

# 2012

## Radioactive Effluent Release Report

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

Completed by  
Generation in accordance with  
Technical Specifications  
for  
United States Nuclear Regulatory Commission  
License Nos.  
NPF-76 & NPF-80  
April 2013

**Authored by:** Kim W. Reynolds  
Effluent Chemist  
Chemistry Division

**Technical Review:** James Wirths, IV  
Staff Chemist  
Chemistry Division

**Approved by:**   
Daniel J. Bryant  
Manager  
Chemistry Division

**TABLE OF CONTENTS**

**PAGE**

***SUMMARY TAB***

**Summary and Introduction ..... 1-1**

***EFFLUENT PROGRAM TAB***

**Supplemental Information for Effluent and Waste Disposal..... 2-1**

- Regulatory Limits
- Effluent Concentrations Limits
- Average Energy (Million Electron Volts/Disintegration)
- Measurement and Approximations of Total Activity
- Batch Releases
- Abnormal (Unplanned) Releases
- Estimate of Total Error
- Solid Waste Shipments
- Radiological Impact on Man
- Meteorological Data
- Lower Limit of Detection
- Dose to Members of the Public

**Technical Specifications and Offsite Dose Calculation Manual Controls Reporting Requirements..... 3-1**

- Offsite Dose Calculation Manual Changes
- Annual Land Use Census
- Radioactive Waste Treatment System Design Modification Description
- Inoperable Effluent Monitoring Instrumentation Explanation
- Gas Storage Tank Curie Limit Violation Description
- Unprotected Outdoor Tank Curie Limit Violation Description
- Abnormal (Unplanned) Release Description
- Radioactive Waste Process Control Program Changes

***RADIOLOGICAL DATA***

**Gaseous Effluents..... 4-1**

**Liquid Effluents ..... 5-1**

**Solid Waste and Irradiated Fuel Shipments..... 6-1**

**TABLE OF CONTENTS**

	<u><b>PAGE</b></u>
 <b><i>DOSE DATA TAB</i></b>	
Dose Accumulations.....	7-1
Results of the Direct Radiation Measurement Program .....	8-1
 <b><i>METEOROLOGICAL DATA TAB</i></b>	
Joint Frequency Tables .....	9-1
Joint Frequency Tables for First Quarter	
Joint Frequency Tables for Second Quarter	
Joint Frequency Tables for Third Quarter	
Joint Frequency Tables for Fourth Quarter	
Joint Frequency Tables for First Quarter Batch Release	
Joint Frequency Tables for Second Quarter Batch Release ( <i>Omitted</i> ) <sup>(1)</sup>	
Joint Frequency Tables for Third Quarter Batch Release ( <i>Omitted</i> ) <sup>(1)</sup>	
Joint Frequency Tables for Fourth Quarter Batch Release	

<sup>(1)</sup>Gaseous Batch Releases were not performed during the second and third quarters of 2012 as the values of these tables would be null or zero.

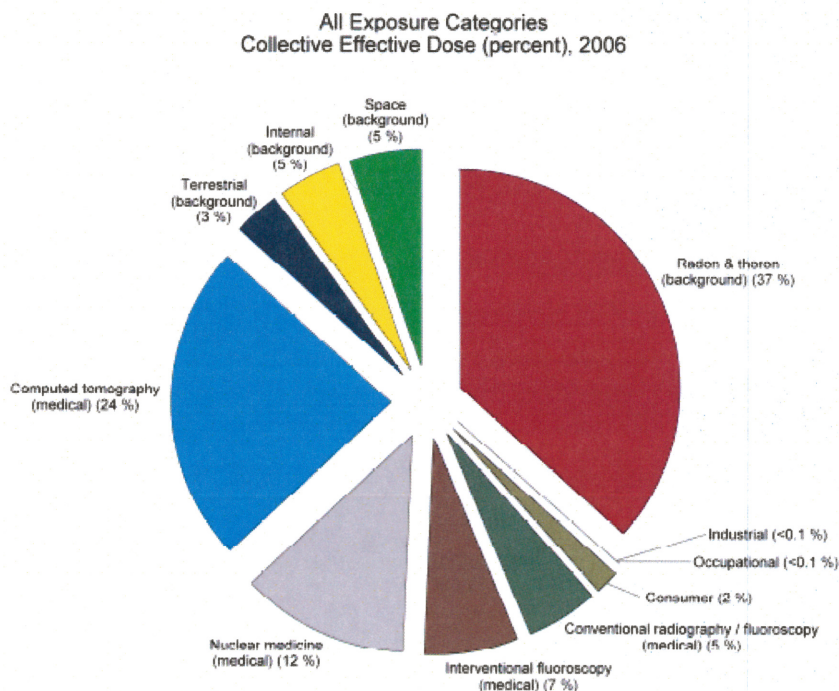
## **Summary Tab**

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### Report Summary

*During 2012, as in all previous years, operation of the South Texas Project created no adverse effects or health risks. The maximum radiation exposure calculated for a hypothetical person living at the boundary of the South Texas Project during 2012 due to operation of the South Texas Project was less than one millirem. For reference, this dose may be compared to the average annual radiation exposure of 620 millirem to people in the United States from all sources. Of that 620 millirem, natural radiation sources in the environment accounted for 50% of the radiation exposure, whilst 48% of the exposure occurred from medical procedures. Nuclear power operations contributed less than one millirem.*

Figure 1-1



\*NCRP (2006). National Council on Radiation Protection and Measurements, *Ionizing Radiation Exposure of the Population of the United States*, (Bethesda, Maryland), NCRP Report No. 160.

During 2012, the estimated total body dose to a hypothetical Member of the Public with the highest probability for exposure from radioactive effluents and direct radiation was 0.023 millirem. This total represents approximately 0.09% of the limits of 40 C.F.R. §190. Based on our 2012 Land Use Census, real individuals reside in the West by Southwest Sector, approximately 4,000 meters (2.5 miles) from the site. For dose calculation purposes, the residents at this location are characterized as the theoretically highest exposed individual with regard to food consumption, occupancy, and other uses of the areas in the plant vicinity. Our dose model assumes that this theoretically highest exposed individual may consume the maximum amount of food with all the food being grown or grazed at the residence. This individual receives shoreline exposure from Little Robbins Slough for 12 hours per year and

consumes 21 kilograms (46 pounds) of fish taken from Little Robbins Slough. This individual receives a submersion dose from noble gases and dose from inhaled radioactive particulates, radioiodines, carbon-14, and tritium. This hypothetical adult is assumed to consume 64 kilograms (140 pounds) of vegetables grown at the residence and consumes 110 kilograms (240 pounds) of meat from livestock grazed at the residence. This estimated total body dose is calculated using models and exposure pathways described in our Offsite Dose Calculation Manual for a hypothetical individual offsite. Other dose estimates for Members of the Public onsite are listed in the report using exposure pathways not addressed by standard dose calculation methods.

Doses from releases to the environment at the South Texas Project Electric Generating Station have historically been and continue to be well below regulatory limits as shown in the following figure. Carbon-14 accounted for over seventy percent of the Total Body Dose reported in gaseous effluents. Members of the public received negligible additional radiation due to the operation of the South Texas Project. This Radioactive Effluent Release Report summarizes the data describing the radioactive liquid and gaseous releases from the South Texas Project Electric Generating Station during 2012. The radioactive effluents from the South Texas Project are effectively monitored and controlled in accordance with regulatory requirements.

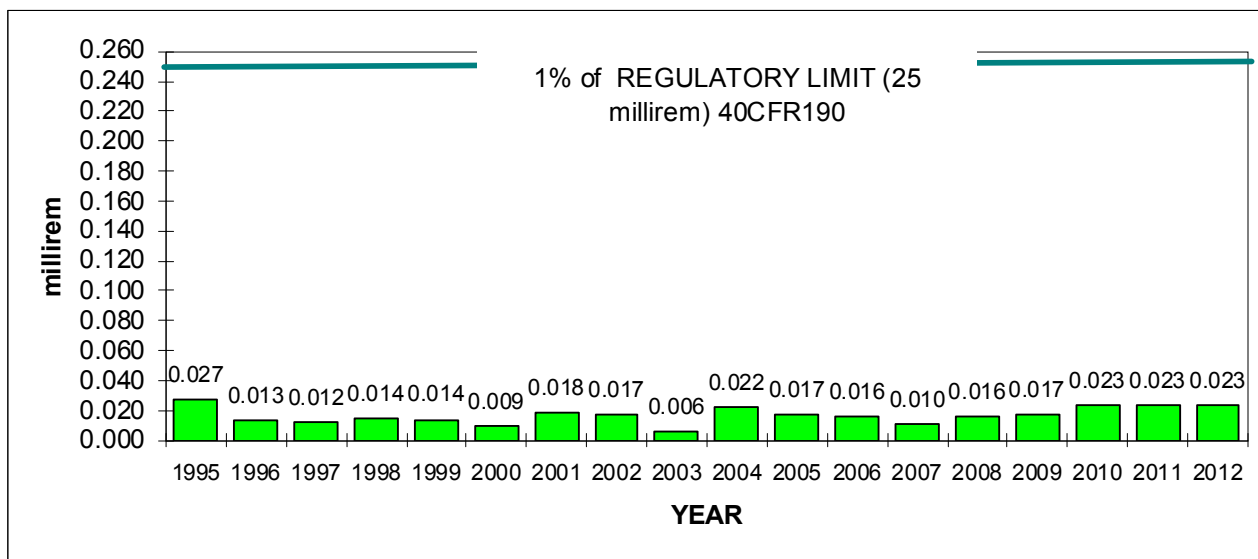


FIGURE 1-2 THEORETICAL TOTAL BODY DOSE FOR ALL PATHWAYS

Liquid and gaseous discharges from the South Texas Project are continuously monitored for radioactive content. Samples are also collected from ventilation systems and liquid discharges and analyzed for radioactivity. The sample and analysis methods are verified and augmented using an environmental laboratory. Radioactivity monitors continuously sample the ventilation exhaust systems. On the liquid discharge lines, radioactivity monitors automatically divert or isolate liquid effluents if the radioactivity is higher than expected. These monitors are also equipped with remote alarm indications in the control rooms and health physics offices.

Prior to and during power operation, the South Texas Project is required to evaluate radioactive material in the environment. We are committed to sampling and analyzing

environmental samples for radioactivity to support our Radiological Environmental Monitoring Program. The results of these environmental samples are reported in our Annual Environmental Operating Report. These environmental measurements affirm the accuracy of our sampling and analysis program.

The radiation monitors and the sampling and analysis program, provide an accurate determination of the type and quantity of radioactive materials released in plant effluents. Liquid effluents are directed to the Main Cooling Reservoir that is located entirely within the site boundary. The South Texas Project continues to aggressively pursue the reduction of radioactive material in liquid effluents consistent with prudent industry practices.

Each year, the effluent monitoring results are summarized in this report and a hypothetical radiation dose to the population in the surrounding area is calculated based on gaseous radioactive effluents, meteorological conditions and liquid radioactive effluents. The hypothetical dose assumes credible paths for radioactive material to reach a member of the public, such as consumption of vegetables from a garden, fish from the river, inhalation, and direct exposure. The highest potential hypothetical dose to an individual at the site boundary was calculated to be less than one millirem or approximately an additional day of radiation exposure from natural radiation sources. The information presented in this report demonstrates that plant operation is consistently controlled to ensure that radioactive effluents remain below regulatory limits and to ensure protection of the public and the environment.

## **INTRODUCTION**

This Radioactive Effluent Release Report is submitted for the period January 1, 2012, through December 31, 2012, in accordance with Appendix A of License Nos. NPF-76 and NPF-80, Technical Specifications and the Offsite Dose Calculation Manual.

A single submittal is made for both units combining those sections that are common. Separate tables of releases and release totals are included where separate processing systems exist.

This report includes an annual summary of hourly meteorological measurements taken during each quarter. This data appears as tables of wind direction and wind speed by atmospheric stability class. All assessments of radiation doses are performed in accordance with the Offsite Dose Calculation Manual.

Minimal quantities of radioactivity were released during 2012. Liquid effluents are discharged to the on-site Main Cooling Reservoir and subsequently released offsite. The radioactivity released in liquids beyond the site boundary was estimated using the South Texas Project Electric Generating Station Offsite Dose Calculation Manual. Solid radioactive waste is shipped offsite for disposal. Table 1-1 lists a brief summary of the radioactive effluents and solid waste attributable to the station.



Table 1-1

TYPE OF RADIOACTIVE MATERIAL	EFFLUENT TYPE	DESTINATION	VOLUME CUBIC METER	CURIES
NOBLE GAS	GAS	OFFSITE	6.0E+09 <sup>(2)</sup>	4.5E+00
PARTICULATE AND IODINES	GAS	OFFSITE	6.0E+09 <sup>(2)</sup>	2.8E-04
TRITIUM & CARBON-14	GAS	OFFSITE	6.0E+09 <sup>(2)</sup>	1.4E+02
TRITIUM	LIQUID	OFFSITE	4.8E+06 <sup>(3)</sup>	2.2E+02 <sup>(5)</sup>
FISSION AND ACTIVATION PRODUCTS	LIQUID	OFFSITE	4.8E+06 <sup>(3)</sup>	2.2E-04 <sup>(5)</sup>
TRITIUM	LIQUID	ON-SITE	3.2E+04 <sup>(4)</sup>	1.7E+03
FISSION AND ACTIVATION PRODUCTS <sup>(1)</sup>	LIQUID	ON-SITE	3.2E+04 <sup>(4)</sup>	1.2E-02
SPENT RESINS AND FILTERS	SOLID	FOR BURIAL	1.8E+01	9.0E+00
DRY COMPRESSIBLE WASTE	SOLID	FOR BURIAL	4.8E+01	1.6E+00
Low Level Exempt Quantities of secondary resin, sludge, and oily sludge	SOLID	FOR BURIAL	3.1E+01	1.2E-06

<sup>(1)</sup>Excludes dissolved and entrained gases.

<sup>(2)</sup>Unit Vent Release Volume for Units 1 and 2.

<sup>(3)</sup>Estimated MCR seepage to identified receptors.

<sup>(4)</sup>Total volume of liquid radioactive effluents discharged to the MCR.

<sup>(5)</sup>Reference ODCM, Table B4-1 for Matagorda Bay.

Tritium was the largest contributor to the offsite doses from radioactive liquid effluents. The offsite doses are well below any regulatory limit and significantly less than the average annual radiation exposure to people in the United States from all sources (620 millirem).

## Effluent Program Tab

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## **Supplemental Information for Effluent and Waste Disposal**

## **Supplemental Information for Effluent and Waste Disposal**

The South Texas Project Electric Generating Station is located on 49,500,000 square meters (12,220 acres) in Matagorda County, Texas, approximately 24,000 meters (15 miles) southwest of Bay City along the west bank of the Colorado River. The South Texas Project is currently owned by NRG Energy, Inc., Austin Energy, and CPS Energy as tenants in common. The Houston Lighting & Power Company was the original project manager of the South Texas Project and was responsible for the engineering, design, licensing, construction, startup, and initial operation of the two unit facility. In 1997, the STP Nuclear Operating Company, assumed operational control of the South Texas Project and responsibility for implementation of the Radioactive Effluent Control Program.

The South Texas Project has two Westinghouse pressurized water reactors. The nominal net electrical capacity of each unit is 1,250 megawatts-electric (MWe). Unit 1 received a low-power testing license on August 21, 1987, obtained initial criticality on March 8, 1988, and was declared commercially operational on August 25, 1988. Unit 2 received a low-power testing license on December 16, 1988, obtained initial criticality on March 12, 1989, and was declared commercially operational on June 19, 1989. The South Texas Project initiated project activities in 2008 to pursue renewal of the operating licenses for Units 1 and 2 from the Nuclear Regulatory Commission (NRC). The license renewal application was submitted to the Nuclear Regulatory Commission in October of 2010 to request authorization to operate STP, Units 1 and 2, for an additional 20 years beyond the period specified in the current licenses. The Nuclear Regulatory Commission determined that the South Texas Project submittal was sufficient to enable them to undertake a review of the application. The Nuclear Regulatory Commission review process is intended to ensure that the plant's original design and current conditions and programs can allow the facility to continue operating safely beyond its original license. The combined units currently produce enough electricity to serve more than two million homes and businesses throughout Texas. With nearly 1,200 baseline employees, the STP Nuclear Operating Company is the largest employer and source of revenue for Matagorda County.

### **Regulatory Limits**

#### **Fission and Activation Gases**

The **air dose** due to noble gases released in gaseous effluents from each unit to areas at and beyond the Site Boundary shall be limited to the following:

During any calendar quarter: Less than or equal to 5 millirads for gamma radiation and less than or equal to 10 millirads for beta radiation, and

During any calendar year: Less than or equal to 10 millirads for gamma radiation and less than or equal to 20 millirads for beta radiation.

#### **Iodines and Particulates, Half-Lives > 8 days**

The **dose** to a Member of the Public from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than eight days in gaseous effluents released, from each unit, to areas at and beyond the Site Boundary shall be limited to the following:

During any calendar quarter: Less than or equal to 7.5 millirems to any organ; and

During any calendar year: Less than or equal to 15 millirems to any organ.

### Liquid Effluents

The **dose or dose commitment** to a Member of the Public from radioactive materials in liquid effluents released from each unit to Unrestricted Areas shall be limited to:

During any calendar quarter: Less than or equal to 1.5 millirems to the whole body and to less than or equal to 5 millirems to any organ; and

During any calendar year: Less than or equal to 3 millirems to the whole body and to less than or equal to 10 millirems to any organ.

### Effluent Concentrations Limits

#### Gaseous Effluents

The **dose rate** due to radioactive materials released in gaseous effluents from the site to areas at and beyond the Site Boundary shall be limited to the following:

For noble gases: Less than or equal to 500 millirems/year to the whole body and less than or equal to 3000 millirems/year to the skin; and

For Iodine-131, Iodine-133, tritium and all radionuclides in particulate form with half-lives greater than eight days: Less than or equal to 1500 millirems/year to any organ.

#### Liquid Effluents

The concentration of radioactive material released in liquid effluents to Unrestricted Areas shall be limited to 10 times the concentrations specified in 10CFR, Part 20, Appendix B, Table II, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.0E-04 microcurie/milliliter total activity.

### Average Energy (Million Electron Volts/Disintegration)

The **Average Energy** (or E-bar) shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration for the isotopes other than Iodines, with half-lives greater than 15 minutes, making up at least 95% of the total non-iodine activity in the coolant. The following average energy values are based on grab sample analyses from each reactor coolant system with both samples being collected during October 2012.

Reactor Coolant Liquid including tritium, fission products (excluding radioiodines), and corrosion and activation products

E-bar (Million Electron Volts/Disintegration)	<u>0.135</u>	Unit 1
	<u>0.091</u>	Unit 2

The average energy (E-bar) values of the radionuclide mixture in gaseous releases of fission and activation gases are based on noble gases released during the reporting period.

Gaseous Effluents only Noble Gases

E-bar (Million Electron Volts/Disintegration)	<u>1.17</u>	Unit 1
	<u>0.96</u>	Unit 2

**Measurement and Approximations of Total Activity**

The following discussions detail the methods used to measure and approximate total activity for the following:

Gaseous Effluents: Fission and Activation Gases, Tritium, Iodines and Particulates

Liquid Effluents: Fission and Activation Products, Tritium, Dissolved and Entrained Gases

Tables A3-1 and A4-1 of the South Texas Project Electric Generating Station Offsite Dose Calculation Manual give sampling frequencies and lower limit of detection requirements for the analysis of liquid and gaseous effluent streams.

Gaseous Effluents

Analytical Methods For Gaseous Releases from the Reactor Containment Building

Monthly pre-release grab samples are collected from the plant Reactor Containment Building atmosphere. These samples are analyzed on a Gamma Spectroscopy System utilizing high purity germanium detectors for noble gas, iodine and particulate activity. Tritium specific radioactivity is measured using Liquid Scintillation Counting techniques.

The radionuclide concentrations obtained are used in conjunction with the gross noble gas release rate monitoring data collected by the radiation monitoring system to estimate the release rate of each radionuclide in the effluent streams. The noble gas release rate data collected by the unit vent radiation monitor is quantified and reported as continuous mode of release. The data from the unit vent radiation monitor in conjunction with the grab sample results of the Reactor Containment Building atmosphere are used to quantify the radioactive material released.

Analytical Methods For Continuous Gaseous Releases

Periodic noble gas and tritium grab samples are taken from the continuous release points such as the Unit Vent. Continuous sampling for particulates and iodine is also performed on effluent streams. These samples are analyzed for tritium and gamma radionuclides, as

described above for gaseous releases. Strontium-89, Strontium-90, and gross alpha analyses were performed by the on-site Radiological Services Laboratory.

Noble gas quantification is performed by the plant radiation monitoring system using noble gas grab sample results and the gross noble gas release rate monitor.

The methodology used for estimating the quantity of carbon-14 released to the environment is described in the following section Dose to Member of the Public from Radioactive Effluents Including Carbon-14.

Secondary system liquid grab samples in conjunction with the mass of the secondary coolant lost are used for quantifying secondary steam releases. The radioactive material in the steam is based on grab sample results of the secondary liquid. The secondary liquid is analyzed for gamma emitters and tritium.

### Liquid Effluents

#### Analytical Methods For Liquid Releases

Liquid batch releases include waste liquid treated by the liquid waste processing system and secondary system chemical regeneration waste. Liquid effluents resulting from primary to secondary leakage or other plant operations are continuously monitored and are tracked as continuous releases. For batch releases, representative pre-release grab samples are taken and analyzed in accordance with Table A3-1 of the Offsite Dose Calculation Manual. For continuous releases, representative samples are collected weekly and analyzed. Radionuclide analyses are performed using a Gamma Spectroscopy System. Aliquots of each pre-release batch sample are composited in accordance with the requirements in Table A3-1 of the Offsite Dose Calculation Manual. Tritium concentrations are determined using Liquid Scintillation Counting techniques. Dissolved and entrained gas concentrations are determined by counting grab samples on the Gamma Spectroscopy System. Strontium-89, Strontium-90, gross alpha, Iron-55, and Nickel-63 determinations are performed by the on-site Radiological Services Laboratory. The radionuclide concentrations obtained are used with the total volume for each batch release.

### Batch Releases

Liquid and gaseous summaries are compiled from permits generated using a computer-based effluent management system and plant procedures. Liquid batch releases are accounted for by individual permits. Gaseous batch releases are accounted for by monthly permits and consist of reactor containment purges for the purpose of reducing radioactive material concentrations. Batch times represent the actual period of releases and the periods that the purge valves were open.



Liquid (Unit 1)

<b>Liquid (Unit 1)</b>	<b>Quarter 1</b>	<b>Quarter 2</b>	<b>Quarter 3</b>	<b>Quarter 4</b>
a. Number of batch releases	31	14	22	33
b. Total time period for batch releases (minutes)	1923	887	1382	2066
c. Maximum time period for a batch release (minutes)	68	69	68	71
d. Average time period for batch releases (minutes)	62	63	63	63
e. Minimum time period for a batch release (minutes)	57	55	55	49

Gaseous (Unit 1)

<b>Gaseous (Unit 1)</b>	<b>Quarter 1</b>	<b>Quarter 2</b>	<b>Quarter 3</b>	<b>Quarter 4</b>
a. Number of batch releases	0	0	0	6
b. Total time period for batch releases (minutes)	0	0	0	49800
c. Maximum time period for a batch release (minutes)	0	0	0	27060
d. Average time period for batch releases (minutes)	0	0	0	8300
e. Minimum time period for a batch release (minutes)	0	0	0	300

Liquid (Unit 2)

<b>Liquid (Unit 2)</b>	<b>Quarter 1</b>	<b>Quarter 2</b>	<b>Quarter 3</b>	<b>Quarter 4</b>
a. Number of batch releases	3	16	5	5
b. Total time period for batch releases (minutes)	178	971	312	310
c. Maximum time period for a batch release (minutes)	60	64	63	62
d. Average time period for batch releases (minutes)	59	61	62	62
e. Minimum time period for a batch release (minutes)	59	51	61	62

Gaseous (Unit 2)

<b>Gaseous (Unit 2)</b>	<b>Quarter 1</b>	<b>Quarter 2</b>	<b>Quarter 3</b>	<b>Quarter 4</b>
a. Number of batch releases	1	0	0	0
b. Total time period for batch releases (minutes)	720	0	0	0
c. Maximum time period for a batch release (minutes)	720	0	0	0
d. Average time period for batch releases (minutes)	720	0	0	0
e. Minimum time period for a batch release (minutes)	720	0	0	0

Abnormal (Unplanned) Releases

No abnormal releases occurred during this reporting period.

Estimate of Total ErrorEstimate of Error for Liquid Effluents

The **maximum error** associated with volume and flow measurements, based upon plant calibration practice, is estimated to be  $\pm 1.27\%$ . The error associated with the flow measurement is small in relation to the counting uncertainty of the radionuclide concentration analysis.

The **average uncertainty** associated with counting measurements is 10% or less at the 95% confidence interval.

The **error** associated with dilution volume is estimated to be  $\pm 10\%$ .

Estimate of Error for Gaseous Effluents

The **maximum error** associated with monitor readings, sample flow, vent flow, sample collection, monitor calibration and laboratory procedures are collectively estimated to be:

Fission and Activation Gases Low Activity (less than 10 microcurie per second)	$\pm 100\%$
Fission and Activation Gases High Activity (greater than or equal to 10 microcurie per second)	$\pm 20\%$
Iodines	$\pm 25\%$
Particulates	$\pm 25\%$
Tritium	$\pm 50\%$

The **average uncertainty** associated with counting measurements is 10% or less at the 95% confidence interval for fission and activation gases, iodines, particulates and tritium.

### Estimate of Error for Solid Radioactive Waste

The **error** associated with determining the volume of solid radioactive waste shipments is estimated to be  $\pm 1\%$ . The **error** associated with determining the filter media, spent primary resins, and spent secondary resins radioactivity and radioactivity from other solid radioactive waste shipments is estimated to be within a factor of two of the real value and is due primarily to waste stream sampling uncertainty. The **error** associated with determining the radioactivity of dry active solid radioactive waste shipments is estimated to be within a factor of three of the real value.

### Solid Waste Shipments

A total of nine shipments of radioactive filter media, spent resins, dry active and other wastes were made during the reporting period. Additionally two shipments of exempt quantities were made to an industrial landfill in Texas. A summary of the data is provided in Section 6, Solid Waste and Irradiated Fuel Shipments. This data is based upon waste generated from Units 1 and 2.

### Radiological Impact on Man

The data for the period January 1, 2012, through December 31, 2012, is provided in the Dose Accumulation (Section 7) and the Summary of Direct Radiation Table 8-1 (Section 8). The following dilution factors and dilution water flows were used for assessing the radiation doses due to radioactive liquid effluents released to unrestricted areas.

Receptor Location	ODCM <sup>(1)</sup> Dilution Factor	Dilution Water Flow Cubic Feet/Second	Dilution Water Flow Liters/Year	Dilution Water Flow Liters/Quarter
Colorado River	1.00E+00	6.00E+02	5.36E+11	1.34E+11
Matagorda Bay	1.63E+02	9.78E+04	8.73E+13	2.18E+13
Little Robbins Slough Area	3.05E-02	1.83E+01	1.63E+10	4.08E+09

<sup>(1)</sup> Offsite Dose Calculation Manual factor

The dilution water flow used to estimate the individual dose due to ingestion of saltwater fish and saltwater invertebrates (shrimp) harvested from the Colorado River was 5.36E+11 liters per year for the years of 1989 through 2012. The dilution water flow used to estimate the individual dose due to ingestion of saltwater fish and saltwater invertebrates harvested from the Matagorda Bay was 8.73E+13 liters per year for the years of 1993 through 2012 as the result of a diversion channel that routes the Colorado River into Matagorda Bay. The dilution water flow used to estimate the individual dose due to ingestion of freshwater fish from the Little Robbins Slough Area was 1.63E+10 liters per year for the years 1989 through 2012. These dilution water flows were also used for estimating individual dose due to shoreline deposits. The radioactive material reported in the Liquid Effluent tables is the amount released to the Main Cooling Reservoir and does not contribute to dose until the radioactive material is released to unrestricted areas. In order to estimate the doses due to liquid effluents, the radioactive material reported must be

adjusted by the values listed in the Offsite Dose Calculation Manual, Table B4-1, "Radionuclide Fractions N(i), Reaching Off-site Bodies of Water".

### **Meteorological Data**

The **2012 meteorological data** is presented in the form of joint frequency tables. Each quarter contains eight tables, one for each stability class and one for all classes combined.

A second set of joint frequency tables is provided for time periods when the reactor containment building fans were operating to remove radioactive material from the containment for personnel protection reasons. These containment purges are classified as batch releases. Batch releases were not performed during the second and third quarters. These joint frequency tables for first and third quarters were omitted as the values were null or zero.

### **Lower Limit of Detection**

The **Lower Limit of Detection** (an a priori limit) is defined as the smallest concentration of radioactive material in a sample that will yield a net count above system background that will be detected with 95% probability, and only a 5% probability of falsely concluding that a blank observation represents a "real" signal. A zero (0) value in the attached tables indicates no activity detected.

### **Dose to Member of the Public**

#### Dose to Member of the Public from Direct Radiation Outside the Site Boundary

The Offsite Dose Calculation Manual includes the direct radiation from plant structures as a component to the dose to a hypothetical, highest exposed Member of the Public located off site due to plant operations. The Offsite Dose Calculation Manual allows measurements made near the plant structures to be used in these calculations following suitable adjustments for distance and exposure time. In 2012, Thermoluminescent Dosimeters were placed along the protected area fence or the concrete intrusion barriers surrounding Units 1 and 2 of the South Texas Project, on the fence of the Onsite Staging Facility (Outside Storage), along the walls of OSF Warehouse D, and around the Old Steam Generator Storage Facility as pictured in Figure 8-1 of Section 8. The results of these measurements are summarized in Table 8-1 of Section 8. The table shows that in 2012, Thermoluminescent Dosimeter measurements were typical of previous year's readings.

In accordance with the ODCM, the dose due to direct radiation can be estimated taking the highest TLD measurement, less background, and correcting for the distance to the site boundary using

$$\text{Dose}_{\text{direct}} = \text{TLD} * (\text{PA})^2 / (\text{RD})^2$$

Where

TLD = background corrected TLD annual dose, mR/yr

PA = distance from source of radiation to the TLD location, meters

RD = distance from the source of radiation to the closest site boundary, meters

The TLD average dose rate is the average of the four quarterly values for the highest location less the quarterly average background at the site boundary. The highest average TLD dose rate was 18.2 mR/quarter for station #22 which is located in the vicinity of the Onsite Staging Facility (outside storage), as shown in Figure 8-1. The value for TLD may be calculated as shown below where the historical site boundary background of 15.4 mR/quarter is used to find the net rate attributable to waste stored onsite.

$$\text{TLD} = 18.2 - 15.4 = 2.8 \text{ mR/quarter}$$

or

$$\text{TLD} = (2.8 \text{ mR/quarter}) * (4 \text{ quarters/yr}) = 11.2 \text{ mrem/yr} \quad \text{assuming a mR is about equal to a mrem}$$

The approximate distances PA and RD are estimated using field measurements and global positioning satellite technology. The total dose to a hypothetical member of the public at the site boundary could be calculated as below:

$$\text{Dose}_{\text{direct}} = (11.2 \text{ mrem/yr}) * (24.4 \text{ meters})^2 / (960 \text{ meters})^2 = 0.007 \text{ mrem/yr}$$

This assumes someone is positioned permanently at the fence near the Onsite Storage Facility. A real person might traverse this area twice daily (to and from work) for a total exposure time of

$$\text{Exposure time (hypothetical person)} = (250 \text{ work days per year}) * (4 \text{ minutes per trip}) * (2 \text{ trips per day})$$

$$\text{Exposure time (hypothetical person)} = 2000 \text{ minutes} = 0.00381 \text{ yr}$$

$$\text{Dosedirect} = 0.007 \text{ mrem/yr} * 0.00381 \text{ yr} = 0.000028 \text{ mrem in 2012}$$

In summary, a realistic dose of 0.000028 mrem was possible to a member of the public offsite in 2012 although a hypothetical maximum annual dose rate of 0.007 mrem/yr was calculated at the nearest offsite location.

#### Dose to Member of the Public from Direct Radiation Inside the Site Boundary

A hypothetical Member of the Public inside the site boundary but outside the protected area fence could receive less than one millirem from direct radiation. The most exposed employee on site who is also a member of the public would be a grounds keeper whose job required him to work in the vicinity of Warehouse "D" for radioactive waste. If such an individual worked 10 hours once a quarter at the fence where the dose rate was highest, their direct radiation dose could be calculated as follows:

$$\text{Dose (mrem)} = 40 * [(28.2-15.4)+(17.1-15.4)+(18.1-15.4)+(18.2-15.4)] / 366 / 24 = 0.091 \text{ mrem}$$

where

- 40 = 10 hours per quarter times four quarters
- 28.2 = average dose rate in first quarter, mrem/quarter
- 17.1 = average dose rate in second quarter, mrem/quarter
- 18.1 = average dose rate in third quarter, mrem/quarter
- 18.2 = average dose rate in fourth quarter, mrem/quarter
- 15.4 = average pre-operation dose rate, mrem/quarter

366 = days in a year  
24 = hours per day

Hence, in 2012 a hypothetical member of the public with the highest exposure to direct radiation received about 0.09 mrem from direct radiation.

#### Dose to Member of the Public from Direct Radiation and Radioactive Effluents Inside the Site Boundary

A hypothetical Member of the Public outside the protected area fence but inside the site boundary could receive approximately 0.70 millirem from radioactive effluents due to inhalation and immersion. This dose plus the direct radiation dose would yield 0.79 millirem, a small fraction of the 10 C.F.R. §20.1301 annual limit.

#### Dose to Member of the Public from Radioactive Effluents Outside the Site Boundary using ODCM Exposure Pathways

During 2012, the estimated total body dose to a hypothetical Member of the Public with the highest probability for exposure from radioactive effluents and direct radiation was 0.023 millirem. This total represents approximately 0.09% of the limits of 40 C.F.R. §190. Based on our 2012 Land Use Census, real individuals reside in the West by Southwest Sector, approximately 4,000 meters (2.5 miles) from the site. For dose calculation purposes, the residents at this location are characterized as the theoretically highest exposed individual with regard to food consumption, occupancy, and other uses of the areas in the plant vicinity. Our dose model assumes that this theoretically highest exposed individual may consume the maximum amount of food with all the food being grown or grazed at the residence. This individual receives shoreline exposure from Little Robbins Slough for 12 hours per year and consumes 21 kilograms (46 pounds) of fish taken from Little Robbins Slough. This individual receives a submersion dose from noble gases and dose from inhaled radioactive particulates, radioiodines, carbon-14, and tritium. This hypothetical adult is assumed to consume 64 kilograms (140 pounds) of vegetables grown at the residence and consumes 110 kilograms (240 pounds) of meat from livestock grazed at the residence. This estimated total body dose is calculated using models and exposure pathways described in our Offsite Dose Calculation Manual for a hypothetical individual offsite. Other dose estimates for Members of the Public onsite are listed in the report using exposure pathways not addressed by standard dose calculation methods.

#### Dose to Member of the Public from Radioactive Effluents Outside the Site Boundary using Liquid to Gaseous Receptor Exposure Pathways

Consistent with normal operation of the units, approximately nineteen hundred curies of tritium were released to the Main Cooling Reservoir during 2012. Since some portion of the tritium released in liquid effluents evaporates from the Main Cooling Reservoir, this section is included to provide an estimate of offsite dose from that gaseous source per section 4.10 of the ODCM. The Main Cooling Reservoir, with a surface area of about 28,300,000 square meters (7000 acres), is an area source and contributes tritium to the atmosphere. The atmospheric dispersion factor for the WSW sector at 4000 meters was estimated to be 4.01E-07 seconds per cubic meter using the EPA code Iclt3 and 2004 meteorological data. The

product of X/Q, tritium released to the MCR, and the dose factor for a population age group (87.9, 91.7, 114.2 or 20.5 millirem-cubic meter per second-curie for age groups adult, teen, child and infant, respectively) generated an estimated whole body dose of 0.1 millirem for the highest exposed population group, a small fraction of the limits of 40 C.F.R. §190.

#### Dose to Member of the Public from Radioactive Effluents including Carbon-14

Carbon-14 was reported as a radioactive effluent in 2010 for the first time. Carbon-14 is a naturally occurring isotope of carbon. Carbon-14 is formed naturally in the upper atmosphere and is also formed in an operating nuclear reactor, primarily through activation of oxygen molecules. The quantity of carbon-14 produced by operating nuclear reactors is significantly less than that produced naturally or from weapons testing.

The NRC published *Regulatory Guide 1.21 Revision 1, Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants* in 1974. This regulatory guidance recommends the content and format of this report. This report follows the recommendations of Regulatory Guide 1.21, Revision 1. In 2009 the NRC published revision 2 of Regulatory Guide 1.21 based on a risk-informed perspective for reporting principal radionuclides. This document recommended methods for estimating and reporting the quantity of carbon-14 released in gaseous effluents. The quantity of carbon-14 released from each unit was estimated using *NUREG-0017, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors PWR-GALE Code*, April 1985. A value of 7.3 curies of carbon-14 was used for each unit. The Semiannual Summation of All Releases by Quarter for All Airborne Effluents found in section 4-2 of this report lists carbon-14 in a similar manner as tritium.

ODCM dose factors were used for estimating doses to members of the public and the doses due to carbon-14 are included in the Dose Accumulations, Section 7-1 of this report. *EPRi Report TR-105715, Characterization of Carbon-14 Generated by the Nuclear Power Industry*, November 1995 concluded that the molecular form of carbon-14 produced in gaseous effluent is 75 to 90 percent hydrocarbons (primarily methane) with the remainder in inorganic form (carbon dioxide or carbon monoxide in gas or carbonates in liquid). This report listed the measured molecular forms of carbon-14 in gaseous effluents from two U.S. and six German commercial pressurized water reactors. The average fraction of inorganic carbon-14 was determined to be 20 percent and the average organic fraction was determined to be 80 percent. The pathway doses were calculated using the average ratio of 1:5 for ingestion pathways, as carbon in the form of hydrocarbons is not absorbed by plants. The radiation doses from STPEGS to the public (including carbon-14) are much lower than regulatory limits and are a very small contributor to the total radiation dose the American public receives each year from natural and manmade sources.

**Technical Specifications and Offsite Dose Calculation Manual  
Controls Reporting Requirements**



**Offsite Dose Calculation Manual Changes (reference, Technical Specifications, 6.13)**

The ODCM was not revised in 2012.

**Annual Land Use Census (reference, Offsite Dose Calculation Manual Controls, 3.12.2.a)**

The Land Use Census verified current nearest residents within five miles. No new residents or receptors were identified within five miles of the site. A dairy goat was identified approximately 8,000 meters (5 miles) from the site in the southeast sector. A dose evaluation was performed and this evaluation determined that sampling of dairy milk was not required. The goat milk pathway was activated and was used in the dose calculation model as described in our ODCM.

**Radioactive Waste Treatment System Design Modification Description (reference, Offsite Dose Calculation Manual Controls, 6.15)**

A review of the work history for 2012 for the solid, liquid and gaseous waste processing systems revealed that no major modifications were installed on these systems in 2012.

**Inoperable Effluent Monitoring Instrumentation Explanation (reference, Offsite Dose Calculation Manual Controls, 6.9.1.4)**

For 2012, inoperable liquid effluent monitoring instruments were corrected within the time specified in Sections 3.3.3.10 of Offsite Dose Calculation Manual Controls.

For 2012, inoperable gaseous effluent monitoring instruments were corrected within the time specified in Sections 3.3.3.11 of Offsite Dose Calculation Manual Controls.

**Gas Storage Tank Curie Limit Violation Description (reference, Offsite Dose Calculation Manual Controls, 6.9.1.4)**

The Reactor Coolant System Vacuum Degassing System was not used during this reporting period. Therefore, the quantity of radioactive material in the Reactor Coolant System Vacuum Degassing System Storage Tanks did not exceed the limits set forth in Section 3.11.2.6 of Technical Specifications.

**Unprotected Outdoor Tank Curie Limit Violation Description (reference, Offsite Dose Calculation Manual Controls, 6.9.1.4)**

There are no Unprotected Outdoor Tanks at South Texas Project Electric Generating Station. Therefore the quantity of radioactive material in any unprotected outdoor tank did not exceed the limit set forth in Section 3.11.1.4 of Technical Specifications.

**Abnormal (Unplanned) Release Description (reference, Offsite Dose Calculation Manual, 6.9.1.4)**

No abnormal (unplanned) releases occurred during this reporting period.

**Radioactive Waste Process Control Program Changes (reference, Technical Specifications, 6.13)**

There were no changes to the Radioactive Waste Process Control Program during this reporting period.

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## **Radiological Data Tab**

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## **GASEOUS EFFLUENTS**

**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL AIRBORNE EFFLUENTS**

**Unit: 1**

Starting : 1-Jan-2012    Ending : 30-Jun-2012

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION GASES</b>				
1. TOTAL RELEASE	CURIES	3.71E-01	4.02E-01	100
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	4.72E-02	5.11E-02	
3. PERCENT OF LIMIT (9.60E+04 uCi/sec)	%	4.92E-05	5.33E-05	
<b>B. RADIOIODINES</b>				
1. IODINE-131	CURIES	0.00E+00	1.60E-09	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	0.00E+00	2.03E-10	
3. PERCENT OF LIMIT (4.00E-02 uCi/sec)	%	0.00E+00	5.08E-07	
<b>C. PARTICULATES</b>				
1. PARTICULATES(HALF-LIVES>8 DAYS)	CURIES	3.07E-05	5.17E-05	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	3.91E-06	6.58E-06	
3. PERCENT OF LIMIT (3.00E-01 uCi/sec)	%	1.30E-03	2.19E-03	
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<b>D. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	1.58E+01	2.43E+01	50
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.01E+00	3.09E+00	
3. PERCENT OF LIMIT (1.80E+05 uCi/sec)	%	1.12E-03	1.72E-03	
<b>E. CARBON-14</b>				
1. TOTAL RELEASE	CURIES	1.82E+00	1.81E+00	None
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.31E-01	2.30E-01	
3. PERCENT OF LIMIT (7.8E+03 uCi/sec)	%	2.97E-03	2.95E-03	

## STP NUCLEAR OPERATING COMPANY

## Unit 1

REPORT CATEGORY: SEMIANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES. TOTALS  
FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: FISSION GASES, IODINES, AND PARTICULATES

REPORTING PERIOD: QUARTER # 1 AND QUARTER # 2 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
FISSION GASES					
Argon-41	CURIES	2.01E-01	2.32E-01	0.00E+00	0.00E+00
Xenon-133	CURIES	1.70E-01	1.69E-01	0.00E+00	0.00E+00
Xenon-135	CURIES	6.99E-04	7.77E-04	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	3.71E-01	4.02E-01	0.00E+00	0.00E+00
IODINES					
Iodine-131	CURIES	0.00E+00	1.60E-09	0.00E+00	1.60E-09
Iodine-133	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	0.00E+00	1.60E-09	0.00E+00	1.60E-09
PARTICULATES					
Beryllium-7	CURIES	3.07E-05	5.17E-05	0.00E+00	0.00E+00
Cobalt-58	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt-60	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium-51	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury-203	CURIES	2.15E-09	2.55E-09	0.00E+00	0.00E+00
Manganese-54	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Niobium-95	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium-75	CURIES	1.30E-09	1.06E-09	0.00E+00	0.00E+00
Zirconium-95	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	3.07E-05	5.17E-05	0.00E+00	0.00E+00
OTHER					
Carbon-14	CURIES	1.82E+00	1.81E+00	0.00E+00	0.00E+00
Hydrogen-3 (Tritium)	CURIES	1.58E+01	2.43E+01	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.76E+01	2.61E+01	0.00E+00	0.00E+00



**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL AIRBORNE EFFLUENTS**

**Unit: 1**

Starting : 1-Jul-2012    Ending : 31-Dec-2012

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION GASES</b>				
1. TOTAL RELEASE	CURIES	4.00E-01	1.32E+00	100
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	5.03E-02	1.67E-01	
3. PERCENT OF LIMIT (9.60E+04 uCi/sec)	%	5.24E-05	1.73E-04	
<b>B. RADIOIODINES</b>				
1. IODINE-131	CURIES	0.00E+00	1.02E-07	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	0.00E+00	1.28E-08	
3. PERCENT OF LIMIT (4.00E-02 uCi/sec)	%	0.00E+00	3.20E-05	
<b>C. PARTICULATES</b>				
1. PARTICULATES(HALF-LIVES>8 DAYS)	CURIES	4.04E-05	5.92E-05	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	5.08E-06	7.44E-06	
3. PERCENT OF LIMIT (3.00E-01 uCi/sec)	%	1.69E-03	2.48E-03	
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<b>D. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	1.49E+01	1.55E+01	50
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	1.88E+00	1.95E+00	
3. PERCENT OF LIMIT (1.80E+05 uCi/sec)	%	1.04E-03	1.09E-03	
<b>E. CARBON-14</b>				
1. TOTAL RELEASE	CURIES	1.83E+00	1.84E+00	None
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.30E-01	2.31E-01	
3. PERCENT OF LIMIT (7.8E+03 uCi/sec)	%	2.95E-03	2.96E-03	

## STP NUCLEAR OPERATING COMPANY

## Unit 1

REPORT CATEGORY: SEMIANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES. TOTALS  
FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: FISSION GASES, IODINES, AND PARTICULATES

REPORTING PERIOD: QUARTER # 3 AND QUARTER # 4 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
FISSION GASES					
Argon-41	CURIES	2.13E-01	1.69E-01	0.00E+00	7.64E-01
Xenon-133	CURIES	1.86E-01	1.44E-01	0.00E+00	2.47E-01
Xenon-135	CURIES	8.05E-04	3.35E-05	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	4.00E-01	3.13E-01	0.00E+00	1.01E+00
IODINES					
Iodine-131	CURIES	0.00E+00	0.00E+00	0.00E+00	1.02E-07
Iodine-133	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	0.00E+00	1.02E-07
PARTICULATES					
Beryllium-7	CURIES	4.04E-05	2.15E-05	0.00E+00	1.53E-05
Cobalt-58	CURIES	0.00E+00	2.27E-07	0.00E+00	5.31E-06
Cobalt-60	CURIES	0.00E+00	7.42E-08	0.00E+00	4.26E-06
Chromium-51	CURIES	0.00E+00	5.46E-07	0.00E+00	1.02E-05
Mercury-203	CURIES	4.00E-09	2.85E-09	0.00E+00	4.97E-08
Manganese-54	CURIES	0.00E+00	8.74E-09	0.00E+00	3.52E-07
Niobium-95	CURIES	0.00E+00	2.28E-08	0.00E+00	1.15E-06
Selenium-75	CURIES	1.47E-09	8.85E-09	0.00E+00	1.52E-07
Zirconium-95	CURIES	0.00E+00	1.25E-08	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	4.04E-05	2.24E-05	0.00E+00	3.67E-05
OTHER					
Carbon-14	CURIES	1.83E+00	1.13E+00	0.00E+00	7.07E-01
Hydrogen-3 (Tritium)	CURIES	1.49E+01	5.29E+00	0.00E+00	1.02E+01
TOTAL FOR PERIOD	CURIES	1.68E+01	6.42E+00	0.00E+00	1.09E+01

**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL AIRBORNE EFFLUENTS**

**Unit: 2**

Starting : 1-Jan-2012    Ending : 30-Jun-2012

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION GASES</b>				
1. TOTAL RELEASE	CURIES	4.42E-01	4.87E-01	100
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	5.62E-02	6.19E-02	
3. PERCENT OF LIMIT (9.60E+04 uCi/sec)	%	5.85E-05	6.45E-05	
<b>B. RADIOIODINES</b>				
1. IODINE-131	CURIES	0.00E+00	1.18E-07	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	0.00E+00	1.51E-08	
3. PERCENT OF LIMIT (4.00E-02 uCi/sec)	%	0.00E+00	3.76E-05	
<b>C. PARTICULATES</b>				
1. PARTICULATES(HALF-LIVES>8 DAYS)	CURIES	1.17E-05	3.36E-05	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	1.49E-06	4.27E-06	
3. PERCENT OF LIMIT (3.00E-01 uCi/sec)	%	4.96E-04	1.42E-03	
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<b>D. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	4.71E+00	6.51E+00	50
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	5.99E-01	8.28E-01	
3. PERCENT OF LIMIT (1.80E+05 uCi/sec)	%	3.33E-04	4.60E-04	
<b>E. CARBON-14</b>				
1. TOTAL RELEASE	CURIES	1.81E+00	1.82E+00	None
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.30E-01	2.31E-01	
3. PERCENT OF LIMIT (7.8E+03 uCi/sec)	%	2.95E-03	2.97E-03	

## STP NUCLEAR OPERATING COMPANY

## Unit 2

REPORT CATEGORY: SEMIANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES. TOTALS  
FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: FISSION GASES, IODINES, AND PARTICULATES

REPORTING PERIOD: QUARTER # 1 AND QUARTER # 2 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
FISSION GASES					
Argon-41	CURIES	0.00E+00	2.84E-01	0.00E+00	0.00E+00
Xenon-133	CURIES	3.12E-01	2.02E-01	1.30E-01	0.00E+00
Xenon-135	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	3.12E-01	4.87E-01	1.30E-01	0.00E+00
IODINES					
Iodine-131	CURIES	0.00E+00	1.18E-07	0.00E+00	0.00E+00
Iodine-133	CURIES	0.00E+00	7.20E-07	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	0.00E+00	8.39E-07	0.00E+00	0.00E+00
PARTICULATES					
Beryllium-7	CURIES	1.17E-05	3.36E-05	0.00E+00	0.00E+00
Cobalt-58	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt-60	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium-51	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury-203	CURIES	0.00E+00	7.27E-10	0.00E+00	0.00E+00
Manganese-54	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Niobium-95	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium-75	CURIES	0.00E+00	1.85E-09	0.00E+00	0.00E+00
Zirconium-95	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.17E-05	3.36E-05	0.00E+00	0.00E+00
OTHER					
Carbon-14	CURIES	1.80E+00	1.82E+00	1.05E-02	0.00E+00
Hydrogen-3 (Tritium)	CURIES	4.69E+00	6.51E+00	2.48E-02	0.00E+00
TOTAL FOR PERIOD	CURIES	6.49E+00	8.32E+00	3.53E-02	0.00E+00

**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL AIRBORNE EFFLUENTS**

**Unit: 2**

Starting : 1-Jul-2012    Ending : 31-Dec-2012

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION GASES</b>				
1. TOTAL RELEASE	CURIES	5.71E-01	5.34E-01	100
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	7.19E-02	6.72E-02	
3. PERCENT OF LIMIT (9.60E+04 uCi/sec)	%	7.49E-05	7.00E-05	
<b>B. RADIOIODINES</b>				
1. IODINE-131	CURIES	5.03E-07	2.81E-07	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	6.33E-08	3.53E-08	
3. PERCENT OF LIMIT (4.00E-02 uCi/sec)	%	1.58E-04	8.82E-05	
<b>C. PARTICULATES</b>				
1. PARTICULATES(HALF-LIVES>8 DAYS)	CURIES	1.78E-05	2.76E-05	25
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.24E-06	3.47E-06	
3. PERCENT OF LIMIT (3.00E-01 uCi/sec)	%	7.47E-04	1.16E-03	
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<b>D. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	2.04E+01	2.05E+01	50
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.57E+00	2.57E+00	
3. PERCENT OF LIMIT (1.80E+05 uCi/sec)	%	1.43E-03	1.43E-03	
<b>E. CARBON-14</b>				
1. TOTAL RELEASE	CURIES	1.84E+00	1.83E+00	None
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.31E-01	2.30E-01	
3. PERCENT OF LIMIT (7.8E+03 uCi/sec)	%	2.97E-03	2.95E-03	

## STP NUCLEAR OPERATING COMPANY

## Unit 2

REPORT CATEGORY: SEMIANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES. TOTALS  
FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: FISSION GASES, IODINES, AND PARTICULATES

REPORTING PERIOD: QUARTER # 3 AND QUARTER # 4 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
FISSION GASES					
Argon-41	CURIES	3.74E-01	3.56E-01	0.00E+00	0.00E+00
Xenon-133	CURIES	1.97E-01	1.78E-01	0.00E+00	0.00E+00
Xenon-135	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	5.71E-01	5.34E-01	0.00E+00	0.00E+00
IODINES					
Iodine-131	CURIES	5.03E-07	2.80E-07	0.00E+00	0.00E+00
Iodine-133	CURIES	3.02E-06	1.20E-06	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	3.52E-06	1.48E-06	0.00E+00	0.00E+00
PARTICULATES					
Beryllium-7	CURIES	1.78E-05	2.75E-05	0.00E+00	0.00E+00
Cobalt-58	CURIES	2.77E-09	2.32E-08	0.00E+00	0.00E+00
Cobalt-60	CURIES	0.00E+00	7.74E-09	0.00E+00	0.00E+00
Chromium-51	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury-203	CURIES	2.57E-09	9.54E-10	0.00E+00	0.00E+00
Manganese-54	CURIES	5.92E-09	1.80E-08	0.00E+00	0.00E+00
Niobium-95	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium-75	CURIES	3.10E-09	1.15E-09	0.00E+00	0.00E+00
Zirconium-95	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.78E-05	2.76E-05	0.00E+00	0.00E+00
OTHER					
Carbon-14	CURIES	1.84E+00	1.83E+00	0.00E+00	0.00E+00
Hydrogen-3 (Tritium)	CURIES	2.04E+01	2.05E+01	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	2.23E+01	2.23E+01	0.00E+00	0.00E+00

## STP NUCLEAR OPERATING COMPANY

## Unit 1 plus 2 Total

REPORT CATEGORY: ANNUAL AIRBORNE GROUND LEVEL RELEASES.  
 TOTALS FOR EACH NUCLIDE RELEASED. FOR  
 ALL OF 2012

NUCLIDES RELEASED	UNITS	UNIT 1 2012	UNIT 2 2012	TOTAL 2012
FISSION GASES				
Argon-41	CURIES	1.57E+00	1.00E+00	2.58E+00
Xenon-133	CURIES	9.14E-01	1.02E+00	1.93E+00
Xenon-135	CURIES	2.31E-03	0.00E+00	2.31E-03
TOTAL FOR PERIOD	CURIES	2.49E+00	2.02E+00	4.51E+00
IODINES				
Iodine-131	CURIES	1.03E-07	8.96E-07	9.99E-07
Iodine-133	CURIES	0.00E+00	4.93E-06	4.93E-06
TOTAL FOR PERIOD	CURIES	1.03E-07	5.82E-06	5.93E-06
PARTICULATES				
Beryllium-7	CURIES	1.60E-04	9.06E-05	2.50E-04
Cobalt-58	CURIES	5.54E-06	2.49E-08	5.56E-06
Cobalt-60	CURIES	4.34E-06	6.45E-09	4.35E-06
Chromium-51	CURIES	1.07E-05	0.00E+00	1.07E-05
Mercury-203	CURIES	6.12E-08	4.25E-09	6.55E-08
Manganese-54	CURIES	3.61E-07	2.22E-08	3.83E-07
Niobium-95	CURIES	1.18E-06	0.00E+00	1.18E-06
Selenium-75	CURIES	1.65E-07	6.10E-09	1.71E-07
Zirconium-95	CURIES	1.25E-08	0.00E+00	1.25E-08
TOTAL FOR PERIOD	CURIES	1.82E-04	9.07E-05	2.73E-04
OTHER				
Carbon-14	CURIES	7.28E+00	7.28E+00	1.46E+01
Hydrogen-3 (Tritium)	CURIES	7.06E+01	5.19E+01	1.23E+02
TOTAL FOR PERIOD	CURIES	7.78E+01	5.92E+01	1.37E+02

## **LIQUID EFFLUENTS**



**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL LIQUID EFFLUENTS**

**Unit: 1**

Starting : 1-Jan-2012    Ending : 30-Jun-2012

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION PRODUCTS</b>				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	3.803E-03	8.362E-04	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	1.335E-09	5.495E-10	
3. PERCENT OF EC* LIMIT (FRACTIONAL)	%	1.376E-03	4.779E-04	
<b>B. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	3.725E+02	2.284E+02	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	1.307E-04	1.501E-04	
3. % OF LIMIT (1.00E-02 uCi/mL)	%	1.307E+00	1.501E+00	
<b>C. DISSOLVED AND ENTRAINED GASES</b>				
1. TOTAL RELEASE	CURIES	1.237E-04	1.174E-03	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	4.341E-11	7.715E-10	
3. PERCENT OF LIMIT (2.00E-04 uCi/mL)	%	2.170E-05	3.858E-04	
<b>D. GROSS ALPHA RADIOACTIVITY</b>				
1. TOTAL RELEASE	CURIES	0.000E+00	0.000E+00	10
<b>E. WASTE VOL RELEASED</b>				
1. TOTAL PRE-DILUTION VOLUME	LITERS	4.580E+06	3.788E+06	1
2. BATCH PRE-DILUTION VOLUME	LITERS	1.737E+06	7.577E+05	1
F. VOLUME OF DILUTION WATER USED**	LITERS	2.845E+09	1.518E+09	10

\*EC= Effluent Concentration

\*\*"Volume of dilution water used" means the volume of water circulated through the main condenser during the actual time of release. Liquid effluent releases ultimately dilute into the volume of the onsite main cooling reservoir and then into offsite water bodies as described in Section 2, subsection Radiological Impact on Man of this report.

## STP NUCLEAR OPERATING COMPANY

## Unit 1

REPORT CATEGORY: SEMIANNUAL LIQUID CONTINUOUS AND BATCH  
RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: ALL RADIONUCLIDES

REPORTING PERIOD: QUARTER # 1 AND QUARTER # 2 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
ALL NUCLIDES					
Cerium-143	CURIES	0.00E+00	0.00E+00	1.10E-07	0.00E+00
Cobalt-58	CURIES	0.00E+00	0.00E+00	9.06E-06	2.24E-06
Cobalt-60	CURIES	0.00E+00	0.00E+00	1.03E-03	1.79E-04
Cesium-134	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cesium-137	CURIES	0.00E+00	0.00E+00	1.52E-05	1.46E-06
Iron-55	CURIES	0.00E+00	0.00E+00	7.64E-04	1.10E-04
Tritium	CURIES	3.07E-02	1.88E-02	3.72E+02	2.28E+02
Krypton-85	CURIES	0.00E+00	0.00E+00	0.00E+00	3.76E-04
Manganese-54	CURIES	0.00E+00	0.00E+00	4.69E-05	0.00E+00
Nickel-63	CURIES	0.00E+00	0.00E+00	1.79E-03	3.28E-04
Antimony-124	CURIES	0.00E+00	0.00E+00	3.43E-06	0.00E+00
Antimony-125	CURIES	0.00E+00	0.00E+00	1.35E-04	2.16E-04
Tin-117M	CURIES	0.00E+00	0.00E+00	4.84E-06	0.00E+00
Tellurium-125M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xenon-133	CURIES	0.00E+00	0.00E+00	1.20E-04	7.66E-04
Xenon-133M	CURIES	0.00E+00	0.00E+00	0.00E+00	1.34E-05
Xenon-135	CURIES	0.00E+00	0.00E+00	4.12E-06	1.87E-05
TOTAL FOR PERIOD	CURIES	3.07E-02	1.88E-02	3.72E+02	2.28E+02

**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL LIQUID EFFLUENTS**

**Unit: 1**

Starting : 1-Jul-2012    Ending : 31-Dec-2012

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION PRODUCTS</b>				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	2.327E-03	1.927E-03	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	9.822E-10	6.665E-10	
3. PERCENT OF EC* LIMIT (FRACTIONAL)	%	8.088E-04	5.173E-04	
<b>B. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	6.158E+02	3.914E+02	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	2.599E-04	1.354E-04	
3. % OF LIMIT (1.00E-02 uCi/mL)	%	2.600E+00	1.354E+00	
<b>C. DISSOLVED AND ENTRAINED GASES</b>				
1. TOTAL RELEASE	CURIES	9.561E-04	3.580E-03	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	4.036E-10	1.238E-09	
3. PERCENT OF LIMIT (2.00E-04 uCi/mL)	%	2.018E-04	6.190E-04	
<b>D. GROSS ALPHA RADIOACTIVITY</b>				
1. TOTAL RELEASE	CURIES	0.000E+00	0.000E+00	10
<b>E. WASTE VOL RELEASED</b>				
1. TOTAL PRE-DILUTION VOLUME	LITERS	4.164E+06	6.279E+06	1
2. BATCH PRE-DILUTION VOLUME	LITERS	1.232E+06	1.821E+06	1
F. VOLUME OF DILUTION WATER USED**	LITERS	2.365E+09	2.885E+09	10

\*EC= Effluent Concentration

\*\*"Volume of dilution water used" means the volume of water circulated through the main condenser during the actual time of release. Liquid effluent releases ultimately dilute into the volume of the onsite main cooling reservoir and then into offsite water bodies as described in Section 2, subsection Radiological Impact on Man of this report.

## STP NUCLEAR OPERATING COMPANY

## Unit 1

REPORT CATEGORY: SEMIANNUAL LIQUID CONTINUOUS AND BATCH  
RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: ALL RADIONUCLIDES

REPORTING PERIOD: QUARTER # 3 AND QUARTER # 4 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
ALL NUCLIDES					
Cerium-143	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt-58	CURIES	0.00E+00	0.00E+00	1.22E-05	3.75E-04
Cobalt-60	CURIES	0.00E+00	0.00E+00	4.57E-04	3.12E-04
Cesium-134	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cesium-137	CURIES	0.00E+00	0.00E+00	1.15E-05	6.76E-06
Iron-55	CURIES	0.00E+00	0.00E+00	3.17E-04	5.20E-04
Tritium	CURIES	1.34E-02	7.57E-03	6.16E+02	3.91E+02
Krypton-85	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese-54	CURIES	0.00E+00	0.00E+00	3.62E-05	0.00E+00
Nickel-63	CURIES	0.00E+00	0.00E+00	1.22E-03	4.44E-04
Antimony-124	CURIES	0.00E+00	0.00E+00	0.00E+00	1.31E-05
Antimony-125	CURIES	0.00E+00	0.00E+00	1.79E-04	2.56E-04
Tin-117M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tellurium-125M	CURIES	0.00E+00	0.00E+00	9.36E-05	0.00E+00
Xenon-133	CURIES	0.00E+00	0.00E+00	9.44E-04	2.93E-03
Xenon-133M	CURIES	0.00E+00	0.00E+00	8.26E-06	1.01E-04
Xenon-135	CURIES	0.00E+00	0.00E+00	3.63E-06	5.45E-04
TOTAL FOR PERIOD	CURIES	1.34E-02	7.57E-03	6.16E+02	3.91E+02

**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL LIQUID EFFLUENTS**

**Unit: 2**

Starting : 1-Jan-2012    Ending : 30-Jun-2012

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION PRODUCTS</b>				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	3.099E-04	1.272E-03	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	1.343E-09	7.641E-10	
3. PERCENT OF EC* LIMIT (FRACTIONAL)	%	8.470E-04	1.015E-03	
<b>B. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	4.556E+00	2.904E+01	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	1.974E-05	1.745E-05	
3. % OF LIMIT (1.00E-02 uCi/mL)	%	1.974E-01	1.744E-01	
<b>C. DISSOLVED AND ENTRAINED GASES</b>				
1. TOTAL RELEASE	CURIES	0.000E+00	5.206E-06	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	0.000E+00	3.127E-12	
3. PERCENT OF LIMIT (2.00E-04 uCi/mL)	%	0.000E+00	1.563E-06	
<b>D. GROSS ALPHA RADIOACTIVITY</b>				
1. TOTAL RELEASE	CURIES	0.000E+00	0.000E+00	10
<b>E. WASTE VOL RELEASED</b>				
1. TOTAL PRE-DILUTION VOLUME	LITERS	2.391E+06	3.631E+06	1
2. BATCH PRE-DILUTION VOLUME	LITERS	1.709E+05	8.784E+05	1
F. VOLUME OF DILUTION WATER USED**	LITERS	2.284E+08	1.661E+09	10

\*EC= Effluent Concentration

\*\*"Volume of dilution water used" means the volume of water circulated through the main condenser during the actual time of release. Liquid effluent releases ultimately dilute into the volume of the onsite main cooling reservoir and then into offsite water bodies as described in Section 2, subsection Radiological Impact on Man of this report.

## STP NUCLEAR OPERATING COMPANY

## Unit 2

REPORT CATEGORY: SEMIANNUAL LIQUID CONTINUOUS AND BATCH  
RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: ALL RADIONUCLIDES

REPORTING PERIOD: QUARTER # 1 AND QUARTER # 2 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
ALL NUCLIDES					
Cerium-143	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt-58	CURIES	0.00E+00	0.00E+00	4.25E-05	9.36E-05
Cobalt-60	CURIES	0.00E+00	0.00E+00	2.41E-05	2.76E-04
Cesium-134	CURIES	0.00E+00	0.00E+00	0.00E+00	8.58E-06
Cesium-137	CURIES	0.00E+00	0.00E+00	0.00E+00	3.54E-05
Iron-55	CURIES	0.00E+00	0.00E+00	3.29E-05	8.75E-05
Tritium	CURIES	1.32E-03	6.00E-03	4.55E+00	2.90E+01
Krypton-85	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese-54	CURIES	0.00E+00	0.00E+00	3.02E-06	1.16E-05
Nickel-63	CURIES	0.00E+00	0.00E+00	6.56E-05	2.25E-04
Antimony-124	CURIES	0.00E+00	0.00E+00	3.28E-05	5.56E-05
Antimony-125	CURIES	0.00E+00	0.00E+00	1.09E-04	4.79E-04
Tin-117M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tellurium-125M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xenon-133	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xenon-133M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xenon-135	CURIES	0.00E+00	0.00E+00	0.00E+00	5.21E-06
TOTAL FOR PERIOD	CURIES	1.32E-03	6.00E-03	4.55E+00	2.90E+01

**STP NUCLEAR OPERATING COMPANY  
SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER  
ALL LIQUID EFFLUENTS**

**Unit: 2**

Starting : 1-Jul-2012    Ending : 31-Dec-2012

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION PRODUCTS</b>				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	7.613E-04	4.622E-04	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	1.417E-09	9.107E-10	
3. PERCENT OF EC* LIMIT (FRACTIONAL)	%	2.370E-03	1.831E-03	
<b>B. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	8.600E+00	3.483E+01	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	1.601E-05	6.863E-05	
3. % OF LIMIT (1.00E-02 uCi/mL)	%	1.600E-01	6.862E-01	
<b>C. DISSOLVED AND ENTRAINED GASES</b>				
1. TOTAL RELEASE	CURIES	0.000E+00	0.000E+00	10
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/mL	0.000E+00	0.000E+00	
3. PERCENT OF LIMIT (2.00E-04 uCi/mL)	%	0.000E+00	0.000E+00	
<b>D. GROSS ALPHA RADIOACTIVITY</b>				
1. TOTAL RELEASE	CURIES	0.000E+00	0.000E+00	10
<b>E. WASTE VOL RELEASED</b>				
1. TOTAL PRE-DILUTION VOLUME	LITERS	3.508E+06	3.637E+06	1
2. BATCH PRE-DILUTION VOLUME	LITERS	2.875E+05	2.872E+05	1
F. VOLUME OF DILUTION WATER USED**	LITERS	5.338E+08	5.039E+08	10

\*EC= Effluent Concentration

\*\*"Volume of dilution water used" means the volume of water circulated through the main condenser during the actual time of release. Liquid effluent releases ultimately dilute into the volume of the onsite main cooling reservoir and then into offsite water bodies as described in Section 2, subsection Radiological Impact on Man of this report.

## STP NUCLEAR OPERATING COMPANY

## Unit 2

REPORT CATEGORY: SEMIANNUAL LIQUID CONTINUOUS AND BATCH  
RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.

TYPE OF ACTIVITY: ALL RADIONUCLIDES

REPORTING PERIOD: QUARTER # 3 AND QUARTER # 4 YEAR 2012

NUCLIDES RELEASED	UNITS	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
ALL NUCLIDES					
Cerium-143	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt-58	CURIES	0.00E+00	0.00E+00	1.95E-05	1.81E-06
Cobalt-60	CURIES	0.00E+00	0.00E+00	1.59E-04	7.39E-05
Cesium-134	CURIES	0.00E+00	0.00E+00	1.71E-05	1.13E-05
Cesium-137	CURIES	0.00E+00	0.00E+00	4.32E-05	4.87E-05
Iron-55	CURIES	0.00E+00	0.00E+00	7.44E-05	5.56E-05
Tritium	CURIES	1.67E-02	1.83E-02	8.58E+00	3.48E+01
Krypton-85	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese-54	CURIES	0.00E+00	0.00E+00	7.06E-06	0.00E+00
Nickel-63	CURIES	0.00E+00	0.00E+00	2.04E-04	1.12E-04
Antimony-124	CURIES	0.00E+00	0.00E+00	2.58E-06	0.00E+00
Antimony-125	CURIES	0.00E+00	0.00E+00	2.35E-04	1.59E-04
Tin-117M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tellurium-125M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xenon-133	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xenon-133M	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xenon-135	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.67E-02	1.83E-02	8.58E+00	3.48E+01



## STP NUCLEAR OPERATING COMPANY

**Unit 1 plus 2 Total**

REPORT CATEGORY: ANNUAL LIQUID RELEASES. TOTALS FOR EACH  
NUCLIDE RELEASED. FOR ALL OF 2012

<b>NUCLIDES RELEASED</b>	<b>UNITS</b>	<b>UNIT 1 2012</b>	<b>UNIT 2 2012</b>	<b>TOTAL 2012</b>
ALL NUCLIDES				
Cerium-143	CURIES	1.10E-07	0.00E+00	1.10E-07
Cobalt-58	CURIES	3.99E-04	1.57E-04	5.56E-04
Cobalt-60	CURIES	1.98E-03	5.33E-04	2.51E-03
Cesium-134	CURIES	0.00E+00	3.70E-05	3.70E-05
Cesium-137	CURIES	3.49E-05	1.27E-04	1.62E-04
Iron-55	CURIES	1.71E-03	2.50E-04	1.96E-03
Tritium	CURIES	1.61E+03	7.70E+01	1.69E+03
Krypton-85	CURIES	3.76E-04	0.00E+00	3.76E-04
Manganese-54	CURIES	8.31E-05	2.16E-05	1.05E-04
Nickel-63	CURIES	3.79E-03	6.06E-04	4.39E-03
Antimony-124	CURIES	1.65E-05	9.10E-05	1.07E-04
Antimony-125	CURIES	7.86E-04	9.82E-04	1.77E-03
Tin-117M	CURIES	4.84E-06	0.00E+00	4.84E-06
Tellurium-125M	CURIES	9.36E-05	0.00E+00	9.36E-05
Xenon-133	CURIES	4.76E-03	0.00E+00	4.76E-03
Xenon-133M	CURIES	1.23E-04	0.00E+00	1.23E-04
Xenon-135	CURIES	5.72E-04	5.21E-06	5.77E-04
TOTAL FOR PERIOD	CURIES	1.61E+03	7.70E+01	1.69E+03
TOTAL Noble Gases	CURIES	5.83E-03	5.21E-06	5.84E-03
TOTAL Excluding Tritium & Noble Gases	CURIES	8.90E-03	2.80E-03	1.17E-02

## **Solid Waste and Irradiated Fuel Shipments**

## A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not Irradiated Fuel)

1. Type of Waste	Units	12-Month Period		Est. Total Error, %	
		Shipped	Buried		
a. Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup>	1.85E+01	1.85E+01	-1.00E+00	1.00E+00
	Ci	9.05E+00	9.05E+00	-5.00E+01	1.50E+02
b. Dry compressible waste, contaminated equip., etc.	m <sup>3</sup>	2.43E+02	4.85E+01	-1.00E+00	1.00E+00
	Ci	1.40E+00	1.55E+00	-6.60E+01	2.00E+02
c. Irradiated components, control rods, etc.	m <sup>3</sup>	None	None	N/A	N/A
	Ci	None	None	N/A	N/A
d. Other (Large Reactor Components and Associated Commodities)	m <sup>3</sup>	None	None	N/A	N/A
	Ci	None	None	N/A	N/A
e. Low Level Exempt Quantities of secondary resin, sludge, and oily sludge.	m <sup>3</sup>	3.13E+01	3.13E+01	-1.00E+00	1.00E+00
	Ci	1.16E-06	1.16E-06	-2.00E+01	2.00E+01

2. Estimate of major nuclide composition (by type of waste)		
a. Spent resins, filter sludges, evaporator bottoms, etc.	Shipped Curie (Ci)	%
Nickel-63	5.263	58.1%
Iron-55	1.587	17.5%
Cobalt-60	1.347	14.9%
Cobalt-58	0.279	3.1%
Cesium-137	0.177	2.0%
Manganese-54	0.099	1.1%
Hydrogen-3	0.076	0.8%
Antimony-125	0.065	0.7%
Cesium-134	0.049	0.5%
b. Dry compressible waste, contaminated equip., etc.	Shipped Curie (Ci)	%
Iron-55	0.802	57.3%
Cobalt-60	0.191	13.7%
Nickel-63	0.129	9.2%
Antimony-125	0.113	8.1%
Cobalt-58	0.069	5.0%
Chromium-51	0.036	2.5%
Manganese-54	0.020	1.4%
Zirconium-95	0.014	1.0%

b. Dry compressible waste, contaminated equip., etc. <i>continued</i>	Shipped Curie (Ci)	%
Niobium-95	0.007	0.5%
Cesium-137	0.004	0.3%
Iron-59	0.001	0.1%
Cobalt-57	0.001	0.0%
c. Irradiated components, control rods, etc.	None	N/A
d. Other (Large Reactor Components and Associated Commodities)	None	N/A
e. Low Level Exempt Quantities of sewage sludge, resin and oily sludge	Shipped Curie (Ci)	%
Cobalt-60	6.85E-07	59.2%
Be-7	4.72E-07	40.8%

3. Solid Waste Disposition			
Number of Shipments	Mode of Transportation	Type of Waste	Destination
6	Truck	a. Spent resins, filter sludges, evaporator bottoms, etc. b. Dry compressible waste, contaminated equip., etc.	Energy Solutions - Duratek Services 1560 Bear Creek Road Oak Ridge, TN 37830
3	Truck	a. Spent resins, filter sludges, evaporator bottoms, etc.	Energy Solutions - Clive Disposal Facility Interstate 80, Exit 49 Clive, UT 84029
2	Truck	e. Low Level Exempt Quantities	Republic Services * Blueridge Landfill 2200 FM 521 Fresno, Texas 77545

Note: \*Shipped per Texas Commission on Environmental Quality exemption to industrial landfill.

## 4. Class of Solid Waste:

A

## 5. Type of Containers Used for Shipment:

General Design, Type A Containers

## 6. Solidifying Agent:

N/A

## B. IRRADIATED FUEL SHIPMENTS (Disposal)

No shipments made during this period.

## **Dose Data Tab**

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## **DOSE ACCUMULATIONS**



**STP NUCLEAR OPERATING COMPANY  
SUMMARY OF MAXIMUM INDIVIDUAL DOSES**

**Unit: 1**

**TOTAL ACCUMULATION FOR PERIODS:**

for LIQUID, GASEOUS AND AIR

Starting: 1-Jan-2012 Ending: 31-Dec-2012

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (mrem)	AGE GROUP	LOCATION DIST DIR (m) (TOWARD)	% OF APPLICABLE LIMIT	LIMIT (mrad or mrem)
LIQUID	TOTAL BODY	9.25E-03	ADULT	LITTLE ROBBINS SLOUGH <sup>(5)</sup>	3.08E-01	3
LIQUID	LIVER	9.28E-03	ADULT	LITTLE ROBBINS SLOUGH <sup>(5)</sup>	9.28E-02	10
NOBLE GAS	AIR DOSE (gamma-mrad)	1.89E-03		2160m W	1.89E-02	10
NOBLE GAS	AIR DOSE (beta-mrad)	6.99E-04		2160m W	3.49E-03	20
NOBLE GAS	TOTAL BODY	1.26E-03	ALL <sup>(1)</sup>	2160m W	2.52E-02	5
NOBLE GAS	TOTAL BODY	3.70E-04	ALL <sup>(2)</sup>	4000m WSW	7.40E-03	5
NOBLE GAS	SKIN	2.03E-03	ALL <sup>(1)</sup>	2160m W	1.35E-02	15
NOBLE GAS	SKIN	5.96E-04	ALL <sup>(2)</sup>	4000m WSW	3.98E-03	15
IODINE, PARTICULATES, TRITIUM & C-14	BONE	3.29E-01	CHILD <sup>(1)</sup>	1720m NW	2.20E+00	15
IODINE, PARTICULATES, TRITIUM & C-14	BONE	6.73E-02	CHILD <sup>(2)</sup>	4000m WSW	4.48E-01	15

**SUMMARY OF POPULATION DOSES FOR 2012**

EFFLUENT	APPLICABLE ORGAN	ESTIMATED POPULATION DOSE (person-rem)	AVERAGE DOSE TO POPULATION (rem per person)
LIQUID	TOTAL BODY	6.23E-04	1.39E-07 <sup>(3)</sup>
GASEOUS	TOTAL BODY	5.60E-02	4.45E-09 <sup>(4)</sup>

**NOTES:**

- <sup>(1)</sup> Doses were calculated for HYPOTHETICAL receptors at the site boundary.
- <sup>(2)</sup> Highest dose for nearest individual or receptor. This individual is assumed to reside at this location.
- <sup>(3)</sup> Calculation based on a population of 303,500 for shore line exposure and for salt water invertebrate ingestion and 3,800 for salt water sport fish ingestion.
- <sup>(4)</sup> Calculation based on a population of 299,000 within fifty (50) miles of South Texas Project Electric Generating Station.
- <sup>(5)</sup> Receptor at this location is an adult ingesting fresh water sport fish and receiving shoreline exposure from the Little Robbins Slough Area.

**STP NUCLEAR OPERATING COMPANY  
SUMMARY OF MAXIMUM INDIVIDUAL DOSES**

**Unit: 2**

**TOTAL ACCUMULATION FOR PERIODS:**

**for LIQUID, GASEOUS, AND AIR**

**Starting: 1-Jan-2012 Ending: 31-Dec-2012**

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (mrem)	AGE GROUP	LOCATION DIST DIR (m) (TOWARD)	% OF APPLICABLE LIMIT	LIMIT (mrad or mrem)
LIQUID	TOTAL BODY	4.48E-04	ADULT	LITTLE ROBBINS SLOUGH <sup>(5)</sup>	1.49E-02	3
LIQUID	LIVER	4.52E-04	ADULT	LITTLE ROBBINS SLOUGH <sup>(5)</sup>	4.52E-03	10
NOBLE GAS	AIR DOSE (gamma-mrad)	4.93E-04		1540m NNW	4.93E-03	10
NOBLE GAS	AIR DOSE (beta-mrad)	2.28E-04		1540m NNW	1.14E-03	20
NOBLE GAS	TOTAL BODY	3.26E-04	ALL <sup>(1)</sup>	1540m NNW	6.53E-03	5
NOBLE GAS	TOTAL BODY	1.15E-04	ALL <sup>(2)</sup>	7200m SW	2.30E-03	5
NOBLE GAS	SKIN	5.38E-04	ALL <sup>(1)</sup>	1540m NNW	3.59E-03	15
NOBLE GAS	SKIN	1.86E-04	ALL <sup>(2)</sup>	7200m SW	1.24E-03	15
IODINE, PARTICULATES, TRITIUM & C-14	BONE	3.28E-01	CHILD <sup>(1)</sup>	1720m NW	2.18E+00	15
IODINE, PARTICULATES, TRITIUM & C-14	BONE	6.68E-02	CHILD <sup>(2)</sup>	4000m WSW	4.45E-01	15

**SUMMARY OF POPULATION DOSES FOR 2012**

EFFLUENT	APPLICABLE ORGAN	ESTIMATED POPULATION DOSE (person-rem)	AVERAGE DOSE TO POPULATION (rem per person)
LIQUID	TOTAL BODY	3.98E-05	6.89E-09 <sup>(3)</sup>
GASEOUS	TOTAL BODY	5.16E-02	4.11E-09 <sup>(4)</sup>

**NOTES:**

- <sup>(1)</sup> Doses were calculated for HYPOTHETICAL receptors at the site boundary.
- <sup>(2)</sup> Highest dose for nearest individual or receptor. This individual is assumed to reside at this location.
- <sup>(3)</sup> Calculation based on a population of 303,500 for shore line exposure and for salt water invertebrate ingestion and 3,800 for salt water sport fish ingestion.
- <sup>(4)</sup> Calculation based on a population of 299,000 within fifty (50) miles of South Texas Project Electric Generating Station.
- <sup>(5)</sup> Receptor at this location is an adult ingesting fresh water sport fish and receiving shoreline exposure from the Little Robbins Slough Area.

**STP NUCLEAR OPERATING COMPANY  
SUMMARY OF MAXIMUM INDIVIDUAL DOSES**

**Unit: 1 plus 2**

**TOTAL ACCUMULATION FOR PERIODS:**

for LIQUID, GASEOUS, AND AIR

Starting: 1-Jan-2012 Ending: 31-Dec-2012

EFFLUENT	APPLICABLE ORGAN	UNIT 1 ESTIMATED DOSE (mrem)	UNIT 2 ESTIMATED DOSE (mrem)	TOTAL 1+2 ESTIMATED DOSE (mrem)	AGE GROUP	LOCATION DIST DIR (m) (TOWARD)
LIQUID	TOTAL BODY	9.25E-03	4.48E-04	9.70E-03	ADULT	LITTLE ROBBINS SLOUGH <sup>(5)</sup>
LIQUID	LIVER	9.28E-03	4.52E-04	9.73E-03	ADULT	LITTLE ROBBINS SLOUGH <sup>(5)</sup>
NOBLE GAS	AIR DOSE (gamma-mrad)	1.89E-03	2.51E-04	2.15E-03		2160m W
NOBLE GAS	AIR DOSE (beta-mrad)	6.99E-04	1.10E-04	8.09E-04		2160m W
NOBLE GAS	TOTAL BODY	1.26E-03	1.66E-04	1.43E-03	ALL <sup>(1)</sup>	2160m W
NOBLE GAS	TOTAL BODY	3.70E-04	7.86E-05	4.49E-04	ALL <sup>(2)</sup>	4000m WSW
NOBLE GAS	SKIN	2.03E-03	2.72E-04	2.30E-03	ALL <sup>(1)</sup>	2160m W
NOBLE GAS	SKIN	5.96E-04	1.29E-04	7.26E-04	ALL <sup>(2)</sup>	4000m WSW
IODINE, PARTICULATES, TRITIUM & C-14	BONE	3.29E-01	3.28E-01	6.57E-01	CHILD <sup>(1)</sup>	1540m NNW
IODINE, PARTICULATES, TRITIUM & C-14	BONE	6.73E-02	6.68E-02	1.34E-01	CHILD <sup>(2)</sup>	4000m WSW
IODINE, PARTICULATES, TRITIUM & C-14	TOTAL BODY	6.56E-03	6.22E-03	1.28E-02	ADULT <sup>(2)</sup>	4000m WSW

**SUMMARY OF POPULATION DOSES FOR 2012**

EFFLUENT	APPLICABLE ORGAN	ESTIMATED POPULATION DOSE (person-rem)	AVERAGE DOSE TO POPULATION (rem per person)
LIQUID	TOTAL BODY	6.63E-04	1.46E-07 <sup>(3)</sup>
GASEOUS	TOTAL BODY	1.08-01	6.80E-09 <sup>(4)</sup>

**NOTES:**

- <sup>(1)</sup> Doses were calculated for HYPOTHETICAL receptors at the site boundary.
- <sup>(2)</sup> Highest dose for nearest individual or receptor. This individual is assumed to reside at this location.
- <sup>(3)</sup> Calculation based on a population of 303,500 for shore line exposure and for salt water invertebrate ingestion and 3,800 for salt water sport fish ingestion.
- <sup>(4)</sup> Calculation based on a population of 299,000 within fifty (50) miles of South Texas Project Electric Generating Station.
- <sup>(5)</sup> Receptor at this location is an adult ingesting fresh water sport fish and receiving shoreline exposure from the Little Robbins Slough Area.

## **RESULTS OF DIRECT RADIATION MEASUREMENTS PROGRAM**

**STP NUCLEAR OPERATING COMPANY  
Onsite Direct Radiation Measurements**

REPORT CATEGORY: THERMOLUMINESCENT DOSIMETER MONITORING

STATIONS QUARTERLY RESULTS FOR 2010 TABLE 8-1

<b>MONITORING STATION NUMBER (Noted on Figure 8-1)</b>	<b>QUARTER 1</b>	<b>QUARTER 2</b>	<b>QUARTER 3</b>	<b>QUARTER 4</b>	<b>AVERAGE RATE</b>	<b>AVERAGE NET RATE</b>
<b>UNITS</b>	milliroentgen	milliroentgen	milliroentgen	milliroentgen	milliroentgen per quarter	milliroentgen per hour
<b>PROTECTED AREA</b>						
1	12.3	13.4	12.4	12.9	12.8	0.0058
2	11.9	13.7	12.0	12.8	12.6	0.0058
3	11.9	12.9	12.1	12.4	12.3	0.0056
4	12.3	12.8	12.9	13.0	12.8	0.0058
5	13.0	14.2	12.7	12.8	13.2	0.0060
6	15.2	16.3	16.6	16.4	16.1	0.0074
7	15.3	17.1	18.1	16.1	16.7	0.0076
8	14.4	16.0	14.5	14.1	14.8	0.0068
9	13.1	13.7	12.7	13.5	13.3	0.0061
10	12.0	12.5	11.8	12.8	12.3	0.0056
11	11.3	10.5	09.8	09.8	10.4	0.0047
12	11.7	11.9	10.2	10.8	11.2	0.0051
13	10.9	11.1	10.9	10.5	10.9	0.0050
14	11.4	12.5	11.6	12.0	11.9	0.0054
15	12.7	13.5	14.1	14.5	13.7	0.0063
16	12.3	12.7	13.9	14.6	13.4	0.0061
<b>ONSITE STAGING FACILITY (OUTSIDE STORAGE)</b>						
17	12.0	12.0	11.1	11.5	11.7	0.0053
18	11.4	11.9	11.2	11.8	11.6	0.0053
19	11.3	11.9	10.9	11.8	11.5	0.0053
20	13.5	14.6	14.2	14.4	14.2	0.0065
<b>ONSITE STAGING FACILITY (WAREHOUSE D)</b>						
21	16.1	15.0	12.9	15.4	14.9	0.0068
22	26.5	15.0	13.2	18.2	18.2	0.0083
23	13.7	11.9	11.1	12.0	12.2	0.0056
24	28.2	12.7	12.1	13.7	16.7	0.0076
<b>OLD STEAM GENERATOR STORAGE FACILITY</b>						
25	12.2	12.6	13.2	12.6	12.7	0.0058
26	15.2	15.3	16.6	16.1	15.8	0.0072
27	13.6	13.7	14.9	14.9	14.3	0.0065
28	14.3	15.7	14.7	14.3	14.8	0.0068

## ***Notes for Onsite Direct Radiation Measurements***

### ***Measurement Results***

Individual values normalized to a 91 day quarter.

Only the calcium sulfate elements were used in these averages.

### ***Average Net Rate:***

Difference between the 2012 exposure rate and the 1986 measured rate due to natural background  
(average rate – 15.4 mR background) / 91 days / 24 hours per day

The pre-operational background rate of 15.4 mR at the site boundary in 1986 has been used to reflect the background baseline exposure rate for STP. Historically the exposure rates measured near the protected area fence have been lower than the historical background at the site boundary. However, dosimeter stations 6 and 7 have at times exceeded this background rate due to radioactive waste processing activities on the south side of Units 1 and 2.

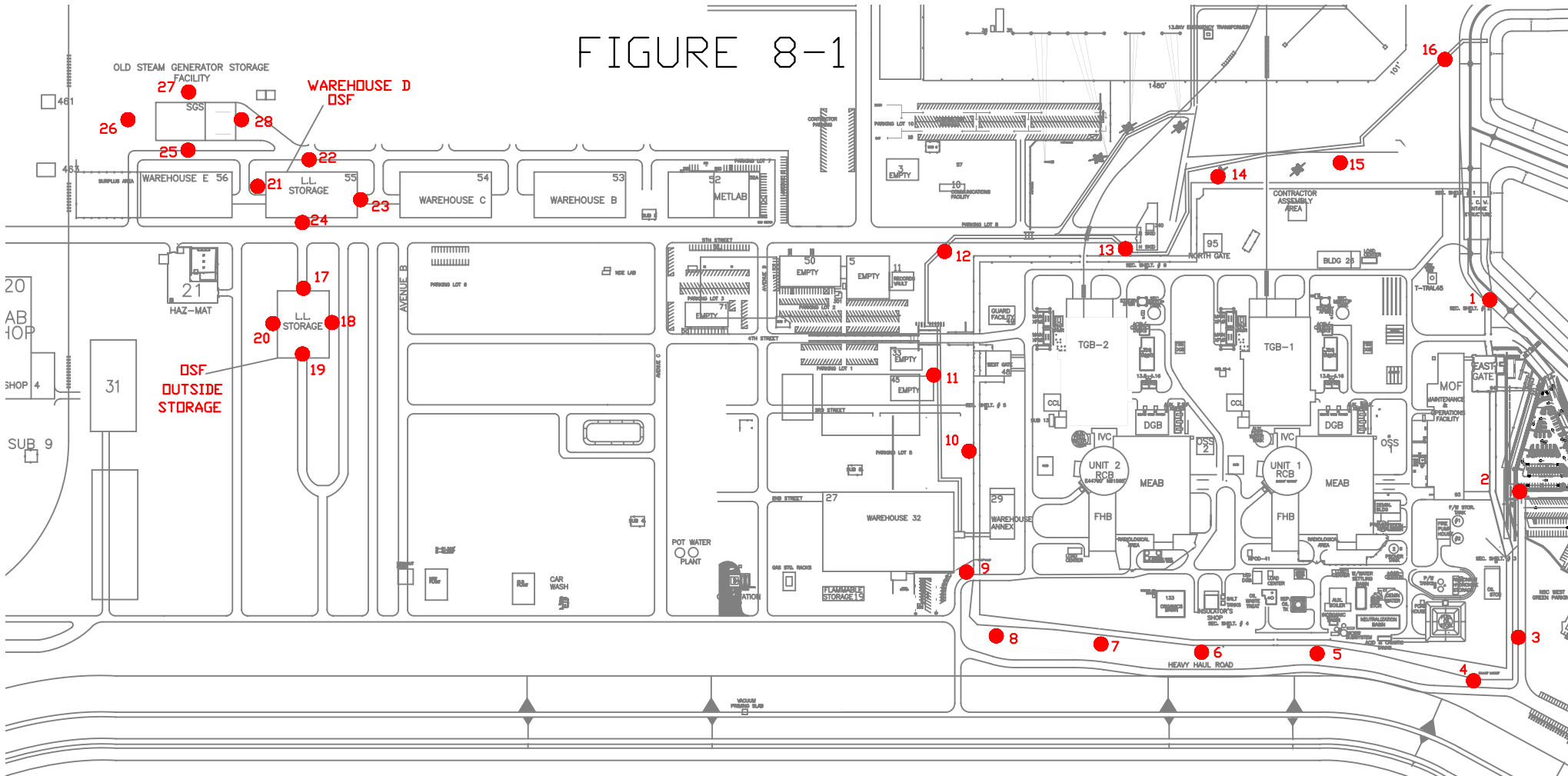
### ***Zero:***

Zero (0 or 0.00) indicate background levels

### ***Milliroentgen:***

Miliroentgen or mR is a unit of exposure for X-rays and gamma rays.

FIGURE 8-1



● -- DIRECT RADIATION MONITORING STATIONS

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION BAY CITY, TEXAS			
<b>A.R.E. - SITE MAP</b>			
SCALE: N.T.S.	FACILITY LAYOUT NUMBER NSCGRA\EROMAPS\A.R.E.-KIM	FIG. NO.	PLOT DATE: 04-28-2013 CADD FILE#: ARESITE.MAP.DWG

## **Meteorological Data Tab**



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## **JOINT FREQUENCY TABLES**

**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

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**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS A**

Wind Speed (MPH) ->  Sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	% Of Total	Avg. Speed
	CALM	1.0 - 3.5	3.6 - 7.5	7.6 - 12.5	12.6 - 18.5	18.6 - 24.5	24.6 - 32.5	32.6 +			
N	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNE	0	0	0	1	1	0	0	0	2	2.0%	10.5
NE	0	0	0	0	0	0	0	0	0	0.0%	0.0
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	0	0	0	0	0	0	0	0	0.0%	0.0
SE	0	0	1	1	2	0	0	0	4	3.9%	11.1
SSE	0	0	1	5	3	1	0	0	10	9.8%	12.2
S	0	1	0	18	7	0	0	0	26	25.5%	11.2
SSW	0	0	4	14	0	0	0	0	18	17.6%	8.2
SW	0	0	1	12	3	0	0	0	16	15.7%	10.1
WSW	0	0	2	1	0	0	0	0	3	2.9%	6.7
W	0	0	0	2	0	0	0	0	2	2.0%	8.1
WNW	0	0	1	2	0	0	0	0	3	2.9%	7.7
NW	0	0	4	3	8	0	0	0	15	14.7%	11.2
NNW	0	0	2	1	0	0	0	0	3	2.9%	6.0
Total	0	1	16	60	24	1	0	0	102		
% Of Total	0.0%	1.0%	15.7%	58.8%	23.5%	1.0%	0.0%	0.0%			

Average speed for this table (MPH): 10.1  
Hours in above table with variable direction : 0  
Total number of CALMs : 6  
Total number of Invalid hours : 2  
Total number of Valid hours : 2182  
Total number of hours for period : 2184

**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS B**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	1	1	5	1	0	0	8	8.6%	14.8
NNE	0	0	0	6	3	0	0	0	9	9.7%	12.0
NE	0	0	1	1	0	0	0	0	2	2.2%	6.2
ENE	0	0	0	1	0	0	0	0	1	1.1%	12.1
E	0	0	0	2	0	0	0	0	2	2.2%	10.5
ESE	0	0	0	1	0	0	0	0	1	1.1%	10.4
SE	0	1	0	3	2	1	0	0	7	7.5%	12.4
SSE	0	0	1	6	9	3	0	0	19	20.4%	13.8
S	0	0	5	9	2	0	0	0	16	17.2%	9.3
SSW	0	0	6	1	0	0	0	0	7	7.5%	5.9
SW	0	0	2	0	0	0	0	0	2	2.2%	5.5
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	2	1	0	0	0	0	3	3.2%	6.9
WNW	0	0	1	2	1	0	0	0	4	4.3%	9.9
NW	0	0	1	2	3	0	0	0	6	6.5%	10.8
NNW	0	0	1	1	2	2	0	0	6	6.5%	14.6
Total	0	1	21	37	27	7	0	0	93		
% Of Total	0.0%	1.1%	22.6%	39.8%	29.0%	7.5%	0.0%	0.0%			

Average speed for this table (MPH): 11.2  
Hours in above table with variable direction : 0  
Total number of CALMs : 6  
Total number of Invalid hours : 2  
Total number of Valid hours : 2182  
Total number of hours for period : 2184

**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS C**

Wind Speed (MPH) ->  Sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	% Of Total	Avg. Speed
	CALM	1.0 - 3.5	3.6 - 7.5	7.6 - 12.5	12.6 - 18.5	18.6 - 24.5	24.6 - 32.5	32.6 +			
N	0	0	4	4	2	1	0	0	11	9.8%	10.2
NNE	0	1	1	7	5	0	0	0	14	12.5%	10.9
NE	0	0	0	3	1	0	0	0	4	3.6%	10.4
ENE	0	0	0	1	0	0	0	0	1	0.9%	11.7
E	0	0	2	1	0	0	0	0	3	2.7%	6.8
ESE	0	0	1	3	1	0	0	0	5	4.5%	10.2
SE	0	0	4	8	4	3	0	0	19	17.0%	11.7
SSE	0	0	1	8	9	2	0	0	20	17.9%	13.6
S	0	1	9	2	2	0	0	0	14	12.5%	7.4
SSW	0	0	7	0	0	0	0	0	7	6.3%	6.5
SW	0	0	5	0	0	0	0	0	5	4.5%	4.7
WSW	0	0	3	0	0	0	0	0	3	2.7%	4.4
W	0	0	1	0	0	0	0	0	1	0.9%	4.2
WNW	0	0	1	0	0	0	0	0	1	0.9%	3.9
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	1	1	1	1	0	0	4	3.6%	12.6
Total	0	2	40	38	25	7	0	0	112		
% Of Total	0.0%	1.8%	35.7%	33.9%	22.3%	6.3%	0.0%	0.0%			

Average speed for this table (MPH): 10.1  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 6  
 Total number of Invalid hours : 2  
 Total number of Valid hours : 2182  
 Total number of hours for period : 2184

**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS D**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	2	15	41	38	6	0	0	102	11.8%	12.0
NNE	0	2	14	29	17	1	0	0	63	7.3%	10.2
NE	0	1	9	19	3	0	0	0	32	3.7%	8.8
ENE	0	1	14	31	7	0	0	0	53	6.1%	9.5
E	0	2	7	16	7	0	0	0	32	3.7%	9.9
ESE	0	4	7	27	15	0	0	0	53	6.1%	10.6
SE	0	0	8	93	63	13	0	0	177	20.5%	12.5
SSE	0	1	11	53	53	14	0	0	132	15.3%	13.0
S	0	5	27	22	8	0	0	0	62	7.2%	8.1
SSW	0	3	11	7	0	0	0	0	21	2.4%	6.3
SW	0	2	12	8	0	0	0	0	22	2.5%	7.1
WSW	0	0	7	3	0	0	0	0	10	1.2%	6.5
W	0	3	8	1	0	0	0	0	12	1.4%	5.3
WNW	0	3	4	3	2	0	0	0	12	1.4%	7.6
NW	0	0	3	4	20	1	0	0	28	3.2%	13.7
NNW	0	4	9	16	20	5	0	0	54	6.2%	11.5
Total	0	33	166	373	253	40	0	0	865		
% Of Total	0.0%	3.8%	19.2%	43.1%	29.2%	4.6%	0.0%	0.0%			

Average speed for this table (MPH): 11.0  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 6  
 Total number of Invalid hours : 2  
 Total number of Valid hours : 2182  
 Total number of hours for period : 2184

**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS E**

Wind Speed (MPH) ->  Sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	% Of Total	Avg. Speed
	CALM	1.0 - 3.5	3.6 - 7.5	7.6 - 12.5	12.6 - 18.5	18.6 - 24.5	24.6 - 32.5	32.6 +			
N	0	3	18	34	6	0	0	0	61	9.6%	8.8
NNE	0	7	24	17	1	0	0	0	49	7.7%	6.5
NE	0	4	4	3	0	0	0	0	11	1.7%	5.2
ENE	0	5	8	5	0	0	0	0	18	2.8%	5.7
E	0	8	15	12	3	0	0	0	38	6.0%	6.8
ESE	1	7	21	8	7	0	0	0	44	6.9%	7.0
SE	0	7	44	33	14	0	0	0	98	15.4%	8.2
SSE	0	0	37	30	17	1	0	0	85	13.3%	9.2
S	0	10	61	36	0	0	0	0	107	16.8%	6.7
SSW	0	11	25	8	0	0	0	0	44	6.9%	5.5
SW	0	4	5	13	1	0	0	0	23	3.6%	7.4
WSW	0	4	2	1	0	0	0	0	7	1.1%	3.8
W	0	4	3	1	0	0	0	0	8	1.3%	4.5
WNW	0	2	8	2	1	0	0	0	13	2.0%	5.9
NW	0	0	6	3	1	0	0	0	10	1.6%	7.8
NNW	0	2	6	11	2	0	0	0	21	3.3%	7.6
Total	1	78	287	217	53	1	0	0	637		
% Of Total	0.2%	12.2%	45.1%	34.1%	8.3%	0.2%	0.0%	0.0%			

Average speed for this table (MPH): 7.3  
Hours in above table with variable direction : 0  
Total number of CALMs : 6  
Total number of Invalid hours : 2  
Total number of Valid hours : 2182  
Total number of hours for period : 2184



**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS F**

Wind Speed (MPH) ->  Sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	% Of Total	Avg. Speed
	CALM	1.0 - 3.5	3.6 - 7.5	7.6 - 12.5	12.6 - 18.5	18.6 - 24.5	24.6 - 32.5	32.6 +			
N	0	3	6	1	0	0	0	0	10	5.8%	4.8
NNE	0	0	1	6	0	0	0	0	7	4.1%	7.5
NE	0	4	7	0	0	0	0	0	11	6.4%	3.7
ENE	0	1	8	0	0	0	0	0	9	5.3%	4.2
E	0	10	6	1	0	0	0	0	17	9.9%	4.0
ESE	0	7	5	0	0	0	0	0	12	7.0%	3.6
SE	0	8	16	0	0	0	0	0	24	14.0%	4.6
SSE	0	15	23	1	0	0	0	0	39	22.8%	4.7
S	0	4	9	0	0	0	0	0	13	7.6%	4.6
SSW	0	0	1	0	0	0	0	0	1	0.6%	4.8
SW	0	1	2	0	0	0	0	0	3	1.8%	4.3
WSW	0	0	3	0	0	0	0	0	3	1.8%	5.0
W	0	1	1	0	0	0	0	0	2	1.2%	3.8
WNW	0	3	0	0	0	0	0	0	3	1.8%	2.1
NW	0	3	2	1	0	0	0	0	6	3.5%	4.1
NNW	0	2	8	1	0	0	0	0	11	6.4%	5.4
Total	0	62	98	11	0	0	0	0	171		
% Of Total	0.0%	36.3%	57.3%	6.4%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 4.5  
Hours in above table with variable direction : 0  
Total number of CALMs : 6  
Total number of Invalid hours : 2  
Total number of Valid hours : 2182  
Total number of hours for period : 2184

**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS G**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	6	3	0	0	0	0	0	9	4.5%	3.9
NNE	2	4	14	0	0	0	0	0	20	9.9%	3.8
NE	0	13	12	0	0	0	0	0	25	12.4%	3.4
ENE	2	15	7	0	0	0	0	0	24	11.9%	2.8
E	0	18	8	0	0	0	0	0	26	12.9%	3.3
ESE	1	13	5	0	0	0	0	0	19	9.4%	3.0
SE	0	20	9	0	0	0	0	0	29	14.4%	3.4
SSE	0	4	1	0	0	0	0	0	5	2.5%	3.0
S	0	0	3	0	0	0	0	0	3	1.5%	3.9
SSW	0	1	0	0	0	0	0	0	1	0.5%	3.5
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	1	0	0	0	0	0	0	1	0.5%	1.6
W	0	0	9	0	0	0	0	0	9	4.5%	4.6
WNW	0	7	2	0	0	0	0	0	9	4.5%	3.1
NW	0	8	2	0	0	0	0	0	10	5.0%	2.7
NNW	0	8	4	0	0	0	0	0	12	5.9%	3.3
Total	5	118	79	0	0	0	0	0	202		
% Of Total	2.5%	58.4%	39.1%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 3.3  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 6  
 Total number of Invalid hours : 2  
 Total number of Valid hours : 2182  
 Total number of hours for period : 2184

**First Quarter 2012**  
**Joint Frequency Table**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**ALL STABILITY CLASSES COMBINED**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	14	47	81	51	8	0	0	201	9.2%	10.3
NNE	2	14	54	66	27	1	0	0	164	7.5%	8.4
NE	0	22	33	26	4	0	0	0	85	3.9%	6.1
ENE	2	22	37	38	7	0	0	0	106	4.9%	6.9
E	0	38	38	32	10	0	0	0	118	5.4%	6.5
ESE	2	31	39	39	23	0	0	0	134	6.1%	7.7
SE	0	36	82	138	85	17	0	0	358	16.4%	10.0
SSE	0	20	75	103	91	21	0	0	310	14.2%	10.8
S	0	21	114	87	19	0	0	0	241	11.0%	7.6
SSW	0	15	54	30	0	0	0	0	99	4.5%	6.2
SW	0	7	27	33	4	0	0	0	71	3.3%	7.5
WSW	0	5	17	5	0	0	0	0	27	1.2%	5.3
W	0	8	24	5	0	0	0	0	37	1.7%	5.1
WNW	0	15	17	9	4	0	0	0	45	2.1%	6.0
NW	0	11	18	13	32	1	0	0	75	3.4%	9.9
NNW	0	16	31	31	25	8	0	0	111	5.1%	9.3
Total	6	295	707	736	382	56	0	0	2182		
% Of Total	0.3%	13.5%	32.4%	33.7%	17.5%	2.6%	0.0%	0.0%			

Average speed for this table (MPH): 8.6  
Hours in above table with variable direction : 0  
Total number of CALMs : 6  
Total number of Invalid hours : 2  
Total number of Valid hours : 2182  
Total number of hours for period : 2184

**Second Quarter 2012**

**Joint Frequency Table**

**From** : 04/01/2012 00:00    **To** : 06/30/2012 23:00

**PRIMARY TOWER**

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## Second Quarter 2012

Joint Frequency TableFrom : 04/01/2012 00:00 To : 06/30/2012 23:00PRIMARY TOWERSTABILITY CLASS A

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	2	1	0	0	0	0	3	1.5%	7.0
NNE	0	0	2	2	0	0	0	0	4	2.0%	7.3
NE	0	0	6	2	0	0	0	0	8	3.9%	6.8
ENE	0	1	0	0	0	0	0	0	1	0.5%	1.5
E	0	0	0	2	0	0	0	0	2	1.0%	8.7
ESE	0	0	0	1	0	0	0	0	1	0.5%	7.7
SE	0	0	1	18	14	2	0	0	35	17.2%	12.7
SSE	0	0	0	26	9	0	0	0	35	17.2%	11.5
S	0	0	5	78	15	0	0	0	98	48.0%	10.2
SSW	0	0	1	6	0	0	0	0	7	3.4%	8.4
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	1	0	0	0	0	1	0.5%	8.4
WNW	0	0	1	0	0	0	0	0	1	0.5%	6.5
NW	0	0	1	2	0	0	0	0	3	1.5%	7.6
NNW	0	0	0	5	0	0	0	0	5	2.5%	9.8
Total	0	1	19	144	38	2	0	0	204		
% Of Total	0.0%	0.5%	9.3%	70.6%	18.6%	1.0%	0.0%	0.0%			

Average speed for this table (MPH): 10.4  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 12  
 Total number of Invalid hours : 39  
 Total number of Valid hours : 2145  
 Total number of hours for period : 2184

## Second Quarter 2012

Joint Frequency TableFrom : 04/01/2012 00:00 To : 06/30/2012 23:00PRIMARY TOWERSTABILITY CLASS B

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	5	0	0	0	0	0	5	3.2%	5.8
NNE	0	0	5	2	0	0	0	0	7	4.5%	7.5
NE	0	1	6	5	0	0	0	0	12	7.7%	7.2
ENE	0	0	8	2	1	0	0	0	11	7.1%	7.3
E	0	1	0	1	0	0	0	0	2	1.3%	5.7
ESE	0	0	0	5	4	0	0	0	9	5.8%	11.4
SE	0	0	3	22	17	0	0	0	42	26.9%	12.1
SSE	0	0	1	16	3	0	0	0	20	12.8%	10.8
S	0	0	5	22	4	0	0	0	31	19.9%	9.5
SSW	0	0	4	0	0	0	0	0	4	2.6%	5.5
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	1	0	0	0	0	0	1	0.6%	5.9
W	0	0	2	0	0	0	0	0	2	1.3%	5.5
WNW	0	0	1	0	0	0	0	0	1	0.6%	5.8
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	2	3	0	4	0	0	9	5.8%	12.8
Total	0	2	43	78	29	4	0	0	156		
% Of Total	0.0%	1.3%	27.6%	50.0%	18.6%	2.6%	0.0%	0.0%			

Average speed for this table (MPH): 9.9  
Hours in above table with variable direction : 0  
Total number of CALMs : 12  
Total number of Invalid hours : 39  
Total number of Valid hours : 2145  
Total number of hours for period : 2184

## Second Quarter 2012

Joint Frequency TableFrom : 04/01/2012 00:00 To : 06/30/2012 23:00PRIMARY TOWERSTABILITY CLASS C

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	6	1	0	0	0	0	7	3.7%	6.3
NNE	0	2	5	8	1	0	0	0	16	8.4%	7.7
NE	0	2	8	4	0	0	0	0	14	7.3%	6.1
ENE	0	0	3	3	1	0	0	0	7	3.7%	7.6
E	0	0	6	3	1	0	0	0	10	5.2%	7.4
ESE	0	0	9	5	4	0	0	0	18	9.4%	9.2
SE	0	0	4	26	9	0	0	0	39	20.4%	11.2
SSE	0	1	1	23	5	0	0	0	30	15.7%	10.4
S	0	0	10	12	10	0	0	0	32	16.8%	10.1
SSW	0	0	4	0	0	0	0	0	4	2.1%	5.8
SW	0	1	0	0	0	0	0	0	1	0.5%	2.6
WSW	0	0	0	1	0	0	0	0	1	0.5%	9.8
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	1	4	1	0	0	0	0	6	3.1%	5.8
NNW	0	0	1	3	2	0	0	0	6	3.1%	10.9
Total	0	7	61	90	33	0	0	0	191		
% Of Total	0.0%	3.7%	31.9%	47.1%	17.3%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 9.2  
Hours in above table with variable direction : 0  
Total number of CALMs : 12  
Total number of Invalid hours : 39  
Total number of Valid hours : 2145  
Total number of hours for period : 2184

## Second Quarter 2012

Joint Frequency TableFrom : 04/01/2012 00:00 To : 06/30/2012 23:00PRIMARY TOWERSTABILITY CLASS D

Wind Speed (MPH) -> Sector	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
N	0	2	15	10	0	0	0	0	27	5.0%	6.9
NNE	0	0	9	18	1	0	0	0	28	5.1%	8.5
NE	0	2	7	11	0	0	0	0	20	3.7%	7.6
ENE	0	8	10	2	0	0	0	0	20	3.7%	4.9
E	0	2	5	9	0	0	0	0	16	2.9%	7.7
ESE	0	1	10	18	16	0	0	0	45	8.3%	10.9
SE	0	0	17	82	52	11	0	0	162	29.8%	12.0
SSE	0	1	29	57	19	13	0	0	119	21.9%	10.8
S	0	1	16	31	6	0	0	0	54	9.9%	9.0
SSW	0	3	7	1	0	0	0	0	11	2.0%	4.9
SW	0	0	3	1	0	0	0	0	4	0.7%	6.2
WSW	0	0	0	1	0	0	0	0	1	0.2%	9.7
W	0	0	1	1	0	0	0	0	2	0.4%	6.7
WNW	0	0	1	0	0	0	0	0	1	0.2%	6.0
NW	0	1	7	1	0	0	0	0	9	1.7%	5.4
NNW	0	4	8	7	6	0	0	0	25	4.6%	8.7
Total	0	25	145	250	100	24	0	0	544		
% Of Total	0.0%	4.6%	26.7%	46.0%	18.4%	4.4%	0.0%	0.0%			

Average speed for this table (MPH): 9.9  
Hours in above table with variable direction : 0  
Total number of CALMs : 12  
Total number of Invalid hours : 39  
Total number of Valid hours : 2145  
Total number of hours for period : 2184



## Second Quarter 2012

Joint Frequency TableFrom : 04/01/2012 00:00 To : 06/30/2012 23:00PRIMARY TOWERSTABILITY CLASS E

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	3	12	2	0	0	0	0	17	2.9%	5.8
NNE	0	2	10	1	0	0	0	0	13	2.2%	5.4
NE	0	3	11	5	0	0	0	0	19	3.2%	6.1
ENE	0	3	11	0	0	0	0	0	14	2.4%	4.4
E	0	4	10	3	1	0	0	0	18	3.1%	6.3
ESE	0	2	18	7	1	0	0	0	28	4.8%	6.8
SE	1	5	61	63	10	1	0	0	141	23.9%	8.0
SSE	0	3	91	69	13	0	0	0	176	29.9%	8.1
S	0	1	42	44	3	0	0	0	90	15.3%	8.2
SSW	0	6	15	1	0	0	0	0	22	3.7%	4.9
SW	0	0	12	0	0	0	0	0	12	2.0%	5.8
WSW	0	2	0	0	0	0	0	0	2	0.3%	3.5
W	0	0	1	0	0	0	0	0	1	0.2%	4.1
WNW	0	4	0	0	0	0	0	0	4	0.7%	2.8
NW	0	3	3	3	3	0	0	0	12	2.0%	8.3
NNW	0	4	11	5	0	0	0	0	20	3.4%	6.5
Total	1	45	308	203	31	1	0	0	589		
% Of Total	0.2%	7.6%	52.3%	34.5%	5.3%	0.2%	0.0%	0.0%			

Average speed for this table (MPH): 7.4  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 12  
 Total number of Invalid hours : 39  
 Total number of Valid hours : 2145  
 Total number of hours for period : 2184

## Second Quarter 2012

Joint Frequency TableFrom : 04/01/2012 00:00 To : 06/30/2012 23:00PRIMARY TOWERSTABILITY CLASS F

Wind Speed (MPH) -> Sector	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
N	0	4	1	1	0	0	0	0	6	2.7%	3.4
NNE	0	11	8	0	0	0	0	0	19	8.6%	3.4
NE	0	18	7	0	0	0	0	0	25	11.3%	3.1
ENE	1	11	4	0	0	0	0	0	16	7.2%	2.9
E	1	18	5	0	0	0	0	0	24	10.9%	2.6
ESE	0	27	9	1	0	0	0	0	37	16.7%	2.9
SE	0	20	24	1	1	0	0	0	46	20.8%	4.3
SSE	0	4	9	0	0	0	0	0	13	5.9%	4.2
S	0	1	1	0	0	0	0	0	2	0.9%	3.5
SSW	0	1	1	0	0	0	0	0	2	0.9%	4.2
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	1	0	0	0	0	0	0	1	0.5%	1.6
W	0	7	1	0	0	0	0	0	8	3.6%	2.6
WNW	1	5	0	0	0	0	0	0	6	2.7%	2.3
NW	0	5	4	0	0	0	0	0	9	4.1%	3.5
NNW	0	4	3	0	0	0	0	0	7	3.2%	3.9
Total	3	137	77	3	1	0	0	0	221		
% Of Total	1.4%	62.0%	34.8%	1.4%	0.5%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 3.4  
Hours in above table with variable direction : 0  
Total number of CALMs : 12  
Total number of Invalid hours : 39  
Total number of Valid hours : 2145  
Total number of hours for period : 2184

## Second Quarter 2012

Joint Frequency TableFrom : 04/01/2012 00:00 To : 06/30/2012 23:00PRIMARY TOWERSTABILITY CLASS G

Wind Speed (MPH) -> Sector	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
N	0	12	4	0	0	0	0	0	16	6.7%	2.7
NNE	0	28	2	0	0	0	0	0	30	12.5%	2.5
NE	2	33	1	0	0	0	0	0	36	15.0%	2.1
ENE	1	10	2	0	0	0	0	0	13	5.4%	2.5
E	2	32	1	0	0	0	0	0	35	14.6%	1.8
ESE	1	29	0	0	0	0	0	0	30	12.5%	2.1
SE	1	26	1	0	0	0	0	0	28	11.7%	2.4
SSE	0	3	0	0	0	0	0	0	3	1.3%	2.2
S	0	0	0	0	0	0	0	0	0	0.0%	0.0
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	1	0	0	0	0	0	0	1	0.4%	2.1
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	1	13	0	0	0	0	0	0	14	5.8%	2.4
NW	0	9	2	0	0	0	0	0	11	4.6%	2.8
NNW	0	17	6	0	0	0	0	0	23	9.6%	3.2
Total	8	213	19	0	0	0	0	0	240		
% Of Total	3.3%	88.8%	7.9%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 2.4  
Hours in above table with variable direction : 0  
Total number of CALMs : 12  
Total number of Invalid hours : 39  
Total number of Valid hours : 2145  
Total number of hours for period : 2184

**Second Quarter 2012**  
**Joint Frequency Table**

**From** : 04/01/2012 00:00    **To** : 06/30/2012 23:00

**PRIMARY TOWER**

**ALL STABILITY CLASSES COMBINED**

<b>Wind Speed (MPH) -&gt;</b>	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
<b>Sector</b>											
N	0	21	45	15	0	0	0	0	81	3.8%	5.5
NNE	0	43	41	31	2	0	0	0	117	5.5%	5.6
NE	2	59	46	27	0	0	0	0	134	6.2%	4.8
ENE	2	33	38	7	2	0	0	0	82	3.8%	4.6
E	3	57	27	18	2	0	0	0	107	5.0%	4.4
ESE	1	59	46	37	25	0	0	0	168	7.8%	6.7
SE	2	51	111	212	103	14	0	0	493	23.0%	9.6
SSE	0	12	131	191	49	13	0	0	396	18.5%	9.4
S	0	3	79	187	38	0	0	0	307	14.3%	9.3
SSW	0	10	32	8	0	0	0	0	50	2.3%	5.5
SW	0	1	15	1	0	0	0	0	17	0.8%	5.7
WSW	0	4	1	2	0	0	0	0	7	0.3%	5.1
W	0	7	5	2	0	0	0	0	14	0.7%	4.1
WNW	2	22	3	0	0	0	0	0	27	1.3%	2.8
NW	0	19	21	7	3	0	0	0	50	2.3%	5.4
NNW	0	29	31	23	8	4	0	0	95	4.4%	7.1
Total	12	430	672	768	232	31	0	0	2145		
% Of Total	0.6%	20.0%	31.3%	35.8%	10.8%	1.4%	0.0%	0.0%			

Average speed for this table (MPH): 7.3  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 12  
 Total number of Invalid hours : 39  
 Total number of Valid hours : 2145  
 Total number of hours for period : 2184

**Third Quarter 2012**

**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

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**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS A**

Wind Speed (MPH) ->  Sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	% Of Total	Avg. Speed
	CALM	1.0 - 3.5	3.6 - 7.5	7.6 - 12.5	12.6 - 18.5	18.6 - 24.5	24.6 - 32.5	32.6 +			
N	0	0	0	1	1	0	0	0	2	1.2%	11.6
NNE	0	0	0	3	0	0	0	0	3	1.8%	9.4
NE	0	0	1	2	0	0	0	0	3	1.8%	8.6
ENE	0	0	1	0	0	0	0	0	1	0.6%	5.1
E	0	0	1	0	0	0	0	0	1	0.6%	4.9
ESE	0	0	0	0	3	0	0	0	3	1.8%	13.6
SE	0	0	0	5	3	0	0	0	8	4.8%	11.9
SSE	0	0	3	13	1	0	0	0	17	10.2%	9.6
S	0	0	5	52	0	0	0	0	57	34.1%	9.1
SSW	0	1	9	32	0	0	0	0	42	25.1%	8.1
SW	0	0	5	9	0	0	0	0	14	8.4%	8.1
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	3	0	0	0	0	0	3	1.8%	5.7
WNW	0	0	2	1	0	0	0	0	3	1.8%	7.5
NW	0	0	0	1	0	0	0	0	1	0.6%	8.6
NNW	0	0	1	5	3	0	0	0	9	5.4%	10.8
Total	0	1	31	124	11	0	0	0	167		
% Of Total	0.0%	0.6%	18.6%	74.3%	6.6%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 9.0  
Hours in above table with variable direction : 0  
Total number of CALMs : 3  
Total number of Invalid hours : 343  
Total number of Valid hours : 1865  
Total number of hours for period : 2208

**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS B**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	1	5	0	0	0	0	6	5.5%	8.3
NNE	0	0	1	2	0	0	0	0	3	2.8%	7.6
NE	0	0	1	4	0	0	0	0	5	4.6%	8.4
ENE	0	0	1	0	0	0	0	0	1	0.9%	7.3
E	0	0	0	0	1	0	0	0	1	0.9%	14.5
ESE	0	0	0	3	3	0	0	0	6	5.5%	12.9
SE	0	0	1	11	1	0	0	0	13	11.9%	10.2
SSE	0	0	0	7	0	0	0	0	7	6.4%	10.8
S	0	0	8	28	0	0	0	0	36	33.0%	8.6
SSW	0	0	7	5	0	0	0	0	12	11.0%	7.5
SW	0	0	3	4	0	0	0	0	7	6.4%	7.4
WSW	0	0	4	0	0	0	0	0	4	3.7%	6.9
W	0	0	1	0	0	0	0	0	1	0.9%	7.5
WNW	0	0	1	0	0	0	0	0	1	0.9%	6.9
NW	0	0	1	1	0	0	0	0	2	1.8%	7.7
NNW	0	0	0	3	1	0	0	0	4	3.7%	10.9
Total	0	0	30	73	6	0	0	0	109		
% Of Total	0.0%	0.0%	27.5%	67.0%	5.5%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 8.9  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 3  
 Total number of Invalid hours : 343  
 Total number of Valid hours : 1865  
 Total number of hours for period : 2208

**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS C**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	1	3	0	0	0	0	4	3.2%	8.7
NNE	0	0	3	0	0	0	0	0	3	2.4%	6.2
NE	0	0	4	0	0	0	0	0	4	3.2%	6.8
ENE	0	0	5	0	0	0	0	0	5	4.0%	6.2
E	0	0	1	1	0	0	0	0	2	1.6%	7.4
ESE	0	0	1	2	2	0	0	0	5	4.0%	10.3
SE	0	0	2	15	2	0	0	0	19	15.1%	10.5
SSE	0	0	5	16	0	0	0	0	21	16.7%	8.8
S	0	0	10	17	0	0	0	0	27	21.4%	8.0
SSW	0	0	6	4	0	0	0	0	10	7.9%	7.0
SW	0	0	7	3	0	0	0	0	10	7.9%	7.4
WSW	0	0	1	1	0	0	0	0	2	1.6%	7.7
W	0	0	3	0	0	0	0	0	3	2.4%	5.2
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	0	3	0	1	0	0	0	4	3.2%	9.1
NNW	0	0	1	6	0	0	0	0	7	5.6%	8.5
Total	0	0	53	68	5	0	0	0	126		
% Of Total	0.0%	0.0%	42.1%	54.0%	4.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 8.3  
Hours in above table with variable direction : 0  
Total number of CALMs : 3  
Total number of Invalid hours : 343  
Total number of Valid hours : 1865  
Total number of hours for period : 2208



**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS D**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	3	11	13	0	0	0	0	27	5.9%	6.9
NNE	0	1	14	5	0	0	0	0	20	4.4%	6.1
NE	0	4	15	3	0	0	0	0	22	4.8%	5.5
ENE	0	2	24	0	0	0	0	0	26	5.7%	5.1
E	0	3	8	6	1	0	0	0	18	3.9%	6.6
ESE	0	0	11	13	2	0	0	0	26	5.7%	8.7
SE	0	0	23	45	2	0	0	0	70	15.3%	8.7
SSE	0	3	15	35	1	0	0	0	54	11.8%	7.8
S	0	0	29	50	0	0	0	0	79	17.2%	7.8
SSW	0	2	23	5	0	0	0	0	30	6.6%	6.0
SW	0	3	14	2	0	0	0	0	19	4.1%	5.6
WSW	0	1	7	0	0	0	0	0	8	1.7%	5.7
W	0	3	4	0	0	0	0	0	7	1.5%	4.0
WNW	0	3	4	4	0	0	0	0	11	2.4%	6.2
NW	0	1	6	1	3	1	0	0	12	2.6%	9.8
NNW	0	0	17	9	3	0	0	0	29	6.3%	8.0
Total	0	29	225	191	12	1	0	0	458		
% Of Total	0.0%	6.3%	49.1%	41.7%	2.6%	0.2%	0.0%	0.0%			

Average speed for this table (MPH): 7.3  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 3  
 Total number of Invalid hours : 343  
 Total number of Valid hours : 1865  
 Total number of hours for period : 2208

**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS E**

<b>Wind Speed (MPH) -&gt;</b>	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
<b>Sector</b>											
N	0	1	9	2	0	0	0	0	12	2.1%	6.3
NNE	0	3	16	2	0	0	0	0	21	3.7%	5.5
NE	0	4	13	0	0	0	0	0	17	3.0%	4.6
ENE	0	4	9	0	0	0	0	0	13	2.3%	4.6
E	0	4	10	6	0	0	0	0	20	3.5%	6.1
ESE	0	1	18	1	0	0	0	0	20	3.5%	5.3
SE	0	2	49	11	0	0	0	0	62	10.8%	6.2
SSE	0	2	77	26	0	0	0	0	105	18.3%	6.6
S	0	2	115	43	0	0	0	0	160	27.8%	6.6
SSW	0	4	66	11	0	0	0	0	81	14.1%	6.1
SW	0	0	21	9	0	0	0	0	30	5.2%	6.9
WSW	0	0	4	1	0	0	0	0	5	0.9%	5.4
W	0	0	1	0	0	0	0	0	1	0.2%	5.9
WNW	0	3	0	0	0	0	0	0	3	0.5%	2.7
NW	0	0	7	0	0	0	0	0	7	1.2%	4.9
NNW	0	4	10	3	1	0	0	0	18	3.1%	6.3
Total	0	34	425	115	1	0	0	0	575		
% Of Total	0.0%	5.9%	73.9%	20.0%	0.2%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 6.2  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 3  
 Total number of Invalid hours : 343  
 Total number of Valid hours : 1865  
 Total number of hours for period : 2208

**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS F**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	6	10	0	0	0	0	0	16	6.1%	4.0
NNE	0	8	9	0	0	0	0	0	17	6.4%	3.7
NE	1	8	4	0	0	0	0	0	13	4.9%	3.0
ENE	0	12	3	0	0	0	0	0	15	5.7%	3.0
E	0	14	10	1	0	0	0	0	25	9.5%	3.8
ESE	0	20	13	0	0	0	0	0	33	12.5%	3.4
SE	0	29	39	1	0	0	0	0	69	26.1%	4.0
SSE	0	5	39	1	0	0	0	0	45	17.0%	5.1
S	0	1	1	0	0	0	0	0	2	0.8%	3.6
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	3	0	0	0	0	0	0	3	1.1%	2.2
WNW	0	6	1	0	0	0	0	0	7	2.7%	2.9
NW	0	8	3	0	0	0	0	0	11	4.2%	2.9
NNW	0	5	3	0	0	0	0	0	8	3.0%	3.9
Total	1	125	135	3	0	0	0	0	264		
% Of Total	0.4%	47.3%	51.1%	1.1%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 3.9  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 3  
 Total number of Invalid hours : 343  
 Total number of Valid hours : 1865  
 Total number of hours for period : 2208

**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS G**

Wind Speed (MPH) ->  Sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	% Of Total	Avg. Speed
	CALM	1.0 - 3.5	3.6 - 7.5	7.6 - 12.5	12.6 - 18.5	18.6 - 24.5	24.6 - 32.5	32.6 +			
N	0	9	2	0	0	0	0	0	11	6.6%	2.5
NNE	0	37	5	0	0	0	0	0	42	25.3%	2.9
NE	0	35	6	0	0	0	0	0	41	24.7%	2.9
ENE	0	13	2	0	0	0	0	0	15	9.0%	2.5
E	1	12	1	0	0	0	0	0	14	8.4%	2.4
ESE	0	4	0	0	0	0	0	0	4	2.4%	2.8
SE	0	0	2	0	0	0	0	0	2	1.2%	4.1
SSE	0	1	0	0	0	0	0	0	1	0.6%	2.9
S	0	0	0	0	0	0	0	0	0	0.0%	0.0
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	1	9	2	0	0	0	0	0	12	7.2%	2.6
NW	0	4	5	0	0	0	0	0	9	5.4%	3.7
NNW	0	10	5	0	0	0	0	0	15	9.0%	3.2
Total	2	134	30	0	0	0	0	0	166		
% Of Total	1.2%	80.7%	18.1%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 2.9  
Hours in above table with variable direction : 0  
Total number of CALMs : 3  
Total number of Invalid hours : 343  
Total number of Valid hours : 1865  
Total number of hours for period : 2208

**Third Quarter 2012**  
**Joint Frequency Table**

**From** : 07/01/2012 00:00    **To** : 09/30/2012 23:00

**PRIMARY TOWER**

**ALL STABILITY CLASSES COMBINED**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	19	34	24	1	0	0	0	78	4.2%	5.9
NNE	0	49	48	12	0	0	0	0	109	5.8%	4.5
NE	1	51	44	9	0	0	0	0	105	5.6%	4.3
ENE	0	31	45	0	0	0	0	0	76	4.1%	4.2
E	1	33	31	14	2	0	0	0	81	4.3%	5.0
ESE	0	25	43	19	10	0	0	0	97	5.2%	6.5
SE	0	31	116	88	8	0	0	0	243	13.0%	7.0
SSE	0	11	139	98	2	0	0	0	250	13.4%	7.1
S	0	3	168	190	0	0	0	0	361	19.4%	7.6
SSW	0	7	111	57	0	0	0	0	175	9.4%	6.7
SW	0	3	50	27	0	0	0	0	80	4.3%	6.9
WSW	0	1	16	2	0	0	0	0	19	1.0%	6.1
W	0	6	12	0	0	0	0	0	18	1.0%	4.5
WNW	1	21	10	5	0	0	0	0	37	2.0%	4.2
NW	0	13	25	3	4	1	0	0	46	2.5%	6.0
NNW	0	19	37	26	8	0	0	0	90	4.8%	6.9
Total	3	323	929	574	35	1	0	0	1865		
% Of Total	0.2%	17.3%	49.8%	30.8%	1.9%	0.1%	0.0%	0.0%			

Average speed for this table (MPH): 6.4  
Hours in above table with variable direction : 0  
Total number of CALMs : 3  
Total number of Invalid hours : 343  
Total number of Valid hours : 1865  
Total number of hours for period : 2208

**Fourth Quarter 2012**

**Joint Frequency Table**

**From** : 10/01/2012 00:00    **To** : 12/31/2012 23:00

**PRIMARY TOWER**

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**Fourth Quarter 2012**  
**Joint Frequency Table**

**From** : 10/01/2012 00:00    **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS A**

Wind Speed (MPH) ->  Sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	% Of Total	Avg. Speed
	CALM	1.0 - 3.5	3.6 - 7.5	7.6 - 12.5	12.6 - 18.5	18.6 - 24.5	24.6 - 32.5	32.6 +			
N	0	0	0	7	12	0	0	0	19	7.7%	13.2
NNE	0	0	3	13	3	0	0	0	19	7.7%	9.8
NE	0	0	4	5	1	0	0	0	10	4.0%	8.2
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	4	4	0	0	0	8	3.2%	11.9
ESE	0	0	0	3	0	0	0	0	3	1.2%	10.3
SE	0	1	0	13	11	0	0	0	25	10.1%	11.8
SSE	0	0	1	22	14	0	0	0	37	14.9%	12.1
S	0	0	5	53	7	0	0	0	65	26.2%	10.0
SSW	0	0	1	17	0	0	0	0	18	7.3%	9.4
SW	0	0	0	5	0	0	0	0	5	2.0%	9.6
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	1	0	1	0	0	0	2	0.8%	10.0
WNW	0	1	1	2	2	1	0	0	7	2.8%	10.4
NW	0	0	1	6	4	0	0	0	11	4.4%	11.1
NNW	0	0	2	5	9	3	0	0	19	7.7%	14.0
Total	0	2	19	155	68	4	0	0	248		
% Of Total	0.0%	0.8%	7.7%	62.5%	27.4%	1.6%	0.0%	0.0%			

Average speed for this table (MPH): 11.0  
Hours in above table with variable direction : 0  
Total number of CALMs : 9  
Total number of Invalid hours : 12  
Total number of Valid hours : 2196  
Total number of hours for period : 2208

## Fourth Quarter 2012

Joint Frequency TableFrom : 10/01/2012 00:00 To : 12/31/2012 23:00PRIMARY TOWERSTABILITY CLASS B

Wind Speed (MPH) -> Sector	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
N	0	0	1	5	4	0	0	0	10	7.9%	10.4
NNE	0	0	5	5	1	0	0	0	11	8.7%	7.9
NE	0	0	5	4	3	0	0	0	12	9.5%	9.4
ENE	0	0	3	3	1	0	0	0	7	5.6%	8.6
E	0	0	0	0	1	0	0	0	1	0.8%	12.6
ESE	0	0	1	1	1	0	0	0	3	2.4%	9.5
SE	0	0	0	10	8	0	0	0	18	14.3%	12.3
SSE	0	0	1	7	5	0	0	0	13	10.3%	11.6
S	0	0	6	12	0	0	0	0	18	14.3%	8.1
SSW	0	0	3	3	0	0	0	0	6	4.8%	7.1
SW	0	0	2	0	0	1	0	0	3	2.4%	9.4
WSW	0	0	3	0	0	0	0	0	3	2.4%	5.2
W	0	0	1	0	0	0	0	0	1	0.8%	4.0
WNW	0	0	1	1	0	0	0	0	2	1.6%	6.0
NW	0	0	1	1	0	1	0	0	3	2.4%	12.0
NNW	0	0	5	3	6	1	0	0	15	11.9%	11.4
Total	0	0	38	55	30	3	0	0	126		
% Of Total	0.0%	0.0%	30.2%	43.7%	23.8%	2.4%	0.0%	0.0%			

Average speed for this table (MPH): 9.8  
Hours in above table with variable direction : 0  
Total number of CALMs : 9  
Total number of Invalid hours : 12  
Total number of Valid hours : 2196  
Total number of hours for period : 2208



## Fourth Quarter 2012

Joint Frequency TableFrom : 10/01/2012 00:00 To : 12/31/2012 23:00PRIMARY TOWERSTABILITY CLASS C

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	3	1	0	0	0	0	4	3.3%	8.4
NNE	0	0	5	6	0	0	0	0	11	8.9%	7.9
NE	0	0	10	6	2	0	0	0	18	14.6%	7.7
ENE	0	0	4	1	0	0	0	0	5	4.1%	6.5
E	0	0	1	3	1	0	0	0	5	4.1%	10.6
ESE	0	0	1	3	0	0	0	0	4	3.3%	9.0
SE	0	0	2	6	4	0	0	0	12	9.8%	10.6
SSE	0	0	3	3	7	0	0	0	13	10.6%	11.2
S	0	0	11	7	3	0	0	0	21	17.1%	8.5
SSW	0	1	5	2	1	0	0	0	9	7.3%	7.2
SW	0	0	1	1	0	0	0	0	2	1.6%	6.9
WSW	0	0	1	0	0	0	0	0	1	0.8%	5.1
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	1	1	0	0	0	0	0	2	1.6%	5.0
NNW	0	1	2	3	7	3	0	0	16	13.0%	13.1
Total	0	3	50	42	25	3	0	0	123		
% Of Total	0.0%	2.4%	40.7%	34.1%	20.3%	2.4%	0.0%	0.0%			

Average speed for this table (MPH): 9.2  
Hours in above table with variable direction : 0  
Total number of CALMs : 9  
Total number of Invalid hours : 12  
Total number of Valid hours : 2196  
Total number of hours for period : 2208

**Fourth Quarter 2012**  
**Joint Frequency Table**

**From** : 10/01/2012 00:00    **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS D**

<b>Wind Speed (MPH) -&gt;</b>	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
<b>Sector</b>											
N	0	1	8	27	18	0	0	0	54	11.6%	10.7
NNE	0	5	19	21	3	0	0	0	48	10.3%	7.6
NE	0	5	15	14	1	0	0	0	35	7.5%	6.5
ENE	0	4	8	10	0	0	0	0	22	4.7%	6.9
E	0	4	11	8	1	0	0	0	24	5.2%	6.9
ESE	0	3	6	12	1	0	0	0	22	4.7%	7.7
SE	0	1	11	48	8	0	0	0	68	14.6%	9.7
SSE	0	2	5	27	6	0	0	0	40	8.6%	10.1
S	0	0	31	17	3	0	0	0	51	10.9%	7.4
SSW	0	1	13	2	0	0	0	0	16	3.4%	6.3
SW	0	1	1	0	0	0	0	0	2	0.4%	2.8
WSW	0	1	1	1	0	0	0	0	3	0.6%	5.4
W	0	1	1	0	0	0	0	0	2	0.4%	4.3
WNW	0	2	2	2	0	0	0	0	6	1.3%	6.2
NW	1	1	2	7	1	3	0	0	15	3.2%	10.4
NNW	0	4	6	16	20	11	1	0	58	12.4%	13.5
Total	1	36	140	212	62	14	1	0	466		
% Of Total	0.2%	7.7%	30.0%	45.5%	13.3%	3.0%	0.2%	0.0%			

Average speed for this table (MPH): 9.0  
Hours in above table with variable direction : 0  
Total number of CALMs : 9  
Total number of Invalid hours : 12  
Total number of Valid hours : 2196  
Total number of hours for period : 2208

## Fourth Quarter 2012

Joint Frequency TableFrom : 10/01/2012 00:00 To : 12/31/2012 23:00PRIMARY TOWERSTABILITY CLASS E

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	3	25	14	1	0	0	0	43	7.8%	7.0
NNE	0	5	30	13	1	0	0	0	49	8.9%	6.2
NE	0	4	16	3	0	0	0	0	23	4.2%	5.4
ENE	0	5	15	3	0	0	0	0	23	4.2%	5.2
E	0	1	12	0	1	0	0	0	14	2.5%	5.7
ESE	0	0	20	6	1	0	0	0	27	4.9%	6.9
SE	0	3	36	42	2	0	0	0	83	15.1%	7.6
SSE	0	2	39	66	7	0	0	0	114	20.7%	8.5
S	0	6	34	15	1	0	0	0	56	10.2%	6.2
SSW	0	11	16	3	0	0	0	0	30	5.5%	4.6
SW	0	2	7	2	0	0	0	0	11	2.0%	5.8
WSW	0	2	6	0	0	0	0	0	8	1.5%	4.4
W	0	1	2	0	0	0	0	0	3	0.5%	4.8
WNW	0	1	7	0	0	0	0	0	8	1.5%	5.3
NW	0	0	6	4	0	0	0	0	10	1.8%	7.0
NNW	0	3	23	18	2	2	0	0	48	8.7%	7.7
Total	0	49	294	189	16	2	0	0	550		
% Of Total	0.0%	8.9%	53.5%	34.4%	2.9%	0.4%	0.0%	0.0%			

Average speed for this table (MPH) : 6.9  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 9  
 Total number of Invalid hours : 12  
 Total number of Valid hours : 2196  
 Total number of hours for period : 2208

## Fourth Quarter 2012

Joint Frequency TableFrom : 10/01/2012 00:00 To : 12/31/2012 23:00PRIMARY TOWERSTABILITY CLASS F

Wind Speed (MPH) -> Sector	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
N	0	6	10	1	0	0	0	0	17	6.3%	4.3
NNE	0	4	13	3	0	0	0	0	20	7.5%	5.5
NE	0	10	3	1	0	0	0	0	14	5.2%	3.9
ENE	1	13	8	0	0	0	0	0	22	8.2%	3.1
E	0	10	15	1	0	0	0	0	26	9.7%	4.1
ESE	0	9	28	0	0	0	0	0	37	13.8%	4.4
SE	0	10	50	5	0	0	0	0	65	24.3%	5.1
SSE	0	7	22	1	0	0	0	0	30	11.2%	4.4
S	0	4	2	0	0	0	0	0	6	2.2%	3.1
SSW	0	3	5	0	0	0	0	0	8	3.0%	3.5
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	1	0	0	0	0	0	1	0.4%	4.4
WNW	0	3	3	0	0	0	0	0	6	2.2%	3.3
NW	1	2	8	0	0	0	0	0	11	4.1%	4.1
NNW	0	1	4	0	0	0	0	0	5	1.9%	4.2
Total	2	82	172	12	0	0	0	0	268		
% Of Total	0.7%	30.6%	64.2%	4.5%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 4.4  
Hours in above table with variable direction : 0  
Total number of CALMs : 9  
Total number of Invalid hours : 12  
Total number of Valid hours : 2196  
Total number of hours for period : 2208

## Fourth Quarter 2012

Joint Frequency TableFrom : 10/01/2012 00:00 To : 12/31/2012 23:00PRIMARY TOWERSTABILITY CLASS G

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	1	13	12	0	0	0	0	0	26	6.3%	3.5
NNE	1	22	29	1	0	0	0	0	53	12.8%	4.1
NE	0	56	26	0	0	0	0	0	82	19.8%	3.1
ENE	2	51	8	0	0	0	0	0	61	14.7%	2.6
E	1	36	15	0	0	0	0	0	52	12.5%	2.9
ESE	0	27	14	0	0	0	0	0	41	9.9%	3.2
SE	0	25	10	0	0	0	0	0	35	8.4%	3.1
SSE	0	9	1	0	0	0	0	0	10	2.4%	2.6
S	0	5	1	0	0	0	0	0	6	1.4%	2.7
SSW	0	2	0	0	0	0	0	0	2	0.5%	2.3
SW	0	1	0	0	0	0	0	0	1	0.2%	1.5
WSW	0	1	0	0	0	0	0	0	1	0.2%	1.4
W	0	1	1	0	0	0	0	0	2	0.5%	2.6
WNW	0	6	1	0	0	0	0	0	7	1.7%	2.6
NW	0	8	7	0	0	0	0	0	15	3.6%	3.6
NNW	1	14	5	0	0	0	0	0	20	4.8%	2.8
	0	1	0	0	0	0	0	0	1	0.2%	3.1
Total	6	278	130	1	0	0	0	0	415		
% Of Total	1.4%	67.0%	31.3%	0.2%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 3.1  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 9  
 Total number of Invalid hours : 12  
 Total number of Valid hours : 2196  
 Total number of hours for period : 2208

**Fourth Quarter 2012**  
**Joint Frequency Table**

**From** : 10/01/2012 00:00    **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**ALL STABILITY CLASSES COMBINED**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	1	23	59	55	35	0	0	0	173	7.9%	8.3
NNE	1	36	104	62	8	0	0	0	211	9.6%	6.4
NE	0	75	79	33	7	0	0	0	194	8.8%	5.1
ENE	3	73	46	17	1	0	0	0	140	6.4%	4.2
E	1	51	54	16	8	0	0	0	130	5.9%	5.1
ESE	0	39	70	25	3	0	0	0	137	6.2%	5.4
SE	0	40	109	124	33	0	0	0	306	13.9%	7.8
SSE	0	20	72	126	39	0	0	0	257	11.7%	8.8
S	0	15	90	104	14	0	0	0	223	10.2%	7.8
SSW	0	18	43	27	1	0	0	0	89	4.1%	6.2
SW	0	4	11	8	0	1	0	0	24	1.1%	6.7
WSW	0	4	11	1	0	0	0	0	16	0.7%	4.6
W	0	3	7	0	1	0	0	0	11	0.5%	5.1
WNW	0	13	15	5	2	1	0	0	36	1.6%	5.6
NW	2	12	26	18	5	4	0	0	67	3.1%	7.4
NNW	1	23	47	45	44	20	1	0	181	8.2%	10.4
	0	1	0	0	0	0	0	0	1	0.0%	3.1
Total	9	450	843	666	201	26	1	0	2196		
% Of Total	0.4%	20.5%	38.4%	30.3%	9.2%	1.2%	0.0%	0.0%			

Average speed for this table (MPH): 7.1  
Hours in above table with variable direction : 0  
Total number of CALMs : 9  
Total number of Invalid hours : 12  
Total number of Valid hours : 2196  
Total number of hours for period : 2208

**Joint Frequency Table - Batch Release Hours**

**From** : 01/01/2012 00:00    **To** : 03/31/2012 23:00

**PRIMARY TOWER**

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**Joint Frequency Table - Batch Release Hours**

**From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS A**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	0	0	0	0	0	0	0	*****	0.0
NNE	0	0	0	0	0	0	0	0	0	*****	0.0
NE	0	0	0	0	0	0	0	0	0	*****	0.0
ENE	0	0	0	0	0	0	0	0	0	*****	0.0
E	0	0	0	0	0	0	0	0	0	*****	0.0
ESE	0	0	0	0	0	0	0	0	0	*****	0.0
SE	0	0	0	0	0	0	0	0	0	*****	0.0
SSE	0	0	0	0	0	0	0	0	0	*****	0.0
S	0	0	0	0	0	0	0	0	0	*****	0.0
SSW	0	0	0	0	0	0	0	0	0	*****	0.0
SW	0	0	0	0	0	0	0	0	0	*****	0.0
WSW	0	0	0	0	0	0	0	0	0	*****	0.0
W	0	0	0	0	0	0	0	0	0	*****	0.0
WNW	0	0	0	0	0	0	0	0	0	*****	0.0
NW	0	0	0	0	0	0	0	0	0	*****	0.0
NNW	0	0	0	0	0	0	0	0	0	*****	0.0
Total	0	0	0	0	0	0	0	0	0		
% Of Total	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Average speed for this table (MPH): 0.0  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 0  
 Total number of Invalid hours : 0  
 Total number of Valid hours : 12  
 Total number of hours for period : 12



**Joint Frequency Table - Batch Release Hours**

**From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS B**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	0	0	0	0	0	0	0	*****	0.0
NNE	0	0	0	0	0	0	0	0	0	*****	0.0
NE	0	0	0	0	0	0	0	0	0	*****	0.0
ENE	0	0	0	0	0	0	0	0	0	*****	0.0
E	0	0	0	0	0	0	0	0	0	*****	0.0
ESE	0	0	0	0	0	0	0	0	0	*****	0.0
SE	0	0	0	0	0	0	0	0	0	*****	0.0
SSE	0	0	0	0	0	0	0	0	0	*****	0.0
S	0	0	0	0	0	0	0	0	0	*****	0.0
SSW	0	0	0	0	0	0	0	0	0	*****	0.0
SW	0	0	0	0	0	0	0	0	0	*****	0.0
WSW	0	0	0	0	0	0	0	0	0	*****	0.0
W	0	0	0	0	0	0	0	0	0	*****	0.0
WNW	0	0	0	0	0	0	0	0	0	*****	0.0
NW	0	0	0	0	0	0	0	0	0	*****	0.0
NNW	0	0	0	0	0	0	0	0	0	*****	0.0
Total	0	0	0	0	0	0	0	0	0		
% Of Total	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Average speed for this table (MPH): 0.0  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 0  
 Total number of Invalid hours : 0  
 Total number of Valid hours : 12  
 Total number of hours for period : 12

**Joint Frequency Table - Batch Release Hours**

**From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS C**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	0	0	0	0	0	0	0	*****	0.0
NNE	0	0	0	0	0	0	0	0	0	*****	0.0
NE	0	0	0	0	0	0	0	0	0	*****	0.0
ENE	0	0	0	0	0	0	0	0	0	*****	0.0
E	0	0	0	0	0	0	0	0	0	*****	0.0
ESE	0	0	0	0	0	0	0	0	0	*****	0.0
SE	0	0	0	0	0	0	0	0	0	*****	0.0
SSE	0	0	0	0	0	0	0	0	0	*****	0.0
S	0	0	0	0	0	0	0	0	0	*****	0.0
SSW	0	0	0	0	0	0	0	0	0	*****	0.0
SW	0	0	0	0	0	0	0	0	0	*****	0.0
WSW	0	0	0	0	0	0	0	0	0	*****	0.0
W	0	0	0	0	0	0	0	0	0	*****	0.0
WNW	0	0	0	0	0	0	0	0	0	*****	0.0
NW	0	0	0	0	0	0	0	0	0	*****	0.0
NNW	0	0	0	0	0	0	0	0	0	*****	0.0
Total	0	0	0	0	0	0	0	0	0		
% Of Total	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Average speed for this table (MPH): 0.0  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 0  
 Total number of Invalid hours : 0  
 Total number of Valid hours : 12  
 Total number of hours for period : 12

**Joint Frequency Table - Batch Release Hours**

**From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS D**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNE	0	0	0	0	0	0	0	0	0	0.0%	0.0
NE	0	0	0	0	0	0	0	0	0	0.0%	0.0
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	0	0	0	0	0	0	0	0	0.0%	0.0
SE	0	0	0	0	0	0	0	0	0	0.0%	0.0
SSE	0	0	0	0	0	0	0	0	0	0.0%	0.0
S	0	0	1	0	0	0	0	0	1	100.0%*	7.3
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
Total	0	0	1	0	0	0	0	0	1		
% Of Total	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 7.3  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 0  
 Total number of Invalid hours : 0  
 Total number of Valid hours : 12  
 Total number of hours for period : 12

**Joint Frequency Table - Batch Release Hours****From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00**PRIMARY TOWER****STABILITY CLASS E**

<b>Wind Speed (MPH) -&gt;</b>	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
<b>Sector</b>											
N	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNE	0	0	0	0	0	0	0	0	0	0.0%	0.0
NE	0	0	0	0	0	0	0	0	0	0.0%	0.0
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	0	0	0	0	0	0	0	0	0.0%	0.0
SE	0	0	0	0	0	0	0	0	0	0.0%	0.0
SSE	0	0	0	0	0	0	0	0	0	0.0%	0.0
S	0	0	2	0	0	0	0	0	2	100.0%*	5.7
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
Total	0	0	2	0	0	0	0	0	2		
% Of Total	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 5.7  
Hours in above table with variable direction : 0  
Total number of CALMs : 0  
Total number of Invalid hours : 0  
Total number of Valid hours : 12  
Total number of hours for period : 12

**Joint Frequency Table - Batch Release Hours**

**From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS F**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNE	0	0	0	0	0	0	0	0	0	0.0%	0.0
NE	0	0	0	0	0	0	0	0	0	0.0%	0.0
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	0	0	0	0	0	0	0	0	0.0%	0.0
SE	0	0	0	0	0	0	0	0	0	0.0%	0.0
SSE	0	1	3	0	0	0	0	0	4	57.1%	4.7
S	0	1	2	0	0	0	0	0	3	42.9%	4.5
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
Total	0	2	5	0	0	0	0	0	7		
% Of Total	0.0%	28.6%	71.4%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 4.6  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 0  
 Total number of Invalid hours : 0  
 Total number of Valid hours : 12  
 Total number of hours for period : 12

**Joint Frequency Table - Batch Release Hours****From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00**PRIMARY TOWER****STABILITY CLASS G**

<b>Wind Speed (MPH) -&gt;</b>	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
<b>Sector</b>											
N	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNE	0	0	0	0	0	0	0	0	0	0.0%	0.0
NE	0	0	0	0	0	0	0	0	0	0.0%	0.0
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	1	0	0	0	0	0	0	1	50.0%	2.1
SE	0	1	0	0	0	0	0	0	1	50.0%	3.1
SSE	0	0	0	0	0	0	0	0	0	0.0%	0.0
S	0	0	0	0	0	0	0	0	0	0.0%	0.0
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
Total	0	2	0	0	0	0	0	0	2		
% Of Total	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 2.6  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 0  
 Total number of Invalid hours : 0  
 Total number of Valid hours : 12  
 Total number of hours for period : 12

**First Quarter 2012**

**Joint Frequency Table - Batch Release Hours**

**From** : 01/01/2012 00:00 **To** : 03/31/2012 23:00

**PRIMARY TOWER**

**ALL STABILITY CLASSES COMBINED**

Wind Speed (MPH) -> Sector	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
N	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNE	0	0	0	0	0	0	0	0	0	0.0%	0.0
NE	0	0	0	0	0	0	0	0	0	0.0%	0.0
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	1	0	0	0	0	0	0	1	8.3%	2.1
SE	0	1	0	0	0	0	0	0	1	8.3%	3.1
SSE	0	1	3	0	0	0	0	0	4	33.3%	4.7
S	0	1	5	0	0	0	0	0	6	50.0%	5.4
SSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
Total	0	4	8	0	0	0	0	0	12		
% Of Total	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 4.7  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 0  
 Total number of Invalid hours : 0  
 Total number of Valid hours : 12  
 Total number of hours for period : 12

**Joint Frequency Table - Batch Release Hours**

**From** : 10/01/2012 00:00    **To** : 12/31/2012 23:00

**PRIMARY TOWER**

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**Joint Frequency Table - Batch Release Hours****From** : 10/01/2012 00:00 **To** : 12/31/2012 23:00**PRIMARY TOWER****STABILITY CLASS A**

<b>Wind Speed (MPH) -&gt;</b>	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
<b>Sector</b>											
N	0	0	0	6	8	0	0	0	14	13.9%	12.7
NNE	0	0	0	6	3	0	0	0	9	8.9%	11.7
NE	0	0	2	1	0	0	0	0	3	3.0%	7.0
ENE	0	0	0	0	0	0	0	0	0	0.0%	0.0
E	0	0	0	1	0	0	0	0	1	1.0%	9.4
ESE	0	0	0	2	0	0	0	0	2	2.0%	10.0
SE	0	1	0	9	6	0	0	0	16	15.8%	11.0
SSE	0	0	0	15	10	0	0	0	25	24.8%	12.4
S	0	0	3	18	1	0	0	0	22	21.8%	9.2
SSW	0	0	1	0	0	0	0	0	1	1.0%	5.6
SW	0	0	0	1	0	0	0	0	1	1.0%	7.9
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	1	0	0	0	0	0	1	1.0%	4.6
WNW	0	0	1	0	0	0	0	0	1	1.0%	3.6
NW	0	0	1	0	0	0	0	0	1	1.0%	6.9
NNW	0	0	2	1	1	0	0	0	4	4.0%	9.7
Total	0	1	11	60	29	0	0	0	101		
% Of Total	0.0%	1.0%	10.9%	59.4%	28.7%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 10.8  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830

**Joint Frequency Table - Batch Release Hours**

**From** : 10/01/2012 00:00 **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS B**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	1	2	0	0	0	0	3	5.3%	8.0
NNE	0	0	1	5	0	0	0	0	6	10.5%	8.2
NE	0	0	1	2	1	0	0	0	4	7.0%	9.9
ENE	0	0	2	1	1	0	0	0	4	7.0%	8.7
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	0	1	0	0	0	0	0	1	1.8%	6.1
SE	0	0	0	6	3	0	0	0	9	15.8%	11.3
SSE	0	0	0	6	3	0	0	0	9	15.8%	11.7
S	0	0	4	5	0	0	0	0	9	15.8%	7.5
SSW	0	0	2	0	0	0	0	0	2	3.5%	5.0
SW	0	0	2	0	0	0	0	0	2	3.5%	4.3
WSW	0	0	2	0	0	0	0	0	2	3.5%	5.1
W	0	0	1	0	0	0	0	0	1	1.8%	4.0
WNW	0	0	1	0	0	0	0	0	1	1.8%	4.0
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	0	4	0	0	0	0	0	4	7.0%	6.4
Total	0	0	22	27	8	0	0	0	57		
% Of Total	0.0%	0.0%	38.6%	47.4%	14.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 8.6  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830

**Joint Frequency Table - Batch Release Hours**

**From** : 10/01/2012 00:00 **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS C**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	0	1	1	0	0	0	0	2	4.0%	9.7
NNE	0	0	2	1	0	0	0	0	3	6.0%	7.3
NE	0	0	5	3	1	0	0	0	9	18.0%	7.9
ENE	0	0	2	1	0	0	0	0	3	6.0%	6.8
E	0	0	0	0	0	0	0	0	0	0.0%	0.0
ESE	0	0	0	1	0	0	0	0	1	2.0%	8.9
SE	0	0	1	3	2	0	0	0	6	12.0%	10.3
SSE	0	0	1	3	3	0	0	0	7	14.0%	10.8
S	0	0	6	1	2	0	0	0	9	18.0%	8.3
SSW	0	1	4	0	0	0	0	0	5	10.0%	4.4
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	1	0	0	0	0	0	0	1	2.0%	2.5
NNW	0	0	2	1	1	0	0	0	4	8.0%	8.2
Total	0	2	24	15	9	0	0	0	50		
% Of Total	0.0%	4.0%	48.0%	30.0%	18.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 8.2  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830

**Joint Frequency Table - Batch Release Hours**

**From** : 10/01/2012 00:00 **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS D**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	1	5	7	6	0	0	0	19	15.8%	9.8
NNE	0	3	6	7	1	0	0	0	17	14.2%	7.0
NE	0	1	6	2	1	0	0	0	10	8.3%	6.5
ENE	0	1	0	0	0	0	0	0	1	0.8%	3.1
E	0	1	3	0	0	0	0	0	4	3.3%	4.9
ESE	0	1	2	3	0	0	0	0	6	5.0%	6.7
SE	0	0	4	11	3	0	0	0	18	15.0%	9.7
SSE	0	0	1	9	2	0	0	0	12	10.0%	10.6
S	0	0	9	3	2	0	0	0	14	11.7%	7.8
SSW	0	1	2	0	0	0	0	0	3	2.5%	4.6
SW	0	1	1	0	0	0	0	0	2	1.7%	2.8
WSW	0	1	1	0	0	0	0	0	2	1.7%	3.8
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	2	0	0	0	0	0	0	2	1.7%	2.3
NW	0	0	1	1	0	0	0	0	2	1.7%	6.9
NNW	0	4	1	3	0	0	0	0	8	6.7%	6.1
Total	0	17	42	46	15	0	0	0	120		
% Of Total	0.0%	14.2%	35.0%	38.3%	12.5%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 7.8  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830

**Joint Frequency Table - Batch Release Hours**

**From** : 10/01/2012 00:00 **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS E**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	1	9	5	1	0	0	0	16	10.1%	6.9
NNE	0	3	15	11	1	0	0	0	30	18.9%	6.7
NE	0	2	3	2	0	0	0	0	7	4.4%	6.0
ENE	0	3	3	0	0	0	0	0	6	3.8%	3.8
E	0	0	3	0	0	0	0	0	3	1.9%	4.5
ESE	0	0	4	1	0	0	0	0	5	3.1%	6.5
SE	0	2	16	25	2	0	0	0	45	28.3%	7.9
SSE	0	0	6	16	5	0	0	0	27	17.0%	9.6
S	0	0	6	0	0	0	0	0	6	3.8%	5.5
SSW	0	0	2	0	0	0	0	0	2	1.3%	6.5
SW	0	0	2	0	0	0	0	0	2	1.3%	5.7
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	1	0	0	0	0	0	1	0.6%	6.4
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NNW	0	1	7	1	0	0	0	0	9	5.7%	5.6
Total	0	12	77	61	9	0	0	0	159		
% Of Total	0.0%	7.5%	48.4%	38.4%	5.7%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 7.2  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830

**Joint Frequency Table - Batch Release Hours**

**From** : 10/01/2012 00:00 **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS F**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	0	2	5	1	0	0	0	0	8	7.2%	5.1
NNE	0	2	3	0	0	0	0	0	5	4.5%	3.9
NE	0	4	2	0	0	0	0	0	6	5.4%	4.2
ENE	1	3	3	0	0	0	0	0	7	6.3%	2.8
E	0	3	5	0	0	0	0	0	8	7.2%	4.2
ESE	0	5	10	0	0	0	0	0	15	13.5%	4.2
SE	0	5	29	5	0	0	0	0	39	35.1%	5.6
SSE	0	4	10	1	0	0	0	0	15	13.5%	4.3
S	0	3	0	0	0	0	0	0	3	2.7%	2.5
SSW	0	2	0	0	0	0	0	0	2	1.8%	2.5
SW	0	0	0	0	0	0	0	0	0	0.0%	0.0
WSW	0	0	0	0	0	0	0	0	0	0.0%	0.0
W	0	0	0	0	0	0	0	0	0	0.0%	0.0
WNW	0	0	0	0	0	0	0	0	0	0.0%	0.0
NW	1	1	0	0	0	0	0	0	2	1.8%	1.5
NNW	0	0	1	0	0	0	0	0	1	0.9%	5.0
Total	2	34	68	7	0	0	0	0	111		
% Of Total	1.8%	30.6%	61.3%	6.3%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 4.5  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830

**Joint Frequency Table - Batch Release Hours**

**From** : 10/01/2012 00:00 **To** : 12/31/2012 23:00

**PRIMARY TOWER**

**STABILITY CLASS G**

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	1	7	4	0	0	0	0	0	12	5.4%	3.4
NNE	1	9	21	1	0	0	0	0	32	14.3%	4.4
NE	0	30	7	0	0	0	0	0	37	16.5%	2.6
ENE	2	31	2	0	0	0	0	0	35	15.6%	2.3
E	1	24	9	0	0	0	0	0	34	15.2%	2.9
ESE	0	15	3	0	0	0	0	0	18	8.0%	2.6
SE	0	19	6	0	0	0	0	0	25	11.2%	3.1
SSE	0	8	1	0	0	0	0	0	9	4.0%	2.5
S	0	3	0	0	0	0	0	0	3	1.3%	1.9
SSW	0	2	0	0	0	0	0	0	2	0.9%	2.3
SW	0	1	0	0	0	0	0	0	1	0.4%	1.5
WSW	0	1	0	0	0	0	0	0	1	0.4%	1.4
W	0	1	0	0	0	0	0	0	1	0.4%	1.5
WNW	0	1	0	0	0	0	0	0	1	0.4%	1.6
NW	0	5	0	0	0	0	0	0	5	2.2%	2.1
NNW	1	7	0	0	0	0	0	0	8	3.6%	2.1
Total	6	164	53	1	0	0	0	0	224		
% Of Total	2.7%	73.2%	23.7%	0.4%	0.0%	0.0%	0.0%	0.0%			

Average speed for this table (MPH): 2.9  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830

Batch Release

## Fourth Quarter 2012

Joint Frequency Tables

Joint Frequency Table - Batch Release HoursFrom : 10/01/2012 00:00 To : 12/31/2012 23:00PRIMARY TOWERALL STABILITY CLASSES COMBINED

Wind Speed (MPH) ->	(1) CALM	(2) 1.0 - 3.5	(3) 3.6 - 7.5	(4) 7.6 - 12.5	(5) 12.6 - 18.5	(6) 18.6 - 24.5	(7) 24.6 - 32.5	(8) 32.6 +	Total	% Of Total	Avg. Speed
Sector											
N	1	11	25	22	15	0	0	0	74	9.0%	8.1
NNE	1	17	48	31	5	0	0	0	102	12.4%	6.4
NE	0	37	26	10	3	0	0	0	76	9.2%	4.8
ENE	3	38	12	2	1	0	0	0	56	6.8%	3.2
E	1	28	20	1	0	0	0	0	50	6.1%	3.5
ESE	0	21	20	7	0	0	0	0	48	5.8%	4.5
SE	0	27	56	59	16	0	0	0	158	19.2%	7.4
SSE	0	12	19	50	23	0	0	0	104	12.7%	9.3
S	0	6	28	27	5	0	0	0	66	8.0%	7.6
SSW	0	6	11	0	0	0	0	0	17	2.1%	4.3
SW	0	2	5	1	0	0	0	0	8	1.0%	4.4
WSW	0	2	3	0	0	0	0	0	5	0.6%	3.8
W	0	1	3	0	0	0	0	0	4	0.5%	4.1
WNW	0	3	2	0	0	0	0	0	5	0.6%	2.8
NW	1	7	2	1	0	0	0	0	11	1.3%	3.3
NNW	1	12	17	6	2	0	0	0	38	4.6%	5.7
Total	8	230	297	217	70	0	0	0	822		
% Of Total	1.0%	28.0%	36.1%	26.4%	8.5%	0.0%	0.0%	0.0%			

Average speed for this table (MPH) : 6.4  
 Hours in above table with variable direction : 0  
 Total number of CALMs : 8  
 Total number of Invalid hours : 8  
 Total number of Valid hours : 822  
 Total number of hours for period : 830