2.11 Lower Limit of Detection (LLD)

The LLD (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.

2.12 Dose to MEMBERS OF THE PUBLIC On Site

MEMBERS OF THE PUBLIC due to their activities within the SITE BOUNDARY may be subject to direct radiation exposure at extremely low levels. MEMBERS OF THE PUBLIC are permitted to skirt the site boundary (1500 meters out) on Farm to Market Highway #521 for about five miles. MEMBERS OF THE PUBLIC are also allowed access to the visitor's center which is within the site boundary about 1600 meters from either Unit 1 or Unit 2.

Appendix A is a summary of the dose rates measured by TLD's placed within the Protected Area fence around the Units (about 133 meters from either unit). The average dose rates measured by these TLD's are listed in Appendix A page 152. The average dose rate measured in the vicinity of STPEGS by the Radiological Environmental Monitoring Program was about 15.4 mrem/quarter in 1986, the year before plant operation began. Hence the average dose rate near the plant was lower than the pre-operational dose rate with the exception of one measurement station (location 1-03 of the accompanying figure). This station is midway between the security fence surrounding Unit 1 and a radioactive waste loading area. The dose rate in this area is about 31.8 mrem/quarter. Normal visits of a few hours to the visitor's center, tours of the site (typically outside the Protected Area fence), or daily trips past the site on FM #521 should have resulted in an annual maximum dose to a MEMBER OF THE PUBLIC of less than 1 mrem/year. The following example calculations support this assertion.

Dose to MEMBER OF PUBLIC at Visitor's Center

The dose to a MEMBER OF THE PUBLIC at the visitor's center may be estimated as follows:

dose rate = 0.0 mrem/quarter * 0.00046 quarters/hr * $(133/1600)^2$

= 0.0 mrem/hr

where 133 = distance from Unit 1 center line Protected Area fence, meters

1600 = distance to visitor's center from Unit 1, meters

dose = 0.0 mrem/hr * 2 hr/visit * 2 visits/yr

= 0.0 mrem

Dose to MEMBER OF THE PUBLIC Touring the Site

The dose to a MEMBER OF THE PUBLIC touring the site outside of the Protected Area may be estimated as follows:

dose rate = 16.4/4 mrem/quarter * 0.00046 quarters/hr

= 0.00189 mrem/hr

where = 16.4 mrem/quarter is the dose rate at location 1-03 and is taken as the worst possible exposure case (31.8-15.4 mrem/quarter).

4 = is the reduction factor between the measurement location and the Protected Area fence

dose = 0.00189 mrem/hr * 0.5 hr/tour * 2 tours/year

= 0.00189 mrem/yr

1989 STPEGS PROTECTED AREA TLD MONITORING STATIONS (PAMs)

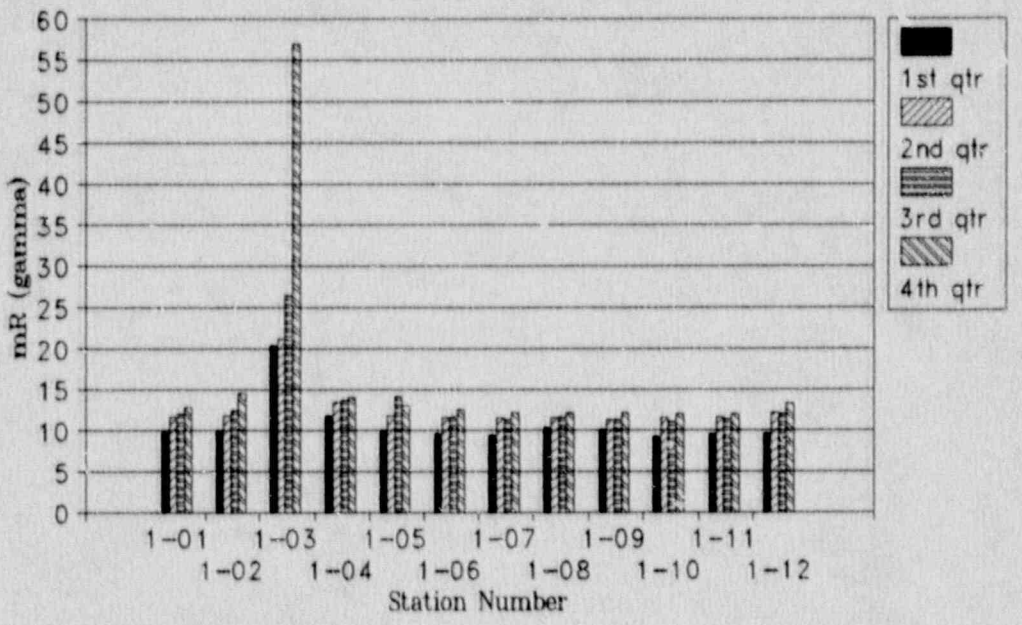
STATION NUMBER	1st qtr average	2nd qtr average	3rd qtr average	4th qtr average	Annual Average by quarter	by month	annual total
1-01	11.0	11.6	12.0	12.7	11.8	3.9	47.3
1-02	11.1	11.7	12.4	14.5	12.4	4.1	49.6
1-03	22.9	21.0	26.3	56.9	31.8	10.6	127.2
1-04	13.2	13.3	13.6	14.0	13.5	4.5	54.1
1-05	11.2	11.7	14.1	13.0	12.5	4.2	50.0
1-06	10.9	11.5	11.6	12.5	11.6	3.9	46.4
1-07	10.5	11.4	11.1	12.0	11.3	3.8	45.1
1-08	11.6	11.5	11.6	15.1	12.4	4.1	49.7
1-09	11.3	11.1	11.2	12.0	11.4	3.8	45.7
1-10	10.4	11.5	11.0	11.9	11.2	3.7	44.7
1-11	10.6	11.6	11.3	11.9	11.4	3.8	45.4
1-12	10.8	12.0	12.0	13.2	12.0	4.0	47.9
2-01	n/a	12.0	11.5	11.8	11.8	3.9	47.1
2-02	n/a	11.4	10.7	11.1	11.1	3.7	44.2
2-03	n/a	12.1	11.6	12.5	12.1	4.0	48.3
2-04	n/a	11.6	10.9	12.1	11.5	3.8	46.1
2-05	n/a	12.5	11.7	13.2	12.4	4.1	49.8
2-06	n/a	12.5	11.2	11.9	11.9	4.0	47.6
2-07	n/a	12.4	11.3	12.8	12.2	4.1	48.7
2-08	n/a	12.5	12.4	13.4	12.8	4.3	51.1
2-09	n/a	12.4	11.6	12.4	12.1	4.0	48.5

NOTES :
a) values are calculated from $CaSO_4$ TLD elements only (E3 & E4)
b) all results normalized to a 91 day quarter
c) no PAMs were in place around Unit II during the first quarter
d) annual total extrapolated from the calculated monthly average

$$\frac{\text{(sum of quarter averages X 4 quarters/yr.)}}{\text{(number of quarters measurements were taken)}} = \text{(annual total)}$$

STPEGS Unit I 1989 PATMS

Quarterly Exposure By Station



STPEGS Unit II 1989 PATMS

Quarterly Exposure By Station