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5

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APR 30 2007

U. S. Nuclear Regulatory Commission
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SUSQUEHANNA STEAM ELECTRIC STATION
ANNUAL RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT **Docket Nos. 50-387**
PLA-6182 **50-388**

The Susquehanna Steam Electric Station Annual Radiological Environmental Operating Report is hereby submitted for the calendar year 2006 in accordance with Technical Specification 5.6.2.

Should you have any questions or require additional information, please contact Mr. Rocco R. Sgarro, Manager – Nuclear Regulatory Affairs, at (610) 774-7552.

B. T. McKinney

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PLA – 6182 RELEASE DUE DATE: **05/15/2007** ORIGINATOR: **Brenda W. O'Rourke**

SUBJECT: Annual Radiological Environmental Operating Report AFFIDAVIT: ☐ YES ☒ NO

VERIFICATION: ☐ REQUIRED ☐ REQUESTED ☒ N/A FORM(S) NDAP-QA-0104-1 ATTACHED: ☐ YES ☒ N/A

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SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 and 2

Annual Radiological
Environmental Operating Report

2006

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SUMMARY AND CONCLUSIONS

Radiological Dose Impact

This report on the Radiological Environmental Monitoring Program covers the year 2006.

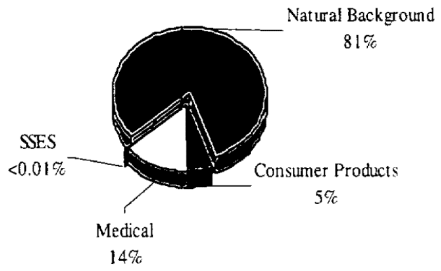
During that period, 1280 analyses were performed on 902 samples at 32 sampling locations. Additionally, 231 TLD direct radiation measurements were performed at 58 locations around the site.

In assessing all the data gathered and comparing with SSES pre-operational data, it was concluded that the operation of SSES had no adverse radiological impact on the health and safety of the public or the environment.

The total whole body dose from both ingested radionuclides and direct radiation from SSES Operations is negligible compared to the public's exposure from natural background radiation, medical irradiation, and radiation from consumer products of more than 300 millirem/year.

The following graph compares public dose from SSES operation to that from other sources of radioactivity and radiation.

COMPARISON OF PERCENT OF AVERAGE ANNUAL PUBLIC DOSE FROM OTHER SOURCES WITH THAT FROM THE SSES



Sources for the values provided, with the exception of Susquehanna, are the following from NCRP Report #93 (1987): Tables 2.4 (Natural Background), 5.1 (Consumer Products), and 7.4 (Medical).

Ambient Gamma Radiation

Environmental direct radiation measurements were performed quarterly on and around the SSES site using thermoluminescent dosimeters (TLDs).

The maximum direct radiation dose from SSES operation to a member of the public was approximately 0.0328 mrem for all of 2006. This dose represents approximately 0.13% of the 25-mrem whole-body SSES Technical Requirements (TRO 3.11.3) limit for all SSES sources of radioactivity and radiation.

Aquatic Environment

Surface water samples were analyzed for concentrations of tritium, iodine-131, and gamma emitting nuclides. Drinking water samples were analyzed for concentrations of gross beta, tritium and gamma emitting nuclides. Gross beta activities detected in drinking water were consistent with those reported in previous years.

Iodine-131 activity was detected in 8 of 36 surface water samples. Evidence indicates that it is there only as the result of the discharge of medical waste to the Susquehanna or Lackawanna Rivers through sewage treatment plants upstream of the SSES. Iodine-131 was not reported to have been discharged with water released from the SSES to the Susquehanna River during 2006.

Tritium activity attributable to SSES operation was detected in the aquatic pathway to man. The maximum dose from the ingestion of tritium was estimated at the nearest downriver municipal water supplier via the drinking water pathway and near the outfall of the SSES discharge to the Susquehanna River via the fish pathway. The maximum whole body and organ doses due to tritium identified via REMP samples is approximately 0.0012 mrem/year. This dose is less than one-tenth of one percent of the dose guidelines stated in 10 CFR 50, Appendix I.

Fish samples were analyzed for concentrations of gamma emitting nuclides. Concentrations of naturally occurring K-40 were consistent with those detected in previous years. No fission or activation products were detected in fish.

Sediment samples were analyzed for concentrations of gamma emitting nuclides. Cesium-137 was observed in sediment and attributed to non-SSES sources (residual fallout from atmospheric weapons testing), except in one sample (indicator 7B) during the fourth quarter which showed a positive statistical detection of Cs-137 and was assumed to be the result of station liquid releases. Cesium-137 was reported to have been discharged with water released from the SSES to the Susquehanna River during 2006. The maximum whole body and organ doses due to cesium identified via REMP samples in the 4th quarter is approximately 0.0040 mrem/year. Concentrations of naturally occurring K-40, radium-226, and actinium-thorium-228 were found consistent with those detected in previous years.

Atmospheric Environment

Air particulate samples were analyzed for concentrations of gross beta and gamma emitting nuclides. Cosmogenic Be-7 was detected at levels consistent with those detected in previous years.

Air iodine samples were analyzed for concentrations of iodine-131. All results were less than the MDC.

Terrestrial Environment

Soil samples were analyzed for concentrations of gamma emitting nuclides. Cesium-137 was observed in soil and attributed to non-SSES sources (residual fallout from atmospheric weapons testing). Concentrations of naturally occurring K-40 were consistent with those detected in previous years. Concentrations of naturally occurring actinium-thorium-228 were consistent with those of previous years.

Cow milk samples were analyzed for concentrations of iodine-131 as well as other gamma emitting nuclides. All iodine results were less than the MDC. Concentrations of naturally occurring K-40 were consistent with those detected in previous years. No fission or activation products were detected.

Pumpkins, soybeans and rye which were irrigated with Susquehanna River water downstream of the SSES were sampled. These food products were sampled during the harvest season and analyzed for concentrations of gamma emitting nuclides. Concentrations of naturally occurring K-40 were found consistent with those in previous years. No fission or activation products were detected.

Ground Water

Ground water samples were analyzed for concentrations of tritium and gamma emitting nuclides. One tritium sample was measured above analysis MDC in 2006. The activity was slightly above the detection limit. The 2006 indicator mean tritium activity level is lower than the range for preoperational years. No fission or activation products were detected.

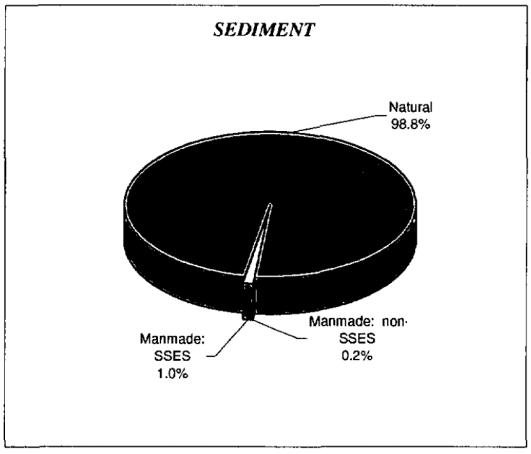
Relative Radionuclide Activity Levels in Selected Media

Some media monitored in the environment are significant for the numbers of gamma-emitting radionuclides routinely measured at levels exceeding analysis MDCs. Sediment in the aquatic pathway and soil in the terrestrial pathway are two such media.

The following graphs show the relative activity contributions for the types of gamma-emitting radionuclides reported at levels above the analysis MDCs in sediment and soil at indicator locations during 2006.

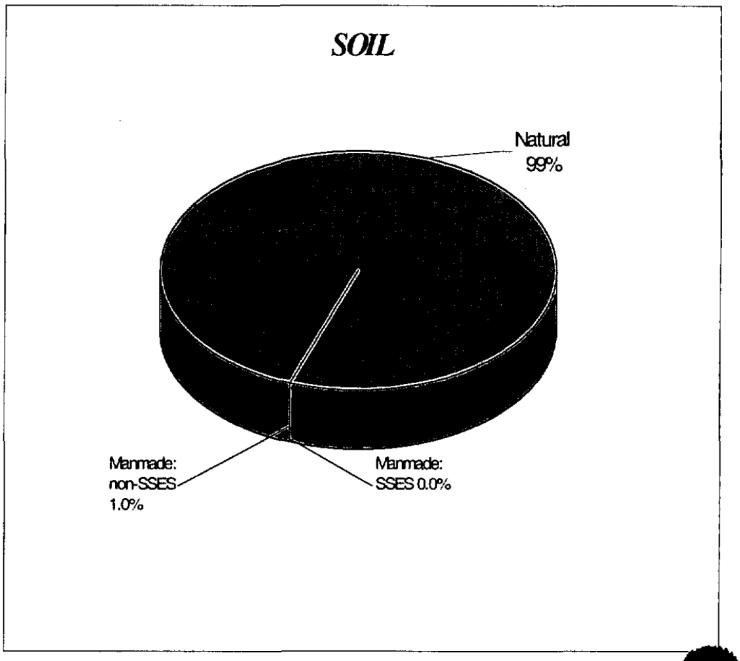
AQUATIC PATHWAY

PERCENT TOTAL GAMMA ACTIVITY



TERRESTRIAL PATHWAY

PERCENT TOTAL GAMMA ACTIVITY



Naturally occurring radionuclides accounts for over 98.0 % of the gamma-emitting activity in both sediment and soil in 2006. Man-made radionuclides of SSES origin accounted for 1.0% of the gamma-emitting activity in sediment and 0.0% soil during 2006. Man-made radionuclides of non-SSES origin account for the rest of the gamma-emitting activity in sediment and soil during 2006.

Radionuclides Contributing to Dose from SSES Operation

Of the three man-made radionuclides reported in the environment by the SSES REMP (i.e. H-3, I-131 and Cs-137), tritium and cesium are the only radionuclides attributable to SSES operation.

The whole body and organ dose to members of the public attributable to tritium identified in REMP blowdown samples was 0.0012 mrem.

Tritium was included in the dose calculation because it was identified in the REMP samples of water being discharged to the river. The concentration of tritium in the water and the volume of water discharged were used to determine the amount of tritium released. The presumed exposure pathways to the public from this radionuclide were drinking water taken from the Susquehanna River at Danville, PA, and eating fish caught near the SSES discharge to the river. This assumption is based on the fact that tritium does not emit gamma radiation and the beta radiation emitted by tritium is not sufficiently penetrating to reach an individual on the shore.

The maximum calculated dose to a member of the public based on Cesium-137 concentration identified in the sediment sample (waterborne pathway) at location 7B in the 4th quarter was 0.0040 mrem/year.

INTRODUCTION

Radiological Environmental Monitoring Program (REMP)

The SSES is located on approximately an 1500-acre tract along the Susquehanna River, five miles northeast of Berwick in Salem Township, Luzerne County, Pennsylvania. The area around the site is primarily rural, consisting predominately of forest and agricultural lands. (More specific information on the demography, hydrology, meteorology, and land use characteristics of the area in the vicinity of the SSES can be found in the Environmental Report (Reference 1), the Final Safety Analysis Report (Reference 2), and the Final Environmental Statement (Reference 3) for the SSES.)

The SSES implements the REMP in accordance with Technical Specifications, Technical Requirements Manual and the Offsite Dose Calculation Manual, which are based on the design objectives in 10CFR Part 50 Appendix I, Sections IV.B.2, IV.B.3, and IV.C.
The REMP supplements the results of the radioactive effluent-monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation in the environment are not higher than expected on the basis of the effluent measurements and modeling of the environment in the vicinity of the SSES.

Key objectives of the SSES REMP are as follows:

- Document compliance with SSES REMP Technical Requirements radiological environmental surveillances
- Verify proper implementation of SSES radiological effluent controls
- Identify, measure, and evaluate trends of radionuclide concentrations in environmental pathways near SSES
- Assess impact of SSES Effluents on the environment and the public

PPL has maintained a Radiological Environmental Monitoring Program (REMP) in the vicinity of the Susquehanna Steam Electric Station Units 1 and 2 since April, 1972, prior to construction of both units and ten years prior to the initial operation of Unit 1 in September, 1982. The purpose of the preoperational REMP (April, 1972 to September, 1982) was to establish a baseline for radioactivity in the local environment that could be compared with the radioactivity levels observed in various environmental media throughout the operational lifetime of the SSES. This comparison facilitates assessments of the radiological impact of the SSES operation.

Potential Exposure Pathways

The three pathways through which radioactive material may reach the public from nuclear power plants are the atmospheric, terrestrial, and aquatic pathways. (Figure 1 depicts these pathways for the intake of radioactive materials.)

Mechanisms by which people may be exposed to radioactivity and radiation in the environment vary with the pathway. Three mechanisms by which a member of the public has the potential to be exposed to radioactivity or radiation from nuclear power plants such as the SSES are as follows:

- inhalation (breathing)
- ingestion (eating and drinking), and
- whole body irradiation directly from a plant or from immersion in the radioactive effluents.

REMP Scope

The scope of the SSES REMP was developed based on the NRC's Radiological Assessment Branch Technical Position on radiological environmental monitoring, as described in Revision 1, November 1979 (Reference 4). However, the REMP conducted by PPL for the SSES exceeds some of the monitoring suggested by the NRC's branch technical position, in terms of the number of monitoring locations, the frequency of certain monitoring, the types of analyses required for the samples, and the achievable analysis sensitivities.

During the operational period of the SSES, two different categories of monitoring locations, called control and indicator locations, were established to further assist in assessing the impact of station operation. Control locations are located at sites where it is considered unlikely that radiation or radioactive material from normal station operation would be detected. Indicator locations are sited where it is expected that radiation and radioactive material that might originate from the station would be most readily detectable.

Control locations for the atmospheric and terrestrial pathways are more than 10 miles from the station. Preferably, the controls also are in directions from the station less likely to be exposed to wind blowing from the station than are the indicator locations. Control locations for the aquatic pathway, the Susquehanna River, are upstream of the station's discharge to the river.

Indicator locations are selected primarily on the basis of proximity to the station, although factors such as meteorology, topography, and sampling practicality also are considered. Indicator locations for the atmospheric and terrestrial pathways are typically less than 10 miles from the station. Most often, they are within 5 miles of the station. Indicator locations in the Susquehanna River are downstream of the station's discharge. Monitoring results from indicator locations are compared with results from control locations. These comparisons are made to discern any differences in the levels and/or types of radioactive material and/or radiation that might exist between indicators and controls and that could be attributable to the station.

In 2006 , the SSES REMP collected 902 samples at 32 locations and performed 1,280 analyses. In addition, the REMP monitors ambient radiation levels using thermoluminescent dosimeters (TLDs) at 58 indicator and control locations, resulting in 231 radiation level measurements in 2006. The media monitored and analyses performed are summarized in the table below. Figures 2 through 7 display the REMP TLDs and sampling locations in the vicinity of the SSES. Appendix C provides directions, distances, and a brief description of each of the locations in Figures 2 through 7.

REMP Monitoring Sensitivity

Detection of radiation and radioactive material from the SSES in the environment is complicated by the presence of naturally occurring radiation and radioactive materials from both terrestrial and cosmic sources. Man-made radiation and radioactive material from non-SSES sources, such as nuclear fallout from previous nuclear weapons tests and medical wastes, also can make identification of SSES radiation and radioactive material difficult. Together, this radiation and radioactive material present background levels from which an attempt is made to distinguish relatively small contributions from the SSES. This effort is further complicated by the natural variations that typically occur from both monitoring location to location and with time at the same locations.

The naturally occurring radionuclides potassium-40, beryllium-7, actinium-228, thorium-228, and tritium are routinely observed in certain environmental media. Potassium-40 has been observed in all monitored media and is routinely seen at readily detectable levels in such media as milk, fish, fruits and vegetables. Seasonal variations in beryllium-7 in air samples are regularly observed. Man-made radionuclides, such as cesium-137 left over from nuclear weapons testing are often observed as well. In addition, the radionuclide tritium, produced by both cosmic radiation interactions in the upper atmosphere as well as man-made (nuclear weapons), is another radionuclide typically observed.

SSES REMP	
Type of Monitoring	**Media Monitored**
Gross Beta Activity	Drinking Water and Air Particulates
Gamma-Emitting Radionuclide Activities	All Media
Tritium Activity	All Waters
Iodine-131 Activity	Surface Water, Air & Milk
Gamma Radiation Exposure (by TLD)	Ambient Radiation Levels

Radioactivity levels in environmental media are usually so low that their measurements, even with state-of-the-art measurement methods, typically have significant degrees of uncertainty associated with them (Reference 5). As a result, expressions are often used when referring to these measurements that convey information about the levels being measured relative to the measurement sensitivities. Terms such as "minimum detectable concentration" (MDC) are used for this purpose. The MDC is an "a priori" estimate of the capability for detecting an activity concentration by a given measurement system, procedure, and type of sample. Counting statistics of the appropriate instrument background are used to compute the MDC for each specific analysis. The formulas used to calculate MDCs may be found in procedures referenced in Appendix A.

The methods of measurement for sample radioactivity levels used by PPL's contracted REMP radioanalytical laboratories are capable of meeting the analysis sensitivity requirements found in the SSES Technical Requirements.

Exposure Pathways to Humans

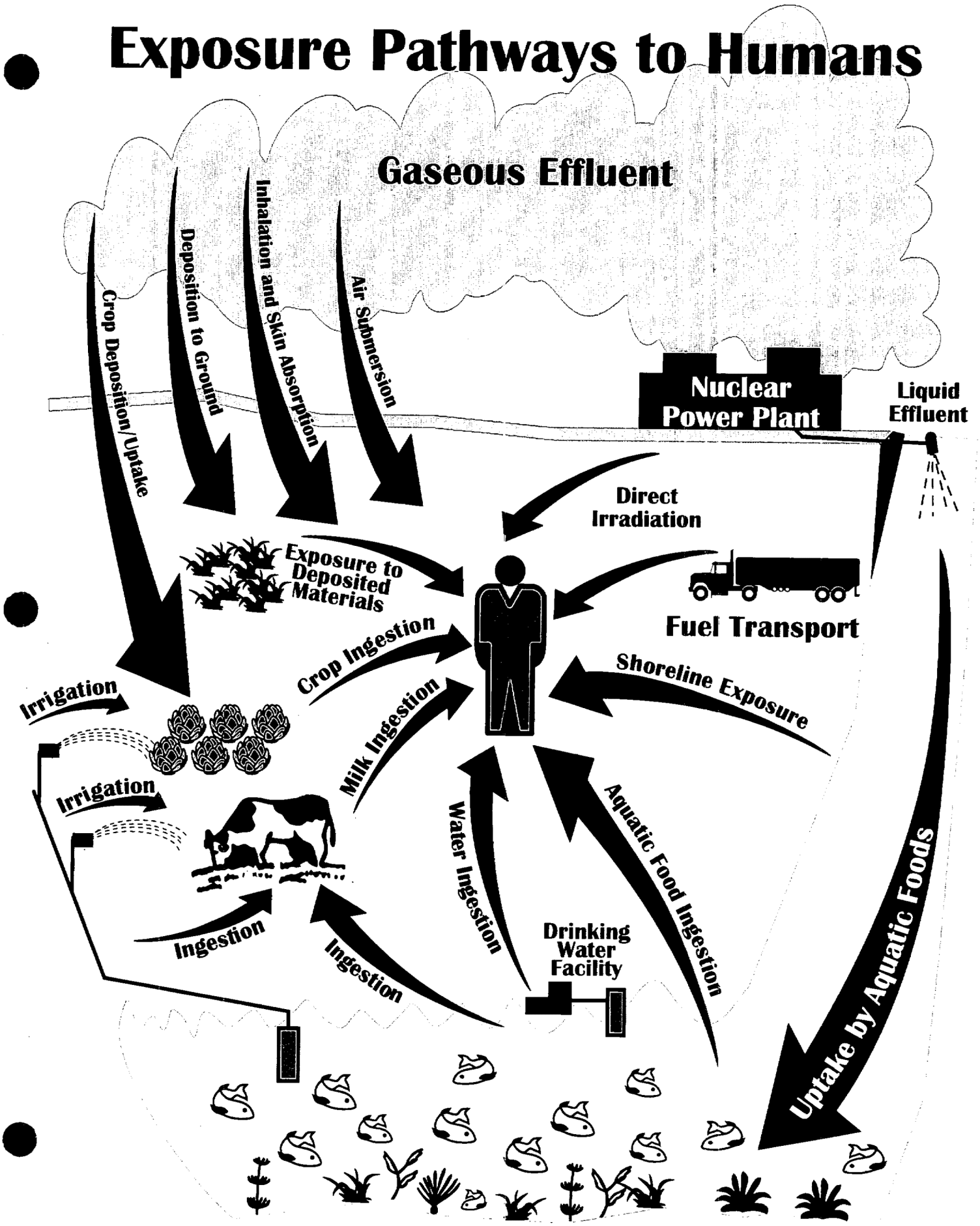


Figure 1

FIGURE 2
2006 TLD MONITORING LOCATIONS
WITHIN ONE MILE

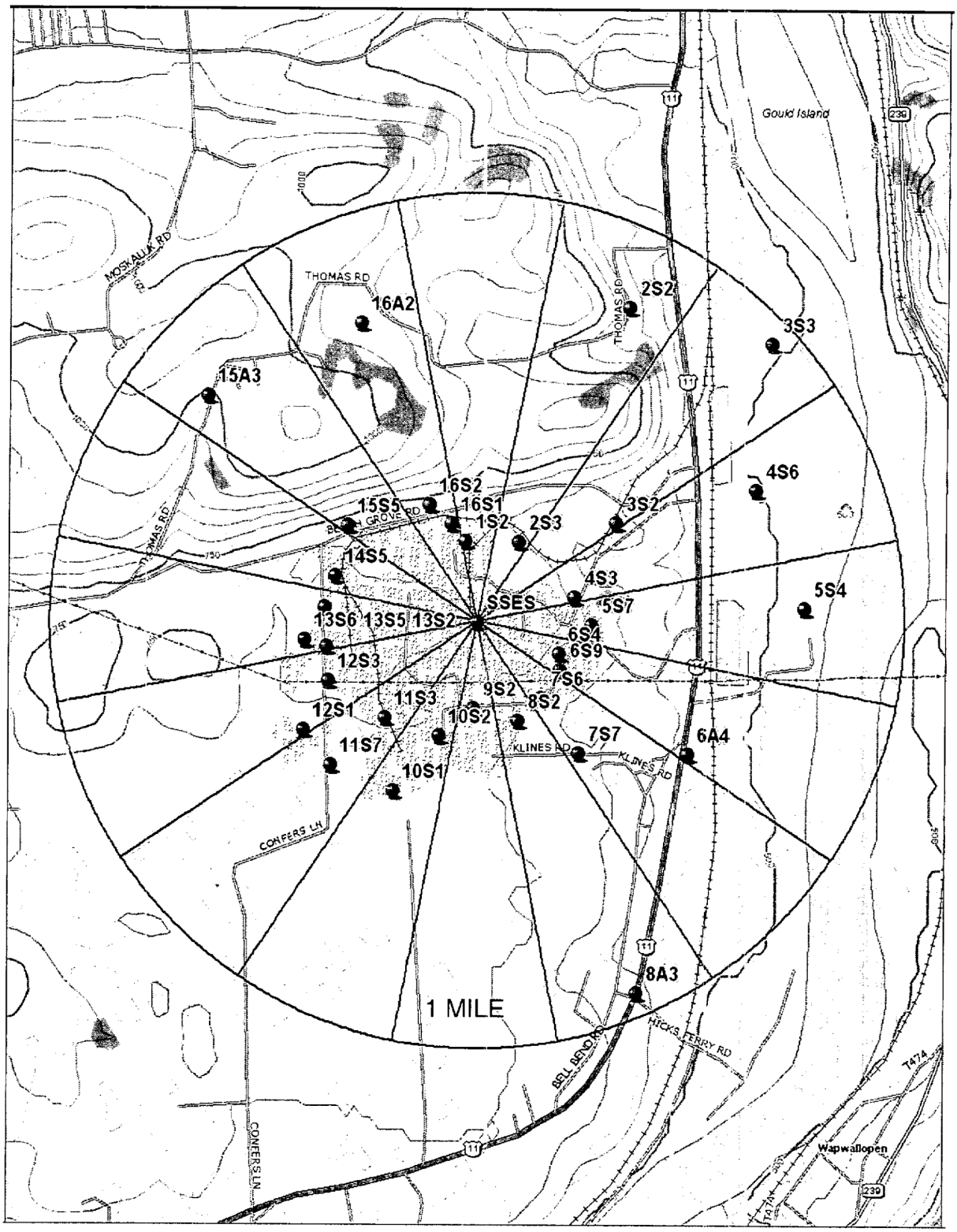


FIGURE 3
2006 TLD MONITORING LOCATIONS
FROM ONE TO FIVE MILES

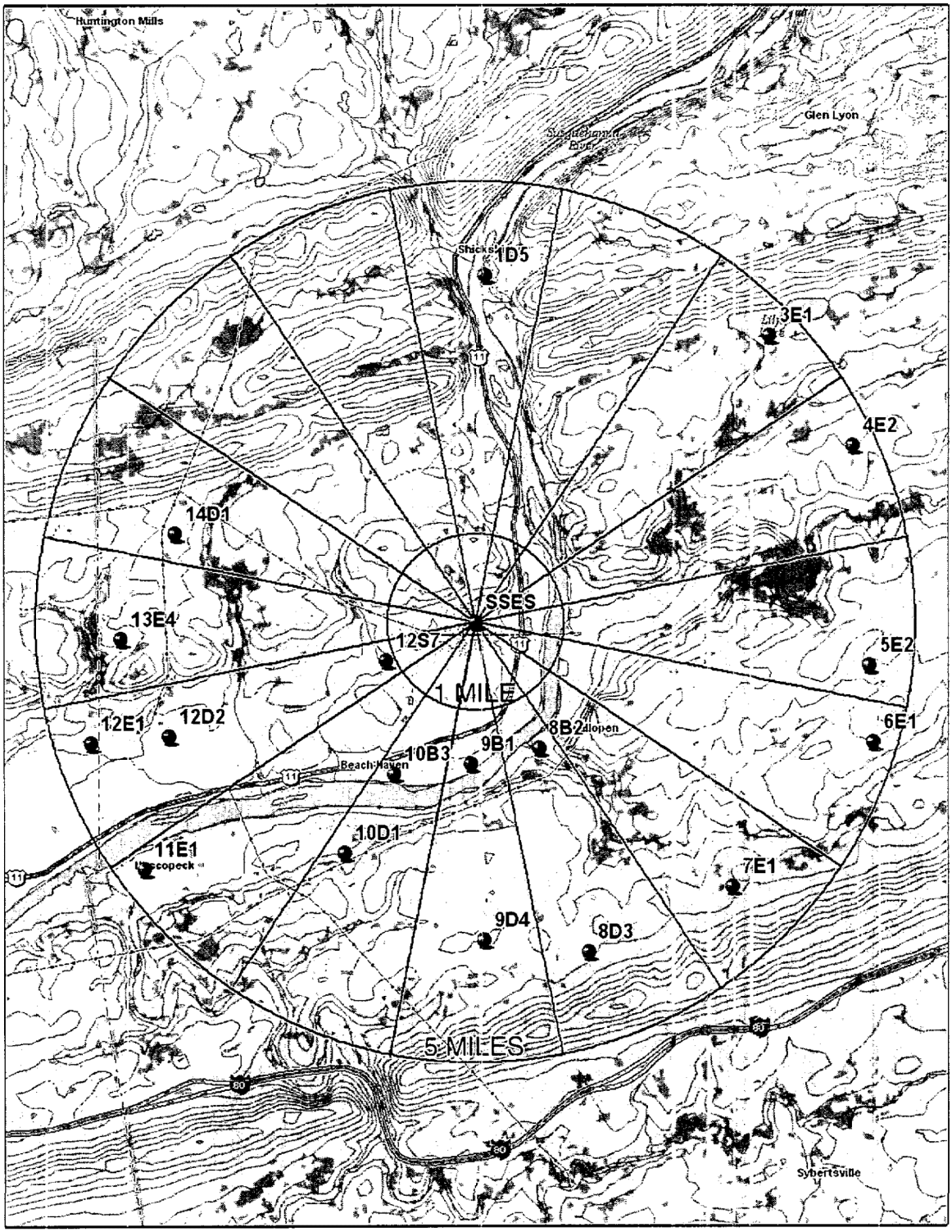


FIGURE 4
2006 TLD MONITORING LOCATIONS
GREATER THAN FIVE MILES

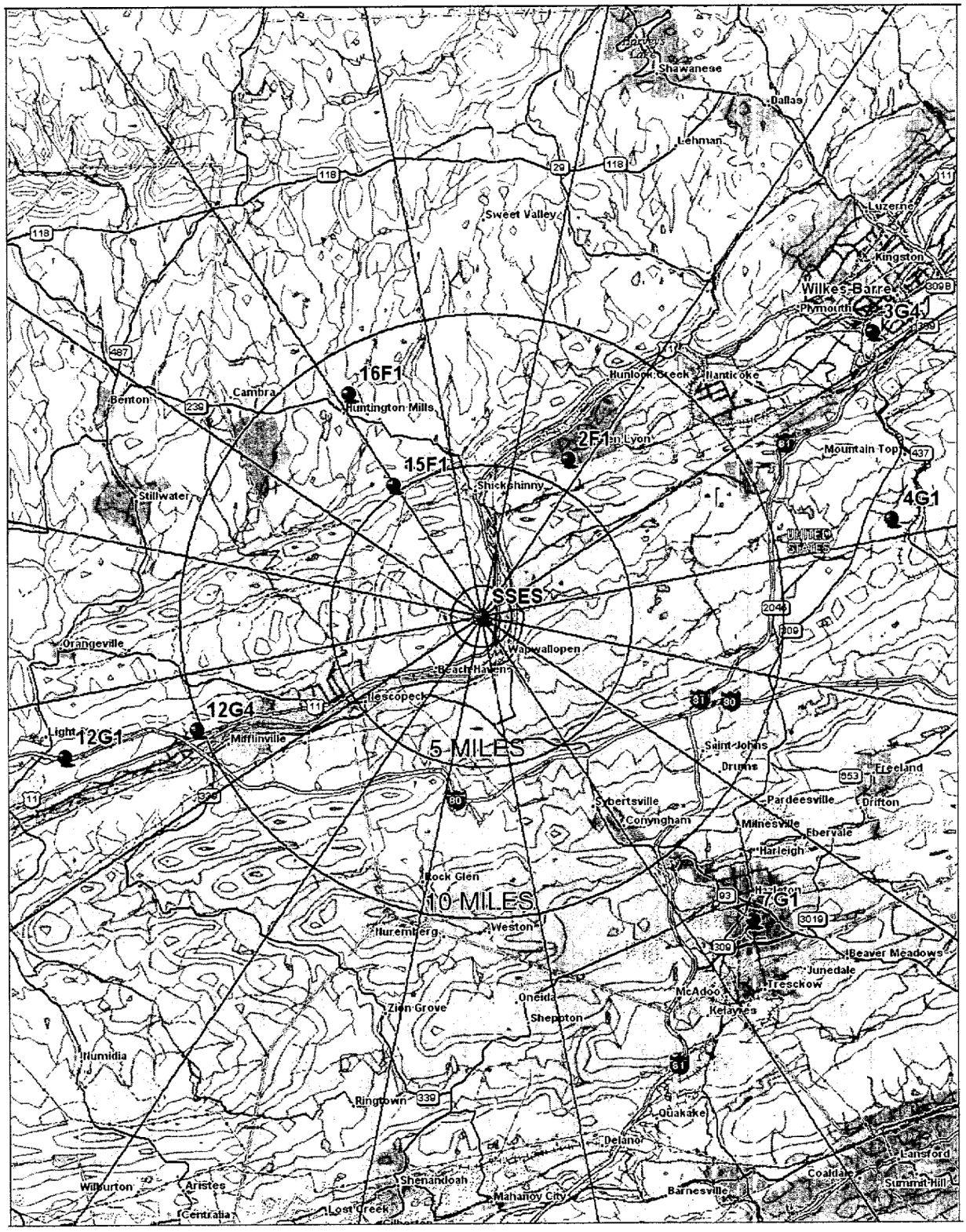


FIGURE 5
2006 ENVIRONMENTAL SAMPLING LOCATIONS WITHIN ONE MILE

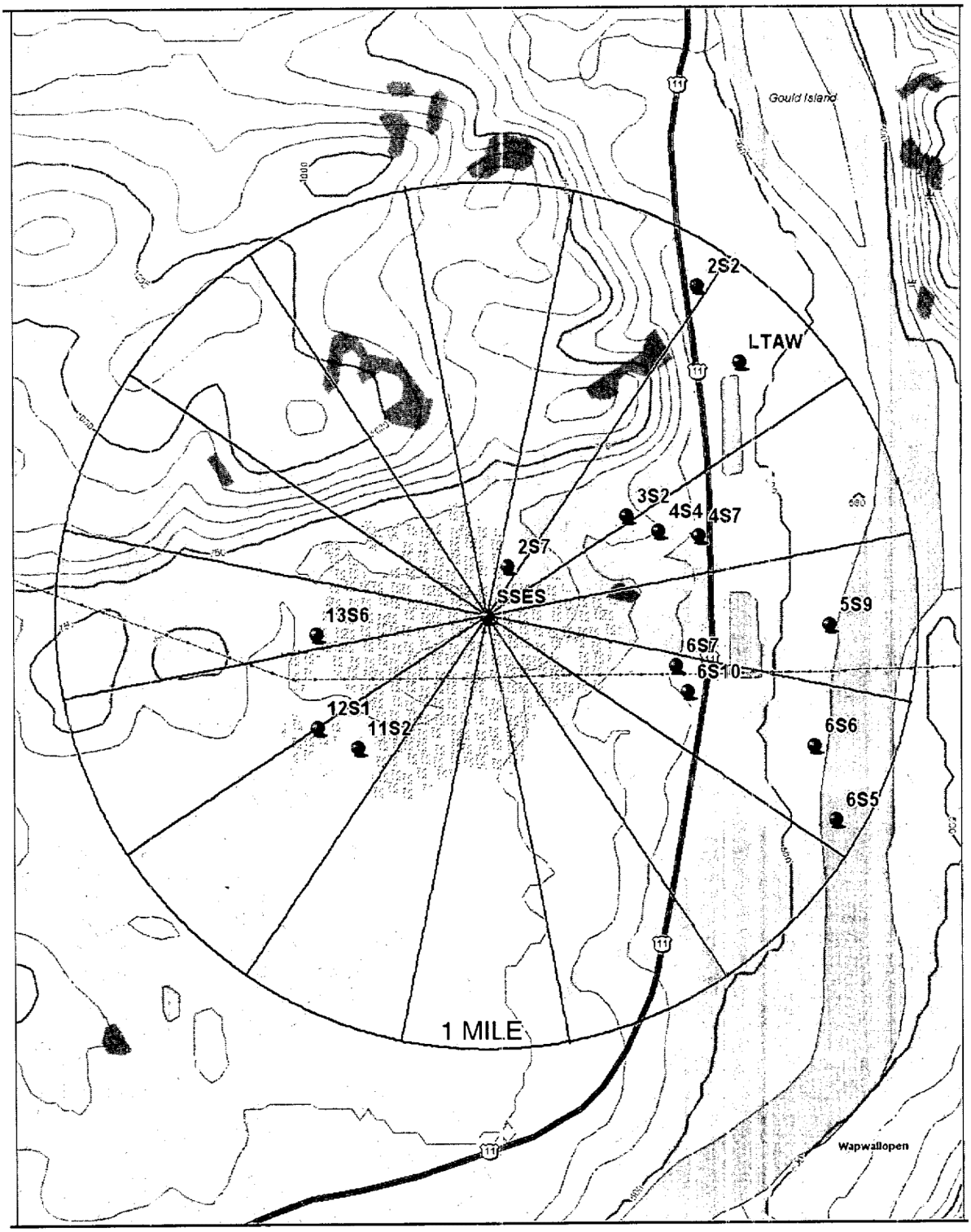


FIGURE 6
2006 ENVIRONMENTAL SAMPLING LOCATIONS
FROM ONE TO FIVE MILES

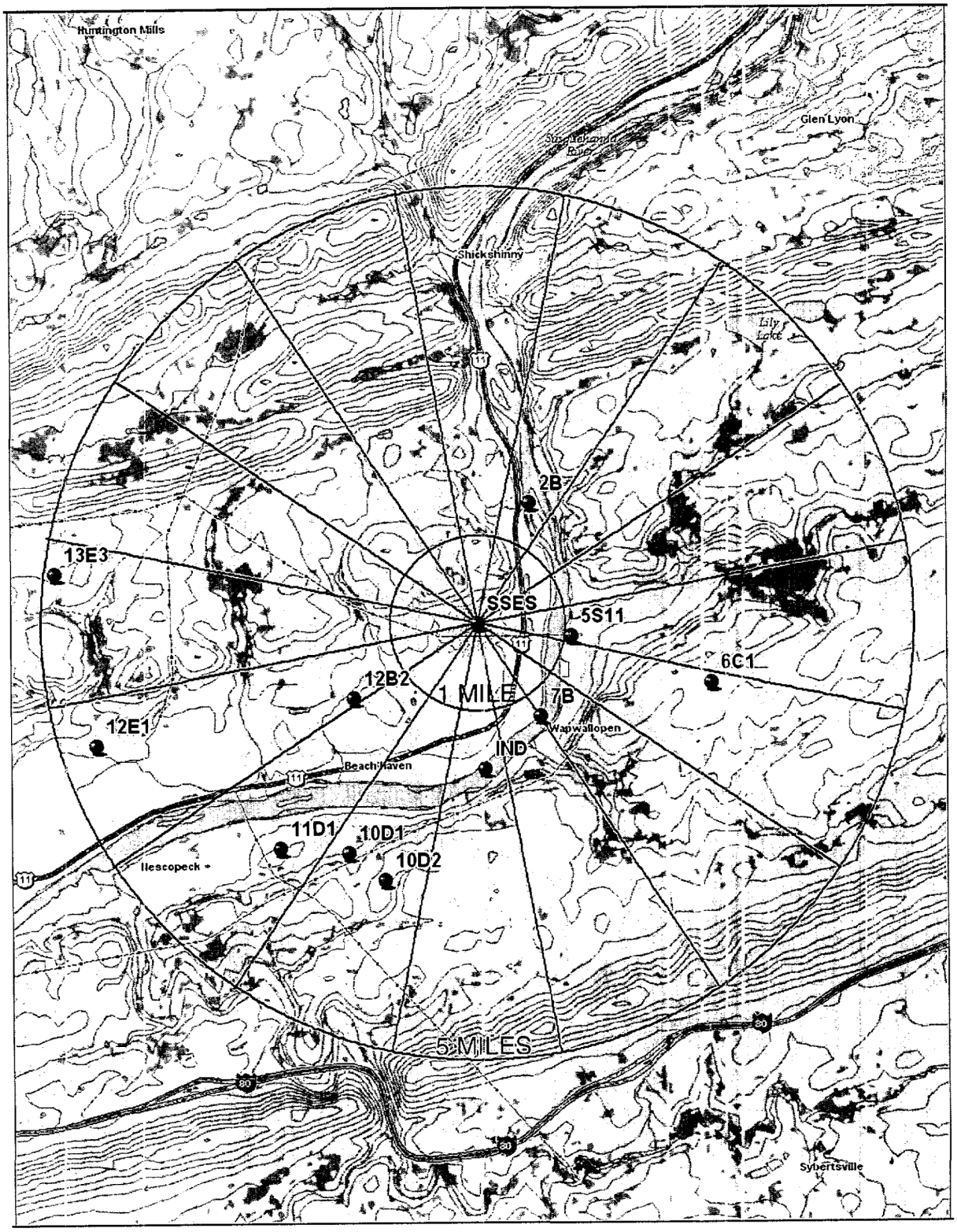
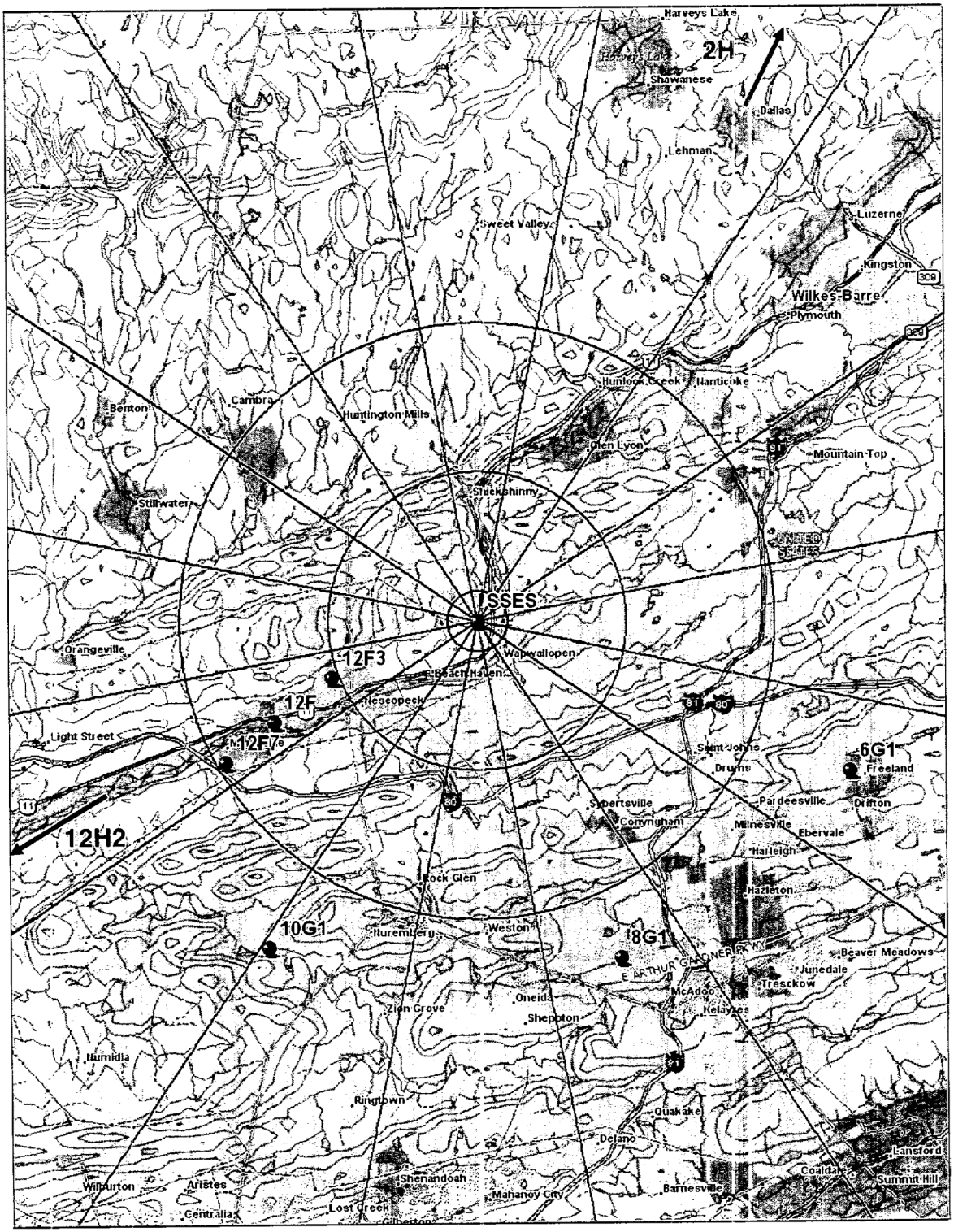


FIGURE 7
2006 ENVIRONMENTAL SAMPLING LOCATIONS
GREATER THAN FIVE MILES



AMBIENT RADIATION MONITORING

INTRODUCTION

The primary method for the SSES REMP measurement of ambient radiation levels is the use of thermoluminescent dosimeters (TLDs). The TLDs are crystals (calcium sulfate) capable of detecting and measuring low levels of radiation by absorbing a portion of the radiation's energy that is incident upon them and storing the captured energy until the TLDs are processed (read). Processing involves heating the TLDs to release their stored energy in the form of light and measuring the intensity of the light that they emit. The intensity of the emitted light is proportional to the amount of radiation to which they were exposed. Calibration of the TLD processors permits a reliable relationship to be established between the light emitted and the amount of radiation dose received by the TLDs. The result permits accurate measurements of the ambient radiation in the environment.

Environmental TLDs are continually exposed to natural radiation from the ground (terrestrial radiation) and from the sky (cosmic) radiation. In addition, they also may be exposed to man-made radiation. Most of the environmental TLD's natural radiation exposure comes from sources in the ground. These terrestrial sources vary naturally with time due to changes in soil moisture, snow cover, etc. The natural-radiation picture is complicated because the factors affecting radiation reaching the TLDs from the ground vary differently with time from one location to another due to locational differences in such factors as soil characteristics (amounts of organic matter, particle size, etc.), drainage opportunities, and exposure to sunlight. Environmental TLDs can also be affected by direct radiation (shine) from the SSES turbine buildings during operation, radwaste transfer and storage, and radioactive gaseous effluents from the SSES.

Unfortunately, TLDs do not have any inherent ability to indicate the source of the radiation to which they are exposed. The placement of numerous TLDs in the environment can facilitate decision-making about the possible radiation sources to which TLDs are exposed. However, a method for evaluating TLD data is still required. The SSES REMP relies on a statistically based approach to simultaneously compare indicator TLD data with control TLD data and operational TLD data with preoperational TLD data. This approach permits the flagging of environmental TLD doses that might have been produced by both man-made sources of radiation, as well as natural radiation sources. It also provides a means for attributing a portion of the total TLD dose to SSES operation if appropriate.

Interpretation of environmental TLD results is described in PPL Nuclear Engineering Study, EC-ENVR-1012 (Revision 0, January 1995).

Scope

Direct radiation measurements were made using Panasonic 710A readers and Panasonic UD-814 (calcium sulfate) thermoluminescent dosimeters (TLD). During 2006, the SSES REMP had 47 indicator, 6 special interest and 5 control TLD locations. Refer to Table C1 and C2 for TLD measurement locations. The TLD locations are placed on and around the SSES site as follows:

A site boundary ring (i.e. an inner ring) with at least 1 TLD in each of the 16 meteorological sectors, in the general area of the site boundary. Currently there are 31 locations. They are: (1S2, 2S2, 2S3, 3S2, 3S3, 4S3, 4S6, 5S4, 5S7, 6S4, 6S9, 7S6, 7S7, 8S2, 8A3, 9S2, 9B1, 10S1,10S2, 11S3, 11S7, 12S1, 12S3, 12S7, 13S2, 13S5, 13S6, 14S5, 15S5, 16S1 and 16S2) near and within the site perimeter representing fence post doses from a SSES release.

An outer distance ring with at least 1 TLD in each of the 16 meteorological sectors, in the 3 to 9 mile range from the site. Currently there are 16 locations. They are: (1D5, 2F1, 3E1, 4E2, 5E2, 6E1, 7E1, 8D3, 9D4, 10D1, 11E1, 12D2, 13E4, 14D1, 15F1 and 16F1). These TLD's are located to measure possible exposures to close-in population.

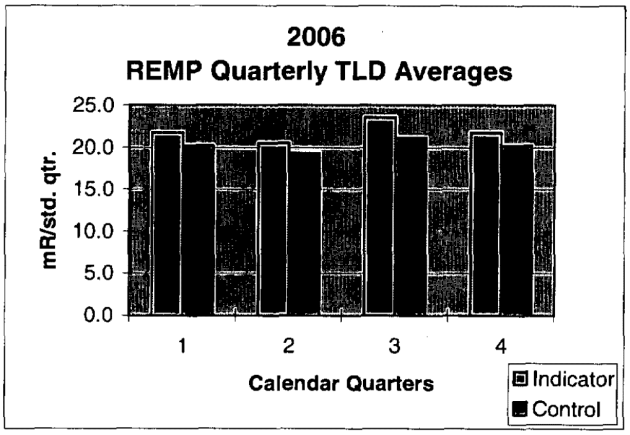
The balance of TLD locations represents the special interest areas such as population centers, schools, residences and control locations. Currently there are six special interest locations (6A4, 15A3, 16A2, 8B2, 10B3 and 12E1) and 5 control locations (3G4, 4G1, 7G1, 12G1 and 12G4).

The specific locations were determined according to the criteria presented in the NRC Branch Technical Position on Radiological Monitoring (Revision 1, November 1979).

Monitoring Results

TLDs

The TLDs were exchanged quarterly and processed by the SSES Health Physics Dosimetry Group. Average quarterly ambient gamma radiation levels measured by environmental TLDs is shown in the bar graph below.



The average environmental results for all indicator and control TLD were 21.7 +/- 8.8 and 20.2 +/- 3.0 (mR/std.qtr.), respectively.

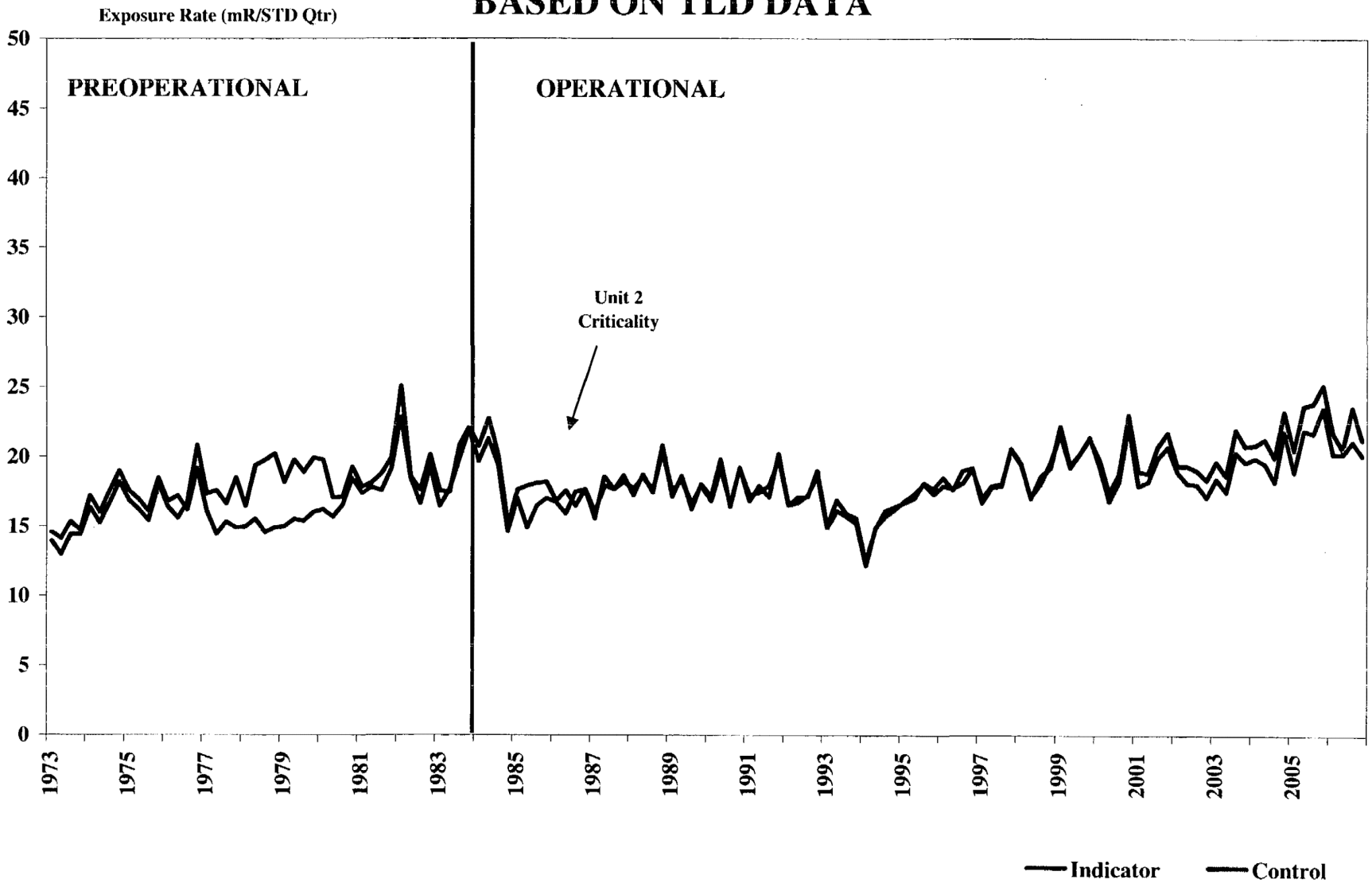
Indicator environmental TLD results for 2006 were examined quarterly on an individual location basis and compared with both current control location results and preoperational data. Very small SSES exposure contributions were identified during 2006 at ten onsite locations as follows: 1S2, 6S4, 6S9, 7S6, 9S2, 10S2, 11S3, 12S3, 13S2, and 13S5.

The highest, estimated, gamma radiation dose of 3.28 E-02 mrem for 2006 was at location 9S2. It is assumed that the occupancy time for a member of the public is no more than one hour each calendar quarter at location 9S2. This dose is approximately 0.13% of the 25 mrem whole-body SSES Technical Requirements (TRO 3.11.3) limit for all SSES sources of radioactivity and radiation.

Refer to the following for results of TLD measurements for 2006:

- Figure 8, trends quarterly TLD results for both preoperational and operational periods
- Appendix G, Table G Summary of Data Table, page G-3 shows the averages for TLD indicator and control locations for the entire year.
- Appendix H, Table H1, page H-3 shows a comparison of the 2006 mean indicator and control TLD results with the means for the preoperational and operational periods at the SSES.
- Appendix I, Table I-1, page I-3 through I-7 shows TLD results for all locations for each quarter of 2006.

FIGURE 8 - AMBIENT RADIATION LEVELS BASED ON TLD DATA



AQUATIC PATHWAY MONITORING

INTRODUCTION

In 2006 the SSES REMP monitored the following media in the aquatic pathway: surface water, drinking water, fish, sediment, fruits and vegetables. Some of the media (e.g., drinking water and fish) provide information that can be especially useful to the estimation of possible dose to the public from potentially ingested radioactivity, if detected. Other media, such as sediment, can be useful for trending radioactivity levels in the aquatic pathway, primarily because of their tendency to assimilate certain materials that might enter the surface water to which they are exposed. The results from monitoring all of these media provide a picture of the aquatic pathway that is clearer than that which could be obtained if one or more were not included in the REMP.

SSES Technical Requirements only require that fruit and vegetables be sampled at locations irrigated by Susquehanna River water from points downstream of the SSES discharge to the River. The land use census (Reference 11) conducted in 2006 looked at farms within 10 miles downstream of the SSES. The Zehner Farm (11D1-field east of Nescopeck) irrigated pumpkins, soybeans and rye in August 2006, using Susquehanna River water. No other fields within 10 miles downriver of Susquehanna SES were irrigated in 2006.

The aquatic pathway in the vicinity of the SSES is the Susquehanna River.

Monitoring of all of the aquatic media, except drinking water, is conducted both downstream and upstream of the location from which occasional SSES low-level radioactive discharges enter the river. The upstream monitoring locations serve as controls to provide data for comparison with downstream monitoring results. The potential exists for radioactive material that might be present in SSES airborne releases to enter the Susquehanna River upstream of the plant through either direct deposition (e.g., settling or washout) or by way of runoff from deposition on land adjacent to the river. However, direct deposition and runoff are considered to be insignificant as means of entry for SSES radioactivity into the Susquehanna River when compared to liquid discharges under normal conditions.

Lake Took-a-While (LTAW), which is located in PPL's Riverlands Recreation Area adjacent to the Susquehanna River, is also considered to be part of the aquatic pathway for monitoring purposes. Although it is not in a position to receive water discharged to the river from the SSES, it can receive storm runoff from the SSES. Storm runoff from the SSES site should not normally contain any measurable radioactivity from the plant. However, the SSES REMP, consistent with other aspects of aquatic monitoring and the REMP, in general, goes beyond its requirements by monitoring LTAW.

Scope

Surface Water

Surface water was routinely sampled from the Susquehanna River at one indicator location (6S5/Outfall Area) and one control location (6S6/River Water Intake Line) during 2006. Sampling also took place at the following additional indicator locations: the SSES discharge line to the river (2S7/6S7), Lake Took-A-While (LTAW) and the Peach Stand Pond (4S7).

Drinking Water

Drinking water samples were collected at location 12H2, the Danville Municipal Water Authority's treatment facility on the Susquehanna River, in 2006. Treated water is collected from the end of the processing flowpath, representing finished water that is suitable for drinking. This is the nearest point downstream of the SSES discharge to the River at which drinking water is obtained. No drinking water control location is sampled. For all intents and purposes, control surface water sampling location (6S6) would be suitable for comparison.

Fish

Fish were sampled from the Susquehanna River in the spring and fall of 2006, at one indicator location, IND, downstream of the SSES liquid discharge to the River and one control location, 2H, sufficiently upstream to essentially preclude the likelihood that fish caught there would spend any time below the SSES discharge. In addition, fish were also sampled in the fall from PPL's Lake Took-a-While, location LTAW. This location is not downstream of the SSES discharge. It is sampled because of its potential for receiving runoff from the SSES. LTAW is considered an indicator location.

Sediment

Sediment sampling was performed in the spring and fall at indicator locations 7B and 12F and control location 2B on the Susquehanna River.

Fruits and Vegetables

Fruits and vegetables were sampled at indicator location 11D1. This location was irrigated with Susquehanna River water in 2006. The edible portions are kept for analysis.

Sampling

Surface Water

Weekly water samples were collected at indicator location 6S5 for both biweekly and monthly compositing. Location 6S5 was considered a backup for locations 2S7 and 6S7 in the event that water could not be obtained from the automatic samplers at these locations. Routine samples for 6S5 were collected from a boat, unless river conditions prohibited boating. When this occurs, samples are collected from an alternate shoreline site located below the Susquehanna SES discharge diffuser. The shoreline samples are collected at the Wetlands Cottage area, approximately 100-150 yards down river from the 6S5 site.

Indicator locations 2S7 and 6S7, the SSES Cooling Tower Blowdown Discharge (CTBD) line, and control location 6S6, the SSES River Water Intake structure, were time -

proportionally sampled using automatic continuous samplers. The samplers were typically set to obtain 30-60 ml aliquots every 20-25 minutes. Weekly, the water obtained by these samplers was retrieved for both biweekly and monthly compositing.

The other surface water monitoring locations, LTAW and Peach Stand Pond (4S7), were grab sampled once each quarter.

Drinking Water

Treated water was time-proportionally sampled by an automatic sampler. The sampler was typically set to obtain three 12-ml aliquots every twenty minutes. Weekly, the water obtained by this sampler was retrieved for monthly compositing.

Fish

Fish were obtained by electrofishing. Electrofishing stuns the fish and allows them to float to the surface so that those of the desired species and sufficient size can be sampled. Sampled fish include recreationally important species, such as smallmouth bass, and also channel catfish and shorthead redhorse. The fish are filleted and the edible portions are kept for analysis.

Sediment

Shoreline sediment was collected to depths of four feet of water.

Fruits and Vegetables

Pumpkins, soybeans and rye which were irrigated with river water downstream from SSES, were sampled during the harvest season.

Sample Preservation and Analysis

Surface and Drinking Water

Surface water samples were analyzed monthly for gamma-emitting radionuclides and tritium activities. One biweekly surface composite sample was analyzed for I-131 activity each month. Drinking water samples were analyzed monthly for beta, gamma-emitting radionuclides, and tritium activities.

Sediment and Fish

Fish are frozen until shipment. All samples are analyzed by gamma spectroscopy for the activities of any gamma emitting radionuclides that may be present.

Monitoring Results

Surface Water

Refer to the following for results of surface water analyses for 2006:

- Appendix G, Table G page G-3 and G-4, shows a summary of the 2006 surface water data.
- Appendix H, Tables H 3 and H 4, shows comparisons of iodine-131 and tritium monitoring results against past years data.
- Appendix I, Tables I-2 and I-3, shows specific results of tritium, gamma spectroscopic and iodine-131 analyses of surface water samples.

The Nuclear Regulatory Commission (NRC) requires that averages of the

activity levels for indicator environmental monitoring locations and for control environmental monitoring locations of surface water, as well as other monitored media, be reported annually. Data from the following four surface water monitoring locations were averaged together as indicators for reporting purposes: location (6S5) on the Susquehanna River downstream of the SSES, Lake-Took-a While (LTAW) adjacent to the river, and the SSES cooling tower blowdown discharge (CTBD) line to the river (2S7/6S7), and the Peach Stand Pond (Secondary Sediment Pond).

Technically, the CTBD line is not part of the environment. The CTBD line is a below ground pipe to which the public has no access, contrary to the other environmental monitoring locations on the Susquehanna River to which the public does have access. However, currently there is no automatic composite sampling of an indicator location on the Susquehanna River, so the CTBD line from the SSES is included as an indicator monitoring location in the radiological environmental monitoring program.

Most of the water entering the Susquehanna River through the SSES CTBD line is simply water that was taken from the river upstream of the SSES, used for cooling purposes without being radioactively contaminated by SSES operation, and returned to the river. Batch discharges of relatively small volumes of slightly radioactively contaminated water are made to the river through the SSES CTBD at times throughout each year. The water is released from tanks of radioactively contaminated water on site to the CTBD and mixes with the noncontaminated water already present in the CTBD. Flow rates from the tanks containing radioactively contaminated water being discharged to the CTBD vary based on the radioactivity level of the batch release. In addition, the minimum flow rate for the returning water in the CTBD is maintained at a flow rate of 5,000 gpm or higher. These requirements are in place to ensure adequate dilution of radioactively contaminated water by the returning noncontaminated water in the CTBD prior to entering the river.

At the point that CTBD water enters the river, additional, rapid dilution of the discharged water by the river is promoted by releasing it through a diffuser. The diffuser is a large pipe with numerous holes in it that is positioned near the bottom of the river. CTBD discharges exit the diffuser through the many holes, enhancing the mixing of the discharge and river waters. The concentrations of contaminants are reduced significantly as the discharged water mixes with the much larger flow of river water. The mean flow rate of the Susquehanna River in 2006 was approximately 9,100,000 gpm. The CTBD average flow during 2006 was 8,730 gpm. Based on the average river flow and the average CTBD flow during 2006, liquid discharges from the SSES blowdown line were diluted by approximately a factor of 1,000 after entering the river. The amount of radioactively contaminated water being discharged is small. Nevertheless, sensitive analyses of the water samples can often detect the low levels of certain types of

radioactivity in the CTBD water following dilution. Though the levels of radioactivity measured in the CTBD water are generally quite low, they tend to be higher than those in the river downstream of the SSES. Most radionuclides discharged from the SSES CTBD are at such low levels in the downstream river water that, even with the sensitive analyses performed, they cannot be detected.

When the radioactivity levels from the CTBD samples throughout the year are averaged with those obtained from actual downstream monitoring locations, the result is an overall indicator location average that is too high to be representative of the actual average radioactivity levels of the downstream river water. As the following discussions are reviewed, consideration should be given to this inflation of average radioactivity levels from the inclusion of CTBD (location 2S7/6S7) results in the indicator data that is averaged.

Surface Water Iodine-131

Bi-weekly (once per month) samples from surface water locations were analyzed for concentrations of iodine-131 activity (Table I-3 and Table G). The 2006 indicator values range from -0.482 to 1.21pCi/l compared to -0.33 to 4.0 for 2005. Comparison of the 2006 mean iodine-131 activity of 0.34 pCi/l for all indicator locations to the average of the annual control mean of 0.36 pCi/l for pre-operational years suggests activity detected slightly below the preoperational control.

Throughout the course of a year, iodine-131 is typically measured at levels in excess of analysis MDCs in some samples obtained from control surface water monitoring locations on the Susquehanna River upstream of the SSES as well as indicator locations downstream of the SSES. As determined by measurements of samples obtained by the SSES REMP, the mean iodine-131 activity level from the CTBD for all of 2006 was 0.49 pCi/l compared to the control mean of 0.32 pCi/l for 2006. The 2006 mean iodine-131 activity of 0.19 pCi/l at the indicator 6S5 (Outfall Area) was slightly lower than the mean iodine-131 activity of 0.32 pCi/l at the control 6S6 (River Water Intake) location.

Iodine-131 from the discharge of medical wastes into the Susquehanna River upstream of the SSES is drawn into the SSES cooling tower basins through the SSES River Water Intake Structure. It is reasonable to assume that concentration of the already existing iodine-131 in the cooling tower basins occurs as it does for other substances found in the river. For example, the SSES routinely assumes concentration factors in the basin for calcium of four to five times the concentrations in the river water entering the basins, based on past measurements. This concentrating effect occurs because of the evaporation of the water in the basins, leaving behind most dissolved and suspended materials in the unevaporated water remaining in the basins. If a concentration factor of four for iodine-131 were to be applied to the 2006 mean iodine-131 activity level for the control samples from the Susquehanna River, a mean concentration of 1.28 pCi/liter for iodine-131 in the basin

water and the water being discharged from the basins would be expected. The actual 2006 mean of 0.49 pCi/l for the CTBD mean is less than half the expected mean.

Because iodine-131 is radioactive, unlike the calcium that has been measured, iodine-131 is removed from the water while it is in the basins through the radioactive decay process. Thus, it might be expected that the net concentration factor for iodine-131 would be somewhat less than that for calcium, considering this additional removal process. The extent to which the iodine-131 concentration factor is less than that for calcium would depend on the mean residence time for the water in the basins compared to iodine-131's radioactive half-life - the greater the ratio of the mean residence time to the half-life, the smaller the concentration factor. A mean residence time for water in the basins is expected to be about two days. This is only about one-fourth of the approximately eight-day half-life of iodine-131. Thus, radioactive decay would not be expected to reduce the concentration factor for iodine-131 by a large amount. Therefore, the difference between the 2006 mean iodine-131 activity of about 0.49 pCi/l in the CTBD and the 2006 mean iodine-131 activity for the control location of 0.32 pCi/l is most probably the result of concentration in the basins. Additional support for this assumption is that iodine-131 was not reported in water discharged from the SSES to the Susquehanna River during 2006.

Surface Water Tritium

Monthly samples from all surface water locations were analyzed for concentrations of tritium activity (Table I-2 and Table G). Tritium was detected in the indicator location above MDC. The 2006 indicator values ranged from -45 to 11,900 pCi/l compared to -354 to 11,000 for 2005. Comparison of the 2006 mean tritium activity of 2,104 pCi/l for all indicator locations to the average of the annual preoperational control mean of 171 pCi/l indicates a contribution of tritium activity from the SSES.

Refer to Figure 10 which trends tritium activity levels separately for surface water indicator and control locations from 1972 through 2006.

The much higher levels of tritium observed in the CTBD line (location 2S7/6S7), when averaged with the low levels from the downstream location 6S5 sample analysis results distort the real environmental picture. The mean tritium activity level from indicator location 6S5 for 2006 was 62.8 pCi/liter, which is greater than the mean tritium activity of 19.1 pCi/l for the control location and is within the range of prior operational and preoperational periods.

Tritium activity levels reported for 2S7/6S7 are from the discharge line prior to dilution in the river. The highest quarterly average tritium activity reported at 2S7/6S7 during 2006 was approximately 8,157 pCi/liter for the fourth quarter. This is well below the NRC Reporting Levels for quarterly average activity levels of 20,000 pCi/liter when a drinking water pathway exists or 30,000 pCi/liter when no drinking water pathway exists.

The tritium activity reported in the CTBD line from location 2S7/6S7 is attributable to the SSES. Refer to the "Dose from the Aquatic Pathway" discussion at the end of this section for additional information on the projected dose to the population from tritium and other radionuclides in the aquatic pathway attributable to the SSES.

No gamma-emitting radionuclides were detected in surface water samples above MDC, with the exception of iodine-131, Ra-226, Ac-228 and Th-228.

Drinking Water

Drinking water was monitored during 2006 at the Danville Water Company's facility 26 miles WSW of the SSES on the Susquehanna River at location 12H2.

There are no known drinking water supplies in Pennsylvania on the Susquehanna River upstream of the SSES and therefore no drinking water control monitoring locations. Danville drinking water analysis results may be compared to the results for surface water control monitoring locations.

Refer to the following for results of surface water analyses for 2006:

- Figure 11 trends gross beta activity levels for drinking water location 12H2 from 1977 through 2006.
- Appendix G, Table G page G-5 and G-6, shows a summary of the 2006 drinking water data.
- Appendix H, Table H 6 and H 7, shows comparisons of gross beta and tritium activity in drinking water for 2006 against past years' data.
- Appendix I, Table I-4 shows specific results of gross beta, tritium and gamma spectroscopic analyses of drinking water

Drinking Water Gross Beta

Monthly samples from the 12H2 drinking water location were analyzed for concentrations of gross beta activity (Table I-4). Beta activity was detected in the 12H2 location above MDC for 2006. The 2006 values ranged from 0.73 to 5.84 pCi/l compared to 1.45 to 3.37 for 2005.

Gross beta activity has been monitored in drinking water since 1977. Gross beta activity is typically measured at levels exceeding the MDCs in drinking water samples. The 2006 mean gross beta activity of 2.4 pCi/l is slightly below the mean gross beta activity of 2.5 for 2005 but is within the range of the preoperational (1977-81) values of 2.2 to 3.2 pC/l.

Drinking Water Tritium

Monthly samples from the 12H2 drinking water location were analyzed for concentrations of tritium activity (Table I-4). Tritium activity was not detected above MDC in any of the 14 drinking water samples in 2006. The 2006 values ranged from -132 to 62.5 pCi/l compared to -141 to 203 for 2005.

The 2006 mean tritium activity of -2.81 pCi/l for drinking water was lower than the mean tritium activity of 51.6 pCi/l for 2005 and is less than the preoperational (1977-81) values of 101 to 194 pCi/l. The 2006 mean tritium

activity level for drinking water is lower than the 2006 mean tritium activity level of 19.1 pCi/l for the surface water control location.

Drinking Water Gamma Spectroscopic

No gamma-emitting radionuclides were detected in drinking water samples above the MDC.

Fish

Refer to the following for results of fish analyses for 2006:

- Table G page G-7 shows a summary of the 2006 fish data.
- Table H 8 page H-4 shows comparisons of potassium-40 monitoring results against past years' data.
- Table I-5 page I-11 shows specific results of gamma spectroscopic analyses of fish.

Fish Gamma Spectroscopic

Semi-annual samples from the indicator (IND) and control (2H) fish locations were analyzed for concentrations of gamma activity (Table I-5).

Four species of fish were sampled at each of one indicator location and one control location on the Susquehanna River in the spring 2006 and again in fall 2006. The species included the following: smallmouth bass, channel catfish, and shorthead redhorse (fall) or white sucker (spring). In addition, one largemouth bass was sampled from PPL's LTAW in September 2006. A total of 13 fish were collected and analyzed.

The only gamma-emitting radionuclide reported in excess of analysis MDCs in fish during 2006 was naturally occurring potassium-40. The 2006 indicator values ranged from 2,640 to 4,250 pCi/kg compared to 2,600 to 4,320 for 2005. The 2006 indicator and control means for the activity levels of potassium-40 in fish were 3,467 pCi/kg and 3,873 pCi/kg, respectively. Naturally occurring potassium-40 in fish is not attributable to the liquid discharges from the SSES to the Susquehanna River.

Sediment

Refer to the following for results of sediment analyses for 2006:

- Appendix G, Table G pages G-8 and G-9, shows a summary of the 2006 sediment data.
- Appendix H, Tables H 9, 10, 11 and 12, shows comparisons of potassium-40, radium-226, thorium-228, and cesium-137 monitoring results against past years' data.
- Appendix I, Table I-6 shows specific results of gamma spectroscopic analyses of sediment samples.

Sediment Gamma Spectroscopic

Semi-annual samples from all sediment locations were analyzed for concentrations of gamma activity (Table I-6). Naturally occurring potassium-40, radium-226, Ac-228, and thorium-228 were measured at activity levels above MDCs in some shoreline sediment samples in 2006. The naturally occurring radionuclides in sediment are not attributable to the liquid discharges

from the SSES to the Susquehanna River.

Cesium-137 was measured at activity levels slightly above analysis MDCs in 4 of 6 shoreline sample analyses in 2006. The 2006 indicator and control means for cesium-137 activity in sediment were 59 pCi/kg and 101 pCi/kg, respectively. The 2006 indicator and control means compared to the 2005 means are essentially at the same values. These samples are within the annual mean for all prior operational as well as preoperational years of station operations. Typically cesium-137 has been observed in previous operational years in the 80 to 170 pCi/kg range and reported attributable to fall out from past weapons testing. Station operations does not typically release cesium-137 in liquid effluents; however, 2.5 E-5 Curies was reported as being released in liquid effluents during the fourth quarter of 2006. A Cs-137 concentration of 152 pCi/Kg was measured in a sample from indicator location 7B during the fourth quarter of 2006. The 7B sample result slightly exceeds the 2B control sample result of 120 +/- 80 pCi/kg (at the 95% confidence level), during the fourth quarter. As a conservative decision, the 7B sediment sample result for the fourth quarter of 2006 was assumed to be attributable to station operations.

Fruits and Vegetables

Refer to the following for results of fruits and vegetables for SSES:

- Appendix G, Table G page G-15, shows a summary of the 2006 fruits and vegetables.
- Appendix I, Table I-12 page I-22, shows specific gamma spectroscopic analysis of fruit/vegetable samples.

Fruit /Vegetable Gamma Spectroscopic

Pumpkin, soybeans and rye samples were collected from the 11D1 location and analyzed for concentrations of gamma emitting nuclide activity (Table I-12). Potassium-40 was the only gamma-emitting radionuclide measured in fruits and vegetables at an activity level above MDC during 2006. The average potassium-40 concentration for the indicator samples was 7423 pCi/kg. The 2006 indicator values ranged from 1820 to 16,600 pCi/kg compared to 3510 to 3587 pCi/kg for 2005.

Potassium-40 in fruits and vegetables is not attributable to SSES operation because it is a naturally occurring radionuclide.

Dose from the Aquatic Pathway

Tritium and Cesium-137 were the only radionuclides identified in 2006 by the SSES REMP in the aquatic pathway that was attributable to SSES operation and also included in the pathway to man.

The total tritium activity released from the SSES for the year was estimated based on REMP monitoring results and used in projecting maximum doses to the public. The annual mean activity level of tritium in the CTBD line (monitoring location 2S7\6S7) for 2006 was 5,396 pCi/l. The annual mean

activity of tritium for control location 6S6 was 19 pCi/l. For the purpose of performing the dose calculation, tritium was assumed to be present continuously in the CTBD line throughout 2006 at a level equivalent to the annual mean activity of 5,396 pCi/l. The annual mean flow rate for the CTBD line was 8,730 gpm. Using the proper unit conversions and multiplying 8,730 gpm times 5,396 pCi/l yields a value of 93.7 curies for the estimate of tritium released from SSES during 2006. This estimate is 4.5 curies more than the 89.2 curies of tritium determined by effluent monitoring that was released to the river by the SSES in 2006.

Given the total tritium activity released, the maximum whole-body and organ doses to hypothetical exposed individuals in four age groups (adult, teenager, child, and infant) were determined according to the methodology of the Offsite Dose Calculation manual using the RETDAS computer program. This is in accordance with SSES Technical Requirement 3.11.4.1.3.

The maximum dose obtained from the ingestion of tritium was estimated at the nearest downriver municipal water supplier via the drinking water pathway and near the outfall of the SSES discharge to the Susquehanna River via the fish pathway. The maximum whole body and organ doses (child) were each calculated as 0.0012 mrem.

Cesium-137 was identified (greater than the minimum detectable concentration, MDC) in one sediment sample (waterborne pathway) for the fourth quarter 2006. The maximum dose to a member of the public, based on the Cesium-137 concentration identified in the sediment sample at location 7B, was calculated as 0.0040 mrem.

FIGURE 10 - TRITIUM ACTIVITY IN SURFACE WATER

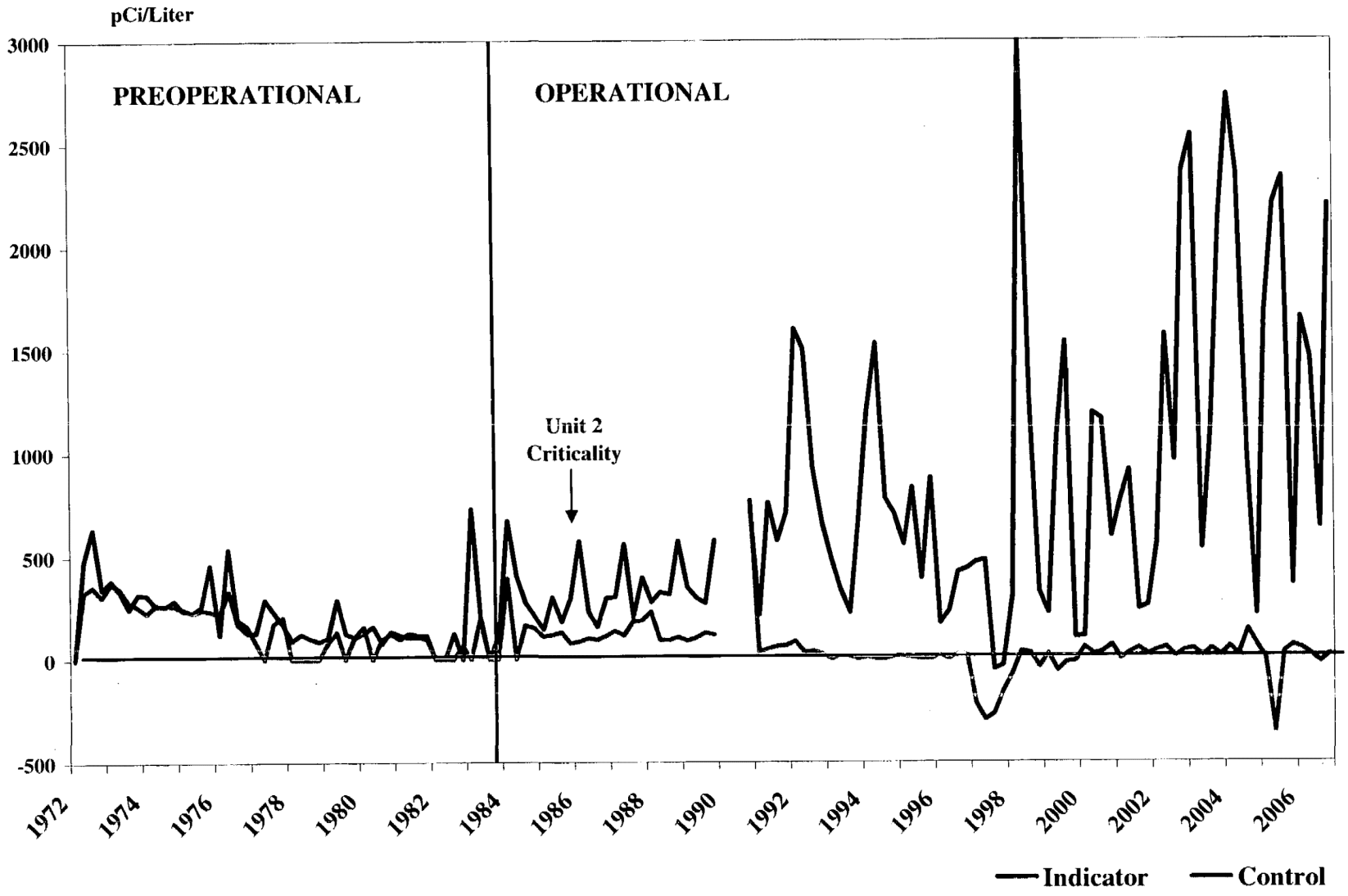
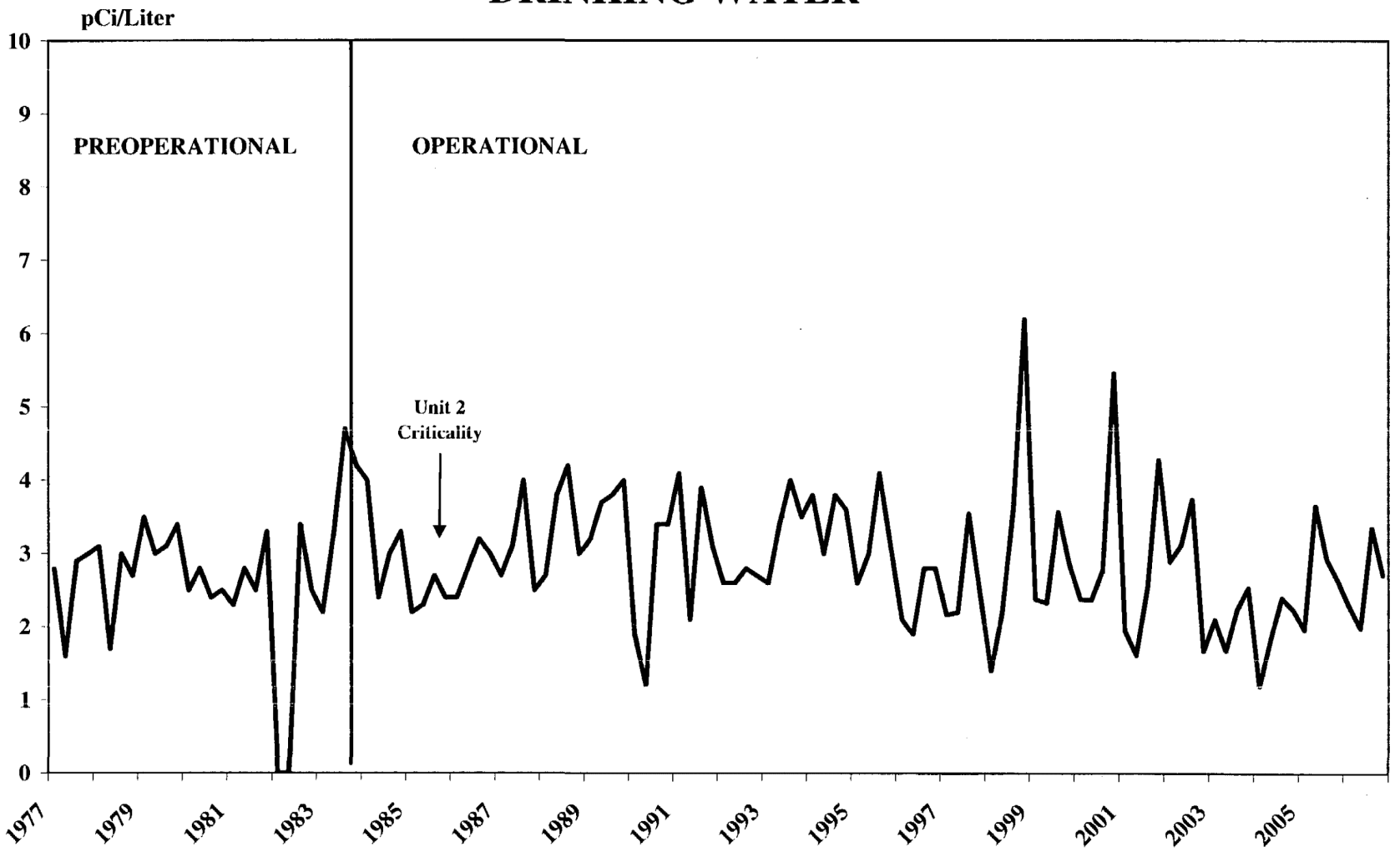


FIGURE 11 - GROSS BETA ACTIVITY IN DRINKING WATER



ATMOSPHERIC PATHWAY MONITORING

INTRODUCTION

Atmospheric monitoring by the SSES REMP involves the sampling and analysis of air. Because the air is the first medium that SSES vent releases enter in the pathway to man, it is fundamental that it be monitored. Mechanisms do exist for the transport of airborne contaminants to other media and their concentration in them. For example, airborne contaminants may move to the terrestrial environment and concentrate in milk. Concentrations of radionuclides can make the sampling and analysis of media like milk more sensitive approaches for the detection of radionuclides, such as iodine-131, in the pathway to man than the monitoring of air directly. (PPL also samples milk; refer to the Terrestrial Pathway Monitoring section of this report.) Nevertheless, the sensitivity of air monitoring can be optimized by the proper selection of sampling techniques and the choice of the proper types of analyses for the collected samples.

Scope

Air samples were collected on particulate filters and charcoal cartridges at indicator locations 3S2, 12S1, 13S6 and 12E1, and control locations 6G1 and 8G1.

Sampling and Analysis

Air

The SSES REMP monitored the air at four indicator locations and two control locations during 2006. The SSES Technical Requirements require monitoring at only a total of five sites. Monitoring is required at three locations at the SSES site boundary in different sectors with the greatest predicted sensitivities for the detection of SSES releases (3S2, 12S1, 13S6). Monitoring must be performed at the community in the vicinity of the SSES with the greatest predicted sensitivity (12E1). A control location that is expected to be unaffected by any routine SSES releases must be monitored (6G1, 8G1).

Airborne particulates were collected on glass fiber filters using low volume (typically 2.0 to 2.5 cfm sampling rates) air samplers that run continuously. Air iodine samples were collected on charcoal cartridges, placed downstream of the particulate filters.

Particulate filters and charcoal cartridges were exchanged weekly at the air monitoring sites. Sampling times were recorded on elapsed-time meters. Air sample volumes for particulate filters and charcoal cartridges were measured with dry-gas meters.

Air filters were analyzed weekly for gross beta activity, then composited quarterly and analyzed for the activities of gamma-emitting radionuclides. The charcoal cartridges were analyzed weekly for iodine-131.

Monitoring Results

Air Particulates

Refer to the following for results of air particulate analyses for 2006:

- Figure 12 trends gross beta activities separately for air particulate indicator and control locations from 1974 through 2006.
- Appendix G, Table G pages G-10 and G-11, shows a summary of the 2006 air particulate data.
- Appendix H, Tables H 13 and 14 page H-5, shows comparisons of gross beta and Beryllium-7 monitoring results against past years' data.
- Appendix I, Table I-8 pages I-14 and I-15, shows specific sample results of gross beta analyses for air particulate filters.

Air Particulate Gross Beta

Weekly samples from all air particulate filter locations were analyzed for concentrations of gross beta activity (Table I-8). Gross beta activity was observed at all locations above MDC for 2006. The 2006 indicator values ranged from 4.79E-3 to 29E-3 pCi/m^3, compared to 3.83E-3 to 27E-3 pCi/m^3 for 2005. The 2006 mean gross beta activity of 14.4 E-3 pCi/m^3 for all indicator locations compared to the average of the annual preoperational control mean of 62E-3 pCi/m^3 indicates activity detected below the preoperational control. In addition, a comparison of the 2006 indicator mean of 14.4 E-3 pCi/m^3 with the 2006 control locations mean of 13.8E-3 pCi/m^3 indicates no appreciable effects from the operation of SSES.

Gross beta activity is normally measured at levels in excess of the analysis MDCs on the fiber filters. The highest gross beta activity levels that have been measured during the operational period of the SSES were obtained in 1986 following the Chernobyl accident in the former Soviet Union.

Note that prior to SSES operation, before 1982, the unusually high gross beta activities were generally attributable to fallout from atmospheric nuclear weapons tests. Typical gross beta activities measured on air particulate filters are the result of naturally occurring radionuclides associated with dust particles suspended in the sampled air. They are thus terrestrial in origin.

The SSES Technical Requirements Manual requires radionuclide analysis if any weekly gross beta result was greater than ten times the most recent years annual mean gross beta value for all air particulate sample control locations. This condition did not occur during 2006.

Air Particulate Gamma Spectroscopic

Quarterly gamma spectroscopic measurements of composited filters often show the naturally occurring radionuclide beryllium-7. Occasionally, other naturally occurring radionuclides, potassium-40 and radium-226, are also observed. Beryllium-7 is cosmogenic in

origin, being produced by the interaction of cosmic radiation with the earth's atmosphere. The other two gamma-emitting radionuclides originate from soil and rock.

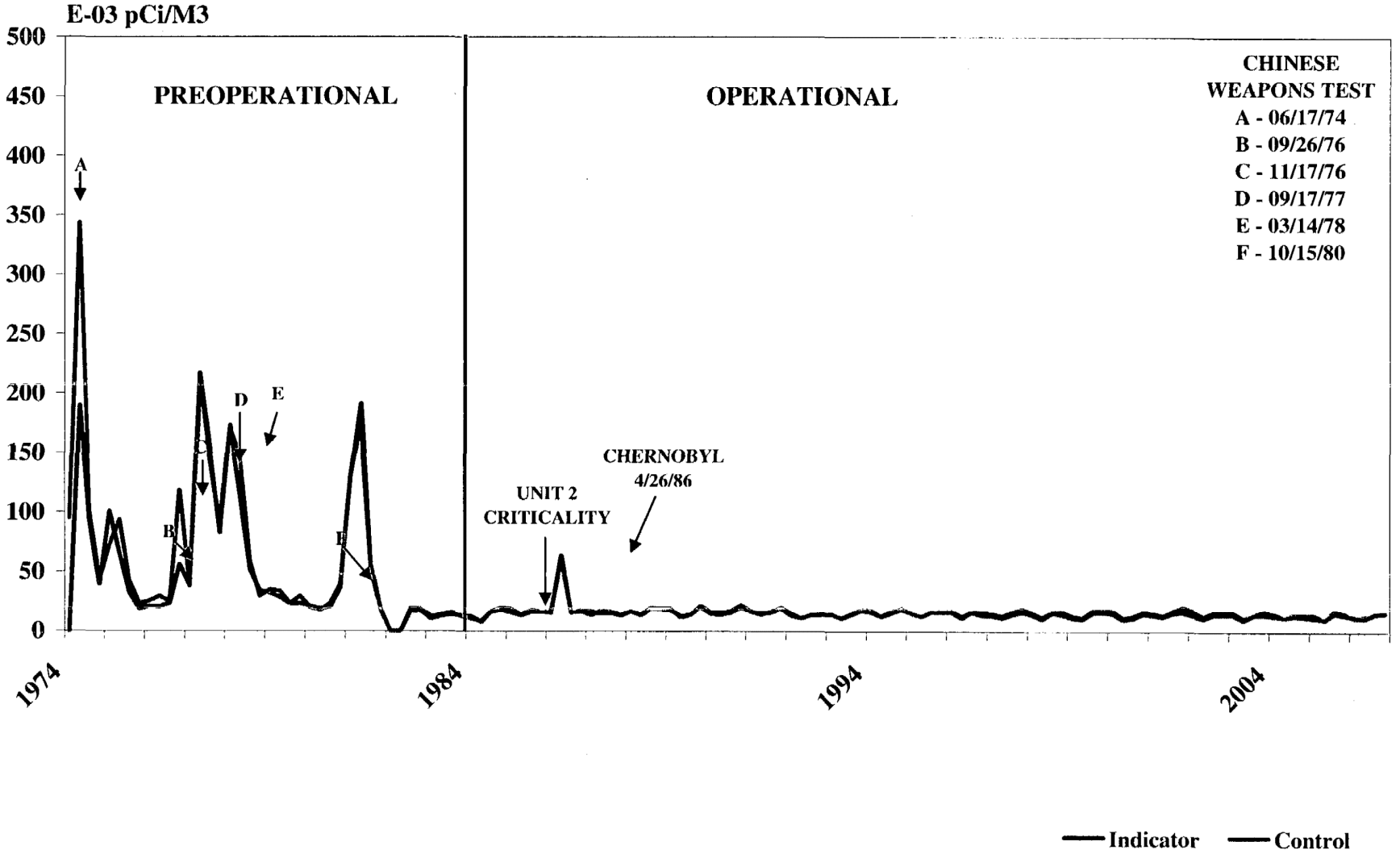
Beryllium-7 was measured above analysis MDCs for all quarterly composite samples in 2006. The 2006 indicator and control means for beryllium-7 activity were 111 and 114 pCi/m^3, respectively. Beryllium-7 activity levels for each 2006 calendar quarter at each monitoring location are presented in Table I-9 of Appendix I. Comparisons of 2006 beryllium-7 analysis results with previous years may be found in Table H 14 of Appendix H.

No other gamma-emitting radionuclides were reported for air in 2006. Beryllium-7 is not attributable to SSES operation.

Air Iodine

Iodine-131 has been detected infrequently from 1976, when it was first monitored, through 2006. Since operation of the SSES began in 1982, iodine-131 has only been positively detected in air samples in 1986 due to the Chernobyl accident. No iodine-131 was reported for the 2006 air monitoring results.

FIGURE 12 - GROSS BETA ACTIVITY IN AIR PARTICULATES



TERRESTRIAL PATHWAY MONITORING

INTRODUCTION

Soil and milk were monitored in the Terrestrial Pathway in 2006.

Soil can be a great accumulator of man-made radionuclides that enter it. The extent of the accumulation in the soil depends of course on the amount of the radionuclides reaching it, but it also depends on the chemical nature of those radionuclides and the particular characteristics of the soil. For example, the element cesium, and, therefore, cesium-137 can be bound very tightly to clay in soils. The amount of clay in soil can vary greatly from one location to another. In clay soils, cesium-137 may move very slowly and also may be taken up very slowly in plants as they absorb soil moisture.

Any medium, such as soil, that tends to accumulate radioactive materials can also provide more sensitivity for radionuclide detection in the environment than those media that don't. Such a medium facilitates the early identification of radionuclides in the environment, as well as awareness of changes that subsequently may occur in the environmental levels of the identified radionuclides.

The SSES REMP samples soil near two of the six REMP air-sampling stations. The purpose for soil sampling near the air sampling sites is to make it easier to correlate air sampling results with soil sampling results if any SSES related radioactive material were found in either medium. Sampling is performed at different depths near the surface to help provide information on how recently certain radioactive materials may have entered the soil. Sampling at more than one depth also may help ensure the detection of materials that move relatively quickly through the soil. Such quick-moving materials may have already passed through the topmost layer of soil at the time of sampling.

Milk was sampled at four locations in 2006. SSES Technical Requirements require that the SSES REMP sample milk at the three most sensitive monitoring locations near the SSES and one control location distant from the SSES.

No requirement exists for the SSES REMP to monitor soil. All monitoring of the terrestrial pathway that is conducted by the SSES REMP in addition to milk (and broad leaf vegetation in certain cases when milk sampling not performed) is voluntary and reflects PPL's willingness to exceed regulatory requirements to ensure that the public and the environment are protected.

Scope

Soil

Soil was sampled in September 2006 in accordance with its scheduled annual sampling frequency, at the following two REMP air sampling locations: 12S1 (indicator) and 8G1 (control).

Several soil plugs were taken at selected spots at each monitoring location. The

plugs were separated into "top" (0-2 inches) and "bottom" (2-6 inches) segments. Each set of top and bottom segments was composited to yield 2 soil samples from each location for analysis. Since there are two monitoring locations, a total of 4 soil samples were analyzed in 2006.

Milk

Milk was sampled at least monthly at the following locations in 2006: 10D1, 10D2, 12B2 (6C1 replaced 12B2 then 13E3 replaced 6C1) and 10G1.

Milk was sampled bi-weekly from April through October when cows were more likely to be on pasture and monthly at other times. Locations 10D1, 10D2, and 13E3 are believed to be the most sensitive indicator sites available for the detection of radionuclides released from the SSES. Location 10G1 is the control location. Since there are four monitoring locations, a total of 84 cow milk samples were collected in 2006.

Sample Preservation and Analysis

All media in the terrestrial pathway are analyzed for the activities of gamma-emitting radionuclides using gamma spectroscopy. The other analysis that is routinely performed is the radiochemical analysis for iodine-131 in milk.

Monitoring Results

Refer to the following for results of the terrestrial pathway analyses for 2006:

- Figure 13 trends iodine-131 activities separately for milk indicator and control locations from 1977 through 2006.
- Appendix G, Table G pages G-12 through G-14, shows a summary of the 2006 terrestrial monitoring results for milk and soil.
- Appendix H, Tables H 15 through 19 pages H-6 and H-7, shows comparisons of terrestrial pathway monitoring results against past years' data.
- Appendix I, Tables I-10 and I-11 pages I-17 through I-21, shows results of specific sample analyses for terrestrial pathway media.

The only man-made radionuclides normally expected at levels in excess of analysis MDCs in the terrestrial pathway are strontium-90 and cesium-137. Both of these radionuclides are present in the environment as a residual from previous atmospheric nuclear weapons testing. Strontium-90 analyses are not now routinely performed for any media samples in the terrestrial pathway. Strontium-90 activity would be expected to be found in milk. SSES Technical Requirements do not require that milk be analyzed for strontium-90. Strontium-90 analyses may be performed at any time if the results of other milk analyses would show detectable levels of fission product activity, such as I-131, which might suggest the SSES as the source.

Cesium-137 normally has been measured in excess of analysis MDCs in most soil samples.

Certain naturally occurring radionuclides are also routinely found above analysis MDCs in terrestrial pathway media. Potassium-40, a primordial and very long-lived radionuclide, which is terrestrial in origin, is observed in all terrestrial pathway media. Other naturally occurring radionuclides often observed in soil are thorium-228 and radium-226.

Soil

Annual samples from the 12S1 and 8G1 soil locations were analyzed for concentrations of gamma emitting nuclides (Table I-11). The following gamma-emitting radionuclides are routinely measured in soil at levels exceeding analysis MDCs: naturally occurring potassium-40, radium -226, thorium-228 and man-made cesium-137. The 2006 analysis results were similar to those for previous years. No other gamma-emitting radionuclides were reported at levels above analysis MDCs.

The 2006 means for indicator and control location potassium-40 activity were 12,450 pCi/kg and 9,575 pCi/kg, respectively. This is not the result of SSES operation because the potassium-40 is naturally occurring.

The 2006 means for indicator and control location radium-226 activity were 3,145 pCi/kg and 2,015 pCi/kg, respectively. Radium-226 in soil is not the result of SSES operation because it is naturally occurring.

The 2006 means for indicator and control location thorium-228 activity were 863 pCi/kg and 798 pCi/kg, respectively. Thorium-228 in soil is not the result of SSES operation because it is naturally occurring.

The 2006 means for indicator and control location cesium-137 activity were 173 pCi/kg and 133 pCi/kg, respectively. The 2006 indicator values ranged from 156 to 190 pCi/kg, compared to 24 to 34 pCi/kg for 2005. Typically cesium-137 has been observed in preoperational control samples at 200 to 1200 pCi/kg as well as prior operational years in the 70 to 1200 pCi/kg range. Soil sample from 12S1 indicator location, approximately 0.4 miles in the WSW, sector had a measured cesium-137 concentration of 156+/-94 pCi/kg. At the 95% confidence level the actual sample activity is greater than the MDC for that analysis of 109 pCi/kg and is between 62 and 250 pCi/kg. The measured activities of cesium-137 were also detected in previous years at expected levels due to residual fall out from past atmospheric weapons testing and the Chernobyl event. As a general rule, it takes approximately ten half lives for a radionuclide to decay to non-detectable levels. Cesium-137 with its 30 year half life (300 years to decay to non-detectable) it would still be present in samples in 2006. Cesium-137 in soil, although man-made, is not from Susquehanna station operations.

Milk

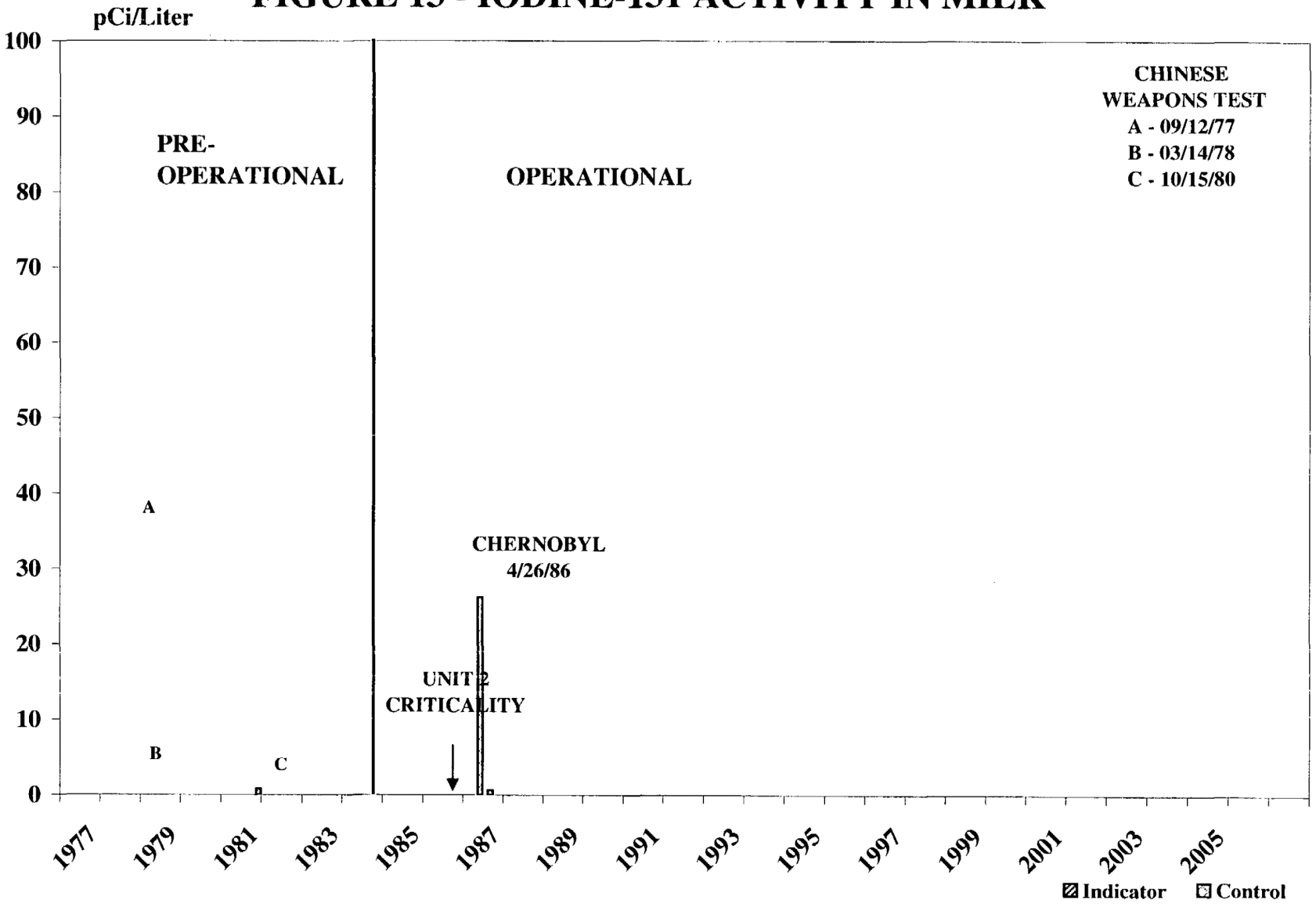
Semi-monthly or monthly samples from all milk locations were analyzed for concentrations of iodine-131 and other gamma-emitting nuclide activity (Table I-10). No detectable iodine-131 activity above MDC was observed at any location for 2006. The 2006 indicator values ranged from -1.36 to 0.66 pCi/l,

compared to -0.176 to 0.26 pCi/l for 2005. Iodine-131 has been chemically separated in milk samples and counted routinely since 1977. Refer to Figure 13 which trends iodine-131 activity in milk for indicator and control locations from 1977 through 2006.

The preoperational years 1976, 1978, and 1980 were exceptional years in the sense that iodine-131 activity was observed in excess of MDCs due to fallout from atmospheric nuclear weapons testing. Iodine-131 activity was also measured at levels exceeding MDCs in milk samples in 1986 in the vicinity of the SSES as a result of the Chernobyl incident.

With the exception of the naturally occurring potassium-40, no gamma-emitting radionuclides were measured in excess of analysis MDCs in 2006. The 2006 means for indicator and control location potassium-40 activity were 1,300 pCi/liter and 1,314 pCi/liter, respectively. The potassium-40 activity in milk is not attributable to SSES operation because it is naturally occurring.

FIGURE 13 - IODINE-131 ACTIVITY IN MILK



GROUND WATER MONITORING

INTRODUCTION

Normal operation of the SSES does not involve the release of radioactive material to ground water directly, or indirectly through the ground. As a result, there are no effluent monitoring data to compare with REMP ground water monitoring results. Ground water could conceivably become contaminated by leakage or spills from the plant or by the washout or deposition of radioactive material that might be airborne. If deposited on the ground, precipitation/soil moisture could aid in the movement of radioactive materials through the ground to water that could conceivably be pumped for drinking purposes. No use of ground water for irrigation near the SSES has been identified.

Primary release paths for recent groundwater contamination events at other nuclear facilities have been: 1) spent fuel pool leakage; 2) leaks from liquid radwaste discharge lines and; 3) leaks from cooling tower blowdown lines. The physical location of the spent fuel pools at Susquehanna and the fuel pool leakage collection system make it highly unlikely that the fuel pools would be a radiological contamination source for groundwater. Leaks from the liquid radwaste discharge line or the cooling tower blowdown line could impact ground water, but to date, there has been no indication of any radiological impacts on groundwater due to station operations.

Scope

Ground water in the SSES vicinity was sampled quarterly at 4 indicator locations (2S2, 4S4, 6S10 and 11S2) and one control location (12F3) during 2006.

With the exception of location 4S4, untreated ground water was sampled. Untreated means that the water has not undergone any processing such as filtration, chlorination, or softening. At location 4S4, the SSES Learning Center, well water actually is obtained from on-site and piped to the Learning Center after treatment. This treatment would not affect tritium analysis. This sampling is performed as a check to ensure that water has not been radioactively contaminated. Sampling is performed at the Learning Center to facilitate the sample collection process.

Sample Preservation & Analysis

Ground water samples were analyzed for gamma-emitting radionuclide and tritium activities. Gamma spectrometric analyses of ground water began in 1979 and tritium analyses in 1972, both prior to SSES operation.

Monitoring Results

Tritium activity levels in ground water have typically been observed to be lower than in surface water. A noticeable decline occurred between 1992 and 1993. Fewer measurements were above the analysis sensitivities after 1993.

Gamma-emitting radionuclides in excess of MDCs have been found in only a few samples in all the years that these analyses have been performed. The naturally occurring radionuclides potassium-40 and thorium-228 have been measured above their MDCs occasionally in ground water. Potassium-40 was reported in 1979, 1981, 1985, 1991, 1992, 1993, and 1997. Thorium-228 was found in 1985 and 1986. The man-made radionuclide cesium-137 has been detected only occasionally since 1979. Its presence has always been attributed to residual fallout from previous atmospheric nuclear weapons tests.

Results for the 2006 specific ground water sample analyses may be found in Table I-7 of Appendix I. A summary of the 2006 ground water monitoring data may be located in Appendix G, pages G-9 and G-10. Comparisons of 2006 monitoring results for tritium with those of past years may be found in Table H 20 of Appendix H.

In 2006, tritium was measured above MDC, in one sample at indicator location 4S4 at a concentration of 178 pCi/l. The activity was slightly above the detection limit. The 2006 indicator values ranged from -9.72 to 178 pCi/l, compared to -664 to 55 pCi/l for 2005.

The 2006 mean tritium activity levels for indicator and control monitoring locations were 45.9 and 23.7 pCi/l, respectively. Both the 2006 indicator and control mean tritium activity levels are lower than their corresponding range for preoperational years.

The only REMP monitored pathway where tritium has been identified as a result of station operations is in the surface water pathway (Susquehanna River) downstream of the site, There have been no indications of any increases in ground water tritium concentrations above normal background levels (based on pre-operational data) since inception of the REMP at PPL Susquehanna.

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10. PPL, "Susquehanna Steam Electric Station, Radioactive Effluent Release Report," Data Period: January – December 2006, April 2006.

11. Ecology III, "Susquehanna Steam Electric Station, 2006 Land Use Census," November 2006.

12. PPL, "Engineering Study, EC-ENVR-1012 (Revision 0, January 1995)," Interpretation of Environmental TLD Results.

13. PPL, Tritium Release REMP Calculation (RETDAS V.3.6.6) – December 2006.

APPENDIX A

2006 REMP SAMPLE COLLECTION, ANALYSIS TYPE, ANALYTICAL METHODS, PROGRAM CHANGES AND EXCEPTIONS

REMP Sample Collection, Analyses and Methods

An independent consulting group, Ecology III, working at Susquehanna's Environmental Laboratory, located approximately ¾ miles east of the SSES, collects and prepares the samples (except for TLD's which are handled by HP). Samples are brought to the laboratory, stored, and shipped to an outside independent analytical laboratory. The following table summarizes the REMP sample collection/analyses performed by Teledyne Brown Engineering, the independent radioanalytical laboratory for 2006. Note that TBE represents Teledyne Brown Engineering and E-III represents Ecology III, Inc.

TABLE A1
(Page 1 of 2)

SOURCE OF REMP DATA FOR MONITORING YEAR 2006				
Sample Medium	**Analysis**	**Analysis Frequency**	**Collection Procedure Number**	**Analytical Procedure Number**
Ambient Radiation	TLD	Quarterly	SSES, HP-TP-205	SSES,HP-TP-159 & 190
Air	Gross Beta	Weekly	E-III, Appendix 2	TBE-2008 Gross Alpha and/or Beta Activity in Various Matrices
Air	I-131	Weekly	E-III, Appendix 2	TBE-2012 Radioiodine in Various Matrices
Air	Gamma	Quarterly	E-III, Appendix 2	TBE-2007 Gamma Emitting Radioisotope Analysis
Drinking Water	Gross Beta	Monthly	E-III, Appendix 5	TBE-2008 Gross Alpha and/or Beta Activity in Various Matrices
All Waters	Tritium	Monthly (LTAW, 4S7 and Groundwater Quarterly	E-III, Appendix 3, 4, 5, 6, 7 & 8	TBE-2010 Tritium and Carbon-14 Analysis by Liquid Scintillation
Surface & Drinking Water	Gamma	Monthly (LTAW and 4S7 Quarterly)	E-III, Appendix 3, 4, 5, 6, & 7	TBE-2007 Gamma Emitting Radioisotope Analysis

TABLE A1
(Page 2 of 2)

Sample Medium	Analysis	Analysis Frequency	Collection Procedure Number	Analytical Procedure Number
Ground Water	Gamma	Quarterly	E-III, Appendix 8	TBE-2007 Gamma Emitting Radioisotope Analysis
Surface Water (except LTAW and 4S7)	I-131	Monthly	E-III, Appendix 4, 5, 6, and 7	TBE-2012 Radioiodine in Various Matrices
Milk	Gamma	Monthly/ Semi-Monthly	E-III, Appendix 9	TBE-2007 Gamma Emitting Radioisotope Analysis
Milk	I-131	Monthly/ Semi-Monthly	E-III, Appendix 9	TBE-2012 Radioiodine in Various Matrices
Fish	Gamma	Semi-Annually (Spring/Fall)	E-III, Appendix 11	TBE-2007 gamma Emitting Radioisotope Analysis
Sediment	Gamma	Semi-Annually (Spring/Fall)	E-III, Appendix 12	TBE-2007 gamma Emitting Radioisotope Analysis
Fruits & Vegetables	Gamma	In Season (when irrigated)	E-III, Appendix 13	TBE-2007 gamma Emitting Radioisotope Analysis
Soil	Gamma	Annually	E-III, Appendix 14	TBE-2007 Gamma Emitting Radioisotope Analysis

PROGRAM CHANGES:

Direct Radiation Monitoring

Reassigned TLD 12E1 at 4.7 miles in WSW Sector (Berwick Hospital) from an indicator to a special interest area TLD location.

Air Monitoring

There were no changes to the air monitoring program for 2006.

Surface Water and Drinking Water Monitoring

Added surface water sampling location 4S7.

Milk

Discontinued milk sampling location 12B2 and 6C1 and added milk sampling locations 5E2, 6E3 and 13E3 to the ODCM.

Ground Water Monitoring

Added ground water sampling locations 6S10 and 11S2.

Fruits & Vegetables

There were no changes to the fruits and vegetable monitoring program in 2006.

Soil Monitoring

There were no changes to the soil monitoring program in 2006.

Sediment Monitoring

There were no changes to the sediment monitoring program in 2006.

Fish Monitoring

There were no changes to the fish monitoring program for 2006.

REMP Appendix G Table.xls and REMP.xls Spreadsheets

Made various software analysis enhancements in support of the above stated program changes.

Annual Radiological Environmental Report Format

Enhanced the program exception section of the Annual Radiological Environmental Operating Report. PCAF 2006-1488 issued to update SC-099-004 Rev. 2 to provide guidance on how sampling deviations are described and documented in the AREOR. All deviations from REMP are documented in the AREOR in two separate tables. A single table for documenting deviations from the required TRM REMP sampling and a separate table for documenting NON-TRM sampling occurrences.

PROGRAM EXCEPTIONS

The following are sampling and analysis exceptions for 2006.

TABLE A2
TRM SAMPLING DEVIATIONS
(Page 1 of 4)

Sample Type	Date	Location	Explanation
Direct Radiation	3rd Q-2005	16A2, 8A3, 2F1 and 6A4.	This is an update with regard to actions to prevent recurrence that were in response to water damage problems in 2005. Unable to process data from 16A2, 8A3 and 2F1 (no data available) due to water damage. Also made correction to fix typographical error to reflect proper TLD location 6A4 that was not processed due to water damage but data from back-up TLD # 1000523 at same location used as valid data. Corrective actions were initiated with TLDs issued for 2nd quarter 2006 being placed in zip lock bags to reduce water infiltration. This action to prevent recurrence was implemented in 2006 based on the event that occurred in 2005 and therefore was not reported in the 2005 AREOR. Procedure change 2006-1076 issued to include expectation in CH-RM-001 procedure to verbally notify main control room upon discovery of TRO condition. To confirm entry and generate Condition report within 72 hours.

TABLE A2
(Page 2 of 4)

Sample Type	Date	Location	Explanation
Air (Particulate & Iodine)	January	12S1	Due to loss of 12Kv power line on 1/21/06, continuous sampling interrupted for approximately 6 hours. Immediate corrective action, valid sample collected (within ideal sample volume range), but down-time exceeded 4 hour limit. Actions to prevent recurrence are not applicable.
	August	12S1	Due to loss of 12kv power line on 8/3/06, continuous sampling interrupted for approximately 10 minutes. Valid sample obtained. Actions to prevent recurrence are not applicable.
	November	6G1	Power interrupted periodically throughout sample period due to installation of new equipment at the Freeland Substation from 11/01/06 to 11/08/06. Valid sample obtained but down-time exceeded 4 hour limit. Actions included substitution of control location 8G1 to satisfy TRM Table 3.11.4.1 requirements for one sample from a control location. Actions to prevent recurrence are not applicable.
Drinking Water	February	12H2	Auto composite sampler found inoperative 2/28/06 due to a mis-positioned sampler mode switch on 2/28/06. Immediate action, a grab sample was taken, the sampler adjusted and restored to service. Corrective action taken, duct tape applied over the sample toggle switch to prevent unintentional switch position movement. Actions to prevent recurrence are not applicable.

TABLE A2
(Page 3 of 4)

Drinking Water	August	12H2	Auto composite sampler found inoperative 8/8/06 due to a miss-positioned sampler mode switch. Immediate action, a grab sample was taken, the sampler adjusted and restored to service. Action to prevent recurrence, notified Danville Water Company of second incident of this type to make them aware and placed a permanent cover over the sampler toggle switch to prevent unintentional switch position movement.
Milk	April	12B2	On April 3, 2006 milk sampling location (12B2) was removed from the Radiological Environmental Monitoring Program (REMP) due to the dairy farm no longer willing to participate. Milk sampling was initiated at substitute location 6C1 on 4/17/06. On June 12, 2006 milk sampling location (6C1) was removed from REMP due to farm shutdown and a new replacement milk sampling location (13E3) was added. There are no applicable actions to prevent recurrence associated with the above condition.

TABLE A2
(Page 4 of 4)

Sample Type	Date	Location	Explanation
Milk	June	10D1 and 10G1	I-131 LLD of 1.0 pCi/l was missed from sample 10D1 on 6/12/2006 and on 6/26/2006 from sample 10D1 and 10G1 due to decay of sample and poor yield. The affected analysis results were not incorporated into the Appendix G Table. The vendor radioanalytical lab was informed by supplier they had discontinued production of the filter currently used for I-131 analysis. After further review, an equivalent filter was used from another supplier but this filter was later discontinued. The vendor's equivalent replacement filters have performed poorly, apparently due to a difference in porosity of the filters. Teledyne corrective action NCR 06-01 documents the investigation and concludes the following: 1) Corrective Actions – filtering will be done with 2 replacement filters instead of one. 2) Action to Prevent Recurrence – The radioanalytical lab procedures allow for the use of specific supplies and reagents or their equivalent. The filter supplier stated that the replacement filters were equivalent to the original filters. Before allowing substitution of equivalent supplies a series of blank and spike samples will be run to verify no change in procedure validity.

TABLE A3
(Page 1 of 4)
NON-TRM SAMPLING OCCURRENCES

Sample Type	Date	Location	Explanation
Direct Radiation	1st Q-2006	3S3	TLD #1000033 unable to process due to water damage. Data from back-up TLD #100055 at same location used as valid data. The 1st quarter 2006 TLD result from primary location 3S2 was analyzed for TRM compliance.
	3rd Q-2006	2S2	Found both TLDs at location 2S2 missing for the third quarter 2006. These lost TLDs were extra TLDs located in the NNE meteorological sector in the inner ring of the station. The required TLDs to comply with the TRM were present at the 2S3 location in the same NNE sector of the inner ring which were collected and analyzed for the 3rd quarter 2006, and used to satisfy TRO Table 3.11.4.1-1. The immediate action taken by the HP Technician was to place a new set of TLDs at the 2S2 location for the Fourth Quarter 2006 monitoring cycle. Actions to prevent recurrence are not applicable.
Air (Particulate & Iodine)	January	3S2	Timer box malfunctioned during sampling period 1/25/06 to 2/01/06 due to gear binding but did not affect air sampler operation. Timer box replaced. Air monitor operability verified. Valid sample collected.
	April	8G1	Timer box malfunctioned during sampling period 4/5/06 to 4/12/06 due to gear binding but did not affect air sampler operation. Timer box replaced. Air monitor operability verified. Valid sample collected.

TABLE A3
(Page 2 of 4)

Sample Type	Date	Location	Explanation
Air (Particulate & Iodine)	June	8G1	Low sampler flow during sampling period 6/21/06 to 6/27/06 due to blocked screen in ball valve assembly but did not affect air sampler operation. Ball valve assembly replaced. Flow adjusted. Air monitor operability verified. Valid sample collected.
Surface Water	January	6S6	Bi-weekly composite for I-131 (low level) was accidentally lost during analysis. The flask which contained the sample was dropped by the laboratory technician. Due to insufficient sample volume a re-analysis could not be performed.
	January	6S6	Found degraded water flow through auto composite sampler during sampling period 1/17/06 to 1/24/06 due to blocked lines from turbid river conditions. Sample lines cleaned. Sampler operability verified. Adequate sample volume collected.
	March	6S7	Auto composite sampler found inoperative during sampling period 3/14/06 to 3/28/06 due to loss of sampler prime. Sampler is not operational and is a back-up to required sampler location 2S7. The March 2006 composite sample from primary location 2S7 was analyzed for TRM compliance.
	April	6S6	Found sample hose misplaced outside the collection tank and no sample collected during period 4/4/06 to 4/6/06 due to unknown reasons. Sample hose re-positioned correctly. Sampler operability verified. Adequate sample volume collected.

Table A3
(Page 3 of 4)

Sample Type	Date	Location	Explanation
Surface Water (cont.d)	April	6S6	Retraining of sample collectors on auto sample setup and verification before leaving area.
Surface Water	April	6S7	Auto composite sampler found inoperative during sampling period 3/28/06 to 4/25/06 due to loss of sampler prime. Sampler is a back-up to required sampler location 2S7. The April 2006 composite sample from primary location 2S7 was analyzed for TRM compliance.
	August	6S7	Found auto composite sampler overflowing at 6S7 during sampling period 8/8/06 to 8/15/06 due broken spring solenoid. Sampler is not operational and is a back-up to required sampler location 2S7. The August 2006 composite sample from primary location 2S7 was analyzed for TRM compliance.
	September	6S7	Auto composite sampler 6S7 is not operational and placed in bypass mode due to mechanical problems.
	October	6S6	Found degraded flow through auto composite sampler during sampling period 10/17/06 to 10/19/06 due to blocked lines from turbid river conditions. Sample lines cleaned. Sampler operability verified. Adequate sample volume collected.
	December	6S7	Found auto composite sampler overflowing at 6S7 during the December 2006 composite sampling period due to broken spring solenoid. Sampler is not operational and is a back-up to required sampler location 2S7. The December 2006 composite

Table A3
(Page 4 of 4)

Sample Type	Date	Location	Explanation
Surface water (cont'd.)	December	6S7	sample from primary location 2S7 was analyzed for TRM compliance . Auto composite sampler 6S7 is being deleted from the REMP.
Milk	3rd Q-2006	ES111-186	Spiked milk sample arrived at offsite radioanalytical lab and was not refrigerated upon receipt and the milk curdled before the I-131 analysis. A new replacement sample (E5156-186) was prepared and analyzed. Results were obtained in October 2006.

In 2006 the SSES REMP overall performance was as follows:

Sample Collection and Analysis

902 of 902 samples were collected for 100% sample collection recovery.

1280 of 1281 analyses were performed on 902 samples for 99.9 % analysis data recovery.

	# of Samples Collected	# of Analyses
Primary	869 of 869	1042 of 1043
Replicate	33 of 33	50 of 50
Split/Duplicate	--	188 of 188
Total	902 of 902	1280 of 1281

TLD Direct Radiation Measurements

231 of 232 TLDs placed in the field were recovered and analyzed for 99.6 % data recovery.

Equipment Operability Trending

Table A4 below depicts trending of REMP continuous air and automatic water composite sampling equipment operability on a year by year basis. Each discrepancy was reviewed to understand the causes of the program exception. It should be noted that deviations from continuous sampling are permitted for routine maintenance or equipment malfunctions for periods not to exceed 4 hours. Occasional equipment power outages/breakdowns were unavoidable.

Table A4
EQUIPMENT OPERABILITY TRENDING
(Page 1 of 1)

Sampling Medium	Sample Location	Description	Percent (%) Operability		
			2004	2005	2006
Air Particulate & Charcoal	3S2	SSES Backup Met. Tower	100	99.5	100
	12S1	West Building	100	100	99.9
	13S6	Former Laydown Area, West of Confers Lane	100	99.9	100
	12E1	Berwick Hospital	100	98.1	100
	6G1	Freeland Substation	100	100	99.8
	8G1	PPL Sys. Facilities Cntr, Humbolt Industrial Park	100	98.6	100
Drinking Water	12H2	Danville Water Company	100	100	96
Surface Water	2S7	Cooling Tower Blowdown Discharge Line	98	99.9	100
	6S6	River Water Intake Line	98	95.3	99.3
	6S7	Cooling Tower Blowdown line (STP, alternate for 2S7)	100	81.9	75

APPENDIX B

2006 REMP MONITORING SCHEDULE (SAMPLING AND ANALYSIS)

TABLE B1
(Page 1 of 2)

Annual Analytical Schedule for the PPL Susquehanna Steam Electric Station Radiological Environmental Monitoring Program – 2006

Media	No. of Locations	Sample Freq.(a)	Analyses Required	Analysis Freq. (a)
Airborne Particulates	6	W QC	Gross Beta (b) Gamma Spectrometry	W Q
Airborne Iodine	6	W	I-131	W
Sediment	3	SA	Gamma Spectrometry	SA
Fish	2 1	SA A	Gamma Spectrometry (on edible portion)	SA A
Surface Water (c)	6	W for MC	Gamma Spectrometry Tritium	M, Q LTAW & 4S7 M, Q LTAW & 4S7
		W for BWC	I-131	M
Ground Water (Well)	5	Q	Gamma Spectrometry Tritium	Q Q
Drinking Water (d)	1	W for MC	Gross Beta Gamma Spectrometry Tritium	M M M
Cow Milk	4[e]	M, SM[e]	I-131 Gamma Spectrometry	M, SM M, SM
Food Products (f) (Soybeans, Rye and Pumpkins)	1	A	Gamma Spectrometry	A
Soil	2	A	Gamma Spectrometry	A
Direct Radiation	58	Q	TLD	Q

(a) W = weekly, BWC = bi-weekly composite (once per month), M = monthly, SM = semi-monthly, Q = quarterly, QC = quarterly composite , SA = semi-annually, A = annually, MC = monthly composite.

(b) If the gross beta activity were greater than 10 times the yearly mean of the control sample, gamma analysis would be performed on the individual filter. Gross beta analysis was performed 24 hours or more following filter change to allow for radon and thorium daughter decay.

(c) Locations 6S6, 6S7, and 2S7 are automatic composite samplers and time-proportional sampling was performed at these locations the entire year. Samples are collected weekly for bi-weekly composite and monthly composite samples. Location 6S5 is a sample from the Susquehanna River downriver of the SSES discharge diffuser. Station 6S5 was grab sampled weekly. 4S7 and LTAW were grab sampled quarterly.

(d) Water from location 12H2 was retrieved weekly. Composite samples of the weekly collections at this location were made monthly (MC) for analysis. Sampling at 12H2 was performed using an automatic composite sampler (ACS) that was operated in the time-proportional mode.

(e) Locations 10D1, 10D2, 10G1, and 12B2 (replaced by 6C1 then 13E3) were sampled semi-monthly from April through October when cows are on pasture, monthly otherwise.

(f) Location 11D1, (Zehner Farm), irrigated pumpkins, soybeans and rye briefly in August 2006 using Susquehanna River water downstream of the SSES. No other fields were identified using river water downstream of the SSES in 2006.

APPENDIX C

2006
REMP MONITORING LOCATION DESCRIPTIONS

TABLE C 1
(Page 1 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2006

Less Than One Mile from the SSES - See Figure 2

Location Code[(a)]	Distance[(a)] (miles)	Direction	Description
1S2	0.2	N	Perimeter Fence
2S2	0.9	NNE	Thomas Road
2S3	0.2	NNE	Perimeter Fence
3S2	0.5	NE	SSES Backup Met Tower
3S3	0.9	NE	Riverlands Garden (Abandoned)
4S3	0.2	ENE	Post, West of SSES APF
4S6	0.7	ENE	Riverlands
5S4	0.8	E	West of Environmental Laboratory
5S7	0.3	E	Perimeter Fence
6S4	0.2	ESE	Perimeter Fence (north)
6S9	0.2	ESE	Perimeter Fence (south)
7S6	0.2	SE	Perimeter Fence
7S7	0.4	SE	End of Kline's Road
8S2	0.2	SSE	Perimeter Fence
9S2	0.2	S	Security Fence
10S1	0.4	SSW	Post - south of switching station
10S2	0.2	SSW	Security Fence
11S3	0.3	SW	Security Fence
11S7	0.4	SW	SSES Access Road Gate #50
12S1	0.4	WSW	SSES West Building

TABLE C 1
(Page 2 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2006

Less Than One Mile from the SSES - See Figure 2

Location Code[(a)]	Distance[(a)] (miles)	Direction	Description
12S3	0.4	WSW	Confer's Lane (east side)
13S2	0.4	W	Perimeter Fence
13S5	0.4	W	Perimeter Fence
13S6	0.4	W	Former Laydown Area - west of Confer's Lane
14S5	0.5	WNW	Beach Grove Road/Confer's Lane
15S5	0.4	NW	Perimeter Fence
16S1	0.3	NNW	Perimeter Fence (east)
16S2	0.3	NNW	Perimeter Fence (west)
6A4*	0.6	ESE	Restaurant (U.S. Route 11)
8A3	0.9	SSE	PPL Wetlands Sign (U. S. Route 11)
15A3*	0.9	NW	Hosler Residence
16A2*	0.8	NNW	Benkinney Residence

TABLE C 1
(Page 3 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2006

From One to Five Miles from the SSES - See Figure 3

Location Code[(a)]	Distance[(a)] (miles)	Direction	Description
12S7	1.1	WSW	Kisner Residence
8B2*	1.4	SSE	Lawall Residence
9B1	1.3	S	Transmission Line - east of Route 11
10B3*	1.7	SSW	Castek Inc.
1D5	4.0	N	Shickshinny/Mocanaqua Sewage Treatment Plt.
8D3	4.0	SSE	Mowry Residence
9D4	3.6	S	Country Folk Store
10D1	3.0	SSW	R. & C. Ryman Farm
12D2	3.7	WSW	Dagostin Residence
14D1	3.6	WNW	Moore's Hill/Mingle Inn Roads Intersection
3E1	4.7	NE	Webb Residence - Lilly Lake
4E2	4.7	ENE	Ruckles Hill/Pond Hill Roads Intersection
5E2	4.5	E	Bloss Farm
6E1	4.7	ESE	St. James Church
7E1	4.2	SE	Harwood Transmission Line Pole #2
11E1	4.7	SW	Thomas Residence
12E1*	4.7	WSW	Berwick Hospital
13E4	4.1	W	Kessler Farm

TABLE C 1
(Page 4 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2006

Greater than Five Miles from the SSES - See Figure 4

Location Code[(a)]	Distance[(a)] (miles)	Direction	Description
2F1	5.9	NNE	St. Adalberts Cemetery
15F1	5.4	NW	Zawatski Farm
16F1	7.8	NNW	Hidlay Residence
3G4**	17	NE	Wilkes Barre Service Center
4G1**	14	ENE	Mountaintop - Crestwood Industrial Park
7G1**	14	SE	Hazleton PP&L Complex
12G1**	15	WSW	PPL Service Center, Bloomsburg
12G4**	10	WSW	Naus Residence

TABLE C 1
(Page 5 of 5)

TLD Locations for the SSES
Radiological Environmental Monitoring Program – 2006

a) All distances from the SSES to monitoring locations are measured from the standby gas treatment vent at 44200/N34117 (Pa. Grid System). The location codes are based on both distance and direction from the SSES. The letters in the location codes indicate if the monitoring locations are on site (within the site boundary) or, if they are not on site, the approximate distances of the locations from the SSES as described below:

S - on site	E - 4-5 miles
A - <1 mile	F - 5-10 miles
B - 1-2 miles	G - 10-20 miles
C - 2-3 miles	H - >20 miles
D - 3-4 miles	*- Special interest areas (other than controls)
	** - Control TLDs

The numbers preceding the letters in the location codes provide the directions of the monitoring locations from the SSES by indicating the sectors in which they are located. A total of 16 sectors (numbered 1 through 16) equally divide an imaginary circle on a map of the SSES and its vicinity, with the SSES at the center of the circle. The middle of sector 1 is directed due north (N). Moving clockwise from sector 1, the sector immediately adjacent to sector 1 is sector 2, the middle of which is directed due north, northeast (NNE). Continuing to move clockwise, the sector numbers increase to 16, which is the north, northwest sector.

The numbers following the letters in the location codes are used to differentiate sampling locations found in the same sectors at approximately the same distances from the SSES.

TABLE C 2
(Page 1 of 4)

Sampling Locations for the SSES Radiological Environmental Monitoring Program – 2006

Less Than One Mile from the SSES - See Figure 5

Location Code[(a)]	Distance[(a)] (miles)	Direction	Description
SURFACE WATER			
2S7	0.1	NNE	Cooling Tower Blowdown Line
5S9	0.8	E	Environmental Lab Boat Ramp (alternate for 6S6)
6S5	0.9	ESE	Outfall Area
6S6*	0.8	ESE	River Water Intake Line
6S7	0.4	ESE	Cooling Tower Blowdown Line (alternate for 2S7)
LTAW	0.7	NE	Lake Took-A-While (on site)
4S7	0.4	ENE	Peach Stand Pond
FISH			
LTAW	0.7	NE - ESE	Lake Took-A-While (on site)
AIR			
12S1	0.4	WSW	SSES West Building
13S6	0.4	W	Former Laydown Area, West of Confers Lane
3S2	0.5	NE	Back-up Meteorological Tower
SOIL			
12S1	0.4	WSW	SSES West Building

TABLE C 2
(Page 2 of 4)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2006

Less Than One Mile from the SSES - See Figure 5

Location Code[a]	Distance[a] (miles)	Direction	Description
		GROUND WATER	
2S2	0.9	NNE	SSES Energy Information Center
4S4	0.5	ENE	SSES Learning Center
6S10	0.4	ESE	Sewage Treatment Plant (STP) Well
11S2	0.4	SW	Tower's Club (Well)
From One to Five Miles From the SSES - See Figure 6			
		FISH[b]	
IND	0.9 - 1.4	ESE	At or Below the SSES Discharge Diffuser
		SEDIMENT[c]	
2B*	1.6	NNE	Gould Island
7B	1.2	SE	Bell Bend
		AIR	
12E1	4.7	WSW	Berwick Hospital
		MILK	
10D1	3.0	SSW	R. & C. Ryman Farm
10D2	3.1	SSW	Raymond Ryman Farm
12B2	1.7	WSW	Berger Farm
13E3	5.0	W	J. Dent Farm
6C1	2.7	ESE	Moyer Farm
		FRUITS/VEGETABLES	
11D1	3.3	SW	Zehner Farm

TABLE C 2
(Page 3 of 4)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2006

Greater than Five Miles from the SSES - See Figure 7

Location Code[a]	Distance[a] (miles)	Direction	Description
DRINKING WATER			
12H2	26	WSW	Danville Water Co. (treated)
FISH			
2H*	30	NNE	Near Falls, Pa.
SEDIMENT[c]			
12F	6.9	WSW	Old Berwick Test Track
AIR			
6G1*	13.5	ESE	Freeland Substation
8G1*	12	SSE	PPL SFC - Humbolt Industrial Park
SOIL			
8G1*	12	SSE	PPL SFC - Humbolt Industrial Park
MILK			
10G1*	14	SSW	Davis Farm
GROUND WATER			
12F3*	5.2	WSW	Berwick Water Company

TABLE C 2
(Page 4 of 4)

Sampling Locations for the SSES
Radiological Environmental Monitoring Program – 2006

a) All distances from the SSES to monitoring locations are measured from the standby gas treatment vent at 44200/N34117 (Pa. Grid System). The location codes are based on both distance and direction from the SSES. The letters in the location codes indicate if the monitoring locations are on site (within the site boundary) or, if they are not on site, the approximate distances of the locations from the SSES as described below:

S - on site	E - 4-5 miles
A - <1 mile	F - 5-10 miles
B - 1-2 miles	G - 10-20 miles
C - 2-3 miles	H - >20 miles
D - 3-4 miles	* - Control locations

The numbers preceding the letters in the location codes provide the directions of the monitoring locations from the SSES by indicating the sectors in which they are located. A total of 16 sectors (numbered 1 through 16) equally divide an imaginary circle on a map of the SSES and its vicinity, with the SSES at the center of the circle. The middle of sector 1 is directed due north (N). Moving clockwise from sector 1, the sector immediately adjacent to sector 1 is sector 2, the middle of which is directed due north, northeast (NNE). Continuing to move clockwise, the sector numbers increase to 16, which is the north, northwest sector.

The numbers following the letters in the location codes are used to differentiate sampling locations found in the same sectors at approximately the same distances from the SSES.

b) No actual location is indicated since fish are sampled from the Susquehanna River at or below the SSES discharge diffuser.

c) No permanent locations exist; samples are taken based on availability. Consequently, it is not necessary to assign a number following the letter in the location code.

APPENDIX D

2006
LAND USE CENSUS RESULTS

2006 LAND USE CENSUS RESULTS

A Land Use Survey, conducted during the 2006 growing season around the SSES, was performed by Ecology III, Inc. to comply with the Offsite Dose Calculation Manual. The purpose of the survey was to document the nearest milk animal, residence, and garden greater than 50 m^2 (approx. 500 ft^2) producing broad leaf vegetation within a distance of 8 km (approx. 5 miles) in each of the 16 meteorological sectors surrounding the SSES.

SUMMARY OF CHANGES FROM 2005 TO 2006

Residence Census:
The residence census was conducted from 24 July through 28 August 2006. Distances of the nearest residences from the Susquehanna SES in the 16 different sectors ranged from 0.5 (J.Futoma, Sector 7 and R. Panetta, Sector 6) to 2.1 miles (D. Barberi, Sector 4), with an average of approximately 1.0 miles.

Changes from the 2005 census was B. Kramer (Sector 15) occupied the former G. Hidlay residence (vacant in 2005).

Garden Census:
The garden census was conducted on 24 July through 11 September 2006. Distances of the nearest gardens from the Susquehanna SES in the 16 different sectors ranged from 0.6 miles (T. Scholl, Sector 7) to 4.5 miles (R. Reider, Sector 15), with an average of 2.3 miles.

Changes from the 2005 census included: Sector 3 – F. Kremski replaced L. Yokum (closer garden), Sector 8 – H. Roinick replaced M. Zaletko (no garden), Sector 9 – T. Stemrich replaced A. Kadir (no garden), Sector 15 – R. Reider replaced D. Goff (no garden)

Dairy Animal Census:
Eight dairy animal sites were identified in the census conducted from 19 June through 31 July 2006. Cows were present at all sites; no dairy goats were found. Changes from 2005 census included two dairies that ceased operations before 2006 census: D. Moyer (location 6C1) and C. and K. Drasher (location 10D3). Also, T. and M. Berger (location 12B2) is no longer a willing participant in the 2006 REMP milk sampling program.

Irrigation
Unusual amounts of rainfall affected the sizes of gardens and amount of irrigation in 2006. The only farm that irrigated crops using Susquehanna River water downriver from the Susquehanna SES in 2006 was the Zehner Farm (location 11D1 – field east of Nescopeck). Pumpkins, soybeans and rye were irrigated briefly in August 2006. No

other farms irrigated this year because soil moisture was sufficient for the crops. Overall results of the survey are summarized below:

TABLE D1
(Page 1 of 1)
Nearest residence, garden, and dairy animal in each of the 16 meteorological sectors within a 5-mile radius of the Susquehanna Steam Electric Station, 2006 .

SECTOR	DIRECTION	NEAREST RESIDENCE	NEAREST GARDEN	NEAREST DAIRY ANIMAL
1	N	1.3 mi	3.2 mi	>5.0 mi
2	NNE	1.0 mi	2.3 mi [i]	>5.0 mi
3	NE	0.9 mi	2.6 mi	>5.0 mi
4	ENE	2.1 mi	2.4 mi [a,d,f,j]	>5.0 mi
5	E	1.4 mi	1.8 mi [a,c]	4.5 mi. [g]
6	ESE	0.5 mi	2.5 mi	4.2 mi [g]
7	SE	0.5 mi	0.6 mi	>5.0 mi
8	SSE	0.6 mi	2.9 mi	>5.0 mi
9	S	1.0 mi	2.5 mi	>5.0 mi
10	SSW	0.9 mi	1.2 mi	3.0 mi [a,b,c,d,e,g]
11	SW	1.5 mi	1.9 mi	>5.0 mi
12	WSW	1.3 mi	1.3 mi	1.7 mi [i,g]
13	W	1.2 mi	1.2 mi	5.0 mi
14	WNW	0.8 mi	1.3 mi	>5.0 mi
15	NW	0.8 mi	4.5 mi	>5.0 mi
16	NNW	0.6 mi	4.0 mi	4.2 mi

[a] Chickens raised for consumption at this location.
[b] Ducks raised for consumption at this location.
[c] Eggs consumed from chickens at this location.
[d] Geese raised for consumption at this location.
[e] Pigs raised for consumption at this location.
[f] Turkeys raised for consumption at this location.
[g] Fruits/vegetables raised for consumption at this location.
[h] Rabbits raised for consumption at this location.*
[i] Beef cattle raised for consumption at this location.
[j] Goats raised for consumption at this location.*
[k] Pheasants raised for consumption at this location.*
[l] Sheep raised for consumption at this location.*
[m] Guinea hen raised for consumption at this location.*

*No locations were identified as raising rabbits, dairy goats, pheasants, sheep and guinea hens during 2006.

APPENDIX E

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APPENDIX F

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APPENDIX G

2006 SSES REMP SUMMARY OF DATA

The averages for indicator and control locations reported in the Summary of Data Table, which summarizes the entire year's results for the SSES REMP, were calculated using all measured values, when available, whether or not they were reported in Appendix I tables. Values below the MDCs, even zeroes and negatives, were part of the averaging process for these analysis results. When no measured results are available in these cases, "LLD" is reported.

Preferably, the averages reported in the Summary of Data table for sample media that are normally collected continuously are determined using only results from continuously collected samples. Occasionally, grab samples are taken for these media when equipment malfunctions or other anomalies preclude or otherwise perturb routine continuous sampling. These grab samples are taken to minimize the time periods when no sampling is being performed, or, in some instances, when continuous sampling is considered to be nonrepresentative.

Because grab samples are snapshots of the media over brief periods, it is preferable not to average the analysis results of these samples with those for continuously collected composite samples. However, when equipment malfunctions are protracted, relatively large periods of time could be entirely unrepresented by averages if the results from grab sample analyses are not considered.

Allowing analysis results for grab samples to be weighted equally with those representing relatively large periods of time would tend to bias the resulting averages unjustifiably towards the conditions at the times that the grabs are obtained. Averages obtained in this way might less accurately reflect the conditions for the combined period of continuous sampling and grab sampling than if only the results from continuous sampling were used. On the other hand, using weighting factors for the analysis results of grab samples derived from the actual time it takes to collect those samples would lead to the grab sample analysis results having a negligible effect on the overall average and not justifying the effort involved.

Grab samples collected in lieu of normal continuous sampling are typically obtained at regular intervals corresponding to the intervals (weekly) at which the continuously collected samples would usually be retrieved for eventual compositing. For example, grab samples are collected once a week but may be composited monthly in place of continuously collected samples that would normally be retrieved weekly and composited monthly. Since each grab sample is used to represent an entire week, albeit imperfect, it is reasonable to weight the analysis results the same. Thus, the results of one weekly grab are given approximately one-fourth the weight of the results for a monthly composite sample collected continuously for each of the four weeks in a month. Similarly, the analysis results of a composite of four weekly grab samples would carry the same weight as the analysis results for a composite of four weeks of continuously collected sample.

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2006
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: **December 27, 2005** **to** **January 31, 2007**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Ambient Radiation (mR/std. qtr.)	TLD 231		2.17E+01 (211 / 212) (1.61E+01 - 4.46E+01)	9S2 0.2 mi S	4.26E+01 (4 / 4) (3.99E+01 - 4.46E+01)	2.02E+01 (20 / 20) (1.72E+01 - 2.36E+01)	0
Surface Water (pCi/l)	Tritium 44	2000	2.10E+03 (32 / 32) (-4.50E+01 - 1.19E+04)	2S7 0.1 mi NNE	5.40E+03 (12 / 12) (6.71E+02 - 1.19E+04)	1.91E+01 (12 / 12) (-6.71E+01 - 1.13E+02)	0
	Iodine-131 35	1	3.37E-01 (24 / 24) (-4.82E-01 - 1.21E+00)	2S7 0.1 mi NNE	4.90E-01 (12 / 12) (-3.94E-01 - 1.21E+00)	3.21E-01 (11 / 11) (-1.14E+00 - 1.56E+00)	0
	Gamma Spec K-40 44		2.33E+01 (32 / 32) (-3.48E+01 - 2.13E+02)	LTAW on site NE-ESE	4.37E+01 (4 / 4) (-2.80E+01 - 2.13E+02)	1.92E+01 (12 / 12) (-3.51E+00 - 1.24E+02)	0
	Mn-54 44	15	5.71E-02 (32 / 32) (-2.68E+00 - 2.61E+00)	2S7 0.1 mi NNE	4.67E-01 (12 / 12) (-9.98E-01 - 2.61E+00)	1.10E-01 (12 / 12) (-1.47E+00 - 1.83E+00)	0
	Co-58 44	15	-4.84E-01 (32 / 32) (-4.24E+00 - 1.89E+00)	LTAW on site NE-ESE	6.45E-02 (4 / 4) (-1.32E+00 - 9.48E-01)	-1.91E-01 (12 / 12) (-9.70E-01 - 7.98E-01)	0
	Fe-59 44	30	3.55E-01 (32 / 32) (-4.50E+00 - 4.93E+00)	4S7 0.4 mi ENE	1.55E+00 (4 / 4) (-3.70E+00 - 4.38E+00)	2.61E-01 (12 / 12) (-1.65E+00 - 5.66E+00)	0
	Co-60 44	15	-6.05E-03 (32 / 32) (-1.15E+00 - 1.01E+00)	2S7 0.1 mi NNE	4.41E-01 (12 / 12) (-4.05E-01 - 1.01E+00)	1.37E-01 (12 / 12) (-1.10E+00 - 1.27E+00)	0
	Zn-65 44	30	8.87E-01 (32 / 32) (-5.62E+00 - 7.00E+00)	6S6 0.8 mi ESE	2.22E+00 (12 / 12) (-4.75E+00 - 9.18E+00)	2.22E+00 (12 / 12) (-4.75E+00 - 9.18E+00)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2006
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: **December 27, 2005** **to** **January 31, 2007**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Surface Water (cont.) (pCi/l)	Zr-95	44	30	-7.69E-01 (32 / 32) (-9.25E+00 - 5.36E+00)	2S7 0.1 mi NNE	-3.13E-01 (12 / 12) (-3.50E+00 - 5.36E+00)	-1.24E+00 (12 / 12) (-3.65E+00 - 3.70E-01)	0
	Nb-95	44	15	6.96E-01 (32 / 32) (-1.38E+00 - 3.21E+00)	6S6 0.8 mi ESE	9.67E-01 (12 / 12) (-1.20E+00 - 2.23E+00)	9.67E-01 (12 / 12) (-1.20E+00 - 2.23E+00)	0
	Cs-134	44	15	1.67E+00 (32 / 32) (-2.89E+00 - 7.87E+00)	6S5 0.9 mi ESE	2.60E+00 (12 / 12) (-2.21E+00 - 7.87E+00)	1.95E+00 (12 / 12) (-2.22E+00 - 5.87E+00)	0
	Cs-137	44	18	1.55E-01 (32 / 32) (-2.07E+00 - 3.05E+00)	2S7 0.1 mi NNE	6.91E-01 (12 / 12) (-7.17E-01 - 3.05E+00)	3.86E-02 (12 / 12) (-1.38E+00 - 9.39E-01)	0
	Ba-140	44	60	-6.28E-01 (32 / 32) (-1.78E+01 - 2.30E+01)	6S5 0.9 mi ESE	8.83E-01 (12 / 12) (-1.23E+01 - 2.30E+01)	-9.75E-01 (12 / 12) (-1.83E+01 - 6.60E+00)	0
	La-140	44	15	4.29E-01 (32 / 32) (-1.06E+01 - 8.76E+00)	2S7 0.1 mi NNE	1.19E+00 (12 / 12) (-3.14E+00 - 8.76E+00)	4.50E-01 (12 / 12) (-3.33E+00 - 6.53E+00)	0

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Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	NAME DISTANCE AND DIRECTION	LOCATION WITH HIGHEST MEAN MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Potable Water (pCi/l)	Gross Beta	14	4	2.42E+00 (14 / 14) (7.27E-01 - 5.84E+00)	12H2 26 mi WSW	2.42E+00 (14 / 14) (7.27E-01 - 5.84E+00)		0
	Tritium	14	2000	-2.81E+00 (14 / 14) (-1.32E+02 - 6.25E+01)	12H2 26 mi WSW	-2.81E+00 (14 / 14) (-1.32E+02 - 6.25E+01)		0
	Gamma Spec							
	K-40	14		8.57E+00 (14 / 14) (-6.10E+01 - 4.17E+01)	12H2 26 mi WSW	8.57E+00 (14 / 14) (-6.10E+01 - 4.17E+01)		0
	Mn-54	14	15	5.10E-02 (14 / 14) (-2.16E+00 - 1.87E+00)	12H2 26 mi WSW	5.10E-02 (14 / 14) (-2.16E+00 - 1.87E+00)		0
	Co-58	14	15	-5.51E-02 (14 / 14) (-1.20E+00 - 2.22E+00)	12H2 26 mi WSW	-5.51E-02 (14 / 14) (-1.20E+00 - 2.22E+00)		0
	Fe-59	14	30	1.02E+00 (14 / 14) (-3.05E+00 - 4.50E+00)	12H2 26 mi WSW	1.02E+00 (14 / 14) (-3.05E+00 - 4.50E+00)		0
	Co-60	14	15	8.73E-03 (14 / 14) (-1.39E+00 - 1.43E+00)	12H2 26 mi WSW	8.73E-03 (14 / 14) (-1.39E+00 - 1.43E+00)		0
	Zn-65	14	30	9.56E-01 (14 / 14) (-6.69E+00 - 3.27E+01)	12H2 26 mi WSW	9.56E-01 (14 / 14) (-6.69E+00 - 3.27E+01)		0
	Zr-95	14	30	-6.02E-01 (14 / 14) (-4.95E+00 - 2.26E+00)	12H2 26 mi WSW	-6.02E-01 (14 / 14) (-4.95E+00 - 2.26E+00)		0

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OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2006
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	NAME DISTANCE AND DIRECTION	LOCATION WITH HIGHEST MEAN MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Potable Water (cont) (pCi/l)	Nb-95	14	15	5.82E-01 (14 / 14) (-1.22E+00 - 2.52E+00)	12H2 26 mi WSW	5.82E-01 (14 / 14) (-1.22E+00 - 2.52E+00)	Only indicator stations sampled for this medium.	0
	Cs-134	14	15	1.57E+00 (14 / 14) (-3.58E+00 - 6.13E+00)	12H2 26 mi WSW	1.57E+00 (14 / 14) (-3.58E+00 - 6.13E+00)		0
	Cs-137	14	18	1.93E-02 (14 / 14) (-1.62E+00 - 1.84E+00)	12H2 26 mi WSW	1.93E-02 (14 / 14) (-1.62E+00 - 1.84E+00)		0
	Ba-140	14	60	1.74E+00 (14 / 14) (-2.92E+01 - 1.54E+01)	12H2 26 mi WSW	1.74E+00 (14 / 14) (-2.92E+01 - 1.54E+01)		0
	La-140	14	15	3.60E-01 (14 / 14) (-4.29E+00 - 1.02E+01)	12H2 26 mi WSW	3.60E-01 (14 / 14) (-4.29E+00 - 1.02E+01)		0

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Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE		LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION			MEAN (3) RANGE		CONTROL LOCATION MEAN (3) RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Fish	Gamma Spec												
(pCi/kg wet)	K-40	13		3.47E+03	(7 / 7)	2H			3.87E+03	(6 / 6)	3.87E+03	(6 / 6)	0
				(2.64E+03	- 4.25E+03)	30	mi	NNE	(3.47E+03	- 4.48E+03)	(3.47E+03	- 4.48E+03)	
	Mn-54	13	130	3.81E+00	(7 / 7)	LTAW			1.88E+01	(1 / 1)	-2.15E+00	(6 / 6)	0
				(-9.33E+00	- 1.88E+01)	on site		NE-ESE	(1.88E+01	- 1.88E+01)	(-3.54E+01	- 9.93E+00)	
	Co-58	13	130	-1.20E+00	(7 / 7)	LTAW			1.18E+01	(1 / 1)	-5.59E+00	(6 / 6)	0
				(-1.35E+01	- 1.26E+01)	on site		NE-ESE	(1.18E+01	- 1.18E+01)	(-2.99E+01	- 1.00E+01)	
	Fe-59	13	260	8.80E+00	(7 / 7)	IND			1.04E+01	(6 / 6)	-1.18E+01	(6 / 6)	0
				(-3.13E+01	- 3.08E+01)	0.9-1.4	mi	ESE	(-3.13E+01	- 3.08E+01)	(-5.26E+01	- 3.56E+01)	
	Co-60	13	130	-1.03E+01	(7 / 7)	2H			1.33E+01	(6 / 6)	1.33E+01	(6 / 6)	0
				(-4.31E+01	- 9.73E+00)	30	mi	NNE	(-4.00E+01	- 8.52E+01)	(-4.00E+01	- 8.52E+01)	
	Zn-65	13	260	-2.76E+01	(7 / 7)	2H			-8.27E+00	(6 / 6)	-8.27E+00	(6 / 6)	0
				(-1.03E+02	- 2.38E+01)	30	mi	NNE	(-1.36E+02	- 4.65E+01)	(-1.36E+02	- 4.65E+01)	
	Zr-95	13		3.28E+00	(7 / 7)	LTAW			6.58E+00	(1 / 1)	-8.42E+00	(6 / 6)	0
				(-3.05E+01	- 3.01E+01)	on site		NE-ESE	(6.58E+00	- 6.58E+00)	(-6.64E+01	- 1.61E+01)	
	Nb-95	13		1.06E+01	(7 / 7)	LTAW			1.97E+01	(1 / 1)	4.75E+00	(6 / 6)	0
				(-1.36E+01	- 2.66E+01)	on site		NE-ESE	(1.97E+01	- 1.97E+01)	(-1.99E+01	- 3.51E+01)	
	Cs-134	13	130	-2.03E-01	(7 / 7)	IND			3.58E+00	(6 / 6)	1.71E+00	(6 / 6)	0
				(-4.67E+01	- 3.21E+01)	0.9-1.4	mi	ESE	(-4.67E+01	- 3.21E+01)	(-4.41E+01	- 2.93E+01)	
	Cs-137	13	150	-3.29E-01	(7 / 7)	2H			7.74E+00	(6 / 6)	7.74E+00	(6 / 6)	0
				(-2.01E+01	- 2.48E+01)	30	mi	NNE	(-5.18E+00	- 2.92E+01)	(-5.18E+00	- 2.92E+01)	
	Ba-140	13		-1.42E+01	(7 / 7)	LTAW			9.79E+01	(1 / 1)	-1.09E+01	(6 / 6)	0
				(-1.19E+02	- 9.79E+01)	on site		NE-ESE	(9.79E+01	- 9.79E+01)	(-8.51E+01	- 6.29E+01)	
	La-140	13		1.24E+00	(7 / 7)	IND			1.49E+01	(6 / 6)	-2.04E+01	(6 / 6)	0
				(-8.09E+01	- 4.16E+01)	0.9-1.4	mi	ESE	(-1.88E+01	- 4.16E+01)	(-5.04E+01	- -2.23E+00)	

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2006
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
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Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE		LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION			MEAN (3) RANGE		CONTROL LOCATION MEAN (3) RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Sediment	Gamma Spec												
(pCi/kg dry)	Be-7	6		2.68E+02	(4 / 4)	2B			8.92E+02	(2 / 2)	8.92E+02	(2 / 2)	0
				(-3.12E+02	- 9.31E+02)	1.6	mi	NNE	(3.37E+01	- 1.75E+03)	(3.37E+01	- 1.75E+03)	
	K-40	6		1.16E+04	(4 / 4)	2B			1.57E+04	(2 / 2)	1.57E+04	(2 / 2)	0
				(1.01E+04	- 1.45E+04)	1.6	mi	NNE	(1.50E+04	- 1.63E+04)	(1.50E+04	- 1.63E+04)	
	Mn-54	6		7.35E+00	(4 / 4)	12F			1.36E+01	(2 / 2)	4.81E+00	(2 / 2)	0
				(-6.71E+00	- 1.56E+01)	6.9	mi	WSW	(1.15E+01	- 1.56E+01)	(4.78E+00	- 4.84E+00)	
	Co-58	6		4.25E-01	(4 / 4)	2B			1.19E+01	(2 / 2)	1.19E+01	(2 / 2)	0
				(-1.84E+01	- 2.28E+01)	1.6	mi	NNE	(-1.03E+00	- 2.49E+01)	(-1.03E+00	- 2.49E+01)	
	Fe-59	6		-3.34E+01	(4 / 4)	2B			5.00E+01	(2 / 2)	5.00E+01	(2 / 2)	0
				(-1.31E+02	- 5.20E+01)	1.6	mi	NNE	(-4.90E+01	- 1.49E+02)	(-4.90E+01	- 1.49E+02)	
	Co-60	6		1.20E+01	(4 / 4)	12F			1.27E+01	(2 / 2)	5.26E+00	(2 / 2)	0
				(4.14E-01	- 2.49E+01)	6.9	mi	WSW	(4.14E-01	- 2.49E+01)	(2.19E+00	- 8.32E+00)	
	Zn-65	6		1.19E+02	(4 / 4)	7B			1.42E+02	(2 / 2)	4.89E+01	(2 / 2)	0
				(3.74E+01	- 2.46E+02)	1.2	mi	SE	(3.74E+01	- 2.46E+02)	(-5.13E+01	- 1.49E+02)	
	Zr-95	6		2.25E-01	(4 / 4)	2B			3.41E+01	(2 / 2)	3.41E+01	(2 / 2)	0
				(-4.96E+01	- 4.24E+01)	1.6	mi	NNE	(8.83E+00	- 5.94E+01)	(8.83E+00	- 5.94E+01)	
	Nb-95	6		3.61E+01	(4 / 4)	12F			5.46E+01	(2 / 2)	1.34E+01	(2 / 2)	0
				(-1.16E+01	- 7.57E+01)	6.9	mi	WSW	(3.34E+01	- 7.57E+01)	(-2.98E+01	- 5.65E+01)	
	Cs-134	6	150	4.04E+01	(4 / 4)	7B			6.87E+01	(2 / 2)	4.63E+01	(2 / 2)	0
				(-4.06E+01	- 1.78E+02)	1.2	mi	SE	(-4.06E+01	- 1.78E+02)	(-1.15E+01	- 1.04E+02)	
	Cs-137	6	180	5.92E+01	(4 / 4)	7B			1.06E+02	(2 / 2)	1.01E+02	(2 / 2)	0
				(-2.39E+01	- 1.52E+02)	1.2	mi	SE	(6.07E+01	- 1.52E+02)	(8.24E+01	- 1.20E+02)	
	Ba-140	6		4.72E+01	(4 / 4)	12F			1.06E+02	(2 / 2)	-1.72E+01	(2 / 2)	0
				(-1.32E+02	- 1.69E+02)	6.9	mi	WSW	(4.37E+01	- 1.69E+02)	(-1.86E+01	- -1.58E+01)	

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NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
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Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE		LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION			MEAN (3) RANGE		CONTROL LOCATION MEAN (3) RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Sediment (cont)	La-140	6		-1.32E+01	(4 / 4)	7B			-8.50E+00	(2 / 2)	-1.30E+02	(2 / 2)	0
(pCi/kg dry)				(-1.22E+02 - 1.05E+02)		1.2	mi	SE	(-1.22E+02 - 1.05E+02)		(-3.12E+02 - 5.20E+01)		
	Ra-226	6		2.14E+03	(4 / 4)	7B			2.40E+03	(2 / 2)	2.39E+03	(2 / 2)	0
				(1.76E+03 - 2.95E+03)		1.2	mi	SE	(1.84E+03 - 2.95E+03)		(2.22E+03 - 2.56E+03)		
	Th-228	6		1.06E+03	(4 / 4)	2B			1.43E+03	(2 / 2)	1.43E+03	(2 / 2)	0
				(7.47E+02 - 1.34E+03)		1.6	mi	NNE	(1.40E+03 - 1.46E+03)		(1.40E+03 - 1.46E+03)		
	Ac-228	6		1.28E+03	(4 / 4)	7B			1.48E+03	(2 / 2)	1.34E+03	(2 / 2)	0
				(9.15E+02 - 1.97E+03)		1.2	mi	SE	(9.93E+02 - 1.97E+03)		(1.31E+03 - 1.37E+03)		
	Ra-228	0											0
Ground Water	Gamma Spec												
(pCi/l)	K-40	19		1.58E+00	(15 / 15)	2S2			1.48E+01	(4 / 4)	-1.92E+00	(4 / 4)	0
				(-6.71E+01 - 4.32E+01)		0.9	mi	NNE	(-1.33E+01 - 3.16E+01)		(-3.13E+01 - 4.10E+01)		
	Mn-54	19	15	-1.49E-01	(15 / 15)	6S10			6.35E-01	(4 / 4)	-1.28E-01	(4 / 4)	0
				(-2.59E+00 - 1.97E+00)		0.4	mi	ESE	(1.38E-01 - 9.61E-01)		(-4.24E-01 - 5.77E-01)		
	Co-58	19	15	-8.24E-01	(15 / 15)	12F3			5.16E-02	(4 / 4)	5.16E-02	(4 / 4)	0
				(-2.93E+00 - 2.00E+00)		5.2	mi	WSW	(-2.06E-01 - 3.91E-01)		(-2.06E-01 - 3.91E-01)		
	Fe-59	19	30	-2.06E-01	(15 / 15)	6S10			1.71E+00	(4 / 4)	-3.96E+00	(4 / 4)	0
				(-1.23E+01 - 8.52E+00)		0.4	mi	ESE	(-3.87E+00 - 8.52E+00)		(-1.11E+01 - 2.52E-01)		
	Co-60	19	15	3.57E-01	(15 / 15)	12F3			8.38E-01	(4 / 4)	8.38E-01	(4 / 4)	0
				(-1.98E+00 - 3.56E+00)		5.2	mi	WSW	(6.70E-01 - 1.07E+00)		(6.70E-01 - 1.07E+00)		
	Zn-65	19	30	1.49E+00	(15 / 15)	2S2			2.63E+00	(4 / 4)	2.48E-01	(4 / 4)	0
				(-1.11E+01 - 1.71E+01)		0.9	mi	NNE	(-2.14E+00 - 6.75E+00)		(6.70E-01 - 6.92E+00)		
	Zr-95	19	30	-2.70E-01	(15 / 15)	11S2			1.67E+00	(3 / 3)	-2.86E+00	(4 / 4)	0
				(-7.32E+00 - 3.48E+00)		0.4	mi	SW	(8.59E-01 - 2.13E+00)		(-5.38E+00 - -1.93E+00)		
	Nb-95	19	15	5.07E-01	(15 / 15)	4S4			2.07E+00	(4 / 4)	-5.55E-01	(4 / 4)	0
				(-2.74E+00 - 5.63E+00)		0.5	mi	ENE	(1.77E-01 - 5.63E+00)		(-1.57E+00 - 3.29E-01)		
	Cs-134	19	15	2.07E+00	(15 / 15)	4S4			4.17E+00	(4 / 4)	1.52E+00	(4 / 4)	0
				(-1.64E+00 - 1.41E+01)		0.5	mi	ENE	(-1.64E+00 - 1.41E+01)		(-1.13E+00 - 5.85E+00)		

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2006
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Ground Water (cont)	Cs-137	19	18	-2.05E-01 (15 / 15)	6S10	9.06E-01 (4 / 4)	5.03E-01 (4 / 4)	0
(pCi/l)				(-4.06E+00 - 2.76E+00)	0.4 mi ESE	(-5.90E-01 - 2.76E+00)	(-5.35E-01 - 2.68E+00)	
	Ba-140	19	60	3.40E+00 (15 / 15)	6S10	8.02E+00 (4 / 4)	3.40E-01 (4 / 4)	0
				(-3.46E+00 - 2.15E+01)	0.4 mi ESE	(-3.08E+00 - 2.15E+01)	(-1.01E+01 - 1.49E+01)	
	La-140	19	15	-3.64E-01 (15 / 15)	4S4	1.52E+00 (4 / 4)	8.00E-02 (4 / 4)	0
				(-8.15E+00 - 1.08E+01)	0.5 mi ENE	(-8.15E+00 - 1.08E+01)	(-4.32E+00 - 5.20E+00)	
	H-3	19	2000	4.59E+01 (15 / 15)	4S4	8.86E+01 (4 / 4)	2.37E+01 (4 / 4)	0
				(-9.72E+00 - 1.78E+02)	0.5 mi ENE	(4.62E+01 - 1.78E+02)	(-2.43E+01 - 7.68E+01)	
Air Particulates	Gross Beta	312	10	1.44E+01 (208 / 208)	13S6	1.47E+01 (52 / 52)	1.38E+01 (104 / 104)	0
(E-03 pCi/m3)				(4.79E+00 - 2.89E+01)	0.4 mi W	(5.97E+00 - 2.56E+01)	(6.00E+00 - 2.37E+01)	
Air Iodine	I-131	312	70	6.61E-01 (208 / 208)	13S6	9.52E-01 (52 / 52)	1.57E-01 (104 / 104)	0
(E-03 pCi/m3)				(-1.50E+01 - 1.14E+01)	0.4 mi W	(-1.35E+01 - 1.02E+01)	(-6.81E+00 - 1.09E+01)	
Air Particulates	Gamma Spec							
Quarterly Composite	Be-7	24		1.11E+02 (16 / 16)	12E1	1.23E+02 (4 / 4)	1.14E+02 (8 / 8)	0
(E-03 pCi/m3)				(7.68E+01 - 1.58E+02)	4.7 mi WSW	(9.37E+01 - 1.58E+02)	(7.87E+01 - 1.39E+02)	
	K-40	24		1.80E+00 (16 / 16)	3S2	4.42E+00 (4 / 4)	-1.48E-01 (8 / 8)	0
				(-6.36E+00 - 1.18E+01)	0.5 mi NE	(-2.44E+00 - 1.18E+01)	(-3.36E+00 - 1.77E+00)	
	Mn-54	24		-5.07E-02 (16 / 16)	3S2	3.57E-01 (4 / 4)	-9.28E-02 (8 / 8)	0
				(-1.08E+00 - 8.30E-01)	0.5 mi NE	(3.17E-03 - 8.30E-01)	(-5.98E-01 - 5.01E-01)	

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NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Air Particulates (cont)							
Quarterly Composite (E-03 pCi/m3)	Co-58	24	-4.56E+00 (16 / 16) (-7.12E+01 - 6.75E-01)	13S6 0.4 mi W	1.50E-01 (4 / 4) (-4.95E-01 - 6.75E-01)	-8.75E-02 (8 / 8) (-9.60E-01 - 9.56E-01)	0
	Fe-59	24	8.00E-03 (16 / 16) (-9.03E+00 - 6.97E+00)	13S6 0.4 mi W	1.67E+00 (4 / 4) (-1.86E+00 - 7)	-1.18E+00 (8 / 8) (-4.59E+00 - 4.39E+00)	0
	Co-60	24	-1.27E+00 (16 / 16) (-2.33E+01 - 1.36E+00)	12S1 0.4 mi WSW	3.76E-01 (4 / 4) (8.03E-04 - 9.81E-01)	1.58E-01 (8 / 8) (-1.88E-01 - 3.42E-01)	0
	Zn-65	24	-2.75E+00 (16 / 16) (-4.88E+01 - 1.96E+00)	12S1 0.4 mi WSW	5.54E-01 (4 / 4) (-5.16E-01 - 1.84E+00)	-1.81E-01 (8 / 8) (-1.91E+00 - 2.03E+00)	0
	Zr-95	24	7.72E-01 (16 / 16) (-7.37E-01 - 6.76E+00)	13S6 0.4 mi W	1.60E+00 (4 / 4) (-7.37E-01 - 6.76E+00)	-3.82E-01 (8 / 8) (-1.97E+00 - 1.44E+00)	0
	Nb-95	24	-2.22E-02 (16 / 16) (-1.97E+00 - 1.60E+00)	3S2 0.5 mi NE	7.65E-01 (4 / 4) (3.47E-01 - 1.60E+00)	-4.70E-02 (8 / 8) (-1.64E+00 - 1.12E+00)	0
	Cs-134	24	50 -2.22E-02 (16 / 16) (-1.07E+00 - 1.13E+00)	8G1 12 mi SSE	5.04E-01 (4 / 4) (1.24E-01 - 9.92E-01)	4.25E-01 (8 / 8) (-1.30E-01 - 1.08E+00)	0
	Cs-137	24	60 1.87E-01 (16 / 16) (-3.11E-01 - 1.11E+00)	12S1 0.4 mi WSW	2.65E-01 (4 / 4) (4.08E-02 - 5.57E-01)	1.41E-01 (8 / 8) (-4.06E-01 - 5.71E-01)	0
	Ba-140	24	1.27E+01 (16 / 16) (-7.55E+02 - 8.30E+02)	3S2 0.5 mi NE	1.85E+02 (4 / 4) (-1.31E+02 - 8.30E+02)	2.39E+01 (8 / 8) (-2.95E+02 - 4.59E+02)	0
	La-140	24	-5.33E+01 (16 / 16) (-3.01E+02 - 1.02E+02)	6G1 13.5 mi ESE	6.14E+01 (4 / 4) (-2.87E+00 - 1.28E+02)	2.23E+01 (8 / 8) (-1.01E+02 - 1.28E+02)	0

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NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
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Reporting Period: December 27, 2005 to January 31, 2007

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)		LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Milk (pCi/l)	I-131	81	1	8.26E-02 (61 / 61) (-1.36E+00 - 6.62E-01)	10D1 3 mi SSW	1.06E-01 (19 / 19) (-2.97E-01 - 6.62E-01)	1.39E-02 (20 / 20) (-3.49E-01 - 5.71E-01)	0
	Gamma Spec							
	K-40	84		1.30E+03 (63 / 63) (9.80E+02 - 1.55E+03)	13E3 5 mi W	1.34E+03 (21 / 21) (1.09E+03 - 1.55E+03)	1.31E+03 (21 / 21) (9.05E+02 - 1.55E+03)	0
	Mn-54	84		-4.06E-01 (63 / 63) (-5.83E+00 - 6.07E+00)	10D2 3.1 mi SSW	-6.83E-02 (21 / 21) (-2.83E+00 - 2.66E+00)	-3.61E-01 (21 / 21) (-5.19E+00 - 2.83E+00)	0
	Co-58	84		-1.57E-01 (63 / 63) (-5.46E+00 - 5.66E+00)	10D1 3 mi SSW	2.99E-01 (21 / 21) (-2.98E+00 - 4.62E+00)	-7.97E-02 (21 / 21) (-2.88E+00 - 4.02E+00)	0
	Fe-59	84		1.08E+00 (63 / 63) (-1.33E+01 - 1.81E+01)	10D1 3 mi SSW	1.60E+00 (21 / 21) (-1.32E+01 - 1.81E+01)	1.47E-01 (21 / 21) (-1.19E+01 - 9.28E+00)	0
	Co-60	84		8.36E-02 (63 / 63) (-5.10E+00 - 6.17E+00)	10D2 3.1 mi SSW	2.37E-01 (21 / 21) (-5.10E+00 - 3.90E+00)	-9.36E-02 (21 / 21) (-5.58E+00 - 6.57E+00)	0
	Zn-65	84		9.54E-01 (63 / 63) (-1.53E+01 - 2.26E+01)	10D1 3 mi SSW	1.82E+00 (21 / 21) (-1.53E+01 - 1.33E+01)	-2.08E-01 (21 / 21) (-1.64E+01 - 1.20E+01)	0
	Zr-95	84		-7.76E-01 (63 / 63) (-1.19E+01 - 1.14E+01)	10G1 14 mi SSW	7.22E-01 (21 / 21) (-6.92E+00 - 6.59E+00)	7.22E-01 (21 / 21) (-6.92E+00 - 6.59E+00)	0
	Nb-95	84		1.13E+00 (63 / 63) (-3.86E+00 - 5.48E+00)	13E3 5 mi W	1.39E+00 (21 / 21) (-2.65E+00 - 4.30E+00)	8.39E-01 (21 / 21) (-6.48E+00 - 9.43E+00)	0
	Cs-134	84	15	1.05E+00 (63 / 63) (-1.20E+01 - 1.20E+01)	10G1 14 mi SSW	1.84E+00 (21 / 21) (-1.13E+01 - 1.96E+01)	1.84E+00 (21 / 21) (-1.13E+01 - 1.96E+01)	0
	Cs-137	84	18	8.14E-01 (63 / 63) (-7.48E+00 - 7.51E+00)	10D2 3.1 mi SSW	1.07E+00 (21 / 21) (-7.48E+00 - 6.81E+00)	9.39E-02 (21 / 21) (-4.20E+00 - 5.54E+00)	0
	Ba-140	84	60	1.43E+00 (63 / 63) (-2.30E+01 - 3.17E+01)	10D1 3 mi SSW	3.01E+00 (21 / 21) (-1.75E+01 - 3.17E+01)	1.06E+00 (21 / 21) (-1.25E+01 - 1.73E+01)	0
	La-140	84	15	-1.04E+00 (63 / 63) (-1.45E+01 - 6.12E+00)	10G1 14 mi SSW	-3.02E-01 (21 / 21) (-8.95E+00 - 8.63E+00)	-3.02E-01 (21 / 21) (-8.95E+00 - 8.63E+00)	0

TABLE G
SUMMARY OF DATA FOR SSES
OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 2006
NAME OF FACILITY: SUSQUEHANNA STEAM ELECTRIC STATION
LOCATION OF FACILITY: LUZERNE COUNTY, PENNSYLVANIA

Reporting Period: **December 27, 2005** **to** **January 31, 2007**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Soil	Gamma Spec						
(pCi/kg dry)	K-40	4	1.25E+04 (2 / 2) (1.16E+04 - 1.33E+04)	12S1 0.4 mi WSW	1.25E+04 (2 / 2) (1.16E+04 - 1.33E+04)	9.58E+03 (2 / 2) (8.75E+03 - 1.04E+04)	0
	Mn-54	4	7.50E+00 (2 / 2) (-1.33E+01 - 2.83E+01)	12S1 0.4 mi WSW	7.50E+00 (2 / 2) (-1.33E+01 - 2.83E+01)	-1.94E+01 (2 / 2) (-3.62E+01 - -2.62E+00)	0
	Co-58	4	9.50E-01 (2 / 2) (-3.44E+01 - 3.63E+01)	12S1 0.4 mi WSW	9.50E-01 (2 / 2) (-3.44E+01 - 3.63E+01)	-1.68E+00 (2 / 2) (-1.99E+00 - -1.36E+00)	0
	Fe-59	4	-3.11E+01 (2 / 2) (-8.67E+01 - 2.46E+01)	8G1 12 mi SSE	6.40E+01 (2 / 2) (-2.01E+01 - 1.48E+02)	6.40E+01 (2 / 2) (-2.01E+01 - 1.48E+02)	0
	Co-60	4	-2.82E+01 (2 / 2) (-6.89E+01 - 1.25E+01)	8G1 12 mi SSE	2.07E+01 (2 / 2) (1.14E+01 - 2.99E+01)	2.07E+01 (2 / 2) (1.14E+01 - 2.99E+01)	0
	Zn-65	4	-3.10E+02 (2 / 2) (-3.71E+02 - -2.49E+02)	8G1 12 mi SSE	-1.27E+02 (2 / 2) (-2.64E+02 - 1.01E+01)	-1.27E+02 (2 / 2) (-2.64E+02 - 1.01E+01)	0
	Zr-95	4	3.03E+01 (2 / 2) (-1.12E+00 - 6.17E+01)	8G1 12 mi SSE	7.84E+01 (2 / 2) (2.76E+00 - 1.54E+02)	7.84E+01 (2 / 2) (2.76E+00 - 1.54E+02)	0
	Nb-95	4	5.39E+01 (2 / 2) (5.14E+01 - 5.63E+01)	8G1 12 mi SSE	8.23E+01 (2 / 2) (7.94E+01 - 8.52E+01)	8.23E+01 (2 / 2) (7.94E+01 - 8.52E+01)	0
	Cs-134	4	-5.39E+00 (2 / 2) (-1.70E+01 - 6.22E+00)	12S1 0.4 mi WSW	-5.39E+00 (2 / 2) (-1.70E+01 - 6.22E+00)	-1.69E+01 (2 / 2) (-2.93E+01 - -4.55E+00)	0
	Cs-137	4	1.73E+02 (2 / 2) (1.56E+02 - 1.90E+02)	12S1 0.4 mi WSW	1.73E+02 (2 / 2) (1.56E+02 - 1.90E+02)	1.33E+02 (2 / 2) (1.09E+02 - 1.56E+02)	0
	Ba-140	4	-4.05E+02 (2 / 2) (-4.83E+02 - -3.26E+02)	12S1 0.4 mi WSW	-4.05E+02 (2 / 2) (-4.83E+02 - -3.26E+02)	-6.42E+02 (2 / 2) (-1.27E+03 - -1.35E+01)	0
	La-140	4	3.91E+01 (2 / 2) (-3.78E+01 - 1.16E+02)	12S1 0.4 mi WSW	3.91E+01 (2 / 2) (-3.78E+01 - 1.16E+02)	-1.65E+02 (2 / 2) (-1.79E+02 - -1.51E+02)	0

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED (1)	LOWER LIMIT OF DETECTION (LLD) (2)	ALL INDICATOR LOCATIONS MEAN (3) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (3) RANGE	CONTROL LOCATION MEAN (3) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS(4)
Soil (cont)	Ra-226 4		3.15E+03 (2 / 2)	12S1	3.15E+03 (2 / 2)	2.02E+03 (2 / 2)	0
(pCi/kg dry)			(2.43E+03 - 3.86E+03)	0.4 mi WSW	(2.43E+03 - 3.86E+03)	(1.92E+03 - 2.11E+03)	
	Th-228 4		8.63E+02 (2 / 2)	12S1	8.63E+02 (2 / 2)	7.98E+02 (2 / 2)	0
			(8.56E+02 - 8.69E+02)	0.4 mi WSW	(8.56E+02 - 8.69E+02)	(7.88E+02 - 8.08E+02)	
Food/Garden Crops	Gamma Spec						
(pCi/kg wet)	Be-7 3		3.60E+01 (3 / 3)	11D1	3.60E+01 (3 3)		0
			(-5.83E+01 - 1.96E+02)	3.3 mi SW	(-5.83E+01 - 1.96E+02)		
	K-40 3		7.42E+03 (3 / 3)	11D1	7.42E+03 (3 / 3)		0
			(1.82E+03 - 1.66E+04)	3.3 mi SW	(1.82E+03 - 1.66E+04)		
	Mn-54 3		-4.23E-01 (3 / 3)	11D1	-4.23E-01 (3 / 3)		0
			(-1.84E+00 - 1.91E+00)	3.3 mi SW	(-1.84E+00 - 1.91E+00)		
	Co-58 3		-1.77E+00 (3 / 3)	11D1	-1.77E+00 (3 / 3)		0
			(-3.74E+00 - 2.03E+00)	3.3 mi SW	(-3.74E+00 - 2.03E+00)		
	Fe-59 3		-3.73E+00 (3 / 3)	11D1	-3.73E+00 (3 / 3)		0
			(-1.73E+01 - 5.60E+00)	3.3 mi SW	(-1.73E+01 - 5.60E+00)		
	Co-60 3		-8.43E-01 (3 / 3)	11D1	-8.43E-01 (3 / 3)		0
			(-5.39E+00 - 6.44E+00)	3.3 mi SW	(-5.39E+00 - 6.44E+00)		
	Zn-65 3		-3.86E+01 (3 / 3)	11D1	-3.86E+01 (3 / 3)		0
			(-1.02E+02 - 2.48E+00)	3.3 mi SW	(-1.02E+02 - 2.48E+00)		
	Zr-95 3		-1.04E+00 (3 / 3)	11D1	-1.04E+00 (3 / 3)		0
			(-5.76E+00 - 5.00E+00)	3.3 mi SW	(-5.76E+00 - 5.00E+00)		
	Nb-95 3		2.14E+00 (3 / 3)	11D1	2.14E+00 (3 / 3)		0
			(-1.46E+00 - 7.12E+00)	3.3 mi SW	(-1.46E+00 - 7.12E+00)		
	I-131 3		-1.21E+01 (3 / 3)	11D1	-1.21E+01 (3 / 3)		0
			(-2.23E+01 - -6.41E+00)	3.3 mi SW	(-2.23E+01 - -6.41E+00)		

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Food/Garden Crops (cont)							
(pCi/kg wet)	Cs-134	3	2.46E+00 (3 / 3) (-2.06E+00 - 6.11E+00)	11D1 3.3 mi SW	2.46E+00 (3 / 3) (-2.06E+00 - 6.11E+00)		0
	Cs-137	3	1.69E+00 (3 / 3) (-1.73E+00 - 5.11E+00)	11D1 3.3 mi SW	1.69E+00 (3 / 3) (-1.73E+00 - 5.11E+00)		0
	Ba-140	3	4.73E+01 (3 / 3) (1.65E+01 - 9.31E+01)	11D1 3.3 mi SW	4.73E+01 (3 / 3) (1.65E+01 - 9.31E+01)		0
	La-140	3	-4.97E+00 (3 / 3) (-1.51E+01 - 2.87E+00)	11D1 3.3 mi SW	-4.97E+00 (3 / 3) (-1.51E+01 - 2.87E+00)		0

1. The total number of analyses does not include duplicates, splits, or repeated analyses.
2. The Technical Requirement LLD's are shown when applicable.
3. The mean and range are based on all available measured results. The ratio indicated in parentheses is the total number of results used to calculate the mean to the total number of samples.
4. USNRC Reporting Levels are specified in the Technical Requirements (i.e.; when Reporting Levels in Technical Requirements are exceeded).

APPENDIX H

COMPARISON OF INDICATOR AND CONTROL 2006 REMP ANNUAL MEANS FOR SELECTED MEDIA ANALYSIS RESULTS WITH MEANS FROM PREOPERATIONAL AND PRIOR OPERATIONAL PERIODS

The data presented in the following tables were included if specific analysis results routinely exceeded the applicable MDCs in 2006 and/or routinely may have done so in previous years. The comparisons may be useful for observing any step changes that may occur in the environment over a long period. However, the importance attached to these comparisons should be tempered by the understanding that changes in methods of analysis, typical MDCs achieved by the analyses, and averaging methods over the years may tend to blur the picture in some cases.

AMBIENT RADIATION MONITORING

TABLE H 1

AMBIENT RADIATION LEVELS AS MEASURED BY TLDS (mR/STD QTR)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-05**	**2006**	**1978-81**	**1982-05**	**2006**
Range	18.5-19.2	14.7-23.2	--	15.0-17.9	14.8-21.5	--
Mean	18.9	18.6	21.7	16.3	18.2	20.2

AQUATIC PATHWAY MONITORING

TABLE H 3

SURFACE WATER IODINE-131 ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979-81	**1982-05**	**2006**	**1979-81**	**1982-05**	**2006**
Range	0.24-0.37	0.06-1.00	--	0.29-0.43	0.03-1.0	--
Mean	0.29	0.38	0.34	0.36	0.33	0.32

TABLE H 4

SURFACE WATER TRITIUM ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-05***	**2006**	**1978-81**	**1982-05***	**2006**
Range	101-122	126-2050	--	119-319	-239 - +212	--
Mean	109	724	2100	171	47	19.1

*1990 results were not averaged with 1982-01 data because the validity of the 1990 values is questionable in some instances. Laboratory analysis error is suspected. See the 1990 Annual Report.

TABLE H 6

DRINKING WATER GROSS BETA ACTIVITIES (pCi/l)			
Period	**Preoperational**	**Operational**	
	1977 - 81	**1982 - 05**	**2006**
Range	2.2 - 3.2	1.9 - 5.4	--
Mean	2.7	3.0	2.4

TABLE H 7

DRINKING WATER TRITIUM ACTIVITIES (pCi/l)			
Period	**Preoperational**	**Operational**	
	1977 – 81	**1982 - 05**	**2006**
Range	101 – 194	-247 - +220	--
Mean	132	62	-2.8

TABLE H 8

FISH POTASSIUM-40 ACTIVITIES (pCi/g wet)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1977-81	**1982-05**	**2006**	**1977-81**	**1982-05**	**2006**
Range	2.7 - 3.5	3.1 - 5.3	--	2.8 - 3.6	3.0 - 4.2	--
Mean	3.2	3.7	3.5	3.2	3.5	3.9

TABLE H 9

SEDIMENT POTASSIUM-40 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-05**	**2006**	**1978-81**	**1982-05**	**2006**
Range	8.6-10.4	7.4-13.6	--	7.5-11.0	6.2-14.8	--
Mean	9.3	10.9	11.6	7.7	10.9	15.7

TABLE H 10

SEDIMENT RADIUM-226 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-05**	**2006**	**1978-81**	**1982-05**	**2006**
Range	0.5-0.7	0.5-2.4	--	0.6-1.9	0.4-2.9	--
Mean	0.6	1.6	2.1	0.7	1.6	2.4

TABLE H 11

SEDIMENT THORIUM-228 ACTIVITIES (pCi/g dry)				
Location	**Indicator**		**Control**	
Period	**1984 – 05***	**2006**	**1984 - 05***	**2006**
Range	0.9 – 3.2	--	0.8 – 3.1	--
Mean	1.3	1.1	1.4	1.4

*Th-232 was reported instead of Th-228 in 1990.

TABLE H 12

SEDIMENT CESIUM-137 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-05**	**2006**	**1978-81**	**1982-05**	**2006**
Range	0.08-0.15	0.02-0.17	--	0.08-0.21	0.06-0.21	--
Mean	0.10	0.08	0.06	0.11	0.10	0.10

ATMOSPHERIC PATHWAY MONITORING

TABLE H 13

AIR PARTICULATE GROSS BETA ACTIVITIES (E-3 pCi/m^3)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-05**	**2006**	**1978-81**	**1982-05**	**2006**
Range	24 - 97	13 – 28.8	--	24 - 102	12 – 27.7	--
Mean	61	16.1	14	62	15.3	14

TABLE H 14

AIR PARTICULATE BERYLLIUM-7 ACTIVITIES (E-3 pCi/m^3)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1982-05***	**2006**	**1978-81**	**1982-05***	**2006**
Range	69 - 81	50 - 137	--	59 - 85	49 - 126	--
Mean	76	95	111	72	89	114

*1990 results were not averaged with 1982-01 data because the validity of the 1990 values is questionable in some instances. Laboratory analysis error is suspected. See the 1990 Annual Report.

TERRESTRIAL PATHWAY MONITORING

TABLE H 15

SOIL POTASSIUM-40 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-05**	**2006**	**1979&81**	**1984-05**	**2006**
Range	9.2 - 9.7	9.4-15.3	--	9.1-11.0	7.4-14.1	--
Mean	9.5	12.0	12.5	10.1	10.3	9.6

TABLE H 16

SOIL RADIUM-226 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-05***	**2006**	**1979&81**	**1984-05***	**2006**
Range	0.8 - 1.3	0.8 - 2.5	--	0.8 - 1.2	1.0 - 2.2	--
Mean	1.1	1.6	3.2	1.0	1.7	2.0

* Radium-226 was not detected (ND) in 2002, 2003, 2004, or 2005.

TABLE H 17

SOIL THORIUM-228 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1984-05**	**2006**	**1979&81**	**1984-05**	**2006**
Range	0.9 - 1.3	0.8 – 2.0	--	--	0.7 – 2.4	--
Mean	1.1	1.0	0.9	1.0	1.0	0.8

TABLE H 18

SOIL CESIUM-137 ACTIVITIES (pCi/g dry)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1979&81	**1982-05**	**2006**	**1979&81**	**1982-05**	**2006**
Range	0.5 - 0.7	0.02 - 0.45	--	0.2 - 1.2	0.07 - 1.2	--
Mean	0.6	0.19	0.17	0.7	0.35	0.13

TABLE H 19

MILK POTASSIUM-40 ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1978-81	**1985-05**	**2006**	**1978-81**	**1985-05**	**2006**
Range	1222-1500	1241-1422	--	1273-1500	1247-1472	--
Mean	1325	1338	1300	1390	1345	1310

TABLE H 20

GROUND WATER TRITIUM ACTIVITIES (pCi/l)						
Location	**Indicator**			**Control**		
Period	**Pre-Op**	**Operational**		**Pre-Op**	**Operational**	
	1980-81	**1982-05**	**2006**	**1980-81**	**1982-05**	**2006**
Range	94-109	-206 - +180	--	117 - 119	-206 - +260	--
Mean	101	53.3	45.9	118	57.0	23.7

APPENDIX I

SPECIFIC ANALYSIS RESULTS TABULATED BY MEDIA AND SAMPLING PERIOD

Results of analyses are generally reported in the following tables to two significant figures. Random uncertainties of counting are reported to the same decimal place as the result.

Calculated values for analysis results are reported with the random uncertainty of counting at two standard deviations (2S), determined by considering both the sample and background count rates. The uncertainty of an activity is influenced by the volume or mass of the sample, the background count rate, the count times, the method used to round off the value obtained to reflect its degree of significance, and other factors. The uncertainties of activities determined by gamma spectrometric analyses are also influenced by the relative concentrations of the radionuclides in the sample, the energies and intensities of the gammas emitted by those radionuclides, and the assumptions used in selecting the radionuclides to be quantitatively determined.

Results reported as less than (<) in these tables are below the minimum detectable concentrations (MDCs). The MDC is an estimate of the detection capabilities of the overall measurement method, taking into account not only the counting system, but also the characteristics of the sample being counted. When the MDC is used as the level to decide whether or not to enter a measured value into a table, there is a 50% chance that the value will be entered when the actual sample activity is equivalent to the MDC. There is only a five percent chance that a value representing a fluctuation in background activity will be entered as sample activity in such an instance.

Measured values for the activities of specific radionuclides, such as the man-made gamma-emitting radionuclides iodine-131 and cesium-137, only appear in the following tables for each specific medium when the levels that are measured exceed the MDC values for those measurements and those radionuclides are actually identified as present in the samples. Measured values for the analyses that are not radionuclide specific, such as gross alpha and beta analyses, also are presented in the tables for specific media only when the levels that are measured actually exceed the MDCs.

TABLE I

ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 01/18/06 to 04/20/06	Second Quarter 04/19/06 to 07/19/06	Third Quarter 07/18/06 to 10/26/06	Fourth Quarter 10/25/06 to 01/31/07
ONSITE				
1S2 +	23.4 ± 1.5	23.5 ± 1.6	28.2 ± 3.3	24.8 ± 2.4
2S2 +	20.7 ± 1.5	19.4 ± 1.2	(4)	18.7 ± 1.7
2S3 +	23.7 ± 1.8	22.2 ± 2.2	25.3 ± 2.8	22.9 ± 2.6
3S2 +	18.8 ± 1.2	17.2 ± 1.8	19.9 ± 1.5	17.9 ± 1.9
3S3 +	20.2 ± 0.9	17.1 ± 1.2	19.7 ± 2.0	17.3 ± 1.3
4S3 +	22.6 ± 2.5	21.8 ± 1.0	27.1 ± 3.5	22.8 ± 1.7
4S6 +	19.9 ± 1.2	17.5 ± 1.4	20.6 ± 2.0	18.5 ± 2.3
5S4 +	16.7 ± 1.5	16.3 ± 0.8	18.7 ± 1.3	16.7 ± 1.5
5S7 +	17.4 ± 1.5	17.3 ± 1.6	19.7 ± 1.4	19.2 ± 0.8
6S4 +	25.1 ± 1.1	25.4 ± 1.6	29.0 ± 1.7	25.9 ± 1.9
6S9 +	26.8 ± 2.2	25.1 ± 2.6	28.2 ± 1.7	25.8 ± 3.6
7S6 +	28.5 ± 1.7	28.3 ± 1.4	30.7 ± 2.8	25.8 ± 3.6
7S7 +	19.2 ± 1.0	17.1 ± 1.4	19.9 ± 1.3	17.7 ± 1.7
8S2 +	23.9 ± 2.1	22.2 ± 2.6	26.5 ± 2.0	24.0 ± 2.1
9S2 +	41.4 ± 5.0	39.9 ± 2.6	44.6 ± 2.0	44.6 ± 4.7
10S1 +	18.3 ± 2.4	17.4 ± 1.4	21.4 ± 2.2	18.4 ± 1.5
10S2 +	30.5 ± 1.2	29.4 ± 2.6	33.5 ± 2.6	31.5 ± 3.0
11S3 +	27.0 ± 2.1	25.6 ± 1.8	29.7 ± 2.8	24.1 ± 1.9
11S7 +	20.3 ± 0.9	19.2 ± 0.6	22.0 ± 1.1	19.7 ± 1.5
12S1 +	20.8 ± 1.4	19.0 ± 1.0	22.7 ± 2.6	20.1 ± 1.9
12S3 +	25.4 ± 0.9	23.7 ± 1.8	26.6 ± 1.7	23.9 ± 2.1
12S7 +	17.2 ± 1.4	16.3 ± 1.2	19.1 ± 1.8	17.5 ± 2.1
13S2 +	25.8 ± 1.8	24.5 ± 1.8	29.3 ± 2.6	26.9 ± 2.6
13S5 +	25.6 ± 1.9	25.3 ± 1.0	28.8 ± 2.8	22.8 ± 2.3
13S6 +	24.0 ± 1.6	22.5 ± 1.2	26.0 ± 1.7	23.2 ± 2.6
14S5 +	23.5 ± 1.7	22.0 ± 1.6	25.9 ± 2.0	22.0 ± 1.9
15S5 +	20.9 ± 0.9	19.9 ± 0.8	22.5 ± 2.6	20.7 ± 2.1
16S1 +	23.0 ± 1.3	23.3 ± 1.2	27.0 ± 2.2	23.2 ± 1.5
16S2 +	23.2 ± 1.9	22.7 ± 1.4	26.2 ± 1.8	23.7 ± 1.3

See the comments at the end of this table.

TABLE I-1
ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 01/18/06 to 04/20/06	Second Quarter 04/19/06 to 07/19/06	Third Quarter 07/18/06 to 10/26/06	Fourth Quarter 10/25/06 to 01/31/07
0-1 MILE OFFSITE				
6A4 +	21.3 ± 1.8	19.5 ± 0.6	22.7 ± 2.2	21.0 ± 1.9
8A3 +	17.7 ± 0.9	17.1 ± 1.4	19.8 ± 2.0	17.8 ± 2.6
15A3 +	19.5 ± 1.6	17.8 ± 1.0	21.1 ± 1.8	18.2 ± 1.7
16A2 +	18.0 ± 0.6	17.1 ± 1.6	19.6 ± 1.5	16.9 ± 2.1
1-2 MILES OFFSITE				
8B2 +	18.3 ± 1.2	17.7 ± 1.2	19.6 ± 1.8	18.3 ± 1.1
9B1 +	17.4 ± 0.9	16.6 ± 1.2	19.4 ± 1.7	17.3 ± 1.9
10B3 +	18.7 ± 1.7	16.8 ± 1.4	19.7 ± 0.9	17.5 ± 1.1
2-4 MILES OFFSITE				
1D5 +	21.0 ± 1.3	19.5 ± 0.6	22.4 ± 1.6	21.1 ± 2.6
8D3 +	19.5 ± 0.9	18.1 ± 0.8	20.7 ± 1.6	19.2 ± 2.1
9D4 +	20.0 ± 1.4	19.2 ± 1.4	21.7 ± 1.5	20.5 ± 2.8
10D1 +	19.8 ± 1.3	18.1 ± 0.8	20.7 ± 2.4	19.8 ± 1.9
12D2 +	21.6 ± 2.1	19.8 ± 1.2	22.7 ± 1.7	20.3 ± 1.7
14D1 +	20.4 ± 2.0	18.6 ± 1.2	22.6 ± 1.3	20.1 ± 2.0
4-5 MILES OFFSITE				
3E1 +	17.9 ± 2.1	16.5 ± 1.4	18.6 ± 0.9	17.9 ± 2.4
4E2 +	20.8 ± 0.7	19.1 ± 1.6	21.9 ± 2.0	19.8 ± 1.7
5E2 +	20.1 ± 1.3	18.7 ± 1.8	20.5 ± 1.6	19.6 ± 2.3
6E1 +	23.9 ± 3.1	21.6 ± 1.6	22.8 ± 1.5	21.3 ± 1.5
7E1 +	21.3 ± 1.2	19.0 ± 1.0	21.1 ± 2.0	19.7 ± 2.1
11E1 +	17.4 ± 2.1	16.1 ± 1.2	18.2 ± 1.3	16.7 ± 1.9
12E1 +	17.6 ± 1.0	17.4 ± 1.4	19.7 ± 1.3	17.6 ± 2.4
13E4 +	22.9 ± 0.9	20.9 ± 1.0	24.2 ± 2.2	21.7 ± 2.4
5-10 MILES OFFSITE				
2F1 +	19.7 ± 1.2	18.7 ± 1.6	19.9 ± 2.2	19.6 ± 2.3
15F1 +	21.2 ± 2.3	20.0 ± 1.0	22.0 ± 1.8	20.0 ± 2.3
16F1 +	21.8 ± 2.1	20.3 ± 1.8	24.0 ± 1.5	21.3 ± 2.8

See the comments at the end of this table.

TABLE I

ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY RESULTS
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results (1) are in mR/std. qtr (2) ± 2S (3)

Location	First Quarter 01/18/06 to 04/20/06	Second Quarter 04/19/06 to 07/19/06	Third Quarter 07/18/06 to 10/26/06	Fourth Quarter 10/25/06 to 01/31/07
10-20 MILES				
3G4 +	21.5 ± 1.8	19.6 ± 0.6	21.8 ± 1.6	20.8 ± 1.7
4G1 +	22.0 ± 2.6	20.4 ± 1.6	23.6 ± 4.7	21.7 ± 2.1
7G1 +	19.1 ± 1.1	19.0 ± 1.0	20.5 ± 2.2	19.4 ± 2.6
12G1 +	18.1 ± 1.5	17.2 ± 1.2	18.4 ± 2.0	18.1 ± 1.5
12G4 +	20.1 ± 0.2	20.2 ± 2.4	21.3 ± 2.4	20.7 ± 1.9
See the comments at the end of this table.				
Location				
Indicator				
Average (5)	21.7 ± 12.3	20.5 ± 10.6	23.5 ± 14.0	21.2 ± 15.7
Control				
Average (5)	20.2 ± 3.7	19.3 ± 3.3	21.1 ± 6.3	20.1 ± 4.5

COMMENTS

(1) Individual monitor location results are normally the average of the elemental doses of six calcium elements from the two TLDs assigned to each monitoring location.

(2) A standard (std.) quarter (qtr.) is considered to be 91.25 days. Results obtained for monitoring periods of other durations are normalized by multiplying them by 91.25/x, where x is the actual duration in days of the period.

(3) Uncertainties for individual monitoring location results are two standard deviations of the elemental doses of six calcium elements from the two TLDs assigned to each monitoring location, representing the variability between the elemental doses of each of the six TLD elements.

(4) No measurement could be made at this location because the TLDs were lost, stolen, or damaged. Refer to Appendix A of the Annual Radiological Environmental Operating Report for an explanation of program exceptions to REMP.

(5) Uncertainties associated with quarterly indicator and control averages are two standard deviations, representing the variability between the results of the individual monitoring locations.

TABLE I-2
TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE		TRITIUM	OTHER ACTIVITY	COMMENTS
6S6	12/27/05	01/24/06*	<123		*Refer to Appendix A, Table A3 for exceptions.
2S7	12/27/05	01/24/06	10200 ± 219		
6S5	01/03/06	01/24/06	<125		
6S6	01/04/06	02/28/06	<129		
2S7	01/24/06	02/28/06	5840 ± 172		
6S5	01/31/06	02/28/06	< 128		
4S7	02/21/06	02/21/06	208 ± 84.4		
LTAW	02/21/06	02/21/06	171 ± 84.5		
6S6	02/28/06	03/28/06	<134		
2S7	02/28/06	03/28/06	2750 ± 131		
6S5	03/07/06	03/28/06	<133		
6S6	03/28/06	04/25/06 *	<139		*Refer to Appendix A, Table A3 for exceptions.
2S7	03/28/06	04/25/06	7370 ± 783		
6S5	04/04/06	04/25/05	<125		
6S6	04/25/06	05/30/06	<119		
2S7	04/25/06	05/30/06	2380 ± 287		
6S5	05/02/06	05/30/06	139 ± 81.7		
4S7	05/16/06	05/16/06	394 ± 96.1		
LTAW	05/16/06	05/16/06	213 ± 87.8		
6S6	05/30/06	06/27/06	<129		
2S7	05/30/06	06/27/06	6380 ± 694		
6S5	06/06/06	06/27/06	<128		

TABLE I-2

TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF SURFACE WATER

SUSQUEHANNA STEAM ELECTRIC STATION - 2006

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE		TRITIUM	OTHER ACTIVITY	COMMENTS
6S6	06/27/06	07/25/06	<144		
2S7	06/27/06	07/25/06	3890 ± 459		
6S5	07/04/06	07/25/06	<145		
6S6	07/25/06	08/22/06	<125		
2S7	07/25/06	08/22/06	1930 ± 249		
6S5	08/01/06	08/22/06	<127		
6S6	08/22/06	09/26/06	<115		
2S7	08/22/06	09/26/06	671 ± 122		
6S5	08/29/06	09/26/06	<111		
4S7	09/19/06	09/19/06	312 ± 88.1		
LTAW	09/19/06	09/19/06	194 ± 85.1		
6S6	09/26/06	10/31/06*	<126		*Refer to Appendix, Table A3 for exceptions.
2S7	09/26/06	10/31/06	692 ± 390		
6S5	10/03/06	10/31/06	381 ± 89.3		
4S7	10/17/06	10/17/06	267 ± 79.6		
LTAW	10/17/2006	10/17/06	168 ± 74.6		
6S6	10/31/06	11/28/06	<127		
2S7	10/31/06	11/28/06	5960 ± 656		
6S5	11/07/06	11/28/06	186 ± 84.5		
6S6	11/28/06	12/26/06	<120		
2S7	11/28/06	12/26/06	11,900 ± 1250		
6S5	12/05/06	12/26/06	<121		

TABLE I-3
IODINE-131 ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	COMMENTS
6S6	01/03/06 - 01/17/06	No data*	*Refer to Appendix A, Table A3 for exceptions.
2S7	01/03/06 - 01/17/06	0.47 ± 0.22	
6S5	01/10/06 - 01/17/06	<0.25	
6S6	02/07/06 - 02/21/06	<0.40	
2S7	02/07/06 - 02/21/06	0.72 ± 0.34	
6S5	02/14/06 - 02/21/06	<0.37	
6S6	03/07/06 - 03/21/06	<0.30	
2S7	03/07/06 - 03/21/06	0.70 ± 0.21	
6S5	03/14/06 - 03/21/06	<0.50	
6S6	04/06/06 - 04/18/06	<0.61	
2S7	04/06/06 - 04/18/06	0.75 ± 0.37	
6S5	04/11/06 - 04/18/06	<0.36	
6S6	05/02/06 - 05/16/06	<0.75	
2S7	05/02/06 - 05/16/06	<0.73	
6S5	05/09/06 - 05/16/06	<0.66	
6S6	06/06/06 - 06/20/06	1.56 ± 0.49	
2S7	06/06/06 - 06/20/06	0.85 ± 0.83	
6S5	06/13/06 - 06/20/06	0.67 ± 0.34	
6S6	07/04/06 - 07/18/06	<0.92	
2S7	07/04/06 - 07/18/06	<0.87	
6S5	07/11/06 - 07/18/06	<0.63	

TABLE I-3
IODINE-131 ANALYSES OF SURFACE WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	I-131	COMMENTS
6S6	08/01/06 - 08/15/06	<0.63	
2S7	08/01/06 - 08/15/06	<0.91	
6S5	08/08/06 - 08/15/06	<0.40	
6S6	09/05/06 - 09/19/06	<0.59	
2S7	09/05/06 - 09/19/06	<0.64	
6S5	09/12/06 - 09/19/06	<0.44	
6S6	10/03/06 - 10/17/06	<0.56	
2S7	10/03/06 - 10/17/06	<0.57	
6S5	10/09/06 - 10/17/06	<0.40	
6S6	11/07/06 - 11/21/06	<0.52	
2S7	11/07/06 - 11/21/06	<0.49	
6S5	11/14/06 - 11/21/06	<0.41	
6S6	12/05/06 - 12/19/06	<0.65	
2S7	12/05/06 - 12/19/06	1.21 ± 0.33	
6S5	12/12/06 - 12/19/06	<0.45	

TABLE I-4
GROSS BETA, TRITIUM, GAMMA SPECTROSCOPIC ANALYSES OF DRINKING WATER
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	GR-BETA	TRITIUM	OTHER ACTIVITY	COMMENTS
12H2	12/27/05 - 01/24/06	<1.80	<122		
12H2	01/24/06 - 02/21/06	2.80 ± 1.28	<127		
12H2	02/28/06 - 02/28/06*	2.63 ± 1.34	<125		* Refer to Appendix A, Table A2 for exception.
12H2	02/28/06 - 03/28/06	<2.07	<133		
12H2	03/28/06 - 04/25/06	2.39 ± 1.44	<119		
12H2	04/25/06 - 05/30/06	<2.02	<120		
12H2	05/30/06 - 06/27/06	<2.18	<125		
12H2	06/27/06 - 07/25/06	5.84 ± 2.78	<126		
12H2	07/25/06 - 08/22/06	<2.06	<126		
12H2	08/08/06 - 08/08/06*	3.40 ± 1.57	<126		* Refer to Appendix A, Table A2 for exception.
12H2	08/22/06 - 09/26/06	2.53 ± 1.43	<112		
12H2	09/26/06 - 10/31/06	2.89 ± 1.47	<150		
12H2	10/31/06 - 11/28/06	<2.07	<123		
12H2	11/28/06 - 12/26/06	1.97 ± 1.31	<122		

TABLE I-5
GAMMA SPECTROSCOPIC ANALYSES OF FISH
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/kg (wet) ± 2S

LOCATION	SAMPLE TYPE	COLLECTION DATE	K-40	COMMENTS
IND	Smallmouth Bass	04/21/06 - 04/21/06	3300 ± 708	
IND	White Sucker	04/21/06 - 04/21/06	4250 ± 583	
IND	Channel Catfish	04/21/06 - 04/21/06	3700 ± 687	
2H	Smallmouth Bass	05/04/06 - 05/04/06	3940 ± 622	
2H	White Sucker	05/04/06 - 05/04/06	3470 ± 795	
2H	Channel Catfish	05/04/06 - 05/06/06	3620 ± 520	
IND	Smallmouth Bass	09/27/06 - 09/27/06	3660 ± 737	
IND	Shorthead Redhorse	09/29/06 - 09/29/06	3110 ± 773	
IND	Channel Catfish	09/27/06 - 09/27/06	2640 ± 693	
2H	Smallmouth Bass	10/05/06 - 10/05/06	4480 ± 902	
2H	Shorthead Redhorse	10/05/06 - 10/05/06	3830 ± 1090	
2H	Channel Catfish	10/05/06 - 10/05/06	3900 ± 826	
LTAW	Largemouth Bass	09/27/06 - 09/27/06	3540 ± 907	

TABLE I-6
GAMMA SPECTROSCOPIC ANALYSES OF SHORELINE SEDIMENT
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/kg (dry) ± 2S

LOCATION	COLLECTION DATE	K-40	Cs-137	Ra-226	Th-228	OTHER ACTIVITY
2B	5/8/2006	15,000 ± 728	82.4 ± 39.7	2220 ± 926	1400 ± 724	Ac-228 1370 ± 156, Be-7 1750 ± 281
7B	5/8/2006	11,300 ± 364	60.7 ± 11.6	1840 ± 282	1040 ± 27.3	Ac-228 993 ± 79, Be-7 931 ± 132
12F	5/8/2006	10,400 ± 424	47.8 ± 16.8	2000 ± 556	1130 ± 42.4	Ac-228 1230 ± 105, Be-7 357 ± 165
2B	10/16/2006	16,300 ± 2470	<115	<2070	1460 ± 203	Ac-228 1310 ± 453, Be-7 <1140
7B	10/16/2006	14,500 ± 1960	152 ± 81.8	2950 ± 1830	1340 ± 165	Ac-228 1970 ± 409, Be-7 <890
12F	10/16/2006	10,100 ± 1720	<82.0	<1610	747 ± 170	Ac-228 915 ± 351, Be-7 <977

TABLE I-7

TRITIUM AND GAMMA SPECTROSCOPIC ANALYSES OF GROUND WATER

SUSQUEHANNA STEAM ELECTRIC STATION - 2006

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	TRITIUM	OTHER ACTIVITY*
12F3	3/13/2006	<130	
2S2	3/13/2006	<130	
4S4 Treated	3/13/2006	<130	
6S10	3/13/2006	<121	
12F3	6/15/2006	<117	
2S2	6/15/2006	<114	
4S4	6/15/2006	178 ± 119	
6S10	6/15/2006	<120	
11S2	6/29/2006	<126	
12F3	8/14/2006	<124	
2S2	8/14/2006	<124	
4S4 Treated	8/14/2006	<125	
6S10	8/14/2006	<124	
11S2	8/14/2006	<125	
12F3	11/6/2006	<148	
2S2	11/6/2006	<148	
4S4 Treated	11/6/2006	<147	
6S10	11/6/2006	<148	
11S2	11/6/2006	<147	

TABLE I-8
GROSS BETA ANALYSES OF AIR PARTICULATE FILTERS
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in E-03 pCi/Cu. M. ± 2S

MONTH	COLLECTION DATE	6G1	8G1	3S2	12E1	12S1	13S6	COMMENTS
JAN	12/28/05 - 1/4/06	7.58 ± 2.09	11.7 ± 2.32	12.8 ± 2.23	14.4 ± 2.36	12.7 ± 2.33	11.1 ± 2.16	
	1/4/06 - 1/11/06	13.0 ± 2.24	15.7 ± 2.36	15.1 ± 2.22	14.2 ± 2.18	13.3 ± 2.18	15.3 ± 2.23	
	1/11/06 - 1/18/06	8.72 ± 2.03	9.82 ± 2.06	12.1 ± 2.1	11.7 ± 2.12	11.3 ± 2.11	10.9 ± 2.05	
	1/18/06 - 1/25/06	11.2 ± 2.16	10.4 ± 2.15	11.5 ± 2.16	11.6 ± 2.19	12.3 ± 2.31	10.5 ± 2.1	
	1/25/06 - 2/1/06	13.9 ± 2.27	12.1 ± 2.21	14.2 ± 2.3	17.4 ± 2.52	14.5 ± 2.33	16.3 ± 2.4	
FEB	2/1/06 - 2/8/06	10.9 ± 2.03	12.9 ± 2.2	11.7 ± 2.06	11.0 ± 2.04	11.8 ± 2.08	14.5 ± 2.25	
	2/8/06 - 2/15/06	13.5 ± 2.17	9.5 ± 1.97	15.0 ± 2.28	14.0 ± 2.24	13.4 ± 2.15	15.0 ± 2.27	
	2/15/06 - 2/22/06	17.5 ± 2.41	18.9 ± 2.5	17.1 ± 2.4	19.7 ± 2.55	19.5 ± 2.55	19.1 ± 2.49	
	2/22/06 - 3/1/06	14.5 ± 2.32	13.0 ± 2.24	14.6 ± 2.33	13.1 ± 2.24	14.2 ± 2.33	15.8 ± 2.37	
MAR	3/1/06 - 3/8/06	11.8 ± 2.30	11.4 ± 2.04	13.1 ± 2.14	13.2 ± 2.17	12.8 ± 2.16	11.2 ± 2.02	
	3/8/06 - 3/15/06	10.9 ± 2.13	9.22 ± 2.03	11.7 ± 2.18	10.9 ± 2.17	9.71 ± 2.15	10.3 ± 2.11	
	3/15/06 - 3/22/06	11.2 ± 1.41	11.7 ± 1.43	12.2 ± 1.51	12.8 ± 1.48	13.9 ± 1.55	12.9 ± 1.49	
	3/22/06 - 3/29/06	8.62 ± 1.95	9.73 ± 2.03	7.5 ± 2.0	8.78 ± 2.03	9.87 ± 2.09	7.79 ± 1.93	
	3/29/06 - 4/5/06	17.3 ± 2.55	13.6 ± 2.24	15.7 ± 2.47	14.5 ± 2.33	18.2 ± 2.55	16.5 ± 2.42	
APR	4/5/06 - 4/12/06	14.1 ± 2.09	14.4 ± 2.08	14.5 ± 2.16	12.1 ± 1.99	14.2 ± 2.11	13.5 ± 2.06	
	4/12/06 - 4/19/06	10.9 ± 2.07	10.9 ± 2.04	12.5 ± 2.21	10.5 ± 2.06	10.8 ± 2.09	11.4 ± 2.08	
	4/19/06 - 4/26/06	6.54 ± 1.89	8.33 ± 1.96	8.31 ± 2.05	6.65 ± 1.89	7.47 ± 2.0	7.14 ± 2.1	
	4/26/06 - 5/3/06	13.8 ± 2.16	13.2 ± 2.08	13.3 ± 2.22	13.4 ± 2.15	13.0 ± 2.15	15.3 ± 2.35	
MAY	5/3/06 - 5/10/06	13.2 ± 2.18	12.8 ± 2.08	15.0 ± 2.33	14.9 ± 2.26	14.3 ± 2.24	15.4 ± 2.35	
	5/10/06 - 5/17/06	7.27 ± 1.76	6.78 ± 1.66	7.97 ± 1.91	9.0 ± 1.87	8.46 ± 1.89	7.2 ± 1.77	
	5/17/06 - 5/24/06	6.88 ± 1.86	6.19 ± 1.82	6.0 ± 1.89	5.84 ± 1.78	4.95 ± 1.86	6.37 ± 1.85	
	5/24/06 - 5/31/06	18.3 ± 2.55	18.7 ± 2.6	21.2 ± 2.84	18.4 ± 2.62	15.3 ± 2.52	19.5 ± 2.65	
JUN	5/31/06 - 6/7/06	10.7 ± 2.07	10.3 ± 2.07	11.2 ± 2.22	9.79 ± 2.17	10.6 ± 2.09	11.5 ± 21.4	
	6/7/06 - 6/14/06	6.08 ± 1.81	6.0 ± 1.79	4.79 ± 1.82	5.74 ± 1.82	5.67 ± 1.79	5.97 ± 1.81	
	6/14/06 - 6/21/06	14.7 ± 2.39	15.6 ± 2.4	15.8 ± 2.54	18.1 ± 2.62	15.4 ± 2.43	18.5 ± 2.58	
	6/21/06 - 6/29/06	8.02 ± 1.68	10.3 ± 2.04	9.62 ± 1.89	10.4 ± 1.89	8.0 ± 1.71	9.74 ± 1.81	
JUL	6/29/06 - 7/5/06	17.6 ± 2.69	21.1 ± 2.89	21.2 ± 3.03	19.7 ± 2.85	15.9 ± 2.61	21.1 ± 2.89	
	7/5/06 - 7/12/06	16.2 ± 2.4	16.2 ± 2.38	15.4 ± 2.47	17.0 ± 2.41	17.0 ± 2.42	16.6 ± 2.39	
	7/12/06 - 7/19/06	18.6 ± 2.5	18.6 ± 2.44	22.4 ± 2.83	22.3 ± 2.67	19.9 ± 2.57	22.4 ± 2.67	
	7/19/06 - 7/26/06	17.3 ± 2.54	16.6 ± 2.44	14.7 ± 2.51	18.5 ± 2.59	17.6 ± 2.55	16.3 ± 2.45	

TABLE

GROSS BETA ANALYSES OF AIR PARTICULATE FILTERS

SUSQUEHANNA STEAM ELECTRIC STATION - 2006

Results in E-03 pCi/Cu. M. ± 2S

MONTH	COLLECTION DATE	6G1	8G1	3S2	12E1	12S1	13S6	COMMENTS
AUG	7/26/06 - 8/2/06	22.9 ± 2.83	23.0 ± 2.75	22.0 ± 2.95	22.8 ± 2.85	21.9 ± 2.8	22.7 ± 2.8	
	8/2/06 - 8/9/06	17.5 ± 2.29	19.0 ± 2.59	18.1 ± 2.41	18.5 ± 2.33	14.9 ± 2.32	16.3 ± 2.3	
	8/9/06 - 8/16/06	18.2 ± 2.33	19.3 ± 2.57	16.6 ± 2.3	19.4 ± 2.58	17.0 ± 2.43	16.8 ± 2.27	
	8/16/06 - 8/23/06	16.1 ± 2.36	13.7 ± 2.38	14.7 ± 2.35	14.3 ± 2.5	14.4 ± 2.42	15.8 ± 2.39	
	8/23/06 - 8/30/06	11.9 ± 2.07	12.4 ± 2.21	14.3 ± 2.23	14.2 ± 2.39	12.7 ± 2.22	13.3 ± 2.16	
SEP	8/30/06 - 9/6/06	8.01 ± 1.86	10.2 ± 2.13	8.01 ± 1.86	8.07 ± 2.0	7.74 ± 1.95	9.68 ± 1.99	
	9/6/06 - 9/13/06	15.7 ± 2.41	16.9 ± 2.57	15.0 ± 2.36	16.5 ± 2.59	16.1 ± 2.51	16.0 ± 2.44	
	9/13/06 - 9/20/06	13.1 ± 2.19	13.5 ± 2.34	11.4 ± 2.09	15.1 ± 2.45	9.36 ± 2.06	11.8 ± 2.13	
	9/20/06 - 9/27/06	15.6 ± 2.28	11.4 ± 2.14	13.8 ± 2.16	13.8 ± 2.29	14.2 ± 2.27	14.0 ± 2.2	
OCT	9/27/06 - 10/4/06	11.5 ± 2.13	13.8 ± 2.41	13.5 ± 2.24	14.3 ± 2.39	14.1 ± 2.5	16.8 ± 2.42	
	10/4/06 - 10/11/06	15.5 ± 2.27	15.5 ± 2.39	17.5 ± 2.42	16.8 ± 2.47	18.0 ± 2.64	17.5 ± 2.43	
	10/11/06 - 10/18/06	13.7 ± 2.16	13.6 ± 2.25	14.1 ± 2.19	15.8 ± 2.38	16.6 ± 2.48	14.2 ± 2.21	
	10/18/06 - 10/25/06	12.0 ± 2.1	11.0 ± 2.15	13.2 ± 2.23	10.2 ± 2.11	10.5 ± 2.19	10.1 ± 2.04	
NOV	10/25/06 - 11/01/06	10.5 ± 1.9	11.4 ± 2.05	11.6 ± 1.99	11.9 ± 2.08	12.3 ± 2.13	13.1 ± 2.09	
	11/1/06 - 11/8/06	21.1 ± 2.7	20.1 ± 2.52	21.6 ± 2.57	20.2 ± 2.56	18.3 ± 2.47	23.5 ± 2.69	
	11/8/06 - 11/15/06	9.31 ± 1.93	9.43 ± 2.09	10.3 ± 2.02	11.7 ± 2.22	9.28 ± 2.05	11.7 ± 2.15	
	11/15/06 - 11/22/06	11.6 ± 2.01	13.1 ± 2.2	11.8 ± 2.05	13.2 ± 2.2	13.4 ± 2.24	11.8 ± 2.07	
	11/22/06 - 11/29/06	23.7 ± 2.7	22.7 ± 2.76	25.1 ± 2.77	28.9 ± 3.04	26.8 ± 2.92	25.6 ± 2.83	
DEC	11/29/06 - 12/6/06	18.4 ± 2.47	17.3 ± 2.52	18.4 ± 2.53	19.4 ± 2.7	18.1 ± 2.59	17.8 ± 2.52	
	12/6/06 - 12/13/06	23.2 ± 2.8	21.5 ± 2.59	25.5 ± 2.67	23.2 ± 2.63	24.5 ± 23.7	23.7 ± 2.63	
	12/13/06 - 12/20/06	22.7 ± 2.05	20.2 ± 1.87	22.7 ± 2.05	20.1 ± 1.84	17.3 ± 1.73	19.8 ± 1.77	
	12/20/06 - 12/27/06	12.3 ± 2.21	12.3 ± 2.17	16.1 ± 2.64	12.2 ± 2.18	14.0 ± 2.28	15.6 ± 2.33	

TABLE I-9
GAMMA SPECTROSCOPIC ANALYSES OF COMPOSITED AIR PARTICULATE FILTERS
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in E-03 pCi/Cu. M. ± 2S

LOCATION	COLLECTION DATE	Be-7	K-40	OTHER ACTIVITY
6G1	12/28/05 - 3/29/06	117 ± 30.5	<12.8	
8G1	12/28/05 - 3/29/06	103 ± 28.1	<15.4	
3S2	12/28/05 - 3/29/06	76.8 ± 24.8	<14.6	Cr-51 <118
12E1	12/28/05 - 3/29/06	109 ± 26.2	<12.4	
12S1	12/28/05 - 3/29/06	90.7 ± 27.4	<16.5	
13S6	12/28/05 - 3/29/06	90.9 ± 34.1	<13.6	
6G1	3/29/06 - 6/29/06	133 ± 37	<26.3	
8G1	3/29/06 - 6/29/06	134 ± 44	<24.5	
3S2	3/29/06 - 6/29/06	139 ± 33.8	<21.9	
12E1	3/29/06 - 6/29/06	134 ± 68.2	<29.5	
12S1	3/29/06 - 6/29/06	123 ± 45.6	<25.5	
13S6	3/29/06 - 6/29/06	131 ± 41.5	<13.4	
6G1	6/29/06 - 9/27/06	123 ± 25.2	<13.2	
8G1	6/29/06 - 9/27/06	139 ± 36.1	<20.1	
3S2	6/29/06 - 9/27/06	152 ± 31.3	<24.2	
12E1	6/29/06 - 9/27/06	158 ± 35.6	<19.2	
12S1	6/29/06 - 9/27/06	103 ± 26.8	<4.68	
13S6	6/29/06 - 9/27/06	134 ± 31.5	<20.8	
6G1	9/27/06 - 12/27/06	78.7 ± 17.9	<15.4	
8G1	9/27/06 - 12/27/06	83.3 ± 22.1	<15.1	
3S2	9/27/06 - 12/27/06	88.7 ± 21.6	<9.04	
12E1	9/27/06 - 12/27/06	93.7 ± 19.2	<14.0	
12S1	9/27/06 - 12/27/06	78.8 ± 20.9	<10.4	
13S6	9/27/06 - 12/27/06	79.3 ± 16.7	<13.9	

TABLE I-10
IODINE-131, AND GAMMA SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10G1	01/19/06	1320 ± 175		
10D1	01/19/06	1310 ± 155		
10D2	01/19/06	1190 ± 124		
12B2	01/19/06	1090 ± 145		
10G1	02/06/06	1450 ± 153		
10D1	02/06/06	1310 ± 154		
10D2	02/06/06	1210 ± 117		
12B2	02/06/06	1340 ± 143		
10G1	03/06/06	1290 ± 135		
10D1	03/06/06	1410 ± 143		
10D2	03/06/06	1320 ± 123		
12B2	03/06/06	1340 ± 149		
10G1	04/03/06	1370 ± 102		
10D1	04/03/06	1360 ± 164		
10D2	04/03/06	1280 ± 128		
13E3	04/03/06*	1390 ± 153		*Refer to Appendix A, Table A2 for exceptions.
10G1	04/17/06	1340 ± 134		
10D1	04/17/06	1380 ± 125		
10D2	04/17/06	1360 ± 138		
6C1	04/17/06	1310 ± 127		
10G1	05/01/06	1360 ± 172		
10D1	05/01/06	1310 ± 156		
10D2	05/01/06	1350 ± 176		
6C1	05/01/06	1240 ± 142		
10G1	05/15/06	1430 ± 148		

TABLE I-10
IODINE-131, AND GAMMA SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10D1	05/15/06	1200 ± 201		
10D2	05/15/06	1400 ± 156		
6C1	05/15/06	1280 ± 165		
10G1	05/30/06	1370 ± 73.3		
10D1	05/30/06	1360 ± 125		
10D2	05/30/06	1250 ± 117		
6C1	05/30/06	1290 ± 110		
10G1	06/12/06	1220 ± 132		
10D1*	06/12/06	1350 ± 70.6		*Refer to Appendix A, Table A2 for exceptions.
10D2	06/12/06	1270 ± 133		
13E3*	06/12/06	1340 ± 157		*Refer to Appendix A, Table A2 for exceptions.
10G1	06/26/06	1330 ± 113		*Refer to Appendix A, Table A2 for exceptions.
10D1	06/26/06	1320 ± 119		*Refer to Appendix A, Table A2 for exceptions.
10D2	06/26/06	1200 ± 135		
13E3	06/26/06	1490 ± 139		
10G1	07/10/06	1240 ± 154		
10D1	07/10/06	1290 ± 141		
10D2	07/10/06	1430 ± 186		
13E3	07/10/06	1550 ± 126		

TABLE I-10

IODINE-131, AND GAMMA SPECTROSCOPIC ANALYSES OF MILK

SUSQUEHANNA STEAM ELECTRIC STATION - 2006

Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10G1	07/24/06	1550 ± 179		
10D1	07/24/06	1400 ± 171		
10D2	07/24/06	1250 ± 176		
13E3	07/24/06	1390 ± 178		
10G1	08/07/06	1350 ± 144		
10D1	08/07/06	1090 ± 160		
10D2	08/07/06	1310 ± 177		
13E3	08/07/06	1430 ± 183		
10G1	08/21/06	1340 ± 126		
10D1	08/21/06	1470 ± 140		
10D2	08/21/06	1130 ± 127		
13E3	08/21/06	1340 ± 125		
10G1	09/05/06	1310 ± 133		
10D1	09/05/06	1360 ± 135		
10D2	09/05/06	1160 ± 128		
13E3	09/05/06	1220 ± 128		
10G1	09/18/06	1210 ± 114		
10D1	09/18/06	1370 ± 121		
10D2	09/18/06	1180 ± 139		
13E3	09/18/06	1280 ± 132		

TABLE I-10
IODINE-131, AND GAMMA SPECTROSCOPIC ANALYSES OF MILK
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/liter ± 2S

LOCATION	COLLECTION DATE	K-40	OTHER ACTIVITY	COMMENTS
10G1	10/02/06	905 ± 196		
10D1	10/02/06	1410 ± 228		
10D2	10/02/06	980 ± 179		
13E3	10/02/06	1090 ± 191		
10G1	10/16/06	1230 ± 76.1		
10D1	10/16/06	1260 ± 89.3		
10D2	10/16/06	1100 ± 145		
13E3	10/16/06	1540 ± 110		
10G1	10/30/06	1230 ± 124		
10D1	10/30/06	1460 ± 105		
10D2	10/30/06	1210 ± 120		
13E3	10/30/06	1280 ± 110		
10G1	11/13/06	1320 ± 88.9		
10D1	11/13/06	1410 ± 114		
10D2	11/13/06	1120 ± 95.7		
13E3	11/13/06	1510 ± 117		
10G1	12/11/06	1300 ± 186		
10D1	12/11/06	1350 ± 217		
10D2	12/11/06	1110 ± 205		
13E3	12/11/06	1340 ± 188		

TABLE I-11
GAMMA SPECTROSCOPIC ANALYSES OF SOIL
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/kg (dry) ± 2S

LOCATION	COLLECTION DATE	K-40	Cs-137	Th-228	COMMENTS
8G1 TOP	9/20/2006	10,400 ± 2010	<154	808 ± 167	Ac-228 1200 ± 370
8G1 BOT	9/20/2006	8750 ± 1920	<135	788 ± 152	Ac-228 912 ± 426
12S1 TOP	9/20/2006	13,300 ± 2210	156 ± 94.2	869 ± 162	Ac-228 804 ± 297
12S1 BOT	9/20/2006	11,600 ± 2010	<85.8	856 ± 153	Ac-228 1040 ± 415 Ra-226 3860 ± 2140

TABLE I-12
GAMMA SPECTROSCOPIC ANALYSES OF FOOD PRODUCTS (FRUITS AND VEGETABLES)
SUSQUEHANNA STEAM ELECTRIC STATION - 2006
Results in pCi/kg (wet) ± 2S

LOCATION	SAMPLE TYPE	COLLECTION DATE	K-40	OTHER ACTIVITY
11D1	Pumpkin	09/25/06	1820 ± 405	
11D1	Soy Beans	11/29/06	16,600 ± 952	
11D1	Rye	12/5/2006	3850 ± 363	

TABLE I-13

TYPICAL MINIMUM DETECTABLE CONCENTRATIONS OF NUCLIDES SEARCHED FOR BUT NOT FOUND BY GAMMA SPECTROMETRY IN THE VICINITY OF SUSQUEHANNA STEAM ELECTRIC STATION, 2006

Nuclide	Fish (pCi/kg wet)	Sediment (pCi/kg dry)	Surface Water (pCi/l)	Ground Water (pCi/l)	Potable Water (pCi/l)
Mn-54	41	15.6	1.6	4.2	2.13
Co-58	39	22.8	2.0	4.5	2.37
Fe-59	109	52.0	7.2	14	7.05
Co-60	40	24.9	1.6	4.6	2.03
Zn-65	100	81.9	3.6	9.4	4.90
Zr-95	75	42.4	3.7	8.0	4.05
Nb-95	43	33.4	2.3	4.7	2.47
Ru-103	N/A	N/A	N/A	N/A	N/A
I-131	100	61.9	2.7	25.0	13.0
Cs-134	41	53.0	1.6	4.2	2.22
Cs-137	39	60.7	1.8	4.4	2.08
Ba-140	261	108	32	40	22.3
La-140	79	105	11	15	7.81
Ce-141	N/A	N/A	N/A	N/A	N/A

Nuclide	Air Particulate (E-3 pCi/m3)	Milk (pCi/l)	Fruit/Veg. (pCi/kg wet)	Soil (pCi/kg dry)	Air Iodine (E-3 pCi/m3)
Mn-54	2.03	9.7	22.1	115	
Co-58	4.22	9.3	22.6	137	
Fe-59	27.1	27.6	61.9	417	
Co-60	1.54	9.6	21.1	124	
Zn-65	2.83	25.2	42.8	237	
Zr-95	8.19	17.9	38.0	235	
Nb-95	4.15	9.2	26.4	173	
Ru-103	N/A	N/A	N/A	N/A	
I-131	N/A	0.74	52.0	144	13.5
Cs-134	2.04	9.2	21.1	90	
Cs-137	1.82	9.9	22.7	154	
Ba-140	31	46.6	149	425	
La-140	102	14.8	35.2	116	
Ce-141	N/A	N/A	N/A	N/A	

APPENDIX J

PERFORMANCE SUMMARY FOR THE RADIOANALYSES OF SPIKED ENVIRONMENTAL SAMPLE MEDIA – 2006

TELEDYNE BROWN ENGINEERING

The data in the tables that follow show how well Teledyne Brown Engineering Environmental Services (TBE) performed in the analysis of radioactively spiked media. Tables J-1 through J-4 provide the performance results for TBE. In addition to the Analytics' spikes analyzed as part of PPL's REMP Laboratory Spike Program (Table J-3), TBE analyzed spikes procured independently from Analytics as part of their respective Quality Control Spike Programs (Table J-2), as well as spikes prepared as part of the following programs:

1. The Proficiency Testing Program of Environmental Resource Associates (Table J-1)

2. The Mixed Analyte Performance Evaluation Program (MAPEP) of the DOE (Table J-4)

It should be noted that program #1 above only provides spiked water for analyses. No other media are included in the spikes provided by this program. The following characteristics are important for the spiked environmental media:

1. When practical, the level of activity in, at least, some of the spiked environmental media should be within the range between required analysis sensitivities for the SSES REMP and the Reporting Levels, if applicable, of the NRC.

2. The spikes should be preserved in a manner as similar as possible to the way that actual samples of those media are prepared.

3. The variety of radionuclides with which environmental media are spiked should be as extensive as practical, including as many of the activation and fission products that could be detected in the vicinity of the SSES as reasonable.

The spiked environmental media prepared by Analytics according to the requirements of PPL's REMP Laboratory Spike Program are intended to incorporate characteristics #1, #2, and #3 to the greatest degree that is practical.

The criteria for the acceptability of the analyses results for the spikes prepared as part of the PPL REMP Laboratory Spike Program (Table J-3) has been established by PPL. They are based on criteria that were originally developed by the NRC. The NRC bases these criteria on an empirical relationship that combines prior experience and accuracy needs. As the resolution of the measurement process improves (relative measurement uncertainty becomes smaller), the criteria for determining acceptability become tighter. Conversely, as the resolution of the process becomes poorer (relative measurement uncertainty becomes bigger), the criteria are widened.

The criteria for acceptability of DOE (MAPEP) program – Table J-4 is based on control limits based on percentiles of historic data distributions.

Note that comment numbers at the extreme right side of the tables denote unacceptable results in Tables J-1 through J-4. Discussions relevant to these comment numbers follow the presentations of the data, as applicable.

TABLE J-1
ENVIRONMENTAL RESOURCE ASSOCIATES (ERA)
PROFICIENCY TESTING PROGRAM - 2006
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)
(Page 1 of 2)

Month/Year	Identification No.	Medium	Units	Nuclide	ERA Known Result (b)	TBE Results (a)	TBE/ERA Ratio	ERA Control Limits	Evaluation (c)
May 2006	Rad 65	Water	pCi/l	Sr-89	32.4	30.2	0.93	23.6 - 41.1	A
			pCi/l	Sr-90	9.00	8.74	0.97	0.340 - 17.7	A
			pCi/l	Ba-133	10.0	10.9	1.09	1.34 - 18.7	A
			pCil	Cs-134	43.4	39.7	0.91	34.7 - 52.1	A
			pCi/l	Cs-137	214	199	0.93	195 - 233	A
			pCi/l	Co-60	113.0	111	0.98	103 - 123	A
			pCi/l	Zn-65	152	146	0.96	126 - 178	A
			pCi/l	Gr-B	23.0	23.7	1.03	14.3 - 31.7	A
			pCi/l	Ra-226	3.02	2.64	0.87	2.23 - 3.81	A
			pCi/l	U-Nat	69.1	74.9	1.08	57.1 - 81.1	A
			pCi/l	H-3	8130	7950	0.98	6720 - 9540	A
	Rad 65	Water	pCi/l	I-131	19.1	18.2	0.95	13.9 - 24.3	A
November 2006	Rad 67	Water	pCi/l	Sr-89	39.9	40.0	1.00	31.2 - 48.6	A
			pCi/l	Sr-90	16.0	16.2	1.01	7.34 - 24.7	A
			pCi/l	Ba-133	70.2	65.0	0.93	58.1 - 82.3	A
			pCi/l	Cs-134	29.9	27.4	0.92	21.2 - 38.6	A
			pCi/l	Cs-137	78.2	74.4	0.95	69.5 - 86.9	A
			pCi/l	Co-60	62.3	61.6	0.99	53.6 - 71.0	A
			pCi/l	Zn-65	277	277	1.00	229 - 325	A
			pCi/l	Gr-B	20.9	22.0	1.05	12.2 - 29.6	A
			pCi/l	U-Nat	3.20	3.18	0.99	0.00 - 8.40	A
			pCi/l	H-3	3050	2930	0.96	2430 - 3670	A
	Rad 67	Water	pCi/l	I-131	22.1	19.8	0.90	16.9 - 27.3	A

TABLE J-1
ENVIRONMENTAL RESOURCE ASSOCIATES (ERA)
PROFICIENCY TESTING PROGRAM - 2006
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

COMMENTS

(a) Teledyne Brown Engineering reported result.
(b) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.
(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006

TELEDYNE

QUALITY CONTROL SPIKE PROGRAM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

(Page 1 of 5)

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (b)	TBE Results (a)	TBE / Analytics Ratio (c)	Evaluation (d)
March 2006	E4964-396	Milk	pCi/l	Sr-89	99.2	91.5	0.92	A
			pCi/l	Sr-90	10.8	12.2	1.13	A
	E4965-396	Milk	pCi/l	I-131	78.0	74.4	0.95	A
				Ce-141	104	95.1	0.91	A
				Cr-51	280	278	0.99	A
				Cs-134	121	103	0.85	A
				Cs-137	88.8	87.6	0.99	A
				Co-58	105	93.9	0.89	A
				Mn-54	93.3	90.0	0.96	A
				Fe-59	86.6	83.0	0.96	A
				Zn-65	176	178	1.01	A
				Co-60	128	118	0.92	A
	E4967-396	AP	pCi	Ce-141	74	89.9	1.21	W
			pCi	Cr-51	200	253	1.27	W
			pCi	Cs-134	86.1	71.5	0.83	A
			pCi	Cs-137	63.3	67.5	1.07	A
			pCi	Co-58	74.6	79.7	1.07	A
			pCi	Mn-54	67	74.9	1.12	A
			pCi	Fe-59	61.8	75.5	1.22	W
			pCi	Zn-65	126	146	1.16	A
			pCi	Co-60	91	91.2	1.00	A
	E4966-396	Charcoal	pCi	I-131	86.2	87.4	1.01	A
June 2006	E5018-396	Milk	pCi/l	Sr-89	129	118	0.91	A
			pCi/l	Sr-90	9.74	9.29	0.95	A

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006

TELEDYNE

QUALITY CONTROL SPIKE PROGRAM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (b)	TBE Results (a)	TBE / Analytics Ratio (c)	Evaluation (d)
June 2006	E5019-396	Milk	pCi/l	I-131	63.2	49.9	0.79	W
			pCi/l	Ce-141	184	174	0.95	A
			pCi/l	Cr-51	259	266	1.03	A
			pCi/l	Cs-134	127	111	0.87	A
			pCi/l	Cs-137	117	116	0.99	A
			pCi/l	Co-58	100	101	1.01	A
			pCi/l	Mn-54	146	144	0.99	A
			pCi/l	Fe-59	93.6	96.7	1.03	A
			pCi/l	Zn-65	185	182	0.98	A
			pCi/l	Co-60	129	126	0.98	A
	E5021-396	AP	pCi	Ce-141	124	113	0.91	A
			pCi	Cr-51	174	176	1.01	A
			pCi	Cs-134	85.1	63.7	0.75	W
			pCi	Cs-137	79.0	76.8	0.97	A
			pCi	Co-58	67.4	63.1	0.94	A
			pCi	Mn-54	99	102	1.04	A
			pCi	Fe-59	62.9	64.6	1.03	A
			pCi	Zn-65	125	131	1.05	A
			pCi	Co-60	86.5	81.6	0.94	A
	E5020-396	Charcoal	pCi	I-131	65.9	65.4	0.99	A

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006

TELEDYNE

QUALITY CONTROL SPIKE PROGRAM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (b)	TBE Results (a)	TBE / Analytics Ratio (c)	Evaluation (d)
September 2006	E5120-396	Milk	pCi/l	Sr-89	89.2	90.3	1.01	A
			pCi/l	Sr-90	12.4	11.6	0.94	A
	E5121-396	Milk	pCi/l	I-131	73.8	67.8	0.92	A
			pCi/l	Ce-141	86.0	85.0	0.99	A
			pCi/l	Cr-51	282	263	0.93	A
			pCi/l	Cs-134	85.0	74.7	0.88	A
			pCi/l	Cs-137	175	172	0.98	A
			pCi/l	Co-58	109	107	0.98	A
			pCi/l	Mn-54	113	110	0.97	A
			pCi/l	Fe-59	43.7	46.6	1.07	A
			pCi/l	Zn-65	145	144	0.99	A
			pCi/l	Co-60	134	127	0.95	A
	E5123-396	AP	pCi	Ce-141	66.4	67.1	1.01	A
			pCi	Cr-51	217	223	1.03	A
			pCi	Cs-134	65.6	51.7	0.79	W
			pCi	Cs-137	135.0	134	0.99	A
			pCi	Co-58	84.3	84.8	1.01	A
			pCi	Mn-54	87	95.2	1.10	A
			pCi	Fe-59	33.7	41.6	1.23	W
			pCi	Zn-65	112	123	1.10	A
			pCi	Co-60	103	98.9	0.96	A
			pCi	Co-57	(1)	0.922	NA	NA
	E5122-396	Charcoal	pCi	I-131	90.7	77.7	0.86	A
December 2006	E5172-396	Milk	pCi/l	Sr-89	72.0	72.4	1.01	A
			pCi/l	Sr-90	5.90	7.05	1.19	A

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006

TELEDYNE

QUALITY CONTROL SPIKE PROGRAM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (b)	TBE Results (a)	TBE / Analytics Ratio (c)	Evaluation (d)
December 2006	E5173-396	Milk	pCi/l	I-131	70.8	71.9	1.02	A
			pCi/l	Ce-141	294	268	0.91	A
			pCi/l	Cr-51	433	420	0.97	A
			pCi/l	Cs-134	147	128	0.87	A
			pCi/l	Cs-137	237	231	0.97	A
			pCi/l	Co-58	83.8	82.0	0.98	A
			pCi/l	Mn-54	111	113	1.02	A
			pCi/l	Fe-59	79.7	79.8	1.00	A
			pCi/l	Zn-65	164	170	1.04	A
			pCi/l	Co-60	281	265	0.94	A
	E5175-396	AP	pCi	Ce-141	210	220	1.05	A
			pCi	Cr-51	309	343	1.11	A
			pCi	Cs-134	105	90.8	0.86	A
			pCi	Cs-137	169.0	185	1.09	A
			pCi	Co-58	59.7	65.0	1.09	A
			pCi	Mn-54	79	90.6	1.15	A
			pCi	Fe-59	56.7	70.7	1.25	W
			pCi	Zn-65	117	136	1.16	A
			pCi	Co-60	200	208	1.04	A
	E5174-396	Charcoal	pCi	I-131	85.4	77.4	0.91	A

TABLE J-2

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006

TELEDYNE

QUALITY CONTROL SPIKE PROGRAM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

COMMENTS

(1) Impurity detected but not measured by Analytics.
(a) Teledyne Brown Engineering reported result.
(b) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.
(c) Ratio of Teledyne Brown Engineering to Analytics results.
(d) Analytics evaluation based on TBE internal QC limits: A= Acceptable. Reported result falls within ratio limits of 0.80-1.20. W-Acceptable with warning. Reported result falls within 0.70-0.80 or 1.20-1.30. N = Not Acceptable. Reported result falls outside the ratio limits of < 0.70 and > 1.30.

TABLE J-3

PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006
TELEDYNE BROWN ENGINEERING ENV SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio
March-06	E4935-186	Sediment	pCi/kg	Ce-141	0.149 ± 0.01	0.144 ± 0.01	0.97
			pCi/kg	Cr-51	0.402 ± 0.01	0.384 ± 0.03	0.96
			pCi/kg	Cs-134	0.173 ± 0.01	0.182 ± 0.02	1.05
			pCi/kg	Cs-137	0.227 ± 0.01	0.25 ± 0.02	1.10
			pCi/kg	Co-58	0.150 ± 0.01	0.141 ± 0.01	0.94
			pCi/kg	Mn-54	0.134 ± 0.00	0.137 ± 0.01	1.02
			pCi/kg	Fe-59	0.124 ± 0.00	0.126 ± 0.02	1.02
			pCi/kg	Zn-65	0.253 ± 0.01	0.267 ± 0.03	1.06
			pCi/kg	Co-60	0.183 ± 0.01	0.176 ± 0.02	0.96
March-06	E4931-186	Milk	pCi/l	I-131	81 ± 3	84 ± 8	1.04
			pCi/l	Ce-141	116 ± 4	119 ± 12	1.03
			pCi/l	Cr-51	313 ± 10	328 ± 40	1.05
			pCi/l	Cs-134	135 ± 5	131 ± 14	0.97
			pCi/l	Cs-137	99 ± 3	106 ± 12	1.07
			pCi/l	Co-58	117 ± 4	118 ± 12	1.01
			pCi/l	Mn-54	104 ± 3	109 ± 11	1.05
			pCi/l	Fe-59	97 ± 3	100 ± 14	1.03
			pCi/l	Zn-65	197 ± 7	188 ± 20	0.95
			pCi/l	Co-60	143 ± 8	148 ± 15	1.03
March-06	E4932A-186	AP Filter	pCi	Ce-141	76 ± 3	75 ± 4	0.99
			pCi	Cr-51	206 ± 7	192 ± 8	0.93
			pCi	Cs-134	89 ± 3	86 ± 3	0.97
			pCi	Cs-137	65 ± 2	64 ± 3	0.98
			pCi	Co-58	77 ± 3	72 ± 3	0.94
			pCi	Mn-54	69 ± 2	67 ± 3	0.97
			pCi	Fe-59	64 ± 2	63 ± 3	0.98
			pCi	Zn-65	130 ± 5	128 ± 5	0.98

(a) Counting error is two standard deviations.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006
TELEDYNE BROWN ENGINEERING ENV SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio
			pCi	Co-60	94 ± 3	90 ± 4	0.96
March-06	E4933A-186	AP Filter	pCi	Ce-141	66 ± 2	64 ± 3	0.97
			pCi	Cr-51	178 ± 6	171 ± 7	0.96
			pCi	Cs-134	77 ± 3	74 ± 3	0.96
			pCi	Cs-137	56 ± 2	54 ± 2	0.96
			pCi	Co-58	66 ± 2	62 ± 2	0.94
			pCi	Mn-54	59 ± 2	57 ± 2	0.97
			pCi	Fe-59	55 ± 2	55 ± 2	1.00
			pCi	Zn-65	112 ± 4	102 ± 4	0.91
			pCi	Co-60	81 ± 3	78 ± 3	0.96
March-06	E4934A-186	AP Filter	pCi	Ce-141	80 ± 3	79 ± 3	0.99
			pCi	Cr-51	215 ± 8	212 ± 8	0.99
			pCi	Cs-134	93 ± 33	87 ± 3	0.94
			pCi	Cs-137	68 ± 2	67 ± 3	0.99
			pCi	Co-58	81 ± 3	76 ± 3	0.94
			pCi	Mn-54	72 ± 3	70 ± 3	0.97
			pCi	Fe-59	67 ± 2	66 ± 3	0.99
			pCi	Zn-65	136 ± 5	136 ± 5	1.00
			pCi	Co-60	98 ± 3	95 ± 4	0.97
March-06	E4938A-186	AP Filter	pCi	Ce-141	72 ± 3	71 ± 3	0.99
			pCi	Cr-51	193 ± 7	183 ± 7	0.95
			pCi	Cs-134	83 ± 3	80 ± 3	0.96
			pCi	Cs-137	61 ± 2	60 ± 2	0.98
			pCi	Co-58	72 ± 3	68 ± 3	0.94
			pCi	Mn-54	65 ± 2	65 ± 3	1.00
			pCi	Fe-59	60 ± 2	59 ± 2	0.98
			pCi	Zn-65	122 ± 4	124 ± 5	1.02
			pCi	Co-60	88 ± 3	87 ± 3	0.99
March-06	E4939A-186	AP Filter	pCi	Ce-141	85 ± 3	84 ± 3	0.99
			pCi	Cr-51	228 ± 8	218 ± 9	0.96
			pCi	Cs-134	99 ± 3	97 ± 4	0.98
			pCi	Cs-137	72 ± 3	69 ± 3	0.96

(a) Counting error is two standard deviations.

TABLE J-3

PPL REMP LABORATORY SPIKE PROGRAM

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006

TELEDYNE BROWN ENGINEERING ENV SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio
			pCi	Co-58	85 ± 3	80 ± 3	0.94
			pCi	Mn-54	76 ± 3	75 ± 3	0.99
			pCi	Fe-59	71 ± 2	69 ± 3	0.97
			pCi	Zn-65	144 ± 5	138 ± 6	0.96
			pCi	Co-60	104 ± 4	101 ± 4	0.97
March-06		AP Filter	pCi	Ce-141	70 ± 2	69 ± 3	0.99
			pCi	Cr-51	189 ± 2	182 ± 7	0.96
			pCi	Cs-134	82 ± 3	78 ± 3	0.95
			pCi	Cs-137	60 ± 2	58 ± 2	0.97
			pCi	Co-58	71 ± 2	65 ± 3	0.92
			pCi	Mn-54	63 ± 2	63 ± 3	1.00
			pCi	Fe-59	59 ± 2	57 ± 2	0.97
			pCi	Zn-65	119 ± 4	115 ± 5	0.97
			pCi	Co-60	86 ± 3	85 ± 3	0.99
June-06	E4936-186	Water	pCi/l	H-3	4210 ± 140	4150 ± 50	0.99
	E5039-186	Charcoal	pCi	I-131	75 ± 2	77 ± 2	1.03

(a) Counting error is two standard deviations.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006
TELEDYNE BROWN ENGINEERING ENV SERVICES

Month/Year	Identification No.	Medium	Units	Nuclide	Analytics Calculated Results (a)	TBE Results (a)	TBE/Analytics Ratio
	E5040-186	Charcoal	pCi	I-131	81 ± 3	78 ± 2	0.96
	E5041-186	Charcoal	pCi	I-131	85 ± 3	88 ± 2	1.04
	E5107-186	Charcoal	pCi	I-131	95 ± 3	99 ± 4	1.04
September-06	E5108-186	Charcoal	pCi	I-131	90 ± 3	93 ± 4	1.03
	E5108-188	Charcoal	pCi	I-131	86 ± 3	85 ± 3	0.99
	E5106-186	Milk	pCi/l	I-131	90 ± 3	85 ± 9	0.94
			pCi/l	Ce-141	124 ± 4	124 ± 6	1.00
			pCi/l	Cr-51	407 ± 14	375 ± 20	0.92
			pCi/l	Cs-134	123 ± 4	108 ± 12	0.88
			pCi/l	Cs-137	253 ± 8	246 ± 12	0.97
			pCi/l	Co-58	158 ± 5	152 ± 7	0.96
			pCi/l	Mn-54	162 ± 5	161 ± 7	0.99
			pCi/l	Fe-59	63 ± 2	67 ± 5	1.06
			pCi/l	Zn-65	209 ± 7	185 ± 10	0.89
			pCi/l	Co-60	193 ± 6	182 ± 9	0.94
September-06	E5110-186	Water	pCi/l	H-3	903 ± 30	912 ± 27	1.01
December-06	E5180-186	Milk	pCi/l	I-131	68 ± 2	66 ± 6	0.97
			pCi/l	Ce-141	451 ± 15	454 ± 40	1.01
			pCi/l	Cr-51	664 ± 22	663 ± 70	1.00
			pCi/l	Cs-134	225 ± 8	225 ± 23	1.00
			pCi/l	Cs-137	363 ± 12	379 ± 40	1.04
			pCi/l	Co-58	128 ± 4	128 ± 14	1.00
			pCi/l	Mn-54	170 ± 6	179 ± 18	1.05
			pCi/l	Fe-59	122 ± 4	121 ± 15	0.99
			pCi/l	Zn-65	251 ± 8	250 ± 25	1.00
			pCi/l	Co-60	430 ± 14	415 ± 40	0.97

(a) Counting error is two standard deviations.

TABLE J-3
PPL REMP LABORATORY SPIKE PROGRAM
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM - 2006
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

COMMENTS

None

TABLE J-4
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)
(Page 1 of 6)

Month/Year	Identification No.	Medium	Units	Nuclide	MAPEP Known Result(b)	TBE Results(a)	Control Limits	Evaluation(c)
January 2006	06-MaW15	Water	Bq/l	Am-241	1.30	1.29	0.91 - 1.69	A
			Bq/l	Cs-134	95.1	79.2	66.57 - 123.63	A
			Bq/l	Cs-137	False Positive Test	-0.188	N/A	A
			Bq/l	Co-57	166.12	151	116.28 - 215.96	A
			Bq/l	Co-60	153.50	141	107.45 - 199.55	A
			Bq/l	H-3	952.01	988	666.41 - 1237.61	A
			Bq/l	Fe-55	129.60	106.0	90.72 - 168.48	A
			Bq/l	Mn-54	315.00	297	220.50 - 409.50	A
			Bq/l	Ni-63	60.34	61.5	44.24 - 78.44	A
			Bq/l	Pu-238	0.91	0.961	0.64 - 1.18	A
			Bq/l	Pu-239/240	0.00710	0.00965	(1)	A
			Bq/l	Sr-90	13.16	12.6	9.21- 17.11	A
			Bq/l	Tc-99	23.38	22.5	16.37 - 30.39	A
			Bq/l	U-234/233	2.09	2.20	1.46 - 2.72	A
			Bq/l	U-238	2.17	2.23	1.52 - 2.82	A
			Bq/l	Zn-65	228.16	219	159.71 - 296.61	A
	06-GrW15	Water	Bq/l	Gr-Alpha	0.575	0.601	>0.0 - 1.162	A
			Bq/l	Gr-Beta	1.52	1.54	0.56 - 1.70	A

TABLE J-4
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)
(Page 2 of 6)

Month/Year	Identification No.	Medium	Units	Nuclide	MAPEP Known Result(b)	TBE Results(a)	Control Limits	Evaluation(c)
	06-MaS15	Soil	Bq/kg	Am-241	57.08	48.8	39.96 - 74.20	A
			Bq/kg	Cs-134		15.9		N (1)
			Bq/kg	Cs-137	339.69	370	237.78 - 441.60	A
			Bq/kg	Co-57	656.29	667	459.40 - 853.18	A
			Bq/kg	Co-60	447.10	478	312.97 - 581.23	A
			Bq/kg	Mn-54	346.77	384	242.74 - 450.80	A
			Bq/kg	Ni-63	323.51	394	226.46 - 420.56	W
			Bq/kg	K-40	604	667	423 - 785	A
			Bq/kg	Sr-90	314.35	253	220.04 - 408.66	A
			Bq/kg	Tc-99	154.76	146	108.33 - 201.19	A
			Bq/kg	Zn-65	657.36	740	460.15 - 854.57	A
	06-RdF15	AP	Bq	Am-241	0.093	0.0850	0.065 - 0.121	A
			Bq	Cs-134	2.934	2.34	2.054 - 3.814	A
			Bq	Cs-137	2.531	2.45	1.772 - 3.290	A
			Bq	Co-57	4.096	3.87	2.867 - 5.325	A
			Bq	Co-60	2.186	2.12	1.530 - 2.842	A
			Bq	Mn-54	False Positive Test	0.0206	N/A	A
			Bq	Pu-238	0.067	0.0766	0.047 - 0.087	A
			Bq	Pu-239/240	0.00041	0.00520	(1)	A
			Bq	Sr-90	0.792	0.761	0.554 - 1.030	A
			Bq	U-234/233	0.020	0.0217	0.014 - 0.026	A
			Bq	U-238	0.021	0.0220	0.015 - 0.027	A
			Bq	Zn-65	3.423	3.86	2.396 - 4.450	A
	06-GrF15	AP	Bq	Gr-Alpha	0.361	0.257	>0.0 - 0.722	A
			Bq	Gr-Beta	0.481	0.398	0.241 - 0.722	A

TABLE J-4
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)
(Page 3 of 6)

Month/Year	Identification No.	Medium	Units	Nuclide	MAPEP Known Result(b)	TBE Results(a)	Control Limits	Evaluation(c)
January 2006	06-RdV15	Vegetation	Bq/kg	Am-241	0.156	0.156	0.109 - 0.203	A
			Bq/kg	Cs-134	False Positive Test	0.369	N/A	A
			Bq/kg	Cs-137	3.074	3.15	2.152 - 3.996	A
			Bq/kg	Co-57	8.578	10.1	6.005 - 11.151	A
			Bq/kg	Co-60	4.520	4.69	3.164 - 5.876	A
			Bq/kg	Mn-54	6.247	6.53	4.373 - 8.121	A
			Bq/kg	Pu-238	0.137	0.183	0.096 - 0.178	N (2)
			Bq/kg	Pu-239/240	0.164	0.111	0.115 - 0.213	N (2)
			Bq/kg	Sr-90	1.561	2.22	1.093 - 2.029	N (2)
			Bq/kg	U-234/233	0.208	0.208	0.146 - 0.270	A
			Bq/kg	U-238	0.216	0.176	0.151 - 0.281	A
			Bq/kg	Zn-65	9.798	10.5	6.859 - 12.737	A
July 2006	06-MaW16	Water	Bq/l	Am-241	2.31	2.09	1.62 - 3.00	A
			Bq/l	Cs-134	112.82	99.8	78.98 - 146.66	A
			Bq/l	Cs-137	196.14	191	137.30 - 254.98	A
			Bq/l	Co-57	213.08	203	149.16 - 277.00	A
			Bq/l	Co-60	47.5	46.2	33.2 - 61.8	A
			Bq/l	H-3	428.85	471	300.20 - 557.50	A
			Bq/l	Fe-55	165.4	173	115.8 - 215.0	A
			Bq/l	Ni-63	118.62	109	83.03 - 154.21	A
			Bq/l	Pu-238	1.39	1.50	0.97 - 1.81	A
			Bq/l	Pu-239/240	1.94	2.01	1.36 - 2.52	A
			Bq/l	Sr-90	15.69	13.7	10.98- 20.40	A
			Bq/l	Tc-99	27.15	29.0	19.00 - 35.29	A
			Bq/l	U-234/233	2.15	2.19	1.50 - 2.80	A
			Bq/l	U-238	2.22	2.25	1.55 - 2.89	A
			Bq/l	Zn-65	176.37	178	123.46 - 229.28	A

TABLE J-4
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

Month/Year	Identification No.	Medium	Units	Nuclide	MAPEP Known Result(b)	TBE Results(a)	Control Limits	Evaluation(c)
	06-GrW16	Water	Bq/l	Gr-Alpha	1.033	1.52	>0.0 - 2.066	A
			Bq/l	Gr-Beta	1.03	1.18	0.52 - 1.54	A
	06-MaS16	Soil	Bq/kg	Am-241	105.47	83.6	73.83 - 137.11	W
			Bq/kg	Cs-134	452.13	393	316.49 - 587.77	A
			Bq/kg	Cs-137	525.73	522	368.01 - 683.45	A
			Bq/kg	Co-57	676.33	636	473.43 - 879.23	A
			Bq/kg	Co-60	1.98	3.78	N/A	A (3)
			Bq/kg	Mn-54	594.25	598	415.98 - 772.52	A
			Bq/kg	Ni-63	627.3	571	470.6 - 874.0	A
			Bq/kg	Pu-238	82	71.2	57 - 107	A
			Bq/kg	Pu-239240	0.93	0.487	N/A	A (3)
			Bq/kg	K-40	604	615	423 - 785	A
			Bq/kg	Sr-90	223.3	178	156.3 - 290.3	W
			Bq/kg	Tc-99	218.01	175	152.61 - 283.41	A
			Bq/kg	U-234/233	152.44	119	106.71 - 198.17	W
			Bq/kg	U-238	158.73	115	111.11 -206.35	W
			Bq/kg	Zn-65	903.61	937	632.53 - 1174.69	A
	06-RdF16	AP	Bq	Am-241	0.142	0.124	0.099 - 0.185	A
			Bq	Cs-134	3.147	2.62	2.203 - 4.091	A
			Bq	Cs-137	1.805	1.98	1.263 - 2.346	A
			Bq	Co-57	2.582	2.65	1.807 - 3.357	A
			Bq	Co-60	1.577	1.63	1.104 - 2.050	A
			Bq	Mn-54	1.92	2.10	1.34 - 2.50	A
			Bq	Pu-238	0.118	0.118	0.083 - 0.153	A
			Bq	Pu-239/240	False Positive Test	0.00822	N/A	A (3)
			Bq	Sr-90	0.62	0.549	0.43 - 0.81	A
			Bq	U-234/233	0.134	0.140	0.094 - 0.174	A
			Bq	U-238	0.139	0.136	0.097 - 0.181	A
			Bq	Zn-65	False Positive Test	-0.163	N/A	A (3)

TABLE J-4
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)
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Month/Year	Identification No.	Medium	Units	Nuclide	MAPEP Known Result(b)	TBE Results(a)	Control Limits	Evaluation(c)
	06-GrF16	AP	Bq	Gr-Alpha	0.290	0.134	>0.0 - 0.580	A
			Bq	Gr-Beta	0.359	0.358	0.180 - 0.538	A

TABLE J-4
DOE - MAPEP
MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES (TBE)

COMMENTS

(1) Evaluated as a false positive by MAPEP although we considered the result a non-detect due to the peak not being identified by the gamma software. For Cs-134, MAPEP suggests the Bi-214 is not being differentiated from the Cs-134 peak. See email attached with MAPEP results in Appendix A. NCR 06-07 generated by TBE to investigate.
(2) Samples analyzed in triplicate. One result was high, which biased the average results high. Since TBE does not analyze Sr and Pu in vegetation, no further action taken by TBE.
(3) Not detected, reported a statistically zero result. (False positive test)
(a) Teledyne Brown Engineering reported result.
(b) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.
(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.