LONG ISLAND LIGHTING COMPANY

OFFSITE DOSE CALCULATION MANUAL

Revision 14 - January 1989

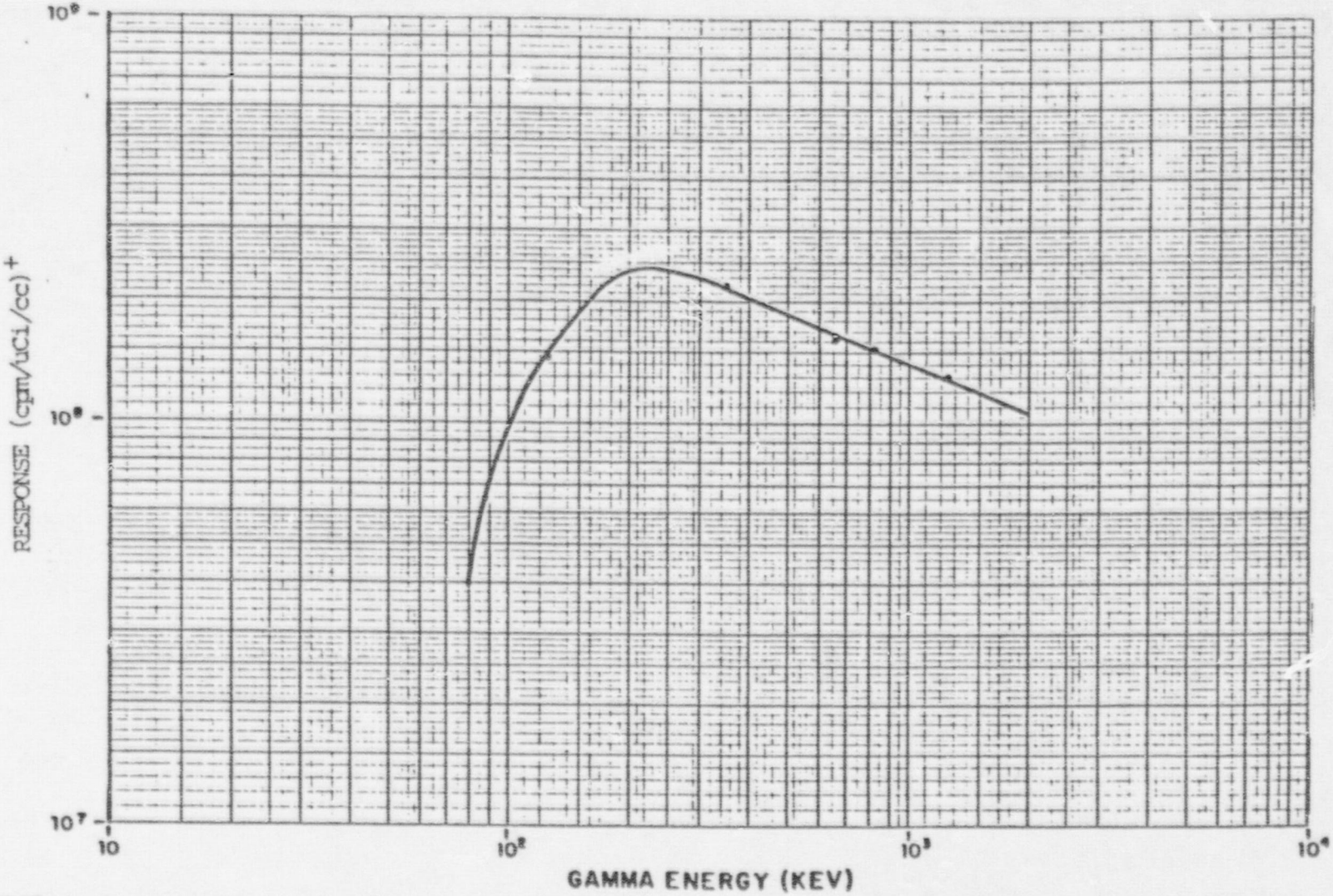
List of Effective Pages

Page, Table (T), or Figure (F)	Revision Number
EP-1	14
EP-2	14
i	3
ii thru vi	13
vii	14
1-1	8
2.1-1	10
2.1-2	2
2.1-3	8
2.1-4	8
2.1-5	8
2.1-6	8
2.1-7	13
F2.1-1	14
F2.1-2	14
2.2-1	1
2.2-2 thru 2.2-5	3
2.2-6 thru 2.2-8	6
T2.2-1	10
F2.2-1	3
F2.2-2 thru F2.2-4	1
F2.2-5 thru F2.2-6	7
3.0-1	10
3.1-1	8
3.1-2	8
3.1-3 thru 3.1-5	8
3.1-6	1
T3.1-1	3
T3.1-2	3
F3.1-1	1
F3.1-2	11
3.2-1	11
3.3-1	4
3.3-2 thru 3.3-4	3
3.3-5	9
3.3-6 thru 3.3-8	13
F3.3-1	10
3.4-1	4
3.4-2	3
3.4-3	9
3.4-4 and 3.4-5	13
T3.4-1	1
3.5-1	4
3.5-2	10
3.5-3 thru 3.5-6	3
3.5-7	13
3.5-8	10
3.5-9	13
3.5-10	13

List of Effective Pages (Cont'd.)

Page, Table (T), or Figure (F)	Revision Number
3.5-11	14
3.5-12	14
3.5.13	13
T3.5-1, p. 1/3	10
T3.5-1, pp. 2/3 and 3/3	1
T3.5-2	1
T3.5-3	1
T3.5-4	1
T3.5-5	3
T3.5-6	1
T3.5-7	1
T3.5-8	13
T3.5-9	3
T3.5-10	3
T3.5-11	3
T3.5-12	3
T3.5-13	3
T3.5-14	3
T3.5-15	3
T3.5-16	3
T3.5-17	14
3.6-1	1
F3.6-1	1
3.7-i	2
4-1	8
4-2 thru 4-3	4
T4-1	13
T4-2	13
5-1	10
T5-1, p. 1/5	10
T5-1, pp. 2/5 thru 3/5	4
T5-1, p. 4/5	1
T5-1, p. 5/5	4
T5-2	14
T5-3	10
T5-4	10
T5-5	13
F5-1	10
F5-2	12
6-1	3
A-1	8
B-1	3

LIST OF FIGURES



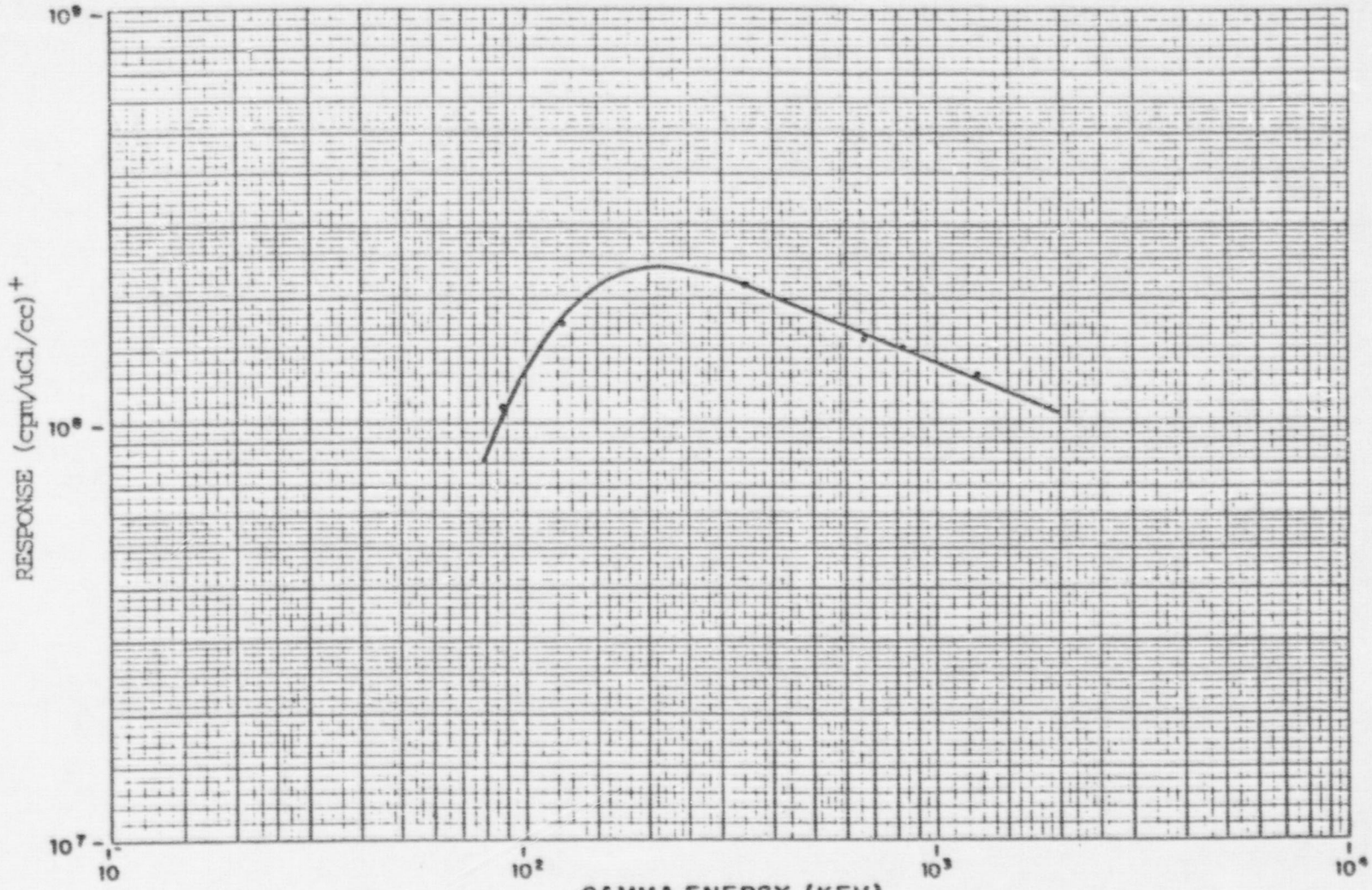
SOURCE:

C-RPD-482, Rev. 0

+ normalized to 1 photon/disintegration

FIGURE 2.1-1

DETECTOR RE-13
RESPONSE VS. GAMMA ENERGY
SHOREHAM NUCLEAR POWER STATION-UNIT 1
OFFSITE DOSE CALCULATION MANUAL



SOURCE:

C-RPD-490, Rev. 0

+ normalized to 1 photon/disintegration

FIGURE 2.1-2

DETECTORS RE-23A, RE-23B and RE-79
RESPONSE VS. GAMMA ENERGY
SHOREHAM NUCLEAR POWER STATION-UNIT 1
OFFSITE DOSE CALCULATION MANUAL

3.5.2 Method 2: (Backup Method)

3.5.2.1 Organ Doses:

$$D_j = 3.17E\text{-}08 * \sum_i [(10^6 * R_a * P_{ij} * \chi/Q_1 + P_{oij} * D/Q_1) * (C_{i1} * V_1 * t_1 - C_{i2} * V_2 * t_2 - C_{i3} * V_3 * t_3)] + 3.17E\text{-}08 * V_2 * t_2 * \sum_i [(10^6 * R_a * P_{ij} * \chi/Q_2 + P_{oij} * D/Q_2) * C_{i2}] + 3.17E\text{-}08 * V_3 * t_3 * \sum_i [(10^6 * R_a * P_{ij} * \chi/Q_2 + P_{oij} * D/Q_3) * C_{i3}] \quad \text{(mrem)}$$

(3.5.2-1)

During periods of no intermittent releases, such as no main condenser air removal pump operation and no containment drywell purge, the above formula reduces to the following:

$$D_j = 3.17E\text{-}08 * V_1 * t_1 * \sum_i [(10^6 * R_a * P_{ij} * \chi/Q_1 + P_{oij} * D/Q_1) * C_{i1}] \quad \text{(mrem)}$$

(3.5.2-2)

If main condenser air removal is performed by the mechanical pump and the sampling is performed at the Station Vent, the following equation should be used:

$$D_j = 3.17 * 10^{-8} * V_1 * t_2 * \sum_i [(10^6 * R_a * P_{ij} * \chi/Q_2 + P_{oij} * D/Q_2) * C_{i1}] \quad \text{(mrem)}$$

(3.5.2-3)

where:

D_j = total dose to organ j (mrem),

P_{ij} = the inhalation dose conversion factor for radionuclides, i, (other than noble gases), and organ j, (mrem per pCi inhaled) from Table 3.5-4.

P_{ij} values listed in Table 3.5-17 are the dose rate conversion factors for tritium and carbon-14 from ingestion of goat's milk.

Note: For short term releases such as from condenser air removal pump or containment drywell purge P_{ij} for C-14 must be adjusted (see note in Table 3.5-17)

R_a = inhalation rate (m^3/yr) from Table 3.5-5,

P_{oij} = the dose conversion factor for radionuclides, other than noble gases, i, and organ j, for goat milk in m^2(mrem/yr per uCi/sec) from Table 3.5-14.

The dose factors P_{ij}, P_{oij} are based on the critical individual organ for the infant group, since this group is most restrictive.

t_1 = 7.88E+06 sec for quarterly dose calculation
= 3.15E+07 sec for yearly dose calculation,

t_2 = release period (sec) for condenser air removal pump,

t_3 = release period (sec) for containment drywell purge exhaust,

C_{i1} = the station ventilation exhaust duct release concentration of radionuclide, i, (uCi/cc) (from the isotopic analyses performed on the iodine and filter cartridge taken from the station ventilation exhaust monitor),

C_{i2} = the air removal pump ventilation exhaust duct release concentration of radionuclide, i, (uCi/cc) (from the isotopic analyses performed on the iodine and particulate filters taken from the air removal pump discharge monitor),

C_{i3} = the containment drywell purge ventilation exhaust concentration of radionuclide, i, (uCi/cc) obtained from the iodine and particulate filters during a filtered release or from the containment drywell atmosphere monitor with the purge lines bypassing the primary containment purge filter (The concentration is obtained from the isotopic analyses performed on the iodine and particulate filters.),

V_1 = 1.73E+08 cc/sec (3.66E+05 cfm), station ventilation exhaust duct ventilation exhaust flow rate,

V_2 = 5.70E+05 cc/sec (1200 cfm), air removal pump exhaust duct ventilation exhaust flow rate,

V_3 = 5.70E+05 cc/sec (1200 cfm), containment drywell purge ventilation exhaust flow rate,

χ/Q_1 = long term dispersion factor due to releases via the station ventilation exhaust point; refer to Table 4-1, cells C1 and C3,

χ/Q_2 = short term dispersion factor due to condenser air removal pump release via the station ventilation exhaust point; refer to Table 4-1, cells C1 and C5.

TABLE 3.5-17

P_{ij}

INFANT INGESTION OF GOAT'S MILK DOSE RATE CONVERSION FACTORS
(mrem per pCi)

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
H-3	-	3.5E-12	3.5E-12	3.5E-12	3.5E-12	3.5E-12	3.5E-12
C-14*	2.4E-9	4.9E-10	4.9E-10	4.9E-10	4.9E-10	4.9E-10	4.9E-10

Note:

*For the short term releases such as from air removal pump or from containment drywell purge vent, C-14 values should be multiplied by 2.

TABLE 5-2

RADIOLOGICAL ENVIRONMENTAL
MONITORING PROGRAM (REMP)
DIRECT RADIATION MONITORING STATIONS

Functional Designation (NUREG-0473)	Location Code (Shoreham REMP)	Location Description
DR1	1S1	Beach east of intake, 0.3 mi. N
DR2	2A2	West end of Creek Road, 0.2 mi. NNE
DR3	3S1	Site Boundary, 0.1 mi. NE
DR4	4S1	Site Boundary, 0.1 mi. ENE
DR5	5S2	Site Boundary, 0.1 mi. E
DR6	6S2	Site Boundary, 0.1 mi. ESE
DR7	7A2	North Country Road, 0.7 mi. SE
DR8	8A3	North Country Road, 0.6 mi. SSE
DR9	9S1	Service Road SNPS, 0.2 mi. S
DR10	10A1	North Country Road, 0.3 mi. SSW
DR11	11A1	Site Boundary, 0.3 mi. SW
DR12	12A1	Meteorological Tower, 0.9 mi, WSW
DR13	13S3	Site Boundary, 0.2 mi. W
DR14	14S2	St. Joseph's Villa, 0.4 mi. WNW
DR15	15S1	Beach west of intake, 0.3 mi. NW
DR16	16S2	Site Boundary 0.3 mi. NNW
DR17	5E2	Calverton, 4.5 mi. E
DR18	6E1	LILCO ROW, 4.8 mi. ESE
DR19	7E1	Calverton, 4.9 mi. SE
DR20	8E1	Calverton, 4.4 mi. SSE
DR21	9E1	Brookhaven National Laboratory, 5.0 mi. S
DR22	10E1	Ridge Substation, 4.0 mi. SSW
DR23	11E1	LILCO ROW. 4.7 mi. SW
DR24	12D1	North Shore Beach Substation, 3.7 mi. WSW
DR25	13E1	Sound Way Drive, 4.5 mi. W
DR26	5D1	Wildwood State Park, 3.4 mi. E
DR27	5F3	Dairy Farm, 7.8 mi. E
DR28	7B1	Overhill Road, 1.4 mi. SE
DR29	12G2	Flowerfield Substation, 15.4 mi. WSW
DR30	12G1	Central Islip Substation, 19.9 mi. WSW
DR31	11G1	MacArthur Substation, 16.6 mi. SW
DR32	8G1	Wading River Road, 10.1 mi. SSE
DR33	6G1	Hampton Bays Substation, 19.0 mi. ESE
DR34	6A1	Sound Road, 0.7 mi. ESE
DR35	2A3	Nearest Residence, 0.3 mi. NNE
DR36	9S2	East Gate SNPS, 0.3 mi. S