzo(a)pyrene	---	0.2	0.2	< 0.03 U	NA	NA
Benzo(b)fluoranthene	---	0.6	2	< 0.03 U	NA	NA
Benzo(g,h,i)perylene	---	380000	30000	< 0.03 U	NA	NA
Benzo(k)fluoranthene	---	6	23	< 0.03 U	NA	NA
bis(2-Chloroethoxy)methane	---	---	---	< 0.06 U	NA	NA
bis(2-Chloroethyl)ether	0.2	0.4	2	< 0.06 U	NA	NA
bis(2-Chloroisopropyl)ether	3	23	67	< 0.06 U	NA	NA
bis(2-Ethylhexyl)phthalate	---	35	140	< 0.06 U	NA	NA
Butyl benzyl phthalate	---	1200	14000	< 0.06 U	NA	NA
Carbazole	---	24	96	< 0.06 U	NA	NA
Chrysene	---	62	230	< 0.03 U	NA	NA
Dibenzo(a,h)anthracene	---	0.2	0.2	< 0.03 U	NA	NA
Dibenzofuran	---	---	---	**0.128**	NA	NA
Diethyl phthalate	57	49000	550000	< 0.06 U	NA	NA
Dimethyl phthalate	---	---	---	< 0.06 U	NA	NA
Di-n-butyl phthalate	---	6100	68000	< 0.06 U	NA	NA
Di-n-octyl phthalate	---	2400	27000	< 0.06 U	NA	NA
Fluoranthene	---	2300	24000	**0.0187 J**	NA	NA
Fluorene	110	2300	24000	**0.373**	NA	NA
Hexachlorobenzene	---	0.3	1	< 0.06 U	NA	NA
Hexachlorobutadiene	---	6	25	< 0.03 U	NA	NA
Hexachlorocyclopentadiene	---	45	110	< 0.6 U	NA	NA
Hexachloroethane	0.2	35	140	< 0.15 U	NA	NA
Indeno(1,2,3-cd)pyrene	---	0.6	2	< 0.03 U	NA	NA
Isophorone	0.2	510	2000	< 0.06 U	NA	NA
Naphthalene	16	6	17	**0.257**	NA	NA
Nitrobenzene	0.2	31	340	< 0.06 U	NA	NA
N-Nitroso-di-n-propylamine	0.2	0.2	0.3	< 0.06 U	NA	NA
N-Nitrosodiphenylamine	0.2	99	390	< 0.15 U	NA	NA
Phenanthrene	---		300000	**0.7**	NA	NA
Pyrene	---	1700	18000	**0.107**	NA	NA

Table 6. Summary of Soil Analytical Results, Semi-Volatile Organic Compounds
PSEG Nuclear, LLC,Salem Generating Station, Hancock's Bridge, New Jersey

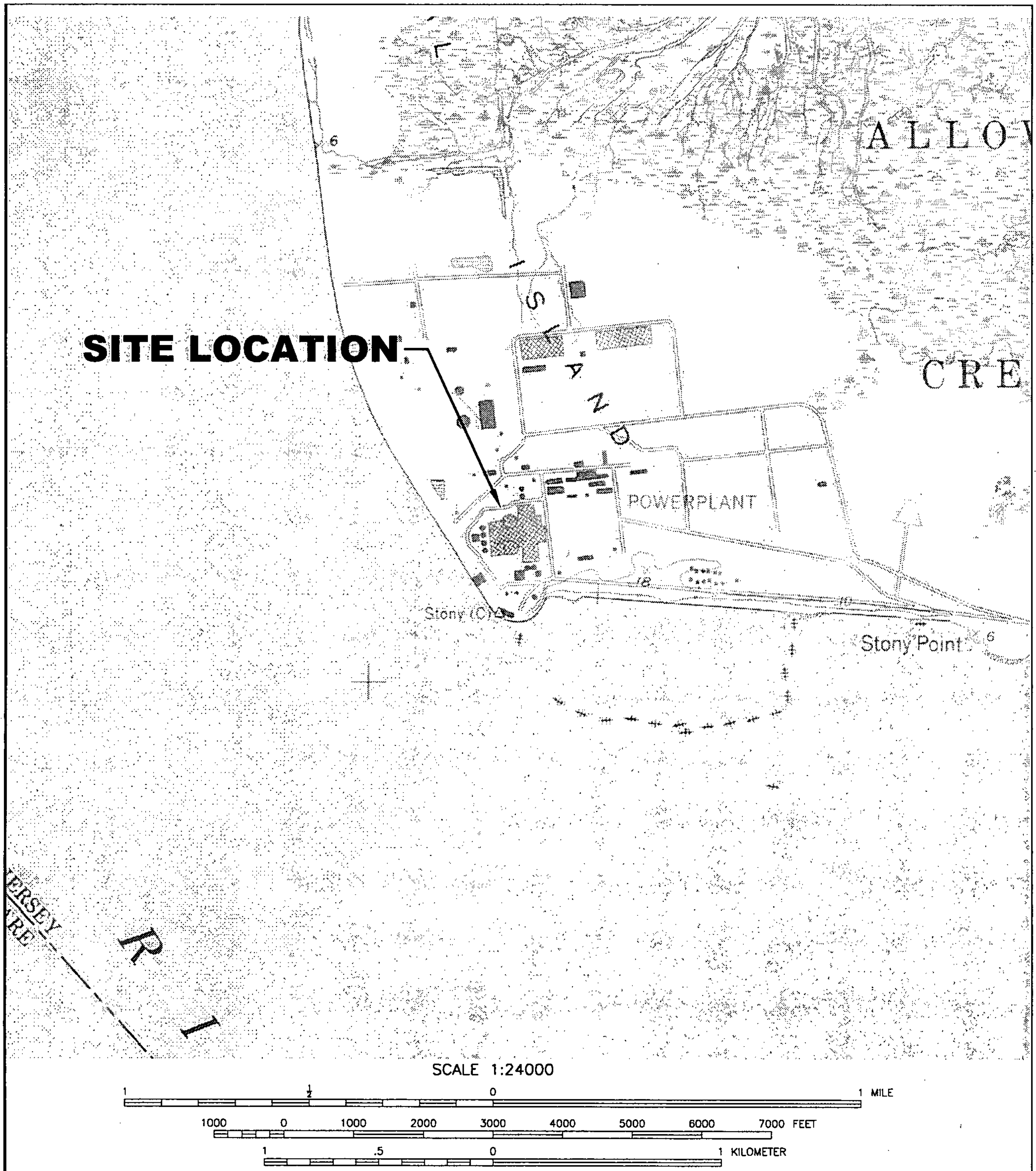
Constituent of Concern			Location ID	TP-10	TP-11	TP-12
			Sample Date	9/22/2009	9/22/2009	9/22/2009
			Depth Interval	2 - 2.5	2 - 2.5	1 - 1.5
			Sample Type Code	N	N	N
	to Groundwater SRS (mg/kg)	2008 Residential Direct Contact SRS (mg/kg)	2008 Non-Residential Direct Contact SRS (mg/kg)			
Semivolatile Organic Compounds - Tentatively identified Compounds (TICs)						
alkane_7.52	---	---	---	**6.1 J**	NA	NA
alkane_8.35	---	---	---	**5.6 J**	NA	NA
alkane_8.75	---	---	---	**8.5 J**	NA	NA
alkane_9.58	---	---	---	**5.5 J**	NA	NA
alkane_9.91	---	---	---	**9.1 J**	NA	NA
alkane_10.52	---	---	---	**3.9 J**	NA	NA
alkane_11	---	---	---	**9 J**	NA	NA
alkane_12.03	---	---	---	**8.9 J**	NA	NA
alkane_12.44	---	---	---	**5 J**	NA	NA
alkane_13.02	---	---	---	**29 J**	NA	NA
alkane_13.94	---	---	---	**22 J**	NA	NA
alkane_14.81	---	---	---	**13 J**	NA	NA
alkane_15.58	---	---	---	**10 J**	NA	NA
alkane_16.24	---	---	---	**7.5 J**	NA	NA
Naphthalene trimethyl	---	---	---	**4 J**	NA	NA
Total TIC, Semi-Volatile	---	---	---	**147 J**	NA	NA

Notes:

SRS	New Jersey Soil Remediation Standards
mg/kg	Milligrams per kilogram (equivalent to parts per million)
5.0	Bold value indicates concentration is above the method detection limit.
▨ **27.0**	Bold and shaded concentrations are above the applicable New Jersey Impact to Groundwater SRS.
☐	Bold and boxed concentrations are above the applicable New Jersey Residential Direct Contact SRS.
5.0	Bold and italics concentrations are above the applicable New Jersey Non-Residential Direct Contact SRS.
U	The compound was not detected at the indicated concentration.
J	Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.
---	No standard published
N	Normal environmental sample
FD	Blind field duplicate
NA	Not analyzed

CITY: Newtown, Pa DIV/GROUP: Env. DB: M. Wasilewski LD: M. Wasilewski PIC: J. Balletto PM: B. Pierce TM: B. Pierce LYR:(Opt)ON=*;OFF=*REF*
G:\APROJECT\PSE&G\NP000603 - Salem - Diesel\NP000603.0007\Task 2 - RAPR\Sept. 2009\Draft\Figures\Figure 01 - Station Location.dwg LAYOUT: 1 SAVED: 8/3/2009 7:16 PM ACADVER: 17.1S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: ARCADIS(SIZE A-B).CTB PLOTTED: 11/1/2009 11:36
AM BY: WASILEWSKI, MATT

XREFS: IMAGES: taylors bridge.jpg PROJECTNAME: —



CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

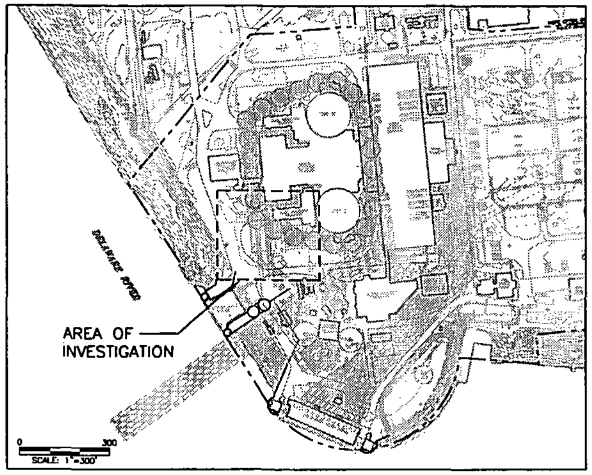
SOURCE: USGS 7.5 MIN. TOPOGRAPHICAL QUADRANGLE TAYLORS BRIDGE, DEL–N.J. 1948, PHOTOREVISED 1981.

PSEG NUCLEAR, LLC
SALEM GENERATING STATION SALEM, NEW JERSEY
REMEDIAL ACTION PROGRESS REPORT

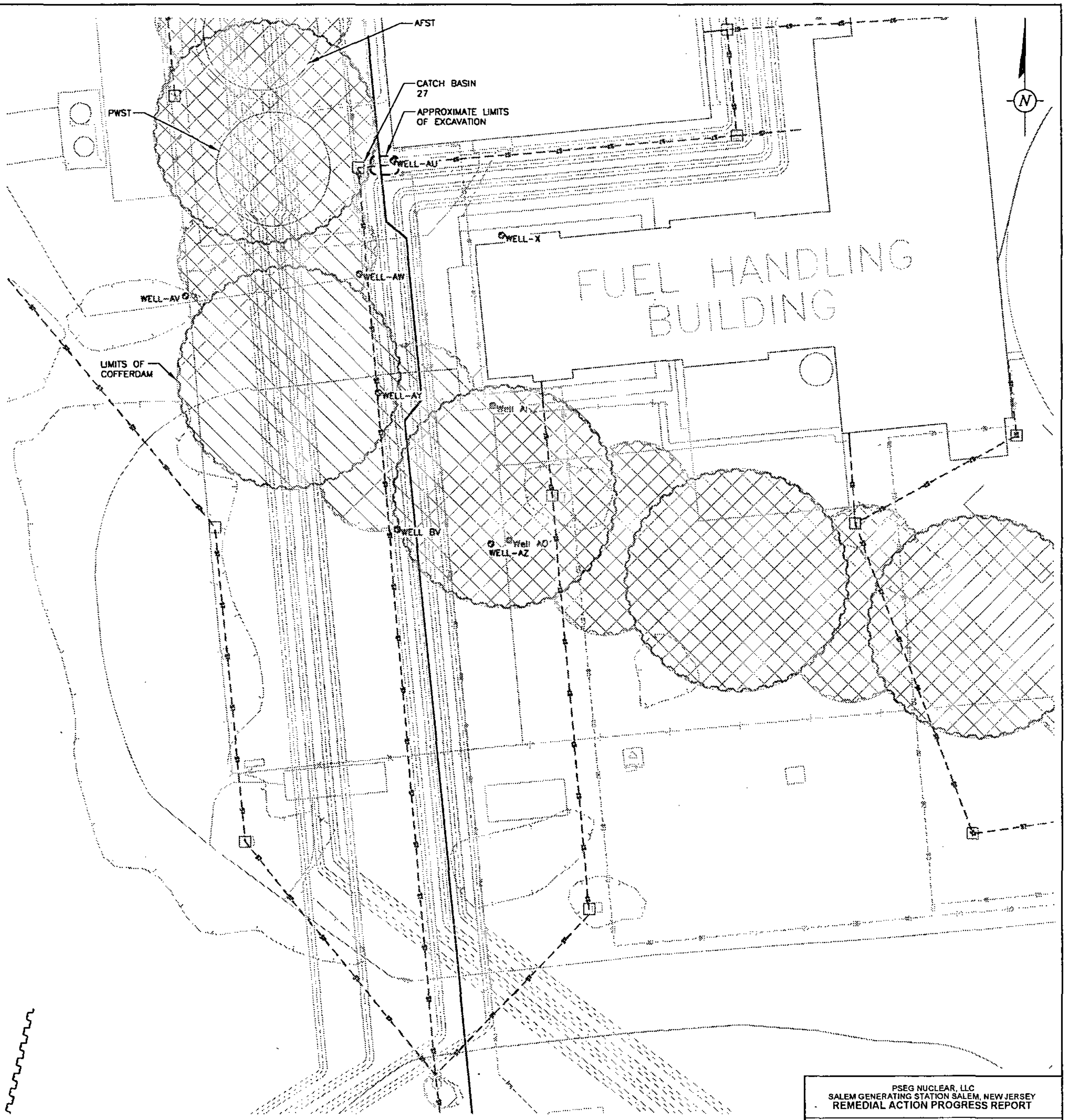
SITE LOCATION

ARCADIS

FIGURE
1



SITE LAYOUT
SCALE: 1"=300'



LEGEND:

WELL-AZ⊙	MONITORING WELL UTILIZED IN THE DIESEL INVESTIGATION AND SCREENED ACROSS THE WATER TABLE.
WELL AO⊗	MONITORING WELL UTILIZED IN A SEPARATE INVESTIGATION AND SCREENED BELOW THE WATER TABLE.
———	DIESEL FUEL UNDERGROUND PIPING
—·—·—	PROPERTY BOUNDARY
···○···	BLOW DOWN PIPING
···×···	LIQUID "RAD" WASTE LINE
▨	SERVICE WATER PIPING
▨	CIRCULATING WATER OUTLET PIPING
▨	CIRCULATING WATER INLET PIPING
—○— —	STORM SEWER PIPING
☐	CATCH BASIN
●	MANHOLE (STORM SEWER)
⌐⌐⌐	SHEET PILE
AFST	AUXILIARY FEEDWATER STORAGE TANK
PWST	PRIMARY WATER STORAGE TANK

NOTE:

WELL AO IS A PUMPING EXTRACTION WELL UTILIZED IN A SEPARATE INVESTIGATION.

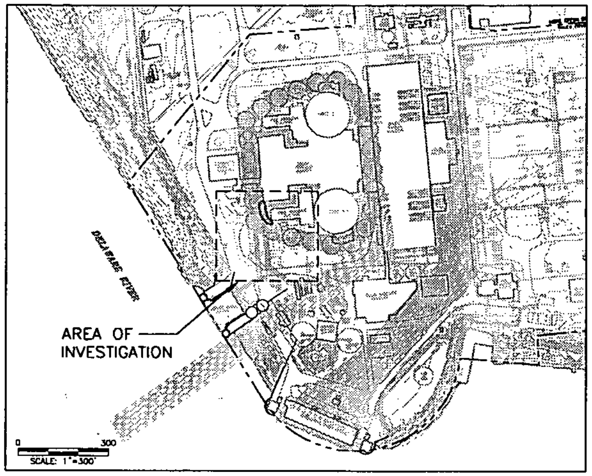
0 20 20
SCALE: 1"=20'

PSEG NUCLEAR, LLC
SALEM GENERATING STATION SALEM, NEW JERSEY
REMEDIAL ACTION PROGRESS REPORT

STATION LAYOUT

ARCADIS

FIGURE
2



SITE LAYOUT

SCALE: 1"=300'

LEGEND:

WELL-AZ ⊗	MONITORING WELL UTILIZED IN THE DIESEL INVESTIGATION AND SCREENED ACROSS THE WATER TABLE.
WELL AO ⊠	MONITORING WELL UTILIZED IN A SEPARATE INVESTIGATION AND SCREENED BELOW THE WATER TABLE.
▨	APPROXIMATE EXTENT OF SEPERATE - PHASE DIESSEL FUEL
———	DIESEL FUEL UNDERGROUND PIPING
—··—··—	PROPERTY BOUNDARY
~~	BLOW DOWN PIPING
~~	LIQUID "RAD" WASTE LINE
░░░	SERVICE WATER PIPING
░░░	CIRCULATING WATER OUTLET PIPING
░░░	CIRCULATING WATER INLET PIPING
— —SD— —	STORM SEWER PIPING
☐	CATCH BASIN
⊗	MANHOLE (STORM SEWER)
⊓⊔⊓⊔	SHEET PILE
AFST	AUXILIARY FEEDWATER STORAGE TANK
PWST	PRIMARY WATER STORAGE TANK
GWQC	NEW JERSEY GROUND WATER QUALITY CRITERIA FOR CLASS IIA AQUIFERS
NS	NOT SAMPLED
J	ESTIMATED VALUE
10.2	BOLD AND GRAY-SHADED VALUES ARE ABOVE THEIR RESPECTIVE GWQC.
--	NO GROUNDWATER QUALITY CRITERIA AVAILABLE

WELL ID

NEW JERSEY GROUNDWATER QUALITY CRITERIA FOR CLASS IIA AQUIFER

WELL-X		
Date		Jun-09
Compound	GWQC	
Acetone	6,000	15.2
Benzene	1	0.38 J
Fluorene	300	0.42 J
Naphthalene	300	0.89 J

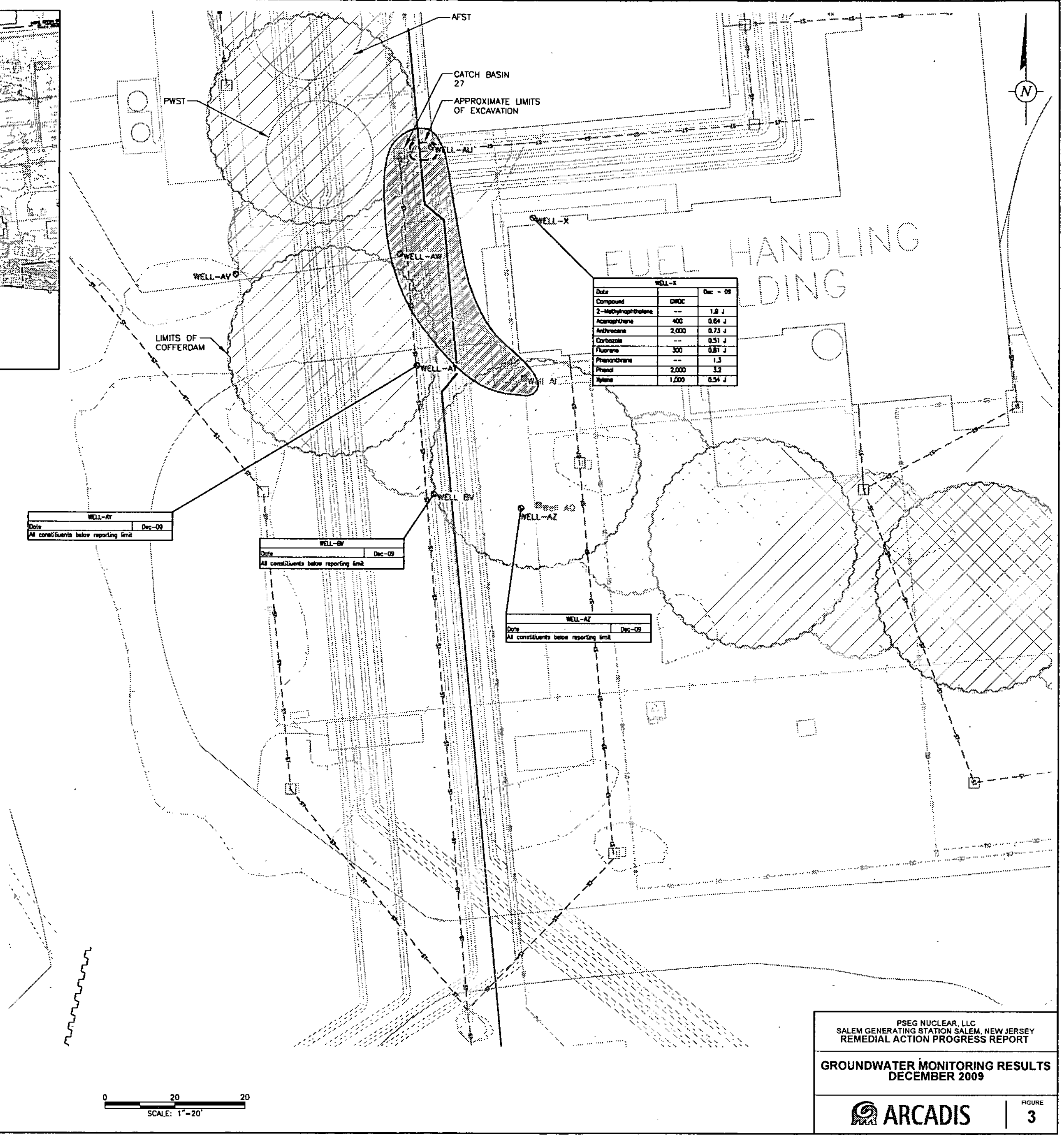
CONSTITUENT OF CONCERN

SAMPLE DATE

ANALYTICAL RESULT

NOTES:

1. PRIOR TO INITIATING GROUNDWATER SAMPLE COLLECTION, DEPTH-TO-WATER AND SEPARATE PHASE PRODUCT THICKNESS MEASUREMENTS WERE COLLECTED FROM THE INDIVIDUAL WELLS USING AN ELECTRONIC OIL-WATER INTERFACE PROBE.
2. MONITORING WELLS NOT INDICATING A MEASURABLE THICKNESS OF SEPARATE PRODUCT (I.E., GREATER THAN 0.01 FEET) WERE SAMPLED UTILIZING LOW-FLOW SAMPLING METHODS.
3. GROUNDWATER SAMPLES WERE ANALYZED FOR PRIORITY POLLUTANT SEMI-VOLATILE AND VOLATILE ORGANICS INCLUDING A LIBRARY SEARCH.
4. UNITS ARE IN ug/l - MICROGRAMS PER LITER (EQUIVALENT TO PARTS PER BILLION) CONCENTRATIONS ARE ONLY SHOWN FOR THOSE CONSTITUENTS DETECTED ABOVE THE LABORTORY DETECTION LIMITS.
5. WELL AO IS A PUMPING EXTRACTION WELL UTILIZED IN A SEPARATE INVESTIGATION.



WELL-X		
Date		Dec - 09
Compound	GWQC	
2-Methylnaphthalene	--	1.9 J
Acenaphthene	400	0.64 J
Anthracene	2,000	0.73 J
Carbazole	--	0.51 J
Fluorene	300	0.81 J
Phenanthrene	--	1.3
Phenol	2,000	3.2
Xylene	1,000	0.54 J

WELL-AY	
Date	Dec-09
All constituents below reporting limit	

WELL-BV	
Date	Dec-09
All constituents below reporting limit	

WELL-AZ	
Date	Dec-09
All constituents below reporting limit	

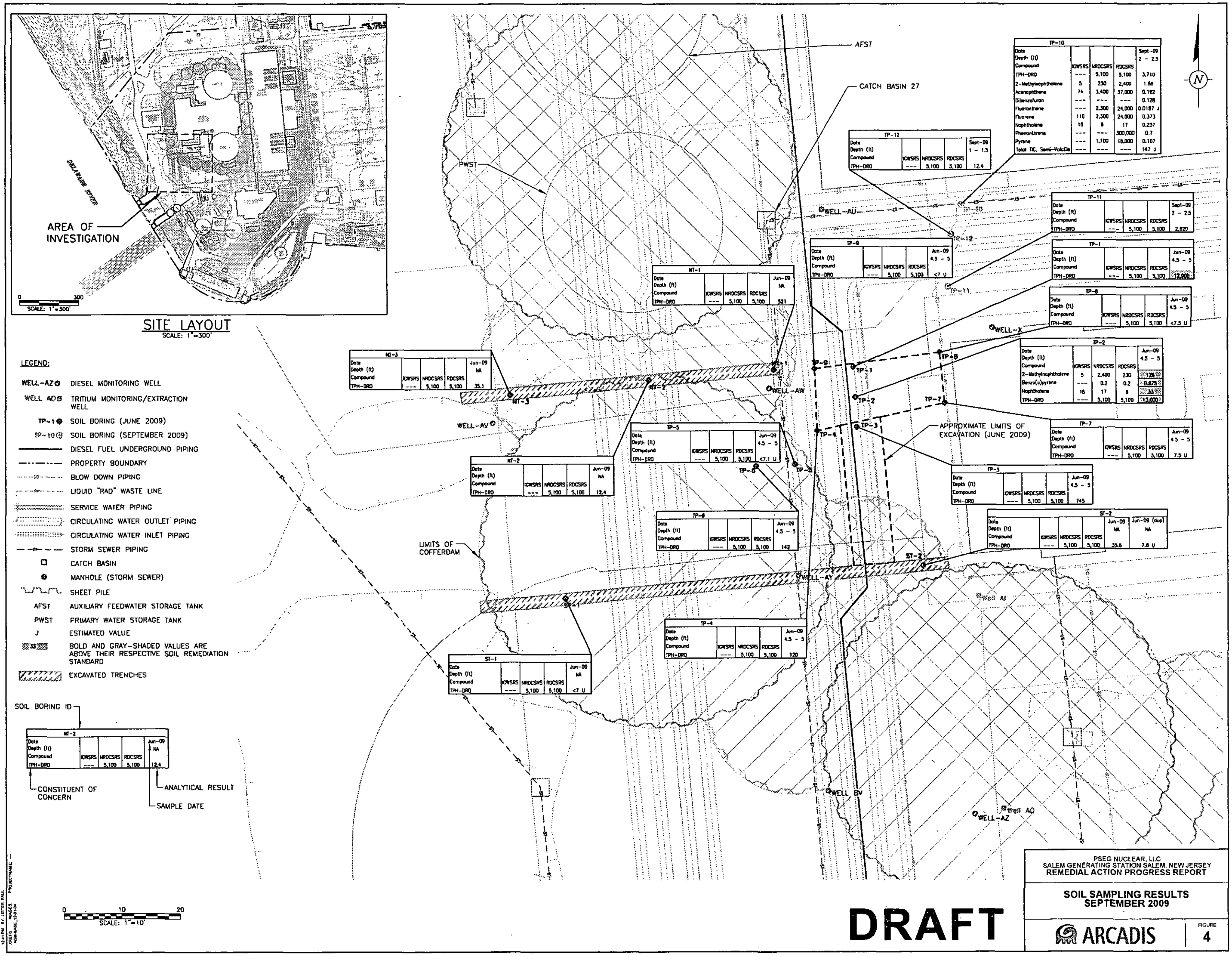
PSEG NUCLEAR, LLC
SALEM GENERATING STATION SALEM, NEW JERSEY
REMEDIAL ACTION PROGRESS REPORT

**GROUNDWATER MONITORING RESULTS
DECEMBER 2009**

ARCADIS

FIGURE
3

CITY: Newtown, Pa DIV/GROUP: Env. DB: M Wasilewski LD: M Wasilewski PIC: J Bellotto PM: B. Pierce TM: B. Pierce LYR:(Opt)ON=*;OFF=*REF
G:\ENVCAD\SYRACUSE\RETURN-TOWN\...\Figure 03 - GROUNDWATER MONITORING RESULTS - DEC 2009.dwg LAYOUT: 3 SAVED: 2/5/2010 10:17 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: ARCADIS(SIZE A-B).CTB PLOTTED: 2/5/2010 10:17 AM BY: SARTORI, KATHERINE
XREFS: IMAGES: AGM-BASE_12-01-04 PROJECTNAME: ---



TP-10

Date				Sept-09
Depth (ft)				2 - 2.5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	3,710
2-Methylnaphthalene	5	230	2,400	1.68
Acenaphthene	74	3,400	37,000	0.182
Dibenzofuran	---	---	---	0.128
Fluoranthene	---	2,300	24,000	0.0187 J
Fluorene	110	2,300	24,000	0.373
Naphthalene	18	6	17	0.257
Phenanthrene	---	---	300,000	0.7
Pyrene	---	1,700	18,000	0.107
Total TIC, Semi-Volatile	---	---	---	147 J

TP-12

Date				Sept-09
Depth (ft)				1 - 1.5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	12.4

TP-11

Date				Sept-09
Depth (ft)				2 - 2.5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	2,820

TP-9

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	<7 U

TP-1

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	**12,900**

NT-1

Date				Jun-09
Depth (ft)				NA
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	521

TP-8

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	<7.5 U

NT-3

Date				Jun-09
Depth (ft)				NA
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	35.1

TP-2

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
2-Methylnaphthalene	5	2,400	230	**128**
Benzo(a)pyrene	---	0.2	0.2	**0.875**
Naphthalene	18	17	8	**33**
TPH-DRO	---	5,100	5,100	**13,000**

TP-5

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	<7.1 U

TP-7

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	7.5 U

NT-2

Date				Jun-09
Depth (ft)				NA
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	12.4

TP-3

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	745

TP-6

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	142

ST-2

Date				Jun-09	Jun-09 (dup)
Depth (ft)				NA	NA
Compound	IGWSRS	NRDCSRS	RDCSRS		
TPH-DRO	---	5,100	5,100	35.6	7.8 U

TP-4

Date				Jun-09
Depth (ft)				4.5 - 5
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	120

ST-1

Date				Jun-09
Depth (ft)				NA
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	<7 U

LEGEND:

WELL-AZ ●	DIESEL MONITORING WELL
WELL AD ⊠	TRITIUM MONITORING/EXTRACTION WELL
TP-1 ●	SOIL BORING (JUNE 2009)
TP-10 ⊕	SOIL BORING (SEPTEMBER 2009)
———	DIESEL FUEL UNDERGROUND PIPING
—··—··—	PROPERTY BOUNDARY
··········	BLOW DOWN PIPING
··········	LIQUID "RAD" WASTE LINE
▨	SERVICE WATER PIPING
▭	CIRCULATING WATER OUTLET PIPING
▨	CIRCULATING WATER INLET PIPING
— — —	STORM SEWER PIPING
□	CATCH BASIN
●	MANHOLE (STORM SEWER)
⊔⊓⊔	SHEET PILE
AFST	AUXILIARY FEEDWATER STORAGE TANK
PWST	PRIMARY WATER STORAGE TANK
J	ESTIMATED VALUE
▨**33**▨	BOLD AND GRAY-SHADED VALUES ARE ABOVE THEIR RESPECTIVE SOIL REMEDIATION STANDARD
▨	EXCAVATED TRENCHES

SOIL BORING ID

NT-2

Date				Jun-09
Depth (ft)				NA
Compound	IGWSRS	NRDCSRS	RDCSRS	
TPH-DRO	---	5,100	5,100	12.4

CONSTITUENT OF CONCERN

ANALYTICAL RESULT

SAMPLE DATE

DRAFT

PSEG NUCLEAR, LLC
SALEM GENERATING STATION SALEM, NEW JERSEY
REMEDIAL ACTION PROGRESS REPORT

SOIL SAMPLING RESULTS
SEPTEMBER 2009

ARCADIS

FIGURE
4

Appendix A

Low-flow Groundwater Sampling Logs

ARCADIS

Groundwater Sampling Form

Page 1 of 1

Project No. NP000603.0006.00002

Well ID AZ

Date 12/8/2009

Project Name/Location PSEG / Hancock's Bridge, NJ

Weather Cloudy, 40

Measuring Pt. Description Top-of-Casing

Screen Setting (ft-bmp) 3 - 9

Casing Diameter (in.) 4

Well Material X PVC
___ SS

Static Water Level (ft-bmp) 4.30

Total Depth (ft-bmp) 9

Water Column/ Gallons in Well

MP Elevation

Pump Intake (ft-bmp) 7.5

Purge Method (mark one):
Centrifugal
Submersible X
Bailer
Other

Sample Method Low Flow

Pump On/Off 1100/1115

Volumes Purged

Sampled by F. Straker

Sample Time: Label 1140
Start 1140
End 1146

Replicate/ Code No.

PID Reading (wellhead)

PID Reading (background)

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
1105	5	350	4.45		7.63	0.652	29.4	7.43	16.74	110.8	none	none
1110	10	350	4.46		7.16	0.663	26.1	7.18	16.86	121.2	none	none
1115	15	350	4.46		7.40	0.666	20.1	7.13	16.68	125.3	none	none
1120	20	350	4.46		7.36	0.662	20.7	7.01	16.73	129.4	none	none
1125	25	350	4.46		7.33	0.661	18.9	6.99	16.71	132.1	none	none
1130	30	350	4.46		7.32	0.661	18.9	6.98	16.71	136.5	none	none
1135	35	350	4.46		7.32	0.664	18.5	6.98	16.78	135.5	none	none
Notes:												

NR - Not Recorded

Constituents Sampled	Container	Number	Preservative
VOC	40 ML VOA	3	HCL
SVOC	1 L Amber Glass	2	None

Well Casing Volumes

Gallons/Foot
1" = 0.04
1.25" = 0.06
1.5" = 0.09
2" = 0.16
2.5" = 0.26
3" = 0.37
3.5" = 0.50
4" = 0.65
6" = 1.47

Well Information

Well Location:

Condition of Well:

Well Completion: Flush Mount

Well Locked at Arrival: Yes

Well Locked at Departure: Yes

Key Number To Well: Not Applicable

ARCADIS

Groundwater Sampling Form

Page 1 of 1

Project No. NP000603.0006.00002
Well ID BV
Date 12/8/2009

Project Name/Location PSEG / Hancock's Bridge, NJ
Weather Cloudy, 40

Measuring Pt. Description Top-of-Casing
Screen Setting (ft-bmp) 3 - 10
Casing Diameter (in.) 4
Well Material X PVC
__ SS

Static Water Level (ft-bmp) 4.23
Total Depth (ft-bmp) 10
Water Column/ Gallons in Well N/A

MP Elevation
Pump Intake (ft-bmp) 7.5
Purge Method (mark one):
Centrifugal
Submersible X
Bailer
Other
Sample Method Low Flow

Pump On/Off 1200/1255
Volumes Purged N/A
Sampled by F. Straker

Sample Time: Label 1245
Start 1245
End 1250
Replicate/ Code No. N/A
PID Reading (wellhead)
PID Reading (background)

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (uS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance Color	Appearance Odor
1205	5	350	4.40		8.73	0.096	201	13.43	14.05	91.0	cloudy	none
1210	10	350	4.41		8.62	0.099	210	13.51	14.10	89.2	cloudy	none
1215	15	350	4.41		9.11	0.089	98.5	9.63	14.06	109.2	cloudy	none
1220	20	350	4.41		9.17	0.088	68.9	9.19	13.99	107.9	cloudy	none
1225	25	350	4.41		8.96	0.087	57.2	9.22	13.99	108.6	cloudy	none
1230	30	350	4.41		9.27	0.086	44.2	8.76	13.95	108.5	cloudy	none
1235	35	350	4.41		9.27	0.086	45.7	8.66	13.99	109.7	none	none
1240	40	350	4.41		9.30	0.086	40.9	8.67	13.97	109.6	none	none
Notes:												

NR - Not Recorded

Constituents Sampled	**Container**	**Number**	**Preservative**
VOC	40 ML VOA	3	HCL
SVOC	1 L Amber Glass	2	None

Well Casing Volumes

Gallons/Foot					
Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

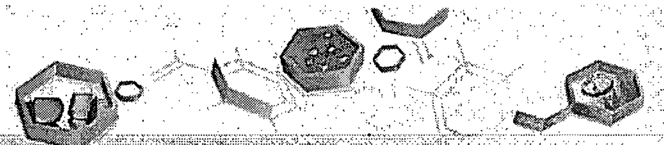
Well Information

Well Location:
Condition of Well:
Well Completion:
Well Locked at Arrival:
Well Locked at Departure:
Key Number To Well:

Appendix B

Groundwater Analytical Results
(December 2009)

New Jersey
ACCUTEST
Laboratories



12/30/09

Technical Report for

Arcadis

PSEG-Salem, Artificial Island, Salem, NJ

NP000603.0007

Accutest Job Number: JA34700

Sampling Date: 12/08/09

Report to:

Arcadis
6 Terry Drive
Newtown, PA 18940
Jonathan.Shafer@arcadis-us.com

ATTN: Jonathan Shafer

Total number of pages in report: **162**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

David N. Speis
VP Ops, Laboratory Director

Client Service contact: Marie Meidhof 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC, PA, RI, SC, TN, VA, WV

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ACCUTEST LABORATORIES 50 YEARS 1956-2006

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Sample Summary

Arcadis

Job No: JA34700

PSEG-Salem, Artificial Island, Salem, NJ
Project No: NP000603.0007

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
JA34700-1	12/08/09	11:40	FS	12/08/09	AQ	Ground Water	AZ
JA34700-2	12/08/09	12:45	FS	12/08/09	AQ	Ground Water	BV
JA34700-3	12/08/09	13:30	FS	12/08/09	AQ	Ground Water	X
JA34700-4	12/08/09	14:00	FS	12/08/09	AQ	Ground Water	AY
JA34700-5	12/08/09	14:20	FS	12/08/09	AQ	Field Blank Water	FB-1282009
JA34700-6	12/08/09	14:45	FS	12/08/09	AQ	Ground Water	YY
JA34700-7	12/08/09	14:45	FS	12/08/09	AQ	Trip Blank Water	TRIP BLANK

ACCUTEST
Laboratories

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Arcadis	Job No	JA34700
Site:	PSEG-Salem, Artificial Island, Salem, NJ	Report Date	12/30/2009 11:46:55 A

On 12/08/2009, 5 Sample(s), 1 Trip Blank(s) and 1 Field Blank(s) were received at Accutest Laboratories at a temperature of 1.1 C. Samples were intact and properly preserved, unless noted below. An Accutest Job Number of JA34700 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix AQ Batch ID: V1A3576

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA34700-1MS, JA34700-2DUP were used as the QC samples indicated.

Extractables by GCMS By Method SW846 8270C

Matrix AQ Batch ID: OP41361

- All samples were extracted within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA34586-1MS, JA34586-1MSD were used as the QC samples indicated.
- RPD(s) for MSD for 4-Nitrophenol are outside control limits for sample OP41361-MSD. Probable cause due to sample homogeneity.
- OP41361-MSD for Phenol-d5: Outside of in house control limits, but within reasonable method recovery limits.
- OP41361-MSD for 4-Nitrophenol: Outside control limits due to matrix interference.
- OP41361-MS for Phenol-d5: Outside of in house control limits, but within reasonable method recovery limits.

Accutest certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting Accutest's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

Accutest Laboratories is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by Accutest Laboratories indicated via signature on the report cover

Sample Results

Report of Analysis

Accutest Laboratories

Report of Analysis

Client Sample ID:	AZ		
Lab Sample ID:	JA34700-1	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A83955.D	1	12/16/09	TGE	n/a	n/a	V1A3576
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: AZ
Lab Sample ID: JA34700-1 **Date Sampled:** 12/08/09
Matrix: AQ - Ground Water **Date Received:** 12/08/09
Method: SW846 8260B **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		76-120%
17060-07-0	1,2-Dichloroethane-D4	116%		64-135%
2037-26-5	Toluene-D8	106%		76-117%
460-00-4	4-Bromofluorobenzene	94%		72-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	AZ		
Lab Sample ID:	JA34700-1	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F85661.D	1	12/23/09	NAP	12/10/09	OP41361	EF4044
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	5.6	1.2	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.6	1.2	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.6	1.4	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.6	1.8	ug/l	
51-28-5	2,4-Dinitrophenol	ND	22	0.82	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	22	0.57	ug/l	
95-48-7	2-Methylphenol	ND	2.2	1.2	ug/l	
	3&4-Methylphenol	ND	2.2	1.2	ug/l	
88-75-5	2-Nitrophenol	ND	5.6	1.4	ug/l	
100-02-7	4-Nitrophenol	ND	11	0.92	ug/l	
87-86-5	Pentachlorophenol	ND	11	0.89	ug/l	
108-95-2	Phenol	ND	2.2	0.64	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.6	1.5	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.6	1.4	ug/l	
83-32-9	Acenaphthene	ND	1.1	0.41	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.30	ug/l	
120-12-7	Anthracene	ND	1.1	0.18	ug/l	
56-55-3	Benzo(a)anthracene	ND	1.1	0.14	ug/l	
50-32-8	Benzo(a)pyrene	ND	1.1	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	1.1	0.27	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	1.1	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	1.1	0.42	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	2.2	0.39	ug/l	
85-68-7	Butyl benzyl phthalate	ND	2.2	0.28	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.6	0.46	ug/l	
106-47-8	4-Chloroaniline	ND	5.6	0.28	ug/l	
86-74-8	Carbazole	ND	2.2	0.18	ug/l	
218-01-9	Chrysene	ND	1.1	0.12	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	2.2	0.28	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	2.2	0.34	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	2.2	0.43	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	2.2	0.39	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: AZ
Lab Sample ID: JA34700-1
Matrix: AQ - Ground Water
Method: SW846 8270C SW846 3510C
Project: PSEG-Salem, Artificial Island, Salem, NJ

Date Sampled: 12/08/09
Date Received: 12/08/09
Percent Solids: n/a

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-50-1	1,2-Dichlorobenzene	ND	2.2	0.47	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	2.2	0.40	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.2	0.43	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	2.2	0.24	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	2.2	0.36	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	5.6	0.33	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	1.1	0.17	ug/l	
132-64-9	Dibenzofuran	ND	5.6	0.34	ug/l	
84-74-2	Di-n-butyl phthalate	ND	2.2	0.21	ug/l	
117-84-0	Di-n-octyl phthalate	ND	2.2	0.44	ug/l	
84-66-2	Diethyl phthalate	ND	2.2	0.18	ug/l	
131-11-3	Dimethyl phthalate	ND	2.2	0.25	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	2.2	0.36	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.19	ug/l	
86-73-7	Fluorene	ND	1.1	0.30	ug/l	
118-74-1	Hexachlorobenzene	ND	2.2	0.41	ug/l	
87-68-3	Hexachlorobutadiene	ND	1.1	0.41	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	22	0.75	ug/l	
67-72-1	Hexachloroethane	ND	5.6	0.29	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1.1	0.15	ug/l	
78-59-1	Isophorone	ND	2.2	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	0.73	ug/l	
88-74-4	2-Nitroaniline	ND	5.6	0.26	ug/l	
99-09-2	3-Nitroaniline	ND	5.6	0.32	ug/l	
100-01-6	4-Nitroaniline	ND	5.6	0.20	ug/l	
91-20-3	Naphthalene	ND	1.1	0.47	ug/l	
98-95-3	Nitrobenzene	ND	2.2	0.28	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	2.2	0.49	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.6	0.24	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.23	ug/l	
129-00-0	Pyrene	ND	1.1	0.17	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.2	0.48	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	41%		13-68%
4165-62-2	Phenol-d5	23%		10-49%
118-79-6	2,4,6-Tribromophenol	100%		37-130%
4165-60-0	Nitrobenzene-d5	75%		25-112%
321-60-8	2-Fluorobiphenyl	75%		31-106%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	AZ		
Lab Sample ID:	JA34700-1	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

ABN TCL List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1718-51-0	Terphenyl-d14	82%		14-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	BV		
Lab Sample ID:	JA34700-2	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A83956.D	1	12/16/09	TGE	n/a	n/a	V1A3576
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BV		
Lab Sample ID:	JA34700-2	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%		76-120%
17060-07-0	1,2-Dichloroethane-D4	117%		64-135%
2037-26-5	Toluene-D8	103%		76-117%
460-00-4	4-Bromofluorobenzene	94%		72-122%

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Page 1 of 3

Client Sample ID: BV
Lab Sample ID: JA34700-2 **Date Sampled:** 12/08/09
Matrix: AQ - Ground Water **Date Received:** 12/08/09
Method: SW846 8270C SW846 3510C **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

	File ID	**DF**	**Analyzed**	**By**	**Prep Date**	**Prep Batch**	**Analytical Batch**
Run #1	F85662.D	1	12/23/09	NAP	12/10/09	OP41361	EF4044
Run #2							

	Initial Volume	**Final Volume**
Run #1	900 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	**Compound**	**Result**	**RL**	**MDL**	**Units**	**Q**
95-57-8	2-Chlorophenol	ND	5.6	1.2	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.6	1.2	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.6	1.4	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.6	1.8	ug/l	
51-28-5	2,4-Dinitrophenol	ND	22	0.82	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	22	0.57	ug/l	
95-48-7	2-Methylphenol	ND	2.2	1.2	ug/l	
	3&4-Methylphenol	ND	2.2	1.2	ug/l	
88-75-5	2-Nitrophenol	ND	5.6	1.4	ug/l	
100-02-7	4-Nitrophenol	ND	11	0.92	ug/l	
87-86-5	Pentachlorophenol	ND	11	0.89	ug/l	
108-95-2	Phenol	ND	2.2	0.64	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.6	1.5	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.6	1.4	ug/l	
83-32-9	Acenaphthene	ND	1.1	0.41	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.30	ug/l	
120-12-7	Anthracene	ND	1.1	0.18	ug/l	
56-55-3	Benzo(a)anthracene	ND	1.1	0.14	ug/l	
50-32-8	Benzo(a)pyrene	ND	1.1	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	1.1	0.27	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	1.1	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	1.1	0.42	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	2.2	0.39	ug/l	
85-68-7	Butyl benzyl phthalate	ND	2.2	0.28	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.6	0.46	ug/l	
106-47-8	4-Chloroaniline	ND	5.6	0.28	ug/l	
86-74-8	Carbazole	ND	2.2	0.18	ug/l	
218-01-9	Chrysene	ND	1.1	0.12	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	2.2	0.28	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	2.2	0.34	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	2.2	0.43	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	2.2	0.39	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: BV
Lab Sample ID: JA34700-2 **Date Sampled:** 12/08/09
Matrix: AQ - Ground Water **Date Received:** 12/08/09
Method: SW846 8270C SW846 3510C **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-50-1	1,2-Dichlorobenzene	ND	2.2	0.47	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	2.2	0.40	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.2	0.43	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	2.2	0.24	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	2.2	0.36	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	5.6	0.33	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	1.1	0.17	ug/l	
132-64-9	Dibenzofuran	ND	5.6	0.34	ug/l	
84-74-2	Di-n-butyl phthalate	ND	2.2	0.21	ug/l	
117-84-0	Di-n-octyl phthalate	ND	2.2	0.44	ug/l	
84-66-2	Diethyl phthalate	ND	2.2	0.18	ug/l	
131-11-3	Dimethyl phthalate	ND	2.2	0.25	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	2.2	0.36	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.19	ug/l	
86-73-7	Fluorene	ND	1.1	0.30	ug/l	
118-74-1	Hexachlorobenzene	ND	2.2	0.41	ug/l	
87-68-3	Hexachlorobutadiene	ND	1.1	0.41	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	22	0.75	ug/l	
67-72-1	Hexachloroethane	ND	5.6	0.29	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1.1	0.15	ug/l	
78-59-1	Isophorone	ND	2.2	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	0.73	ug/l	
88-74-4	2-Nitroaniline	ND	5.6	0.26	ug/l	
99-09-2	3-Nitroaniline	ND	5.6	0.32	ug/l	
100-01-6	4-Nitroaniline	ND	5.6	0.20	ug/l	
91-20-3	Naphthalene	ND	1.1	0.47	ug/l	
98-95-3	Nitrobenzene	ND	2.2	0.28	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	2.2	0.49	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.6	0.24	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.23	ug/l	
129-00-0	Pyrene	ND	1.1	0.17	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.2	0.48	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	33%		13-68%
4165-62-2	Phenol-d5	18%		10-49%
118-79-6	2,4,6-Tribromophenol	79%		37-130%
4165-60-0	Nitrobenzene-d5	64%		25-112%
321-60-8	2-Fluorobiphenyl	61%		31-106%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BV		
Lab Sample ID:	JA34700-2	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

ABN TCL List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1718-51-0	Terphenyl-d14	70%		14-122%

ND = Not detected MDL - Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Raw Data: 1A83957.D

Accutest Laboratories

Report of Analysis

Client Sample ID: X
Lab Sample ID: JA34700-3 **Date Sampled:** 12/08/09
Matrix: AQ - Ground Water **Date Received:** 12/08/09
Method: SW846 8260B **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A83957.D	1	12/16/09	TGE	n/a	n/a	V1A3576
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	X		
Lab Sample ID:	JA34700-3	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	0.54	1.0	0.25	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%		76-120%
17060-07-0	1,2-Dichloroethane-D4	117%		64-135%
2037-26-5	Toluene-D8	106%		76-117%
460-00-4	4-Bromofluorobenzene	94%		72-122%

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	X		
Lab Sample ID:	JA34700-3	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3M16331.D	1	12/29/09	LP	12/10/09	OP41361	E3M719
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	5.3	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.3	1.1	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.3	1.3	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.3	1.7	ug/l	
51-28-5	2,4-Dinitrophenol	ND	21	0.78	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	21	0.54	ug/l	
95-48-7	2-Methylphenol	ND	2.1	1.2	ug/l	
	3&4-Methylphenol	ND	2.1	1.1	ug/l	
88-75-5	2-Nitrophenol	ND	5.3	1.3	ug/l	
100-02-7	4-Nitrophenol	ND	11	0.87	ug/l	
87-86-5	Pentachlorophenol	ND	11	0.84	ug/l	
108-95-2	Phenol	3.2	2.1	0.61	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.3	1.4	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.3	1.3	ug/l	
83-32-9	Acenaphthene	0.64	1.1	0.39	ug/l	J
208-96-8	Acenaphthylene	ND	1.1	0.29	ug/l	
120-12-7	Anthracene	0.73	1.1	0.17	ug/l	J
56-55-3	Benzo(a)anthracene	ND	1.1	0.13	ug/l	
50-32-8	Benzo(a)pyrene	ND	1.1	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	1.1	0.26	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	1.1	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	1.1	0.40	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	2.1	0.37	ug/l	
85-68-7	Butyl benzyl phthalate	ND	2.1	0.26	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.3	0.44	ug/l	
106-47-8	4-Chloroaniline	ND	5.3	0.27	ug/l	
86-74-8	Carbazole	0.51	2.1	0.17	ug/l	J
218-01-9	Chrysene	ND	1.1	0.11	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	2.1	0.26	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	2.1	0.33	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	2.1	0.41	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	2.1	0.37	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: X
Lab Sample ID: JA34700-3 **Date Sampled:** 12/08/09
Matrix: AQ - Ground Water **Date Received:** 12/08/09
Method: SW846 8270C SW846 3510C **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-50-1	1,2-Dichlorobenzene	ND	2.1	0.44	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	2.1	0.38	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.1	0.41	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	2.1	0.23	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	2.1	0.34	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	5.3	0.31	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	1.1	0.16	ug/l	
132-64-9	Dibenzofuran	ND	5.3	0.32	ug/l	
84-74-2	Di-n-butyl phthalate	ND	2.1	0.20	ug/l	
117-84-0	Di-n-octyl phthalate	ND	2.1	0.42	ug/l	
84-66-2	Diethyl phthalate	ND	2.1	0.17	ug/l	
131-11-3	Dimethyl phthalate	ND	2.1	0.24	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	2.1	0.34	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.18	ug/l	
86-73-7	Fluorene	0.81	1.1	0.28	ug/l	J
118-74-1	Hexachlorobenzene	ND	2.1	0.39	ug/l	
87-68-3	Hexachlorobutadiene	ND	1.1	0.39	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	21	0.71	ug/l	
67-72-1	Hexachloroethane	ND	5.3	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1.1	0.14	ug/l	
78-59-1	Isophorone	ND	2.1	0.26	ug/l	
91-57-6	2-Methylnaphthalene	1.9	2.1	0.69	ug/l	J
88-74-4	2-Nitroaniline	ND	5.3	0.25	ug/l	
99-09-2	3-Nitroaniline	ND	5.3	0.30	ug/l	
100-01-6	4-Nitroaniline	ND	5.3	0.19	ug/l	
91-20-3	Naphthalene	ND	1.1	0.45	ug/l	
98-95-3	Nitrobenzene	ND	2.1	0.27	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	2.1	0.46	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.3	0.23	ug/l	
85-01-8	Phenanthrene	1.3	1.1	0.22	ug/l	
129-00-0	Pyrene	ND	1.1	0.16	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.1	0.46	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	32%		13-68%
4165-62-2	Phenol-d5	16%		10-49%
118-79-6	2,4,6-Tribromophenol	101%		37-130%
4165-60-0	Nitrobenzene-d5	63%		25-112%
321-60-8	2-Fluorobiphenyl	67%		31-106%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	X		
Lab Sample ID:	JA34700-3	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

ABN TCL List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1718-51-0	Terphenyl-d14	79%		14-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	AY		
Lab Sample ID:	JA34700-4	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A83958.D	1	12/16/09	TGE	n/a	n/a	V1A3576
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	

ND = Not detected   MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	AY		
Lab Sample ID:	JA34700-4	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		76-120%
17060-07-0	1,2-Dichloroethane-D4	115%		64-135%
2037-26-5	Toluene-D8	105%		76-117%
460-00-4	4-Bromofluorobenzene	94%		72-122%

ND = Not detected　　MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: **3M16332.D**

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Report of Analysis

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Client Sample ID: AY
Lab Sample ID: JA34700-4
Matrix: AQ - Ground Water
Method: SW846 8270C SW846 3510C
Project: PSEG-Salem, Artificial Island, Salem, NJ
Date Sampled: 12/08/09
Date Received: 12/08/09
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3M16332.D	1	12/29/09	LP	12/10/09	OP41361	E3M719
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	5.3	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.3	1.1	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.3	1.3	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.3	1.7	ug/l	
51-28-5	2,4-Dinitrophenol	ND	21	0.78	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	21	0.54	ug/l	
95-48-7	2-Methylphenol	ND	2.1	1.2	ug/l	
	3&4-Methylphenol	ND	2.1	1.1	ug/l	
88-75-5	2-Nitrophenol	ND	5.3	1.3	ug/l	
100-02-7	4-Nitrophenol	ND	11	0.87	ug/l	
87-86-5	Pentachlorophenol	ND	11	0.84	ug/l	
108-95-2	Phenol	ND	2.1	0.61	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.3	1.4	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.3	1.3	ug/l	
83-32-9	Acenaphthene	ND	1.1	0.39	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.29	ug/l	
120-12-7	Anthracene	ND	1.1	0.17	ug/l	
56-55-3	Benzo(a)anthracene	ND	1.1	0.13	ug/l	
50-32-8	Benzo(a)pyrene	ND	1.1	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	1.1	0.26	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	1.1	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	1.1	0.40	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	2.1	0.37	ug/l	
85-68-7	Butyl benzyl phthalate	ND	2.1	0.26	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.3	0.44	ug/l	
106-47-8	4-Chloroaniline	ND	5.3	0.27	ug/l	
86-74-8	Carbazole	ND	2.1	0.17	ug/l	
218-01-9	Chrysene	ND	1.1	0.11	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	2.1	0.26	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	2.1	0.33	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	2.1	0.41	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	2.1	0.37	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	AY		
Lab Sample ID:	JA34700-4	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-50-1	1,2-Dichlorobenzene	ND	2.1	0.44	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	2.1	0.38	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.1	0.41	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	2.1	0.23	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	2.1	0.34	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	5.3	0.31	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	1.1	0.16	ug/l	
132-64-9	Dibenzofuran	ND	5.3	0.32	ug/l	
84-74-2	Di-n-butyl phthalate	ND	2.1	0.20	ug/l	
117-84-0	Di-n-octyl phthalate	ND	2.1	0.42	ug/l	
84-66-2	Diethyl phthalate	ND	2.1	0.17	ug/l	
131-11-3	Dimethyl phthalate	ND	2.1	0.24	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	2.1	0.34	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.18	ug/l	
86-73-7	Fluorene	ND	1.1	0.28	ug/l	
118-74-1	Hexachlorobenzene	ND	2.1	0.39	ug/l	
87-68-3	Hexachlorobutadiene	ND	1.1	0.39	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	21	0.71	ug/l	
67-72-1	Hexachloroethane	ND	5.3	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1.1	0.14	ug/l	
78-59-1	Isophorone	ND	2.1	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.1	0.69	ug/l	
88-74-4	2-Nitroaniline	ND	5.3	0.25	ug/l	
99-09-2	3-Nitroaniline	ND	5.3	0.30	ug/l	
100-01-6	4-Nitroaniline	ND	5.3	0.19	ug/l	
91-20-3	Naphthalene	ND	1.1	0.45	ug/l	
98-95-3	Nitrobenzene	ND	2.1	0.27	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	2.1	0.46	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.3	0.23	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.22	ug/l	
129-00-0	Pyrene	ND	1.1	0.16	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.1	0.46	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	20%		13-68%
4165-62-2	Phenol-d5	12%		10-49%
118-79-6	2,4,6-Tribromophenol	46%		37-130%
4165-60-0	Nitrobenzene-d5	37%		25-112%
321-60-8	2-Fluorobiphenyl	38%		31-106%

ND = Not detected   MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	AY		
Lab Sample ID:	JA34700-4	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

ABN TCL List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1718-51-0	Terphenyl-d14	40%		14-122%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

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Client Sample ID:	FB-1282009		
Lab Sample ID:	JA34700-5	**Date Sampled:**	12/08/09
Matrix:	AQ - Field Blank Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A83959.D	1	12/16/09	TGE	n/a	n/a	V1A3576
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: FB-1282009
Lab Sample ID: JA34700-5 **Date Sampled:** 12/08/09
Matrix: AQ - Field Blank Water **Date Received:** 12/08/09
Method: SW846 8260B **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%		76-120%
17060-07-0	1,2-Dichloroethane-D4	118%		64-135%
2037-26-5	Toluene-D8	104%		76-117%
460-00-4	4-Bromofluorobenzene	93%		72-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID: FB-1282009
Lab Sample ID: JA34700-5 **Date Sampled:** 12/08/09
Matrix: AQ - Field Blank Water **Date Received:** 12/08/09
Method: SW846 8270C SW846 3510C **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3M16333.D	1	12/29/09	LP	12/10/09	OP41361	E3M719
Run #2							

	Initial Volume	Final Volume
Run #1	930 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	5.4	1.2	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.4	1.1	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.4	1.3	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.4	1.8	ug/l	
51-28-5	2,4-Dinitrophenol	ND	22	0.79	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	22	0.55	ug/l	
95-48-7	2-Methylphenol	ND	2.2	1.2	ug/l	
	3&4-Methylphenol	ND	2.2	1.1	ug/l	
88-75-5	2-Nitrophenol	ND	5.4	1.3	ug/l	
100-02-7	4-Nitrophenol	ND	11	0.89	ug/l	
87-86-5	Pentachlorophenol	ND	11	0.86	ug/l	
108-95-2	Phenol	ND	2.2	0.62	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.4	1.4	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.4	1.3	ug/l	
83-32-9	Acenaphthene	ND	1.1	0.39	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.29	ug/l	
120-12-7	Anthracene	ND	1.1	0.17	ug/l	
56-55-3	Benzo(a)anthracene	ND	1.1	0.13	ug/l	
50-32-8	Benzo(a)pyrene	ND	1.1	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	1.1	0.26	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	1.1	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	1.1	0.41	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	2.2	0.38	ug/l	
85-68-7	Butyl benzyl phthalate	ND	2.2	0.27	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.4	0.45	ug/l	
106-47-8	4-Chloroaniline	ND	5.4	0.27	ug/l	
86-74-8	Carbazole	ND	2.2	0.18	ug/l	
218-01-9	Chrysene	ND	1.1	0.12	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	2.2	0.27	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	2.2	0.33	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	2.2	0.42	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	2.2	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: FB-1282009
Lab Sample ID: JA34700-5 **Date Sampled:** 12/08/09
Matrix: AQ - Field Blank Water **Date Received:** 12/08/09
Method: SW846 8270C SW846 3510C **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-50-1	1,2-Dichlorobenzene	ND	2.2	0.45	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	2.2	0.38	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.2	0.42	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	2.2	0.24	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	2.2	0.35	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	5.4	0.32	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	1.1	0.16	ug/l	
132-64-9	Dibenzofuran	ND	5.4	0.33	ug/l	
84-74-2	Di-n-butyl phthalate	ND	2.2	0.21	ug/l	
117-84-0	Di-n-octyl phthalate	ND	2.2	0.42	ug/l	
84-66-2	Diethyl phthalate	ND	2.2	0.18	ug/l	
131-11-3	Dimethyl phthalate	ND	2.2	0.24	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	2.2	0.35	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.18	ug/l	
86-73-7	Fluorene	ND	1.1	0.29	ug/l	
118-74-1	Hexachlorobenzene	ND	2.2	0.40	ug/l	
87-68-3	Hexachlorobutadiene	ND	1.1	0.40	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	22	0.72	ug/l	
67-72-1	Hexachloroethane	ND	5.4	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1.1	0.14	ug/l	
78-59-1	Isophorone	ND	2.2	0.27	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	0.71	ug/l	
88-74-4	2-Nitroaniline	ND	5.4	0.25	ug/l	
99-09-2	3-Nitroaniline	ND	5.4	0.31	ug/l	
100-01-6	4-Nitroaniline	ND	5.4	0.19	ug/l	
91-20-3	Naphthalene	ND	1.1	0.46	ug/l	
98-95-3	Nitrobenzene	ND	2.2	0.27	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	2.2	0.47	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.4	0.23	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.23	ug/l	
129-00-0	Pyrene	ND	1.1	0.17	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.2	0.47	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	47%		13-68%
4165-62-2	Phenol-d5	21%		10-49%
118-79-6	2,4,6-Tribromophenol	103%		37-130%
4165-60-0	Nitrobenzene-d5	80%		25-112%
321-60-8	2-Fluorobiphenyl	80%		31-106%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FB-1282009		
Lab Sample ID:	JA34700-5	**Date Sampled:**	12/08/09
Matrix:	AQ - Field Blank Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

ABN TCL List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1718-51-0	Terphenyl-d14	96%		14-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: 1A83960.D

Accutest Laboratories

Report of Analysis

Client Sample ID: YY
Lab Sample ID: JA34700-6
Matrix: AQ - Ground Water
Method: SW846 8260B
Project: PSEG-Salem, Artificial Island, Salem, NJ
Date Sampled: 12/08/09
Date Received: 12/08/09
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A83960.D	1	12/16/09	TGE	n/a	n/a	V1A3576
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	

ND = Not detected
MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	YY		
Lab Sample ID:	JA34700-6	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		76-120%
17060-07-0	1,2-Dichloroethane-D4	115%		64-135%
2037-26-5	Toluene-D8	105%		76-117%
460-00-4	4-Bromofluorobenzene	96%		72-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	YY		
Lab Sample ID:	JA34700-6	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**.	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3M16334.D	1	12/29/09	LP	12/10/09	OP41361	E3M719
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	1.1	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	1.2	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	1.7	ug/l	
51-28-5	2,4-Dinitrophenol	ND	20	0.74	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	20	0.51	ug/l	
95-48-7	2-Methylphenol	ND	2.0	1.1	ug/l	
	3&4-Methylphenol	ND	2.0	1.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	1.2	ug/l	
100-02-7	4-Nitrophenol	ND	10	0.83	ug/l	
87-86-5	Pentachlorophenol	ND	10	0.80	ug/l	
108-95-2	Phenol	ND	2.0	0.58	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	1.3	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	1.2	ug/l	
83-32-9	Acenaphthene	ND	1.0	0.37	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.27	ug/l	
120-12-7	Anthracene	ND	1.0	0.16	ug/l	
56-55-3	Benzo(a)anthracene	ND	1.0	0.12	ug/l	
50-32-8	Benzo(a)pyrene	ND	1.0	0.095	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	1.0	0.25	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	1.0	0.12	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	1.0	0.38	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	2.0	0.35	ug/l	
85-68-7	Butyl benzyl phthalate	ND	2.0	0.25	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	0.42	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	0.25	ug/l	
86-74-8	Carbazole	ND	2.0	0.17	ug/l	
218-01-9	Chrysene	ND	1.0	0.11	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	2.0	0.25	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	2.0	0.31	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	2.0	0.39	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	2.0	0.35	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: YY
Lab Sample ID: JA34700-6 **Date Sampled:** 12/08/09
Matrix: AQ - Ground Water **Date Received:** 12/08/09
Method: SW846 8270C SW846 3510C **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
95-50-1	1,2-Dichlorobenzene	ND	2.0	0.42	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	2.0	0.36	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.0	0.39	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	2.0	0.22	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	2.0	0.33	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	5.0	0.30	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	1.0	0.15	ug/l	
132-64-9	Dibenzofuran	ND	5.0	0.30	ug/l	
84-74-2	Di-n-butyl phthalate	ND	2.0	0.19	ug/l	
117-84-0	Di-n-octyl phthalate	ND	2.0	0.40	ug/l	
84-66-2	Diethyl phthalate	ND	2.0	0.17	ug/l	
131-11-3	Dimethyl phthalate	ND	2.0	0.23	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	2.0	0.33	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.17	ug/l	
86-73-7	Fluorene	ND	1.0	0.27	ug/l	
118-74-1	Hexachlorobenzene	ND	2.0	0.37	ug/l	
87-68-3	Hexachlorobutadiene	ND	1.0	0.37	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	20	0.67	ug/l	
67-72-1	Hexachloroethane	ND	5.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1.0	0.13	ug/l	
78-59-1	Isophorone	ND	2.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.0	0.66	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	0.24	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	0.29	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	0.18	ug/l	
91-20-3	Naphthalene	ND	1.0	0.43	ug/l	
98-95-3	Nitrobenzene	ND	2.0	0.25	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	2.0	0.44	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	0.22	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.21	ug/l	
129-00-0	Pyrene	ND	1.0	0.16	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.44	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	29%		13-68%
4165-62-2	Phenol-d5	18%		10-49%
118-79-6	2,4,6-Tribromophenol	84%		37-130%
4165-60-0	Nitrobenzene-d5	60%		25-112%
321-60-8	2-Fluorobiphenyl	60%		31-106%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	YY		
Lab Sample ID:	JA34700-6	**Date Sampled:**	12/08/09
Matrix:	AQ - Ground Water	**Date Received:**	12/08/09
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

ABN TCL List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1718-51-0	Terphenyl-d14	74%		14-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID: TRIP BLANK
Lab Sample ID: JA34700-7 **Date Sampled:** 12/08/09
Matrix: AQ - Trip Blank Water **Date Received:** 12/08/09
Method: SW846 8260B **Percent Solids:** n/a
Project: PSEG-Salem, Artificial Island, Salem, NJ

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1A83961.D	1	12/16/09	TGE	n/a	n/a	V1A3576
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	JA34700-7	**Date Sampled:**	12/08/09
Matrix:	AQ - Trip Blank Water	**Date Received:**	12/08/09
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%		76-120%
17060-07-0	1,2-Dichloroethane-D4	119%		64-135%
2037-26-5	Toluene-D8	106%		76-117%
460-00-4	4-Bromofluorobenzene	92%		72-122%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody
- Sample Tracking Chronicle
- Internal Chain of Custody

ACCUTEST
Laboratories

GW
FB
WTB

CHAIN OF CUSTODY

PAGE ___ OF ___

2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.accutest.com

FED-EX Tracking #
Bottle Order Control #
Accutest Quote #
Accutest Job # JA34700

Client / Reporting Information

Company Name: ARCADIS
Street Address: TERRY DR SUITE 300
City: VEWTOWN State: PA Zip: 18940
Project Contact: [illegible] Shaffer E-mail:
Phone #: 267-685-1800 Fax #: 267-685-1801
Sampler(s) Name(s): Frank Striker Phone #:

Project Information

Project Name: PSEG - DIESEL
Street:
City: SALEM State: NJ
Project #: NP000603.0007
Client Purchase Order #:
Project Manager: BRAD PIERCE

Billing Information (If different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analysis (see TEST CODE sheet)

Matrix Codes
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB-Field Blank
EB-Equipment Blank
RB- Rinse Blank
TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	VOC	SVOC	LAB USE ONLY
1	AZ		12-8-09	1140	FS	GW	5	3				2				X	X	EXI7,
2	BV		↓	1245	↓	↓		↓				↓				↓	↓	941
3	X		↓	1330	↓	↓		↓				↓				↓	↓	
4	AY		↓	1400	↓	↓		↓				↓				↓	↓	
5	FB - 1282009		↓	1420	↓	↓	4	2				↓				↓	↓	
6	YY		↓	1445	↓	↓	5	3				↓				↓	↓	
7	T[illegible] BLNK		12 7.09	0630		AQ	2	2								↓		

Turnaround Time (Business days)

☐ Std. 15 Business Days
☐ Std. 10 Business Days (by Contract only)
☐ 10 Day RUSH
☐ 5 Day RUSH
☐ 3 Day EMERGENCY
☐ 2 Day EMERGENCY
☐ 1 Day EMERGENCY
Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ FULLT1 (Level 3+4)
☐ NJ Reduced
☐ Commercial "C"
☐ NYASP Category A
☐ NYASP Category B
☐ State Forms
☐ EDD Format ______
☐ Other ______

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

* return any unused samples to PSEG

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1	12-8-09 1800	1	2		2

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
3		3	4		4

Relinquished by:	Date Time:	Received By:	Custody Seal #		Preserved where applicable	On Ice	Cooler Temp.
5		5		☐ Intact ☐ Not intact	☐	☒	1.1c, 1.5

A

JA34700: Chain of Custody
Page 1 of 2

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JA34700
Client:
Immediate Client Services Action Required: No
Date / Time Received: 12/8/2009
Delivery Method:
Client Service Action Required at Login: No
Project:
No. Coolers: 1
Airbill #'s:

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	Infared gun	
3. Cooler media:	Ice (bag)	

Quality Control Preservatio	Y	N	N/A
1. Trip Blank present / cooler:	☑	☐	
2. Trip Blank listed on COC:	☑	☐	
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

JA34700: Chain of Custody

Page 2 of 2

Internal Sample Tracking Chronicle

Arcadis

Job No: JA34700

PSEG-Salem, Artificial Island, Salem, NJ
Project No: NP000603.0007

Sample Number	Method	Analyzed	By	Prepped	By	Test Codes
JA34700-1 AZ	Collected: 08-DEC-09 11:40 By: FS		Received: 08-DEC-09 By: MPC			
JA34700-1	SW846 8260B	16-DEC-09 01:00	TGE			V8260TCL
JA34700-1	SW846 8270C	23-DEC-09 17:09	NAP	10-DEC-09	AJ	AB8270TCL
JA34700-2 BV	Collected: 08-DEC-09 12:45 By: FS		Received: 08-DEC-09 By: MPC			
JA34700-2	SW846 8260B	16-DEC-09 01:28	TGE			V8260TCL
JA34700-2	SW846 8270C	23-DEC-09 17:41	NAP	10-DEC-09	AJ	AB8270TCL
JA34700-3 X	Collected: 08-DEC-09 13:30 By: FS		Received: 08-DEC-09 By: MPC			
JA34700-3	SW846 8260B	16-DEC-09 01:57	TGE			V8260TCL
JA34700-3	SW846 8270C	29-DEC-09 01:23	LP	10-DEC-09	AJ	AB8270TCL
JA34700-4 AY	Collected: 08-DEC-09 14:00 By: FS		Received: 08-DEC-09 By: MPC			
JA34700-4	SW846 8260B	16-DEC-09 02:27	TGE			V8260TCL
JA34700-4	SW846 8270C	29-DEC-09 01:50	LP	10-DEC-09	AJ	AB8270TCL
JA34700-5 FB-1282009	Collected: 08-DEC-09 14:20 By: FS		Received: 08-DEC-09 By: MPC			
JA34700-5	SW846 8260B	16-DEC-09 02:56	TGE			V8260TCL
JA34700-5	SW846 8270C	29-DEC-09 02:17	LP	10-DEC-09	AJ	AB8270TCL
JA34700-6 YY	Collected: 08-DEC-09 14:45 By: FS		Received: 08-DEC-09 By: MPC			
JA34700-6	SW846 8260B	16-DEC-09 03:26	TGE			V8260TCL
JA34700-6	SW846 8270C	29-DEC-09 02:43	LP	10-DEC-09	AJ	AB8270TCL
JA34700-7 TRIP BLANK	Collected: 08-DEC-09 14:45 By: FS		Received: 08-DEC-09 By: MPC			
JA34700-7	SW846 8260B	16-DEC-09 03:55	TGE			V8260TCL

Accutest Internal Chain of Custody

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Received: 12/08/09

Sample. Bottle Number	Transfer FROM	Transfer TO	Date/Time	Reason
JA34700-1.1	Secured Storage	Amce Joshi	12/10/09 08:19	Retrieve from Storage
JA34700-1.1	Amce Joshi		12/10/09 16:51	Depleted
JA34700-1.1.1	Amce Joshi	Organics Prep	12/10/09 08:20	Extract from JA34700-1.1
JA34700-1.1.1	Organics Prep	Amce Joshi	12/10/09 16:52	Extract from JA34700-1.1
JA34700-1.1.1	Amce Joshi	Extract Storage	12/10/09 16:52	Return to Storage
JA34700-1.1.1	Extract Storage	Nina Pandya	12/16/09 09:43	Retrieve from Storage
JA34700-1.1.1	Nina Pandya	GCMSF	12/16/09 09:43	Load on Instrument
JA34700-1.1.1	GCMSF	Nina Pandya	12/17/09 11:05	Unload from Instrument
JA34700-1.1.1	Nina Pandya	Extract Freezer	12/17/09 11:05	Return to Storage
JA34700-1.1.1	Extract Freezer	Nina Pandya	12/23/09 14:13	Retrieve from Storage
JA34700-1.1.1	Nina Pandya	GCMSF	12/23/09 14:13	Load on Instrument
JA34700-1.3	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-1.3	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-1.3	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-1.3	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-1.4	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-1.4	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-1.4	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-1.4	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-2.1	Secured Storage	Amce Joshi	12/10/09 08:19	Retrieve from Storage
JA34700-2.1	Amce Joshi		12/10/09 16:51	Depleted
JA34700-2.1.1	Amce Joshi	Organics Prep	12/10/09 08:20	Extract from JA34700-2.1
JA34700-2.1.1	Organics Prep	Amce Joshi	12/10/09 16:52	Extract from JA34700-2.1
JA34700-2.1.1	Amce Joshi	Extract Storage	12/10/09 16:52	Return to Storage
JA34700-2.1.1	Extract Storage	Nina Pandya	12/16/09 09:43	Retrieve from Storage
JA34700-2.1.1	Nina Pandya	GCMSF	12/16/09 09:43	Load on Instrument
JA34700-2.1.1	GCMSF	Nina Pandya	12/17/09 11:05	Unload from Instrument
JA34700-2.1.1	Nina Pandya	Extract Freezer	12/17/09 11:05	Return to Storage
JA34700-2.1.1	Extract Freezer	Nina Pandya	12/23/09 14:13	Retrieve from Storage
JA34700-2.1.1	Nina Pandya	GCMSF	12/23/09 14:13	Load on Instrument
JA34700-2.3	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-2.3	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-2.3	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-2.3	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-2.4	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-2.4	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-2.4	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument

Accutest Internal Chain of Custody

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Received: 12/08/09

Sample. Bottle Number	Transfer FROM	Transfer TO	Date/Time	Reason
JA34700-2.4	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-3.1	Secured Storage	Amce Joshi	12/10/09 08:19	Retrieve from Storage
JA34700-3.1	Amce Joshi		12/10/09 16:51	Depleted
JA34700-3.1.1	Amce Joshi	Organics Prep	12/10/09 08:20	Extract from JA34700-3.1
JA34700-3.1.1	Organics Prep	Amce Joshi	12/10/09 16:52	Extract from JA34700-3.1
JA34700-3.1.1	Amce Joshi	Extract Storage	12/10/09 16:52	Return to Storage
JA34700-3.1.1	Extract Storage	Nina Pandya	12/16/09 09:43	Retrieve from Storage
JA34700-3.1.1	Nina Pandya	GCMSF	12/16/09 09:43	Load on Instrument
JA34700-3.1.1	GCMSF	Nina Pandya	12/17/09 11:05	Unload from Instrument
JA34700-3.1.1	Nina Pandya	Extract Freezer	12/17/09 11:05	Return to Storage
JA34700-3.1.1	Extract Freezer	Nina Pandya	12/23/09 14:13	Retrieve from Storage
JA34700-3.1.1	Nina Pandya	GCMSF	12/23/09 14:13	Load on Instrument
JA34700-3.1.1	GCMSF	Larisa Pejdah	12/29/09 00:36	Unload from Instrument
JA34700-3.1.1	Larisa Pejdah	GCMSM	12/29/09 00:36	Load on Instrument
JA34700-3.4	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-3.4	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-3.4	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-3.4	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-4.1	Secured Storage	Amce Joshi	12/10/09 08:19	Retrieve from Storage
JA34700-4.1	Amce Joshi		12/10/09 16:51	Depleted
JA34700-4.1.1	Amce Joshi	Organics Prep	12/10/09 08:20	Extract from JA34700-4.1
JA34700-4.1.1	Organics Prep	Amce Joshi	12/10/09 16:52	Extract from JA34700-4.1
JA34700-4.1.1	Amce Joshi	Extract Storage	12/10/09 16:52	Return to Storage
JA34700-4.1.1	Extract Storage	Nina Pandya	12/16/09 09:43	Retrieve from Storage
JA34700-4.1.1	Nina Pandya	GCMSF	12/16/09 09:43	Load on Instrument
JA34700-4.1.1	GCMSF	Nina Pandya	12/17/09 11:05	Unload from Instrument
JA34700-4.1.1	Nina Pandya	Extract Freezer	12/17/09 11:05	Return to Storage
JA34700-4.1.1	Extract Freezer	Nina Pandya	12/23/09 14:13	Retrieve from Storage
JA34700-4.1.1	Nina Pandya	GCMSF	12/23/09 14:13	Load on Instrument
JA34700-4.1.1	GCMSF	Larisa Pejdah	12/29/09 00:36	Unload from Instrument
JA34700-4.1.1	Larisa Pejdah	GCMSM	12/29/09 00:36	Load on Instrument
JA34700-4.4	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-4.4	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-4.4	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-4.4	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-5.1	Secured Storage	Amce Joshi	12/10/09 08:19	Retrieve from Storage
JA34700-5.1	Amce Joshi		12/10/09 16:51	Depleted

Accutest Internal Chain of Custody

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Received: 12/08/09

Sample. Bottle Number	Transfer FROM	Transfer TO	Date/Time	Reason
JA34700-5.1.1	Amce Joshi	Organics Prep	12/10/09 08:20	Extract from JA34700-5.1
JA34700-5.1.1	Organics Prep	Amce Joshi	12/10/09 16:52	Extract from JA34700-5.1
JA34700-5.1.1	Amce Joshi	Extract Storage	12/10/09 16:52	Return to Storage
JA34700-5.1.1	Extract Storage	Nina Pandya	12/16/09 09:43	Retrieve from Storage
JA34700-5.1.1	Nina Pandya	GCMSF	12/16/09 09:43	Load on Instrument
JA34700-5.1.1	GCMSF	Nina Pandya	12/17/09 11:05	Unload from Instrument
JA34700-5.1.1	Nina Pandya	Extract Freezer	12/17/09 11:05	Return to Storage
JA34700-5.1.1	Extract Freezer	Nina Pandya	12/23/09 14:13	Retrieve from Storage
JA34700-5.1.1	Nina Pandya	GCMSF	12/23/09 14:13	Load on Instrument
JA34700-5.1.1	GCMSF	Larisa Pejdah	12/29/09 00:36	Unload from Instrument
JA34700-5.1.1	Larisa Pejdah	GCMSM	12/29/09 00:36	Load on Instrument
JA34700-5.4	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-5.4	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-5.4	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-5.4	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-6.2	Secured Storage	Amce Joshi	12/10/09 08:19	Retrieve from Storage
JA34700-6.2	Amce Joshi		12/10/09 16:51	Depleted
JA34700-6.2.1	Amce Joshi	Organics Prep	12/10/09 08:20	Extract from JA34700-6.2
JA34700-6.2.1	Organics Prep	Amce Joshi	12/10/09 16:52	Extract from JA34700-6.2
JA34700-6.2.1	Amce Joshi	Extract Storage	12/10/09 16:52	Return to Storage
JA34700-6.2.1	Extract Storage	Nina Pandya	12/16/09 09:43	Retrieve from Storage
JA34700-6.2.1	Nina Pandya	GCMSF	12/16/09 09:43	Load on Instrument
JA34700-6.2.1	GCMSF	Nina Pandya	12/17/09 11:05	Unload from Instrument
JA34700-6.2.1	Nina Pandya	Extract Freezer	12/17/09 11:05	Return to Storage
JA34700-6.2.1	Extract Freezer	Larisa Pejdah	12/29/09 00:36	Retrieve from Storage
JA34700-6.2.1	Larisa Pejdah	GCMSM	12/29/09 00:36	Load on Instrument
JA34700-6.4	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-6.4	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-6.4	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-6.4	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage
JA34700-7.4	Secured Storage	Tatiana G. Espana	12/15/09 11:01	Retrieve from Storage
JA34700-7.4	Tatiana G. Espana	GCMS1A	12/15/09 11:01	Load on Instrument
JA34700-7.4	GCMS1A	Tatiana G. Espana	12/16/09 11:24	Unload from Instrument
JA34700-7.4	Tatiana G. Espana	Secured Storage	12/16/09 11:24	Return to Storage

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Instrument Performance Checks (BFB)
- Internal Standard Area Summaries
- Surrogate Recovery Summaries
- Initial and Continuing Calibration Summaries

Method Blank Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A3576-MB	1A83950.D	1	12/15/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	2.9	ug/l	
71-43-2	Benzene	ND	1.0	0.23	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.22	ug/l	
75-25-2	Bromoform	ND	4.0	0.23	ug/l	
74-83-9	Bromomethane	ND	2.0	0.30	ug/l	
78-93-3	2-Butanone (MEK)	ND	10	1.6	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.74	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.26	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.39	ug/l	
75-00-3	Chloroethane	ND	1.0	0.37	ug/l	
67-66-3	Chloroform	ND	1.0	0.23	ug/l	
74-87-3	Chloromethane	ND	1.0	0.29	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.22	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.29	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.33	ug/l	
75-35-4	1,1-Dichloroethene	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethene	ND	1.0	0.25	ug/l	
540-59-0	1,2-Dichloroethene (total)	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.27	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.25	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
591-78-6	2-Hexanone	ND	5.0	1.4	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	0.86	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.30	ug/l	
100-42-5	Styrene	ND	5.0	0.58	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
127-18-4	Tetrachloroethene	ND	1.0	0.27	ug/l	
108-88-3	Toluene	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.26	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.23	ug/l	
79-01-6	Trichloroethene	ND	1.0	0.24	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.25	ug/l	

Method Blank Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A3576-MB	1A83950.D	1	12/15/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	105%	76-120%
17060-07-0	1,2-Dichloroethane-D4	115%	64-135%
2037-26-5	Toluene-D8	106%	76-117%
460-00-4	4-Bromofluorobenzene	96%	72-122%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	Total TIC, Volatile		0	ug/l	

Blank Spike Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A3576-BS	1A83951.D	1	12/15/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	50	43.8	88	51-151
71-43-2	Benzene	50	46.5	93	75-122
75-27-4	Bromodichloromethane	50	57.6	115	77-128
75-25-2	Bromoform	50	55.3	111	67-141
74-83-9	Bromomethane	50	48.9	98	53-152
78-93-3	2-Butanone (MEK)	50	46.8	94	64-130
75-15-0	Carbon disulfide	50	43.9	88	59-140
56-23-5	Carbon tetrachloride	50	56.6	113	75-148
108-90-7	Chlorobenzene	50	51.9	104	76-124
75-00-3	Chloroethane	50	47.7	95	54-147
67-66-3	Chloroform	50	52.3	105	77-124
74-87-3	Chloromethane	50	49.1	98	46-144
124-48-1	Dibromochloromethane	50	53.3	107	76-132
75-34-3	1,1-Dichloroethane	50	49.3	99	72-124
107-06-2	1,2-Dichloroethane	50	56.9	114	66-150
75-35-4	1,1-Dichloroethene	50	45.3	91	61-132
156-59-2	cis-1,2-Dichloroethene	50	50.7	101	71-119
156-60-5	trans-1,2-Dichloroethene	50	46.2	92	71-123
540-59-0	1,2-Dichloroethene (total)	100	97.0	97	71-121
78-87-5	1,2-Dichloropropane	50	50.5	101	75-120
10061-01-5	cis-1,3-Dichloropropene	50	51.9	104	77-124
10061-02-6	trans-1,3-Dichloropropene	50	53.6	107	75-132
100-41-4	Ethylbenzene	50	48.9	98	77-124
591-78-6	2-Hexanone	50	44.5	89	58-136
108-10-1	4-Methyl-2-pentanone(MIBK)	50	44.2	88	63-135
75-09-2	Methylene chloride	50	45.3	91	69-122
100-42-5	Styrene	50	49.9	100	78-126
79-34-5	1,1,2,2-Tetrachloroethane	50	46.1	92	66-125
127-18-4	Tetrachloroethene	50	52.0	104	70-136
108-88-3	Toluene	50	48.2	96	76-126
71-55-6	1,1,1-Trichloroethane	50	56.3	113	77-136
79-00-5	1,1,2-Trichloroethane	50	51.4	103	75-123
79-01-6	Trichloroethene	50	52.6	105	79-126
75-01-4	Vinyl chloride	50	47.0	94	56-146
1330-20-7	Xylene (total)	150	152	101	77-125

Blank Spike Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V1A3576-BS	1A83951.D	1	12/15/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	107%	76-120%
17060-07-0	1,2-Dichloroethane-D4	116%	64-135%
2037-26-5	Toluene-D8	105%	76-117%
460-00-4	4-Bromofluorobenzene	96%	72-122%

Matrix Spike Summary

Page 1 of 2

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
JA34700-1MS	1A83952.D	1	12/15/09	TGE	n/a	n/a	V1A3576
JA34700-1	1A83955.D	1	12/16/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Compound	JA34700-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Limits
67-64-1	Acetone	ND		50	44.3	89	44-157
71-43-2	Benzene	ND		50	44.6	89	38-139
75-27-4	Bromodichloromethane	ND		50	54.8	110	70-135
75-25-2	Bromoform	ND		50	51.1	102	53-139
74-83-9	Bromomethane	ND		50	41.0	82	44-150
78-93-3	2-Butanone (MEK)	ND		50	50.4	101	58-140
75-15-0	Carbon disulfide	ND		50	36.8	74	34-136
56-23-5	Carbon tetrachloride	ND		50	48.9	98	50-161
108-90-7	Chlorobenzene	ND		50	50.7	101	65-128
75-00-3	Chloroethane	ND		50	40.9	82	41-151
67-66-3	Chloroform	ND		50	49.2	98	66-132
74-87-3	Chloromethane	ND		50	39.5	79	35-149
124-48-1	Dibromochloromethane	ND		50	52.5	105	67-134
75-34-3	1,1-Dichloroethane	ND		50	46.5	93	59-132
107-06-2	1,2-Dichloroethane	ND		50	57.6	115	59-153
75-35-4	1,1-Dichloroethene	ND		50	38.7	77	41-144
156-59-2	cis-1,2-Dichloroethene	ND		50	47.6	95	57-131
156-60-5	trans-1,2-Dichloroethene	ND		50	43.4	87	55-131
540-59-0	1,2-Dichloroethene (total)	ND		100	91.0	91	56-131
78-87-5	1,2-Dichloropropane	ND		50	49.6	99	67-125
10061-01-5	cis-1,3-Dichloropropene	ND		50	50.7	101	68-126
10061-02-6	trans-1,3-Dichloropropene	ND		50	53.2	106	68-134
100-41-4	Ethylbenzene	ND		50	47.1	94	37-143
591-78-6	2-Hexanone	ND		50	46.0	92	53-145
108-10-1	4-Methyl-2-pentanone(MIBK)	ND		50	48.6	97	57-141
75-09-2	Methylene chloride	ND		50	43.9	88	59-129
100-42-5	Styrene	ND		50	48.0	96	60-135
79-34-5	1,1,2,2-Tetrachloroethane	ND		50	47.8	96	62-126
127-18-4	Tetrachloroethene	ND		50	49.0	98	48-145
108-88-3	Toluene	ND		50	46.4	93	44-141
71-55-6	1,1,1-Trichloroethane	ND		50	50.2	100	55-149
79-00-5	1,1,2-Trichloroethane	ND		50	50.6	101	70-127
79-01-6	Trichloroethene	ND		50	49.9	100	53-141
75-01-4	Vinyl chloride	ND		50	38.0	76	34-151
1330-20-7	Xylene (total)	ND		150	144	96	36-144

Matrix Spike Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
JA34700-1MS	1A83952.D	1	12/15/09	TGE	n/a	n/a	V1A3576
JA34700-1	1A83955.D	1	12/16/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Surrogate Recoveries	MS	JA34700-1	Limits
1868-53-7	Dibromofluoromethane	105%	108%	76-120%
17060-07-0	1,2-Dichloroethane-D4	116%	116%	64-135%
2037-26-5	Toluene-D8	105%	106%	76-117%
460-00-4	4-Bromofluorobenzene	96%	94%	72-122%

Duplicate Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
JA34700-2DUP	1A83954.D	1	12/16/09	TGE	n/a	n/a	V1A3576
JA34700-2	1A83956.D	1	12/16/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Compound	JA34700-2 ug/l	Q	DUP ug/l	Q	RPD	Limits
67-64-1	Acetone	ND		ND		nc	11
71-43-2	Benzene	ND		ND		nc	11
75-27-4	Bromodichloromethane	ND		ND		nc	10
75-25-2	Bromoform	ND		ND		nc	10
74-83-9	Bromomethane	ND		ND		nc	10
78-93-3	2-Butanone (MEK)	ND		ND		nc	10
75-15-0	Carbon disulfide	ND		ND		nc	10
56-23-5	Carbon tetrachloride	ND		ND		nc	10
108-90-7	Chlorobenzene	ND		ND		nc	10
75-00-3	Chloroethane	ND		ND		nc	10
67-66-3	Chloroform	ND		ND		nc	10
74-87-3	Chloromethane	ND		ND		nc	10
124-48-1	Dibromochloromethane	ND		ND		nc	10
75-34-3	1,1-Dichloroethane	ND		ND		nc	11
107-06-2	1,2-Dichloroethane	ND		ND		nc	10
75-35-4	1,1-Dichloroethene	ND		ND		nc	10
156-59-2	cis-1,2-Dichloroethene	ND		ND		nc	17
156-60-5	trans-1,2-Dichloroethene	ND		ND		nc	10
540-59-0	1,2-Dichloroethene (total)	ND		ND		nc	14
78-87-5	1,2-Dichloropropane	ND		ND		nc	10
10061-01-5	cis-1,3-Dichloropropene	ND		ND		nc	10
10061-02-6	trans-1,3-Dichloropropene	ND		ND		nc	10
100-41-4	Ethylbenzene	ND		ND		nc	10
591-78-6	2-Hexanone	ND		ND		nc	10
108-10-1	4-Methyl-2-pentanone(MIBK)	ND		ND		nc	10
75-09-2	Methylene chloride	ND		ND		nc	10
100-42-5	Styrene	ND		ND		nc	10
79-34-5	1,1,2,2-Tetrachloroethane	ND		ND		nc	10
127-18-4	Tetrachloroethene	ND		ND		nc	10
108-88-3	Toluene	ND		ND		nc	14
71-55-6	1,1,1-Trichloroethane	ND		ND		nc	10
79-00-5	1,1,2-Trichloroethane	ND		ND		nc	10
79-01-6	Trichloroethene	ND		ND		nc	13
75-01-4	Vinyl chloride	ND		ND		nc	15
1330-20-7	Xylene (total)	ND		ND		nc	14

Duplicate Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
JA34700-2DUP	1A83954.D	1	12/16/09	TGE	n/a	n/a	V1A3576
JA34700-2	1A83956.D	1	12/16/09	TGE	n/a	n/a	V1A3576

The QC reported here applies to the following samples: **Method:** SW846 8260B

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6, JA34700-7

CAS No.	Surrogate Recoveries	DUP	JA34700-2	Limits
1868-53-7	Dibromofluoromethane	106%	106%	76-120%
17060-07-0	1,2-Dichloroethane-D4	114%	117%	64-135%
2037-26-5	Toluene-D8	105%	103%	76-117%
460-00-4	4-Bromofluorobenzene	95%	94%	72-122%

Instrument Performance Check (BFB)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: V1A3533-BFB
Lab File ID: 1A82945.D
Instrument ID: GCMS1A
Injection Date: 11/17/09
Injection Time: 10:11

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
50	14.99 - 40.0% of mass 95	20144	21.0		Pass
75	30.0 - 60.0% of mass 95	45882	47.8		Pass
95	Base peak, 100% relative abundance	95968	100.0		Pass
96	5.0 - 9.0% of mass 95	6101	6.4		Pass
173	Less than 2.0% of mass 174	0	0.0	(0.0) [a]	Pass
174	50.0 - 120.0% of mass 95	109322	113.9		Pass
175	5.0 - 9.0% of mass 174	8642	9.0	(7.9) [a]	Pass
176	95.0 - 101.0% of mass 174	106992	111.5	(97.9) [a]	Pass
177	5.0 - 9.0% of mass 176	7047	7.3	(6.6) [b]	Pass

(a) Value is % of mass 174
(b) Value is % of mass 176

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
V1A3533-IC3533	1A82946.D	11/17/09	10:39	00:28	Initial cal 0.5
V1A3533-IC3533	1A82947.D	11/17/09	11:08	00:57	Initial cal 1
V1A3533-IC3533	1A82949.D	11/17/09	12:06	01:55	Initial cal 5
V1A3533-IC3533	1A82950.D	11/17/09	12:35	02:24	Initial cal 20
V1A3533-ICC3533	1A82951.D	11/17/09	13:04	02:53	Initial cal 50
V1A3533-IC3533	1A82952.D	11/17/09	13:33	03:22	Initial cal 100
V1A3533-IC3533	1A82953.D	11/17/09	14:02	03:51	Initial cal 200
V1A3533-IC3533	1A82955.D	11/17/09	16:07	05:56	Initial cal 2
V1A3533-ICV3533	1A82956.D	11/17/09	16:59	06:48	Initial cal verification 50

Instrument Performance Check (BFB)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: V1A3576-BFB
Lab File ID: 1A83947.D
Instrument ID: GCMS1A
Injection Date: 12/15/09
Injection Time: 20:38

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
50	15.0 - 40.0% of mass 95	26706	25.0		Pass
75	30.0 - 60.0% of mass 95	57906	54.2		Pass
95	Base peak, 100% relative abundance	106834	100.0		Pass
96	5.0 - 9.0% of mass 95	7076	6.6		Pass
173	Less than 2.0% of mass 174	0	0.0	(0.0) [a]	Pass
174	50.0 - 120.0% of mass 95	119952	112.3		Pass
175	5.0 - 9.0% of mass 174	10484	9.8	(8.7) [a]	Pass
176	95.0 - 101.0% of mass 174	116266	108.8	(96.9) [a]	Pass
177	5.0 - 9.0% of mass 176	7973	7.5	(6.9) [b]	Pass

(a) Value is % of mass 174
(b) Value is % of mass 176

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
V1A3576-CC3533	1A83948.D	12/15/09	21:35	00:57	Continuing cal 50
V1A3576-MB	1A83950.D	12/15/09	22:34	01:56	Method Blank
V1A3576-BS	1A83951.D	12/15/09	23:03	02:25	Blank Spike
JA34700-1MS	1A83952.D	12/15/09	23:32	02:54	Matrix Spike
JA34700-2DUP	1A83954.D	12/16/09	00:31	03:53	Duplicate
JA34700-1	1A83955.D	12/16/09	01:00	04:22	AZ
JA34700-2	1A83956.D	12/16/09	01:28	04:50	BV
JA34700-3	1A83957.D	12/16/09	01:57	05:19	X
JA34700-4	1A83958.D	12/16/09	02:27	05:49	AY
JA34700-5	1A83959.D	12/16/09	02:56	06:18	FB-1282009
JA34700-6	1A83960.D	12/16/09	03:26	06:48	YY
JA34700-7	1A83961.D	12/16/09	03:55	07:17	TRIP BLANK
ZZZZZZ	1A83962.D	12/16/09	04:24	07:46	(unrelated sample)
ZZZZZZ	1A83963.D	12/16/09	04:53	08:15	(unrelated sample)
ZZZZZZ	1A83964.D	12/16/09	05:23	08:45	(unrelated sample)
ZZZZZZ	1A83965.D	12/16/09	05:52	09:14	(unrelated sample)
ZZZZZZ	1A83966.D	12/16/09	06:21	09:43	(unrelated sample)
ZZZZZZ	1A83967.D	12/16/09	06:50	10:12	(unrelated sample)
ZZZZZZ	1A83968.D	12/16/09	07:20	10:42	(unrelated sample)
ZZZZZZ	1A83969.D	12/16/09	07:49	11:11	(unrelated sample)
ZZZZZZ	1A83970.D	12/16/09	08:18	11:40	(unrelated sample)

Volatile Internal Standard Area Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Check Std:	V1A3576-CC3533	**Injection Date:**	12/15/09
Lab File ID:	1A83948.D	**Injection Time:**	21:35
Instrument ID:	GCMS1A	**Method:**	SW846 8260B

	IS 1 AREA	RT	IS 2 AREA	RT	IS 3 AREA	RT	IS 4 AREA	RT	IS 5 AREA	RT
Check Std	134758	8.16	313076	10.58	393853	11.55	366696	14.89	232084	17.37
Upper Limit [a]	269516	8.66	626152	11.08	787706	12.05	733392	15.39	464168	17.87
Lower Limit [b]	67379	7.66	156538	10.08	196927	11.05	183348	14.39	116042	16.87

Lab Sample ID	IS 1 AREA	RT	IS 2 AREA	RT	IS 3 AREA	RT	IS 4 AREA	RT	IS 5 AREA	RT
V1A3576-MB	128573	8.15	350215	10.59	421686	11.55	384780	14.89	257880	17.37
V1A3576-BS	130304	8.16	311745	10.59	394920	11.55	369131	14.89	240731	17.37
JA34700-1MS	152715	8.16	319375	10.58	400627	11.55	370044	14.89	237318	17.37
JA34700-2DUP	138369	8.16	354822	10.58	424396	11.55	388606	14.89	261911	17.37
JA34700-1	136815	8.16	336036	10.59	400905	11.54	368514	14.89	254558	17.37
JA34700-2	143243	8.16	332283	10.59	399901	11.55	365034	14.89	249863	17.37
JA34700-3	149885	8.15	329315	10.59	391634	11.54	362263	14.88	246988	17.37
JA34700-4	137313	8.16	334651	10.59	399119	11.55	364055	14.88	248826	17.37
JA34700-5	135830	8.15	326021	10.59	393941	11.55	357282	14.89	249384	17.37
JA34700-6	125820	8.15	330919	10.58	390897	11.54	361924	14.89	246112	17.37
JA34700-7	139309	8.16	318856	10.58	386568	11.55	352150	14.88	248913	17.37
ZZZZZZ	131526	8.15	321081	10.59	382574	11.55	350061	14.88	246799	17.37
ZZZZZZ	130945	8.16	315635	10.58	380717	11.55	352327	14.89	239262	17.37
ZZZZZZ	142819	8.15	316629	10.59	378449	11.55	347372	14.89	241269	17.37
ZZZZZZ	135362	8.16	320043	10.59	376322	11.54	346400	14.88	242367	17.37
ZZZZZZ	129555	8.15	313161	10.59	375363	11.54	344460	14.89	246294	17.37
ZZZZZZ	140335	8.15	324210	10.59	380576	11.55	352772	14.88	246655	17.37
ZZZZZZ	121660	8.15	315450	10.58	374791	11.55	345788	14.89	240907	17.37
ZZZZZZ	131991	8.15	316909	10.58	376997	11.55	348380	14.89	239917	17.37
ZZZZZZ	143191	8.15	307632	10.59	365604	11.54	340396	14.89	234670	17.37

IS 1 = Tert Butyl Alcohol-D9
IS 2 = Pentafluorobenzene
IS 3 = 1,4-Difluorobenzene
IS 4 = Chlorobenzene-D5
IS 5 = 1,4-Dichlorobenzene-d4

(a) Upper Limit = + 100% of check standard area; Retention time + 0.5 minutes.
(b) Lower Limit = -50% of check standard area; Retention time -0.5 minutes.

Volatile Surrogate Recovery Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Method: SW846 8260B **Matrix:** AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4
JA34700-1	1A83955.D	108.0	116.0	106.0	94.0
JA34700-2	1A83956.D	106.0	117.0	103.0	94.0
JA34700-3	1A83957.D	107.0	117.0	106.0	94.0
JA34700-4	1A83958.D	105.0	115.0	105.0	94.0
JA34700-5	1A83959.D	109.0	118.0	104.0	93.0
JA34700-6	1A83960.D	105.0	115.0	105.0	96.0
JA34700-7	1A83961.D	109.0	119.0	106.0	92.0
JA34700-1MS	1A83952.D	105.0	116.0	105.0	96.0
JA34700-2DUP	1A83954.D	106.0	114.0	105.0	95.0
V1A3576-BS	1A83951.D	107.0	116.0	105.0	96.0
V1A3576-MB	1A83950.D	105.0	115.0	106.0	96.0

Surrogate Compounds	Recovery Limits
S1 = Dibromofluoromethane	76-120%
S2 = 1,2-Dichloroethane-D4	64-135%
S3 = Toluene-D8	76-117%
S4 = 4-Bromofluorobenzene	72-122%

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: V1A3533-ICC3533
Lab FileID: 1A82951.D

```
                         Response Factor Report  MS1A

 Method        : C:\MSDCHEM\1\METHODS\M1A3533.M (RTE Integrator)
 Title         : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
 Last Update   : Fri Nov 20 15:06:04 2009
 Response via  : Initial Calibration

 Calibration Files
 1   =1A82947.D   0.5 =1A82946.D   100 =1A82952.D   50   =1A82951.D
 20  =1A82950.D   200 =1A82953.D   5    =1A82949.D   2    =1A82955.D

  Compound          1      0.5    100   50     20     200   5      2      Avg %RSD
 ---------------------------------------------------------------------------------

 1)     tert butyl alcohol-d9 ----------------ISTD---------------------
 2) tertiary but              1.142 1.179 1.213 1.227 1.188       1.190   2.78
 3) Ethanol      0.137       0.128 0.153 0.200       0.177 0.281 0.179  31.41
        ----- Quadratic regression -----          Coefficient =  0.9976
            Response Ratio = 0.02322 + 0.18459 *A + -0.00290 *A^2

 4) 1,4-dioxane               0.086 0.086 0.079 0.089 0.069 0.205 0.102  49.82
          ----- Linear regression -----  Coefficient =  0.9915
            Response Ratio = 0.00636 + 0.08546 *A


 5) I   pentafluorobenzene    ----------------ISTD--------------------
 6) chlorodifluo              0.539 0.587 0.575 0.545 0.552 0.497 0.549   5.74
 7) dichlorodifl 0.468       0.603 0.636 0.601 0.600 0.552 0.485 0.564  11.44
 8) chloromethan 0.753       0.829 0.831 0.803 0.691 0.789 0.778 0.782   6.20
 9) vinyl chlori 0.606 0.572 0.680 0.681 0.659 0.643 0.651 0.635 0.641   5.79
10) bromomethane 0.404 0.380 0.373 0.384 0.383 0.285 0.396 0.411 0.377  10.41
11) chloroethane 0.280 0.285 0.313 0.323 0.325 0.292 0.327 0.337 0.310   6.97
12) trichloroflu 0.754 0.700 0.820 0.847 0.825 0.791 0.835 0.866 0.805   6.78
13) ethyl ether               0.231 0.244 0.229 0.218 0.226 0.223 0.229   3.88
14) acrolein     0.089 0.078       0.102 0.096       0.087       0.091   9.90
15) 1,1-dichloro 0.270       0.364 0.385 0.361 0.343 0.368 0.378 0.352  11.05
16) acetone                   0.169 0.200 0.204 0.175 0.234       0.196  13.27
17) allyl chlori              0.193 0.210 0.199 0.186 0.197 0.186 0.195   4.60
18) acetonitrile              0.045 0.050 0.054 0.044 0.059       0.051  12.68
19) iodomethane               0.811 0.851 0.806 0.781 0.802 0.755 0.801   3.98
20) carbon disul 0.959       1.161 1.255 1.184 1.107 1.212 1.195 1.153   8.39
21) methylene ch              0.372 0.395 0.378 0.360 0.399 0.401 0.384   4.37
22) methyl aceta 0.315 0.290 0.385 0.399 0.396 0.375 0.418 0.441 0.377  13.51
23) methyl tert  0.935       1.208 1.268 1.202 1.164 1.238 1.222 1.177   9.45
24) trans-1,2-di 0.319 0.320 0.354 0.386 0.371 0.338 0.383 0.376 0.356   7.74
25) di-isopropyl 1.243 1.388 1.399 1.512 1.530 1.385 1.557 1.551 1.446   7.64
26) 2-butanone                0.046 0.046 0.043 0.045 0.035       0.043  10.27
27) 1,1-dichloro 0.602 0.628 0.664 0.724 0.699 0.638 0.726 0.721 0.675   7.25
28) chloroprene  0.561 0.594 0.641 0.699 0.697 0.647 0.714 0.712 0.658   8.72
29) acrylonitril 0.153       0.174 0.186 0.176 0.165 0.190 0.195 0.177   8.33
30) vinyl acetat              0.066 0.069 0.064 0.067 0.056       0.065   7.76
31) ethyl tert-b 1.156 1.330 1.356 1.435 1.416 1.369 1.446 1.394 1.363   6.78
32) ethyl acetat              0.067 0.071 0.066 0.062 0.060       0.065   6.63
33) 2,2-dichloro 0.583 0.651 0.623 0.672 0.656 0.591 0.670 0.673 0.640   5.69
34) cis-1,2-dich 0.319 0.304 0.400 0.430 0.413 0.384 0.410 0.420 0.385  12.40
35) methylacryla              0.497 0.513 0.488 0.485 0.493 0.494 0.495   2.00
36) propionitril              0.068 0.070 0.067 0.066 0.072 0.084 0.071   9.25
37) bromochlorom 0.177       0.233 0.247 0.235 0.226 0.232 0.218 0.224  10.05
38) tetrahydrofu 0.166       0.168 0.175 0.172 0.162 0.182 0.214 0.177   9.97
39) chloroform   0.389 0.395 0.435 0.466 0.447 0.420 0.456 0.470 0.435   7.10
```

Initial Calibration Summary

Page 2 of 3

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: V1A3533-ICC3533
Lab FileID: 1A82951.D

```
40) T-BUTYL FORM 0.395 0.396 0.457 0.484 0.479 0.462 0.492 0.460 0.453   8.31
41) dibromofluor 0.275 0.337 0.343 0.390 0.360 0.375 0.362 0.359 0.350   9.91
42) 1,2-dichloro 0.356       0.424 0.480 0.454 0.462 0.451 0.454 0.440   9.21
43) freon 113                0.392 0.408 0.396 0.394 0.411 0.394 0.399   2.01
44) methacryloni             0.298 0.306 0.294 0.293 0.290 0.289 0.295   2.15
45) 1,1,1-trichl 0.527 0.529 0.658 0.693 0.658 0.632 0.664 0.667 0.628  10.23
46) cyclohexane  0.455 0.366 0.512 0.550 0.503 0.497 0.531 0.516 0.491  11.73
47) iso-butyl al             0.005 0.005 0.005 0.005 0.003       0.005# 16.39
            ----- Linear regression -----  Coefficient =  0.9998
               Response Ratio = -0.00052 + 0.00497 *A


48) I   1,4-difluorobenzene    ----------------ISTD---------------------
49) epichlorohyd             0.036 0.037 0.037 0.037 0.038 0.044 0.038   8.04
50) n-butyl alco             0.010 0.010 0.010 0.010 0.010 0.012 0.010  10.02
51) carbon tetra 0.421 0.463 0.468 0.500 0.487 0.440 0.516 0.506 0.475   7.03
52) 1,1-dichloro 0.328 0.324 0.367 0.392 0.379 0.353 0.389 0.385 0.365   7.39
53) hexane       0.353 0.345 0.384 0.426 0.428 0.391 0.439 0.443 0.401   9.61
54) benzene      0.878 0.978 1.017 1.077 1.041 0.971 1.080 1.097 1.017   7.19
55) tert-amyl me 0.184 0.171 0.210 0.224 0.223 0.211 0.241 0.245 0.213  12.11
56) heptane      0.172       0.190 0.210 0.202 0.196 0.214 0.220 0.201   8.17
57) isopropyl ac             0.642 0.666 0.659 0.648 0.704       0.664   3.67
58) 1,2-dichloro 0.371 0.407 0.446 0.473 0.454 0.424 0.469 0.451 0.437   7.87
59) trichloroeth 0.250 0.213 0.309 0.322 0.313 0.295 0.309 0.314 0.291  13.25
60) 2-nitropropa                                                 0.000# -1.00
61) 2-chloroethy 0.166 0.162 0.192 0.202 0.201 0.190 0.207 0.192 0.189   8.68
62) methyl metha             0.191 0.200 0.185 0.183 0.184 0.161 0.184   7.00
63) 1,2-dichloro 0.233 0.230 0.281 0.299 0.291 0.266 0.299 0.274 0.272  10.05
64) dibromometha 0.140       0.192 0.198 0.191 0.184 0.197 0.185 0.184  10.81
65) methylcycloh 0.423 0.409 0.464 0.500 0.495 0.464 0.506 0.499 0.470   7.90
66) bromodichlor 0.337 0.283 0.426 0.441 0.420 0.412 0.420 0.410 0.394  13.87
67) cis-1,3-dich 0.374 0.380 0.469 0.482 0.458 0.457 0.468 0.464 0.444   9.49
68) toluene-d8 ( 0.881       0.889 1.007 0.947 0.955 0.955 0.966 0.943   4.69
69) 4-methyl-2-p             0.138 0.138 0.133 0.135 0.139 0.134 0.136   1.78
70) toluene      0.597 0.664 0.663 0.694 0.655 0.645 0.694 0.684 0.662   4.79
71) 3-methyl-1-b             0.016 0.016 0.017 0.016 0.017       0.016   3.18
72) trans-1,3-di 0.370 0.360 0.451 0.467 0.435 0.438 0.456 0.449 0.428   9.40
73) ethyl methac 0.271       0.363 0.371 0.348 0.355 0.365 0.349 0.346   9.87
74) 1,1,2-trichl 0.152       0.216 0.221 0.207 0.210 0.211 0.210 0.204  11.53
75) 2-hexanone               0.120 0.134 0.127 0.119 0.129 0.118 0.124   5.14

76) I   chlorobenzene-d5       ----------------ISTD---------------------
77) tetrachloroe 0.290 0.293 0.338 0.365 0.350 0.320 0.356 0.358 0.334   8.83
78) 1,3-dichloro 0.395 0.365 0.446 0.469 0.451 0.418 0.463 0.477 0.435   9.04
79) butyl acetat             0.212 0.225 0.227 0.216 0.242 0.220 0.224   4.75
80) 3,3-DIMETHYL             0.039 0.041 0.041 0.043 0.043       0.041   3.69
81) dibromochlor 0.360 0.328 0.422 0.437 0.414 0.403 0.426 0.407 0.400   9.23
82) 1,2-dibromoe 0.261 0.239 0.331 0.341 0.324 0.319 0.339 0.316 0.309  12.28
83) chlorobenzen 0.730 0.713 0.898 0.927 0.869 0.864 0.884 0.873 0.845   9.32
84) 1,1,1,2-tetr 0.312 0.297 0.391 0.410 0.395 0.371 0.413 0.383 0.372  11.72
85) ethylbenzene 1.271 1.320 1.414 1.504 1.455 1.346 1.478 1.494 1.410   6.23
86) m,p-xylene   0.482 0.528 0.556 0.585 0.571 0.544 0.589 0.576 0.554   6.48
87) o-xylene     0.483 0.490 0.597 0.627 0.594 0.595 0.606 0.590 0.573   9.52
88) styrene      0.776 0.767 0.971 1.022 0.974 0.948 0.991 0.994 0.930  10.80
89) bromoform    0.280 0.247 0.368 0.376 0.346 0.365 0.361 0.324 0.334  14.00

90) I   1,4-dichlorobenzene-d ----------------ISTD---------------------
91) isopropylben 2.047 2.173 2.460 2.653 2.497 2.344 2.479 2.485 2.392   8.21
92) 4-bromofluor             0.611 0.715 0.657 0.652 0.749 0.846 0.705  12.02
93) cyclohexanon             0.005 0.005 0.005 0.005 0.005       0.005#  4.27
```

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Sample: V1A3533-ICC3533
Lab FileID: 1A82951.D

```
 94) bromobenzene 0.614 0.592 0.734 0.785 0.737 0.703 0.750 0.792 0.713  10.38
 95) 1,1,2,2-tetr 0.554 0.519 0.644 0.666 0.618 0.609 0.680 0.663 0.619   9.23
 96) trans-1,4-di             0.236 0.232 0.217 0.214 0.204       0.221   5.98
 97) 1,2,3-trichl 0.144       0.182 0.191 0.179 0.173 0.188 0.180 0.177   8.88
 98) n-propylbenz 2.210 2.299 2.639 2.855 2.704 2.530 2.778 2.940 2.619   9.88
 99) 2-chlorotolu 0.519 0.489 0.627 0.676 0.633 0.614 0.631 0.637 0.603  10.66
100) 4-chlorotolu 1.358 1.428 1.678 1.771 1.640 1.624 1.700 1.721 1.615   9.01
101) 1,3,5-trimet 1.668 1.676 2.142 2.250 2.089 2.082 2.093 2.105 2.013  10.80
102) tert-butylbe 1.573       2.392 2.454 2.223 2.300 2.168 2.267 2.197  13.28
103) pentachloroe 0.453 0.395 0.570 0.582 0.548 0.547 0.557 0.530 0.523  12.41
104) 1,2,4-trimet 1.720 1.682 2.188 2.281 2.136 2.097 2.126 2.253 2.060  11.20
105) sec-butylben 2.113 2.228 2.835 2.918 2.728 2.723 2.588 2.886 2.627  11.50
106) 1,3-dichloro 1.162 1.115 1.437 1.469 1.382 1.381 1.375 1.487 1.351  10.22
107) p-isopropylt 1.951 1.975 2.609 2.658 2.519 2.529 2.402 2.600 2.405  11.79
108) 1,4-dichloro 1.196 1.137 1.458 1.477 1.404 1.417 1.336 1.487 1.364   9.65
109) benzyl chlor 1.349 1.259 1.513 1.578 1.533 1.519 1.558 1.634 1.493   8.37
110) 1,2-dichloro 1.150 0.982 1.499 1.516 1.423 1.429 1.359 1.478 1.355  14.03
111) n-butylbenze             1.187 1.218 1.116 1.155 1.049 1.292 1.169   7.19
112) 1,2-dibromo- 0.125       0.184 0.187 0.169 0.170 0.175 0.181 0.170  12.28
113) 1,3,5-TRICHL             1.557 1.653 1.471 1.400 1.309 1.946 1.556  14.48
114) 1,2,4-trichl             1.452 1.546 1.375 1.308 1.220       1.380   9.13
115) hexachlorobu             0.716 0.794 0.727 0.640 0.656       0.707   8.66
116) naphthalene              3.006 3.201 2.930 2.698 2.776       2.922   6.77
117) 1,2,3-trichl             1.266 1.343 1.216 1.157 1.106       1.218   7.60
118) hexachloroet 0.425       0.635 0.633 0.593 0.605 0.528 0.557 0.568  13.05
-----------------------------------------------------------------------------
 (#) = Out of Range  ###  Number of calibration levels exceeded format  ###

         M1A3533.M        Fri Nov 20 15:06:31 2009   MS1A
```

Initial Calibration Verification

Job Number:	JA34700	**Sample:**	V1A3533-ICV3533
Account:	AGMPAL Arcadis	**Lab FileID:**	1A82956.D
Project:	PSEG-Salem, Artificial Island, Salem, NJ		

```
                    Evaluate Continuing Calibration Report

  Data File : C:\MSDCHEM\1\DATA\1A82956.D                   Vial: 1
  Acq On    : 17 Nov 2009   4:59 pm                     Operator: TATIANAE
  Sample    : ICV3533-50                                Inst    : MS1A
  Misc      : MS88590,V1A3533,w,,,,1                    Multiplr: 1.00
  MS Integration Params: rteint.p

  Method        : C:\MSDCHEM\1\METHODS\M1A3533.M (RTE Integrator)
  Title         : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
  Last Update   : Wed Nov 18 08:10:34 2009
  Response via  : Multiple Level Calibration

  Min. RRF     :   0.010  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  20%     Max. Rel. Area : 200%

         Compound                          AvgRF   CCRF      %Dev Area%  Dev(min)R.T.
  -------------------------------------------------------------------------------------
  1      tert butyl alcohol-d9             1.000   1.000      0.0   99   0.00      8.16
  2 M    tertiary butyl alcohol            1.190   1.168      1.8   98   0.00      8.30

             ----------------------- True     Calc.    % Drift  ------------
  3      Ethanol                        5000.000 4167.991     16.6   88   0.00      6.74
  4 M    1,4-dioxane                    1250.000 1044.607     16.4   85   0.00     12.31


             ----------------------- AvgRF   CCRF      % Dev  -------------
   5 I   pentafluorobenzene                1.000   1.000      0.0  103   0.00     10.59
   6 M   chlorodifluoromethane             0.549   0.545      0.7   96  -0.01      4.25
   7 M   dichlorodifluoromethane           0.564   0.623    -10.5  101   0.00      4.23
   8 M   chloromethane                     0.782   0.910    -16.4  113  -0.02      4.61
   9 M   vinyl chloride                    0.641   0.746    -16.4  113  -0.02      4.89
  10 M   bromomethane                      0.377   0.419    -11.1  112  -0.01      5.64
  11 M   chloroethane                      0.310   0.359    -15.8  114   0.00      5.85
  12 M   trichlorofluoromethane            0.805   0.885     -9.9  108   0.00      6.37
  13 M   ethyl ether                       0.229   0.264    -15.3  111   0.00      6.86
  14 M   acrolein                          0.091   0.128    -40.7# 130   0.00      7.16
  15 M   1,1-dichloroethene                0.352   0.398    -13.1  107   0.00      7.33
  16 M   acetone                           0.196   0.180      8.2   93   0.00      7.43
  17 M   allyl chloride                    0.195   0.225    -15.4  111   0.00      7.95
  18 M   acetonitrile                      0.051   0.048      5.9  100   0.00      7.94
  19 M   iodomethane                       0.801   0.882    -10.1  107   0.00      7.66
  20 M   carbon disulfide                  1.153   1.249     -8.3  103   0.00      7.79
  21 M   methylene chloride                0.384   0.414     -7.8  108   0.00      8.17
  22 M   methyl acetate                    0.377   0.392     -4.0  101   0.00      7.96
  23 M   methyl tert butyl ether           1.177   1.320    -12.1  107   0.00      8.54
  24 M   trans-1,2-dichloroethene          0.356   0.396    -11.2  106   0.00      8.59
  25 M   di-isopropyl ether                1.446   1.450     -0.3   99   0.00      9.20
  26 M   2-butanone                        0.043   0.049    -14.0  110   0.00     10.01
  27 M   1,1-dichloroethane                0.675   0.772    -14.4  110   0.00      9.23
  28 M   chloroprene                       0.658   0.657      0.2   97   0.00      9.34
  29 M   acrylonitrile                     0.177   0.184     -4.0  102   0.00      8.56
  30 M   vinyl acetate                     0.065   0.066     -1.5   99   0.00      9.23
  31 M   ethyl tert-butyl ether            1.363   1.374     -0.8   99   0.00      9.71
  32 M   ethyl acetate                     0.065   0.062      4.6   90   0.00     10.03
  33 M   2,2-dichloropropane               0.640   0.727    -13.6  112   0.00     10.02
  34 M   cis-1,2-dichloroethene            0.385   0.456    -18.4  109   0.00     10.04
  35     methylacrylate                    0.495   0.532     -7.5  107   0.00     10.11
  36 M   propionitrile                     0.071   0.069      2.8  101   0.00     10.12
  37 M   bromochloromethane                0.224   0.257    -14.7  108   0.00     10.37
```

Initial Calibration Verification

Job Number: JA34700 **Sample:** V1A3533-ICV3533
Account: AGMPAL Arcadis **Lab FileID:** 1A82956.D
Project: PSEG-Salem, Artificial Island, Salem, NJ

38	M	tetrahydrofuran	0.177	0.184	-4.0	108	0.00	10.42
39	M	chloroform	0.435	0.488	-12.2	108	0.00	10.43
40	M	T-BUTYL FORMATE	0.453	0.458	-1.1	98	0.00	10.46
41	S	dibromofluoromethane (s)	0.350	0.374	-6.9	99	0.00	10.64
42	S	1,2-dichloroethane-d4 (s)	0.440	0.457	-3.9	98	0.00	11.08
43	M	freon 113	0.399	0.382	4.3	96	-0.01	7.30
44	M	methacrylonitrile	0.295	0.319	-8.1	107	0.00	10.31
45	M	1,1,1-trichloroethane	0.628	0.721	-14.8	107	0.00	10.68
46	M	cyclohexane	0.491	0.517	-5.3	97	0.00	10.75
		-----------------------	True	Calc.	% Drift	------------		
47		iso-butyl alcohol	500.000	546.907	-9.4	109	0.00	10.88
		-----------------------	AvgRF	CCRF	% Dev	-------------		
48	I	1,4-difluorobenzene	1.000	1.000	0.0	104	0.00	11.55
49	M	epichlorohydrin	0.038	0.035	7.9	99	0.00	12.87
50	M	n-butyl alcohol	0.010	0.009#	10.0	93	0.00	11.70
51	M	carbon tetrachloride	0.475	0.509	-7.2	106	0.00	10.90
52	M	1,1-dichloropropene	0.365	0.405	-11.0	108	0.00	10.88
53	M	hexane	0.401	0.391	2.5	96	0.00	8.92
54	M	benzene	1.017	1.105	-8.7	107	0.00	11.16
55	M	tert-amyl methyl ether	0.213	0.208	2.3	97	0.00	11.18
56	M	heptane	0.201	0.193	4.0	96	0.00	11.32
57	M	isopropyl acetate	0.664	0.627	5.6	98	0.00	11.08
58	M	1,2-dichloroethane	0.437	0.478	-9.4	105	0.00	11.18
59	M	trichloroethene	0.291	0.332	-14.1	107	0.00	11.90
60	M	2-nitropropane	0.000	0.000#	0.0	99	0.00	13.10
61	M	2-chloroethyl vinyl ether	0.189	0.191	-1.1	99	0.00	12.73
62	M	methyl methacrylate	0.184	0.203	-10.3	106	0.00	12.19
63	M	1,2-dichloropropane	0.272	0.308	-13.2	107	0.00	12.18
64	M	dibromomethane	0.184	0.205	-11.4	108	0.00	12.35
65	M	methylcyclohexane	0.470	0.456	3.0	95	0.00	12.12
66	M	bromodichloromethane	0.394	0.468	-18.8	111	0.00	12.49
67	M	cis-1,3-dichloropropene	0.444	0.506	-14.0	109	0.00	12.97
68	S	toluene-d8 (s)	0.943	0.975	-3.4	101	0.00	13.27
69	M	4-methyl-2-pentanone	0.136	0.143	-5.1	107	0.00	13.07
70	M	toluene	0.662	0.719	-8.6	108	0.00	13.35
71	M	3-methyl-1-butanol	0.016	0.015	6.3	97	0.00	13.10
72	M	trans-1,3-dichloropropene	0.428	0.493	-15.2	110	0.00	13.57
73	M	ethyl methacrylate	0.346	0.395	-14.2	111	0.00	13.55
74	M	1,1,2-trichloroethane	0.204	0.235	-15.2	111	0.00	13.79
75	M	2-hexanone	0.124	0.141	-13.7	110	0.00	13.97
76	I	chlorobenzene-d5	1.000	1.000	0.0	105	0.00	14.89
77	M	tetrachloroethene	0.334	0.375	-12.3	108	0.00	13.97
78	M	1,3-dichloropropane	0.435	0.490	-12.6	110	0.00	13.99
79	M	butyl acetate	0.224	0.212	5.4	99	0.00	14.05
80	M	3,3-DIMETHYL-1-BUTANOL	0.041	0.038	7.3	98	0.00	14.16
81	M	dibromochloromethane	0.400	0.437	-9.2	105	0.00	14.27
82	M	1,2-dibromoethane	0.309	0.359	-16.2	111	0.00	14.43
83	M	chlorobenzene	0.845	0.980	-16.0	111	0.00	14.92
84	M	1,1,1,2-tetrachloroethane	0.372	0.422	-13.4	108	0.00	14.98
85	M	ethylbenzene	1.410	1.535	-8.9	107	0.00	14.97
86	M	m,p-xylene	0.554	0.609	-9.9	110	0.00	15.09
87	M	o-xylene	0.573	0.664	-15.9	112	0.00	15.54
88	M	styrene	0.930	1.028	-10.5	106	0.00	15.55
89	M	bromoform	0.334	0.388	-16.2	109	0.00	15.85
90	I	1,4-dichlorobenzene-d4	1.000	1.000	0.0	105	0.00	17.37

Initial Calibration Verification

Job Number: JA34700 **Sample:** V1A3533-ICV3533
Account: AGMPAL Arcadis **Lab FileID:** 1A82956.D
Project: PSEG-Salem, Artificial Island, Salem, NJ

```
 91 M   isopropylbenzene              2.392    2.368      1.0    93   0.00    15.90
 92 S   4-bromofluorobenzene (s)      0.705    0.693      1.7   101   0.00    16.12
 93     cyclohexanone                 0.005    0.005#     0.0   110   0.00    16.24
 94 M   bromobenzene                  0.713    0.805    -12.9   107   0.00    16.34
 95 M   1,1,2,2-tetrachloroethane     0.619    0.693    -12.0   109   0.00    16.23
 96 M   trans-1,4-dichloro-2-bute     0.221    0.262    -18.6   118   0.00    16.28
 97 M   1,2,3-trichloropropane        0.177    0.220    -24.3#  121   0.00    16.32
 98 M   n-propylbenzene               2.619    2.914    -11.3   107   0.00    16.33
 99 M   2-chlorotoluene               0.603    0.703    -16.6   109   0.00    16.50
100 M   4-chlorotoluene               1.615    1.868    -15.7   110   0.00    16.61
101 M   1,3,5-trimethylbenzene        2.013    2.331    -15.8   108   0.00    16.49
102 M   tert-butylbenzene             2.197    2.588    -17.8   110   0.00    16.86
103 M   pentachloroethane             0.523    0.619    -18.4   111   0.00    16.97
104 M   1,2,4-trimethylbenzene        2.060    2.353    -14.2   108   0.00    16.91
105 M   sec-butylbenzene              2.627    3.063    -16.6   110   0.00    17.09
106 M   1,3-dichlorobenzene           1.351    1.571    -16.3   112   0.00    17.31
107 M   p-isopropyltoluene            2.405    2.868    -19.3   113   0.00    17.22
108 M   1,4-dichlorobenzene           1.364    1.569    -15.0   111   0.00    17.40
109     benzyl chloride               1.493    1.566     -4.9   104   0.00    17.52
110 M   1,2-dichlorobenzene           1.355    1.599    -18.0   110   0.00    17.84
111 M   n-butylbenzene                1.169    1.296    -10.9   111   0.00    17.67
112 M   1,2-dibromo-3-chloropropa     0.170    0.195    -14.7   109   0.00    18.75
113     1,3,5-TRICHLOROBENZENE        1.556    1.660     -6.7   105   0.00    18.98
114 M   1,2,4-trichlorobenzene        1.380    1.602    -16.1   108   0.00    19.84
115 M   hexachlorobutadiene           0.707    0.794    -12.3   105   0.00    19.98
116 M   naphthalene                   2.922    3.302    -13.0   108   0.00    20.25
117 M   1,2,3-trichlorobenzene        1.218    1.444    -18.6   113   0.00    20.61
118 m   hexachloroethane              0.568    0.717    -26.2#  118   0.00    18.14
 -------------------------------------------------------------------------------
 -------------------------------------------------------------------------------

      (#) = Out of Range            SPCC's out = 0  CCC's out = 0
       1A82951.D  M1A3533.M        Wed Nov 18 14:48:39 2009   MS1A
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: V1A3576-CC3533
Lab FileID: 1A83948.D

```
                    Evaluate Continuing Calibration Report

Data File : C:\MSDCHEM\1\DATA\1A83948.D                    Vial: 26
Acq On    : 15 Dec 2009   9:35 pm                      Operator: TATIANAE
Sample    : CC3533-50                                  Inst    : MS1A
Misc      : MS90188,V1A3576,w,,,,1                     Multiplr: 1.00
MS Integration Params: rteint.p

Method         : C:\MSDCHEM\1\METHODS\M1A3533.M (RTE Integrator)
Title          : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
Last Update    : Fri Nov 20 15:06:04 2009
Response via   : Multiple Level Calibration

Min. RRF     :   0.010  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
Max. RRF Dev :  20%     Max. Rel. Area : 200%

       Compound                        AvgRF    CCRF      %Dev Area%  Dev(min)R.T.
-----------------------------------------------------------------------------------
1      tert butyl alcohol-d9           1.000    1.000      0.0  108   0.00     8.16
2 M    tertiary butyl alcohol          1.190    1.166      2.0  107   0.00     8.29

          ---------------------- True     Calc.   % Drift  ------------
3      Ethanol                      5000.000 5441.936     -8.8  120   0.00     6.73
4 M    1,4-dioxane                  1250.000 931.361      25.5#  84   0.00    12.30


          ---------------------- AvgRF    CCRF     % Dev    -------------
 5 I   pentafluorobenzene              1.000    1.000      0.0  118   0.00    10.58
 6 M   chlorodifluoromethane           0.549    0.480     12.6   97  -0.01     4.25
 7 M   dichlorodifluoromethane         0.564    0.641    -13.7  119   0.00     4.23
 8 M   chloromethane                   0.782    0.744      4.9  106  -0.01     4.61
 9 M   vinyl chloride                  0.641    0.615      4.1  107  -0.02     4.89
10 M   bromomethane                    0.377    0.357      5.3  110   0.00     5.65
11 M   chloroethane                    0.310    0.295      4.8  108   0.00     5.85
12 M   trichlorofluoromethane          0.805    0.914    -13.5  128  -0.03     6.35
13 M   ethyl ether                     0.229    0.224      2.2  109   0.00     6.86
14 M   acrolein                        0.091    0.086      5.5  100   0.00     7.16
15 M   1,1-dichloroethene              0.352    0.305     13.4   94   0.00     7.33
16 M   acetone                         0.196    0.166     15.3   98   0.00     7.43
17 M   allyl chloride                  0.195    0.184      5.6  104  -0.01     7.95
18 M   acetonitrile                    0.051    0.042     17.6   98   0.00     7.94
19 M   iodomethane                     0.801    0.784      2.1  109   0.00     7.65
20 M   carbon disulfide                1.153    1.133      1.7  107  -0.01     7.79
21 M   methylene chloride              0.384    0.338     12.0  101   0.00     8.17
22 M   methyl acetate                  0.377    0.349      7.4  103   0.00     7.95
23 M   methyl tert butyl ether         1.177    1.184     -0.6  110   0.00     8.53
24 M   trans-1,2-dichloroethene        0.356    0.342      3.9  105  -0.01     8.59
25 M   di-isopropyl ether              1.446    1.444      0.1  113   0.00     9.20
26 M   2-butanone                      0.043    0.039      9.3  102   0.00    10.01
27 M   1,1-dichloroethane              0.675    0.652      3.4  106  -0.01     9.22
28 M   chloroprene                     0.658    0.655      0.5  111   0.00     9.34
29 M   acrylonitrile                   0.177    0.152     14.1   97   0.00     8.56
30 M   vinyl acetate                   0.065    0.056     13.8   95   0.00     9.23
31 M   ethyl tert-butyl ether          1.363    1.320      3.2  109   0.00     9.71
32 M   ethyl acetate                   0.065    0.059      9.2   98   0.00    10.03
33 M   2,2-dichloropropane             0.640    0.615      3.9  108   0.00    10.02
34 M   cis-1,2-dichloroethene          0.385    0.377      2.1  103   0.00    10.03
35     methylacrylate                  0.495    0.448      9.5  103   0.00    10.11
36 M   propionitrile                   0.071    0.059     16.9   99   0.00    10.11
37 M   bromochloromethane               0.224    0.227     -1.3  109  -0.01    10.36
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Sample: V1A3576-CC3533
Lab FileID: 1A83948.D

38	M	tetrahydrofuran	0.177	0.161	9.0	109	0.00	10.41
39	M	chloroform	0.435	0.440	-1.1	112	0.00	10.43
40	M	T-BUTYL FORMATE	0.453	0.437	3.5	107	0.00	10.45
41	S	dibromofluoromethane (s)	0.350	0.375	-7.1	114	-0.01	10.64
42	S	1,2-dichloroethane-d4 (s)	0.440	0.502	-14.1	124	-0.01	11.08
43	M	freon 113	0.399	0.358	10.3	104	-0.02	7.30
44	M	methacrylonitrile	0.295	0.274	7.1	106	0.00	10.31
45	M	1,1,1-trichloroethane	0.628	0.708	-12.7	121	0.00	10.68
46	M	cyclohexane	0.491	0.475	3.3	102	0.00	10.75
		-----------------------	True	Calc.	% Drift	------------		
47		iso-butyl alcohol	500.000	504.820	-1.0	116	0.00	10.88
		-----------------------	AvgRF	CCRF	% Dev	-------------		
48	I	1,4-difluorobenzene	1.000	1.000	0.0	115	0.00	11.55
49	M	epichlorohydrin	0.038	0.032	15.8	98	0.00	12.87
50	M	n-butyl alcohol	0.010	0.009#	10.0	108	0.00	11.69
51	M	carbon tetrachloride	0.475	0.543	-14.3	125	0.00	10.89
52	M	1,1-dichloropropene	0.365	0.378	-3.6	111	0.00	10.87
53	M	hexane	0.401	0.356	11.2	96	-0.01	8.91
54	M	benzene	1.017	0.957	5.9	102	0.00	11.15
55	M	tert-amyl methyl ether	0.213	0.214	-0.5	110	0.00	11.18
56	M	heptane	0.201	0.189	6.0	103	0.00	11.32
57	M	isopropyl acetate	0.664	0.813	-22.4#	140	0.00	11.08
58	M	1,2-dichloroethane	0.437	0.502	-14.9	122	0.00	11.18
59	M	trichloroethene	0.291	0.306	-5.2	109	-0.01	11.90
60	M	2-nitropropane	0.000	0.000#	0.0	113	0.00	13.10
61	M	2-chloroethyl vinyl ether	0.189	0.218	-15.3	124	0.00	12.73
62	M	methyl methacrylate	0.184	0.173	6.0	100	0.00	12.19
63	M	1,2-dichloropropane	0.272	0.271	0.4	104	0.00	12.17
64	M	dibromomethane	0.184	0.191	-3.8	111	0.00	12.35
65	M	methylcyclohexane	0.470	0.428	8.9	98	0.00	12.12
66	M	bromodichloromethane	0.394	0.443	-12.4	115	0.00	12.48
67	M	cis-1,3-dichloropropene	0.444	0.452	-1.8	108	0.00	12.96
68	S	toluene-d8 (s)	0.943	0.989	-4.9	113	0.00	13.27
69	M	4-methyl-2-pentanone	0.136	0.122	10.3	101	0.00	13.06
70	M	toluene	0.662	0.651	1.7	108	0.00	13.35
71	M	3-methyl-1-butanol	0.016	0.016	0.0	112	0.00	13.10
72	M	trans-1,3-dichloropropene	0.428	0.465	-8.6	114	0.00	13.56
73	M	ethyl methacrylate	0.346	0.337	2.6	104	0.00	13.55
74	M	1,1,2-trichloroethane	0.204	0.205	-0.5	107	0.00	13.79
75	M	2-hexanone	0.124	0.105	15.3	90	0.00	13.97
76	I	chlorobenzene-d5	1.000	1.000	0.0	116	0.00	14.89
77	M	tetrachloroethene	0.334	0.358	-7.2	114	0.00	13.97
78	M	1,3-dichloropropane	0.435	0.436	-0.2	108	0.00	13.98
79	M	butyl acetate	0.224	0.203	9.4	104	0.00	14.04
80	M	3,3-DIMETHYL-1-BUTANOL	0.041	0.038	7.3	108	0.00	14.16
81	M	dibromochloromethane	0.400	0.431	-7.7	115	0.00	14.27
82	M	1,2-dibromoethane	0.309	0.320	-3.6	109	0.00	14.43
83	M	chlorobenzene	0.845	0.888	-5.1	111	0.00	14.92
84	M	1,1,1,2-tetrachloroethane	0.372	0.404	-8.6	114	0.00	14.98
85	M	ethylbenzene	1.410	1.411	-0.1	109	0.00	14.97
86	M	m,p-xylene	0.554	0.556	-0.4	110	0.00	15.08
87	M	o-xylene	0.573	0.590	-3.0	109	0.00	15.53
88	M	styrene	0.930	0.955	-2.7	108	0.00	15.54
89	M	bromoform	0.334	0.361	-8.1	111	0.00	15.84
90	I	1,4-dichlorobenzene-d4	1.000	1.000	0.0	117	0.00	17.37

Continuing Calibration Summary

Job Number: JA34700 **Sample:** V1A3576-CC3533
Account: AGMPAL Arcadis **Lab FileID:** 1A83948.D
Project: PSEG-Salem, Artificial Island, Salem, NJ

91	M	isopropylbenzene	2.392	2.498	-4.4	110	0.00	15.89
92	S	4-bromofluorobenzene (s)	0.705	0.674	4.4	110	0.00	16.12
93		cyclohexanone	0.005	0.005#	0.0	119	0.00	16.23
94	M	bromobenzene	0.713	0.751	-5.3	112	0.00	16.33
95	M	1,1,2,2-tetrachloroethane	0.619	0.575	7.1	101	0.00	16.23
96	M	trans-1,4-dichloro-2-bute	0.221	0.210	5.0	106	0.00	16.27
97	M	1,2,3-trichloropropane	0.177	0.186	-5.1	114	0.00	16.31
98	M	n-propylbenzene	2.619	2.618	0.0	107	0.00	16.33
99	M	2-chlorotoluene	0.603	0.626	-3.8	108	0.00	16.50
100	M	4-chlorotoluene	1.615	1.706	-5.6	112	0.00	16.60
101	M	1,3,5-trimethylbenzene	2.013	2.139	-6.3	111	0.00	16.48
102	M	tert-butylbenzene	2.197	2.138	2.7	102	0.00	16.86
103	M	pentachloroethane	0.523	0.572	-9.4	115	0.00	16.96
104	M	1,2,4-trimethylbenzene	2.060	2.182	-5.9	112	0.00	16.91
105	M	sec-butylbenzene	2.627	2.736	-4.1	109	0.00	17.09
106	M	1,3-dichlorobenzene	1.351	1.408	-4.2	112	0.00	17.31
107	M	p-isopropyltoluene	2.405	2.568	-6.8	113	0.00	17.21
108	M	1,4-dichlorobenzene	1.364	1.424	-4.4	112	0.00	17.39
109		benzyl chloride	1.493	1.275	14.6	94	0.00	17.52
110	M	1,2-dichlorobenzene	1.355	1.460	-7.7	112	0.00	17.83
111	M	n-butylbenzene	1.169	1.129	3.4	108	0.00	17.67
112	M	1,2-dibromo-3-chloropropa	0.170	0.179	-5.3	111	0.00	18.75
113		1,3,5-TRICHLOROBENZENE	1.556	1.561	-0.3	110	0.00	18.98
114	M	1,2,4-trichlorobenzene	1.380	1.482	-7.4	112	0.00	19.83
115	M	hexachlorobutadiene	0.707	0.764	-8.1	112	0.00	19.98
116	M	naphthalene	2.922	2.834	3.0	103	0.00	20.24
117	M	1,2,3-trichlorobenzene	1.218	1.300	-6.7	113	0.00	20.61
118	m	hexachloroethane	0.568	0.617	-8.6	114	0.00	18.13

```
(#) = Out of Range          SPCC's out = 0  CCC's out = 0
 1A82951.D  M1A3533.M      Wed Dec 16 14:33:23 2009   RPT1
```

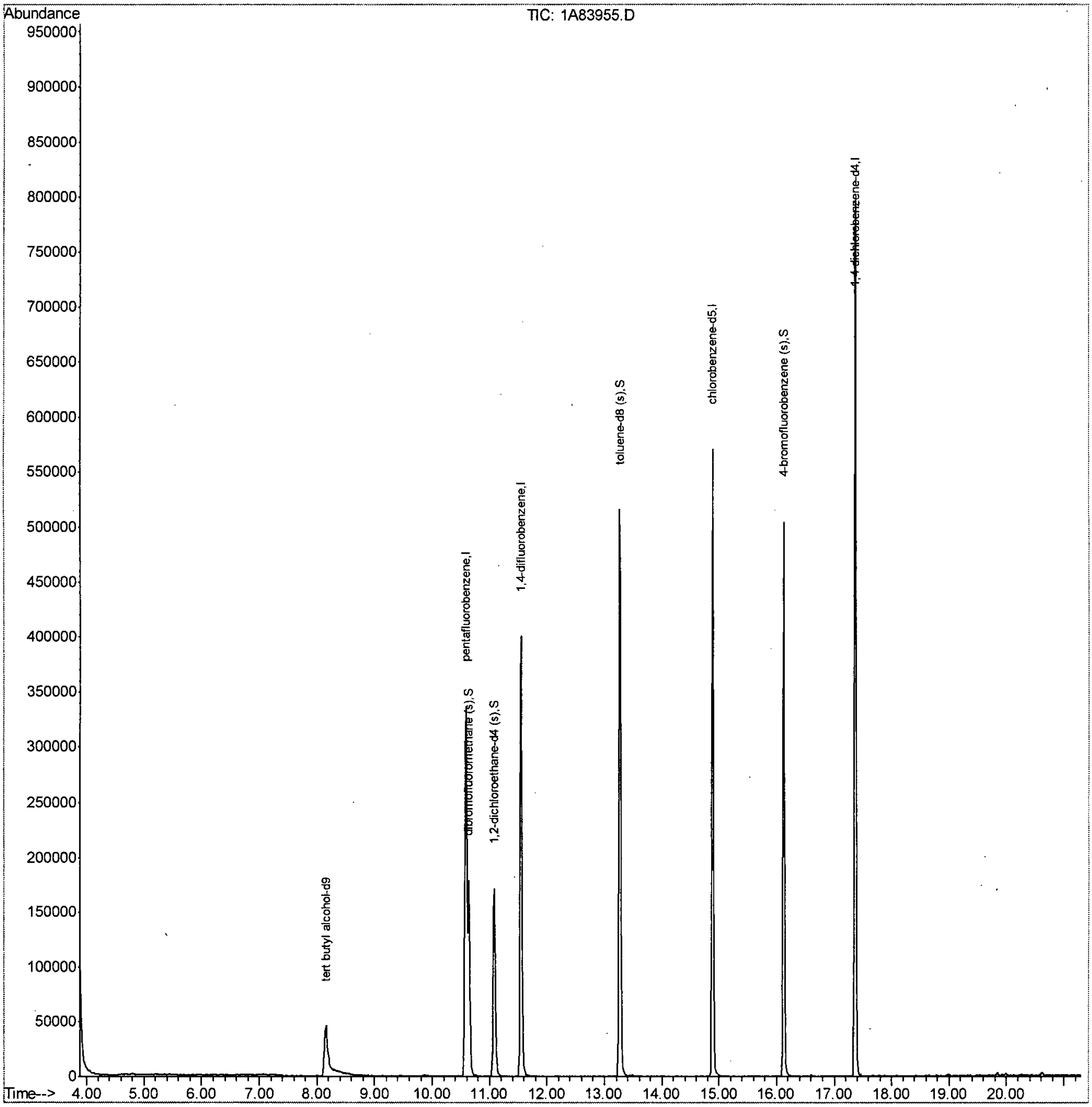
GC/MS Volatiles

Raw Data

```
                         Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83955.D
Acq On    : 16 Dec 2009   1:00 am
Operator  : TATIANAE
Sample    : JA34700-1
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 33   Sample Multiplier: 1

Quant Time: Dec 16 14:35:53 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards                R.T. QIon  Response  Conc Units Dev(Min)
--------------------------------------------------------------------------
   1) tert butyl alcohol-d9        8.16   65   136815   500.00 ug/L   -0.01
   5) pentafluorobenzene          10.59  168   336036    50.00 ug/L    0.00
  48) 1,4-difluorobenzene         11.54  114   400905    50.00 ug/L    0.00
  76) chlorobenzene-d5            14.89  117   368514    50.00 ug/L    0.00
  90) 1,4-dichlorobenzene-d4      17.37  152   254558    50.00 ug/L    0.00

 System Monitoring Compounds
  41) dibromofluoromethane (s)    10.64  113   126897    53.92 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 120    Recovery   =  107.84%
  42) 1,2-dichloroethane-d4 (s)   11.08   65   172344    58.24 ug/L    0.00
   Spiked Amount     50.000   Range  64 - 135    Recovery   =  116.48%
  68) toluene-d8 (s)              13.26   98   401764    53.14 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 117    Recovery   =  106.28%
  92) 4-bromofluorobenzene (s)    16.12   95   168572    46.95 ug/L    0.00
   Spiked Amount     50.000   Range  72 - 122    Recovery   =   93.90%

 Target Compounds                                                   Qvalue
--------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

Quantitation Report (QT Reviewed)

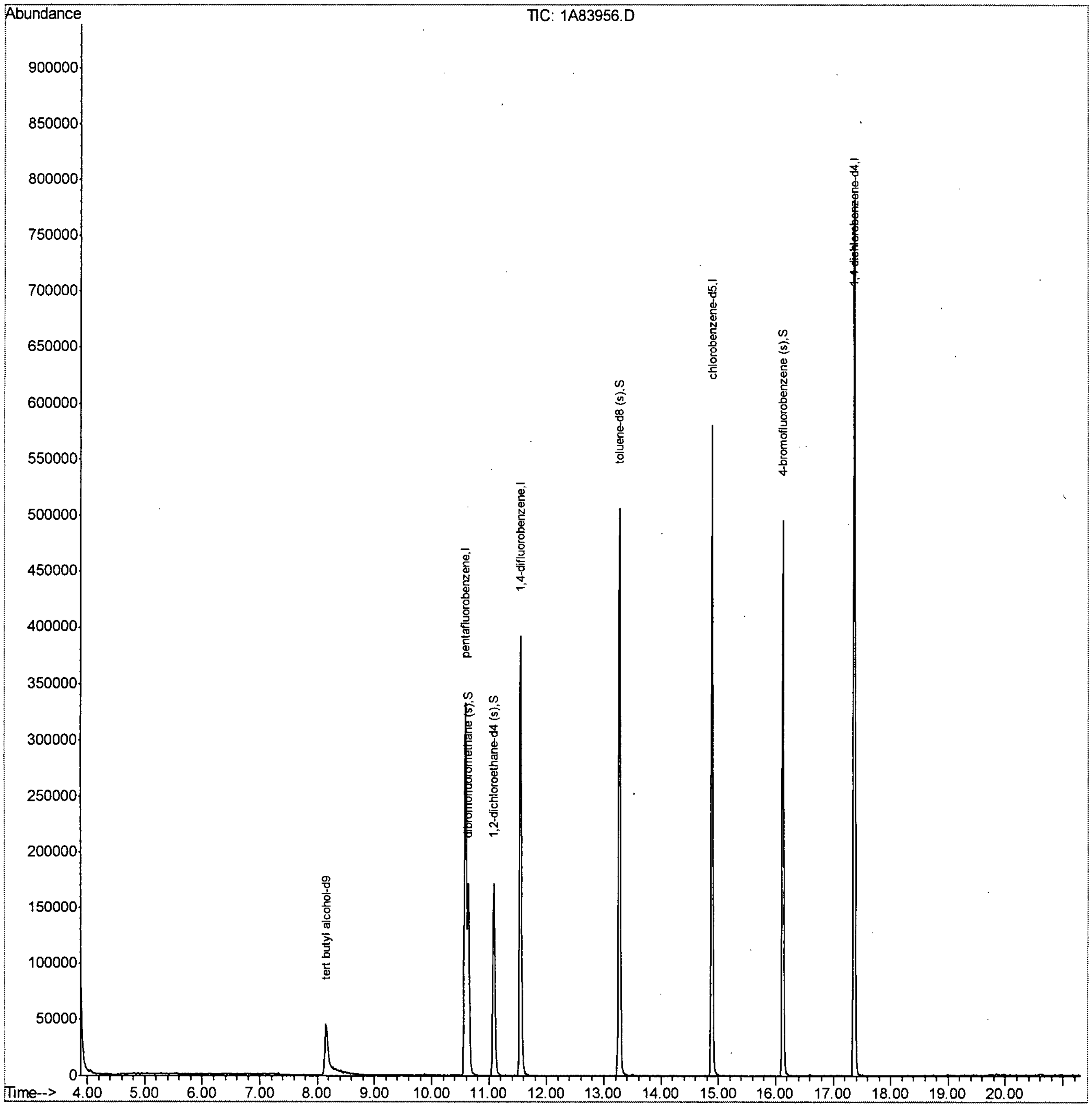
```
Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83955.D
Acq On    : 16 Dec 2009   1:00 am
Operator  : TATIANAE
Sample    : JA34700-1
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 33   Sample Multiplier: 1

Quant Time: Dec 16 14:35:53 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
```



```
                           Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83956.D
Acq On    : 16 Dec 2009   1:28 am
Operator  : TATIANAE
Sample    : JA34700-2
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 34   Sample Multiplier: 1

Quant Time: Dec 16 14:36:19 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards              R.T. QIon  Response  Conc Units Dev(Min)
-------------------------------------------------------------------------
  1) tert butyl alcohol-d9        8.16   65   143243   500.00 ug/L   -0.01
  5) pentafluorobenzene          10.59  168   332283    50.00 ug/L    0.00
 48) 1,4-difluorobenzene         11.55  114   399901    50.00 ug/L    0.00
 76) chlorobenzene-d5            14.89  117   365034    50.00 ug/L    0.00
 90) 1,4-dichlorobenzene-d4      17.37  152   249863    50.00 ug/L    0.00

 System Monitoring Compounds
 41) dibromofluoromethane (s)    10.64  113   123838    53.22 ug/L    0.00
  Spiked Amount     50.000   Range  76 - 120    Recovery   =  106.44%
 42) 1,2-dichloroethane-d4 (s)   11.08   65   171168    58.50 ug/L    0.00
  Spiked Amount     50.000   Range  64 - 135    Recovery   =  117.00%
 68) toluene-d8 (s)              13.27   98   389439    51.64 ug/L    0.00
  Spiked Amount     50.000   Range  76 - 117    Recovery   =  103.28%
 92) 4-bromofluorobenzene (s)    16.12   95   166302    47.19 ug/L    0.00
  Spiked Amount     50.000   Range  72 - 122    Recovery   =   94.38%

 Target Compounds                                                 Qvalue
-------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

Quantitation Report (QT Reviewed)

```
Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83956.D
Acq On    : 16 Dec 2009   1:28 am
Operator  : TATIANAE
Sample    : JA34700-2
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 34   Sample Multiplier: 1

Quant Time: Dec 16 14:36:19 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
```



```
                         Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83957.D
Acq On    : 16 Dec 2009   1:57 am
Operator  : TATIANAE
Sample    : JA34700-3
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 35   Sample Multiplier: 1

Quant Time: Dec 17 16:36:30 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards                 R.T. QIon  Response  Conc Units Dev(Min)
 ---------------------------------------------------------------------------

   1) tert butyl alcohol-d9         8.15   65    149885   500.00 ug/L   -0.02
   5) pentafluorobenzene           10.59  168    329315    50.00 ug/L    0.00
  48) 1,4-difluorobenzene          11.54  114    391634    50.00 ug/L    0.00
  76) chlorobenzene-d5             14.88  117    362263    50.00 ug/L    0.00
  90) 1,4-dichlorobenzene-d4       17.37  152    246988    50.00 ug/L    0.00

 System Monitoring Compounds
  41) dibromofluoromethane (s)     10.64  113    123686    53.63 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 120    Recovery   =  107.26%
  42) 1,2-dichloroethane-d4 (s)    11.08   65    168931    58.26 ug/L   -0.01
   Spiked Amount     50.000   Range  64 - 135    Recovery   =  116.52%
  68) toluene-d8 (s)               13.27   98    391578    53.02 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 117    Recovery   =  106.04%
  92) 4-bromofluorobenzene (s)     16.12   95    164581    47.24 ug/L    0.00
   Spiked Amount     50.000   Range  72 - 122    Recovery   =   94.48%

 Target Compounds                                                     Qvalue
  85) ethylbenzene                 14.99   91      2300     0.23 ug/L      81
  86) m,p-xylene                   15.10  106      1062     0.26 ug/L #    71
  87) o-xylene                     15.54  106      1149     0.28 ug/L #    62
 ---------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

Quantitation Report (QT Reviewed)

```
Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83957.D
Acq On    : 16 Dec 2009   1:57 am
Operator  : TATIANAE
Sample    : JA34700-3
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 35   Sample Multiplier: 1

Quant Time: Dec 17 16:36:30 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
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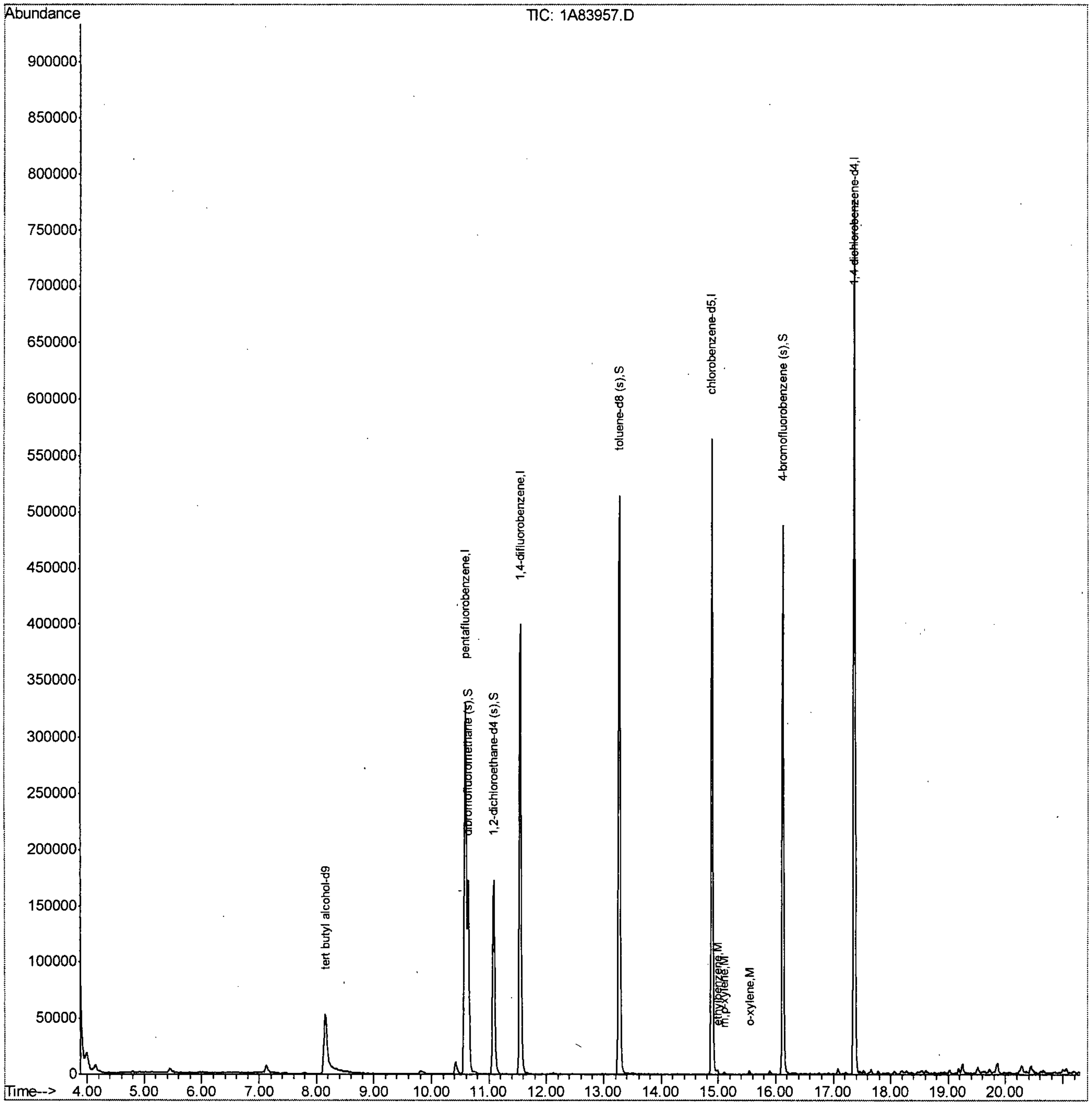
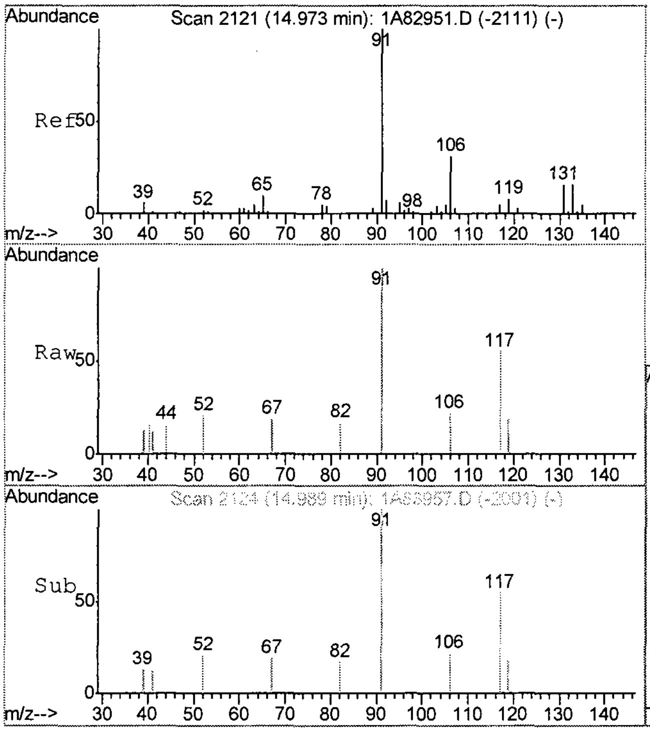
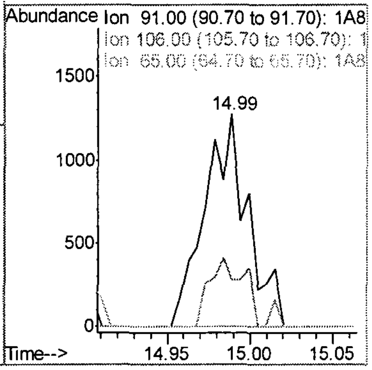
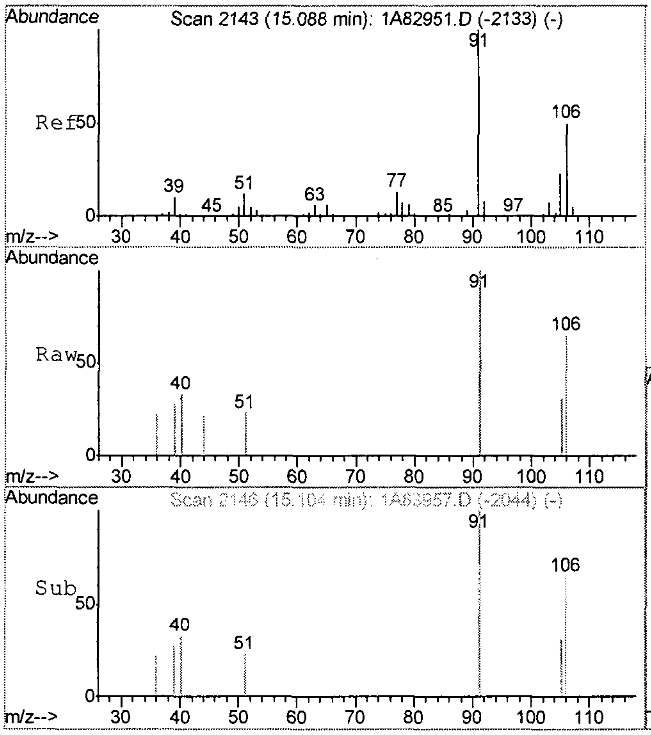




```
#85
ethylbenzene
Concen:     0.23 ug/L
RT: 14.99 min  Scan# 2124
Delta R.T.    0.02 min
Lab File:   1A83957.D
Acq: 16 Dec 2009   1:57 am

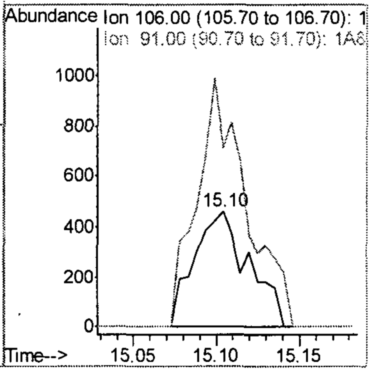
Tgt Ion: 91 Resp:     2300
Ion  Ratio  Lower  Upper
 91  100
106   22.3    1.3   61.3
 65    0.0    0.0   39.5
```

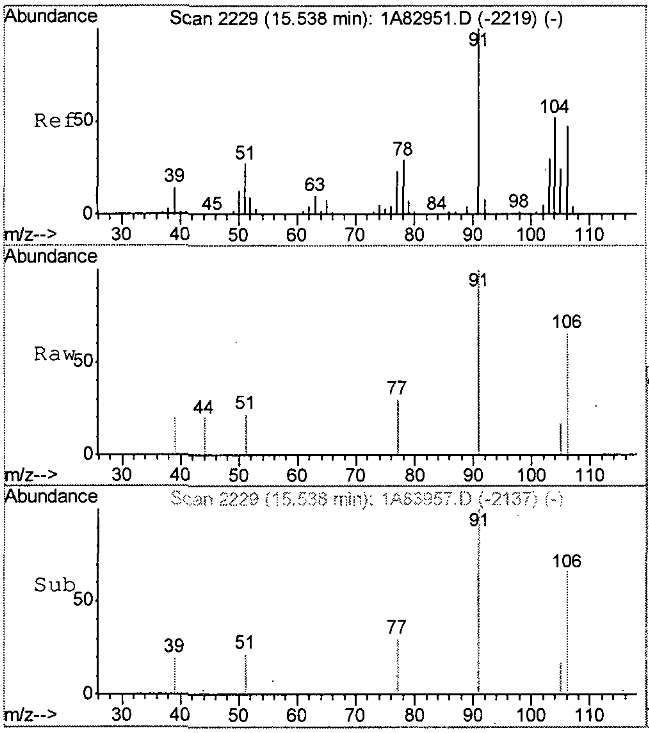




```
#86
m,p-xylene
Concen:     0.26 ug/L
RT: 15.10 min  Scan# 2146
Delta R.T.    0.02 min
Lab File:   1A83957.D
Acq: 16 Dec 2009   1:57 am

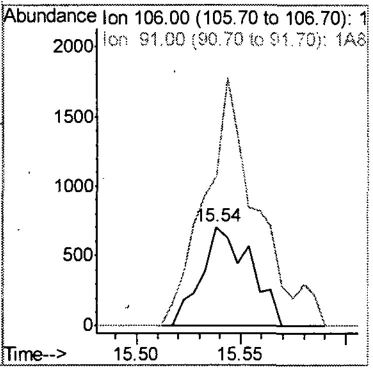
Tgt Ion:106 Resp:     1062
Ion  Ratio  Lower  Upper
106  100
 91  154.8  169.0  229.0#
```





```
#87
o-xylene
Concen:     0.28 ug/L
RT: 15.54 min  Scan# 2229
Delta R.T.    0.00 min
Lab File:    1A83957.D
Acq: 16 Dec 2009   1:57 am

Tgt Ion:106 Resp:     1149
Ion  Ratio  Lower  Upper
106  100
 91  152.6  181.8  241.8#
```



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                    Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83958.D
Acq On    : 16 Dec 2009   2:27 am
Operator  : TATIANAE
Sample    : JA34700-4
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 36   Sample Multiplier: 1

Quant Time: Dec 17 16:37:26 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards                 R.T. QIon  Response  Conc Units Dev(Min)
-----------------------------------------------------------------------------
   1) tert butyl alcohol-d9         8.16   65   137313   500.00 ug/L   -0.01
   5) pentafluorobenzene           10.59  168   334651    50.00 ug/L    0.00
  48) 1,4-difluorobenzene          11.55  114   399119    50.00 ug/L    0.00
  76) chlorobenzene-d5             14.88  117   364055    50.00 ug/L    0.00
  90) 1,4-dichlorobenzene-d4       17.37  152   248826    50.00 ug/L    0.00

 System Monitoring Compounds
  41) dibromofluoromethane (s)     10.64  113   123583    52.73 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 120    Recovery   =  105.46%
  42) 1,2-dichloroethane-d4 (s)    11.08   65   170092    57.72 ug/L    0.00
   Spiked Amount     50.000   Range  64 - 135    Recovery   =  115.44%
  68) toluene-d8 (s)               13.27   98   393880    52.33 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 117    Recovery   =  104.66%
  92) 4-bromofluorobenzene (s)     16.12   95   164594    46.90 ug/L    0.00
   Spiked Amount     50.000   Range  72 - 122    Recovery   =   93.80%

 Target Compounds                                                    Qvalue
-----------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```
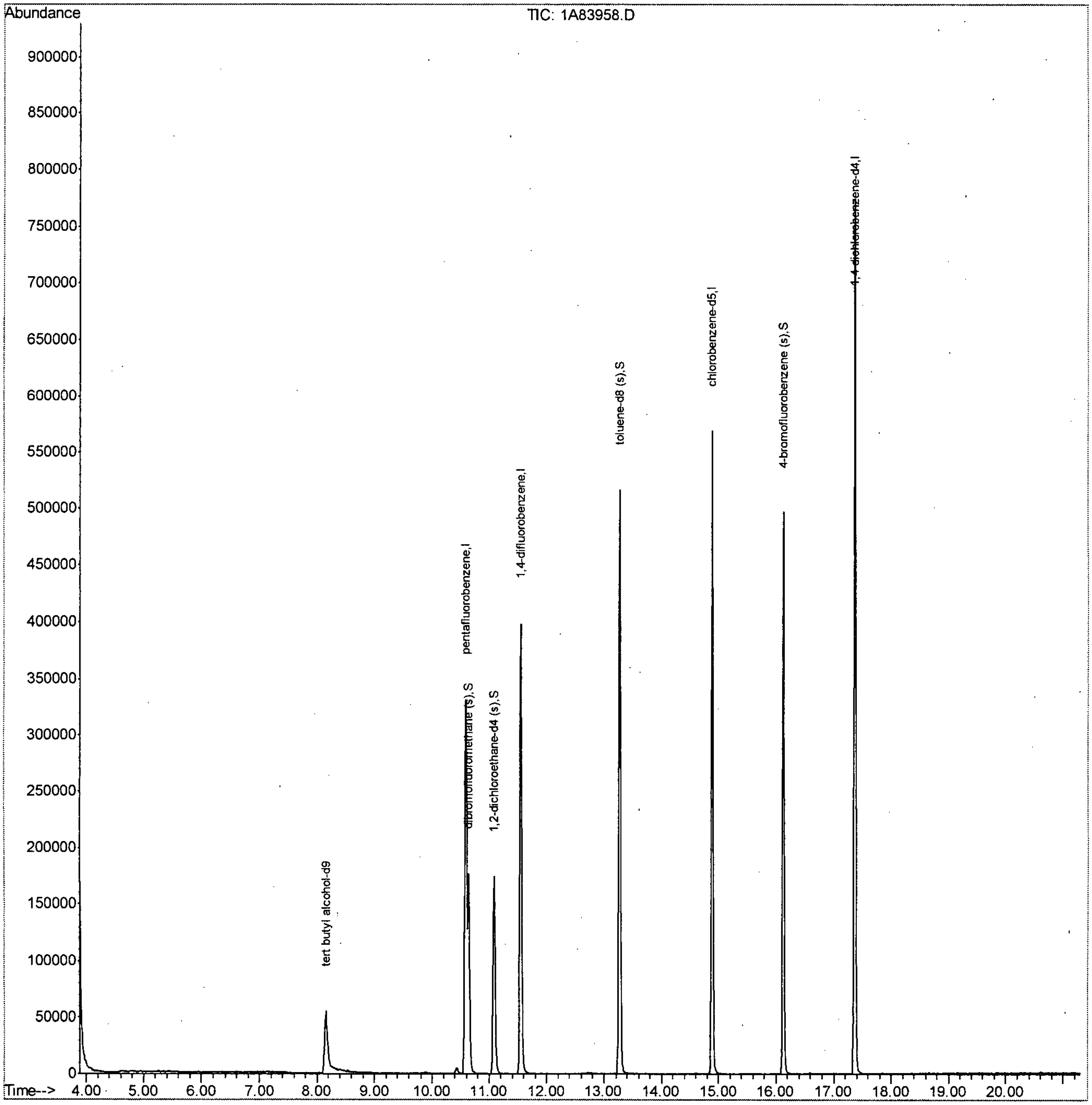
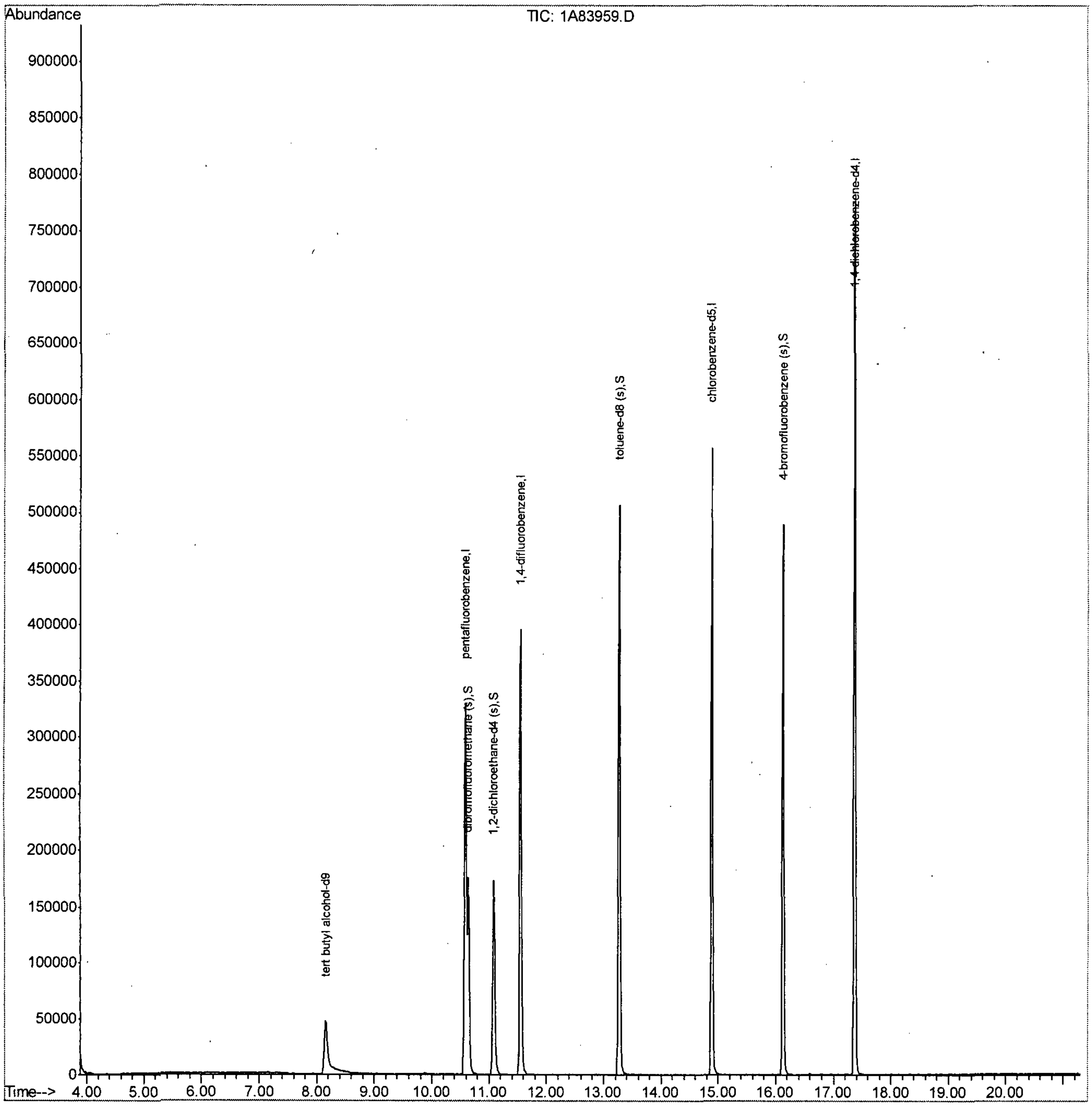

```
                         Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83958.D
Acq On    : 16 Dec 2009   2:27 am
Operator  : TATIANAE
Sample    : JA34700-4
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 36   Sample Multiplier: 1

Quant Time: Dec 17 16:37:26 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
```



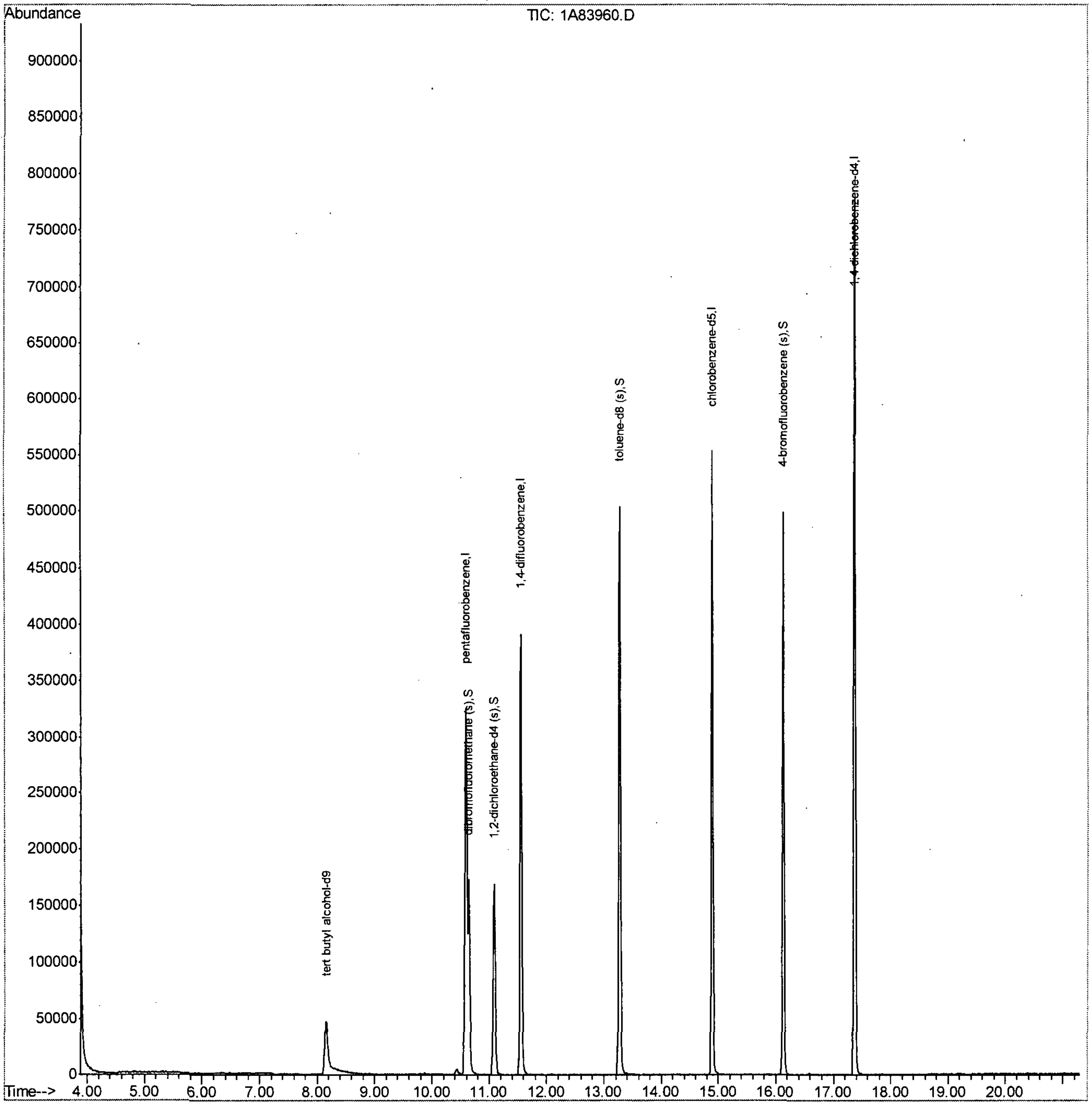
```
                    Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83959.D
Acq On    : 16 Dec 2009   2:56 am
Operator  : TATIANAE
Sample    : JA34700-5
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 37   Sample Multiplier: 1

Quant Time: Dec 17 16:37:46 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards              R.T. QIon  Response  Conc Units Dev(Min)
 ------------------------------------------------------------------------
   1) tert butyl alcohol-d9       8.15   65   135830   500.00 ug/L   -0.02
   5) pentafluorobenzene         10.59  168   326021    50.00 ug/L    0.00
  48) 1,4-difluorobenzene        11.55  114   393941    50.00 ug/L    0.00
  76) chlorobenzene-d5           14.89  117   357282    50.00 ug/L    0.00
  90) 1,4-dichlorobenzene-d4     17.37  152   249384    50.00 ug/L    0.00

 System Monitoring Compounds
  41) dibromofluoromethane (s)    10.64  113   124819    54.67 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 120    Recovery   =  109.34%
  42) 1,2-dichloroethane-d4 (s)   11.08   65   168928    58.84 ug/L    0.00
   Spiked Amount     50.000   Range  64 - 135    Recovery   =  117.68%
  68) toluene-d8 (s)              13.27   98   387311    52.13 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 117    Recovery   =  104.26%
  92) 4-bromofluorobenzene (s)    16.12   95   163858    46.58 ug/L    0.00
   Spiked Amount     50.000   Range  72 - 122    Recovery   =   93.16%

 Target Compounds                                                 Qvalue
 ------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

```
                        Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83959.D
Acq On    : 16 Dec 2009   2:56 am
Operator  : TATIANAE
Sample    : JA34700-5
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 37   Sample Multiplier: 1

Quant Time: Dec 17 16:37:46 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
```



```
                     Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83960.D
Acq On    : 16 Dec 2009   3:26 am
Operator  : TATIANAE
Sample    : JA34700-6
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 38   Sample Multiplier: 1

Quant Time: Dec 17 16:39:20 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards                 R.T. QIon  Response  Conc Units Dev(Min)
 --------------------------------------------------------------------------
   1) tert butyl alcohol-d9        8.15   65   125820   500.00 ug/L   -0.02
   5) pentafluorobenzene          10.58  168   330919    50.00 ug/L    0.00
  48) 1,4-difluorobenzene         11.54  114   390897    50.00 ug/L    0.00
  76) chlorobenzene-d5            14.89  117   361924    50.00 ug/L    0.00
  90) 1,4-dichlorobenzene-d4      17.37  152   246112    50.00 ug/L    0.00

 System Monitoring Compounds
  41) dibromofluoromethane (s)    10.64  113   122199    52.73 ug/L   -0.01
   Spiked Amount     50.000   Range  76 - 120    Recovery   =  105.46%
  42) 1,2-dichloroethane-d4 (s)   11.08   65   168074    57.68 ug/L    0.00
   Spiked Amount     50.000   Range  64 - 135    Recovery   =  115.36%
  68) toluene-d8 (s)              13.27   98   387006    52.50 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 117    Recovery   =  105.00%
  92) 4-bromofluorobenzene (s)    16.12   95   165943    47.80 ug/L    0.00
   Spiked Amount     50.000   Range  72 - 122    Recovery   =   95.60%

 Target Compounds                                                    Qvalue
 --------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

```
                         Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83960.D
Acq On    : 16 Dec 2009   3:26 am
Operator  : TATIANAE
Sample    : JA34700-6
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 38   Sample Multiplier: 1

Quant Time: Dec 17 16:39:20 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
```



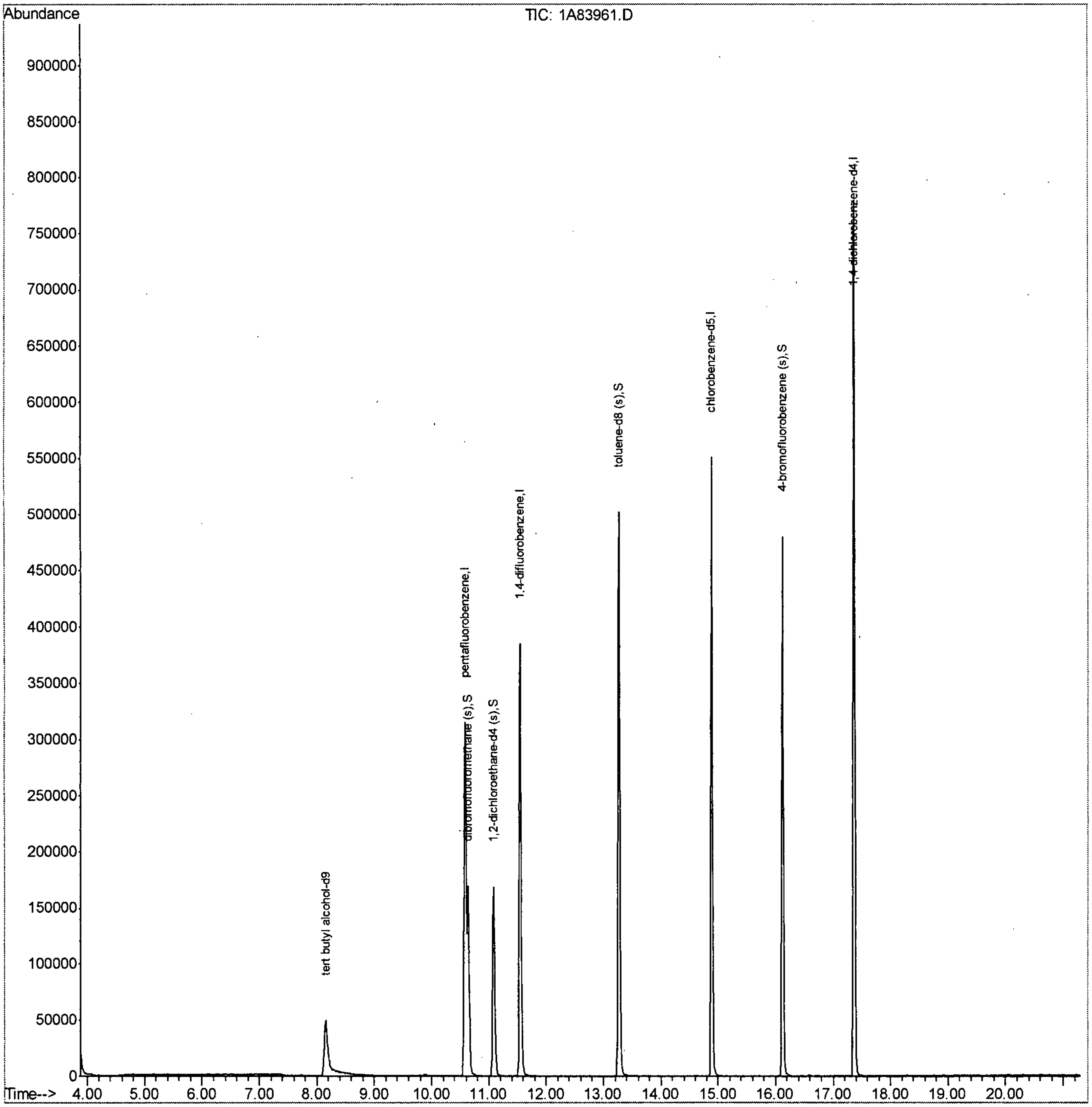
```
                     Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83961.D
Acq On    : 16 Dec 2009   3:55 am
Operator  : TATIANAE
Sample    : JA34700-7
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 39   Sample Multiplier: 1

Quant Time: Dec 17 16:39:42 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards              R.T. QIon  Response  Conc Units Dev(Min)
--------------------------------------------------------------------------
   1) tert butyl alcohol-d9      8.16   65   139309   500.00 ug/L   -0.01
   5) pentafluorobenzene        10.58  168   318856    50.00 ug/L    0.00
  48) 1,4-difluorobenzene       11.55  114   386568    50.00 ug/L    0.00
  76) chlorobenzene-d5          14.88  117   352150    50.00 ug/L    0.00
  90) 1,4-dichlorobenzene-d4    17.37  152   248913    50.00 ug/L    0.00

 System Monitoring Compounds
  41) dibromofluoromethane (s)   10.64  113   121924    54.60 ug/L  -0.01
   Spiked Amount     50.000   Range  76 - 120    Recovery   =  109.20%
  42) 1,2-dichloroethane-d4 (s)  11.08   65   167679    59.72 ug/L   0.00
   Spiked Amount     50.000   Range  64 - 135    Recovery   =  119.44%
  68) toluene-d8 (s)             13.27   98   385175    52.83 ug/L   0.00
   Spiked Amount     50.000   Range  76 - 117    Recovery   =  105.66%
  92) 4-bromofluorobenzene (s)   16.12   95   161357    45.96 ug/L   0.00
   Spiked Amount     50.000   Range  72 - 122    Recovery   =   91.92%

 Target Compounds                                                 Qvalue
--------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

6.1.7

6

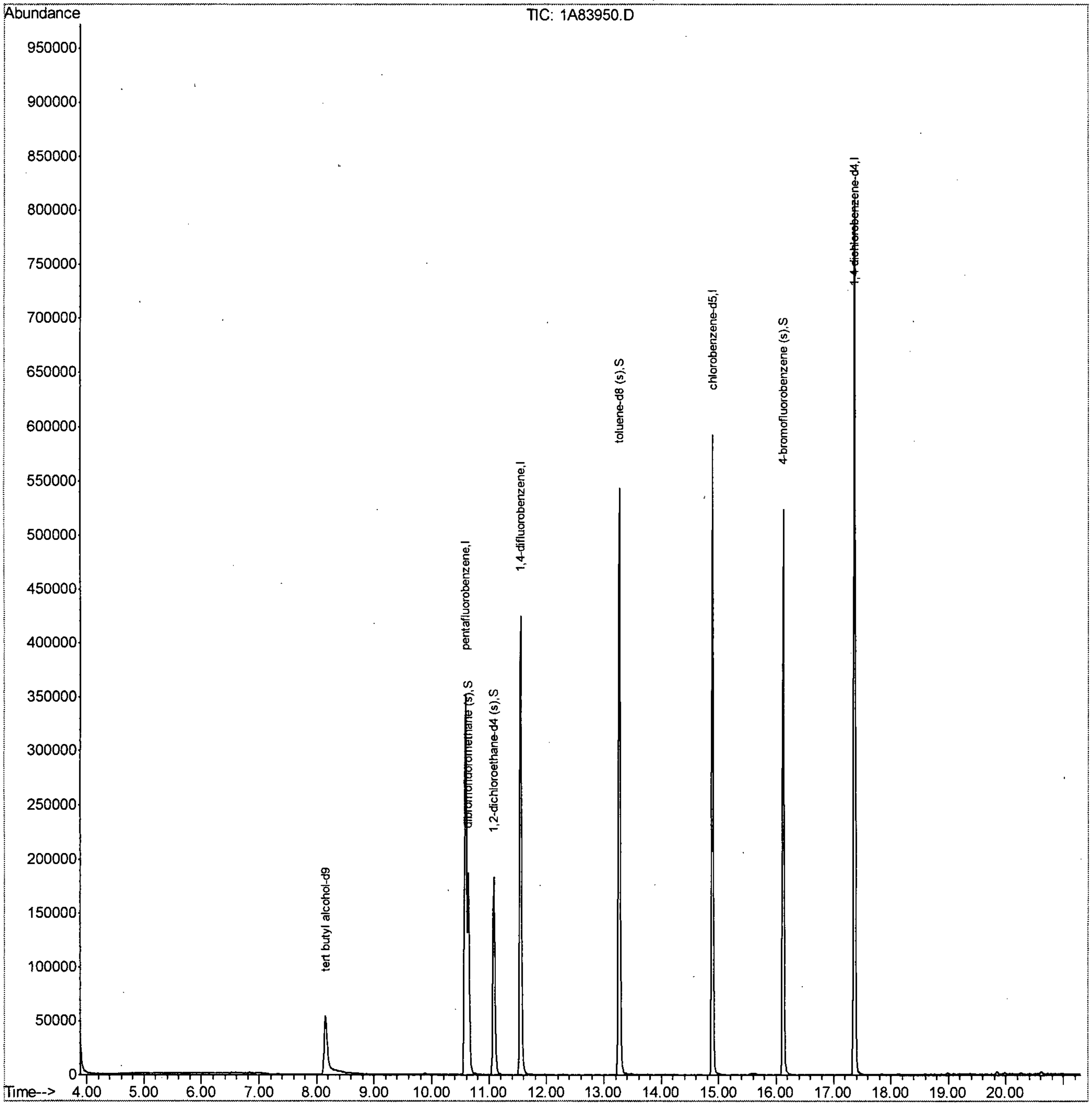
Quantitation Report (QT Reviewed)

```
Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83961.D
Acq On    : 16 Dec 2009   3:55 am
Operator  : TATIANAE
Sample    : JA34700-7
Misc      : MS90193,V1A3576,w,,,,1
ALS Vial  : 39   Sample Multiplier: 1

Quant Time: Dec 17 16:39:42 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
```



```
                          Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83950.D
Acq On    : 15 Dec 2009  10:34 pm
Operator  : TATIANAE
Sample    : MB
Misc      : MS90160,V1A3576,w,,,,1
ALS Vial  : 28   Sample Multiplier: 1

Quant Time: Dec 16 14:34:10 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration

 Internal Standards                 R.T. QIon  Response  Conc Units Dev(Min)
 ---------------------------------------------------------------------------
   1) tert butyl alcohol-d9         8.15   65   128573   500.00 ug/L   -0.02
   5) pentafluorobenzene           10.59  168   350215    50.00 ug/L    0.00
  48) 1,4-difluorobenzene          11.55  114   421686    50.00 ug/L    0.00
  76) chlorobenzene-d5             14.89  117   384780    50.00 ug/L    0.00
  90) 1,4-dichlorobenzene-d4       17.37  152   257880    50.00 ug/L    0.00

 System Monitoring Compounds
  41) dibromofluoromethane (s)     10.64  113   128824    52.53 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 120    Recovery   =  105.06%
  42) 1,2-dichloroethane-d4 (s)    11.08   65   177410    57.53 ug/L    0.00
   Spiked Amount     50.000   Range  64 - 135    Recovery   =  115.06%
  68) toluene-d8 (s)               13.26   98   420196    52.84 ug/L    0.00
   Spiked Amount     50.000   Range  76 - 117    Recovery   =  105.68%
  92) 4-bromofluorobenzene (s)     16.12   95   175207    48.17 ug/L    0.00
   Spiked Amount     50.000   Range  72 - 122    Recovery   =   96.34%

 Target Compounds                                                   Qvalue
 ---------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

```
                    Quantitation Report    (QT Reviewed)

Data Path : C:\MSDCHEM\1\DATA\
Data File : 1A83950.D
Acq On    : 15 Dec 2009  10:34 pm
Operator  : TATIANAE
Sample    : MB
Misc      : MS90160,V1A3576,w,,,,1
ALS Vial  : 28   Sample Multiplier: 1

Quant Time: Dec 16 14:34:10 2009
Quant Method : C:\MSDCHEM\1\METHODS\M1A3533.M
Quant Title  : Method SW846 8260B, ZB624 60mx0.25mmx1.4um
QLast Update : Fri Nov 20 15:06:04 2009
Response via : Initial Calibration
```



GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Instrument Performance Checks (DFTPP)
- Internal Standard Area Summaries
- Surrogate Recovery Summaries
- Initial and Continuing Calibration Summaries

Method Blank Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-MB	F85423.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	1.1	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	1.2	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	1.7	ug/l	
51-28-5	2,4-Dinitrophenol	ND	20	0.74	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	20	0.51	ug/l	
95-48-7	2-Methylphenol	ND	2.0	1.1	ug/l	
	3&4-Methylphenol	ND	2.0	1.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	1.2	ug/l	
100-02-7	4-Nitrophenol	ND	10	0.83	ug/l	
87-86-5	Pentachlorophenol	ND	10	0.80	ug/l	
108-95-2	Phenol	ND	2.0	0.58	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	1.3	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	1.2	ug/l	
83-32-9	Acenaphthene	ND	1.0	0.37	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.27	ug/l	
120-12-7	Anthracene	ND	1.0	0.16	ug/l	
56-55-3	Benzo(a)anthracene	ND	1.0	0.12	ug/l	
50-32-8	Benzo(a)pyrene	ND	1.0	0.095	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	1.0	0.25	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	1.0	0.12	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	1.0	0.38	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	2.0	0.35	ug/l	
85-68-7	Butyl benzyl phthalate	ND	2.0	0.25	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	0.42	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	0.25	ug/l	
86-74-8	Carbazole	ND	2.0	0.17	ug/l	
218-01-9	Chrysene	ND	1.0	0.11	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	2.0	0.25	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	2.0	0.31	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	2.0	0.39	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	2.0	0.35	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	2.0	0.42	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	2.0	0.36	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	2.0	0.39	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	2.0	0.22	ug/l	

Method Blank Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-MB	F85423.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Compound	Result	RL	MDL	Units	Q
606-20-2	2,6-Dinitrotoluene	ND	2.0	0.33	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	5.0	0.30	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	1.0	0.15	ug/l	
132-64-9	Dibenzofuran	ND	5.0	0.30	ug/l	
84-74-2	Di-n-butyl phthalate	ND	2.0	0.19	ug/l	
117-84-0	Di-n-octyl phthalate	ND	2.0	0.40	ug/l	
84-66-2	Diethyl phthalate	ND	2.0	0.17	ug/l	
131-11-3	Dimethyl phthalate	ND	2.0	0.23	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	2.0	0.33	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.17	ug/l	
86-73-7	Fluorene	ND	1.0	0.27	ug/l	
118-74-1	Hexachlorobenzene	ND	2.0	0.37	ug/l	
87-68-3	Hexachlorobutadiene	ND	1.0	0.37	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	20	0.67	ug/l	
67-72-1	Hexachloroethane	ND	5.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1.0	0.13	ug/l	
78-59-1	Isophorone	ND	2.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.0	0.66	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	0.24	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	0.29	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	0.18	ug/l	
91-20-3	Naphthalene	ND	1.0	0.43	ug/l	
98-95-3	Nitrobenzene	ND	2.0	0.25	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	2.0	0.44	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	0.22	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.21	ug/l	
129-00-0	Pyrene	ND	1.0	0.16	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.44	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	55%	13-68%
4165-62-2	Phenol-d5	37%	10-49%
118-79-6	2,4,6-Tribromophenol	98%	37-130%
4165-60-0	Nitrobenzene-d5	100%	25-112%

Method Blank Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-MB	F85423.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Surrogate Recoveries		Limits
321-60-8	2-Fluorobiphenyl	82%	31-106%
1718-51-0	Terphenyl-d14	84%	14-122%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	system artifact	1.44	9	ug/l	J
	unknown acid	14.89	4.4	ug/l	J
	Total TIC, Semi-Volatile		4.4	ug/l	J

Blank Spike Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-BS1	F85424.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
95-57-8	2-Chlorophenol	50	35.9	72	41-102
59-50-7	4-Chloro-3-methyl phenol	50	45.1	90	52-117
120-83-2	2,4-Dichlorophenol	50	39.1	78	47-113
105-67-9	2,4-Dimethylphenol	50	47.8	96	43-122
51-28-5	2,4-Dinitrophenol	100	79.9	80	32-138
534-52-1	4,6-Dinitro-o-cresol	50	37.0	74	47-122
95-48-7	2-Methylphenol	50	35.7	71	36-100
	3&4-Methylphenol	50	33.3	67	31-98
88-75-5	2-Nitrophenol	50	38.7	77	44-114
100-02-7	4-Nitrophenol	50	25.1	50	16-76
87-86-5	Pentachlorophenol	50	36.6	73	35-122
108-95-2	Phenol	50	17.8	36	15-62
95-95-4	2,4,5-Trichlorophenol	50	41.7	83	56-115
88-06-2	2,4,6-Trichlorophenol	50	41.5	83	54-113
83-32-9	Acenaphthene	50	42.7	85	46-110
208-96-8	Acenaphthylene	50	38.2	76	42-103
120-12-7	Anthracene	50	44.9	90	57-123
56-55-3	Benzo(a)anthracene	50	44.4	89	56-125
50-32-8	Benzo(a)pyrene	50	48.1	96	57-125
205-99-2	Benzo(b)fluoranthene	50	45.7	91	49-130
191-24-2	Benzo(g,h,i)perylene	50	48.7	97	55-129
207-08-9	Benzo(k)fluoranthene	50	51.1	102	53-132
101-55-3	4-Bromophenyl phenyl ether	50	48.5	97	55-121
85-68-7	Butyl benzyl phthalate	50	49.8	100	55-132
91-58-7	2-Chloronaphthalene	50	41.8	84	39-108
106-47-8	4-Chloroaniline	50	39.0	78	34-103
86-74-8	Carbazole	50	47.6	95	63-122
218-01-9	Chrysene	50	45.2	90	57-123
111-91-1	bis(2-Chloroethoxy)methane	50	46.6	93	43-119
111-44-4	bis(2-Chloroethyl)ether	50	45.3	91	36-124
108-60-1	bis(2-Chloroisopropyl)ether	50	41.1	82	40-106
7005-72-3	4-Chlorophenyl phenyl ether	50	46.2	92	50-117
95-50-1	1,2-Dichlorobenzene	50	30.4	61	22-90
541-73-1	1,3-Dichlorobenzene	50	27.4	55	19-85
106-46-7	1,4-Dichlorobenzene	50	28.9	58	20-88
121-14-2	2,4-Dinitrotoluene	50	49.5	99	56-124

Blank Spike Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-BS1	F85424.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
606-20-2	2,6-Dinitrotoluene	50	41.5	83	55-128
91-94-1	3,3'-Dichlorobenzidine	50	30.3	61	42-116
53-70-3	Dibenzo(a,h)anthracene	50	48.2	96	55-133
132-64-9	Dibenzofuran	50	46.5	93	53-109
84-74-2	Di-n-butyl phthalate	50	46.3	93	58-130
117-84-0	Di-n-octyl phthalate	50	54.0	108	55-133
84-66-2	Diethyl phthalate	50	45.5	91	52-123
131-11-3	Dimethyl phthalate	50	48.6	97	44-126
117-81-7	bis(2-Ethylhexyl)phthalate	50	48.1	96	57-134
206-44-0	Fluoranthene	50	44.1	88	56-124
86-73-7	Fluorene	50	46.2	92	53-118
118-74-1	Hexachlorobenzene	50	48.3	97	54-119
87-68-3	Hexachlorobutadiene	50	27.6	55	11-100
77-47-4	Hexachlorocyclopentadiene	100	74.7	75	5-120
67-72-1	Hexachloroethane	50	24.8	50	13-88
193-39-5	Indeno(1,2,3-cd)pyrene	50	60.7	121	55-131
78-59-1	Isophorone	50	47.3	95	43-120
91-57-6	2-Methylnaphthalene	50	37.8	76	33-103
88-74-4	2-Nitroaniline	50	63.3	127	48-132
99-09-2	3-Nitroaniline	50	40.6	81	48-115
100-01-6	4-Nitroaniline	50	48.8	98	51-125
91-20-3	Naphthalene	50	36.7	73	33-98
98-95-3	Nitrobenzene	50	42.9	86	41-114
621-64-7	N-Nitroso-di-n-propylamine	50	50.7	101	41-121
86-30-6	N-Nitrosodiphenylamine	50	46.3	93	54-136
85-01-8	Phenanthrene	50	44.5	89	57-119
129-00-0	Pyrene	50	45.5	91	56-123
120-82-1	1,2,4-Trichlorobenzene	50	32.6	65	21-97

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	57%	13-68%
4165-62-2	Phenol-d5	46%	10-49%
118-79-6	2,4,6-Tribromophenol	100%	37-130%
4165-60-0	Nitrobenzene-d5	92%	25-112%

Blank Spike Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-BS1	F85424.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Surrogate Recoveries	BSP	Limits
321-60-8	2-Fluorobiphenyl	79%	31-106%
1718-51-0	Terphenyl-d14	79%	14-122%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-MS	F85432.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036
OP41361-MSD	F85433.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036
JA34586-1	F85431.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Compound	JA34586-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
95-57-8	2-Chlorophenol	ND		100	65.5	66	62.0	62	5	32-102/33
59-50-7	4-Chloro-3-methyl phenol	ND		100	86.6	87	85.0	85	2	38-126/30
120-83-2	2,4-Dichlorophenol	ND		100	74.0	74	68.3	68	8	33-116/34
105-67-9	2,4-Dimethylphenol	ND		100	91.6	92	87.8	88	4	30-128/32
51-28-5	2,4-Dinitrophenol	ND		200	85.1	43	101	51	17	20-151/29
534-52-1	4,6-Dinitro-o-cresol	ND		100	49.3	49	53.9	54	9	31-135/29
95-48-7	2-Methylphenol	ND		100	72.2	72	67.8	68	6	26-111/33
	3&4-Methylphenol	ND		100	73.7	74	68.8	69	7	26-111/33
88-75-5	2-Nitrophenol	ND		100	70.9	71	68.7	69	3	29-116/35
100-02-7	4-Nitrophenol	ND		100	54.0	54	20.9	21	88* [a]	10-123/35
87-86-5	Pentachlorophenol	ND		100	71.0	71	66.3	66	7	34-133/26
108-95-2	Phenol	ND		100	52.2	52	50.4	50	4	14-85/37
95-95-4	2,4,5-Trichlorophenol	ND		100	79.9	80	77.0	77	4	44-121/26
88-06-2	2,4,6-Trichlorophenol	ND		100	80.9	81	78.3	78	3	41-119/28
83-32-9	Acenaphthene	ND		100	82.2	82	79.9	80	3	37-114/31
208-96-8	Acenaphthylene	ND		100	73.4	73	71.7	72	2	33-108/31
120-12-7	Anthracene	ND		100	89.3	89	84.1	84	6	48-125/26
56-55-3	Benzo(a)anthracene	ND		100	87.9	88	82.9	83	6	48-127/26
50-32-8	Benzo(a)pyrene	ND		100	95.4	95	92.3	92	3	48-128/26
205-99-2	Benzo(b)fluoranthene	ND		100	91.1	91	87.8	88	4	41-133/29
191-24-2	Benzo(g,h,i)perylene	ND		100	91.5	92	87.7	88	4	42-134/27
207-08-9	Benzo(k)fluoranthene	ND		100	98.7	99	95.6	96	3	45-133/30
101-55-3	4-Bromophenyl phenyl ether	ND		100	97.0	97	94.3	94	3	47-123/28
85-68-7	Butyl benzyl phthalate	ND		100	97.8	98	94.2	94	4	47-137/27
91-58-7	2-Chloronaphthalene	ND		100	79.5	80	76.1	76	4	35-110/32
106-47-8	4-Chloroaniline	ND		100	70.9	71	66.5	67	6	22-98/36
86-74-8	Carbazole	ND		100	93.2	93	87.5	88	6	54-127/26
218-01-9	Chrysene	ND		100	90.5	91	85.6	86	6	49-125/25
111-91-1	bis(2-Chloroethoxy)methane	ND		100	88.0	88	86.0	86	2	33-116/36
111-44-4	bis(2-Chloroethyl)ether	ND		100	75.1	75	77.7	78	3	24-124/34
108-60-1	bis(2-Chloroisopropyl)ether	ND		100	72.6	73	70.8	71	3	31-104/35
7005-72-3	4-Chlorophenyl phenyl ether	ND		100	90.6	91	88.7	89	2	42-119/28
95-50-1	1,2-Dichlorobenzene	ND		100	52.4	52	48.2	48	8	19-92/36
541-73-1	1,3-Dichlorobenzene	ND		100	47.3	47	43.3	43	9	20-84/37
106-46-7	1,4-Dichlorobenzene	ND		100	48.9	49	46.3	46	5	20-86/36
121-14-2	2,4-Dinitrotoluene	ND		100	97.0	97	90.6	91	7	45-129/28

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-MS	F85432.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036
OP41361-MSD	F85433.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036
JA34586-1	F85431.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Compound	JA34586-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
606-20-2	2,6-Dinitrotoluene	ND		100	78.8	79	75.3	75	5	46-132/29
91-94-1	3,3'-Dichlorobenzidine	ND		100	57.1	57	56.0	56	2	17-119/36
53-70-3	Dibenzo(a,h)anthracene	ND		100	95.1	95	91.1	91	4	45-136/27
132-64-9	Dibenzofuran	ND		100	89.0	89	84.1	84	6	44-114/30
84-74-2	Di-n-butyl phthalate	ND		100	93.8	94	87.7	88	7	49-134/26
117-84-0	Di-n-octyl phthalate	ND		100	104	104	100	100	4	46-140/25
84-66-2	Diethyl phthalate	ND		100	88.7	89	85.2	85	4	46-123/27
131-11-3	Dimethyl phthalate	ND		100	94.3	94	91.0	91	4	39-123/32
117-81-7	bis(2-Ethylhexyl)phthalate	ND		100	94.7	95	90.0	90	5	49-141/27
206-44-0	Fluoranthene	ND		100	86.1	86	82.4	82	4	46-127/27
86-73-7	Fluorene	ND		100	89.5	90	87.2	87	3	44-121/29
118-74-1	Hexachlorobenzene	ND		100	95.8	96	91.3	91	5	46-120/27
87-68-3	Hexachlorobutadiene	ND		100	54.9	55	52.6	53	4	15-99/39
77-47-4	Hexachlorocyclopentadiene	ND		200	149	75	149	75	0	4-124/39
67-72-1	Hexachloroethane	ND		100	45.7	46	42.8	43	7	16-86/39
193-39-5	Indeno(1,2,3-cd)pyrene	ND		100	119	119	115	115	3	43-137/28
78-59-1	Isophorone	ND		100	87.3	87	86.9	87	0	33-117/36
91-57-6	2-Methylnaphthalene	ND		100	71.8	72	70.2	70	2	22-117/37
88-74-4	2-Nitroaniline	ND		100	117	117	111	111	5	37-135/29
99-09-2	3-Nitroaniline	ND		100	76.5	77	69.2	69	10	34-115/28
100-01-6	4-Nitroaniline	ND		100	81.4	81	72.2	72	12	36-128/30
91-20-3	Naphthalene	ND		100	63.9	64	61.5	62	4	22-106/35
98-95-3	Nitrobenzene	ND		100	77.2	77	78.7	79	2	30-116/37
621-64-7	N-Nitroso-di-n-propylamine	ND		100	93.8	94	88.7	89	6	32-118/35
86-30-6	N-Nitrosodiphenylamine	ND		100	92.5	93	88.2	88	5	42-145/27
85-01-8	Phenanthrene	ND		100	87.4	87	84.1	84	4	45-127/27
129-00-0	Pyrene	ND		100	89.6	90	85.6	86	5	45-129/26
120-82-1	1,2,4-Trichlorobenzene	ND		100	57.0	57	56.9	57	0	23-97/37

CAS No.	Surrogate Recoveries	MS	MSD	JA34586-1	Limits
367-12-4	2-Fluorophenol	64%	63%		13-68%
4165-62-2	Phenol-d5	61%*[b]	59%*[b]		10-49%
118-79-6	2,4,6-Tribromophenol	99%	94%		37-130%
4165-60-0	Nitrobenzene-d5	83%	82%	89%	25-112%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP41361-MS	F85432.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036
OP41361-MSD	F85433.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036
JA34586-1	F85431.D	1	12/11/09	NAP	12/10/09	OP41361	EF4036

The QC reported here applies to the following samples: **Method:** SW846 8270C

JA34700-1, JA34700-2, JA34700-3, JA34700-4, JA34700-5, JA34700-6

CAS No.	Surrogate Recoveries	MS	MSD	JA34586-1	Limits
321-60-8	2-Fluorobiphenyl	82%	75%	75%	31-106%
1718-51-0	Terphenyl-d14	82%	75%	77%	14-122%

(a) Outside control limits due to matrix interference.
(b) Outside of in house control limits, but within reasonable method recovery limits.

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M667-DFTPP **Injection Date:** 11/13/09
Lab File ID: 3M15140.D **Injection Time:** 22:31
Instrument ID: GCMS3M

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
51	30.0 - 60.0% of mass 198	78108	36.7		Pass
68	Less than 2.0% of mass 69	1233	0.58	(1.4) [a]	Pass
69	Mass 69 relative abundance	88381	41.5		Pass
70	Less than 2.0% of mass 69	278	0.13	(0.31) [a]	Pass
127	40.0 - 60.0% of mass 198	118266	55.6		Pass
197	Less than 1.0% of mass 198	883	0.41		Pass
198	Base peak, 100% relative abundance	212864	100.0		Pass
199	5.0 - 9.0% of mass 198	14757	6.9		Pass
275	10.0 - 30.0% of mass 198	53629	25.2		Pass
365	1.0 - 100.0% of mass 198	8080	3.8		Pass
441	Present, but less than mass 443	31677	14.9	(77.9) [b]	Pass
442	40.0 - 100.0% of mass 198	212112	99.6		Pass
443	17.0 - 23.0% of mass 442	40672	19.1	(19.2) [c]	Pass

(a) Value is % of mass 69
(b) Value is % of mass 443
(c) Value is % of mass 442

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
E3M667-ICC667	3M15141.D	11/13/09	22:44	00:13	Initial cal 50
E3M667-IC667	3M15142.D	11/13/09	23:14	00:43	Initial cal 100
E3M667-IC667	3M15143.D	11/13/09	23:44	01:13	Initial cal 80
E3M667-IC667	3M15144.D	11/14/09	00:13	01:42	Initial cal 25
E3M667-IC667	3M15145.D	11/14/09	00:43	02:12	Initial cal 10
E3M667-IC667	3M15146.D	11/14/09	01:12	02:41	Initial cal 5
E3M667-IC667	3M15147.D	11/14/09	01:42	03:11	Initial cal 2
E3M667-IC667	3M15148.D	11/14/09	02:12	03:41	Initial cal 1

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M703-DFTPP
Lab File ID: 3M15980.D
Instrument ID: GCMS3M
Injection Date: 12/14/09
Injection Time: 11:24

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
51	30.0 - 60.0% of mass 198	39146	30.0		Pass
68	Less than 2.0% of mass 69	816	0.63	(1.7) [a]	Pass
69	Mass 69 relative abundance	48618	37.3		Pass
70	Less than 2.0% of mass 69	234	0.18	(0.48) [a]	Pass
127	40.0 - 60.0% of mass 198	66757	51.2		Pass
197	Less than 1.0% of mass 198	424	0.33		Pass
198	Base peak, 100% relative abundance	130397	100.0		Pass
199	5.0 - 9.0% of mass 198	8811	6.8		Pass
275	10.0 - 30.0% of mass 198	35317	27.1		Pass
365	1.0 - 100.0% of mass 198	6375	4.9		Pass
441	Present, but less than mass 443	13631	10.5	(83.5) [b]	Pass
442	40.0 - 100.0% of mass 198	86733	66.5		Pass
443	17.0 - 23.0% of mass 442	16315	12.5	(18.8) [c]	Pass

(a) Value is % of mass 69
(b) Value is % of mass 443
(c) Value is % of mass 442

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
E3M703-IC703	3M15981.D	12/14/09	11:37	00:13	Initial cal 100
E3M703-IC703	3M15982.D	12/14/09	12:04	00:40	Initial cal 1
E3M703-IC703	3M15983.D	12/14/09	12:31	01:07	Initial cal 80
E3M703-IC703	3M15984.D	12/14/09	12:56	01:32	Initial cal 2
E3M703-IC703	3M15986.D	12/14/09	13:50	02:26	Initial cal 5
E3M703-IC703	3M15988.D	12/14/09	14:43	03:19	Initial cal 10
E3M703-IC703	3M15985.D	12/14/09	15:50	04:26	Initial cal 50
E3M703-ICC703	3M15987.D	12/14/09	16:16	04:52	Initial cal 25
E3M703-ICV703	3M15990.D	12/14/09	17:25	06:01	Initial cal verification 50
E3M703-ICV703	3M15991.D	12/14/09	17:51	06:27	Initial cal verification 50

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample:	E3M719-DFTPP	**Injection Date:**	12/28/09
Lab File ID:	3M16325.D	**Injection Time:**	22:29
Instrument ID:	GCMS3M		

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance	Pass/Fail
51	30.0 - 60.0% of mass 198	202676	32.2	Pass
68	Less than 2.0% of mass 69	0	0.0 (0.0) [a]	Pass
69	Mass 69 relative abundance	254944	40.6	Pass
70	Less than 2.0% of mass 69	0	0.0 (0.0) [a]	Pass
127	40.0 - 60.0% of mass 198	321624	51.2	Pass
197	Less than 1.0% of mass 198	0	0.0	Pass
198	Base peak, 100% relative abundance	628593	100.0	Pass
199	5.0 - 9.0% of mass 198	42510	6.8	Pass
275	10.0 - 30.0% of mass 198	166210	26.4	Pass
365	1.0 - 100.0% of mass 198	21942	3.5	Pass
441	Present, but less than mass 443	93984	15.0 (85.4) [b]	Pass
442	40.0 - 100.0% of mass 198	584000	92.9	Pass
443	17.0 - 23.0% of mass 442	110010	17.5 (18.8) [c]	Pass

(a) Value is % of mass 69
(b) Value is % of mass 443
(c) Value is % of mass 442

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
E3M719-CC703	3M16326.D	12/28/09	22:44	00:15	Continuing cal 25
E3M719-CC667	3M16327.D	12/28/09	23:10	00:41	Continuing cal 25
OP41506-BS1	3M16328.D	12/29/09	00:04	01:35	Blank Spike
OP41443-MB1	3M16329.D	12/29/09	00:30	02:01	Method Blank
OP41443-BS1	3M16330.D	12/29/09	00:57	02:28	Blank Spike
JA34700-3	3M16331.D	12/29/09	01:23	02:54	X
JA34700-4	3M16332.D	12/29/09	01:50	03:21	AY
JA34700-5	3M16333.D	12/29/09	02:17	03:48	FB-1282009
JA34700-6	3M16334.D	12/29/09	02:43	04:14	YY
ZZZZZZ	3M16335.D	12/29/09	03:09	04:40	(unrelated sample)
OP41506-MS	3M16336.D	12/29/09	03:36	05:07	Matrix Spike
OP41506-MSD	3M16337.D	12/29/09	04:02	05:33	Matrix Spike Duplicate
ZZZZZZ	3M16338.D	12/29/09	04:29	06:00	(unrelated sample)
ZZZZZZ	3M16339.D	12/29/09	04:55	06:26	(unrelated sample)
ZZZZZZ	3M16340.D	12/29/09	05:21	06:52	(unrelated sample)
ZZZZZZ	3M16341.D	12/29/09	05:48	07:19	(unrelated sample)
ZZZZZZ	3M16342.D	12/29/09	06:14	07:45	(unrelated sample)
ZZZZZZ	3M16343.D	12/29/09	06:40	08:11	(unrelated sample)
ZZZZZZ	3M16344.D	12/29/09	07:06	08:37	(unrelated sample)

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M719-DFTPP
Lab File ID: 3M16325.D
Instrument ID: GCMS3M
Injection Date: 12/28/09
Injection Time: 22:29

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
ZZZZZZ	3M16345.D	12/29/09	07:33	09:04	(unrelated sample)
JA35062-1	3M16346.D	12/29/09	07:59	09:30	(used for QC only; not part of job JA34700)
OP41443-MS	3M16348.D	12/29/09	08:51	10:22	Matrix Spike
OP41443-MSD	3M16349.D	12/29/09	09:18	10:49	Matrix Spike Duplicate
OP41560-MB1	3M16350.D	12/29/09	09:44	11:15	Method Blank
ZZZZZZ	3M16351.D	12/29/09	10:11	11:42	(unrelated sample)
ZZZZZZ	3M16352.D	12/29/09	10:37	12:08	(unrelated sample)
OP41522-MB1	3M16356.D	12/29/09	14:23	15:54	Method Blank
OP41522-BS1	3M16357.D	12/29/09	14:50	16:21	Blank Spike
OP41632-BS1	3M16359.D	12/29/09	15:43	17:14	Blank Spike
ZZZZZZ	3M16360.D	12/29/09	16:52	18:23	(unrelated sample)
ZZZZZZ	3M16361.D	12/29/09	17:19	18:50	(unrelated sample)
ZZZZZZ	3M16362.D	12/29/09	17:45	19:16	(unrelated sample)
ZZZZZZ	3M16363.D	12/29/09	18:12	19:43	(unrelated sample)
ZZZZZZ	3M16364.D	12/29/09	18:38	20:09	(unrelated sample)
ZZZZZZ	3M16365.D	12/29/09	19:04	20:35	(unrelated sample)
ZZZZZZ	3M16366.D	12/29/09	19:31	21:02	(unrelated sample)
ZZZZZZ	3M16367.D	12/29/09	19:57	21:28	(unrelated sample)
ZZZZZZ	3M16368.D	12/29/09	20:24	21:55	(unrelated sample)

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample:	EF3993-DFTPP	**Injection Date:**	11/03/09
Lab File ID:	F84454.D	**Injection Time:**	12:34
Instrument ID:	GCMSF		

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
51	30.0 - 60.0% of mass 198	6897	41.3		Pass
68	Less than 2.0% of mass 69	0	0.0	(0.0) [a]	Pass
69	Mass 69 relative abundance	6096	36.5		Pass
70	Less than 2.0% of mass 69	0	0.0	(0.0) [a]	Pass
127	40.0 - 60.0% of mass 198	8324	49.9		Pass
197	Less than 1.0% of mass 198	0	0.0		Pass
198	Base peak, 100% relative abundance	16681	100.0		Pass
199	5.0 - 9.0% of mass 198	1164	7.0		Pass
275	10.0 - 30.0% of mass 198	3932	23.6		Pass
365	1.0 - 100.0% of mass 198	389	2.3		Pass
441	Present, but less than mass 443	1548	9.3	(83.0) [b]	Pass
442	40.0 - 100.0% of mass 198	9331	55.9		Pass
443	17.0 - 23.0% of mass 442	1864	11.2	(20.0) [c]	Pass

(a) Value is % of mass 69
(b) Value is % of mass 443
(c) Value is % of mass 442

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
EF3993-ICC3993	F84455.D	11/03/09	13:32	00:58	Initial cal 50
EF3993-IC3993	F84456.D	11/03/09	14:04	01:30	Initial cal 100
EF3993-IC3993	F84457.D	11/03/09	14:37	02:03	Initial cal 80
EF3993-IC3993	F84458.D	11/03/09	15:09	02:35	Initial cal 25
EF3993-IC3993	F84459.D	11/03/09	15:41	03:07	Initial cal 10
EF3993-IC3993	F84460.D	11/03/09	16:14	03:40	Initial cal 5
EF3993-IC3993	F84461.D	11/03/09	16:46	04:12	Initial cal 2
EF3993-IC3993	F84462.D	11/03/09	17:18	04:44	Initial cal 1

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3994-DFTPP
Lab File ID: F84463.D
Instrument ID: GCMSF
Injection Date: 11/03/09
Injection Time: 17:54

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
51	30.0 - 60.0% of mass 198	7496	45.9		Pass
68	Less than 2.0% of mass 69	106	0.65	(1.5) [a]	Pass
69	Mass 69 relative abundance	6963	42.7		Pass
70	Less than 2.0% of mass 69	0	0.0	(0.0) [a]	Pass
127	40.0 - 60.0% of mass 198	8762	53.7		Pass
197	Less than 1.0% of mass 198	0	0.0		Pass
198	Base peak, 100% relative abundance	16321	100.0		Pass
199	5.0 - 9.0% of mass 198	1128	6.9		Pass
275	10.0 - 30.0% of mass 198	3963	24.3		Pass
365	1.0 - 100.0% of mass 198	387	2.4		Pass
441	Present, but less than mass 443	1599	9.8	(76.5) [b]	Pass
442	40.0 - 100.0% of mass 198	10778	66.0		Pass
443	17.0 - 23.0% of mass 442	2091	12.8	(19.4) [c]	Pass

(a) Value is % of mass 69
(b) Value is % of mass 443
(c) Value is % of mass 442

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
EF3994-ICC3994	F84464.D	11/03/09	18:09	00:15	Initial cal 50
EF3994-IC3994	F84465.D	11/03/09	18:41	00:47	Initial cal 100
EF3994-IC3994	F84466.D	11/03/09	19:13	01:19	Initial cal 80
EF3994-IC3994	F84467.D	11/03/09	19:45	01:51	Initial cal 25
EF3994-IC3994	F84468.D	11/03/09	20:18	02:24	Initial cal 10
EF3994-IC3994	F84469.D	11/03/09	20:50	02:56	Initial cal 5
EF3994-IC3994	F84470.D	11/03/09	21:23	03:29	Initial cal 2
EF3994-IC3994	F84471.D	11/03/09	21:55	04:01	Initial cal 1
EF3994-ICV3993	F84472.D	11/03/09	22:28	04:34	Initial cal verification 50
EF3994-ICV3993	F84473.D	11/03/09	23:00	05:06	Initial cal verification 50
EF3994-ICV3993	F84474.D	11/03/09	23:32	05:38	Initial cal verification 50

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4036-DFTPP
Lab File ID: F85418.D
Instrument ID: GCMSF
Injection Date: 12/11/09
Injection Time: 08:10

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
51	30.0 - 60.0% of mass 198	9565	49.0		Pass
68	Less than 2.0% of mass 69	0	0.0	(0.0) [a]	Pass
69	Mass 69 relative abundance	9826	50.4		Pass
70	Less than 2.0% of mass 69	0	0.0	(0.0) [a]	Pass
127	40.0 - 60.0% of mass 198	11186	57.3		Pass
197	Less than 1.0% of mass 198	0	0.0		Pass
198	Base peak, 100% relative abundance	19508	100.0		Pass
199	5.0 - 9.0% of mass 198	1336	6.8		Pass
275	10.0 - 30.0% of mass 198	4049	20.8		Pass
365	1.0 - 100.0% of mass 198	481	2.5		Pass
441	Present, but less than mass 443	2239	11.5	(88.7) [b]	Pass
442	40.0 - 100.0% of mass 198	13726	70.4		Pass
443	17.0 - 23.0% of mass 442	2525	12.9	(18.4) [c]	Pass

(a) Value is % of mass 69
(b) Value is % of mass 443
(c) Value is % of mass 442

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
EF4036-CC3993	F85419.D	12/11/09	08:27	00:17	Continuing cal 25
EF4036-CC3994	F85420.D	12/11/09	09:07	00:57	Continuing cal 25
OP41373-MB1	F85421.D	12/11/09	09:40	01:30	Method Blank
OP41373-BS1	F85422.D	12/11/09	10:11	02:01	Blank Spike
OP41361-MB	F85423.D	12/11/09	10:43	02:33	Method Blank
OP41361-BS1	F85424.D	12/11/09	11:15	03:05	Blank Spike
ZZZZZZ	F85425.D	12/11/09	11:47	03:37	(unrelated sample)
ZZZZZZ	F85426.D	12/11/09	12:18	04:08	(unrelated sample)
ZZZZZZ	F85427.D	12/11/09	12:50	04:40	(unrelated sample)
JA34793-8	F85428.D	12/11/09	13:22	05:12	(used for QC only; not part of job JA34700)
OP41373-MS	F85429.D	12/11/09	13:54	05:44	Matrix Spike
OP41373-MSD	F85430.D	12/11/09	14:25	06:15	Matrix Spike Duplicate
JA34586-1	F85431.D	12/11/09	14:56	06:46	(used for QC only; not part of job JA34700)
OP41361-MS	F85432.D	12/11/09	15:28	07:18	Matrix Spike
OP41361A-MS	F85432.D	12/11/09	15:28	07:18	Matrix Spike
OP41361-MSD	F85433.D	12/11/09	16:00	07:50	Matrix Spike Duplicate
OP41361A-MSD	F85433.D	12/11/09	16:00	07:50	Matrix Spike Duplicate
ZZZZZZ	F85434.D	12/11/09	16:31	08:21	(unrelated sample)
ZZZZZZ	F85435.D	12/11/09	17:03	08:53	(unrelated sample)

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4036-DFTPP
Lab File ID: F85418.D
Instrument ID: GCMSF
Injection Date: 12/11/09
Injection Time: 08:10

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
OP41271-LB12	F85437.D	12/11/09	18:07	09:57	Leachate Blank
OP41362-LB14	F85438.D	12/11/09	18:39	10:29	Leachate Blank
ZZZZZZ	F85439.D	12/11/09	19:10	11:00	(unrelated sample)
ZZZZZZ	F85440.D	12/11/09	19:42	11:32	(unrelated sample)

Instrument Performance Check (DFTPP)

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4044-DFTPP
Lab File ID: F85644.D
Instrument ID: GCMSF
Injection Date: 12/23/09
Injection Time: 07:16

m/e	Ion Abundance Criteria	Raw Abundance	% Relative Abundance		Pass/Fail
51	30.0 - 60.0% of mass 198	40680	34.8		Pass
68	Less than 2.0% of mass 69	0	0.0	(0.0) [a]	Pass
69	Mass 69 relative abundance	48655	41.7		Pass
70	Less than 2.0% of mass 69	111	0.1	(0.23) [a]	Pass
127	40.0 - 60.0% of mass 198	54700	46.8		Pass
197	Less than 1.0% of mass 198	0	0.0		Pass
198	Base peak, 100% relative abundance	116782	100.0		Pass
199	5.0 - 9.0% of mass 198	8026	6.9		Pass
275	10.0 - 30.0% of mass 198	33189	28.4		Pass
365	1.0 - 100.0% of mass 198	4241	3.6		Pass
441	Present, but less than mass 443	15427	13.2	(78.3) [b]	Pass
442	40.0 - 100.0% of mass 198	99581	85.3		Pass
443	17.0 - 23.0% of mass 442	19714	16.9	(19.8) [c]	Pass

(a) Value is % of mass 69
(b) Value is % of mass 443
(c) Value is % of mass 442

This check applies to the following Samples, MS, MSD, Blanks, and Standards:

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	Hours Lapsed	Client Sample ID
EF4044-CC3993	F85645.D	12/23/09	08:10	00:54	Continuing cal 50
EF4044-CC3994	F85646.D	12/23/09	08:42	01:26	Continuing cal 50
OP41545-MB1	F85648.D	12/23/09	09:49	02:33	Method Blank
OP41545-BS1	F85649.D	12/23/09	10:21	03:05	Blank Spike
OP41473-MB1	F85650.D	12/23/09	10:52	03:36	Method Blank
OP41473-BS1	F85651.D	12/23/09	11:24	04:08	Blank Spike
ZZZZZZ	F85652.D	12/23/09	11:56	04:40	(unrelated sample)
ZZZZZZ	F85653.D	12/23/09	12:28	05:12	(unrelated sample)
ZZZZZZ	F85654.D	12/23/09	13:00	05:44	(unrelated sample)
JA35876-14	F85655.D	12/23/09	13:32	06:16	(used for QC only; not part of job JA34700)
OP41545-MS	F85656.D	12/23/09	14:04	06:48	Matrix Spike
OP41545A-MS	F85656.D	12/23/09	14:04	06:48	Matrix Spike
OP41545-MSD	F85657.D	12/23/09	14:36	07:20	Matrix Spike Duplicate
OP41545A-MSD	F85657.D	12/23/09	14:36	07:20	Matrix Spike Duplicate
JA35555-1	F85658.D	12/23/09	15:34	08:18	(used for QC only; not part of job JA34700)
OP41473-MS	F85659.D	12/23/09	16:05	08:49	Matrix Spike
OP41473-MSD	F85660.D	12/23/09	16:38	09:22	Matrix Spike Duplicate
JA34700-1	F85661.D	12/23/09	17:09	09:53	AZ
JA34700-2	F85662.D	12/23/09	17:41	10:25	BV

Semivolatile Internal Standard Area Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Check Std: E3M719-CC703
Lab File ID: 3M16326.D
Instrument ID: GCMS3M
Injection Date: 12/28/09
Injection Time: 22:44
Method: SW846 8270C

	IS 1		IS 2		IS 3		IS 4		IS 5		IS 6	
	AREA	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**
Check Std	952827	3.77	3633414	5.48	2168683	8.18	3587860	10.50	4043361	14.28	3738282	15.94
Upper Limit [a]	1905654	4.27	7266828	5.98	4337366	8.68	7175720	11.00	8086722	14.78	7476564	16.44
Lower Limit [b]	476414	3.27	1816707	4.98	1084342	7.68	1793930	10.00	2021681	13.78	1869141	15.44

Lab	**IS 1**		**IS 2**		**IS 3**		**IS 4**		**IS 5**		**IS 6**	
Sample ID	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**
OP41506-BS1	714966	3.77	2616163	5.48	1522763	8.17	2546611	10.49	2720498	14.28	2461504	15.94
OP41443-MB1	601616	3.77	2181694	5.48	1275971	8.17	2040792	10.49	2216033	14.27	2115619	15.94
OP41443-BS1	690382	3.77	2490510	5.48	1458445	8.17	2447685	10.49	2596514	14.27	2352832	15.94
JA34700-3	768439	3.77	2961718	5.47	1812436	8.17	2961731	10.49	3260074	14.27	3092183	15.94
JA34700-4	694496	3.77	2626194	5.47	1616799	8.17	2622055	10.49	2923908	14.26	2826448	15.93
JA34700-5	855814	3.77	3196326	5.47	1934832	8.17	3099605	10.49	3442755	14.27	3287079	15.94
JA34700-6	893164	3.77	3353695	5.47	2071814	8.17	3357540	10.49	3797301	14.27	3605848	15.94
ZZZZZZ	709952	3.77	2784654	5.47	1716227	8.17	2774988	10.49	3132422	14.26	3034500	15.93
OP41506-MS	586571	3.77	2109346	5.47	1243039	8.17	2096463	10.49	2231018	14.27	2017261	15.94
OP41506-MSD	634381	3.76	2303532	5.47	1355865	8.17	2275105	10.49	2458546	14.26	2219531	15.93
ZZZZZZ	604144	3.77	2251593	5.47	1304068	8.17	2092175	10.49	2304671	14.26	2192821	15.93
ZZZZZZ	560201	3.77	2102570	5.47	1222374	8.17	1947802	10.48	2178765	14.26	2115063	15.93
ZZZZZZ	595959	3.77	2205122	5.47	1268656	8.17	2008691	10.48	2244629	14.26	2139065	15.93
ZZZZZZ	636049	3.78	2391221	5.48	1370045	8.17	2144793	10.49	2397892	14.26	2287834	15.93
ZZZZZZ	728599	3.77	2861823	5.48	1630475	8.17	2550138	10.48	2851457	14.26	2696684	15.93
ZZZZZZ	737000	3.80	2639326	5.48	1478754	8.17	2342070	10.48	2554073	14.26	2452959	15.93
ZZZZZZ	798064	3.87	2790923	5.54	1474523	8.17	2365901	10.48	2723256	14.27	2646144	15.94
ZZZZZZ	774897	3.77	3150561	5.48	2553547	8.20	4054908	10.75	3367087	14.64	2763641	16.24
JA35062-1	943518	3.78	3736833	5.49	3766623	8.35	1160615*	10.81	2481479	14.64	1650554*	16.70*
OP41443-MS	985766	3.78	3280436	5.50	2569345	8.37	1607113*	10.83	837350*	14.62	2588941	16.28
OP41443-MSD	443399*	3.78	1671339*	5.50	1245236	8.47	905104*	10.90	1120386*	14.62	3322933	16.27
OP41560-MB1	828840	3.78	3099823	5.48	1877984	8.18	3085848	10.51	3874834	14.29	4091308	15.96
ZZZZZZ	583468	3.78	1940740	5.48	1203669	8.18	2139955	10.50	3041409	14.28	3312791	15.95
ZZZZZZ	1118151	3.77	4056359	5.48	2548242	8.18	4368553	10.50	5299050	14.28	5418897	15.95
OP41522-MB1	482684	3.77	1755897*	5.47	1010097*	8.17	1536752*	10.49	1438714*	14.27	1311260*	15.94
OP41522-BS1	455615*	3.76	1678158*	5.47	937920*	8.17	1569745*	10.49	1400817*	14.27	1134164*	15.94
OP41632-BS1	416615*	3.76	1565559*	5.47	873462*	8.17	1463345*	10.49	1355620*	14.27	1105428*	15.94
ZZZZZZ	664866	3.76	2463759	5.47	1414354	8.17	2122903	10.49	1927646*	14.27	1836180*	15.94
ZZZZZZ	750511	3.76	2810484	5.47	1595197	8.17	2403446	10.49	2180643	14.27	2049301	15.94
ZZZZZZ	720865	3.76	3040271	5.47	1803219	8.17	2714857	10.49	2421206	14.27	2232483	15.94
ZZZZZZ	588889	3.77	2351104	5.48	1613129	8.21	2443000	10.54	1963672*	14.28	1767039*	15.94
ZZZZZZ	628662	3.77	2474683	5.48	1466126	8.18	2180226	10.50	2068199	14.27	1954320	15.94
ZZZZZZ	550588	3.77	2118874	5.48	1221383	8.17	1857519	10.49	1799038*	14.27	1682682*	15.94
ZZZZZZ	579511	3.77	2220642	5.47	1283547	8.17	1980171	10.49	1934284*	14.27	1759845*	15.94
ZZZZZZ	571540	3.77	2199103	5.47	1269385	8.17	1960350	10.49	1950077*	14.27	1750756*	15.94

Semivolatile Internal Standard Area Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Check Std:	E3M719-CC703	**Injection Date:**	12/28/09
Lab File ID:	3M16326.D	**Injection Time:**	22:44
Instrument ID:	GCMS3M	**Method:**	SW846 8270C

Lab Sample ID	**IS 1 AREA**	**RT**	**IS 2 AREA**	**RT**	**IS 3 AREA**	**RT**	**IS 4 AREA**	**RT**	**IS 5 AREA**	**RT**	**IS 6 AREA**	**RT**
ZZZZZZ	542520	3.78	2116718	5.48	1215543	8.17	1878123	10.49	1761177*	14.27	1636966*	15.94

IS 1 = 1,4-Dichlorobenzene-d4
IS 2 = Naphthalene-d8
IS 3 = Acenaphthene-D10
IS 4 = Phenanthrene-d10
IS 5 = Chrysene-d12
IS 6 = Perylene-d12

(a) Upper Limit = + 100% of check standard area; Retention time + 0.5 minutes.
(b) Lower Limit = -50% of check standard area; Retention time -0.5 minutes.

Semivolatile Internal Standard Area Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Check Std: EF4036-CC3993
Lab File ID: F85419.D
Instrument ID: GCMSF
Injection Date: 12/11/09
Injection Time: 08:27
Method: SW846 8270C

	IS 1		IS 2		IS 3		IS 4		IS 5		IS 6	
	AREA	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**
Check Std	63442	3.49	229246	5.76	137912	9.61	222840	12.96	213590	18.99	182559	21.40
Upper Limit [a]	126884	3.99	458492	6.26	275824	10.11	445680	13.46	427180	19.49	365118	21.90
Lower Limit [b]	31721	2.99	114623	5.26	68956	9.11	111420	12.46	106795	18.49	91280	20.90

Lab	**IS 1**		**IS 2**		**IS 3**		**IS 4**		**IS 5**		**IS 6**	
Sample ID	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**	**AREA**	**RT**
OP41373-MB1	63958	3.49	236291	5.76	134279	9.61	211746	12.97	186397	18.99	158709	21.40
OP41373-BS1	66971	3.49	239853	5.76	134323	9.61	203832	12.96	177880	18.98	147239	21.40
OP41361-MB	57849	3.50	216504	5.77	123725	9.61	192206	12.97	183810	19.00	162571	21.40
OP41361-BS1	59832	3.49	214241	5.76	119352	9.61	186776	12.96	173008	18.98	147055	21.40
ZZZZZZ	56107	3.50	206170	5.77	119952	9.61	187019	12.97	177503	19.00	157316	21.40
ZZZZZZ	66542	3.49	239853	5.77	134162	9.61	197468	12.97	168109	19.00	137976	21.40
ZZZZZZ	69498	3.49	247394	5.76	136983	9.61	204145	12.97	175736	19.00	141366	21.40
JA34793-8	64395	3.49	226421	5.76	125278	9.61	175526	12.96	146242	18.99	121107	21.40
OP41373-MS	61210	3.49	220807	5.76	121675	9.61	175285	12.96	138012	18.99	116404	21.40
OP41373-MSD	66197	3.48	236035	5.76	128057	9.61	184214	12.96	142262	18.99	120852	21.40
JA34586-1	55808	3.49	205419	5.76	119300	9.61	180469	12.97	163244	18.99	145096	21.39
OP41361-MS	57315	3.49	209744	5.76	117587	9.61	180341	12.96	166572	18.98	144287	21.40
OP41361A-MS	57315	3.49	209744	5.76	117587	9.61	180341	12.96	166572	18.98	144287	21.40
OP41361-MSD	61836	3.49	215925	5.76	123155	9.61	189711	12.96	173643	18.99	147857	21.40
OP41361A-MSD	61836	3.49	215925	5.76	123155	9.61	189711	12.96	173643	18.99	147857	21.40
ZZZZZZ	58548	3.49	211114	5.77	121298	9.61	184420	12.97	172396	18.99	153067	21.40
ZZZZZZ	49420	3.50	174465	5.77	59342*	9.94	178380	13.09	179807	18.99	116484	21.40
OP41271-LB12	55303	3.50	197506	5.77	113112	9.62	165796	12.97	152058	19.00	126177	21.41
OP41362-LB14	54112	3.50	190178	5.77	105245	9.61	162503	12.97	147653	19.00	106087	21.41
ZZZZZZ	54103	3.50	196510	5.77	109594	9.61	167156	12.97	148519	19.00	121758	21.41
ZZZZZZ	52067	3.50	186542	5.77	102117	9.62	157902	12.98	140530	19.00	117844	21.41

IS 1 = 1,4-Dichlorobenzene-d4
IS 2 = Naphthalene-d8
IS 3 = Acenaphthene-D10
IS 4 = Phenanthrene-d10
IS 5 = Chrysene-d12
IS 6 = Perylene-d12

(a) Upper Limit = + 100% of check standard area; Retention time + 0.5 minutes.
(b) Lower Limit = -50% of check standard area; Retention time -0.5 minutes.

Semivolatile Internal Standard Area Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Check Std: EF4044-CC3993
Lab File ID: F85645.D
Instrument ID: GCMSF
Injection Date: 12/23/09
Injection Time: 08:10
Method: SW846 8270C

	IS 1 AREA	RT	IS 2 AREA	RT	IS 3 AREA	RT	IS 4 AREA	RT	IS 5 AREA	RT	IS 6 AREA	RT
Check Std	85494	3.45	315700	5.72	188151	9.56	315114	12.91	337605	18.94	300572	21.36
Upper Limit ^{a}	170988	3.95	631400	6.22	376302	10.06	630228	13.41	675210	19.44	601144	21.86
Lower Limit ^{b}	42747	2.95	157850	5.22	94076	9.06	157557	12.41	168803	18.44	150286	20.86

Lab Sample ID	IS 1 AREA	RT	IS 2 AREA	RT	IS 3 AREA	RT	IS 4 AREA	RT	IS 5 AREA	RT	IS 6 AREA	RT
OP41545-MB1	76418	3.47	276908	5.73	159023	9.56	258655	12.93	272883	18.96	234934	21.37
OP41545-BS1	72260	3.46	268035	5.72	154281	9.56	259129	12.91	277063	18.95	241952	21.37
OP41473-MB1	79752	3.46	288417	5.73	158086	9.56	263142	12.92	271811	18.96	235852	21.37
OP41473-BS1	86497	3.45	310749	5.72	180668	9.56	296733	12.91	308490	18.94	275961	21.37
ZZZZZZ	80644	3.46	288389	5.73	158967	9.56	258295	12.91	281247	18.95	263737	21.36
ZZZZZZ	84996	3.46	299275	5.72	171928	9.56	289114	12.91	311684	18.94	298245	21.36
ZZZZZZ	83788	3.45	301489	5.72	171787	9.56	281309	12.91	302113	18.94	280858	21.35
JA35876-14	73811	3.46	270831	5.72	155717	9.56	263795	12.91	275592	18.94	244437	21.35
OP41545-MS	76267	3.45	276239	5.72	164380	9.56	274179	12.91	289005	18.94	257918	21.36
OP41545A-MS	76267	3.45	276239	5.72	164380	9.56	274179	12.91	289005	18.94	257918	21.36
OP41545-MSD	75672	3.45	280861	5.72	168116	9.56	275887	12.91	297555	18.94	267003	21.36
OP41545A-MSD	75672	3.45	280861	5.72	168116	9.56	275887	12.91	297555	18.94	267003	21.36
JA35555-1	83353	3.46	301431	5.72	184537	9.58	324012	12.94	378120	18.96	348008	21.39
OP41473-MS	91987	3.46	328812	5.72	190648	9.58	320083	12.93	353595	18.96	327031	21.38
OP41473-MSD	90035	3.46	322643	5.73	190869	9.58	320655	12.94	359310	18.97	327051	21.39
JA34700-1	99437	3.46	357244	5.73	216975	9.57	354926	12.92	369436	18.96	331470	21.37
JA34700-2	101990	3.46	378579	5.73	228791	9.56	374758	12.92	400876	18.96	345007	21.37

IS 1 = 1,4-Dichlorobenzene-d4
IS 2 = Naphthalene-d8
IS 3 = Acenaphthene-D10
IS 4 = Phenanthrene-d10
IS 5 = Chrysene-d12
IS 6 = Perylene-d12

(a) Upper Limit = + 100% of check standard area; Retention time + 0.5 minutes.
(b) Lower Limit = -50% of check standard area; Retention time -0.5 minutes.

Semivolatile Surrogate Recovery Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Method: SW846 8270C **Matrix:** AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4	S5	S6
JA34700-1	F85661.D	41.0	23.0	100.0	75.0	75.0	82.0
JA34700-2	F85662.D	33.0	18.0	79.0	64.0	61.0	70.0
JA34700-3	3M16331.D	32.0	16.0	101.0	63.0	67.0	79.0
JA34700-4	3M16332.D	20.0	12.0	46.0	37.0	38.0	40.0
JA34700-5	3M16333.D	47.0	21.0	103.0	80.0	80.0	96.0
JA34700-6	3M16334.D	29.0	18.0	84.0	60.0	60.0	74.0
OP41361-BS1	F85424.D	57.0	46.0	100.0	92.0	79.0	79.0
OP41361-MB	F85423.D	55.0	37.0	98.0	100.0	82.0	84.0
OP41361-MS	F85432.D	64.0	61.0* [a]	99.0	83.0	82.0	82.0
OP41361-MSD	F85433.D	63.0	59.0* [a]	94.0	82.0	75.0	75.0

Surrogate Compounds	Recovery Limits
S1 = 2-Fluorophenol	13-68%
S2 = Phenol-d5	10-49%
S3 = 2,4,6-Tribromophenol	37-130%
S4 = Nitrobenzene-d5	25-112%
S5 = 2-Fluorobiphenyl	31-106%
S6 = Terphenyl-d14	14-122%

(a) Outside of in house control limits, but within reasonable method recovery limits.

7.6.1

7

Initial Calibration Summary

Page 1 of 1

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M667-ICC667
Lab FileID: 3M15141.D

```
                    Response Factor Report  MS3M

  Method         : C:\MSDCHEM\1\METHODS\M3M667.M (RTE Integrator)
  Title          : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
  Last Update    : Sat Nov 14 12:01:51 2009
  Response via   : Initial Calibration

  Calibration Files
  100 =3m15142.D   80  =3m15143.D   50  =3m15141.D   25  =3m15144.D
  10  =3m15145.D   5   =3m15146.D   2   =3m15147.D   1   =3m15148.D

   Compound          100   80    50    25    10    5     2     1     Avg %RSD
  ---------------------------------------------------------------------------



102)     1,4-Dichlorobenzene-d -----------------ISTD---------------------
103) Benzaldehyde       0.903 0.842 0.860 1.114 1.062 0.930 1.057 0.967  11.26

104)     Phenanthrene-d10a     ----------------ISTD----------------------
105) Atrazine     0.106 0.109 0.116 0.103 0.114 0.105 0.089 0.096 0.105   8.74

106)     Acenaphthene-d10a     ----------------ISTD----------------------
107) 1,2,4,5-Tetr 0.500 0.513 0.534 0.471 0.542 0.521 0.444 0.545 0.509   6.98

108)     Chrysene-d12a         ----------------ISTD----------------------
109) Benzidine    0.482 0.546 0.697 0.565 0.708 0.623             0.604  14.75
 ---------------------------------------------------------------------------
 (#) = Out of Range  ###  Number of calibration levels exceeded format  ###

          M3M668.M          Mon Nov 16 12:03:06 2009   MS3M
```

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M703-ICC703
Lab FileID: 3M15987.D

```
                        Response Factor Report  MS3M

  Method       : C:\MSDCHEM\1\METHODS\M3M703HQ.M (RTE Integrator)
  Title        : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
  Last Update  : Wed Dec 16 12:51:04 2009
  Response via : Initial Calibration

  Calibration Files
  100 =3m15981.D   80  =3m15983.D   50  =3m15985 .D  25  =3m15987 .D
  10  =3m15988.D   5   =3m15986.D   2   =3m15984.D   1   =3m15982.D

   Compound          100    80     50     25     10     5      2      1      Avg %RSD
 ----------------------------------------------------------------------------------

 1) I   1,4-Dichlorobenzene-d ----------------ISTD---------------------
 2) 1,4-Dioxane                                                        0.000# -1.00
 3) Pyridine      1.349 1.404 1.293 1.285 1.447 1.283 1.261 1.356 1.335   4.95
 4) N-Nitrosodim  0.907 0.915 0.874 0.851 0.955 0.912 0.875 0.857 0.893   3.90
 5) 2-Fluorophen  1.249 1.244 1.139 1.052 1.328 1.230             1.207   8.03
 6) Indene        2.040 2.057 1.904 1.860 2.074 1.927 1.839 2.004 1.963   4.69
 7) Cumene        2.899 2.932 2.727 2.680 3.029 2.867 2.518 2.756 2.801   5.81
 8) Phenol-d5     1.724 1.748 1.604 1.518 1.916 1.756 1.571 1.522 1.670   8.36
 9) Phenol        1.945 1.957 1.812 1.736 1.967 1.787 1.720 1.453 1.797   9.51
10) Aniline       1.667 1.715 1.587 1.581 1.840 1.682 1.393 1.246 1.589  11.90
11) bis(2-Chloro  1.489 1.527 1.420 1.372 1.642 1.583 1.604 1.589 1.528   6.21
12) 2-Chlorophen  1.612 1.570 1.373 1.311 1.448 1.384 1.284 1.326 1.414   8.57
13) Decane        1.271 1.447 1.534 1.561 1.761 1.716 1.616 1.708 1.577  10.29
14) 1,3-Dichloro  1.662 1.637 1.478 1.430 1.576 1.489 1.430 1.416 1.515   6.43
15) 1,4-Dichloro  1.747 1.711 1.532 1.469 1.685 1.594 1.556 1.539 1.604   6.18
16) Benzyl alcoh  1.000 1.019 0.919 0.824 0.919 0.747 0.727       0.879  13.20
17) 1,2-Dichloro  1.742 1.694 1.467 1.395 1.561 1.475 1.439 1.382 1.519   8.88
18) Acetophenone  1.840 1.870 1.757 1.724 1.883 1.788 1.676 1.388 1.741   9.16
19) 2-Methylphen  1.255 1.278 1.189 1.126 1.307 1.232 1.142 1.103 1.204   6.25
20) 2,2'-oxybis(  0.480 0.487 0.452 0.449 0.499 0.458 0.439 0.471 0.467   4.51
21) 3&4-Methylph  1.395 1.392 1.189 1.107 1.357 1.262 1.094 1.020 1.227  11.95
22) n-Nitroso-di  0.958 0.995 0.955 0.936 1.038 0.985 0.876 0.875 0.952   5.92
23) Hexachloroet  0.648 0.627 0.515 0.473 0.526 0.479 0.480 0.448 0.525  14.12

24) I   Naphthalene-d8        ----------------ISTD---------------------
25) Nitrobenzene  0.450 0.452 0.416 0.412 0.456 0.430 0.363 0.378 0.420   8.19
26) Nitrobenzene  0.206 0.202 0.183 0.179 0.195 0.178 0.166 0.162 0.184   8.79
27) Quinoline     0.644 0.641 0.570 0.579 0.649 0.586 0.614 0.500 0.598   8.41
28) Isophorone    0.746 0.757 0.709 0.696 0.767 0.739 0.653 0.657 0.716   6.16
29) 2-Nitropheno  0.238 0.230 0.197 0.187 0.202 0.184 0.169 0.157 0.196  14.19
30) 2,4-Dimethyl  0.385 0.382 0.323 0.293 0.325 0.294             0.334  12.34
31) Benzoic Acid  0.239 0.239 0.182 0.166 0.248 0.215             0.215  15.72
          ----- Quadratic regression -----             Coefficient =  0.9944
                Response Ratio = 0.01345 + 0.13029 *A + 0.04359 *A^2

32) bis(2-Chloro  0.455 0.454 0.418 0.405 0.442 0.416 0.386 0.420 0.424   5.68
33) 2,4-Dichloro  0.316 0.299 0.253 0.232 0.276 0.254 0.223 0.253 0.263  12.09
34) 2,6-Dichloro  0.343 0.334 0.275 0.260 0.296 0.264 0.265 0.285 0.290  11.00
35) 1,3,5-Trichl  0.395 0.376 0.311 0.291 0.324 0.294 0.285 0.286 0.320  13.31
36) 1,2,4-Trichl  0.361 0.347 0.299 0.288 0.318 0.297 0.282 0.307 0.312   9.00
37) 1,2,3-Trichl  0.413 0.389 0.301 0.278 0.306 0.281 0.270 0.282 0.315  17.40
          ----- Quadratic regression -----             Coefficient =  0.9987
                Response Ratio = 0.00624 + 0.21243 *A + 0.08075 *A^2

38) Naphthalene   1.230 1.211 1.081 1.038 1.159 1.076 1.050 1.115 1.120   6.51
39) 4-Chloroanil  0.483 0.475 0.398 0.381 0.437 0.396 0.367 0.325 0.408  13.29
```

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Sample: E3M703-ICC703
Lab FileID: 3M15987.D

```
  40) 2,3-Dichloro 0.351 0.352 0.309 0.299 0.331 0.300 0.300 0.285 0.316   8.07
  41) Caprolactam  0.126 0.127 0.119 0.152 0.172 0.156 0.123       0.139  14.68
  42) Hexachlorobu 0.322 0.293 0.196 0.177 0.185 0.171 0.162 0.176 0.210  29.20
           ----- Quadratic regression -----                Coefficient =  0.9978
                Response Ratio = 0.00691 + 0.09567 *A + 0.09105 *A^2

  43) 4-Chloro-3-m 0.343 0.342 0.306 0.285 0.311 0.286 0.258 0.292 0.303   9.66
  44) 2-Methylnaph 0.998 0.997 0.983 0.913 0.961 0.866 0.562 0.599 0.860  20.75
             ----- Linear regression -----  Coefficient =  0.9998
                Response Ratio = -0.02227 + 1.00482 *A

  45) 1-Methylnaph 0.770 0.756 0.653 0.626 0.710 0.691 0.713 0.846 0.721   9.67
  46) Dimethylnaph 0.699 0.675 0.569 0.539 0.584 0.537 0.499 0.564 0.583  11.89

  47) I   Acenaphthene-d10       ----------------ISTD---------------------
  48) Hexachlorocy 0.425 0.403 0.278 0.227 0.235 0.191 0.145       0.272  38.72
           ----- Quadratic regression -----                Coefficient =  0.9968
                Response Ratio = -0.00082 + 0.17031 *A + 0.05259 *A^2

  49) 2,4,6-Trichl 0.424 0.397 0.320 0.301 0.324 0.293 0.260       0.331  17.64
           ----- Quadratic regression -----                Coefficient =  0.9992
                Response Ratio = 0.00778 + 0.23274 *A + 0.07612 *A^2

  50) 2,4,5-Trichl 0.390 0.367 0.308 0.279 0.360 0.343 0.301       0.335  11.96
  51) 2-Fluorobiph 1.581 1.517 1.296 1.217 1.351 1.244 1.230 1.338 1.347  10.02
  52) 2-Chloronaph       1.418 1.146 1.032 1.147 1.052 1.045 0.979 1.117  13.06
  53) Biphenyl           1.843 1.462 1.336 1.469 1.355 1.314 1.351 1.447  12.76
  54) 2-Nitroanili 0.407 0.406 0.362 0.332 0.374 0.336 0.323 0.345 0.361   9.11
  55) Dimethylphth       1.655 1.320 1.175 1.273 1.170 1.163 1.343 1.300  13.34
  56) Acenaphthyle 2.378 2.298 1.882 1.715 1.912 1.748 1.679 1.898 1.939  13.53
  57) 2,6-Dinitrot 0.304 0.299 0.265 0.250 0.269 0.244 0.210 0.235 0.260  12.27
  58) 3-Nitroanili 0.344 0.333 0.294 0.257 0.299 0.244             0.295  13.40
  59) Acenaphthene 1.354 1.311 1.131 1.080 1.199 1.131 1.116 1.227 1.194   8.21
  60) 2,4-Dinitrop 0.166 0.155 0.113 0.088 0.090 0.063             0.112  36.05
           ----- Quadratic regression -----                Coefficient =  0.9981
                Response Ratio = -0.00264 + 0.06996 *A + 0.01981 *A^2

  61) 4-Nitropheno 0.168 0.158 0.107 0.141 0.140 0.115             0.138  17.06
           ----- Quadratic regression -----                Coefficient =  0.9915
                Response Ratio = 0.01427 + 0.06290 *A + 0.04048 *A^2

  62) Dibenzofuran 1.812 1.754 1.513 1.431 1.589 1.510 1.471 1.660 1.592   8.65
  63) 2,4-Dinitrot 0.406 0.401 0.358 0.334 0.371 0.329 0.318 0.381 0.362   9.15
  64) 2,3,4,6-Tetr 0.379 0.353 0.271 0.249 0.255 0.234 0.203 0.160 0.263  27.62
           ----- Quadratic regression -----                Coefficient =  0.9990
                Response Ratio = 0.00370 + 0.18546 *A + 0.07814 *A^2

  65) Diethylphtha 1.742 1.656 1.299 1.209 1.330 1.251 1.212 1.467 1.396  14.74
  66) Fluorene     1.550 1.476 1.255 1.183 1.305 1.206 1.191 1.348 1.314  10.39
  67) 4-Chlorophen 0.918 0.835 0.576 0.518 0.571 0.536 0.538 0.629 0.640  23.66
           ----- Quadratic regression -----                Coefficient =  0.9981
                Response Ratio = 0.02268 + 0.29618 *A + 0.24898 *A^2

  68) 4-Nitroanili 0.368 0.353 0.283 0.247 0.312 0.283             0.308  14.98

  69) I   Phenanthrene-d10       ----------------ISTD---------------------
  70) 4,6-Dinitro- 0.166 0.144 0.109 0.104 0.107 0.078             0.118  26.88
           ----- Quadratic regression -----                Coefficient =  0.9990
                Response Ratio = 0.00874 + 0.04945 *A + 0.04519 *A^2
```

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M703-ICC703
Lab FileID: 3M15987.D

```
 71) n-Nitrosodip 0.615 0.579 0.481 0.479 0.536 0.498 0.521 0.559 0.534   9.11
 72) 1,2-Diphenyl 0.876 0.900 0.907 0.938 1.084 1.004 1.004 1.118 0.979   9.08
 73) 2,4,6-Tribro 0.105 0.101 0.089 0.089 0.104 0.094             0.097   7.33
 74) 4-Bromopheny 0.213 0.202 0.174 0.173 0.200 0.191 0.192 0.256 0.200  13.08
 75) Hexachlorobe 0.239 0.231 0.198 0.198 0.229 0.213 0.230 0.298 0.229  13.80
 76) Pentachlorop 0.175 0.161 0.125 0.106 0.113 0.088             0.128  26.18
          ----- Quadratic regression -----                Coefficient =  0.9992
               Response Ratio = 0.00465 + 0.07924 *A + 0.01927 *A^2

 77) Phenanthrene 0.997 0.985 0.896 0.896 1.035 0.999 1.087 1.389 1.035  15.12
             ----- Linear regression -----  Coefficient =  0.9976
               Response Ratio = -0.01309 + 0.98469 *A

 78) Anthracene   0.986 0.954 0.870 0.887 1.053 1.005 1.113 1.511 1.047  19.46
             ----- Linear regression -----  Coefficient =  0.9967
               Response Ratio = -0.01006 + 0.96381 *A

 79) Carbazole    0.857 0.827 0.761 0.759 0.950 0.899 1.021       0.868  11.18
 80) Di-n-butylph 1.275 1.266 1.157 1.162 1.278 1.198 1.191 1.373 1.238   5.96
 81) Fluoranthene 1.198 1.146 0.981 0.951 1.084 1.041 1.146 1.363 1.114  11.81
 82) Octadecane         0.379 0.407 0.448 0.537 0.505 0.492       0.461  13.21

 83) I   Chrysene-d12          ----------------ISTD---------------------
 84) Pyrene       0.990 0.993 0.984 0.977 1.134 1.105 1.177 1.449 1.101  14.61
 85) Butyl steara       0.246 0.317 0.337 0.397 0.372 0.410       0.346  17.48
 86) Terphenyl-d1 0.777 0.755 0.706 0.673 0.805 0.820 0.963       0.786  11.99
 87) Butylbenzylp 0.460 0.465 0.484 0.493 0.551 0.502 0.461 0.496 0.489   6.12
 88) Benzo[a]anth 0.947 0.938 0.889 0.885 0.971 0.913 0.894 0.971 0.926   3.84
 89) 3,3'-Dichlor 0.415 0.402 0.337 0.304 0.338 0.300 0.293       0.341  14.41
 90) Chrysene     0.985 0.993 0.904 0.867 1.031 1.017 1.071 1.128 0.999   8.45
 91) bis(2-Ethylh 0.658 0.661 0.662 0.663 0.728 0.655 0.622 0.614 0.658   5.22

 92) I   Perylene-d12          ----------------ISTD---------------------
 93) Di-n-octylph 1.807 1.740 1.511 1.361 1.351 1.154 0.957       1.412  21.50
             ----- Linear regression -----  Coefficient =  0.9944
               Response Ratio = -0.15383 + 1.81527 *A

 94) Benzo[b]fluo 2.652 2.218 1.394 1.129 0.977 0.813 0.642 0.796 1.328  54.98
          ----- Quadratic regression -----                Coefficient =  0.9991
               Response Ratio = 0.05389 + 0.28145 *A + 0.94102 *A^2

 95) Benzo[k]fluo       1.567 1.326 1.088 1.292 1.145 1.142 0.969 1.218  16.02
          ----- Quadratic regression -----                Coefficient =  0.9994
               Response Ratio = 0.02355 + 0.88955 *A + 0.33247 *A^2

 96) Benzo[a]pyre 1.417 1.379 1.098 0.985 1.070 1.020 0.777 0.754 1.063  22.82
          ----- Quadratic regression -----                Coefficient =  0.9984
               Response Ratio = 0.00364 + 0.86530 *A + 0.22851 *A^2

 97) Indeno[1,2,3 1.795 1.629 1.305 1.108 1.133 0.986 0.900 0.944 1.225  26.86
          ----- Quadratic regression -----                Coefficient =  0.9998
               Response Ratio = 0.01250 + 0.84950 *A + 0.37825 *A^2

 98) Dibenz(a,h)a 1.146 1.075 0.884 0.791 0.811 0.722 0.645 0.681 0.844  21.51
          ----- Quadratic regression -----                Coefficient =  0.9996
               Response Ratio = 0.00465 + 0.66139 *A + 0.19579 *A^2

 99) Dibenz[a,h]a 1.615 1.483 1.152 0.914 0.920 0.869 0.816 0.788 1.070  29.68
          ----- Quadratic regression -----                Coefficient =  0.9995
               Response Ratio = 0.00467 + 0.72339 *A + 0.36132 *A^2
```

Initial Calibration Summary

Page 4 of 4

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M703-ICC703
Lab FileID: 3M15987.D

```
100) 7,12-Dimethy       0.804 0.604 0.437 0.413 0.324 0.272       0.476  41.44
          ----- Quadratic regression -----                Coefficient =  0.9999
               Response Ratio = 0.00582 + 0.26753 *A + 0.26668 *A^2

101) Benzo[g,h,i] 1.228 1.139 0.975 0.882 0.986 0.902 0.840 0.879 0.979  14.05


 ----------------------------------------------------------------------------
 (#) = Out of Range  ###  Number of calibration levels exceeded format  ###

          M3M703HQ.M        Wed Dec 16 12:51:53 2009   MS3M
```

Initial Calibration Verification

Page 1 of 3

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M703-ICV703
Lab FileID: 3M15990.D

```
                    Evaluate Continuing Calibration Report

Data File : C:\msdchem\1\DATA\e3m703\3m15990.D            Vial: 11
Acq On    : 14 Dec 2009   5:25 pm                     Operator: kristis
Sample    : icv703-50                                 Inst.   : MS3M
Misc      : op41242,E3M703,1000,,,1,1                 Multiplr: 1.00
MS Integration Params: lscint.p

Method       : C:\MSDCHEM\1\METHODS\M3M703HQ.M (RTE Integrator)
Title        : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
Last Update  : Wed Dec 16 12:51:04 2009
Response via : Multiple Level Calibration

Min. RRF     :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
Max. RRF Dev :  20%     Max. Rel. Area : 202%

       Compound                        AvgRF   CCRF     %Dev Area%  Dev(min)R.T.
--------------------------------------------------------------------------------

  1 I  1,4-Dichlorobenzene-d4         1.000   1.000      0.0  110   0.00    3.85
  3 t  Pyridine                       1.335   1.561    -16.9  133   0.03    1.70
  4 t  N-Nitrosodimethylamine         0.893   0.943     -5.6  118   0.03    1.70
  6 t  Indene                         1.963   2.319    -18.1  134   0.00    4.19
  7 t  Cumene                         2.801   2.834     -1.2  114   0.01    3.02
 11 t  bis(2-Chloroethyl)ether        1.528   1.514      0.9  117   0.00    3.59
 13 t  Decane                         1.577   1.688     -7.0  121   0.00    3.69
 14 t  1,3-Dichlorobenzene            1.515   1.589     -4.9  118   0.00    3.80
 15 t  1,4-Dichlorobenzene            1.604   1.638     -2.1  117   0.00    3.86
 16 t  Benzyl alcohol                 0.879   0.962     -9.4  115  -0.02    4.10
 17 t  1,2-Dichlorobenzene            1.519   1.580     -4.0  118   0.00    4.09
 18 t  Acetophenone                   1.741   1.964    -12.8  123  -0.01    4.40
 20 t  2,2'-oxybis(1-Chloropropa       0.467   0.473     -1.3  115   0.00    4.26
 22 t  n-Nitroso-di-n-propylamin      0.952   1.012     -6.3  116   0.00    4.45
 23 t  Hexachloroethane               0.525   0.533     -1.5  114   0.00    4.47

 24 I  Naphthalene-d8                 1.000   1.000      0.0  106   0.00    5.56
 26 t  Nitrobenzene                   0.184   0.186     -1.1  108   0.00    4.63
 27 t  Quinoline                      0.598   0.687    -14.9  128  -0.03    6.10
 28 t  Isophorone                     0.716   0.733     -2.4  109   0.00    4.94
          ----------------------- AvgRF   CCRF     % Dev   ------------
 32 t  bis(2-Chloroethoxy)methan      0.424   0.466     -9.9  118   0.00    5.31

 36 t  1,2,4-Trichlorobenzene         0.312   0.331     -6.1  117   0.00    5.51


          ----------------------- AvgRF   CCRF     % Dev   ------------
 38 t  Naphthalene                    1.120   1.158     -3.4  113   0.00    5.59
 40 t  2,3-Dichloroaniline            0.316   0.313      0.9  107   0.00    7.16
 41 t  Caprolactam                    0.139   0.162    -16.5  144   0.00    6.27

          ----------------------- True    Calc.   % Drift  ------------
 42 t  Hexachlorobutadiene           50.000  48.525      3.0  111   0.00    5.87


          ----------------------- True    Calc.   % Drift  ------------
 44 t  2-Methylnaphthalene           50.000  44.674     10.7   83   0.00    6.63

          ----------------------- AvgRF   CCRF     % Dev   ------------
 45 t  1-Methylnaphthalene            0.721   0.708      1.8  115   0.00    6.79
 46 t  Dimethylnaphthalene            0.583   0.610     -4.6  113   0.00    7.61
```

Initial Calibration Verification

Job Number: JA34700 **Sample:** E3M703-ICV703
Account: AGMPAL Arcadis **Lab FileID:** 3M15990.D
Project: PSEG-Salem, Artificial Island, Salem, NJ

```
 47 I   Acenaphthene-d10              1.000    1.000       0.0  102   0.00      8.26

          ----------------------- True     Calc.     % Drift  ------------
 48 t   Hexachlorocyclopentadiene 100.000   99.225       0.8  109   0.00      6.99

 52 t   2-Chloronaphthalene           1.117    1.247     -11.6  111   0.00      7.38
 53 t   Biphenyl                      1.447    1.626     -12.4  114   0.00      7.38
 54 t   2-Nitroaniline                0.361    0.394      -9.1  111  -0.02      7.66
 55 t   Dimethylphthalate             1.300    1.400      -7.7  108   0.01      8.02
 56 t   Acenaphthylene                1.939    1.795       7.4   97   0.00      8.02
 57 t   2,6-Dinitrotoluene            0.260    0.278      -6.9  107   0.00      8.11
 58 t   3-Nitroaniline                0.295    0.269       8.8   93  -0.03      8.34
 59 t   Acenaphthene                  1.194    1.226      -2.7  111   0.01      8.32

          ----------------------- AvgRF    CCRF        % Dev   -------------
 62 t   Dibenzofuran                  1.592    1.673      -5.1  113   0.00      8.57
 63 t   2,4-Dinitrotoluene            0.362    0.350       3.3  100   0.00      8.72



          ----------------------- AvgRF    CCRF        % Dev   -------------
 65 t   Diethylphthalate              1.396    1.358       2.7  107   0.00      9.14
 66 t   Fluorene                      1.314    1.376      -4.7  112   0.00      9.11

          ----------------------- True     Calc.     % Drift  ------------
 67 t   4-Chlorophenyl-phenylethe    50.000   48.887       2.2  107   0.00      9.16

          ----------------------- AvgRF    CCRF        % Dev   -------------
 68 t   4-Nitroaniline                0.308    0.281       8.8  101  -0.02      9.33

 69 I   Phenanthrene-d10              1.000    1.000       0.0  101   0.00     10.58

          ----------------------- AvgRF    CCRF        % Dev   -------------
 71 t   n-Nitrosodiphenylamine        0.534    0.490       8.2  103   0.00      9.39
 72 t   1,2-Diphenylhydrazine         0.979    0.953       2.7  106   0.01      9.41
 74 t   4-Bromophenyl-phenylether     0.200    0.190       5.0  110   0.00      9.92
 75 t   Hexachlorobenzene             0.229    0.210       8.3  107   0.00     10.11

 77 t   Phenanthrene                 50.000   49.669       0.7  109   0.01     10.62
 78 t   Anthracene                   50.000   50.242      -0.5  112   0.00     10.69

          ----------------------- AvgRF    CCRF        % Dev   -------------
 79 t   Carbazole                     0.868    0.875      -0.8  116  -0.02     11.02
 80 t   Di-n-butylphthalate           1.238    1.222       1.3  107   0.00     11.71
 81 t   Fluoranthene                  1.114    1.028       7.7  106   0.00     12.42
 82 t   Octadecane                    0.461    0.450       2.4  112   0.00     10.58

 83 I   Chrysene-d12                  1.000    1.000       0.0   90   0.00     14.34
 84 t   Pyrene                        1.101    1.129      -2.5  104   0.00     12.71

 87 t   Butylbenzylphthalate          0.489    0.557     -13.9  104   0.00     13.75
 88 t   Benzo[a]anthracene            0.926    1.003      -8.3  102   0.00     14.32
 89 t   3,3'-Dichlorobenzidine        0.341    0.285      16.4   77  -0.02     14.36
 90 t   Chrysene                      0.999    1.047      -4.8  105   0.01     14.38
 91 t   bis(2-Ethylhexyl)phthalat     0.658    0.759     -15.3  104   0.01     14.54

 92 I   Perylene-d12                  1.000    1.000       0.0   89   0.00     16.00

          ----------------------- True     Calc.     % Drift  ------------
 93 t   Di-n-octylphthalate          50.000   50.807      -1.6  102   0.01     15.26
```

Initial Calibration Verification

Page 3 of 3

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M703-ICV703
Lab FileID: 3M15990.D

```
 94 t   Benzo[b]fluoranthene       50.000  51.572     -3.1  102   0.02   15.62
 95 t   Benzo[k]fluoranthene       50.000  52.699     -5.4   96   0.01   15.64
 96 t   Benzo[a]pyrene             50.000  52.108     -4.2   99   0.01   15.95
 97 t   Indeno[1,2,3-cd]pyrene     50.000  52.969     -5.9   99   0.00   17.09
 98 t   Dibenz(a,h)acridine        50.000  51.413     -2.8   95   0.00   16.85
 99 t   Dibenz[a,h]anthracene      50.000  51.477     -3.0   95   0.01   17.10
100 t   7,12-Dimethylbenz(a)anthr  50.000  48.222      3.6   85   0.02   15.62

            ---------------------- AvgRF   CCRF      % Dev  -------------
101 t   Benzo[g,h,i]perylene        0.979   1.076     -9.9   99   0.00   17.37

 -----------------------------------------------------------------------
 -----------------------------------------------------------------------

    (#) = Out of Range              SPCC's out = 0  CCC's out = 0
     3m15985a.D M3M703HQ.M        Wed Dec 16 16:23:32 2009    MS3M
```

Initial Calibration Verification

Page 1 of 1

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M703-ICV703
Lab FileID: 3M15991.D

```
                   Evaluate Continuing Calibration Report

 Data File : C:\msdchem\1\DATA\e3m703\3m15991.D           Vial: 12
 Acq On    : 14 Dec 2009   5:51 pm                     Operator: kristis
 Sample    : icv703-50                                 Inst    : MS3M
 Misc      : op41242,E3M703,1000,,,1,1                 Multiplr: 1.00
 MS Integration Params: lscint.p

 Method        : C:\MSDCHEM\1\METHODS\M3M703HQ.M (RTE Integrator)
 Title         : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
 Last Update   : Mon Dec 14 16:51:52 2009
 Response via  : Multiple Level Calibration

 Min. RRF      :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
 Max. RRF Dev :  20%     Max. Rel. Area : 202%

        Compound                          AvgRF   CCRF      %Dev Area%  Dev(min)R.T.
 ------------------------------------------------------------------------------------
  1 I   1,4-Dichlorobenzene-d4            1.000   1.000      0.0   90   0.00    3.84
 10 t   Aniline                           1.589   1.861    -17.1  105   0.00    3.53

 24 I   Naphthalene-d8                    1.000   1.000      0.0   88   0.00    5.56
 39 t   4-Chloroaniline                   0.408   0.366     10.3   81  -0.02    5.77

--------------------------------------------------------------------------------
--------------------------------------------------------------------------------

   (#) = Out of Range             SPCC's out = 0  CCC's out = 0
    3m15985a.D M3M703HQ.M       Mon Dec 14 22:12:27 2009   MS3M
```

Initial Calibration Verification

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M704-ICV703
Lab FileID: 3M15996.D

```
                    Evaluate Continuing Calibration Report

 Data File : C:\msdchem\1\DATA\e3m703\3m15996.D            Vial: 5
 Acq On    : 14 Dec 2009   8:13 pm                      Operator: kristis
 Sample    : icv703-50                                  Inst    : MS3M
 Misc      : op41242,E3M704,1000,,,1,1                  Multiplr: 1.00
 MS Integration Params: lscint.p

 Method        : C:\MSDCHEM\1\METHODS\M3M703HQ.M (RTE Integrator)
 Title         : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
 Last Update   : Tue Dec 15 16:01:17 2009
 Response via  : Multiple Level Calibration

 Min. RRF     :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
 Max. RRF Dev :  20%     Max. Rel. Area : 202%

         Compound                        AvgRF   CCRF      %Dev Area%  Dev(min)R.T.
 -----------------------------------------------------------------------------------
  1 I   1,4-Dichlorobenzene-d4          1.000   1.000      0.0    90   0.00     3.84
  9 t   Phenol                          1.797   1.827     -1.7    90  -0.02     3.60
 12 t   2-Chlorophenol                  1.414   1.422     -0.6    93   0.00     3.67
 19 t   2-Methylphenol                  1.204   1.293     -7.4    97  -0.01     4.31
 21 t   3&4-Methylphenol                1.227   1.381    -12.6   104  -0.03     4.51

 24 I   Naphthalene-d8                  1.000   1.000      0.0    88   0.00     5.56
 29 t   2-Nitrophenol                   0.196   0.203     -3.6    91  -0.01     5.07
 30 t   2,4-Dimethylphenol              0.334   0.395    -18.3   108  -0.02     5.22

            ----------------------- True    Calc.   % Drift  ------------
 31     Benzoic Acid                   50.000  57.296    -14.6   112   0.02     5.62


 33 t   2,4-Dichlorophenol              0.263   0.250      4.9    87  -0.03     5.47
 34     2,6-Dichlorophenol              0.290   0.285      1.7    91  -0.01     5.77

            ----------------------- AvgRF   CCRF     % Dev    -------------
 43 t   4-Chloro-3-methylphenol         0.303   0.303      0.0    87  -0.03     6.62


 47 I   Acenaphthene-d10                1.000   1.000      0.0    83   0.00     8.26

 49 t   2,4,6-Trichlorophenol          50.000  52.060     -4.1    91  -0.03     7.17

            ----------------------- AvgRF   CCRF     % Dev    -------------
 50 t   2,4,5-Trichlorophenol           0.335   0.345     -3.0    93  -0.04     7.28

            ----------------------- True    Calc.   % Drift  ------------
 60 t   2,4-Dinitrophenol             100.000  82.626    -17.4    54  -0.01     8.52
 61 t   4-Nitrophenol                  50.000  59.793    -19.6   123  -0.12     8.90

              ----------------------- True    Calc.   % Drift  ------------
 64     2,3,4,6-Tetrachlorophenol      50.000  50.472     -0.9    89  -0.02     8.90


 69 I   Phenanthrene-d10                1.000   1.000      0.0    68   0.00    10.57

            ----------------------- True    Calc.   % Drift  ------------
 70 t   4,6-Dinitro-2-methylpheno      50.000  52.814     -5.6    77  -0.04     9.35
```

Initial Calibration Verification

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M704-ICV703
Lab FileID: 3M15996.D

```
                 ----------------------- True     Calc.    % Drift  ------------
76 t   Pentachlorophenol         100.000  108.726     -8.7   76    0.00    10.45

------------------------------------------------------------------------------
------------------------------------------------------------------------------

   (#) = Out of Range              SPCC's out = 0  CCC's out = 0
    3m15985a.D M3M703HQ.M        Tue Dec 15 16:31:12 2009    MS3M
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M719-CC703
Lab FileID: 3M16326.D

```
                    Evaluate Continuing Calibration Report

 Data File : C:\msdchem\1\DATA\e3m719\3m16326.D           Vial: 2
 Acq On    : 28 Dec 2009  10:44 pm                     Operator: larisap
 Sample    : cc703-25                                  Inst    : MS3M
 Misc      : op41506,E3M719,                           Multiplr: 1.00
 MS Integration Params: lscint.p

 Method         : C:\MSDCHEM\1\METHODS\M3M703HQ.M (RTE Integrator)
 Title          : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
 Last Update    : Tue Dec 29 13:24:46 2009
 Response via   : Multiple Level Calibration

 Min. RRF      :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
 Max. RRF Dev  :  20%     Max. Rel. Area : 202%

        Compound                     AvgRF    CCRF      %Dev Area%  Dev(min)R.T.
 ------------------------------------------------------------------------------
  1 I   1,4-Dichlorobenzene-d4       1.000    1.000      0.0  124    0.00    3.77
  2 t   1,4-Dioxane                         -----------NA-----------
  3 t   Pyridine                     1.335    1.009     24.4#  97    0.00    1.63
  4 t   N-Nitrosodimethylamine       0.893    0.692     22.5# 101    0.00    1.63
  5 S   2-Fluorophenol               1.207    1.128      6.5  133    0.00    2.57
  6 t   Indene                       1.963    1.776      9.5  118    0.00    4.11
  7 t   Cumene                       2.801    2.614      6.7  121    0.00    2.93
  8 S   Phenol-d5                    1.670    1.556      6.8  127    0.00    3.53
  9 t   Phenol                       1.797    1.552     13.6  111    0.00    3.55
 10 t   Aniline                      1.589    1.096     31.0#  86    0.00    3.47
 11 t   bis(2-Chloroethyl)ether      1.528    1.338     12.4  121    0.00    3.52
 12 t   2-Chlorophenol               1.414    1.340      5.2  127    0.00    3.60
 13 t   Decane                       1.577    1.386     12.1  110    0.00    3.60
 14 t   1,3-Dichlorobenzene          1.515    1.410      6.9  122    0.00    3.72
 15 t   1,4-Dichlorobenzene          1.604    1.507      6.0  127    0.00    3.78
 16 t   Benzyl alcohol               0.879    0.670     23.8# 101    0.00    4.04
 17 t   1,2-Dichlorobenzene          1.519    1.402      7.7  124    0.00    4.01
 18 t   Acetophenone                 1.741    1.683      3.3  121    0.00    4.34
 19 t   2-Methylphenol               1.204    1.093      9.2  120    0.00    4.25
 20 t   2,2'-oxybis(1-Chloropropa    0.467    0.432      7.5  119    0.00    4.18
 21 t   3&4-Methylphenol             1.227    1.129      8.0  126    0.00    4.47
 22 t   n-Nitroso-di-n-propylamin    0.952    0.859      9.8  114    0.00    4.38
 23 t   Hexachloroethane             0.525    0.529     -0.8  138    0.00    4.39

 24 I   Naphthalene-d8               1.000    1.000      0.0  127    0.00    5.48
 25 S   Nitrobenzene-d5              0.420    0.369     12.1  114    0.00    4.53
 26 t   Nitrobenzene                 0.184    0.168      8.7  119    0.00    4.56
 27 t   Quinoline                    0.598    0.553      7.5  121    0.00    6.05
 28 t   Isophorone                   0.716    0.631     11.9  115    0.00    4.88
 29 t   2-Nitrophenol                0.196    0.188      4.1  127    0.00    5.00
 30 t   2,4-Dimethylphenol           0.334    0.281     15.9  122    0.00    5.16

          ----------------------- True      Calc.    % Drift  ------------
 31     Benzoic Acid                25.000   30.610    -22.4# 170    0.00    5.50

          ----------------------- AvgRF     CCRF      % Dev    -------------
 32 t   bis(2-Chloroethoxy)methan    0.424    0.342     19.3  107    0.00    5.23
 33 t   2,4-Dichlorophenol           0.263    0.269     -2.3  147    0.00    5.41
 34     2,6-Dichlorophenol           0.290    0.278      4.1  136    0.00    5.70
 35 t   1,3,5-Trichlorobenzene       0.320    0.309      3.4  135    0.00    4.98
 36 t   1,2,4-Trichlorobenzene       0.312    0.304      2.6  134    0.00    5.43
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M719-CC703
Lab FileID: 3M16326.D

```
         ----------------------- True    Calc.    % Drift  ------------
37 t  1,2,3-Trichlorobenzene    25.000  26.656     -6.6  135   0.00    5.78

         ----------------------- AvgRF   CCRF      % Dev   -------------
38 t  Naphthalene                1.120   0.992     11.4  122   0.00    5.50
39 t  4-Chloroaniline            0.408   0.359     12.0  120   0.00    5.71
40 t  2,3-Dichloroaniline        0.316   0.307      2.8  131   0.00    7.08
41 t  Caprolactam                0.139   0.133      4.3  112   0.00    6.25

         ----------------------- True    Calc.    % Drift  ------------
42 t  Hexachlorobutadiene       25.000  28.155    -12.6  137   0.00    5.78

         ----------------------- AvgRF   CCRF      % Dev   -------------
43 t  4-Chloro-3-methylphenol    0.303   0.285      5.9  127   0.00    6.57

         ----------------------- True    Calc.    % Drift  ------------
44 t  2-Methylnaphthalene       25.000  23.042      7.8  124   0.00    6.55

         ----------------------- AvgRF   CCRF      % Dev   -------------
45 t  1-Methylnaphthalene        0.721   0.652      9.6  132   0.00    6.71
46 t  Dimethylnaphthalene        0.583   0.554      5.0  131   0.00    7.53

47 I  Acenaphthene-d10           1.000   1.000      0.0  131   0.00    8.18

         ----------------------- True    Calc.    % Drift  ------------
48 t  Hexachlorocyclopentadiene 50.000  47.990      4.0  128   0.00    6.89
49 t  2,4,6-Trichlorophenol     25.000  27.774    -11.1  143   0.00    7.11

         ----------------------- AvgRF   CCRF      % Dev   -------------
50 t  2,4,5-Trichlorophenol      0.335   0.370    -10.4  173   0.00    7.24
51 S  2-Fluorobiphenyl           1.347   1.216      9.7  130   0.00    7.17
52 t  2-Chloronaphthalene        1.117   1.064      4.7  135   0.00    7.29
53 t  Biphenyl                   1.447   1.303     10.0  127   0.00    7.30
54 t  2-Nitroaniline             0.361   0.329      8.9  129   0.00    7.61
55 t  Dimethylphthalate          1.300   1.226      5.7  136   0.00    7.93
56 t  Acenaphthylene             1.939   1.667     14.0  127   0.00    7.93
57 t  2,6-Dinitrotoluene         0.260   0.266     -2.3  139   0.00    8.03
58 t  3-Nitroaniline             0.295   0.259     12.2  132   0.00    8.30
59 t  Acenaphthene               1.194   1.040     12.9  126   0.00    8.23

         ----------------------- True    Calc.    % Drift  ------------
60 t  2,4-Dinitrophenol         50.000  55.484    -11.0  158   0.00    8.46
61 t  4-Nitrophenol             25.000  30.032    -20.1# 125   0.00    8.88

         ----------------------- AvgRF   CCRF      % Dev   -------------
62 t  Dibenzofuran               1.592   1.464      8.0  134   0.00    8.49
63 t  2,4-Dinitrotoluene         0.362   0.370     -2.2  145   0.00    8.66

         ----------------------- True    Calc.    % Drift  ------------
64    2,3,4,6-Tetrachlorophenol 25.000  27.925    -11.7  144   0.00    8.83

         ----------------------- AvgRF   CCRF      % Dev   -------------
65 t  Diethylphthalate           1.396   1.250     10.5  135   0.00    9.04
66 t  Fluorene                   1.314   1.176     10.5  130   0.00    9.02

         ----------------------- True    Calc.    % Drift  ------------
67 t  4-Chlorophenyl-phenylethe 25.000  28.644    -14.6  146   0.00    9.07

         ----------------------- AvgRF   CCRF      % Dev   -------------
68 t  4-Nitroaniline             0.308   0.248     19.5  131   0.00    9.31
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M719-CC703
Lab FileID: 3M16326.D

```
 69 I   Phenanthrene-d10              1.000    1.000        0.0  124    0.00    10.50

        ----------------------- True     Calc.     % Drift  ------------
 70 t   4,6-Dinitro-2-methylpheno  25.000   29.768      -19.1  134    0.00     9.31

        ----------------------- AvgRF    CCRF      % Dev    -------------
 71 t   n-Nitrosodiphenylamine        0.534    0.518        3.0  134    0.00     9.30
 72 t   1,2-Diphenylhydrazine         0.979    0.863       11.8  114    0.00     9.31
 73 S   2,4,6-Tribromophenol          0.097    0.110      -13.4  153    0.00     9.48
 74 t   4-Bromophenyl-phenylether     0.200    0.202       -1.0  144    0.00     9.83
 75 t   Hexachlorobenzene             0.229    0.226        1.3  141    0.00    10.02

        ----------------------- True     Calc.     % Drift  ------------
 76 t   Pentachlorophenol          50.000   54.526       -9.1  139    0.00    10.39
 77 t   Phenanthrene               25.000   25.428       -1.7  135    0.00    10.53
 78 t   Anthracene                 25.000   25.871       -3.5  137    0.00    10.60

        ----------------------- AvgRF    CCRF      % Dev    -------------
 79 t   Carbazole                     0.868    0.852        1.8  139    0.00    10.95
 80 t   Di-n-butylphthalate           1.238    1.253       -1.2  133    0.00    11.62
 81 t   Fluoranthene                  1.114    1.062        4.7  138    0.00    12.34
 82 t   Octadecane                    0.461    0.436        5.4  120    0.00    10.48

 83 I   Chrysene-d12                  1.000    1.000        0.0  136    0.00    14.28
 84 t   Pyrene                        1.101    0.995        9.6  139    0.00    12.64
 85     Butyl stearate                0.346    0.308       11.0  124    0.00    13.74
 86 S   Terphenyl-d14                 0.786    0.744        5.3  151    0.00    12.93
 87 t   Butylbenzylphthalate          0.489    0.504       -3.1  139    0.00    13.67
 88 t   Benzo[a]anthracene            0.926    0.941       -1.6  145    0.00    14.25
 89 t   3,3'-Dichlorobenzidine        0.341    0.352       -3.2  158    0.00    14.29
 90 t   Chrysene                      0.999    0.961        3.8  151    0.00    14.31
 91 t   bis(2-Ethylhexyl)phthalat     0.658    0.738      -12.2  152    0.00    14.45

 92 I   Perylene-d12                  1.000    1.000        0.0  158    0.00    15.94

        ----------------------- True     Calc.     % Drift  ------------
 93 t   Di-n-octylphthalate        25.000   22.560        9.8  161    0.00    15.17
 94 t   Benzo[b]fluoranthene       25.000   28.663      -14.7  165    0.00    15.55
 95 t   Benzo[k]fluoranthene       25.000   22.714        9.1  147    0.00    15.57
 96 t   Benzo[a]pyrene             25.000   24.972        0.1  162    0.00    15.89
 97 t   Indeno[1,2,3-cd]pyrene     25.000   27.540      -10.2  177    0.00    17.02
 98 t   Dibenz(a,h)acridine        25.000   28.643      -14.6  185    0.00    16.78
 99 t   Dibenz[a,h]anthracene      25.000   27.750      -11.0  188    0.00    17.03
100 t   7,12-Dimethylbenz(a)anthr  25.000   23.347        6.6  146    0.00    15.54

        ----------------------- AvgRF    CCRF      % Dev    -------------
101 t   Benzo[g,h,i]perylene          0.979    1.052       -7.5  188    0.00    17.29
 ------------------------------------------------------------------------
 ------------------------------------------------------------------------

    (#) = Out of Range            SPCC's out = 0   CCC's out = 0
     3m15987a.D M3M703HQ.M      Tue Dec 29 13:26:14 2009    MS3M
```

Continuing Calibration Summary

Page 1 of 1

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: E3M719-CC667
Lab FileID: 3M16327.D

```
                   Evaluate Continuing Calibration Report

 Data File : C:\msdchem\1\DATA\e3m719\3m16327.D           Vial: 3
 Acq On    : 28 Dec 2009  11:10 pm                    Operator: larisap
 Sample    : cc667-25                                 Inst    : MS3M
 Misc      : op41506,E3M719,                          Multiplr: 1.00
 MS Integration Params: lscint.p

 Method        : C:\MSDCHEM\1\METHODS\M3M703HQ.M (RTE Integrator)
 Title         : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
 Last Update   : Tue Dec 29 13:26:53 2009
 Response via  : Multiple Level Calibration

 Min. RRF      :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
 Max. RRF Dev :  20%      Max. Rel. Area : 202%

            Compound                  AvgRF    CCRF      %Dev Area%  Dev(min)R.T.
 -------------------------------------------------------------------------------
102     1,4-Dichlorobenzene-d4a      1.000    1.000      0.0    65   0.00     3.77
103     Benzaldehyde                 0.967    0.939      2.9    71   0.00     3.32

104     Phenanthrene-d10a            1.000    1.000      0.0    76   0.00    10.49
105     Atrazine                     0.105    0.126    -20.0#   92   0.00    10.26

106     Acenaphthene-d10a            1.000    1.000      0.0    74   0.00     8.17
107     1,2,4,5-Tetrachlorobenzen    0.509    0.579    -13.8    91   0.00     6.87

108     Chrysene-d12a                1.000    1.000      0.0    84   0.00    14.27
109     Benzidine                    0.604    0.264     56.3#   39#  0.00    12.69
 -------------------------------------------------------------------------
 -------------------------------------------------------------------------

     (#) = Out of Range              SPCC's out = 0  CCC's out = 0
      3m15987a.D M3M703HQ.M        Tue Dec 29 13:33:14 2009    MS3M
```

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3993-ICC3993
Lab FileID: F84455.D

```
                         Response Factor Report  MSF

  Method         : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
  Title          : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update    : Wed Nov 04 07:59:35 2009
  Response via   : Initial Calibration

  Calibration Files
  2   =F84461.D    5   =F84460.D    25   =F84458.D    80   =F84457.D
  100 =F84456.D    50  =F84455.D    1    =F84462.D    10   =F84459.D

   Compound          2     5     25     80    100    50     1     10    Avg %RSD
  -----------------------------------------------------------------------------

  1) I   1,4-Dichlorobenzene-d ----------------ISTD---------------------
  2) 1,4-Dioxane  0.580 0.502 0.506 0.465 0.457 0.464 0.665 0.492 0.516  13.84
  3) Pyridine     1.240 1.330 1.348 1.384 1.369 1.243 1.581 1.447 1.368   8.08
  4) N-Nitrosodim 0.737 0.760 0.812 0.760 0.756 0.750 0.718 0.843 0.767   5.30
  5) 2-Fluorophen 1.188 1.222 1.323 1.338 1.321 1.262 1.050 1.354 1.257   8.15
  6) Indene       2.032 2.042 2.052 2.052 2.042 2.013 2.304 2.199 2.092   4.93
  7) Cumene       2.827 2.774 2.816 2.750 2.764 2.733 3.131 2.975 2.846   4.84
  8) Phenol-d5    1.683 1.701 1.618 1.648 1.638 1.591 1.720 1.861 1.682   5.00
  9) Phenol       1.700 1.695 1.739 1.708 1.680 1.678 1.724 1.875 1.725   3.71
 10) Aniline      1.766 1.850 1.533 1.514 1.490 1.416 2.081 1.901 1.694  14.10
 11) bis(2-Chloro 1.326 1.281 1.261 1.221 1.215 1.160 1.491 1.377 1.291   8.15
 12) 2-Chlorophen 1.406 1.442 1.433 1.393 1.379 1.393 1.541 1.540 1.441   4.53
 13) Decane       1.848 1.759 1.661 1.558 1.556 1.576 2.200 1.822 1.748  12.42
 14) 1,3-Dichloro 1.577 1.570 1.582 1.552 1.560 1.547 1.687 1.674 1.593   3.46
 15) 1,4-Dichloro 1.602 1.604 1.595 1.575 1.574 1.568 1.734 1.696 1.619   3.82
 16) Benzyl alcoh 0.808 0.814 0.879 0.876 0.874 0.828       0.932 0.859   5.19
 17) 1,2-Dichloro 1.485 1.497 1.518 1.478 1.480 1.482 1.596 1.606 1.518   3.49
 18) Acetophenone 1.726 1.736 1.730 1.748 1.750 1.720 1.851 1.870 1.766   3.35
 19) 2-Methylphen 1.104 1.217 1.229 1.219 1.223 1.196 1.069 1.332 1.199   6.75
 20) 2,2'-oxybis( 0.432 0.438 0.437 0.441 0.439 0.432 0.469 0.465 0.444   3.29
 21) 3&4-Methylph 1.121 1.251 1.329 1.336 1.338 1.283 1.024 1.398 1.260  10.01
 22) n-Nitroso-di 0.908 0.929 0.885 0.879 0.869 0.867 0.966 0.942 0.906   4.06
 23) Hexachloroet 0.497 0.502 0.526 0.523 0.516 0.528 0.532 0.549 0.521   3.20

 24) I   Naphthalene-d8        ----------------ISTD---------------------
 25) Nitrobenzene 0.396 0.373 0.381 0.386 0.391 0.381 0.410 0.415 0.392   3.76
 26) Nitrobenzene 0.177 0.178 0.186 0.186 0.189 0.186 0.172 0.197 0.184   4.38
 27) Quinoline    0.616 0.659 0.687 0.702 0.710 0.693 0.669 0.721 0.682   4.92
 28) Isophorone   0.665 0.645 0.643 0.618 0.614 0.627 0.709 0.700 0.653   5.53
 29) 2-Nitropheno 0.179 0.191 0.213 0.213 0.216 0.211 0.179 0.218 0.202   8.27
 30) 2,4-Dimethyl       0.257 0.307 0.348 0.354 0.323       0.297 0.314  11.36
 31) Benzoic acid 0.078 0.177 0.284 0.305       0.255       0.247 0.224  37.45
           ----- Linear regression -----  Coefficient =  0.9915
             Response Ratio = -0.01756 + 0.30241 *A

 32) bis(2-Chloro 0.361 0.379 0.388 0.388 0.393 0.385 0.403 0.413 0.389   3.96
 33) 2,4-Dichloro 0.272 0.293 0.322 0.323 0.327 0.320 0.231 0.330 0.302  11.62
 34) 2,6-Dichloro 0.294 0.292 0.317 0.317 0.322 0.318 0.306 0.327 0.312   4.13
 35) 1,3,5-Trichl 0.351 0.352 0.361 0.357 0.363 0.362 0.386 0.380 0.364   3.49
 36) 1,2,4-Trichl 0.330 0.335 0.335 0.335 0.341 0.340 0.351 0.357 0.341   2.72
 37) 1,2,3-Trichl 0.320 0.324 0.333 0.330 0.334 0.334 0.338 0.353 0.333   2.96
 38) Naphthalene  1.141 1.115 1.116 1.105 1.120 1.110 1.256 1.195 1.145   4.69
 39) 4-Chloroanil 0.422 0.441 0.434 0.425 0.426 0.425 0.422 0.483 0.435   4.74
 40) 2,3-Dichloro 0.339 0.349 0.368 0.368 0.376 0.372 0.348 0.380 0.363   4.17
 41) Caprolactam  0.306 0.231 0.186 0.185 0.192 0.177 0.336 0.203 0.227  26.85
           ----- Linear regression -----  Coefficient =  0.9981
```

7.7.8

7

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3993-ICC3993
Lab FileID: F84455.D

```
            Response Ratio = 0.00217 + 0.18649 *A

 42) Hexachlorobu 0.178 0.175 0.179 0.175 0.177 0.179 0.196 0.187 0.181   4.05
 43) 4-Chloro-3-m 0.216 0.261 0.298 0.298 0.306 0.302       0.304 0.283  11.88
 44) 2-Methylnaph 0.691 0.702 0.734 0.737 0.750 0.740 0.756 0.769 0.735   3.58
 45) 1-Methylnaph 0.726 0.735 0.724 0.727 0.739 0.730 0.799 0.791 0.746   4.08
 46) Dimethylnaph 0.600 0.613 0.644 0.647 0.655 0.649 0.649 0.675 0.642   3.71

 47) I   Acenaphthene-d10      ----------------ISTD--------------------
 48) Hexachlorocy 0.158 0.184 0.245 0.272 0.277 0.261 0.143 0.233 0.222  23.77
          ----- Linear regression -----  Coefficient =  0.9993
            Response Ratio = -0.02236 + 0.27800 *A

 49) 2,4,6-Trichl 0.334 0.345 0.375 0.376 0.377 0.376 0.310 0.395 0.361   7.85
 50) 2,4,5-Trichl 0.345 0.372 0.412 0.411 0.415 0.405       0.425 0.398   7.19
 51) 2-Fluorobiph 1.422 1.403 1.397 1.339 1.346 1.370 1.596 1.531 1.425   6.41
 52) 2-Chloronaph 1.167 1.142 1.157 1.127 1.135 1.140 1.248 1.258 1.172   4.42
 53) Biphenyl     1.530 1.492 1.508 1.445 1.454 1.482 1.617 1.636 1.521   4.66
 54) 2-Nitroanili 0.274 0.301 0.325 0.332 0.332 0.326       0.348 0.320   7.69
 55) Dimethylphth 1.222 1.238 1.259 1.229 1.252 1.232 1.380 1.358 1.271   4.87
 56) Acenaphthyle 1.844 1.838 1.895 1.869 1.867 1.855 2.057 2.034 1.907   4.58
 57) 2,6-Dinitrot 0.223 0.252 0.282 0.289 0.296 0.280 0.197 0.295 0.264  13.94
 58) 3-Nitroanili 0.255 0.279 0.323 0.330 0.339 0.321       0.335 0.312  10.27
 59) Acenaphthene 1.180 1.134 1.151 1.133 1.164 1.142 1.301 1.255 1.183   5.25
 60) 2,4-Dinitrop       0.064 0.136 0.173 0.183 0.154       0.109 0.136  32.46
          ----- Linear regression -----  Coefficient =  0.9960
            Response Ratio = -0.05120 + 0.18802 *A

 61) 4-Nitropheno       0.124 0.169 0.150 0.155 0.138       0.157 0.149  10.67
 62) Dibenzofuran 1.546 1.572 1.587 1.549 1.575 1.545 1.665 1.714 1.594   3.91
 63) 2,4-Dinitrot 0.297 0.324 0.391 0.398 0.409 0.392       0.385 0.371  11.47
 64) 2,3,4,6-Tetr 0.240 0.273 0.302 0.316 0.325 0.313       0.313 0.297  10.20
 65) Diethylphtha 1.441 1.375 1.313 1.233 1.251 1.326 1.728 1.442 1.389  11.35
 66) Fluorene     1.297 1.297 1.322 1.302 1.325 1.313 1.414 1.431 1.338   4.01
 67) 4-Chlorophen 0.553 0.568 0.581 0.568 0.579 0.575 0.568 0.615 0.576   3.16
 68) 4-Nitroanili 0.214 0.278 0.327 0.334 0.342 0.310       0.332 0.305  14.89

 69) I   Phenanthrene-d10      ----------------ISTD--------------------
 70) 4,6-Dinitro-       0.087 0.134 0.159 0.160 0.146       0.124 0.135  20.25
          ----- Linear regression -----  Coefficient =  0.9987
            Response Ratio = -0.01427 + 0.16483 *A

 71) n-Nitrosodip 0.565 0.581 0.578 0.560 0.571 0.575 0.587 0.629 0.581   3.65
 72) 1,2-Diphenyl 0.884 0.871 0.868 0.827 0.845 0.828 0.933 0.959 0.877   5.45
 73) 2,4,6-Tribro 0.086 0.100 0.108 0.109 0.113 0.110       0.113 0.105   9.24
 74) 4-Bromopheny 0.213 0.206 0.214 0.219 0.226 0.215 0.210 0.230 0.217   3.67
 75) Hexachlorobe 0.227 0.222 0.229 0.228 0.231 0.226 0.243 0.242 0.231   3.28
 76) Pentachlorop 0.090 0.107 0.143 0.153 0.159 0.149 0.071 0.134 0.126  25.83
          ----- Linear regression -----  Coefficient =  0.9992
            Response Ratio = -0.01232 + 0.15841 *A

 77) Phenanthrene 1.234 1.179 1.160 1.144 1.165 1.122 1.380 1.257 1.205   6.96
 78) Anthracene   1.200 1.203 1.178 1.154 1.176 1.129 1.349 1.294 1.210   6.12
 79) Carbazole    1.043 1.076 1.086 1.075 1.096 1.056 1.117 1.167 1.090   3.56
 80) Di-n-butylph 1.430 1.369 1.354 1.343 1.386 1.325 1.715 1.460 1.423   8.88
 81) Fluoranthene 1.190 1.178 1.199 1.197 1.231 1.184 1.311 1.279 1.221   4.01
 82) Octadecane   0.655 0.581 0.554 0.538 0.542 0.536 0.766 0.623 0.599  13.36

 83) I   Chrysene-d12          ----------------ISTD--------------------
 84) Pyrene       1.300 1.260 1.276 1.313 1.329 1.226 1.483 1.404 1.324   6.28
```

Initial Calibration Summary

Page 3 of 3

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3993-ICC3993
Lab FileID: F84455.D

```
 85) Terphenyl-d1 0.923 0.887 0.881 0.909 0.921 0.864 1.090 0.980 0.932    7.82
 86) Butylbenzylp 0.566 0.568 0.585 0.612 0.629 0.577 0.593 0.627 0.595    4.24
 87) Butyl steara 0.633 0.502 0.442 0.416 0.422 0.400       0.491 0.472   17.03
         ----- Linear regression -----   Coefficient =  0.9990
           Response Ratio = 0.01111 + 0.41205 *A

 88) Benzo[a]anth 1.159 1.107 1.118 1.157 1.174 1.091 1.320 1.213 1.167    6.27
 89) 3,3'-Dichlor 0.351 0.382 0.415 0.427 0.431 0.397 0.335 0.435 0.397    9.53
 90) Chrysene     1.125 1.103 1.071 1.082 1.089 1.036 1.289 1.169 1.120    7.01
 91) bis(2-Ethylh 0.822 0.782 0.799 0.843 0.854 0.792 0.895 0.875 0.833    4.91

 92) I   Perylene-d12           ----------------ISTD---------------------
 93) Di-n-octylph 1.329 1.390 1.502 1.542 1.600 1.479 1.314 1.620 1.472    7.97
 94) Benzo[b]fluo 1.079 1.107 1.170 1.398 1.343 1.154 1.138 1.283 1.209    9.68
 95) Benzo[k]fluo 1.286 1.266 1.288 0.995 1.089 1.200 1.448 1.457 1.253   12.75
 96) Benzo[a]pyre 1.097 1.063 1.128 1.133 1.165 1.083 1.134 1.258 1.133    5.31
 97) Indeno[1,2,3 0.838 0.963 1.005 1.099 1.151 1.024 1.080 1.052 1.026    9.35
 98) Dibenz(a,h)a 0.830 0.890 0.951 0.965 0.992 0.906 0.875 1.019 0.928    6.87
 99) Dibenz[a,h]a 0.994 1.003 1.047 1.024 1.058 0.995 1.020 1.137 1.035    4.60
100) 7,12-Dimethy 0.298 0.213 0.460 0.497 0.506 0.478 0.303 0.377 0.392   28.18
         ----- Linear regression -----   Coefficient =  0.9992
           Response Ratio = -0.02487 + 0.51106 *A

101) Benzo[g,h,i] 1.107 1.102 1.115 1.130 1.153 1.052 1.201 1.232 1.136    5.06

 ----------------------------------------------------------------------------
 (#) = Out of Range  ###  Number of calibration levels exceeded format  ###

        MF3993.M         Thu Nov 05 11:07:01 2009   GCMS3A
```

7.7.8

7

Initial Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3994-ICC3994
Lab FileID: F84464.D

```
                      Response Factor Report  MSF

  Method         : C:\MSDCHEM\1\METHODS\MF3994.M (RTE Integrator)
  Title          : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update    : Wed Nov 04 07:56:21 2009
  Response via   : Initial Calibration

  Calibration Files
  2   =F84470.D    5   =F84469.D    25   =F84467.D    80   =F84466.D
  100 =F84465.D    50  =F84464.D    1    =F84471.D    10   =F84468.D

   Compound          2      5      25     80     100    50     1      10     Avg  %RSD
 ------------------------------------------------------------------------------------
102) i   1,4-Dichlorobenzene-d ----------------ISTD----------------------
103) Benzaldehyde 0.870 1.002 0.854 0.926 0.870 0.851 0.951 1.104 0.929   9.55

104)     Acenaphthene-d10a     ----------------ISTD----------------------
105) 1,2,4,5-Tetr 0.450 0.547 0.510 0.548 0.532 0.577 0.515 0.586 0.533   8.03
106) Atrazine     0.246 0.298 0.311 0.305 0.302 0.345 0.247 0.339 0.299  12.29

107) i   Chrysene-d12a         ----------------ISTD----------------------
108) Benzidine          0.628 0.523 0.525 0.474 0.649       0.679 0.580  14.34
 ------------------------------------------------------------------------------------
 (#) = Out of Range  ###  Number of calibration levels exceeded format  ###

          MF3994.M          Wed Nov 04 12:32:51 2009    GCMS3A
```

Initial Calibration Verification

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Sample: EF3994-ICV3993
Lab FileID: F84472.D

```
                    Evaluate Continuing Calibration Report

  Data File : C:\MSDCHEM\1\DATA\EF3993\F84472.D            Vial: 18
  Acq On    :  3 Nov 2009  10:28 pm                    Operator: ninap
  Sample    : icv3993-50                               Inst     : MSF
  Misc      : op40617,ef3994,2nd source-bn-1,2         Multiplr: 1.00
  MS Integration Params: RTEINT.P

  Method        : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
  Title         : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update   : Wed Nov 04 07:59:35 2009
  Response via  : Multiple Level Calibration

  Min. RRF     :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  20%     Max. Rel. Area : 200%

         Compound                          AvgRF   CCRF      %Dev Area%  Dev(min)R.T.
  ---------------------------------------------------------------------------------------

   1 I   1,4-Dichlorobenzene-d4            1.000   1.000      0.0   74   0.00    3.96
   2 t   1,4-Dioxane                       0.516   0.564     -9.3   89   0.02    1.19
   3 t   Pyridine                          1.368   1.636    -19.6   97  -0.01    1.37
   4 t   N-Nitrosodimethylamine            0.767   0.907    -18.3   89   0.00    1.37
   5 S   2-Fluorophenol                            -----------NA----------
   6 t   Indene                            2.092   2.462    -17.7   90   0.00    4.42
   7 t   Cumene                            2.846   2.993     -5.2   81   0.00    2.90
   8 S   Phenol-d5                                 -----------NA----------
   9 t   Phenol                                    -----------NA----------
  10 t   Aniline                                   -----------NA----------
  11 t   bis(2-Chloroethyl)ether           1.291   1.400     -8.4   89   0.00    3.67
  12 t   2-Chlorophenol                            -----------NA----------
  13 t   Decane                            1.748   2.071    -18.5   97   0.00    3.81
  14 t   1,3-Dichlorobenzene               1.593   1.724     -8.2   82   0.00    3.90
  15 t   1,4-Dichlorobenzene               1.619   1.779     -9.9   84   0.00    3.99
  16 t   Benzyl alcohol                    0.859   0.949    -10.5   84  -0.06    4.32
  17 t   1,2-Dichlorobenzene               1.518   1.674    -10.3   83   0.00    4.29
  18 t   Acetophenone                      1.766   2.021    -14.4   87  -0.02    4.74
  19 t   2-Methylphenol                            -----------NA----------
  20 t   2,2'-oxybis(1-Chloropropa         0.444   0.476     -7.2   81  -0.01    4.57
  21 t   3&4-Methylphenol                          -----------NA----------
  22 t   n-Nitroso-di-n-propylamin         0.906   1.017    -12.3   86  -0.02    4.83
  23 t   Hexachloroethane                  0.521   0.564     -8.3   79   0.00    4.80

  24 I   Naphthalene-d8                    1.000   1.000      0.0   73   0.00    6.32
  25 S   Nitrobenzene-d5                           -----------NA----------
  26 t   Nitrobenzene                      0.184   0.202     -9.8   80  -0.01    5.03
  27 t   Quinoline                         0.682   0.792    -16.1   84  -0.04    7.11
  28 t   Isophorone                        0.653   0.691     -5.8   81  -0.02    5.50
  29 t   2-Nitrophenol                             -----------NA----------
  30 t   2,4-Dimethylphenol                        -----------NA----------

             ---------------------- True    Calc.   % Drift  ------------
  31 t   Benzoic acid                              -----------NA----------

             ---------------------- AvgRF   CCRF     % Dev   -------------
  32 t   bis(2-Chloroethoxy)methan         0.389   0.452    -16.2   86  -0.01    6.05
  33 t   2,4-Dichlorophenol                        -----------NA----------
  34     2,6-Dichlorophenol                        -----------NA----------
  35     1,3,5-Trichlorobenzene                    -----------NA----------
  36 t   1,2,4-Trichlorobenzene            0.341   0.378    -10.9   82   0.00    6.27
  37     1,2,3-Trichlorobenzene                    -----------NA----------
```

Initial Calibration Verification

Job Number: JA34700 **Sample:** EF3994-ICV3993
Account: AGMPAL Arcadis **Lab FileID:** F84472.D
Project: PSEG-Salem, Artificial Island, Salem, NJ

```
 38 t   Naphthalene                    1.145   1.227      -7.2   81   0.00      6.36
 39 t   4-Chloroaniline                       ----------NA----------
 40 t   2,3-Dichloroaniline            0.363   0.361       0.6   71   0.00      8.64

          ----------------------- True    Calc.    % Drift  ------------
 41 t   Caprolactam                   50.000  50.749      -1.5   79  -0.06      7.39

          ----------------------- AvgRF   CCRF      % Dev   -------------
 42 t   Hexachlorobutadiene            0.181   0.203     -12.2   83   0.00      6.81
 43 t   4-Chloro-3-methylphenol               ----------NA----------
 44 t   2-Methylnaphthalene            0.735   0.809     -10.1   80   0.00      7.87
 45 t   1-Methylnaphthalene            0.746   0.801      -7.4   80   0.00      8.09
 46 t   Dimethylnaphthalene            0.642   0.699      -8.9   79   0.00      9.30

 47 I   Acenaphthene-d10               1.000   1.000       0.0   69   0.00     10.22

          ----------------------- True    Calc.    % Drift  ------------
 48 t   Hexachlorocyclopentadiene    100.000 106.427      -6.4   75   0.00      8.40

          ----------------------- AvgRF   CCRF      % Dev   -------------
 49 t   2,4,6-Trichlorophenol                 ----------NA----------
 50 t   2,4,5-Trichlorophenol                 ----------NA----------
 51 S   2-Fluorobiphenyl                      ----------NA----------
 52 t   2-Chloronaphthalene            1.172   1.286      -9.7   78   0.00      8.93
 53 t   Biphenyl                       1.521   1.694     -11.4   79   0.00      8.98
 54 t   2-Nitroaniline                 0.320   0.367     -14.7   77  -0.02      9.39
 55 t   Dimethylphthalate              1.271   1.365      -7.4   76   0.00      9.96
 56 t   Acenaphthylene                 1.907   1.857       2.6   69   0.00      9.86
 57 t   2,6-Dinitrotoluene             0.264   0.301     -14.0   74   0.00     10.08
 58 t   3-Nitroaniline                 0.312   0.299       4.2   64  -0.03     10.37
 59 t   Acenaphthene                   1.183   1.256      -6.2   76   0.00     10.30

          ----------------------- True    Calc.    % Drift  ------------
 60 t   2,4-Dinitrophenol                     ----------NA----------

          ----------------------- AvgRF   CCRF      % Dev   -------------
 61 t   4-Nitrophenol                         ----------NA----------
 62 t   Dibenzofuran                   1.594   1.799     -12.9   80   0.00     10.68
 63 t   2,4-Dinitrotoluene             0.371   0.392      -5.7   69  -0.02     10.97
 64     2,3,4,6-Tetrachlorophenol             ----------NA----------
 65 t   Diethylphthalate               1.389   1.334       4.0   69   0.00     11.63
 66 t   Fluorene                       1.338   1.454      -8.7   76   0.00     11.47
 67 t   4-Chlorophenyl-phenylethe      0.576   0.641     -11.3   77   0.00     11.59
 68 t   4-Nitroaniline                 0.305   0.337     -10.5   75  -0.04     11.81

 69 I   Phenanthrene-d10               1.000   1.000       0.0   67   0.00     13.59

          ----------------------- True    Calc.    % Drift  ------------
 70 t   4,6-Dinitro-2-methylpheno             ----------NA----------

          ----------------------- AvgRF   CCRF      % Dev   -------------
 71 t   n-Nitrosodiphenylamine         0.581   0.645     -11.0   75   0.00     11.93
 72 t   1,2-Diphenylhydrazine          0.877   0.977     -11.4   79   0.00     11.94
 73 S   2,4,6-Tribromophenol                  ----------NA----------
 74 t   4-Bromophenyl-phenylether      0.217   0.238      -9.7   74   0.00     12.69
 75 t   Hexachlorobenzene              0.231   0.249      -7.8   74   0.00     12.92

          ----------------------- True    Calc.    % Drift  ------------
 76 t   Pentachlorophenol                     ----------NA----------
```

Initial Calibration Verification

Job Number: JA34700 **Sample:** EF3994-ICV3993
Account: AGMPAL Arcadis **Lab FileID:** F84472.D
Project: PSEG-Salem, Artificial Island, Salem, NJ

```
           ----------------------- AvgRF   CCRF     % Dev   -------------
 77 t  Phenanthrene               1.205   1.279     -6.1   76   0.00   13.64
 78 t  Anthracene                 1.210   1.309     -8.2   77   0.00   13.75
 79 t  Carbazole                  1.090   1.243    -14.0   79  -0.01   14.27
 80 t  Di-n-butylphthalate        1.423   1.463     -2.8   74   0.00   15.47
 81 t  Fluoranthene               1.221   1.271     -4.1   72   0.00   16.41
 82 t  Octadecane                 0.599   0.649     -8.3   81   0.00   13.82

 83 I  Chrysene-d12               1.000   1.000      0.0   63   0.00   19.54
 84 t  Pyrene                     1.324   1.393     -5.2   72   0.00   16.89
 85 S  Terphenyl-d14                      ----------NA----------
 86 t  Butylbenzylphthalate       0.595   0.640     -7.6   70   0.00   18.80

           ----------------------- True    Calc.   % Drift  ------------
 87    Butyl stearate                     ----------NA----------

           ----------------------- AvgRF   CCRF     % Dev   -------------
 88 t  Benzo[a]anthracene         1.167   1.172     -0.4   68   0.00   19.52
 89 t  3,3'-Dichlorobenzidine     0.397   0.341     14.1   54   0.00   19.63
 90 t  Chrysene                   1.120   1.189     -6.2   72   0.00   19.59
 91 t  bis(2-Ethylhexyl)phthalat  0.833   0.878     -5.4   70   0.00   20.05

 92 I  Perylene-d12               1.000   1.000      0.0   60   0.00   21.89
 93 t  Di-n-octylphthalate        1.472   1.657    -12.6   68   0.00   21.08
 94 t  Benzo[b]fluoranthene       1.209   1.283     -6.1   67   0.00   21.35
 95 t  Benzo[k]fluoranthene       1.253   1.413    -12.8   71   0.00   21.40
 96 t  Benzo[a]pyrene             1.133   1.248    -10.2   70   0.00   21.81
 97 t  Indeno[1,2,3-cd]pyrene     1.026   1.102     -7.4   65   0.00   23.29
 98 t  Dibenz(a,h)acridine        0.928   1.014     -9.3   68   0.00   23.04
 99 t  Dibenz[a,h]anthracene      1.035   1.139    -10.0   69   0.00   23.32

           ----------------------- True    Calc.   % Drift  ------------
100 t  7,12-Dimethylbenz(a)anthr 50.000  61.890    -23.8#  77   0.00   21.39

           ----------------------- AvgRF   CCRF     % Dev   -------------
101 t  Benzo[g,h,i]perylene       1.136   1.237     -8.9   71   0.00   23.58

102 i  1,4-Dichlorobenzene-d4A    1.000   1.000      0.0   57   0.00    3.96
103 t  Benzaldehyde                       ----------NA----------

104    Acenaphthene-d10a          1.000   1.000      0.0   60   0.00   10.22
105    1,2,4,5-Tetrachlorobenzen  0.533   0.644    -20.8#  67   0.00    8.34
106    Atrazine                   0.299   0.342    -14.4   59  -0.01   13.41
110 i  Chrysene-d12a              1.000   1.000      0.0   59   0.00   19.54
111 t  Benzidine                          ----------NA----------
 --------------------------------------------------------------------------
 --------------------------------------------------------------------------

    (#) = Out of Range            SPCC's out = 0  CCC's out = 0
     F84455.D    MF3993.M      Wed Nov 04 12:21:23 2009    GCMS3A
```

Initial Calibration Verification

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3994-ICV3993
Lab FileID: F84473.D

```
                    Evaluate Continuing Calibration Report

  Data File : C:\MSDCHEM\1\DATA\EF3993\F84473.D            Vial: 19
  Acq On    :  3 Nov 2009  11:00 pm                    Operator: ninap
  Sample    : icv3993-50                               Inst    : MSF
  Misc      : op40617,ef3994,2nd source-acid           Multiplr: 1.00
  MS Integration Params: RTEINT.P

  Method       : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
  Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update  : Wed Nov 04 07:59:35 2009
  Response via : Multiple Level Calibration

  Min. RRF     :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  20%     Max. Rel. Area : 200%

        Compound                      AvgRF   CCRF      %Dev Area%  Dev(min)R.T.
 -------------------------------------------------------------------------------
   1 I   1,4-Dichlorobenzene-d4        1.000   1.000      0.0   81   0.00    3.96
   9 t   Phenol                        1.725   1.532     11.2   74  -0.02    3.65
  12 t   2-Chlorophenol                1.441   1.330      7.7   78  -0.01    3.72
  19 t   2-Methylphenol                1.199   1.120      6.6   76  -0.02    4.62
  21 t   3&4-Methylphenol              1.260   1.183      6.1   75  -0.03    4.91

  24 I   Naphthalene-d8                1.000   1.000      0.0   81   0.00    6.32
  29 t   2-Nitrophenol                 0.202   0.186      7.9   72  -0.01    5.65
  30 t   2,4-Dimethylphenol            0.314   0.332     -5.7   84  -0.03    5.91

         ----------------------- True    Calc.   % Drift  ------------
  31 t   Benzoic acid                 50.000  42.394     15.2   77   0.00    6.40

         ----------------------- AvgRF   CCRF      % Dev  -------------
  33 t   2,4-Dichlorophenol            0.302   0.279      7.6   71  -0.04    6.18
  34     2,6-Dichlorophenol            0.312   0.283      9.3   72  -0.02    6.64
  43 t   4-Chloro-3-methylphenol       0.283   0.257      9.2   69  -0.04    7.90

  47 I   Acenaphthene-d10              1.000   1.000      0.0   75   0.00   10.22

  49 t   2,4,6-Trichlorophenol         0.361   0.335      7.2   67  -0.02    8.67
  50 t   2,4,5-Trichlorophenol         0.398   0.375      5.8   70  -0.04    8.78
  61 t   4-Nitrophenol                 0.149   0.140      6.0   76  -0.02   11.10
  64     2,3,4,6-Tetrachlorophenol     0.297   0.265     10.8   64  -0.02   11.18

  69 I   Phenanthrene-d10              1.000   1.000      0.0   72   0.00   13.59

         ----------------------- True    Calc.   % Drift  ------------
  70 t   4,6-Dinitro-2-methylpheno    50.000  41.460     17.1   55  -0.02   11.89

         ----------------------- AvgRF   CCRF      % Dev  -------------

         ----------------------- True    Calc.   % Drift  ------------
  76 t   Pentachlorophenol           100.000  83.156     16.8   60  -0.02   13.44

         ----------------------- AvgRF   CCRF      % Dev  -------------

  83 I   Chrysene-d12                  1.000   1.000      0.0   66  -0.01   19.53

  92 I   Perylene-d12                  1.000   1.000      0.0   65  -0.01   21.89

 102 i   1,4-Dichlorobenzene-d4A       1.000   1.000      0.0   63   0.00    3.96
```

Initial Calibration Verification

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Sample: EF3994-ICV3993
Lab FileID: F84473.D

```
104     Acenaphthene-d10a            1.000    1.000       0.0    65   0.00    10.22

110 i   Chrysene-d12a                1.000    1.000       0.0    62  -0.01    19.53
 -----------------------------------------------------------------------------
 -----------------------------------------------------------------------------

    (#) = Out of Range             SPCC's out = 0  CCC's out = 0
     F84455.D    MF3993.M         Wed Nov 04 12:22:39 2009    GCMS3A
```

Initial Calibration Verification

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3994-ICV3993
Lab FileID: F84474.D

```
                    Evaluate Continuing Calibration Report

Data File : C:\MSDCHEM\1\DATA\EF3993\F84474.D             Vial: 20
Acq On    :  3 Nov 2009  11:32 pm                      Operator: ninap
Sample    : icv3993-50                                 Inst    : MSF
Misc      : op40617,ef3994,3rd source                  Multiplr: 1.00
MS Integration Params: RTEINT.P

Method       : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
Last Update  : Wed Nov 04 07:59:35 2009
Response via : Multiple Level Calibration

Min. RRF     :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
Max. RRF Dev :  20%     Max. Rel. Area : 200%

       Compound                         AvgRF   CCRF      %Dev Area%  Dev(min)R.T.
-----------------------------------------------------------------------------------
  1 I   1,4-Dichlorobenzene-d4          1.000   1.000      0.0    94   0.00    3.96
 10 t   Aniline                         1.694   1.844     -8.9   122  -0.01    3.56

 24 I   Naphthalene-d8                  1.000   1.000      0.0    94   0.00    6.32

 39 t   4-Chloroaniline                 0.435   0.456     -4.8   101  -0.02    6.65

 47 I   Acenaphthene-d10                1.000   1.000      0.0    89   0.00   10.22


 69 I   Phenanthrene-d10                1.000   1.000      0.0    88   0.00   13.59


 83 I   Chrysene-d12                    1.000   1.000      0.0    84   0.00   19.54

 92 I   Perylene-d12                    1.000   1.000      0.0    83  -0.01   21.89

102 i   1,4-Dichlorobenzene-d4A         1.000   1.000      0.0    73   0.00    3.96
103 t   Benzaldehyde                    0.929   0.875      5.8    75   0.00    3.34

104     Acenaphthene-d10a               1.000   1.000      0.0    78   0.00   10.22

110 i   Chrysene-d12a                   1.000   1.000      0.0    79   0.00   19.54
111 t   Benzidine                       0.580   0.615     -6.0    75   0.00   16.94
 --------------------------------------------------------------------------
 --------------------------------------------------------------------------

   (#) = Out of Range              SPCC's out = 0  CCC's out = 0
    F84455.D    MF3993.M        Wed Nov 04 12:22:41 2009   GCMS3A
```

Initial Calibration Verification

Page 1 of 1

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF3996-ICV3993
Lab FileID: F84488.D

```
                     Evaluate Continuing Calibration Report

  Data File : C:\MSDCHEM\1\DATA\EF3996D\F84488.D           Vial: 5
  Acq On    :  4 Nov 2009  10:16 am                     Operator: ninap
  Sample    : icv3993-50                                Inst    : MSF
  Misc      : op40617,ef3996,2,4 dinitrophenol          Multiplr: 1.00
  MS Integration Params: RTEINT.P

  Method       : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
  Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update  : Wed Nov 04 07:59:35 2009
  Response via : Multiple Level Calibration

  Min. RRF     :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  20%     Max. Rel. Area : 200%

         Compound                         AvgRF    CCRF       %Dev Area%  Dev(min)R.T.
 -------------------------------------------------------------------------------------
  1 I   1,4-Dichlorobenzene-d4           1.000    1.000        0.0   78   0.00     3.96

 24 I   Naphthalene-d8                   1.000    1.000        0.0   79   0.00     6.32

 47 I   Acenaphthene-d10                 1.000    1.000        0.0   73  -0.01    10.22


            ----------------------- True     Calc.    % Drift  ------------
 60 t   2,4-Dinitrophenol              100.000   85.912      14.1   56  -0.03    10.62
            ----------------------- AvgRF    CCRF      % Dev   -------------

 69 I   Phenanthrene-d10                 1.000    1.000        0.0   71  -0.01    13.58


 83 I   Chrysene-d12                     1.000    1.000        0.0   63  -0.02    19.53

 92 I   Perylene-d12                     1.000    1.000        0.0   60  -0.02    21.88

102 i   1,4-Dichlorobenzene-d4A          1.000    1.000        0.0   60   0.00     3.96

104     Acenaphthene-d10a                1.000    1.000        0.0   64  -0.01    10.22

107 i   Chrysene-d12a                    1.000    1.000        0.0   59  -0.02    19.53
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------

    (#) = Out of Range              SPCC's out = 0  CCC's out = 0
     F84455.D    MF3993.M         Mon Nov 09 11:57:51 2009   GCMS3A
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4036-CC3993
Lab FileID: F85419.D

```
                    Evaluate Continuing Calibration Report

  Data File : C:\MSDCHEM\1\DATA\EF4036\F85419.D              Vial: 2
  Acq On    : 11 Dec 2009   8:27 am                      Operator: ninap
  Sample    : cc3993-25                                  Inst    : MSF
  Misc      : op41214,ef4036,1000,,,1,1                  Multiplr: 1.00
  MS Integration Params: RTEINT.P

  Method         : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
  Title          : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update    : Thu Dec 03 14:55:43 2009
  Response via   : Multiple Level Calibration

  Min. RRF      :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev  :  20%     Max. Rel. Area : 200%

         Compound                         AvgRF    CCRF      %Dev Area%  Dev(min)R.T.
  -------------------------------------------------------------------------------
  1 I   1,4-Dichlorobenzene-d4           1.000    1.000       0.0   64  -0.05     3.49
  2 t   1,4-Dioxane                      0.516    0.459      11.0   58  -0.02     0.97
  3 t   Pyridine                         1.368    1.294       5.4   61  -0.02     1.14
  4 t   N-Nitrosodimethylamine           0.767    0.751       2.1   59  -0.02     1.14
  5 S   2-Fluorophenol                   1.257    1.245       1.0   60  -0.03     2.13
  6 t   Indene                           2.092    2.077       0.7   65  -0.04     3.93
  7 t   Cumene                           2.846    2.976      -4.6   68  -0.03     2.49
  8 S   Phenol-d5                        1.682    1.841      -9.5   73  -0.05     3.31
  9 t   Phenol                           1.725    1.675       2.9   62  -0.05     3.33
 10 t   Aniline                          1.694    1.351      20.2#  56  -0.03     3.16
 11 t   bis(2-Chloroethyl)ether          1.291    1.332      -3.2   68  -0.03     3.24
 12 t   2-Chlorophenol                   1.441    1.434       0.5   64  -0.04     3.31
 13 t   Decane                           1.748    2.655     -51.9# 102  -0.04     3.34
 14 t   1,3-Dichlorobenzene              1.593    1.578       0.9   64  -0.04     3.43
 15 t   1,4-Dichlorobenzene              1.619    1.599       1.2   64  -0.04     3.51
 16 t   Benzyl alcohol                   0.859    0.813       5.4   59  -0.03     3.92
 17 t   1,2-Dichlorobenzene              1.518    1.503       1.0   63  -0.04     3.80
 18 t   Acetophenone                     1.766    1.844      -4.4   68  -0.03     4.28
 19 t   2-Methylphenol                   1.199    1.238      -3.3   64  -0.04     4.24
 20 t   2,2'-oxybis(1-Chloropropa        0.444    0.429       3.4   63  -0.04     4.09
 21 t   3&4-Methylphenol                 1.260    1.331      -5.6   64  -0.03     4.56
 22 t   n-Nitroso-di-n-propylamin        0.906    1.027     -13.4   74  -0.05     4.35
 23 t   Hexachloroethane                 0.521    0.548      -5.2   67  -0.05     4.27

 24 I   Naphthalene-d8                   1.000    1.000       0.0   65  -0.06     5.76
 25 S   Nitrobenzene-d5                  0.392    0.447     -14.0   76  -0.04     4.51
 26 t   Nitrobenzene                     0.184    0.181       1.6   63  -0.03     4.55
 27 t   Quinoline                        0.682    0.696      -2.1   65  -0.05     6.62
 28 t   Isophorone                       0.653    0.722     -10.6   72  -0.05     4.99
 29 t   2-Nitrophenol                    0.202    0.199       1.5   60  -0.03     5.17
 30 t   2,4-Dimethylphenol               0.314    0.327      -4.1   69  -0.03     5.49

            ----------------------- True     Calc.    % Drift  ------------
 31 t   Benzoic acid                    25.000   23.685      5.3   59  -0.04     6.04

            ----------------------- AvgRF    CCRF      % Dev   -------------
 32 t   bis(2-Chloroethoxy)methan        0.389    0.397      -2.1   66  -0.04     5.54
 33 t   2,4-Dichlorophenol               0.302    0.305      -1.0   61  -0.02     5.78
 34     2,6-Dichlorophenol               0.312    0.321      -2.9   65  -0.04     6.15
 35     1,3,5-Trichlorobenzene           0.364    0.348       4.4   62  -0.05     5.10
 36 t   1,2,4-Trichlorobenzene           0.341    0.343      -0.6   66  -0.05     5.72
 37     1,2,3-Trichlorobenzene           0.333    0.328       1.5   64  -0.05     6.21
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4036-CC3993
Lab FileID: F85419.D

```
 38 t   Naphthalene                   1.145   1.141      0.3   66  -0.06     5.80
 39 t   4-Chloroaniline               0.435   0.415      4.6   62  -0.02     6.19
 40 t   2,3-Dichloroaniline           0.363   0.372     -2.5   65  -0.05     8.09

        -----------------------  True    Calc.    % Drift  ------------
 41 t   Caprolactam                  25.000  29.451    -17.8   77  -0.16     6.97

        -----------------------  AvgRF    CCRF     % Dev   -------------
 42 t   Hexachlorobutadiene           0.181   0.194     -7.2   70  -0.06     6.23
 43 t   4-Chloro-3-methylphenol       0.283   0.331    -17.0   72   0.00     7.54
 44 t   2-Methylnaphthalene           0.735   0.736     -0.1   65  -0.06     7.29
 45 t   1-Methylnaphthalene           0.746   1.006    -34.9#  90  -0.06     7.51
 46 t   Dimethylnaphthalene           0.642   0.652     -1.6   65  -0.06     8.71

 47 I   Acenaphthene-d10              1.000   1.000      0.0   66  -0.06     9.61

        -----------------------  True    Calc.    % Drift  ------------
 48 t   Hexachlorocyclopentadiene    50.000  50.091     -0.2   71  -0.06     7.80

        -----------------------  AvgRF    CCRF     % Dev   -------------
 49 t   2,4,6-Trichlorophenol         0.361   0.368     -1.9   65  -0.04     8.18
 50 t   2,4,5-Trichlorophenol         0.398   0.407     -2.3   65   0.00     8.40
 51 S   2-Fluorobiphenyl              1.425   1.395      2.1   66  -0.06     8.23
 52 t   2-Chloronaphthalene           1.172   1.163      0.8   67  -0.06     8.34
 53 t   Biphenyl                      1.521   1.481      2.6   65  -0.06     8.40
 54 t   2-Nitroaniline                0.320   0.443    -38.4#  90  -0.03     8.91
 55 t   Dimethylphthalate             1.271   1.293     -1.7   68  -0.06     9.40
 56 t   Acenaphthylene                1.907   1.843      3.4   64  -0.06     9.25
 57 t   2,6-Dinitrotoluene            0.264   0.215     18.6   51  -0.04     9.55
 58 t   3-Nitroaniline                0.312   0.336     -7.7   69  -0.02     9.92
 59 t   Acenaphthene                  1.183   1.142      3.5   66  -0.06     9.68

        -----------------------  True    Calc.    % Drift  ------------
 60 t   2,4-Dinitrophenol            50.000  47.511      5.0   67   0.01    10.21

        -----------------------  AvgRF    CCRF     % Dev   -------------
 61 t   4-Nitrophenol                 0.149   0.177    -18.8   69   0.02    10.97
 62 t   Dibenzofuran                  1.594   1.574      1.3   66  -0.06    10.08
 63 t   2,4-Dinitrotoluene            0.371   0.410    -10.5   70  -0.03    10.48
 64     2,3,4,6-Tetrachlorophenol     0.297   0.302     -1.7   66  -0.04    10.66
 65 t   Diethylphthalate              1.389   1.343      3.3   68  -0.06    11.04
 66 t   Fluorene                      1.338   1.343     -0.4   67  -0.07    10.85
 67 t   4-Chlorophenyl-phenylethe     0.576   0.590     -2.4   67  -0.06    10.98
 68 t   4-Nitroaniline                0.305   0.306     -0.3   62  -0.02    11.38

 69 I   Phenanthrene-d10              1.000   1.000      0.0   69  -0.07    12.96

        -----------------------  True    Calc.    % Drift  ------------
 70 t   4,6-Dinitro-2-methylpheno    25.000  23.094      7.6   66  -0.04    11.40

        -----------------------  AvgRF    CCRF     % Dev   -------------
 71 t   n-Nitrosodiphenylamine        0.581   0.553      4.8   66  -0.06    11.35
 72 t   1,2-Diphenylhydrazine         0.877   1.028    -17.2   81  -0.06    11.33
 73 S   2,4,6-Tribromophenol          0.105   0.111     -5.7   71  -0.05    11.53
 74 t   4-Bromophenyl-phenylether     0.217   0.221     -1.8   71  -0.07    12.06
 75 t   Hexachlorobenzene             0.231   0.232     -0.4   70  -0.07    12.29

        -----------------------  True    Calc.    % Drift  ------------
 76 t   Pentachlorophenol            50.000  48.745      2.5   70  -0.07    12.89
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Sample: EF4036-CC3993
Lab FileID: F85419.D

```
               ----------------------- AvgRF   CCRF    % Dev   -------------
 77 t   Phenanthrene                   1.205   1.137     5.6   67  -0.07   13.01
 78 t   Anthracene                     1.210   1.149     5.0   67  -0.07   13.12
 79 t   Carbazole                      1.090   1.036     5.0   66  -0.04   13.72
 80 t   Di-n-butylphthalate            1.423   1.402     1.5   71  -0.07   14.85
 81 t   Fluoranthene                   1.221   1.165     4.6   67  -0.07   15.77
 82 t   Octadecane                     0.599   0.780   -30.2#  97  -0.07   13.20

 83 I   Chrysene-d12                   1.000   1.000     0.0   67  -0.07   18.99
 84 t   Pyrene                         1.324   1.281     3.2   67  -0.07   16.24
 85 S   Terphenyl-d14                  0.932   0.911     2.3   69  -0.07   16.86
 86 t   Butylbenzylphthalate           0.595   0.624    -4.9   72  -0.07   18.22

               ----------------------- True    Calc.   % Drift ------------
 87     Butyl stearate                25.000  33.548   -34.2#  87  -0.08   18.47

               ----------------------- AvgRF   CCRF    % Dev   -------------
 88 t   Benzo[a]anthracene             1.167   1.096     6.1   66  -0.07   18.95
 89 t   3,3'-Dichlorobenzidine         0.397   0.376     5.3   61  -0.05   19.14
 90 t   Chrysene                       1.120   1.055     5.8   66  -0.07   19.03
 91 t   bis(2-Ethylhexyl)phthalat      0.833   0.829     0.5   70  -0.07   19.51

 92 I   Perylene-d12                   1.000   1.000     0.0   63  -0.07   21.40
 93 t   Di-n-octylphthalate            1.472   1.665   -13.1   70  -0.07   20.56
 94 t   Benzo[b]fluoranthene           1.209   1.063    12.1   57  -0.07   20.85
 95 t   Benzo[k]fluoranthene           1.253   1.387   -10.7   68  -0.06   20.88
 96 t   Benzo[a]pyrene                 1.133   1.142    -0.8   64  -0.07   21.30
 97 t   Indeno[1,2,3-cd]pyrene         1.026   1.216   -18.5   76  -0.17   22.81
 98 t   Dibenz(a,h)acridine            0.928   0.908     2.2   60  -0.14   22.56
 99 t   Dibenz[a,h]anthracene          1.035   1.003     3.1   60  -0.17   22.83

               ----------------------- True    Calc.   % Drift ------------
100 t   7,12-Dimethylbenz(a)anthr     25.000  21.937    12.3   56  -0.08   20.85

               ----------------------- AvgRF   CCRF    % Dev   -------------
101 t   Benzo[g,h,i]perylene           1.136   1.099     3.3   62  -0.19   23.10

  -------------------------------------------------------------------------
  -------------------------------------------------------------------------

    (#) = Out of Range              SPCC's out = 0  CCC's out = 0
     F85213.D   MF3993.M        Fri Dec 11 13:00:25 2009    GCMS3A
```

Continuing Calibration Summary

Page 1 of 1

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ
Sample: EF4036-CC3994
Lab FileID: F85420.D

```
                    Evaluate Continuing Calibration Report

Data File : C:\MSDCHEM\1\DATA\EF4036\F85420.D            Vial: 3
Acq On    : 11 Dec 2009   9:07 am                     Operator: ninap
Sample    : cc3994-25                                 Inst    : MSF
Misc      : op41214,ef4036,1000,,,1,1                 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method       : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
Last Update  : Thu Dec 03 14:55:43 2009
Response via : Multiple Level Calibration

Min. RRF     :    0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
Max. RRF Dev :   20%     Max. Rel. Area : 200%

       Compound                          AvgRF   CCRF     %Dev Area%  Dev(min)R.T.
  -----------------------------------------------------------------------------
102 i  1,4-Dichlorobenzene-d4A           1.000   1.000     0.0    76  -0.04    3.49
103 t  Benzaldehyde                      0.929   0.865     6.9    77  -0.02    2.95

104    Acenaphthene-d10a                 1.000   1.000     0.0    82  -0.07    9.61
105    1,2,4,5-Tetrachlorobenzen         0.533   0.516     3.2    83  -0.05    7.76
106    Atrazine                          0.299   0.325    -8.7    86  -0.09   12.83

107 i  Chrysene-d12a                     1.000   1.000     0.0    87  -0.07   18.98
108 t  Benzidine                         0.580   0.423    27.1#   70  -0.10   16.42
 --------------------------------------------------------------------------
 --------------------------------------------------------------------------

   (#) = Out of Range               SPCC's out = 0  CCC's out = 0
    F85213.D    MF3993.M        Fri Dec 11 13:02:58 2009   GCMS3A
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4044-CC3993
Lab FileID: F85645.D

```
                    Evaluate Continuing Calibration Report

  Data File : C:\MSDCHEM\1\DATA\EF4044\F85645.D           Vial: 2
  Acq On    : 23 Dec 2009   8:10 am                   Operator: ninap
  Sample    : cc3993-50                               Inst    : MSF
  Misc      : op41442,ef4044,1000,,,1,1               Multiplr: 1.00
  MS Integration Params: RTEINT.P

  Method         : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
  Title          : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update    : Thu Dec 03 14:55:43 2009
  Response via   : Multiple Level Calibration

  Min. RRF      :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  20%     Max. Rel. Area : 200%

          Compound                          AvgRF    CCRF       %Dev Area%  Dev(min) R.T.
  ------------------------------------------------------------------------------------------
  1 I    1,4-Dichlorobenzene-d4             1.000    1.000       0.0  106  -0.09     3.45
  2 t    1,4-Dioxane                        0.516    0.564      -9.3  128  -0.04     0.95
  3 t    Pyridine                           1.368    1.547     -13.1  132  -0.05     1.11
  4 t    N-Nitrosodimethylamine             0.767    0.949     -23.7# 134  -0.05     1.11
  5 S    2-Fluorophenol                     1.257    1.243       1.1  104  -0.09     2.07
  6 t    Indene                             2.092    1.984       5.2  104  -0.09     3.89
  7 t    Cumene                             2.846    2.900      -1.9  112  -0.07     2.45
  8 S    Phenol-d5                          1.682    1.817      -8.0  121  -0.13     3.23
  9 t    Phenol                             1.725    1.822      -5.6  115  -0.13     3.25
 10 t    Aniline                            1.694    1.655       2.3  124  -0.09     3.10
 11 t    bis(2-Chloroethyl)ether            1.291    1.424     -10.3  130  -0.08     3.19
 12 t    2-Chlorophenol                     1.441    1.392       3.4  106  -0.10     3.25
 13 t    Decane                             1.748    1.560      10.8  105  -0.09     3.30
 14 t    1,3-Dichlorobenzene                1.593    1.531       3.9  105  -0.09     3.39
 15 t    1,4-Dichlorobenzene                1.619    1.570       3.0  106  -0.09     3.47
 16 t    Benzyl alcohol                     0.859    0.895      -4.2  114  -0.08     3.86
 17 t    1,2-Dichlorobenzene                1.518    1.509       0.6  108  -0.09     3.76
 18 t    Acetophenone                       1.766    1.794      -1.6  110  -0.07     4.24
 19 t    2-Methylphenol                     1.199    1.251      -4.3  111  -0.10     4.17
 20 t    2,2'-oxybis(1-Chloropropa          0.444    0.443       0.2  108  -0.09     4.04
 21 t    3&4-Methylphenol                   1.260    1.369      -8.7  113  -0.11     4.48
 22 t    n-Nitroso-di-n-propylamin          0.906    1.073     -18.4  131  -0.09     4.32
 23 t    Hexachloroethane                   0.521    0.579     -11.1  116  -0.10     4.22

 24 I    Naphthalene-d8                     1.000    1.000       0.0  109  -0.10     5.72
 25 S    Nitrobenzene-d5                    0.392    0.438     -11.7  126  -0.09     4.47
 26 t    Nitrobenzene                       0.184    0.183       0.5  108  -0.08     4.50
 27 t    Quinoline                          0.682    0.653       4.3  103  -0.08     6.59
 28 t    Isophorone                         0.653    0.733     -12.3  128  -0.09     4.96
 29 t    2-Nitrophenol                      0.202    0.209      -3.5  108  -0.08     5.11
 30 t    2,4-Dimethylphenol                 0.314    0.348     -10.8  118  -0.11     5.41

         ----------------------- True     Calc.     % Drift   ------------
 31 t    Benzoic acid                      50.000   43.928      12.1  108   0.00     6.07

         ----------------------- AvgRF    CCRF       % Dev    -------------
 32 t    bis(2-Chloroethoxy)methan          0.389    0.419      -7.7  119  -0.10     5.49
 33 t    2,4-Dichlorophenol                 0.302    0.299       1.0  102  -0.09     5.71
 34      2,6-Dichlorophenol                 0.312    0.313      -0.3  108  -0.10     6.08
 35      1,3,5-Trichlorobenzene             0.364    0.359       1.4  108  -0.10     5.06
 36 t    1,2,4-Trichlorobenzene             0.341    0.346      -1.5  111  -0.10     5.68
 37      1,2,3-Trichlorobenzene             0.333    0.332       0.3  109  -0.10     6.16
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4044-CC3993
Lab FileID: F85645.D

```
 38 t   Naphthalene                1.145    1.101       3.8  109  -0.11     5.75
 39 t   4-Chloroaniline            0.435    0.431       0.9  111  -0.09     6.13
 40 t   2,3-Dichloroaniline        0.363    0.358       1.4  105  -0.11     8.03

        ----------------------- True     Calc.    % Drift  ------------
 41 t   Caprolactam               50.000   48.553       2.9  113  -0.15     6.98

        ----------------------- AvgRF    CCRF      % Dev   -------------
 42 t   Hexachlorobutadiene        0.181    0.216     -19.3  132  -0.11     6.19
 43 t   4-Chloro-3-methylphenol    0.283    0.319     -12.7  115  -0.10     7.45
 44 t   2-Methylnaphthalene        0.735    0.757      -3.0  112  -0.11     7.24
 45 t   1-Methylnaphthalene        0.746    0.958     -28.4# 144  -0.11     7.46
 46 t   Dimethylnaphthalene        0.642    0.645      -0.5  109  -0.11     8.66

 47 I   Acenaphthene-d10           1.000    1.000       0.0  109  -0.11     9.56

        ----------------------- True     Calc.    % Drift  ------------
 48 t   Hexachlorocyclopentadiene 100.000 113.141     -13.1  128  -0.11     7.75

        ----------------------- AvgRF    CCRF      % Dev   -------------
 49 t   2,4,6-Trichlorophenol      0.361    0.383      -6.1  111  -0.10     8.12
 50 t   2,4,5-Trichlorophenol      0.398    0.414      -4.0  112  -0.09     8.32
 51 S   2-Fluorobiphenyl           1.425    1.405       1.4  112  -0.11     8.19
 52 t   2-Chloronaphthalene        1.172    1.187      -1.3  114  -0.11     8.30
 53 t   Biphenyl                   1.521    1.473       3.2  109  -0.11     8.35
 54 t   2-Nitroaniline             0.320    0.393     -22.8# 132  -0.09     8.85
 55 t   Dimethylphthalate          1.271    1.292      -1.7  115  -0.10     9.36
 56 t   Acenaphthylene             1.907    1.859       2.5  110  -0.11     9.20
 57 t   2,6-Dinitrotoluene         0.264    0.221      16.3   86  -0.09     9.50
 58 t   3-Nitroaniline             0.312    0.312       0.0  106  -0.09     9.85
 59 t   Acenaphthene               1.183    1.164       1.6  111  -0.11     9.63

        ----------------------- True     Calc.    % Drift  ------------
 60 t   2,4-Dinitrophenol         100.000 103.116      -3.1  123  -0.07    10.13

        ----------------------- AvgRF    CCRF      % Dev   -------------
 61 t   4-Nitrophenol              0.149    0.131      12.1  104  -0.20    10.75
 62 t   Dibenzofuran               1.594    1.668      -4.6  118  -0.11    10.03
 63 t   2,4-Dinitrotoluene         0.371    0.420     -13.2  117  -0.08    10.43
 64     2,3,4,6-Tetrachlorophenol  0.297    0.341     -14.8  119  -0.12    10.58
 65 t   Diethylphthalate           1.389    1.270       8.6  105  -0.11    11.00
 66 t   Fluorene                   1.338    1.349      -0.8  112  -0.12    10.80
 67 t   4-Chlorophenyl-phenylethe  0.576    0.666     -15.6  127  -0.11    10.93
 68 t   4-Nitroaniline             0.305    0.294       3.6  104  -0.07    11.33

 69 I   Phenanthrene-d10           1.000    1.000       0.0  117  -0.12    12.91

        ----------------------- True     Calc.    % Drift  ------------
 70 t   4,6-Dinitro-2-methylpheno 50.000   48.454       3.1  119  -0.09    11.35

        ----------------------- AvgRF    CCRF      % Dev   -------------
 71 t   n-Nitrosodiphenylamine     0.581    0.584      -0.5  119  -0.12    11.29
 72 t   1,2-Diphenylhydrazine      0.877    0.888      -1.3  125  -0.12    11.28
 73 S   2,4,6-Tribromophenol       0.105    0.122     -16.2  130  -0.12    11.47
 74 t   4-Bromophenyl-phenylether  0.217    0.246     -13.4  133  -0.12    12.01
 75 t   Hexachlorobenzene          0.231    0.273     -18.2  142  -0.12    12.24

        ----------------------- True     Calc.    % Drift  ------------
 76 t   Pentachlorophenol         100.000 100.435      -0.4  121  -0.14    12.83
```

Continuing Calibration Summary

Job Number: JA34700 **Sample:** EF4044-CC3993
Account: AGMPAL Arcadis **Lab FileID:** F85645.D
Project: PSEG-Salem, Artificial Island, Salem, NJ

```
                ----------------------- AvgRF   CCRF     % Dev   -------------
 77 t   Phenanthrene                1.205   1.108      8.0  115  -0.12    12.96
 78 t   Anthracene                  1.210   1.122      7.3  116  -0.12    13.07
 79 t   Carbazole                   1.090   1.007      7.6  112  -0.11    13.65
 80 t   Di-n-butylphthalate         1.423   1.263     11.2  111  -0.12    14.80
 81 t   Fluoranthene                1.221   1.241     -1.6  123  -0.12    15.72
 82 t   Octadecane                  0.599   0.504     15.9  110  -0.12    13.15

 83 I   Chrysene-d12                1.000   1.000      0.0  126  -0.11    18.94
 84 t   Pyrene                      1.324   1.202      9.2  124  -0.12    16.19
 85 S   Terphenyl-d14               0.932   0.894      4.1  131  -0.13    16.81
 86 t   Butylbenzylphthalate        0.595   0.494     17.0  108  -0.12    18.18

                ----------------------- True    Calc.   % Drift  ------------
 87     Butyl stearate             50.000  39.954     20.1# 107  -0.12    18.43

                ----------------------- AvgRF   CCRF     % Dev   -------------
 88 t   Benzo[a]anthracene          1.167   1.074      8.0  124  -0.11    18.92
 89 t   3,3'-Dichlorobenzidine      0.397   0.412     -3.8  131  -0.11    19.07
 90 t   Chrysene                    1.120   1.059      5.4  129  -0.11    18.99
 91 t   bis(2-Ethylhexyl)phthalat   0.833   0.669     19.7  106  -0.11    19.47

 92 I   Perylene-d12                1.000   1.000      0.0  123  -0.11    21.36
 93 t   Di-n-octylphthalate         1.472   1.266     14.0  106  -0.11    20.52
 94 t   Benzo[b]fluoranthene        1.209   1.092      9.7  117  -0.11    20.81
 95 t   Benzo[k]fluoranthene        1.253   1.315     -4.9  135  -0.11    20.84
 96 t   Benzo[a]pyrene              1.133   1.098      3.1  125  -0.11    21.27
 97 t   Indeno[1,2,3-cd]pyrene      1.026   1.213    -18.2  146  -0.21    22.76
 98 t   Dibenz(a,h)acridine         0.928   0.944     -1.7  129  -0.18    22.52
 99 t   Dibenz[a,h]anthracene       1.035   1.057     -2.1  131  -0.21    22.79

                ----------------------- True    Calc.   % Drift  ------------
100 t   7,12-Dimethylbenz(a)anthr  50.000  52.520     -5.0  133  -0.12    20.81

                ----------------------- AvgRF   CCRF     % Dev   -------------
101 t   Benzo[g,h,i]perylene        1.136   1.106      2.6  130  -0.24    23.06

 -----------------------------------------------------------------------
 -----------------------------------------------------------------------

    (#) = Out of Range            SPCC's out = 0  CCC's out = 0
     F84455.D   MF3993.M        Wed Dec 23 12:13:35 2009   GCMS3A
```

Continuing Calibration Summary

Job Number: JA34700
Account: AGMPAL Arcadis
Project: PSEG-Salem, Artificial Island, Salem, NJ

Sample: EF4044-CC3994
Lab FileID: F85646.D

```
                  Evaluate Continuing Calibration Report

  Data File : C:\MSDCHEM\1\DATA\EF4044\F85646.D            Vial: 3
  Acq On    : 23 Dec 2009   8:42 am                     Operator: ninap
  Sample    : cc3994-50                                 Inst    : MSF
  Misc      : op41442,ef4044,tcl42                      Multiplr: 1.00
  MS Integration Params: RTEINT.P

  Method        : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
  Title         : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
  Last Update   : Thu Dec 03 14:55:43 2009
  Response via  : Multiple Level Calibration

  Min. RRF     :   0.050  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  20%     Max. Rel. Area : 200%

         Compound                        AvgRF   CCRF      %Dev Area%  Dev(min)R.T.
  -----------------------------------------------------------------------------------
102 i   1,4-Dichlorobenzene-d4A          1.000   1.000      0.0  125  -0.08     3.46
103 t   Benzaldehyde                     0.929   0.817     12.1  120  -0.07     2.90

104     Acenaphthene-d10a                1.000   1.000      0.0  140  -0.12     9.56
105     1,2,4,5-Tetrachlorobenzen        0.533   0.670    -25.7# 163  -0.11     7.71
106     Atrazine                         0.299   0.392    -31.1# 159  -0.11    12.80

107 i   Chrysene-d12a                    1.000   1.000      0.0  173  -0.11    18.94
108 t   Benzidine                        0.580   0.565      2.6  150  -0.20    16.32
 -----------------------------------------------------------------------------
 -----------------------------------------------------------------------------

    (#) = Out of Range                SPCC's out = 0  CCC's out = 0
     F84455.D   MF3993.M          Wed Dec 23 12:15:15 2009   GCMS3A
```

GC/MS Semi-volatiles

Raw Data

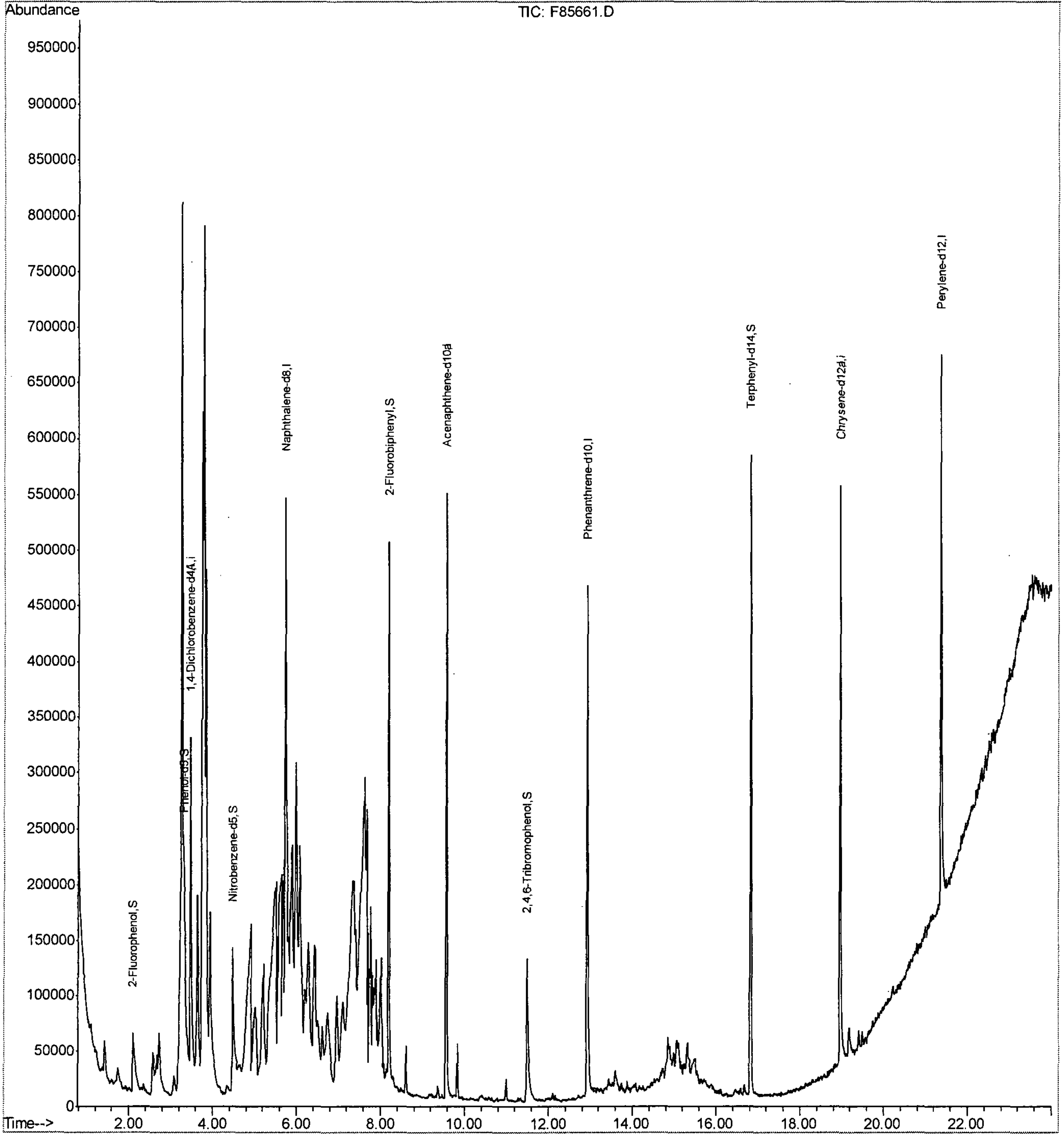
```
                              Quantitation Report    (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\EF4044\F85661.D           Vial: 18
Acq On    : 23 Dec 2009   5:09 pm                   Operator: ninap
Sample    : ja34700-1                               Inst    : MSF
Misc      : op41361,ef4044,900                      Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Dec 23 17:34:01 2009         Quant Results File: MF3993.RES

Quant Method : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
Last Update  : Thu Dec 03 14:55:43 2009
Response via : Initial Calibration
DataAcq Meth : MF3993

 Internal Standards                R.T. QIon  Response  Conc Units Dev(Min)
-----------------------------------------------------------------------------

  1) 1,4-Dichlorobenzene-d4        3.46  152     99437    40.00 ppb    -0.08
 24) Naphthalene-d8                5.73  136    357244    40.00 ppb    -0.10
 47) Acenaphthene-d10              9.57  164    216975    40.00 ppb    -0.11
 69) Phenanthrene-d10             12.92  188    354926    40.00 ppb    -0.11
 83) Chrysene-d12                 18.96  240    369436    40.00 ppb    -0.10
 92) Perylene-d12                 21.37  264    331470    40.00 ppb    -0.10
102) 1,4-Dichlorobenzene-d4A       3.46  152     99437    40.00 ppb    -0.08
104) Acenaphthene-d10a             9.57  164    216975    40.00 ppb    -0.11
107) Chrysene-d12a                18.96  240    369436    40.00 ppb    -0.10

 System Monitoring Compounds
  5) 2-Fluorophenol                2.10  112     63710    20.39 ppb    -0.05
  Spiked Amount     50.000                       Recovery   =   40.78%
  8) Phenol-d5                     3.32   99     48505    11.60 ppb    -0.04
  Spiked Amount     50.000                       Recovery   =   23.20%
 25) Nitrobenzene-d5               4.48   82    130904    37.43 ppb    -0.08
  Spiked Amount     50.000                       Recovery   =   74.86%
 51) 2-Fluorobiphenyl              8.19  172    290597    37.58 ppb    -0.10
  Spiked Amount     50.000                       Recovery   =   75.16%
 73) 2,4,6-Tribromophenol         11.49  330     46788    49.99 ppb    -0.10
  Spiked Amount     50.000                       Recovery   =   99.98%
 85) Terphenyl-d14                16.83  244    354160    41.16 ppb    -0.11
  Spiked Amount     50.000                       Recovery   =   82.32%

 Target Compounds                                                     Qvalue
```

8.1.1

8

```
-----------------------------------------------------------------------------
(#) = qualifier out of range (m) = manual integration (+) = signals summed
F85661.D  MF3993.M      Thu Dec 24 15:01:43 2009      GCMS3A               Page 1
```

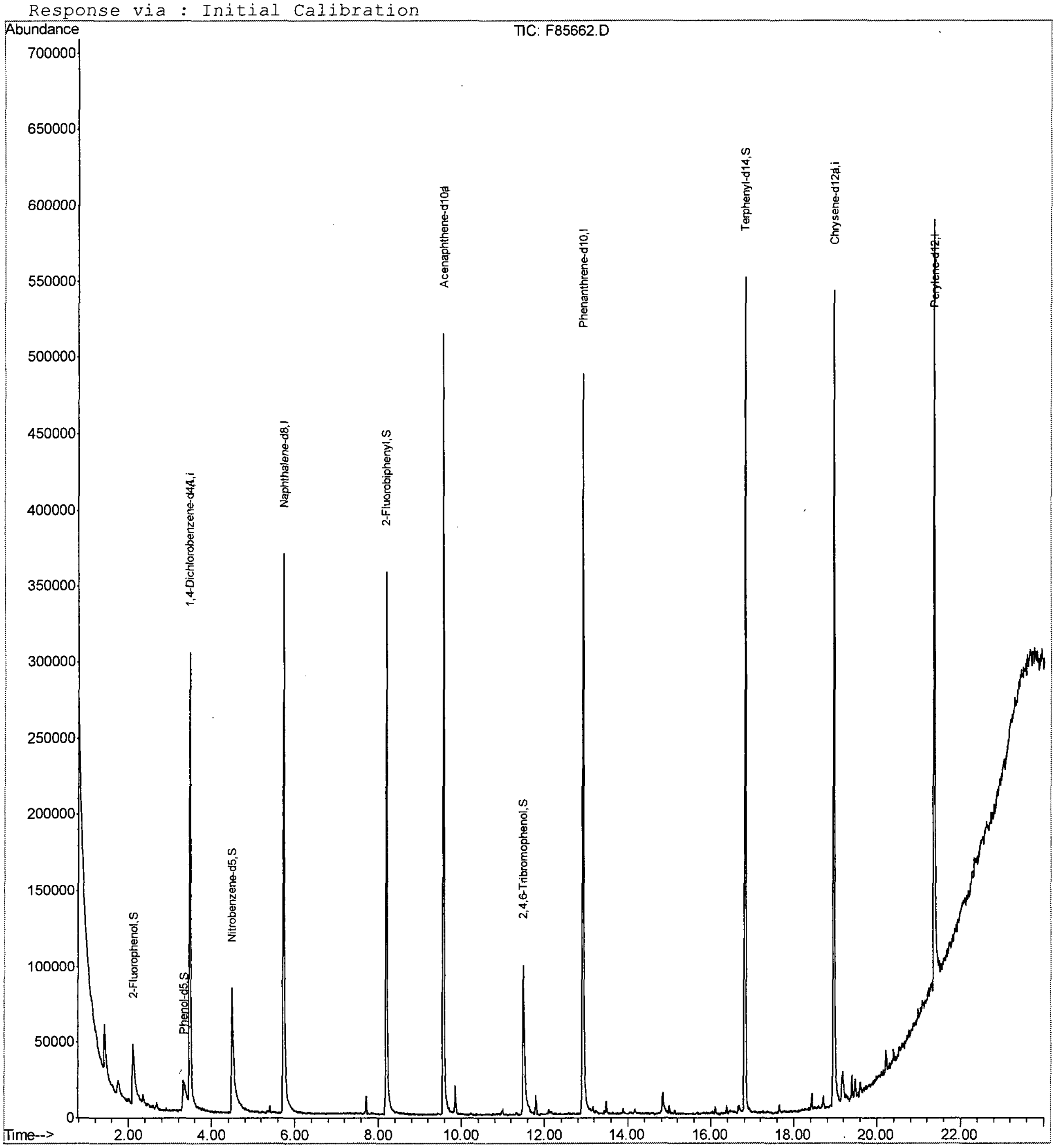
```
                          Quantitation Report    (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\EF4044\F85661.D              Vial: 18
Acq On    : 23 Dec 2009   5:09 pm                      Operator: ninap
Sample    : ja34700-1                                  Inst    : MSF
Misc      : op41361,ef4044,900                         Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Dec 24 15:01 2009            Quant Results File: MF3993.RES

Method       : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
Last Update  : Thu Dec 03 14:55:43 2009
Response via : Initial Calibration
```



```
F85661.D  MF3993.M      Thu Dec 24 15:01:43 2009      GCMS3A                     Page 2
```

```
                          Quantitation Report    (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\EF4044\F85662.D           Vial: 19
Acq On    : 23 Dec 2009   5:41 pm                   Operator: ninap
Sample    : ja34700-2                               Inst    : MSF
Misc      : op41361,ef4044,900                      Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Dec 23 18:06:04 2009          Quant Results File: MF3993.RES

Quant Method : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
Last Update  : Thu Dec 03 14:55:43 2009
Response via : Initial Calibration
DataAcq Meth : MF3993

 Internal Standards                 R.T. QIon  Response  Conc Units Dev(Min)
---------------------------------------------------------------------------
   1) 1,4-Dichlorobenzene-d4        3.46  152   101990    40.00 ppb    -0.08
  24) Naphthalene-d8                5.73  136   378579    40.00 ppb    -0.10
  47) Acenaphthene-d10              9.56  164   228791    40.00 ppb    -0.11
  69) Phenanthrene-d10             12.92  188   374758    40.00 ppb    -0.12
  83) Chrysene-d12                 18.96  240   400876    40.00 ppb    -0.10
  92) Perylene-d12                 21.37  264   345007    40.00 ppb    -0.10
 102) 1,4-Dichlorobenzene-d4A       3.46  152   101990    40.00 ppb    -0.08
 104) Acenaphthene-d10a             9.56  164   228791    40.00 ppb    -0.11
 107) Chrysene-d12a                18.96  240   400876    40.00 ppb    -0.10

 System Monitoring Compounds
   5) 2-Fluorophenol                2.10  112    52934    16.51 ppb    -0.05
   Spiked Amount     50.000                    Recovery   =   33.02%
   8) Phenol-d5                     3.33   99    39270     9.15 ppb    -0.03
   Spiked Amount     50.000                    Recovery   =   18.30%
  25) Nitrobenzene-d5               4.49   82   119156    32.15 ppb    -0.06
   Spiked Amount     50.000                    Recovery   =   64.30%
  51) 2-Fluorobiphenyl              8.19  172   248541    30.48 ppb    -0.11
   Spiked Amount     50.000                    Recovery   =   60.96%
  73) 2,4,6-Tribromophenol         11.49  330    39002    39.47 ppb    -0.10
   Spiked Amount     50.000                    Recovery   =   78.94%
  85) Terphenyl-d14                16.82  244   325272    34.84 ppb    -0.11
   Spiked Amount     50.000                    Recovery   =   69.68%

 Target Compounds                                                   Qvalue

---------------------------------------------------------------------------
 (#) = qualifier out of range (m) = manual integration (+) = signals summed
 F85662.D  MF3993.M      Mon Dec 28 10:53:01 2009      GCMS3A
```

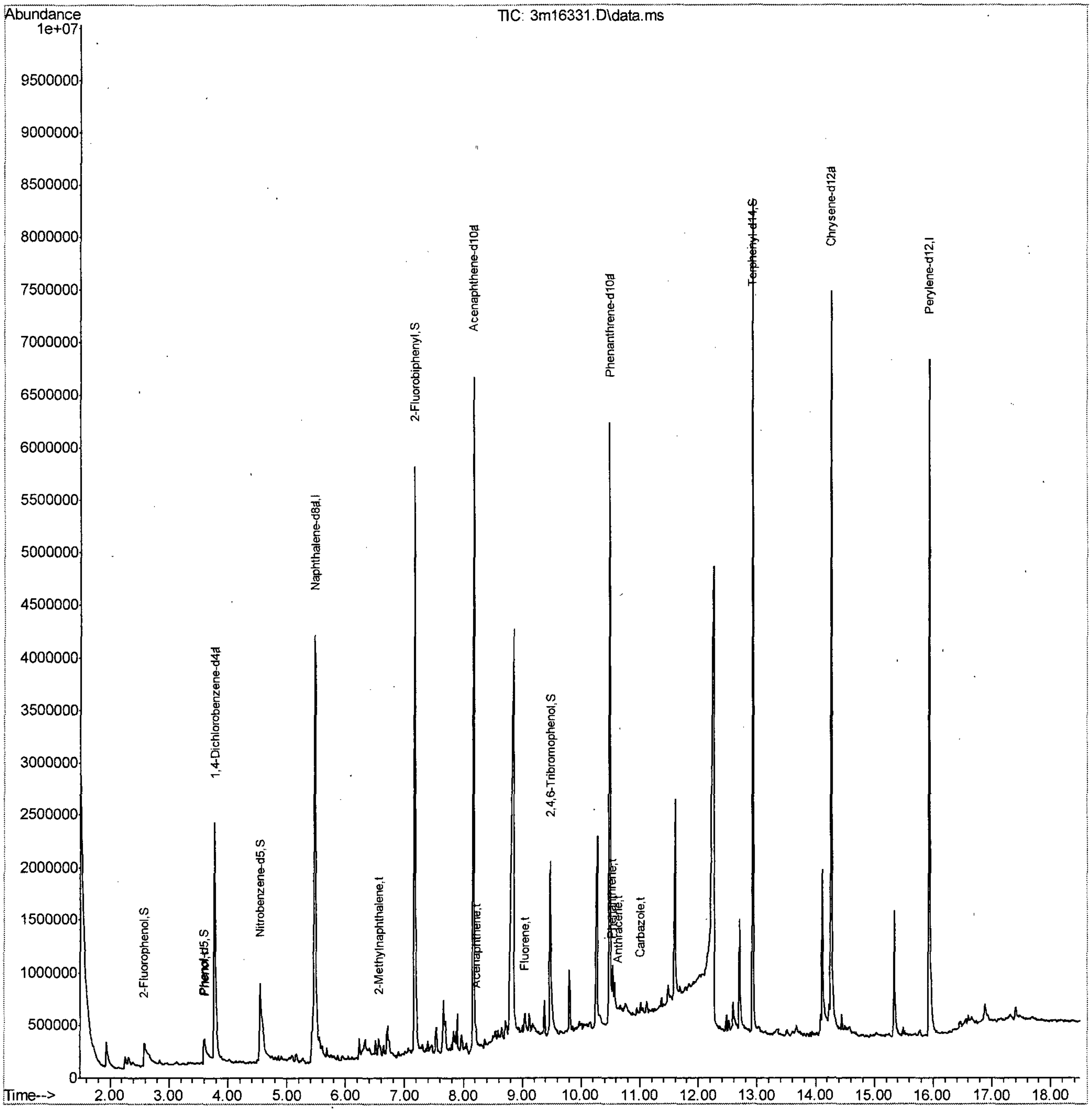
```
                         Quantitation Report    (QT Reviewed)

   Data File : C:\MSDCHEM\1\DATA\EF4044\F85662.D          Vial: 19
   Acq On    : 23 Dec 2009   5:41 pm                  Operator: ninap
   Sample    : ja34700-2                              Inst    : MSF
   Misc      : op41361,ef4044,900                     Multiplr: 1.00
   MS Integration Params: RTEINT.P
   Quant Time: Dec 28 10:52 2009             Quant Results File: MF3993.RES

   Method       : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
   Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
   Last Update  : Thu Dec 03 14:55:43 2009
   Response via : Initial Calibration
```

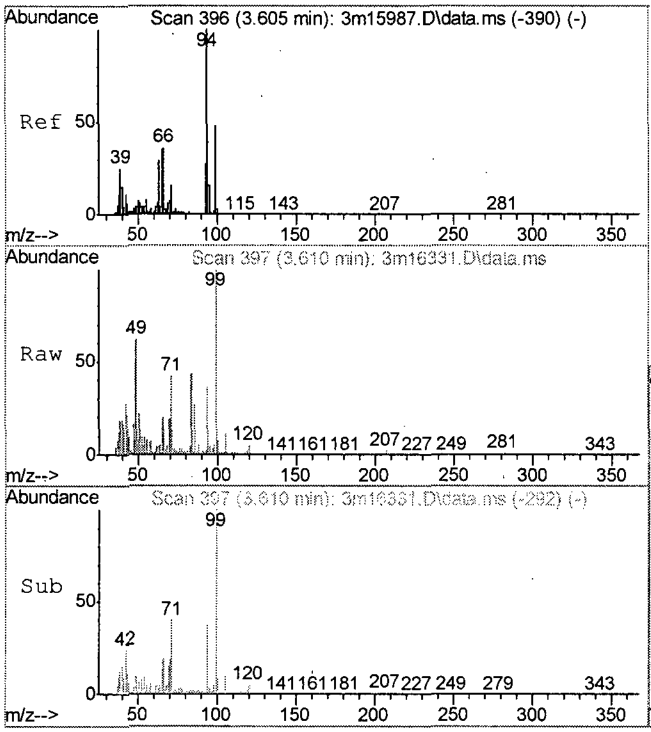


Manual Integrations
APPROVED
(compounds with "m" flag)
Cheng-Hwan Ao
12/30/09 00:20

```
                    Quantitation Report    (QT Reviewed)

Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16331.D
Acq On    : 29 Dec 2009   1:23 am
Operator  : larisap
Sample    : ja34700-3
Misc      : op41361,E3M719,950
ALS Vial  : 7   Sample Multiplier: 1

Quant Time: Dec 29 13:39:03 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration

        Compound                      R.T. QIon  Response  Conc Units Dev(Min)
 -----------------------------------------------------------------------------
 Internal Standards
   1) 1,4-Dichlorobenzene-d4        3.771  152    768439    40.00 ppb     0.00
  24) Naphthalene-d8                5.472  136   2961718    40.00 ppb     0.00
  47) Acenaphthene-d10              8.173  164   1812436    40.00 ppb     0.00
  69) Phenanthrene-d10             10.489  188   2961731    40.00 ppb    -0.01
  83) Chrysene-d12                 14.270  240   3260074    40.00 ppb    -0.01
  92) Perylene-d12                 15.939  264   3092183    40.00 ppb     0.00
 102) 1,4-Dichlorobenzene-d4a       3.771  152    768439    40.00 ppb     0.00
 104) Phenanthrene-d10a            10.489  188   2961731    40.00 ppb    -0.01
 106) Acenaphthene-d10a             8.173  164   1812436    40.00 ppb     0.00
 108) Chrysene-d12a                14.270  240   3260074    40.00 ppb    -0.01
 110) Naphthalene-d8a               5.472  136   2959976    40.00 ppb     0.00

 System Monitoring Compounds
   5) 2-Fluorophenol                2.583  112    372472    16.06 ppb     0.02
   Spiked Amount     50.000                       Recovery   =   32.12%
   8) Phenol-d5                     3.594   99    256334     7.99 ppb     0.06
   Spiked Amount     50.000                       Recovery   =   15.98%
  25) Nitrobenzene-d5               4.541   82    975795    31.41 ppb     0.01
   Spiked Amount     50.000                       Recovery   =   62.82%
  51) 2-Fluorobiphenyl              7.167  172   2036212    33.37 ppb     0.00
   Spiked Amount     50.000                       Recovery   =   66.74%
  73) 2,4,6-Tribromophenol          9.472  330    364872    50.72 ppb     0.00
   Spiked Amount     50.000                       Recovery   =  101.44%
  86) Terphenyl-d14                12.928  244   2513050    39.25 ppb     0.00
   Spiked Amount     50.000                       Recovery   =   78.50%

 Target Compounds                                                      Qvalue
   9) Phenol                        3.610   94    106270     3.08 ppb       85
  44) 2-Methylnaphthalene           6.563  142     71065     1.84 ppb       81
  59) Acenaphthene                  8.221  153     33094     0.61 ppb       89
  66) Fluorene                      9.039  166     45735     0.77 ppb       95
  77) Phenanthrene                 10.521  178     49389     1.21 ppb       95
  78) Anthracene                   10.628  178     19774     0.69 ppb       74
  79) Carbazole                    11.007  167     31118m    0.48 ppb
 -----------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

```
                         Quantitation Report    (QT Reviewed)

Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16331.D
Acq On    : 29 Dec 2009   1:23 am
Operator  : larisap
Sample    : ja34700-3
Misc      : op41361,E3M719,950
ALS Vial  : 7   Sample Multiplier: 1

Quant Time: Dec 29 13:39:03 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration
```

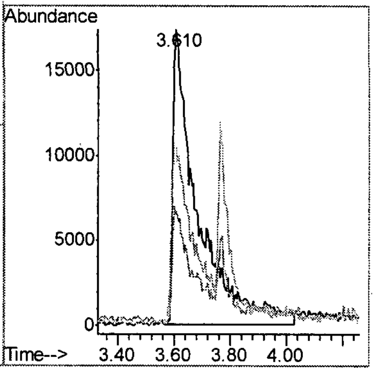


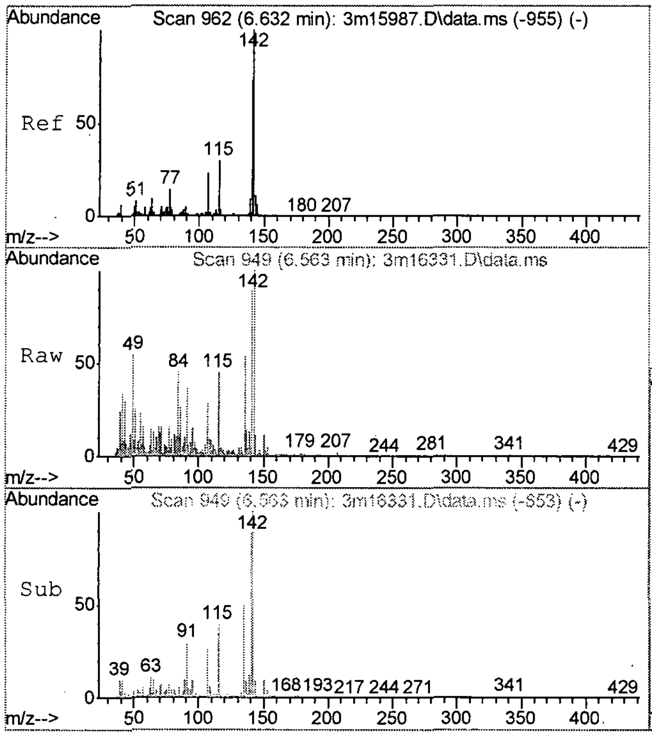


#9
Phenol
Concen: 3.08 ppb
RT: 3.610 min Scan# 397
Delta R.T. 0.064 min
Lab File: 3m16331.D
Acq: 29 Dec 2009 1:23 am

Tgt Ion: 94 Resp: 106270

Ion	Ratio	Lower	Upper
94	100		
65	36.6	5.9	65.9
66	54.8	7.3	67.3

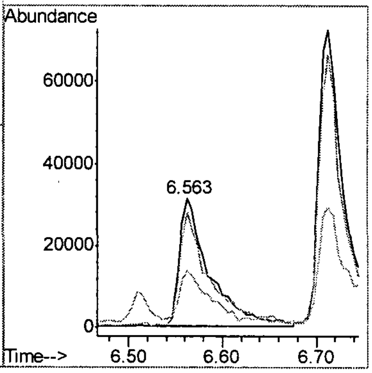


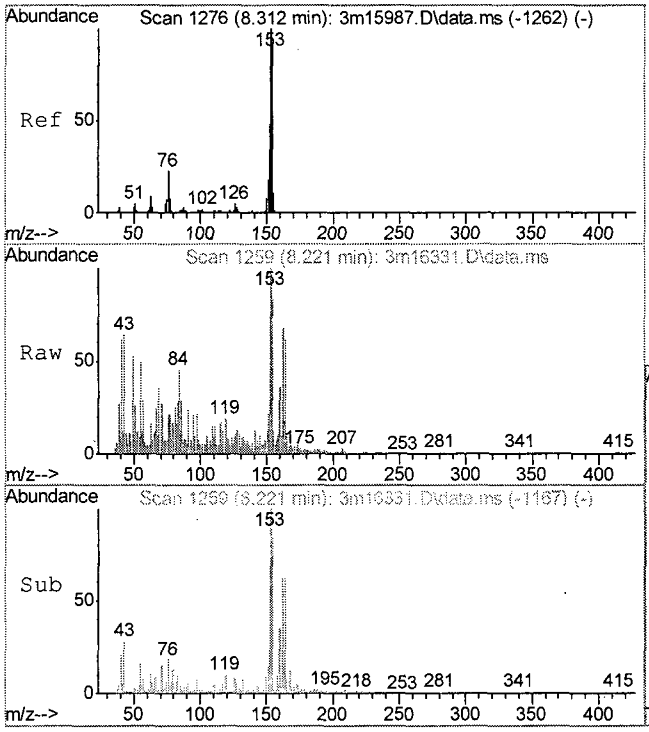


#44
2-Methylnaphthalene
Concen: 1.84 ppb
RT: 6.563 min Scan# 949
Delta R.T. 0.016 min
Lab File: 3m16331.D
Acq: 29 Dec 2009 1:23 am

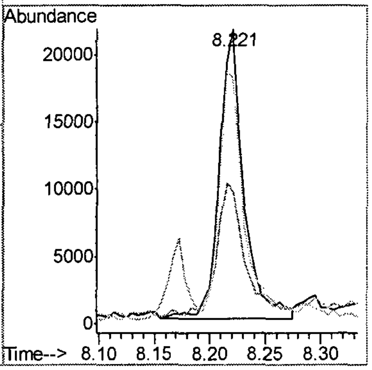
Tgt Ion:142 Resp: 71065

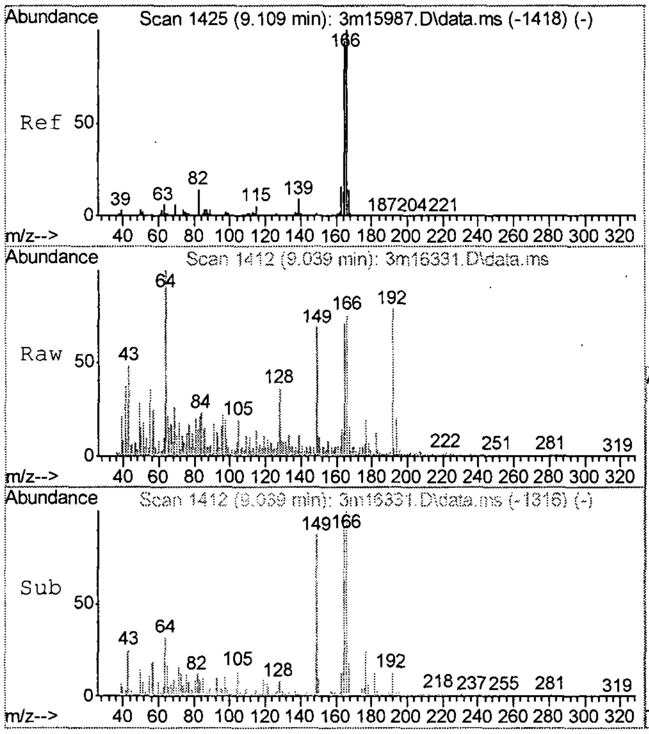
Ion	Ratio	Lower	Upper
142	100		
141	88.9	42.9	102.9
115	39.9	0.0	59.8



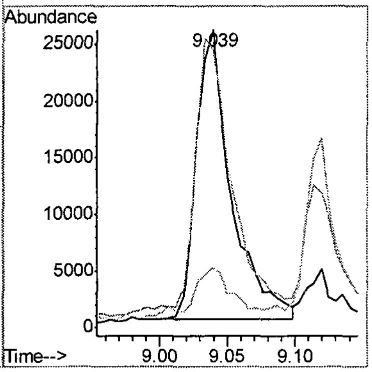


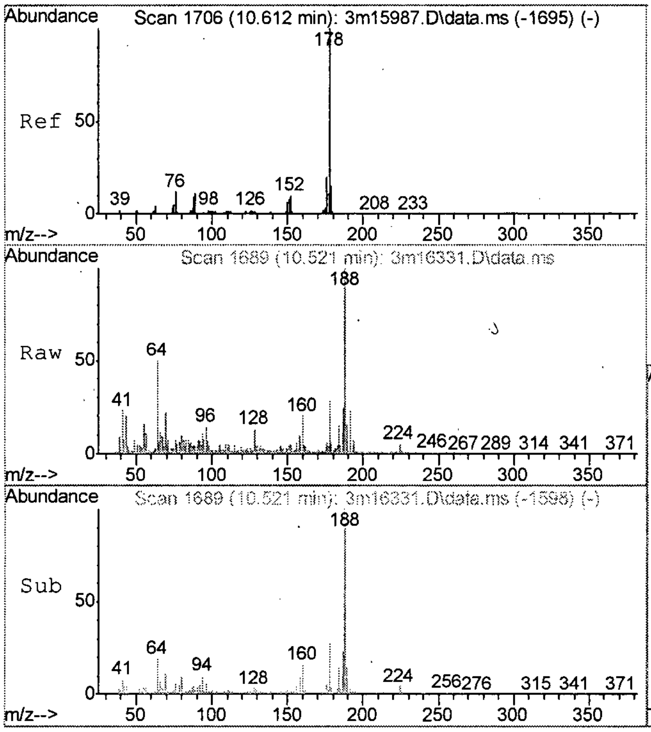
```
#59
Acenaphthene
Concen:     0.61 ppb
RT:    8.221 min  Scan# 1259
Delta R.T.   -0.005 min
Lab File:    3m16331.D
Acq: 29 Dec 2009   1:23 am

Tgt Ion:153 Resp:    33094
Ion   Ratio   Lower   Upper
153   100
152    42.4    18.2    78.2
154    80.1    62.3   122.3
```



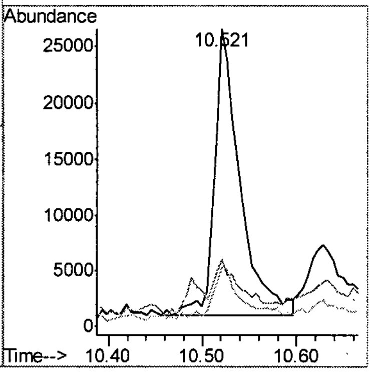


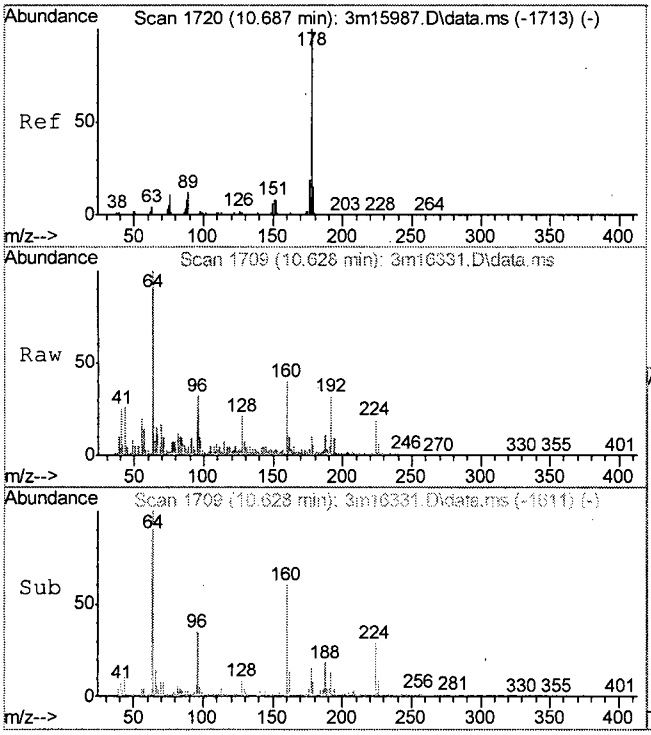
```
#66
Fluorene
Concen:     0.77 ppb
RT:    9.039 min  Scan# 1412
Delta R.T.   0.016 min
Lab File:    3m16331.D
Acq: 29 Dec 2009   1:23 am

Tgt Ion:166 Resp:    45735
Ion   Ratio   Lower   Upper
166   100
165    89.1    64.4   124.4
167    14.3     0.0    43.6
```



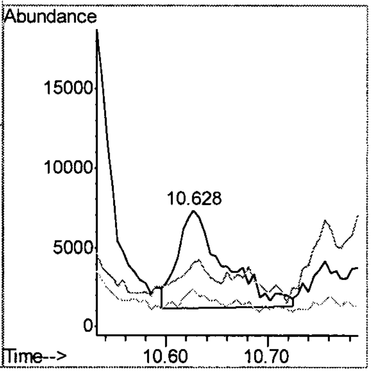


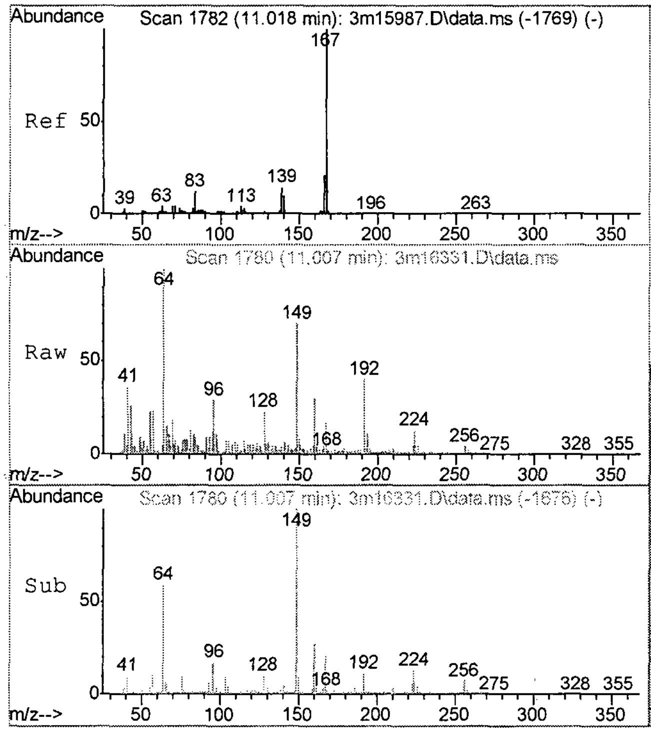
```
#77
Phenanthrene
Concen:    1.21 ppb
RT:  10.521 min  Scan# 1689
Delta R.T.   -0.011 min
Lab File:    3m16331.D
Acq: 29 Dec 2009   1:23 am

Tgt Ion:178 Resp:   49389
Ion  Ratio  Lower  Upper
178  100
179   16.4    0.0   45.1
176   17.4    0.0   50.3
```



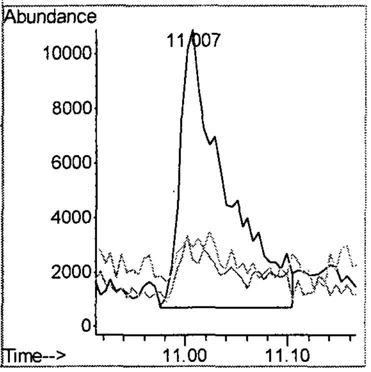


```
#78
Anthracene
Concen:    0.69 ppb
RT:  10.628 min  Scan# 1709
Delta R.T.   0.027 min
Lab File:    3m16331.D
Acq: 29 Dec 2009   1:23 am

Tgt Ion:178 Resp:   19774
Ion  Ratio  Lower  Upper
178  100
179   30.2    0.0   45.2
176   27.2    0.0   49.3
```





```
#79
Carbazole
Concen:     0.48 ppb m
RT:  11.007 min  Scan# 1780
Delta R.T.  0.059 min
Lab File:   3m16331.D
Acq: 29 Dec 2009   1:23 am

Tgt Ion:167 Resp:   31118
Ion  Ratio  Lower  Upper
167  100
166   22.5    0.0   50.6
139   26.9    0.0   43.7
```

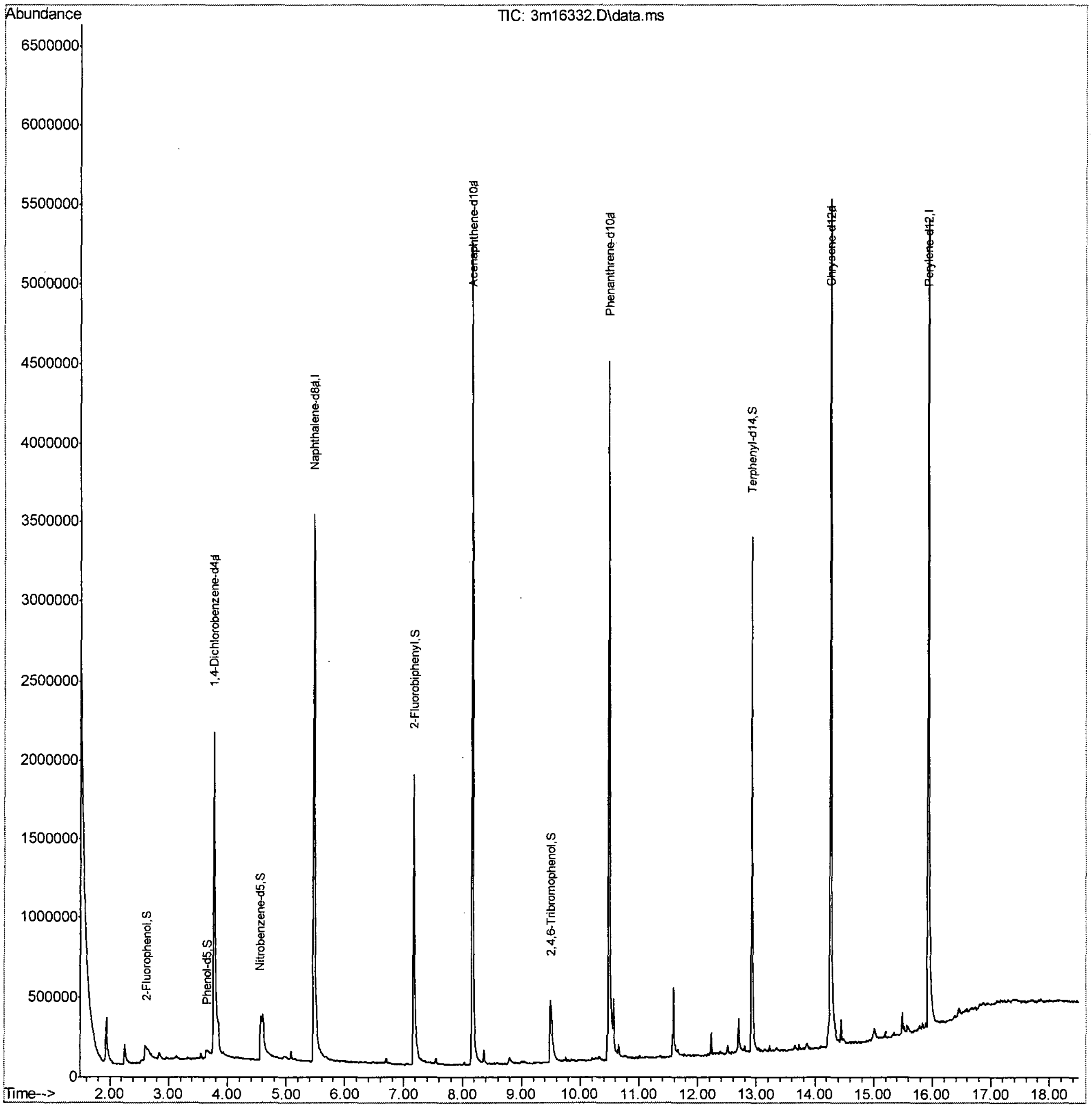


```
                         Quantitation Report    (QT Reviewed)

Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16332.D
Acq On    : 29 Dec 2009   1:50 am
Operator  : larisap
Sample    : ja34700-4
Misc      : op41361,E3M719,950
ALS Vial  : 8   Sample Multiplier: 1

Quant Time: Dec 29 13:40:11 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration

       Compound                    R.T. QIon  Response  Conc Units Dev(Min)
--------------------------------------------------------------------------
Internal Standards
  1) 1,4-Dichlorobenzene-d4       3.765  152   694496    40.00 ppb     0.00
 24) Naphthalene-d8               5.472  136  2626194    40.00 ppb     0.00
 47) Acenaphthene-d10             8.167  164  1616799    40.00 ppb    -0.01
 69) Phenanthrene-d10            10.489  188  2622055    40.00 ppb    -0.01
 83) Chrysene-d12                14.265  240  2923908    40.00 ppb    -0.02
 92) Perylene-d12                15.934  264  2826448    40.00 ppb    -0.01
102) 1,4-Dichlorobenzene-d4a      3.765  152   694496    40.00 ppb     0.00
104) Phenanthrene-d10a           10.489  188  2623053    40.00 ppb    -0.01
106) Acenaphthene-d10a            8.167  164  1616799    40.00 ppb    -0.01
108) Chrysene-d12a               14.265  240  2923908    40.00 ppb    -0.02
110) Naphthalene-d8a              5.472  136  2625425    40.00 ppb     0.00

System Monitoring Compounds
  5) 2-Fluorophenol               2.615  112   208343     9.94 ppb     0.05
  Spiked Amount     50.000                     Recovery   =   19.88%
  8) Phenol-d5                    3.653   99   172048     5.93 ppb     0.12
  Spiked Amount     50.000                     Recovery   =   11.86%
 25) Nitrobenzene-d5              4.562   82   506535    18.39 ppb     0.03
  Spiked Amount     50.000                     Recovery   =   36.78%
 51) 2-Fluorobiphenyl             7.167  172  1029667    18.92 ppb     0.00
  Spiked Amount     50.000                     Recovery   =   37.84%
 73) 2,4,6-Tribromophenol         9.488  330   147967    23.23 ppb     0.01
  Spiked Amount     50.000                     Recovery   =   46.46%
 86) Terphenyl-d14               12.922  244  1155838    20.13 ppb     0.00
  Spiked Amount     50.000                     Recovery   =   40.26%

Target Compounds                                                   Qvalue
--------------------------------------------------------------------------

(#) = qualifier out of range (m) = manual integration (+) = signals summed
```

8.1.4

8

```
                    Quantitation Report    (QT Reviewed)

Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16332.D
Acq On    : 29 Dec 2009   1:50 am
Operator  : larisap
Sample    : ja34700-4
Misc      : op41361,E3M719,950
ALS Vial  : 8   Sample Multiplier: 1

Quant Time: Dec 29 13:40:11 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration
```

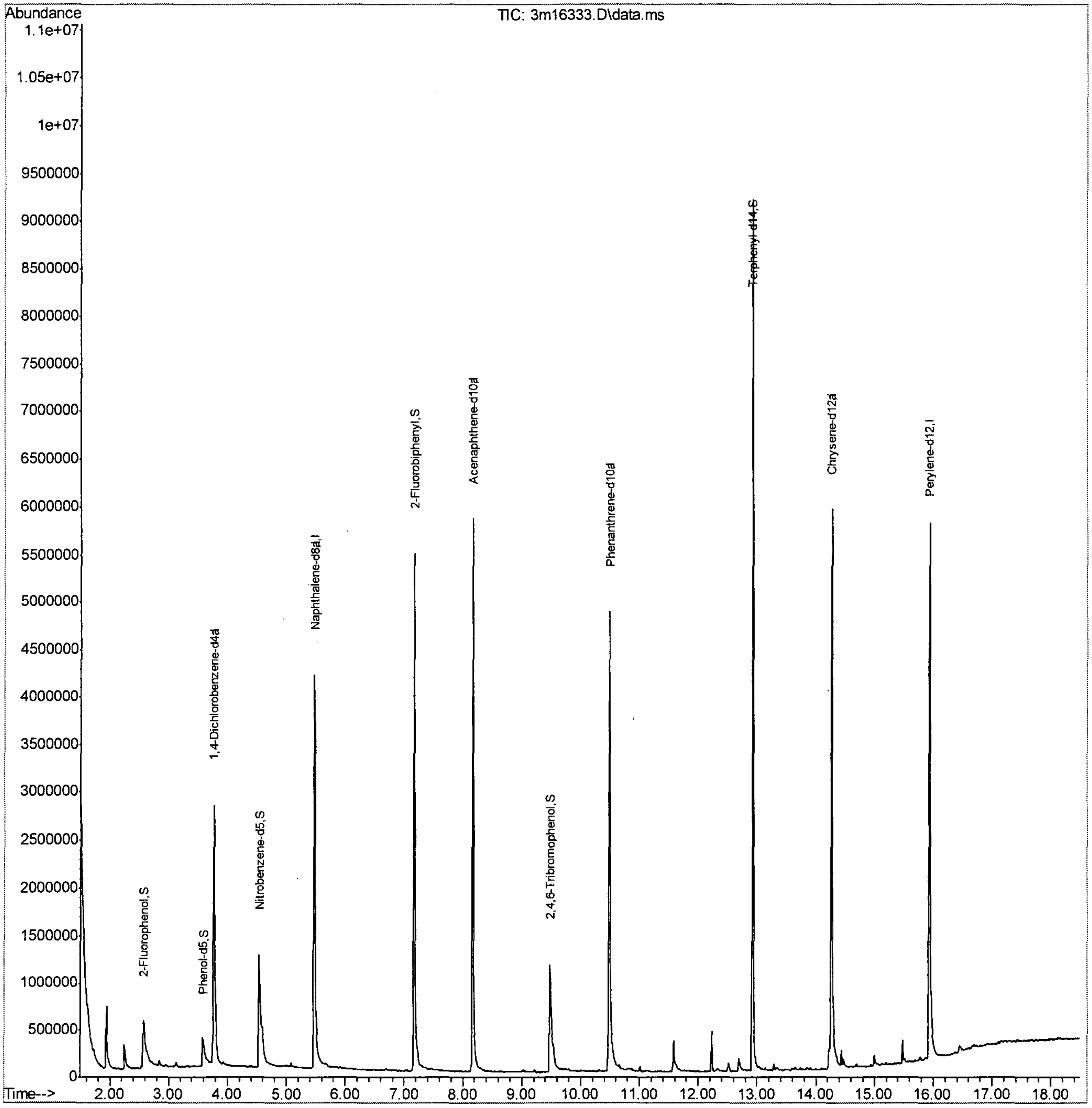


```
M3M703HQ.M Tue Dec 29 13:40:15 2009 MS3M                          Page: 2
```

```
                              Quantitation Report    (QT Reviewed)

Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16333.D
Acq On    : 29 Dec 2009   2:17 am
Operator  : larisap
Sample    : ja34700-5
Misc      : op41361,E3M719,930
ALS Vial  : 9   Sample Multiplier: 1

Quant Time: Dec 29 13:41:03 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration

        Compound                      R.T. QIon  Response  Conc Units Dev(Min)
-------------------------------------------------------------------------------
 Internal Standards
   1) 1,4-Dichlorobenzene-d4       3.765  152   855814    40.00 ppb      0.00
  24) Naphthalene-d8               5.472  136  3196326    40.00 ppb      0.00
  47) Acenaphthene-d10             8.173  164  1934832    40.00 ppb      0.00
  69) Phenanthrene-d10            10.489  188  3099605    40.00 ppb     -0.01
  83) Chrysene-d12                14.270  240  3442755    40.00 ppb     -0.01
  92) Perylene-d12                15.939  264  3287079    40.00 ppb      0.00
 102) 1,4-Dichlorobenzene-d4a      3.765  152   855814    40.00 ppb      0.00
 104) Phenanthrene-d10a           10.489  188  3100145    40.00 ppb     -0.01
 106) Acenaphthene-d10a            8.173  164  1934832    40.00 ppb      0.00
 108) Chrysene-d12a               14.270  240  3443104    40.00 ppb     -0.01
 110) Naphthalene-d8a              5.472  136  3196326    40.00 ppb      0.00

 System Monitoring Compounds
   5) 2-Fluorophenol               2.573  112   609748    23.61 ppb      0.00
    Spiked Amount     50.000                     Recovery   =   47.22%
   8) Phenol-d5                    3.589   99   383320    10.73 ppb      0.06
    Spiked Amount     50.000                     Recovery   =   21.46%
  25) Nitrobenzene-d5              4.536   82  1335560    39.84 ppb      0.00
    Spiked Amount     50.000                     Recovery   =   79.68%
  51) 2-Fluorobiphenyl             7.167  172  2593764    39.82 ppb      0.00
    Spiked Amount     50.000                     Recovery   =   79.64%
  73) 2,4,6-Tribromophenol         9.478  330   386086    51.28 ppb      0.00
    Spiked Amount     50.000                     Recovery   =  102.56%
  86) Terphenyl-d14               12.928  244  3237949    47.89 ppb      0.00
    Spiked Amount     50.000                     Recovery   =   95.78%

 Target Compounds                                                    Qvalue
-------------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

Quantitation Report (QT Reviewed)

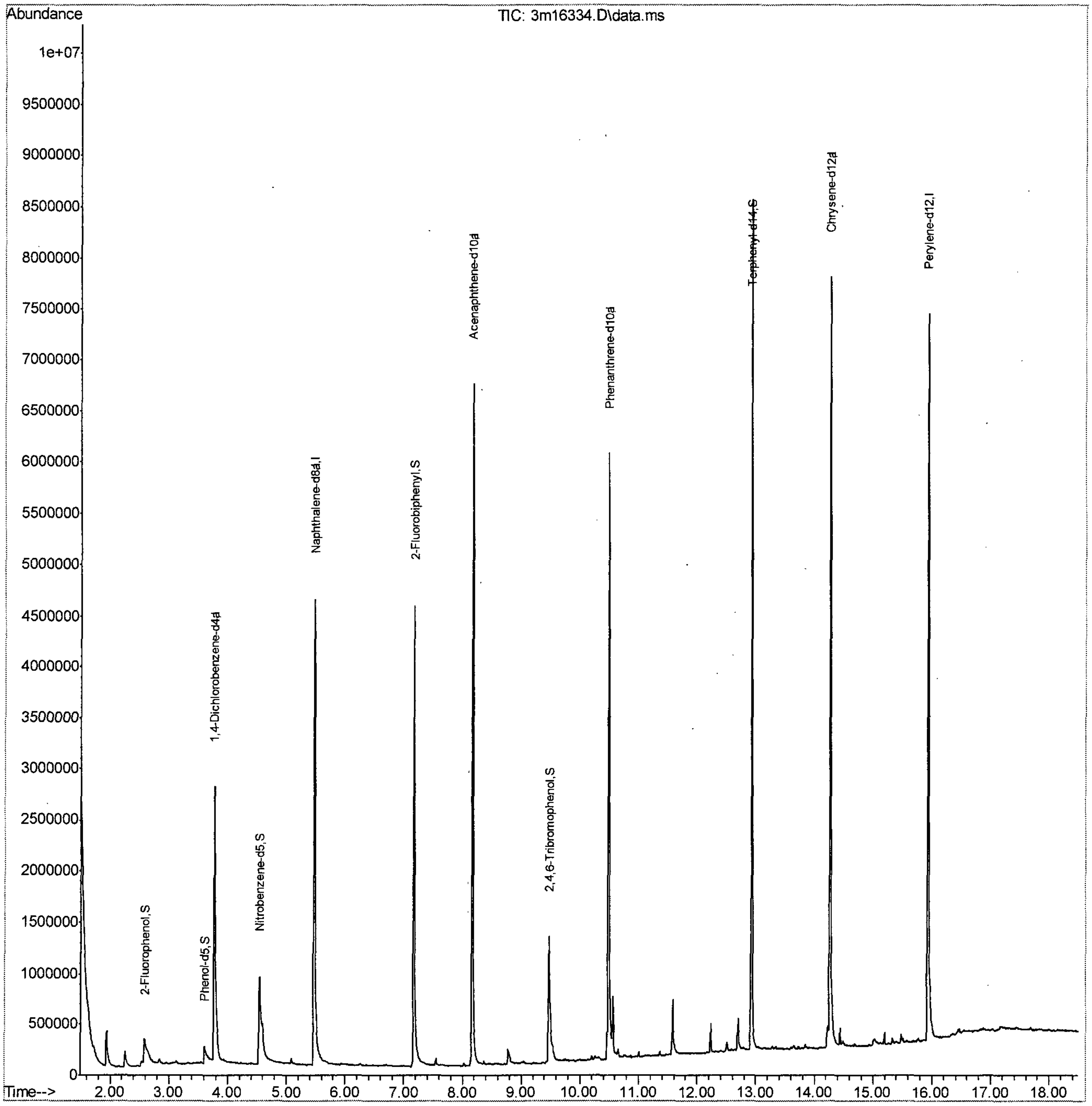
```
Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16333.D
Acq On    : 29 Dec 2009   2:17 am
Operator  : larisap
Sample    : ja34700-5
Misc      : op41361,E3M719,930
ALS Vial  : 9   Sample Multiplier: 1

Quant Time: Dec 29 13:41:03 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration
```



```
                              Quantitation Report    (QT Reviewed)

Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16334.D
Acq On    : 29 Dec 2009   2:43 am
Operator  : larisap
Sample    : ja34700-6
Misc      : op41361,E3M719,1000
ALS Vial  : 10   Sample Multiplier: 1

Quant Time: Dec 29 13:41:53 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration

        Compound                      R.T. QIon  Response  Conc Units Dev(Min)
 ------------------------------------------------------------------------------
 Internal Standards
   1) 1,4-Dichlorobenzene-d4        3.765  152    893164    40.00 ppb      0.00
  24) Naphthalene-d8                5.471  136   3353695    40.00 ppb      0.00
  47) Acenaphthene-d10              8.172  164   2071814    40.00 ppb      0.00
  69) Phenanthrene-d10             10.488  188   3357540    40.00 ppb     -0.01
  83) Chrysene-d12                 14.270  240   3797301    40.00 ppb     -0.01
  92) Perylene-d12                 15.939  264   3605848    40.00 ppb      0.00
 102) 1,4-Dichlorobenzene-d4a       3.765  152    893164    40.00 ppb      0.00
 104) Phenanthrene-d10a            10.488  188   3357540    40.00 ppb     -0.01
 106) Acenaphthene-d10a             8.172  164   2071814    40.00 ppb      0.00
 108) Chrysene-d12a                14.270  240   3797301    40.00 ppb     -0.01
 110) Naphthalene-d8a               5.471  136   3353695    40.00 ppb      0.00

 System Monitoring Compounds
   5) 2-Fluorophenol                2.589  112    388381    14.41 ppb      0.02
   Spiked Amount     50.000                      Recovery   =   28.82%
   8) Phenol-d5                     3.605   99    328466     8.81 ppb      0.07
   Spiked Amount     50.000                      Recovery   =   17.62%
  25) Nitrobenzene-d5               4.541   82   1057870    30.07 ppb      0.01
   Spiked Amount     50.000                      Recovery   =   60.14%
  51) 2-Fluorobiphenyl              7.167  172   2096818    30.06 ppb      0.00
   Spiked Amount     50.000                      Recovery   =   60.12%
  73) 2,4,6-Tribromophenol          9.472  330    342846    42.04 ppb      0.00
   Spiked Amount     50.000                      Recovery   =   84.08%
  86) Terphenyl-d14                12.927  244   2772767    37.18 ppb      0.00
   Spiked Amount     50.000                      Recovery   =   74.36%

 Target Compounds                                                       Qvalue
 ------------------------------------------------------------------------------

 (#) = qualifier out of range (m) = manual integration (+) = signals summed
```

Quantitation Report (QT Reviewed)

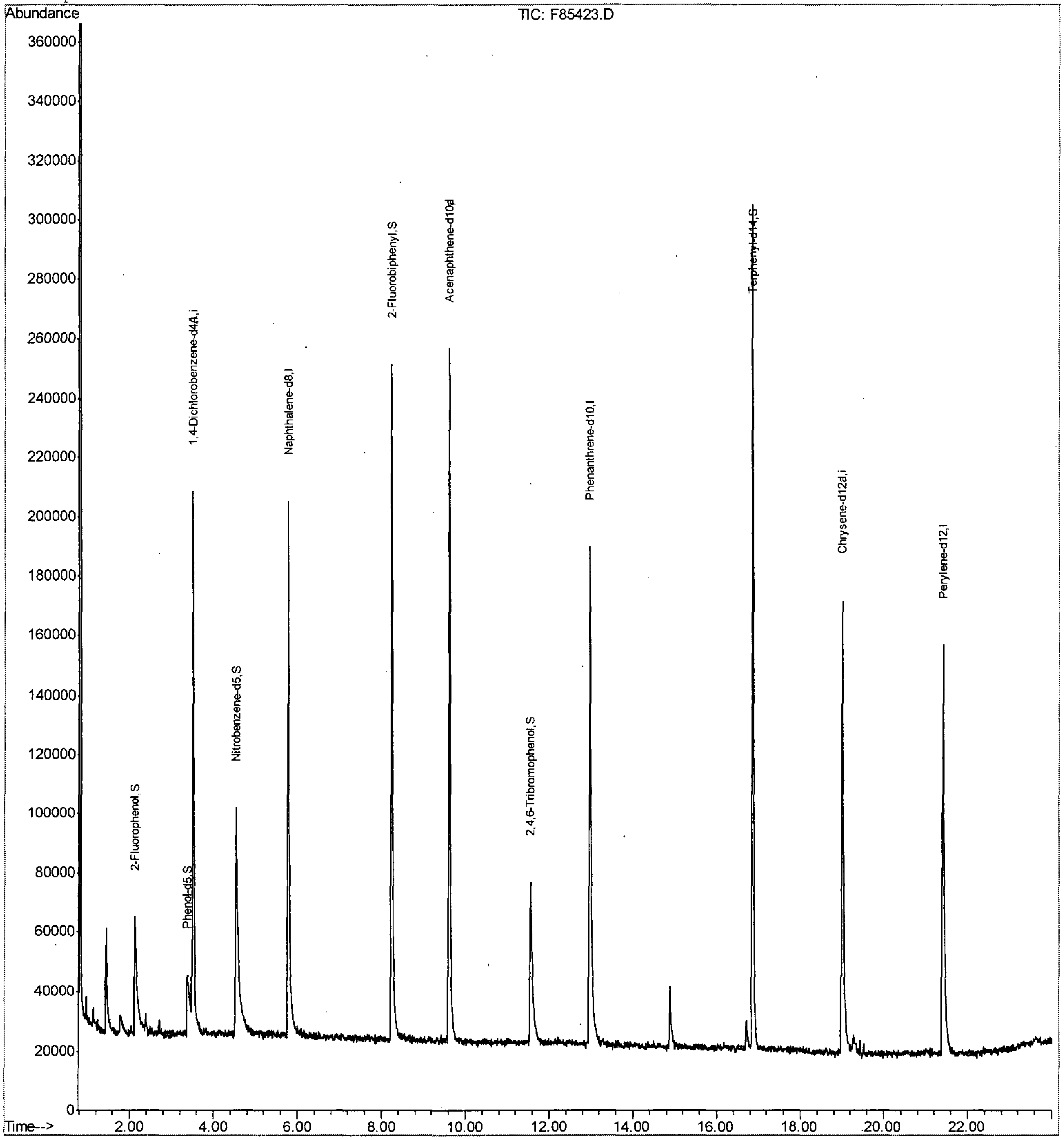
```
Data Path : C:\msdchem\1\DATA\e3m719\
Data File : 3m16334.D
Acq On    : 29 Dec 2009   2:43 am
Operator  : larisap
Sample    : ja34700-6
Misc      : op41361,E3M719,1000
ALS Vial  : 10   Sample Multiplier: 1

Quant Time: Dec 29 13:41:53 2009
Quant Method : C:\MSDCHEM\1\METHODS\M3M703HQ.M
Quant Title  : SEMI-VOA METHOD. Column ZB-5ms 20mX0.18mmIDX0.18u
QLast Update : Tue Dec 29 13:33:58 2009
Response via : Initial Calibration
```



M3M703HQ.M Tue Dec 29 13:41:58 2009 MS3M

```
                         Quantitation Report    (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\EF4036\F85423.D          Vial: 6
Acq On    : 11 Dec 2009  10:43 am                  Operator: ninap
Sample    : op41361-mb1                            Inst    : MSF
Misc      : op41361,ef4036,1000,,,1,1              Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Dec 11 11:07:49 2009            Quant Results File: MF3993.RES

Quant Method : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
Last Update  : Thu Dec 03 14:55:43 2009
Response via : Initial Calibration
DataAcq Meth : MF3993

 Internal Standards                  R.T. QIon  Response  Conc Units Dev(Min)
-----------------------------------------------------------------------------
   1) 1,4-Dichlorobenzene-d4         3.50  152     57849    40.00 ppb    -0.04
  24) Naphthalene-d8                 5.77  136    216504    40.00 ppb    -0.05
  47) Acenaphthene-d10               9.61  164    123725    40.00 ppb    -0.06
  69) Phenanthrene-d10              12.97  188    192206    40.00 ppb    -0.07
  83) Chrysene-d12                  19.00  240    183810    40.00 ppb    -0.06
  92) Perylene-d12                  21.40  264    162571    40.00 ppb    -0.07
 102) 1,4-Dichlorobenzene-d4A        3.50  152     57849    40.00 ppb    -0.04
 104) Acenaphthene-d10a              9.61  164    123725    40.00 ppb    -0.06
 107) Chrysene-d12a                 19.00  240    183810    40.00 ppb    -0.06

 System Monitoring Compounds
   5) 2-Fluorophenol                 2.13  112     50208    27.61 ppb    -0.03
   Spiked Amount     50.000                     Recovery   =   55.22%
   8) Phenol-d5                      3.37   99     44957    18.48 ppb     0.00
   Spiked Amount     50.000                     Recovery   =   36.96%
  25) Nitrobenzene-d5                4.52   82    105660    49.85 ppb    -0.03
   Spiked Amount     50.000                     Recovery   =   99.70%
  51) 2-Fluorobiphenyl               8.24  172    180006    40.83 ppb    -0.06
   Spiked Amount     50.000                     Recovery   =   81.66%
  73) 2,4,6-Tribromophenol          11.54  330     24788    48.91 ppb    -0.04
   Spiked Amount     50.000                     Recovery   =   97.82%
  85) Terphenyl-d14                 16.86  244    180681    42.20 ppb    -0.07
   Spiked Amount     50.000                     Recovery   =   84.40%

 Target Compounds                                                   Qvalue





-----------------------------------------------------------------------------
(#) = qualifier out of range (m) = manual integration (+) = signals summed
F85423.D  MF3993.M      Fri Dec 11 13:05:24 2009      GCMS3A
```

```
                              Quantitation Report    (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\EF4036\F85423.D           Vial: 6
Acq On    : 11 Dec 2009  10:43 am                    Operator: ninap
Sample    : op41361-mb1                              Inst    : MSF
Misc      : op41361,ef4036,1000,,,1,1                Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Dec 11 13:05 2009              Quant Results File: MF3993.RES

Method       : C:\MSDCHEM\1\METHODS\MF3993.M (RTE Integrator)
Title        : Semi Volatile GC/MS, zbX-5MS 20m x .18mm x .18um
Last Update  : Thu Dec 03 14:55:43 2009
Response via : Initial Calibration
```



ARCADIS

Appendix C

Soil Analytical Results (September 2009)

New Jersey
ACCUTEST
Laboratories

IT'S ALL IN THE CHEMISTRY

01/19/10

Technical Report for

Arcadis

PSEG-Diesel, Salem, NJ

NP000571.0008

Accutest Job Number: JA28757

Sampling Dates: 09/22/09 - 09/23/09

Report to:

Arcadis Geraghty & Miller

Jonathan.Shafer@arcadis-us.com

ATTN: Jonathan Shafer

Total number of pages in report: **16**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

David N. Speis
VP Ops, Laboratory Director

ACCUTEST LABORATORIES
50
YEARS
1956-2006

Client Service contact: Marie Meidhof 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC, PA, RI, SC, TN, VA, WV

Table of Contents

-1-

Sample Summary

Arcadis

Job No: JA28757

PSEG-Diesel, Salem, NJ
Project No: NP000571.0008

Sample	Collected				Matrix		Client
Number	Date	Time	By	Received	Code	Type	Sample ID
JA28757-1	09/22/09	08:00	KH	09/24/09	SO	Soil	TP-10(2.0-2.5)092209
JA28757-1R	09/22/09	08:00	KH	09/24/09	SO	Soil	TP-10(2.0-2.5)092209
JA28757-2	09/22/09	11:00	KH	09/24/09	SO	Soil	TP-11(2.0-2.5)092209
JA28757-3	09/22/09	13:10	KH	09/24/09	SO	Soil	TP-12(1.0-1.5)092209
JA28757-4	09/23/09	10:30	KH	09/24/09	AQ	Field Blank Soil	FB-092209

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Arcadis	Job No	JA28757
Site:	PSEG-Diesel, Salem, NJ	Report Date	10/8/2009 6:50:21 PM

On 09/24/2009, 3 Sample(s), 0 Trip Blank(s) and 1 Field Blank(s) were received at Accutest Laboratories at a temperature of 5 C. Samples were intact and properly preserved, unless noted below. An Accutest Job Number of JA28757 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Extractables by GCMS By Method SW846 8270C

Matrix SO Batch ID: OP40276

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA29550-1MS, JA29550-1MSD were used as the QC samples indicated.

Extractables by GC By Method SW846-8015

Matrix AQ Batch ID: OP40082

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA28658-1MS, JA28658-1MSD were used as the QC samples indicated.

Matrix SO Batch ID: OP40102

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA28839-1MS, JA28839-1MSD were used as the QC samples indicated.

Wet Chemistry By Method SM18 2540G

Matrix SO Batch ID: GN30648

- The data for SM18 2540G meets quality control requirements.

Accutest certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting Accutest's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

Accutest Laboratories is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by Accutest Laboratories indicated via signature on the report cover

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	TP-10(2.0-2.5)092209			
Lab Sample ID:	JA28757-1		**Date Sampled:**	09/22/09
Matrix:	SO - Soil		**Date Received:**	09/24/09
Method:	SW846-8015 SW846 3545		**Percent Solids:**	94.3
Project:	PSEG-Diesel, Salem, NJ			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Y17806.D	1	09/28/09	DNM	09/26/09	OP40102	G3Y545
Run #2	3Y17857.D	10	09/30/09	DNM	09/26/09	OP40102	G3Y547

	Initial Weight	Final Volume
Run #1	17.2 g	1.0 ml
Run #2	17.2 g	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	3710 [a]	62	31	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	110%	134%	17-148%
16416-32-3	Tetracosane-d50	143%	147%	29-151%
438-22-2	5a-Androstane	98%	37%	19-161%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TP-10(2.0-2.5)092209		
Lab Sample ID:	JA28757-1R	**Date Sampled:**	09/22/09
Matrix:	SO - Soil	**Date Received:**	09/24/09
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	94.3
Project:	PSEG-Diesel, Salem, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P45389.D	1	10/07/09	NAP	10/06/09	OP40276	EP1936
Run #2							

	Initial Weight	Final Volume
Run #1	35.1 g	1.0 ml
Run #2		

BN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	162	30	8.8	ug/kg	
208-96-8	Acenaphthylene	ND	30	9.7	ug/kg	
120-12-7	Anthracene	ND	30	11	ug/kg	
56-55-3	Benzo(a)anthracene	ND	30	9.8	ug/kg	
50-32-8	Benzo(a)pyrene	ND	30	9.2	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	30	10	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	30	11	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	30	11	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	60	11	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	60	17	ug/kg	
91-58-7	2-Chloronaphthalene	ND	60	9.4	ug/kg	
106-47-8	4-Chloroaniline	ND	150	9.7	ug/kg	
86-74-8	Carbazole	ND	60	14	ug/kg	
218-01-9	Chrysene	ND	30	10	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	60	12	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	60	9.1	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	60	9.0	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	60	9.1	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	60	8.7	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	60	8.1	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	60	6.7	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	60	13	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	60	12	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	150	7.7	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	30	10	ug/kg	
132-64-9	Dibenzofuran	128	60	9.0	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	60	6.7	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	60	15	ug/kg	
84-66-2	Diethyl phthalate	ND	60	10	ug/kg	
131-11-3	Dimethyl phthalate	ND	60	11	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	60	27	ug/kg	
206-44-0	Fluoranthene	18.7	30	13	ug/kg	J

ND = Not detected MDL - Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: TP-10(2.0-2.5)092209
Lab Sample ID: JA28757-1R
Matrix: SO - Soil
Method: SW846 8270C SW846 3550B
Project: PSEG-Diesel, Salem, NJ

Date Sampled: 09/22/09
Date Received: 09/24/09
Percent Solids: 94.3

BN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
86-73-7	Fluorene	373	30	9.9	ug/kg	
118-74-1	Hexachlorobenzene	ND	60	9.8	ug/kg	
87-68-3	Hexachlorobutadiene	ND	30	8.4	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	600	31	ug/kg	
67-72-1	Hexachloroethane	ND	150	8.4	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	30	10	ug/kg	
78-59-1	Isophorone	ND	60	8.1	ug/kg	
91-57-6	2-Methylnaphthalene	1660	60	17	ug/kg	
88-74-4	2-Nitroaniline	ND	150	13	ug/kg	
99-09-2	3-Nitroaniline	ND	150	12	ug/kg	
100-01-6	4-Nitroaniline	ND	150	12	ug/kg	
91-20-3	Naphthalene	257	30	8.2	ug/kg	
98-95-3	Nitrobenzene	ND	60	8.7	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	60	7.4	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	150	18	ug/kg	
85-01-8	Phenanthrene	700	30	14	ug/kg	
129-00-0	Pyrene	107	30	12	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	60	8.0	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	76%		28-113%
321-60-8	2-Fluorobiphenyl	66%		38-107%
1718-51-0	Terphenyl-d14	47%		31-116%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	alkane	7.52	6100	ug/kg	J
	alkane	8.35	5600	ug/kg	J
	alkane	8.75	8500	ug/kg	J
	alkane	9.58	5500	ug/kg	J
	alkane	9.91	9100	ug/kg	J
	alkane	10.52	3900	ug/kg	J
	alkane	11.00	9000	ug/kg	J
	Naphthalene trimethyl	11.63	4000	ug/kg	J
	alkane	12.03	8900	ug/kg	J
	alkane	12.44	5000	ug/kg	J
	alkane	13.02	29000	ug/kg	J
	alkane	13.94	22000	ug/kg	J
	alkane	14.81	13000	ug/kg	J

ND = Not detected
MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TP-10(2.0-2.5)092209		
Lab Sample ID:	JA28757-1R	**Date Sampled:**	09/22/09
Matrix:	SO - Soil	**Date Received:**	09/24/09
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	94.3
Project:	PSEG-Diesel, Salem, NJ		

BN TCL List

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	alkane	15.58	10000	ug/kg	J
	alkane	16.24	7500	ug/kg	J
	Total TIC, Semi-Volatile		147100	ug/kg	J

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TP-11(2.0-2.5)092209		
Lab Sample ID:	JA28757-2	**Date Sampled:**	09/22/09
Matrix:	SO - Soil	**Date Received:**	09/24/09
Method:	SW846-8015 SW846 3545	**Percent Solids:**	92.7
Project:	PSEG-Diesel, Salem, NJ		

	File ID	**DF**	**Analyzed**	**By**	**Prep Date**	**Prep Batch**	**Analytical Batch**
Run #1	3Y17807.D	1	09/28/09	DNM	09/26/09	OP40102	G3Y545
Run #2							

	Initial Weight	**Final Volume**
Run #1	17.0 g	1.0 ml
Run #2		

CAS No.	**Compound**	**Result**	**RL**	**MDL**	**Units**	**Q**
	TPH-DRO (C10-C28)	2620	6.3	3.1	mg/kg	

CAS No.	**Surrogate Recoveries**	**Run# 1**	**Run# 2**	**Limits**
84-15-1	o-Terphenyl	66%		17-148%
16416-32-3	Tetracosane-d50	109%		29-151%
438-22-2	5a-Androstane	91%		19-161%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: TP-12(1.0-1.5)092209
Lab Sample ID: JA28757-3
Matrix: SO - Soil
Method: SW846-8015 SW846 3545
Project: PSEG-Diesel, Salem, NJ

Date Sampled: 09/22/09
Date Received: 09/24/09
Percent Solids: 93.5

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Y17808.D	1	09/28/09	DNM	09/26/09	OP40102	G3Y545
Run #2							

	Initial Weight	Final Volume
Run #1	17.2 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	12.4	6.2	3.1	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	92%		17-148%
16416-32-3	Tetracosane-d50	110%		29-151%
438-22-2	5a-Androstane	88%		19-161%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: FB-092209
Lab Sample ID: JA28757-4
Matrix: AQ - Field Blank Soil
Method: SW846-8015 SW846 3510C
Project: PSEG-Diesel, Salem, NJ
Date Sampled: 09/23/09
Date Received: 09/24/09
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Y17780.D	1	09/25/09	DNM	09/25/09	OP40082	G3Y544
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.10	0.039	mg/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	110%		34-139%
16416-32-3	Tetracosane-d50	127%		34-141%
438-22-2	5a-Androstane	102%		26-140%

ND = Not detected
MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST. Laboratories

SO FB

CHAIN OF CUSTODY

2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.accutest.com

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FED-EX Tracking #
Bottle Order Control #
Accutest Quote #
Accutest Job # JA28757

Client / Reporting Information

Company Name: ARCADIS
Street Address: 6 Terry Dr Suite 300
City / State / Zip: Newtown PA 18940
Project Contact: Jon Shafer
E-mail: jon.shafer@arcadis-us.com
Phone #: 267 685 1800
Fax #: 267 685 1801
Sampler(s) Name(s): Krista Hankins
Phone #: 610 755 7080

Project Information

Project Name: PSEG - Salem
Street
City: Salem
State: NJ
Project #: NP000571.0008
Client Purchase Order #
Project Manager: Brad Place

Billing Information (If different from Report to)
Company Name: ARCADIS
Street Address: 630 Plaza Dr Suite 100
City / State / Zip: Highlands Ranch CO 80129
Attention:

Requested Analysis (see TEST CODE sheet)

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	DRO	LAB USE ONLY
-1	TP-10(2.0-2.5)092209		9/22/09	0800	KH	SO	1									X	EX43,
-2	TP-11 (2.0-2.5)092209		↓	1100	KH	SO	1									X	EX29
-3	TP-12 (1.0-1.5)092209		↓	1310	KH	SO	1									X	
-4	FB-092209		9/23/09	1030	KH	WW	2	2								X	

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB-Field Blank
EB-Equipment Blank
RB- Rinse Blank
TB-Trip Blank

Turnaround Time (Business days)

☐ Std. 15 Business Days
☐ Std. 10 Business Days (by Contract only)
☐ 10 Day *RUSH*
☑ 5 Day *RUSH*
☐ 3 Day *EMERGENCY*
☐ 2 Day *EMERGENCY*
☐ 1 Day *EMERGENCY*
Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

☐ Commercial "A" (Level 1)
☐ Commercial "B" (Level 2)
☐ FULLT1 (Level 3+4)
☑ NJ Reduced
☐ Commercial "C"
☐ NYASP Category A
☐ NYASP Category B
☐ State Forms
☑ EDD Format EQUIS
☐ Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler: 1 Krista Hankins
Date Time: 9/23/09 1300
Received By: 1
Relinquished By: 2 ~~9/24/09~~
Date Time: 9/24/09 1135
Received By: 2
Relinquished by Sampler: 3
Date Time: 9/24/09 1310
Received By: 3
Relinquished By: 4
Date Time:
Received By: 4
Relinquished by: 5
Date Time:
Received By: 5
Custody Seal #
☐ Intact
☒ Not intact
Preserved where applicable
On Ice ☒
Cooler Temp. 5.0°C

IA

JA28757: Chain of Custody
Page 1 of 3

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JA28757 Client: Immediate Client Services Action Required: No
Date / Time Received: 9/24/2009 Delivery Method: Client Service Action Required at Login: No
Project: No. Coolers: 1 Airbill #'s:

Cooler Security Y or N Y or N
1. Custody Seals Present: ☑ ☐ 3. COC Present: ☑ ☐
2. Custody Seals Intact: ☑ ☐ 4. Smpl Dates/Time OK ☑ ☐

Cooler Temperature Y or N
1. Temp criteria achieved: ☑ ☐
2. Cooler temp verification: Infared gun
3. Cooler media: Ice (bag)

Quality Control Preservatio Y or N N/A
1. Trip Blank present / cooler: ☐ ☐
2. Trip Blank listed on COC: ☐ ☐
3. Samples preserved properly: ☑ ☐
4. VOCs headspace free: ☐ ☐ ☑

Sample Integrity - Documentation Y or N
1. Sample labels present on bottles: ☑ ☐
2. Container labeling complete: ☑ ☐
3. Sample container label / COC agree: ☑ ☐

Sample Integrity - Condition Y or N
1. Sample recvd within HT: ☑ ☐
2. All containers accounted for: ☑ ☐
3. Condition of sample: Intact

Sample Integrity - Instructions Y or N N/A
1. Analysis requested is clear: ☑ ☐
2. Bottles received for unspecified tests ☐ ☑
3. Sufficient volume recvd for analysis: ☑ ☐
4. Compositing instructions clear: ☐ ☐ ☑
5. Filtering instructions clear: ☐ ☐ ☑

Comments

JA28757: Chain of Custody
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Job Change Order: JA28757_10/6/2009

Requested Date:	10/6/2009	**Received Date:**	9/24/2009
Account Name:	Arcadis	**Due Date:**	10/1/2009
Project Description:	PSEG-Diesel, Salem, NJ	**Deliverable:**	REDT2
CSR:	MM	**TAT (Days):**	1

Sample #:	**Change:**
JA28757-1	Please relog for B8270TCL+. 24-hr or fastest available TAT.

TP-10(2.0-2.5)092209

Above Changes Per: Jonathan Shafer **Date:** 10/6/2009

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service Representative.

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