PROGRAM DESCRIPTION

The South Texas Project initiated a comprehensive pre-operational Radiological Environmental Monitoring Program in July 1985. That program terminated on March 7, 1988, when the operational program was implemented. The pre-operational monitoring program data forms the baseline against which operational changes are measured.

Critical pathway analysis requires that samples be taken from water, air, and land environments. These samples are obtained to evaluate potential radiation exposure. Sample types are based on established pathways and experience gained at other nuclear facilities. Sample locations were determined after considering site meteorology, Colorado River hydrology, local demography, and land use. Sampling locations are further evaluated and modified according to field and analysis experience. Table 1 at the end of this section lists the minimum sampling locations and frequency of collection.

Sampling locations consist of indicator and control stations. Indicator stations are locations on or off the site that may be influenced by plant discharges during plant operation. Control stations are located beyond the measurable influence of the South Texas Project or any other nuclear facility. Although most samples analyzed are accompanied by a control sample, it should be noted that this practice is not always possible or meaningful with all sample types. Fluctuations in the concentration of radionuclides and direct radiation exposure at indicator stations are evaluated in relation to historical data and against the control stations. Indicator stations are compared with characteristics identified during the pre-operational program to monitor for radiological effects from plant operation.

Several sample identification methods are used to implement the program. Figures 6-1 and 6-2 are maps that identify permanent sample stations. Descriptions of sample stations shown on Figure 6-1 and 6-2 are found in Table 2. Table 2 also includes additional sampling locations and media types that may be used for additional information. Figure 6-3 illustrates the zones used when collection locations are not permanent sample stations.

NEI GROUNDWATER PROTECTION INITIATIVE

During 2006, the Nuclear Energy Institute sponsored a task force to establish consistent methods and approaches to the monitoring and reporting of information about radioactive isotopes in groundwater, the resulting program is called the NEI Groundwater Protection Initiative. In 2006 the South Texas Project participated in the task force and has implemented the recommendations from NEI 07-07 "Industry Ground Water Protection Initiative" and other industry guidance.

During 2005 several shallow aquifer wells were sampled within the immediate plant grounds and had positive values that were below the EPA drinking water limit of 20,000 pCi/kg. The positive results were attributed to an underground pipe that leaked and was repaired several years ago. To monitor this tritium, several shallow aquifer test wells were added to the sampling schedule inside the protected area, the area enclosed within the security fence, during 2008. Two of the wells, between the two units, were positive and have been sampled quarterly. The concentration of one well has remained fairly constant at approximately 1,250 pCi/kg and the other has decreased from approximately 15,000 to 6,600 pCi/kg. Three wells that had no detectable tritium are sampled annually to determine if there is movement of

Designated Sample Locations

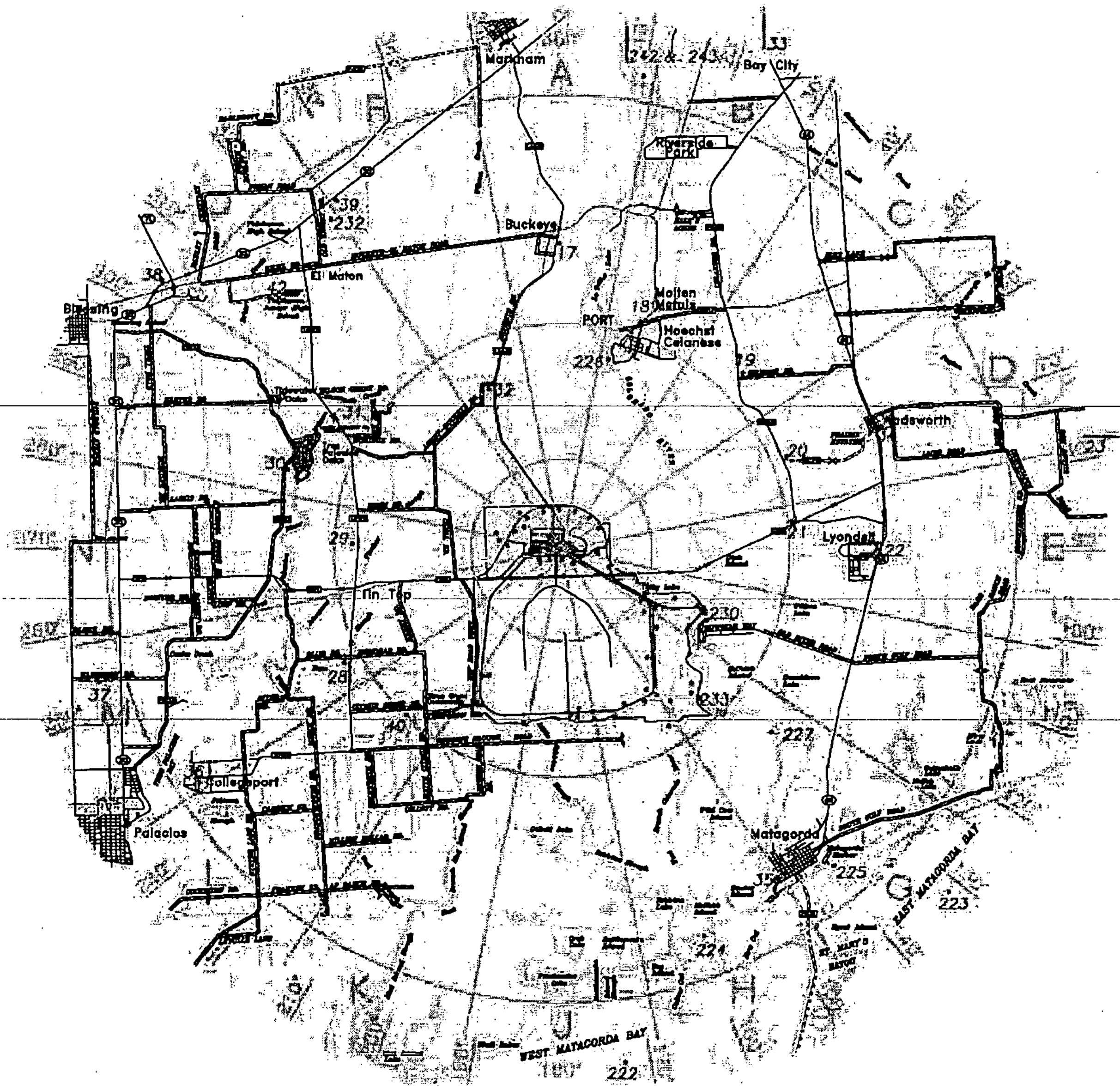


Figure 6-1

REMP ON SITE LOCATIONS

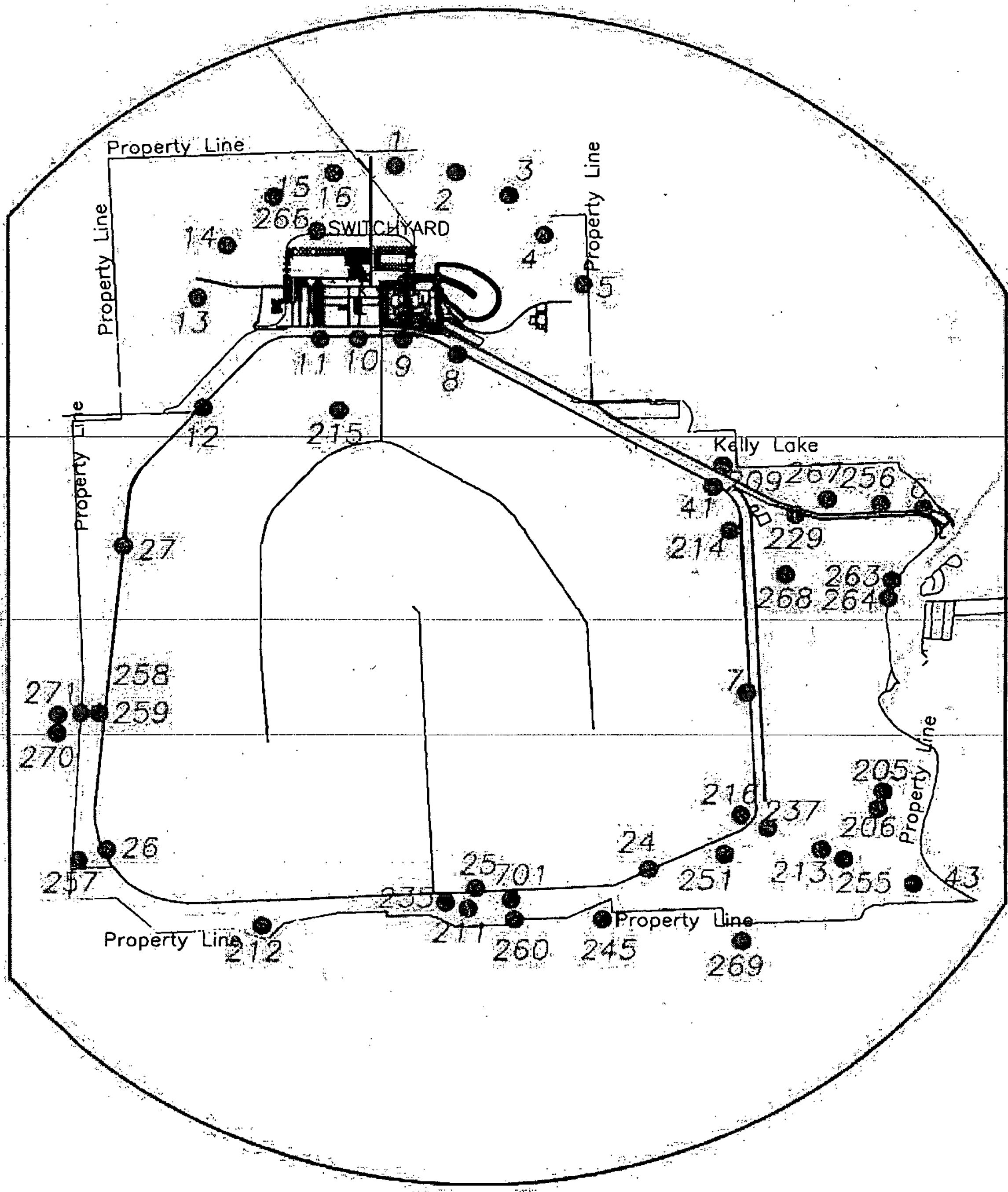
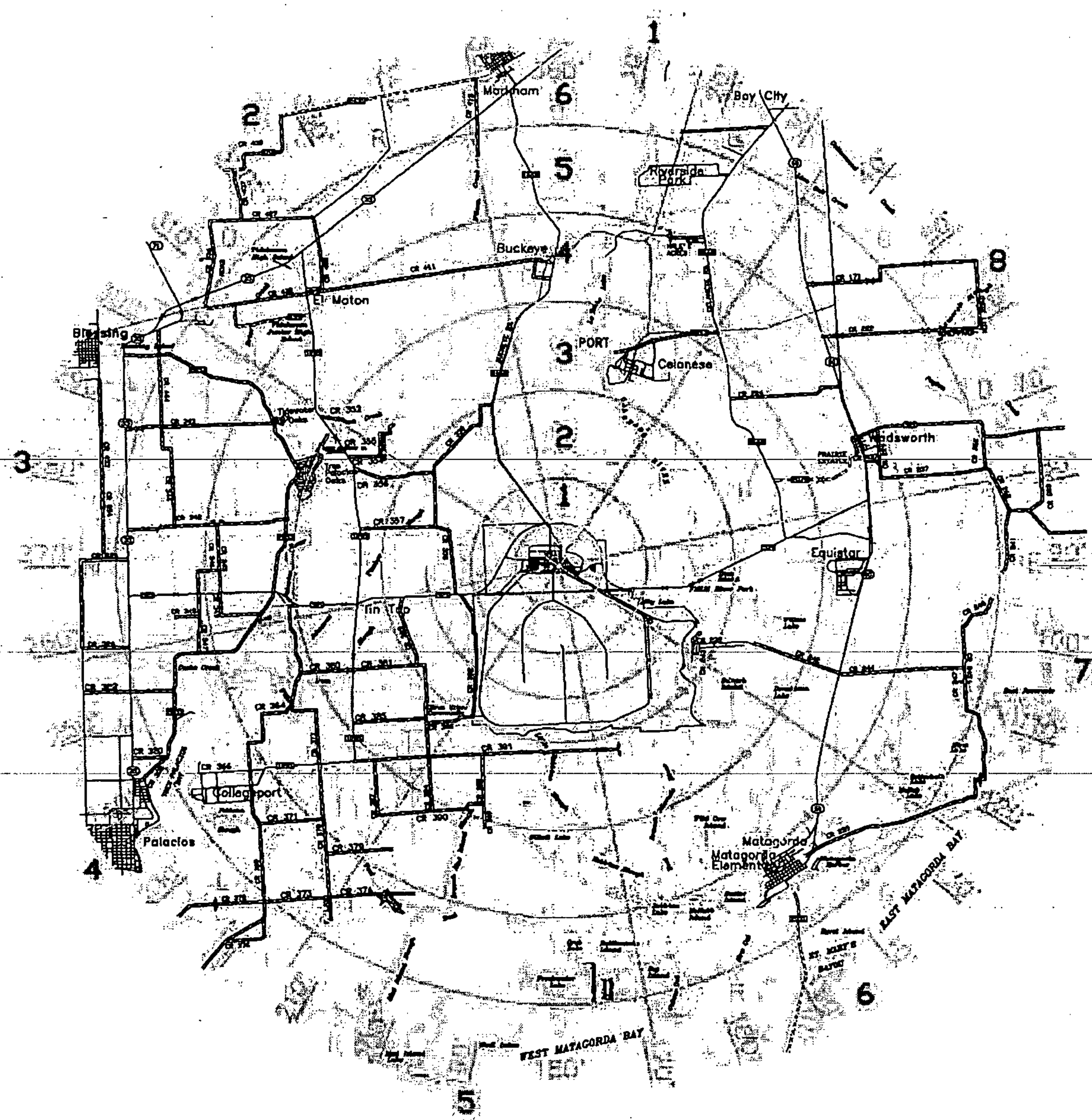


Figure 6-2

ZONE LOCATION MAP



The zone station number is determined in the following manner:

*The first character of the stationnumber "Z" to identify it as a zone station.
*The second character is the direction coordinate numbers 1-8.
*The third character is the distance from the site number 1-6.

Figure 6-3

the tritium in the protected area. These three wells continue to have no detectable tritium. During 2008, three additional wells were installed in the protected area near Unit 1 on the east side. This was suggested during a hydrology study due to the direction of flow of the shallow aquifer and the lack of appropriate wells to sample on the east side of the plants. The samples collected from these wells contained no detectable tritium.

As discussed in previous reports, the tritium has been monitored in the shallow aquifer for several years on the south side of the Main Cooling Reservoir. This was predicted by models used when licensing the site, and validated with additional studies for Units 3 & 4. A site conceptual model developed in 2008 to implement the Groundwater Protection Initiative validated the original predictions of the site hydrology. The models predicted that the tritium would be at the highest concentration in the shallow aquifer on the southeast side of the Main Cooling Reservoir. This prediction has shown to be true with the positive results from station #251 and station #235 which have been sampled for several years and is discussed later in this report. To enhance the database, shallow aquifer wells onsite were added to the environmental program in 2007. Station #259 and #258, on the west side of the Main Cooling Reservoir, are the only wells added that had detectable tritium, and the concentrations were very low (200 to 600 pCi/kg). In the last quarter of 2008 two additional wells, #270 and #271 were installed west of the fence line near #258 and #259. Well #270 is in the lower shallow aquifer, and was also at a very low concentration of approximately 500 pCi/kilogram. Well #271 in the upper shallow aquifer was below measurable concentrations. This data indicates that the model used during the licensing phase appears to predict the movement of tritium in the shallow aquifer correctly.

During 2008, there were two occurrences of water leaking onto the ground. One was from a small pipe break. The second was from a resin box overflow. These leaks were promply identifed, stopped and evaluated under site programs and procedures. Information is recorded in the Corrective Action Program database. The evaluations revealed that there was no release to an unidentified pathway, no radioactive material was released offsite, and there was no impact to drinking water or the health and safety of the public.

ANALYSIS OF RESULTS AND TRENDS

Environmental samples from areas surrounding the South Texas Project continue to indicate no significant radiological effects from plant operation. Analytical values from offsite indicator sample stations continue to trend with the control stations. Onsite indicator samples continued to increase or decrease in measured values at their expected rates.

Average quarterly beta activity from three onsite indicator stations and a single control station for air particulate samples have been compared historically from 1988 through 2008 (see Figure 6-4). The average of the onsite indicators trends closely with the offsite control values. The comparison illustrates that plant operations are not having an impact on air particulate activity even at the Sensitive Indicator Stations (#1, #15, and #16). These stations are located near the plant downwind from the plant, based on the prevailing wind direction. The beta activity measured in the air particulate samples is from natural radioactive material. Gamma analysis is performed on quarterly composites of the air particulate samples to determine if any activity is from the South Texas Project. The gamma analysis revealed that it was all natural radioactivity.

Direct gamma radiation is monitored in the environment by thermoluminescent dosimeters located at 40 sites. The natural direct gamma radiation varies according to location because of differences in the natural radioactive materials in the soil, its moisture content, and the vegetation cover. Figure 6-5 compares the amount of direct gamma radiation measured at the plant since the fourth quarter of 1985 for three different types of stations. The Control Stations are greater than 10 miles from the site and are in the direction of the least prevailing winds (Stations #23 and #37). The Sensitive Indicator Stations are in the directions that the wind blows most often and are one mile from the power plants on Farm-to-

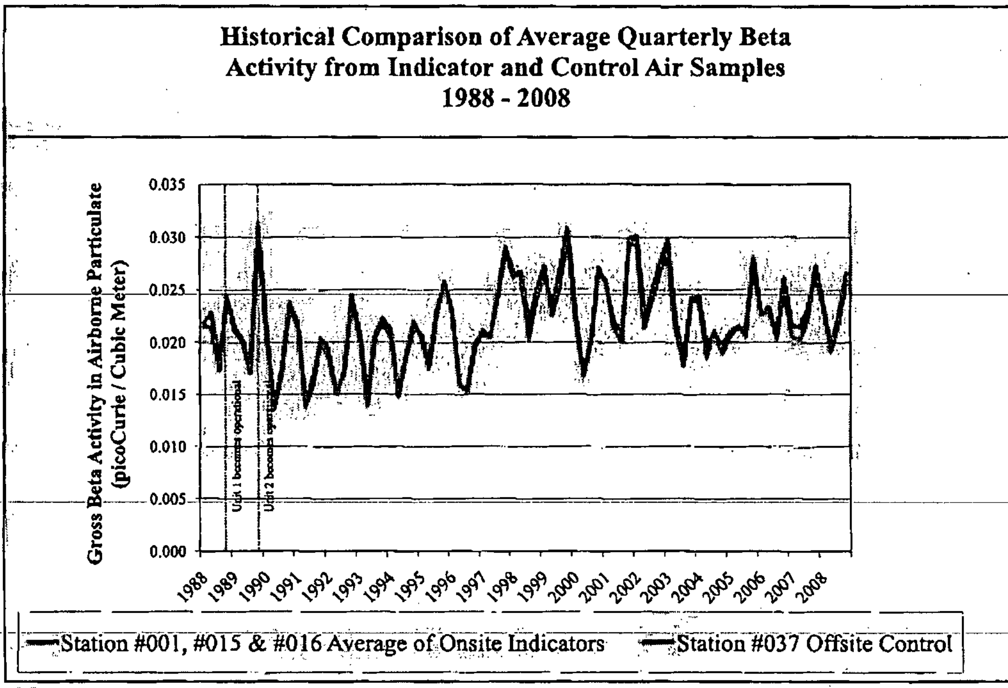


Figure 6-4

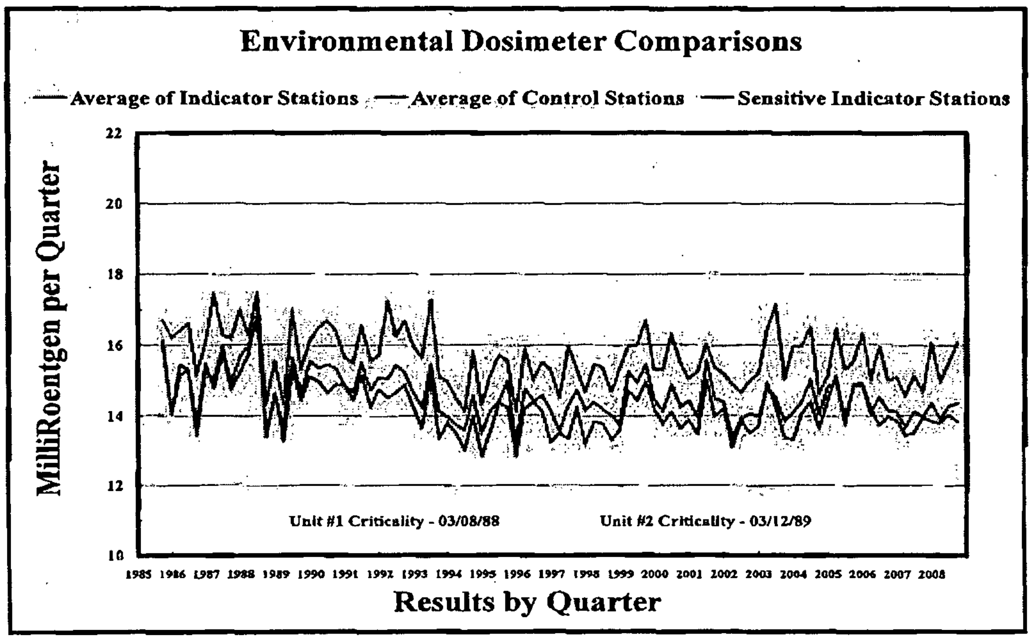


Figure 6-5

Market Road 521 (Stations #1, #15 and #16). The Indicator Stations are the remainder of the stations excluding Stations #38, 40, and 42. The values plotted are the averages for all of the stations according to type. Figure 6-5 indicates changing conditions in the area of the individual stations. The average of the Control Stations is higher than the other stations because station #23 is in an area that has a slightly higher natural background radiation, probably due to the soil composition. The trends of Figure 6-5

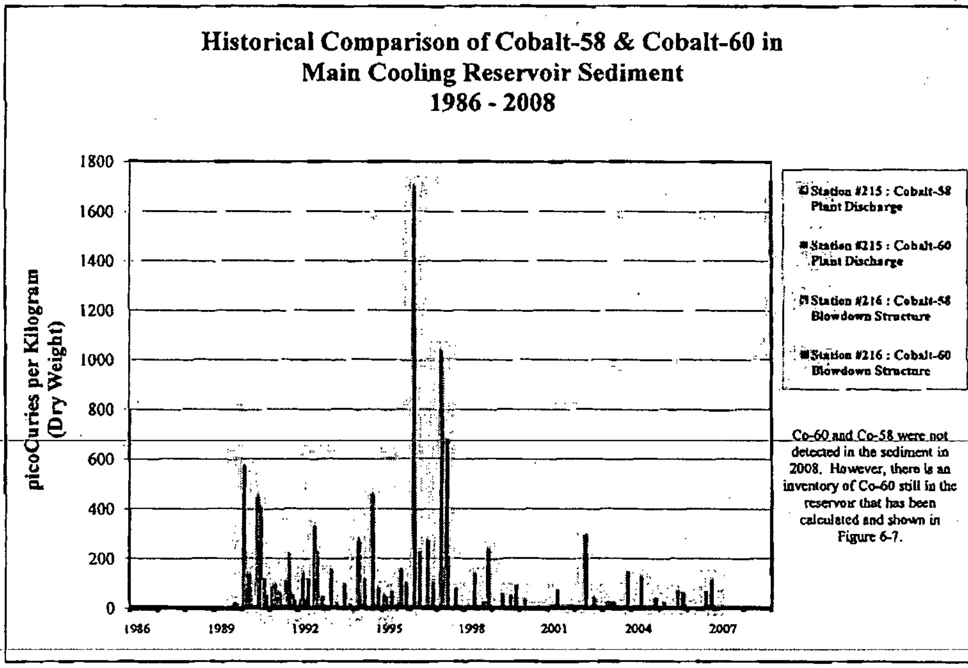


Figure 6-6

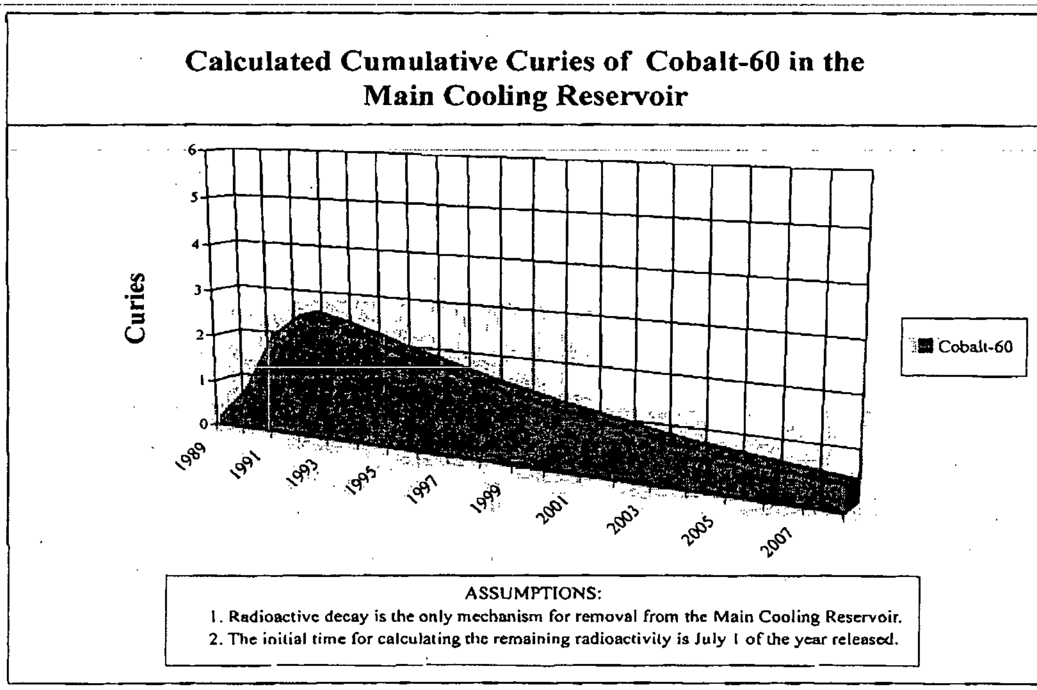


Figure 6-7

clearly show that the power plants are not adding to the direct radiation in the environment.

Bottom sediment samples are taken from the Main Cooling Reservoir each year. Figure 6-6 shows the positive results from two plant-produced radioactive materials, Cobalt-58 and Cobalt-60. The Cobalt-58 and Cobalt-60 inventory in the reservoir has decreased since 1992 because of equipment installed to reduce radioactive effluents. The amount of Cobalt-58 has decreased below levels that can be reliably detected. In 2008, Cobalt-60 could not be detected in the reservoir bottom sediment samples. Figure 6-7 demonstrates the decline in the total amount of Cobalt-60 in the reservoir.

Cesium-137 was measured in one of the Main Cooling Reservoir bottom sediment samples. However, Cesium-137 was present in the environment before the operation of the South Texas Project, and the sample concentrations were approximately equal to pre-operational values. The Cesium-137 measured in the Main Cooling Reservoir does not suggest an increase due to plant operation.

Tritium is a radioactive isotope of hydrogen and is produced during plant operation. Tritium produced in the reactors is a part of the water molecule. Wastewater is treated to remove impurities before release, but tritium cannot be removed because it is chemically part of the water molecule. Some of the tritium is released into the atmosphere, and the remainder is released into the Main Cooling Reservoir. The

Historical Comparison of Tritium Added to and Remaining in the Main Cooling Reservoir 1989 - 2008

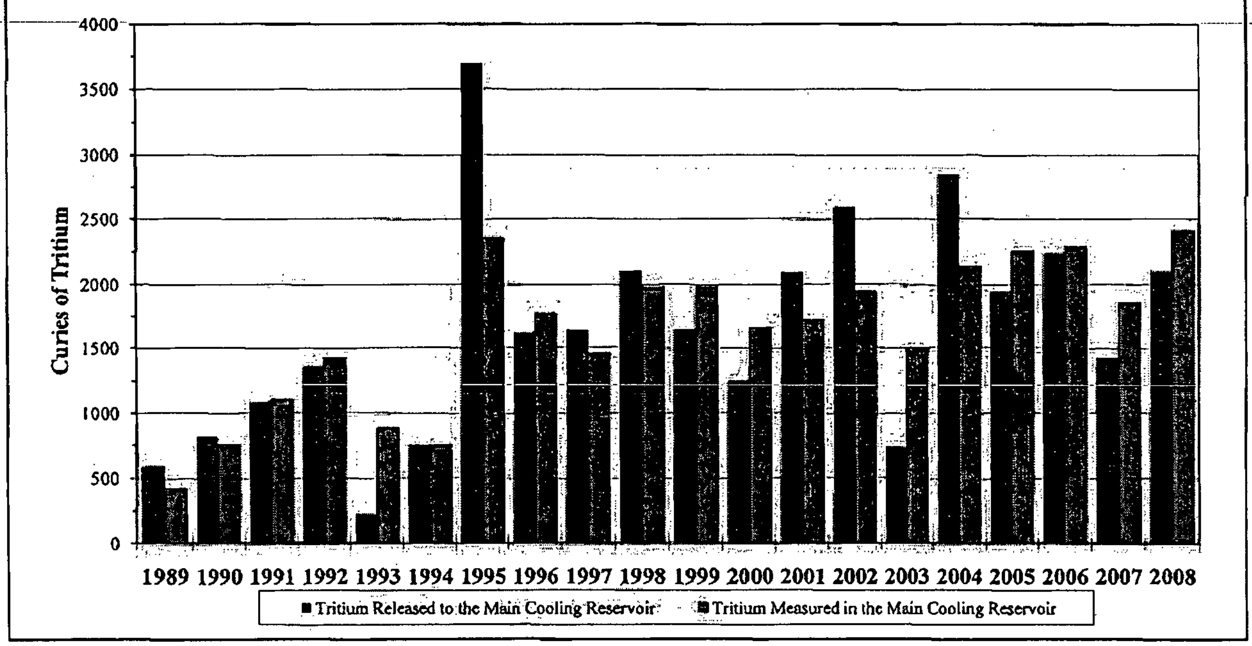


Figure 6-8

tritium escapes from the Main Cooling Reservoir by evaporation, movement into the shallow aquifer, and by percolation from the relief wells that are a part of the dike's stabilization system. Figure 6-8 shows the amount of tritium released to the Main Cooling Reservoir each year and the amount present during the last quarter of each year. This indicates that almost half of the tritium is removed from the reservoir annually. Rainwater was collected and analyzed during 2008 to determine if the tritium remained in the local area. Tritium was not found in any rainwater samples.

The concentration of tritium in the Main Cooling Reservoir increased in 2008, probably due to the limited rainfall and minimal makeup from the river in 2008, which normally dilutes the concentration of tritium in the Main Cooling Reservoir and the shallow aquifer surrounding it. This effect of the reduced rainfall has induced higher concentrations in the shallow aquifer wells and surface waters across the site.

Historical Comparison of Tritium Activity in Reservoir Relief Wells 1990 - 2008

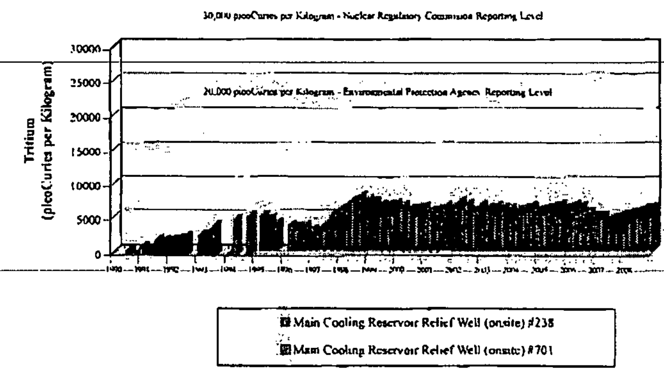


Figure 6-9

Historical Comparison of Tritium Activity in Surface Water 1988 - 2008

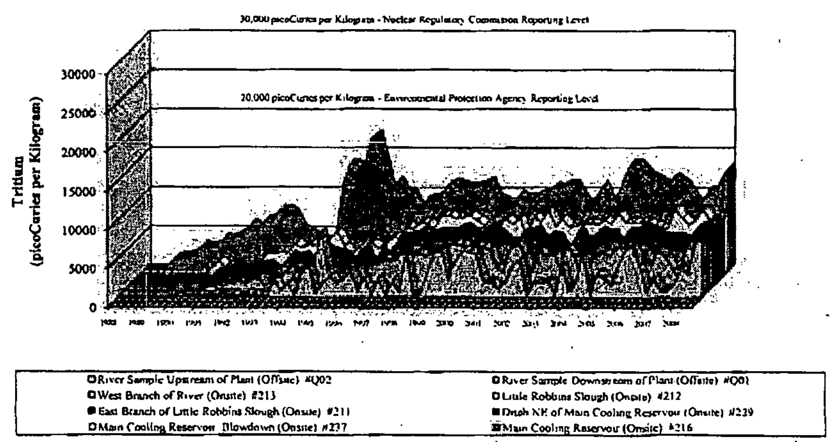


Figure 6-10

Slightly increased tritium released from the plant to the Main Cooling Reservoir may have also contributed. Tritium enters the sloughs and ditches of the site as runoff from the relief wells that surround the reservoir. Examples of tritium in the relief wells are shown in Figure 6-9. Relief well #238 was sampled until a more dependable relief well #701 was identified. The tritium concentration in eight surface water sample points for 1988 through 2008 is shown in Figure 6-10. The specific sample point locations can be found in Table 2. Tritium levels in the onsite sloughs and ditches vary due to the concentration in the reservoir and the amount of rainfall received. The average tritium concentration in the sloughs and ditches should never equal that of the reservoir because it decays as it migrates through the dike relief well system and is also diluted by rainwater.

Tritium was identified in the shallow (ten to thirty feet deep) aquifer test well #235, approximately seventy-five yards south of the reservoir dike base during 1999. In 2008, the concentration of well #235 has remained fairly constant. Figure 6-11 indicates that the tritium concentration is increased but bounded by previous values measured in 2001. In 2008, samples were collected from the shallow aquifer well #251 southeast of the Main Cooling Reservoir. Samples have been collected quarterly and the tritium levels have remained near that of the relief wells. The results of the analysis from these two shallow aquifer wells are shown in Figure 6-11. Wells #258 and #259 on the west side of the site have been sampled since 2006. Wells #270 and #271 were installed during the last quarter of 2008. The results are shown in Figure 6-12. The concentrations are consistent with the original model for the site and confirm there is no negative impact to the health and safety of the public or the environment.

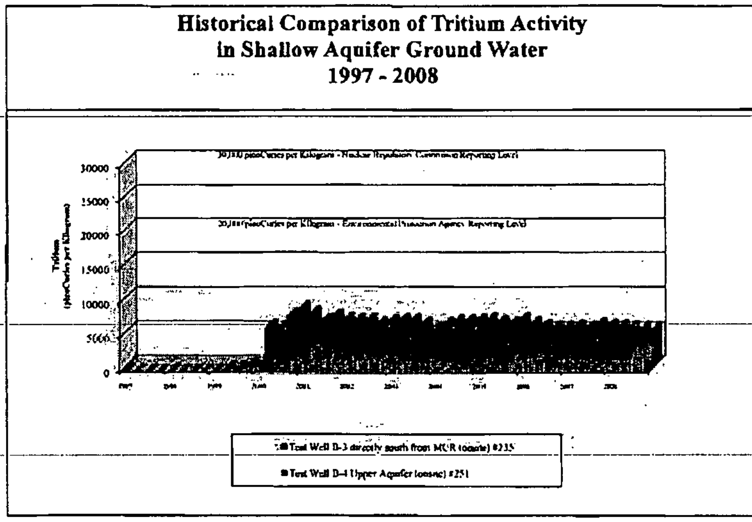


Figure 6-11

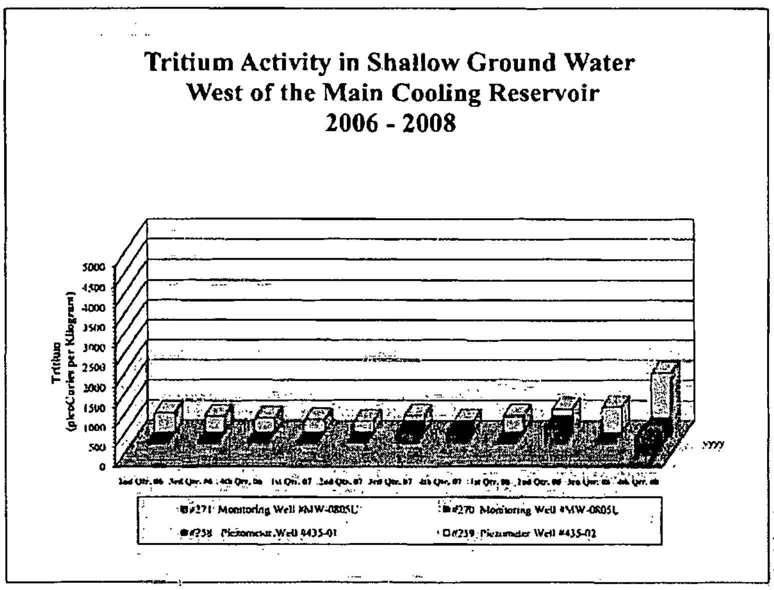


Figure 6-12

The drinking water onsite is pumped from deep aquifer wells and is tested quarterly to verify tritium is not present. Water from the reservoir and other surface water onsite is not used as drinking water. The maximum dose that any individual can receive from tritium in surface water is less than one millirem in a year. This is insignificant compared to the approximate 620 mrem the public receives a year from natural radioactivity in the environment and the radiation received from medical procedures. The current reservoir concentration is less than half the reporting level.

In preparation for the construction of Units 3 & 4, approximately 20 geological test wells were installed within 200 yards of the reservoir dike on the north side. These wells were sampled as they were installed and approximately half had very low levels of tritium at a fraction of the concentration of the reservoir. This was expected because of their close proximity to the Main Cooling Reservoir.

Some samples are collected and analyzed in addition to those required by our licensing documents or internal procedures. These samples are obtained to give additional assurance that the public and the environment are protected from any adverse effects from the plant. These samples include pasture grass, sediment samples, rain water, shallow aquifer well water, water from various ditches and sloughs onsite, and air samples near communities or other areas of interest. The results of these analyses indicate that there is no detectable radiological effect on the environment by plant operation.

LAND USE CENSUS

Sector	Distance (approx miles)	Location
ENE	4.5	CR 232 (Ryman Road)
ESE	3.5	Selkirk Island
SE	3.5	Selkirk Island
SW	4.5	CR 386 (Corporon Road)
WSW	2.5	FM 521
W	4.5	FM 1095
WNW	4.5	CR 356 (Ashby-Buckeye Road)
NW	4.5	CR 354 (Mondrik Road)
NNW	3.5	Runnells Ranch (FM 1468)
N	3.5	Runnells Ranch (FM 1468)

The Annual Land Use Census is performed to determine if any changes have occurred in the location of residents and the use of the land within five miles of the South Texas Project generating units. The information is used to determine whether any changes are needed in the Radiological Environmental Monitoring Program. The census is performed by contacting area residents and local government agencies that provide the information. The results of the survey indicated that no changes were required.

In addition, a survey is performed to verify the nearest residents within five miles of the South Texas Project generating units in each of 16 sectors. The ten sectors that have residents within five miles and the distance to the nearest residence in each sector are listed above.