WASTE SOLIDIFICATION TECHNICAL SPECIFICATIONS

AND

ADMINISTRATIVE CONTROL TECHNICAL SPECIFICATIONS

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
3.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS	4.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS
Applicability:	Applicability:
Applies to the operating status of the liquid, gaseous and solid effluent treatment systems.	Applies to the surveillance requirements for the liquid, gaseous and solid effluent treatment systems.
Objective:	Objective:
To assure operability of the liquid, gaseous and solid effluent treatment system.	To verify operability of the liquid, gaseous and solid effluent treatment system.
Specification:	Specification:
(a) Liquid	(a) Liquid
The liquid radwaste treatment system shall be OPERABLE. The system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the dose due to liquid effluent releases to unrestricted areas (see Figure 3.6.12-1) would exceed 0.18 mrem to the total body or 0.6 mrem to any organ in any calendar quarter.	Doses due to liquid releases to unrestricted areas shall be calculated monthly when releases are made.
With radioactive liquid waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which includes the following information:	The liquid radwaste system shall be demonstrated OPERABLE quarterly unless the liquid radwaste system has been utilized to process radioactive liquid effluents during the previous quarter.
Identification of equipment or subsystems not OPERABLE and the reason for nonoperability.	
Action(s) taken to restore the nonoperable equipment to OPERABLE status.	
Summary description of action(s) taken to prevent a recurrence.	

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
3.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS	4.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS
(c) Solid	(c) Solid
A radwaste solidification system shall be OPERABLE and used to provide for the SOLIDIFICATION of wet solid wastes, for the SOLIDIFICATION and packaging of other radioactive wastes, and to ensure the meeting of the requirements of 10 CFR Part 20 and of 10 CFR Part 71 prior to shipment of radioactive wastes from the site.	The solid radwaste system shall be demonstrated operable at least once per quarter by performance of functional tests of the equipment and components of a solid radwaste system or by operating a solid radwaste system at least once in the previous quarter in accordance with the process control program or demonstrate the capability for solidification for verification of the existence of a valid contract for SOLIDIFICATION to be performed in accordance with the PROCESS CONTROL PROGRAM.
With the requirements of 10 CFR Part 20, 10 CFR Part 71, and the PROCESS CONTROL PROGRAM of Specification 6.15, not satisfied, suspend shipments of defective containers of solid radioactive wastes from the site.	The PROCESS CONTROL PROGRAM of Specification 6.15 shall be used to verify the SOLIDIFICATION of at least one representative test specimen from at least every tenth batch of each type of wet radioactive waste (e.g., filter sludges, spent resins, evaporator bottoms, radioactive chemical wastes and filter media). The test specimens shall be processed in accordance with procedures of the PROCESS CONTROL PROGRAM.
With the solid radwaste system not OPERABLE for more than 31 days, when required to meet 10 CFR Part 20 and 10 CFR Part 71, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which includes the following information:	
Identification of equipment of subsystems not OPERABLE and the reasons for inoperability.	

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
3.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS (cont'd)	4.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS (cont'd)
(c) Solid (cont'd)	(c) Solid (cont'd)
Action(s) taken to restore the inoperable equipment to OPERABLE status. A description of alternative used for SOLIDIFICATION and packaging of wastes. Summary description of action(s) taken to prevent a recurrence.	If any test specimen fails to verify SOLIDIFICATION, the SOLIDIFICATION of the batch under test shall be suspended until such time as additional test specimens can be obtained, alternative SOLIDIFICATION parameters can be determined in accordance with the PROCESS CONTROL PROGRAM, and a subsequent test verifies SOLIDIFICATION. SOLIDIFICATION of the batch may then be resumed using the alternative SOLIDIFICATION parameters determined by the PROCESS CONTROL PROGRAM. If the initial test specimen from a batch of waste fails to verify SOLIDIFICATION, the PROCESS CONTROL PROGRAM shall provide for the collection and testing of representative test specimens from each consecutive batch the same type of wet waste until 3 consecutive initial test specimens demonstrate SOLIDIFICATION. The PROCESS CONTROL PROGRAM shall be modified as required to assure SOLIDIFICATION of subsequent batches of waste.

LIMITING CONDITION FOR OPERATION

3.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS (cont')

SURVEILLANCE REQUIREMENT

4.6.13 RADIOACTIVE EFFLUENT TREATMENT SYSTEMS (cont'd)

Reports

The semiannual Radioactive Effluent Release Report shall include the following information for each type of solid waste shipped offsite during the report period:

container volume,

total curie quantity (determined measurement or estimate),

principal gamma radionuclides (determined by measurement or estimate),

type of waste (e.g., LSA, Type A, Type B, Large Quantity), and

solidification agent (e.g., cement urea formaldehyde).

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The OPERABILITY of the liquid radwaste treatment system ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirements that the appropriate portions of this system can be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable". This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and design objective Section 11.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the guide set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

The OPERABILITY of the gaseous radwaste treatment system ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of these systems be used when specified provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable". This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and design objective Section IID of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the guide set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

The OPERABILITY of the solid waste system ensures that the system will be available for use whenever solid radwastes require processing and packaging prior to being shipped offsite. This specification implements the requirements of 10 CFR Part 50.36a and General Design Criteria 60 of Appendix A to 10 CFR Part 50. The process parameters included in establishing the PROCESS CONTROL PROGRAM may include, but are not limited to waste type, waste pH, waste/liquid/solidification agent/catalyst ratios, waste oil content, waste principal chemical constituents, mixing and curing times.

e. Continued

The semi-annual Radioactive Effluent Release Reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, "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," with data summarized on a quarterly basis following the format of Appendix B thereof.

The semi-annual Radioactive Effluent Release Reports shall include a summary of the meteorological conditions concurrent with the release of gaseous effluents during each quarter as outlined in Regulatory Guide 1.21, with data summarized on a quarterly basis following the format of Appendix B thereof.

The semi-annual Radioactive Effluent Release Reports shall include an assessment of the radiation doses from radioactive effluents to individuals due to their activities inside the unrestricted area boundary (Figure 3.6.12-1) during the report period. All assumptions used in making these assessments (e.g., specific activity, exposure time and location) shall be included in these reports.

The semi-annual Radioactive Effluent Release Reports shall include the following information for all unplanned releases to unrestricted areas of radioactive materials in gaseous and liquid effluents:

a) A description of the event and equipment involved.

b) Cause(s) for the unplanned release.

c) Actions taken to prevent recurrence.

d) Consequences of the unplanned release.

The semi-annual Radioactive Effluent Release Reports shall include an assessment of the radiation doses from the radioactive liquid and gaseous effluents released from the unit during each calendar quarter as outlined in Regulatory Guide 1.21, Appendix B, Section E1, 2, 3. In addition, the unrestricted area boundary maximum noble gas gamma air and beta air doses shall be evaluated. The meteorological conditions concurrent with the releases of effluents shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the Offsite Dose Calculation Manual.

The semiannual radioactive effluent reports shall include any changes to the Process Control Program or to the Offsite Dose Calculation Manual made during the reporting period, as provided in Specifications 6.15 and 6.16.

6.15 Process Control Program

The Process Control Program shall be a manual containing the equipment operating procedures, process parameters, set points, drawings and controls, and the laboratory procedures detailing the program of sampling, analysis, and evaluation within which solidification of radioactive wastes from liquid systems is assured, consistent with Specifications 3.6.13c and 4.6.13c.

a. Changes to the Process Control Program shall be made by either of the following methods:

(1) Licensee initiated changes:

Shall be submitted to the Commission by inclusion in the semiannual Radioactive Effluent Release Report for the period in which the change(s) was made and shall contain:

sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information;

a determination that the change did not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes; and

documentation of the fact that the change has been reviewed and found acceptable by the Site Operations Review Committee.

Shall become effective upon review and acceptance by the Site Operations Review Committee, unless otherwise acted upon by the Commission through written notification to the licensee.

(2) Commission initiated changes:

Shall be determined by the Site Operations Review Committee to be applicable to the facility after consideration of facility design;

The licensee shall provide the Commission with written notification of its determination of applicability including any necessary revisions to reflect facility design;

Shall be reviewed by the Safety Review and Audit Board.

6.16 Offsite Dose Calculation Manual

The Offsite Dose Calculation Manual shall describe the methodology and parameters to be used in the calculation of offsite doses due to radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring instrumentation alarm/trip setpoints consistent with the applicable Limiting Conditions for Operation contained in these Technical Specifications.

Any changes to the Offsite Dose Calculation Manual shall be made by either of the following methods:

(1) Licensee initiated changes:

Shall be submitted to the Commission by inclusion in the semiannual Radioactive Effluent Release Report the period in which the change(s) was made and shall contain:

sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information;

a determination that the change will not reduce the accuracy or reliability of dose calculations or setpoint determinations; and

documentation of the fact that the change has been reviewed and found acceptable by the Site Operations Review Committee.

Shall become effective upon review and acceptance by the Site Operations Review Committee, unless otherwise acted upon by the Commission through written notification to that licensee.

(2) Commission initiated changes:

Shall be determined by the Site Operations Review Committee to be applicable to the facility after consideration of facility design.

The licensee shall provide the Commission with written notification of their determination of applicability including any necessary revisions to reflect facility design.

Shall be reviewed by the Safety Review and Audit Board.

OFFSITE DOSE CALCULATION MANUAL

NINE MILE POINT NUCLEAR STATION

UNIT 1

OFF-SITE DOSE CALCULATIONAL MANUAL

LICENSE NO. DPR-63

DOCKET NO. 50-220

APPROVALS	SIGNATURES	DATE AND INITIALS REVISION 0	REVISION 1	REVISION 2
Radiochemistry and Radiation Protection Supervisor E. W. Leach	E. W. Leach	4/10/79 EWL		
Station Superintendent NMPNS T. J. Perkins	T J Perkins	4/10/79 TJP		
General Superintendent Nuclear Generation Chairman of S.O.R.C. T. E. Lempges	T E Lempges	4/10/79 TEL		

NIAGARA MOHAWK POWER CORPORATION

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A. LIQUID RADWASTE EFFLUENT MONITOR ALARM SETPOINT DETERMINATION

(Reference T.S. Section 3.6.11.a, 4.6.11.a, 3.6.12.a.1):

The alarm setting on the liquid radwaste effluent monitor is based on dilution water flow, waste tank discharge rate, the isotopic composition of the liquid to be discharged, the background count rate of the monitor, and the efficiency of the monitor. Due to the variability of these parameters, an adjustable alarm setpoint is provided and will be set just prior to the release of each batch of liquid waste.

The following methodology (specified by Procedures N1-PSP-4 and N1-OP-28) is used for determining setpoint of the High and High High alarms:

1. A sample will be taken from the tank to be discharged and a gamma isotopic analysis performed.

2. From the tank analysis and the MPC values (10CFR20 Table II, Column 2) a Required Dilution Factor will be calculated, using the relation:

   $RDF = \Sigma\ (C_i/MPC_i)$

   Where: C_i = concentration of nuclide i, μCi/ml

   MPC_i = Maximum Permissible Concentration for nuclide i, μCi/ml

3. The maximum discharge rate permitted is determined by Circulating and Service Water pump configuration, and Required Dilution Factor. For a given dilution flow, discharge flow is calculated (by nomograph) according to the equation:

   $$\text{discharge flow} = \frac{\text{dilution flow}}{RDF \times F}$$

   Where: F = Conservative safety factor (1.1 to 2) used to account for non-gamma emitters.

4. The liquid effluent monitor alarm (High High) setpoint, which ensures that the limits of Specification 3.6.12.a.1 are not exceeded, is calculated as follows:

   $Setpoint = MPC \times RDF \times F_1 \times F_2$

   Where: Set Point = Dial setting on alarm potentiometer

   MPC = Maximum permissible concentration in discharge canal for isotopic mixture being discharged, or a lesser concentration.

   RDF = Isotopic mixture Required Dilution Factor as defined above.

A. LIQUID RADWASTE EFFLUENT MONITOR SET POINT DETERMINATION (Cont.)

4. F_1 = Monitor calibration factor, $\frac{cps}{\mu Ci/ml}$

F_2 = Potentiometer setting factor, relating turns setting to alarm set point in cps.

The set points may be tabulated to maintain a conservatively low MPC in the discharge card, or calculated for a specific discharge.

B. SERVICE WATER MONITOR ALARM SET POINT DETERMINATION

1. The monitor high high alarm point maximum setting permitted is calculated in accordance with:

$$Alarm_{cpm} = MPC_{canal} \times \frac{\text{Canal Flow}}{\text{Service Water Flow}} \times F_1 \text{ cpm}/\mu Ci/ml$$

2. The monitor High High alarm may be set at any level below this calculated maximum value.

3. The monitor High alarm set point may be set between 2x and 5x background.

4. MPC used is that associated with the isotopic mixture of the most probable contaminant, the Reactor Closed Loop Cooling system, unless significant activity is found in the Service Water, in which case, the Service Water isotopic analysis will be used.

5. Upon receipt of the Hi alarm, an investigation will commence to determine and isolate the input source to the Service Water System.

6. A grab sample should be taken immediately, and as often as required to account for activity discharged by isotopic analysis of the samples.

7. Upon receipt of the Hi alarm, the Hi Hi alarm set point should be re-calculated and set in accordance with the mixture actually present in the service water.

C. GASEOUS EFFLUENT MONITOR SETPOINTS

(Technical Specifications Section 3.6.11.b, 4.6.11.b)

1. A gaseous sample from the stack shall be taken and analyzed for isotopic composition monthly. From this analysis the total release rate, in μCi/sec, will be calculated, using the following equation:

   Stack Release Rate = Stack Flow Rate x Stack Concentration

   $\mu Ci/sec = cm^3/sec \times \Sigma_i \mu Ci_i/cm^3$

2. For each stack monitor, the monitor reading, net cpm or net cps, will be related to Release Rate by a stack Calibration Factor:

   $$CF = \frac{\mu Ci/sec}{net\ cpm} \quad \underline{or}\ CF = \frac{\mu Ci/sec}{net\ cps}$$

   The appropriate factors for monitors 07, 08, 11 and 12 are posted at the stack monitors, and reflect the latest representative isotopic analysis.

3. The limits on noble gas releases imposed by Specification 3.6.12.b.1 shall not be exceeded prior to receiving an alarm on the stack monitor.

4. The stack monitor maximum instantaneous release rate alarm shall be set to alarm at or below a release rate Q_S given by the equation:

   $$\Sigma_i\ Q_{is}\ (1.6\ \overline{E}_{i\gamma} + 0.3\ \overline{E}_{i\beta}) \leq 1$$

   Gamma and beta $\overline{E}$ are based on stack gaseous release gamma isotopic analysis and Table 1.

5. Normally the high alarm will be set at approximately 25% of this calculated value, and the High High alarm to approximately 75% of this value. The set points will be reset quarterly, or if an isotopic analysis results in a calculated release rate limit which varies by > 25% from that calculated the last time it was set.

C. GASEOUS EFFLUENT MONITOR SETPOINTS (Cont.)

6. A gaseous sample from the recombiner discharge shall be taken and analyzed for isotopic composition at least monthly. From this analysis the release rate, in μCi/sec at the recombiner discharge, will be calculated:

   Recombiner Release Rate = Off Gas Flow Rate x Off Gas Concentration
   $\mu Ci/sec = cm^3/sec \times \Sigma_i \mu Ci_i/cm^3$

7. For each off gas monitor, the reading in mr/hr will be related to the release rate at the Recombiner Discharge by an off gas calibration constant, posted at the monitor:

   $$K = \frac{\mu Ci/sec}{mr/hr}$$

8. The design Off Gas Treatment System holdup time (flow rate adjusted) will be applied to each Xe and Kr nuclide detected to determine the portion of the Stack Release attributable to Off Gas.

9. The Off Gas monitor (at the recombiner discharge) shall be set to initiate automatic closure of the waste gas discharge valve prior to exceeding a stack release rate Q_s given by the equation:

   $$\Sigma_i Q_{is} (1.0 \overline{E}_{i\gamma} + 0.3 \overline{E}_{i\beta}) \leq 1$$

D. LIQUID EFFLUENT CONCENTRATION AND DOSE CALCULATIONS

(Technical Specifications 3.6.12.a.1, 3.6.12.a.2, 4.6.12.a.1, 4.6.12.a.2)

1. Each liquid waste tank to be discharged is GeLi analyzed, a Required Dilution Factor assigned, and a maximum discharge flow determined as discussed in Sections A1, 2 and 3. This procedure ensures meeting the concentration requirements of Tech Spec 3.6.12.a.1 and surveillance requirements of Specification 4.6.12.a.1.

2. Prior to each radioactive liquid discharge, an estimate of Curies to be discharged is made (based on the GeLi analysis, and tank volume) and added to previous discharge estimates for the calendar quarter. If these estimates total 1.25 Ci for the current calendar quarter, an evaluation of operability* of the liquid radwaste treatment system must be made. If it is

*See Section D-5

D. LIQUID EFFLUENT CONCENTRATION AND DOSE CALCULATIONS (Cont.)

2. determined that waste is being discharge without treatment and in excess of this quantity, a Special Report is to be submitted to the Commission, if confirming dose evaluation of actual releases indicate Specification 3.6.13.a has been exceeded (Since the composite analyses which allow complete dose calculations to be made are required quarterly, premature dose calculations are not required. See Section D-6 for dose calculation methods.).

3. The total tank curies discharged each month is calculated from tank concentration and volume data. The dose specifications for liquid waste (T.S. 3.6.12.a.2) are considered to be satisfied if the total curies discharged is less than 10 curies per calendar quarter (excluding tuition and dissolved gases).

4. If the calendar quarter curies discharged approaches the value given in Section D-3, a dose calculation will be made to determine compliance with Specifications 3.6.12.a.2 in accordance with Section D - 6d. New quarter and year maximum curie discharge limits may then be set on the basis of those calculations.

5. Liquid Waste Treatment System Operability

   a) The liquid waste treatment system is considered operable if no liquid waste discharges have occurred during the calendar quarter.

   b) The liquid waste treatment system is considered operable and the liquid waste is considered discharged with treatment if each discharge (excluding laundry drain tanks) has been made from a Waste Sample Tank, which has been processed through a filter and demineralizer, or filter and demineralizer following a waste concentrator as described in submittal Nine Mile Point Nuclear Station Unit 1, Docket 50-220, Compliance with 10CFR50 Appendix I (1976). (See Figure 1, updated to reflect system modifications).

   c) It is anticipated that through usage of one or two liquid waste concentrators NMP Unit 1 will maintain virtually zero discharge during normal operation. Therefore projected dose calculations used as a triggering mechanism for use of appropriate subsystems of the liquid waste processing system are unnecessary and inappropriate.

6. Liquid Effluent Dose Calculation Methods

   a) The dose calculations required shall be accomplished by ratio of curies released to the curies released which were used in calculating compliance with 10CFR50 Appendix I, (Reference 1). It was determined, using methods

D. LIQUID EFFLUENT CONCENTRATION AND DOSE CALCULATIONS (Cont.)

6. a) referenced therein, that 1.3 curies released resulted in an adult Whole Body dose of 0.089 mrem, and an infant thyroid dose of 0.22 mrem. These were the highest doses calculated, and were due principally to ingestion of fish (adult WB dose) and potable water (infant thyroid dose). This method is intended to satisfy Technical Specifications 4.6.12.a.2 and 4.6.13.a.

b) Whole Body Dose:

$$\frac{\text{Curies Released}}{\text{1.3 curies}} = \frac{\text{Whole Body Dose (Adult)}}{\text{0.089 mrem}}$$

Therefore, WB Dose = Curies released x 0.068

c) Maximum Organ Dose:

$$\frac{\text{Curies Released}}{\text{1.3 curies}} = \frac{\text{Organ Dose (Infant Thyroid)}}{\text{0.22 mrem}}$$

Therefore, Organ Dose = Curies Released x 0.17

d) As an alternative, the methodology of Regulatory Guide 1.109 may be used with actual release data (isotopic analysis) to calculate whole body dose and organ dose. The site-specific values of Reference 1 are to be used, as appropriate, to calculate dose due to ingestion of potable water (City of Oswego water supply) and ingestion of fish (caught at the edge of the initial mixing zone).

E. GASEOUS EFFLUENT DOSE RATE AND DOSE CALCULATIONS

(Technical Specifications 3.6.12.b, 4.6.12.b)

1. The dose rate limit for noble gases is considered to be met if the stack release rate Q (in Ci/sec) is restricted to a value obtained from the equation:

$$\Sigma_i \, Q'_{is} \, (1.6 \, \overline{E}_{i\gamma} + 0.3 \, \overline{E}_{i\beta}) \leq 1$$

E. GASEOUS EFFLUENT DOSE RATE AND DOSE CALCULATIONS (Cont.)

2. The dose rate limit for all radioiodines and for all radioactive materials in particulate form is considered to be met if the stack release rate Q (in Ci/sec) is restricted, for these materials, to a value obtained from the equation:

$$Q'_s \leq 8.3 \times 10^{-5}$$

3. The air dose limit for noble gases is considered to be met if the calendar quarter average stack release rate Q (in Ci/sec) is restricted to a value obtained from the equations:

$$\Sigma_i \, (Q'_{is} \, \overline{E}_{i\gamma}) \leq 1.0 \times 10^{-1}$$

$$\Sigma_i \, (Q'_{is} \, \overline{E}_{i\beta}) \leq 1.1$$

4. The dose to an organ of an individual from radioiodines and radioactive materials in particulate form with half-lives greater than 8 days is considered to be met if the calendar quarter average stack release rate Q (in Ci/sec) is restricted for these materials, to a value obtained from the equation:

$$Q'_s \leq 6.7 \times 10^{-6}$$

5. The indication of noble gas release rate is the stack monitor; readings are evaluated at intervals sufficient to ensure meeting the limits specified in paragraphs 1 and 3 of this section. Other surveillance is performed as specified by Technical Specification Table 4.6.12-2.

6. The monthly cumulative dose contribution to the Whole Body shall be calculated by ratio of the average release rate to the release rate corresponding to 500 mrem/year, for the appropriate isotopic analysis period, then by sum of the dose for each such period for the month. (An analogeous calculation will be made for dose due to iodines and particulates).

$$\frac{\text{Dose}_{\text{interval}}}{500 \times d/365} = \frac{Q_{\text{average}}}{Q_{\text{max. inst.}}}$$

$Q_{\text{max. inst.}}$ = Q_s, release rate, calculated from isotopic analysis, corresponding to 500 mrem/yr (See Section C-4).

d = days of the month the above release rate limit (and isotopic analysis) was applicable.

$\text{Dose}_{\text{interval}}$ = Dose at the site boundary corresponding to the isotopic analysis period.

E. GASEOUS EFFLUENT DOSE RATE AND DOSE CALCULATIONS (Cont.)

7. If the release rates cited in Sections E-1, E-2, E-3 and E-4 are approached, dose calculations may be made using the methodology of Regulatory Guide 1.109 in order to determine new allowable release rates based on the isotopic analysis of material being discharged.

8. The semi-annual Radioactive Effluent Release Report will include the calculations required by Technical Specifications 6.9.1e:

   a) The assessment of radiation doses from radioactive effluents to individuals due to their activities inside the unrestricted area boundary shall be made using the readings obtained from On-Site TLD locations (see figure 2).

   b) The evaluation of any unplanned release will be made using methodology appropriate to the release pathway.

   c) Total body and skin doses to individuals exposed at the point of maximum off-site ground-level concentrations of radioactive materials in gaseous effluents will be evaluated using the methodology of Regulatory Guide 1.109.

   d) Organ doses to individuals in unrestricted areas from radioactive iodine and radioactive material in particulate form from all pathways of exposure will be evaluated using the methodology of Regulatory Guide 1.109.

REFERENCES

1. Nine Mile Point Nuclear Station Unit 1, Docket 50-220, Compliance with 10CFR50 Appendix I, 1976.

2. Regulatory Guide 1.109, Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I, Revision 1, October 1977.

3. Radiological Technical Specifications, Appendix A to Facility Operating License No. DPR-63 for the Niagara Mohawk Power Corporation Nine Mile Point Nuclear Station Unit 1, Docket No. 50-220.

4. Regulatory Guide 1.21, 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, Revision 1, June 1974.

TABLE 1

AVERAGE ENERGY PER DISINTEGRATION

Isotope	$\bar{E}_\gamma$, mev/dis	(Ref)	$\bar{E}_\beta$, mev/dis[3]	(Ref)
Kr-83m	0.00248	(1)	0.0371	(1)
Kr-85	0.0022	(1)	0.250	(1)
Kr-85m	0.159	(1)	0.253	(1)
Kr-87	0.793	(1)	1.32	(1)
Kr-88	1.95	(1)	0.377	(1)
Kr-89	2.22	(2)	1.37	(2)
Kr-90	2.10	(2)	1.01	(2)
Xe-131m	0.0201	(1)	0.143	(1)
Xe-133	0.0454	(1)	0.135	(1)
Xe-133m	0.042	(1)	0.19	(1)
Xe-135	0.247	(1)	0.317	(1)
Xe-135m	0.432	(1)	0.095	(1)
Xe-137	0.194	(1)	1.64	(1)
Xe-138	1.18	(1)	0.611	(1)

(1) ORNL-4923, Radioactive Atoms - Supplement I, M. S. Martin, November 1973.

(2) NEDO-12037, "Summary of Gamma and Beta Emitters and Intensity Data"; M. E. Meek, R. S. Gilbert, January 1970. (The average β energy was computed from the maximum energy using the ICRP II equation, not the 1/3 value assumption used in this reference).

(3) The average β energy includes conversion electrons.

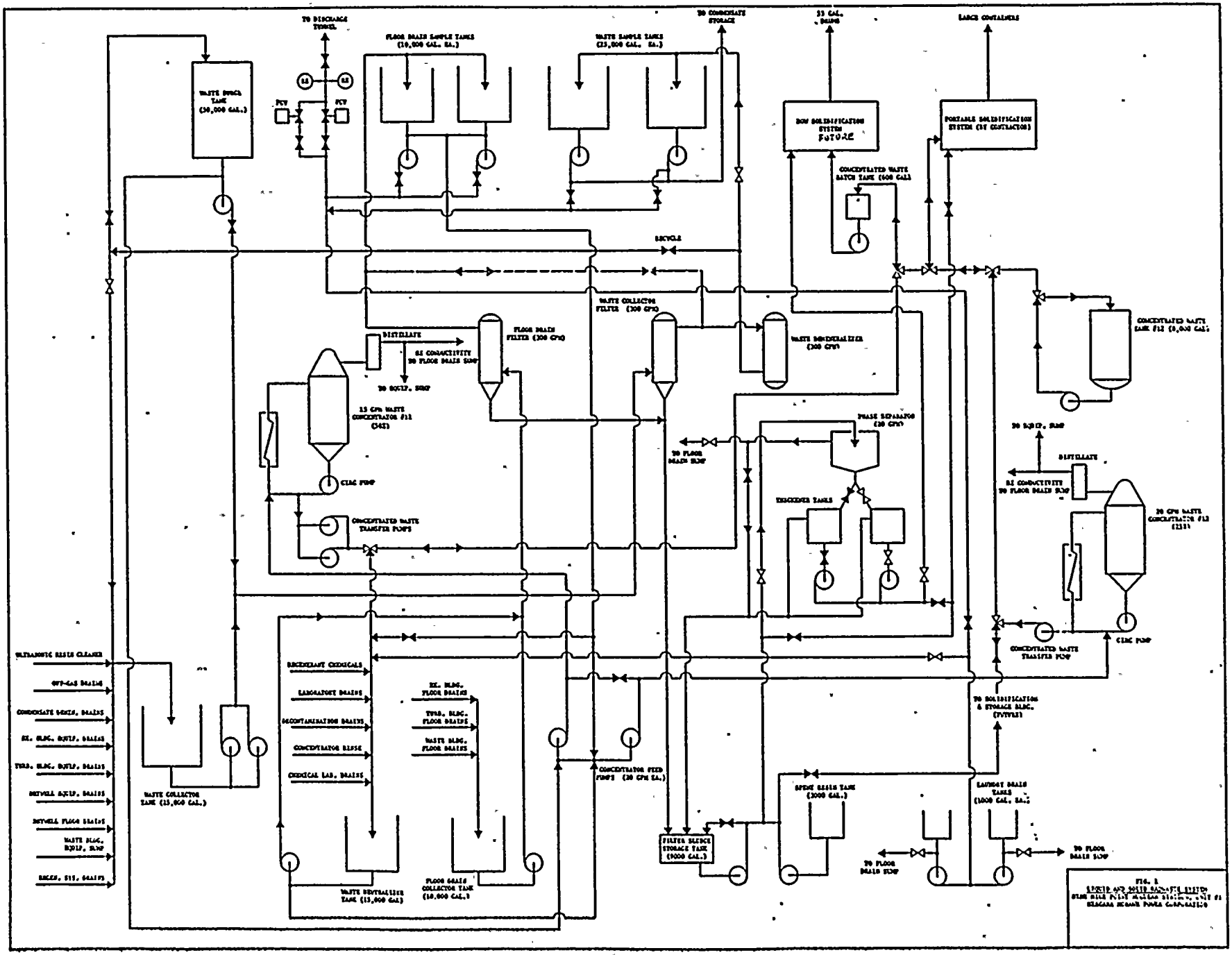

TO DISCHARGE TUNNEL
FLOOR DRAIN SAMPLE TANK (10,000 GAL. EA.)
WASTE SAMPLE TANK (15,000 GAL. EA.)
TO CONDENSATE STORAGE
55 GAL. DRUMS
LARGE CONTAINERS
WASTE SURGE TANK (50,000 GAL.)
PCV
PCV
LC
LC
RDM SOLIDIFICATION SYSTEM FUTURE
PORTABLE SOLIDIFICATION SYSTEM (BY CONTRACTOR)
CONCENTRATED WASTE BATCH TANK (600 GAL)
RECYCLE
WASTE COLLECTOR FILTER (300 GPM)
WASTE DEMINERALIZER (300 GPM)
FLOOR DRAIN FILTER (300 GPM)
DISTILLATE
5% CONDUCTIVITY TO FLOOR DRAIN SUMP
TO EQUIP. SUMP
CONCENTRATED WASTE TANK #12 (8,000 GAL)
15 GPM WASTE CONCENTRATOR #11 (1421)
CIRC PUMP
CONCENTRATED WASTE TRANSFER PUMPS
PHASE SEPARATOR (20 GPM)
TO FLOOR DRAIN SUMP
TO EQUIP. SUMP
DISTILLATE
5% CONDUCTIVITY TO FLOOR DRAIN SUMP
EVAPORATOR TANKS
30 GPM WASTE CONCENTRATOR #12 (2231)
CIRC PUMP
CONCENTRATED WASTE TRANSFER PUMP
TO SOLIDIFICATION & STORAGE BLDG. (TUNNEL)
ULTRASONIC RESIN CLEANER
OFF-GAS DRAINS
CONDENSATE DRAIN, DRAINS
RX. BLDG. EQUIP. DRAINS
TURB. BLDG. EQUIP. DRAINS
DRYWELL EQUIP. DRAINS
DRYWELL FLOOR DRAINS
WASTE BLDG. EQUIP. SUMP
RADWS, SVC. DRAINS
WASTE COLLECTOR TANK (15,000 GAL.)
DECONTAMINANT CHEMICALS
LABORATORY DRAINS
DECONTAMINATION DRAINS
CONCENTRATOR RINSE
CHEMICAL LAB. DRAINS
RX. BLDG. FLOOR DRAINS
TURB. BLDG. FLOOR DRAINS
WASTE BLDG. FLOOR DRAINS
WASTE NEUTRALIZER TANK (15,000 GAL)
FLOOR DRAIN COLLECTOR TANK (10,000 GAL.)
CONCENTRATOR FEED PUMPS (20 GPM EA.)
FILTER SLUDGE STORAGE TANK (9000 GAL.)
SPENT RESIN TANK (3000 GAL.)
LAUNDRY DRAIN TANKS (1000 GAL. EA.)
TO FLOOR DRAIN SUMP
TO FLOOR DRAIN SUMP

FIG. 1

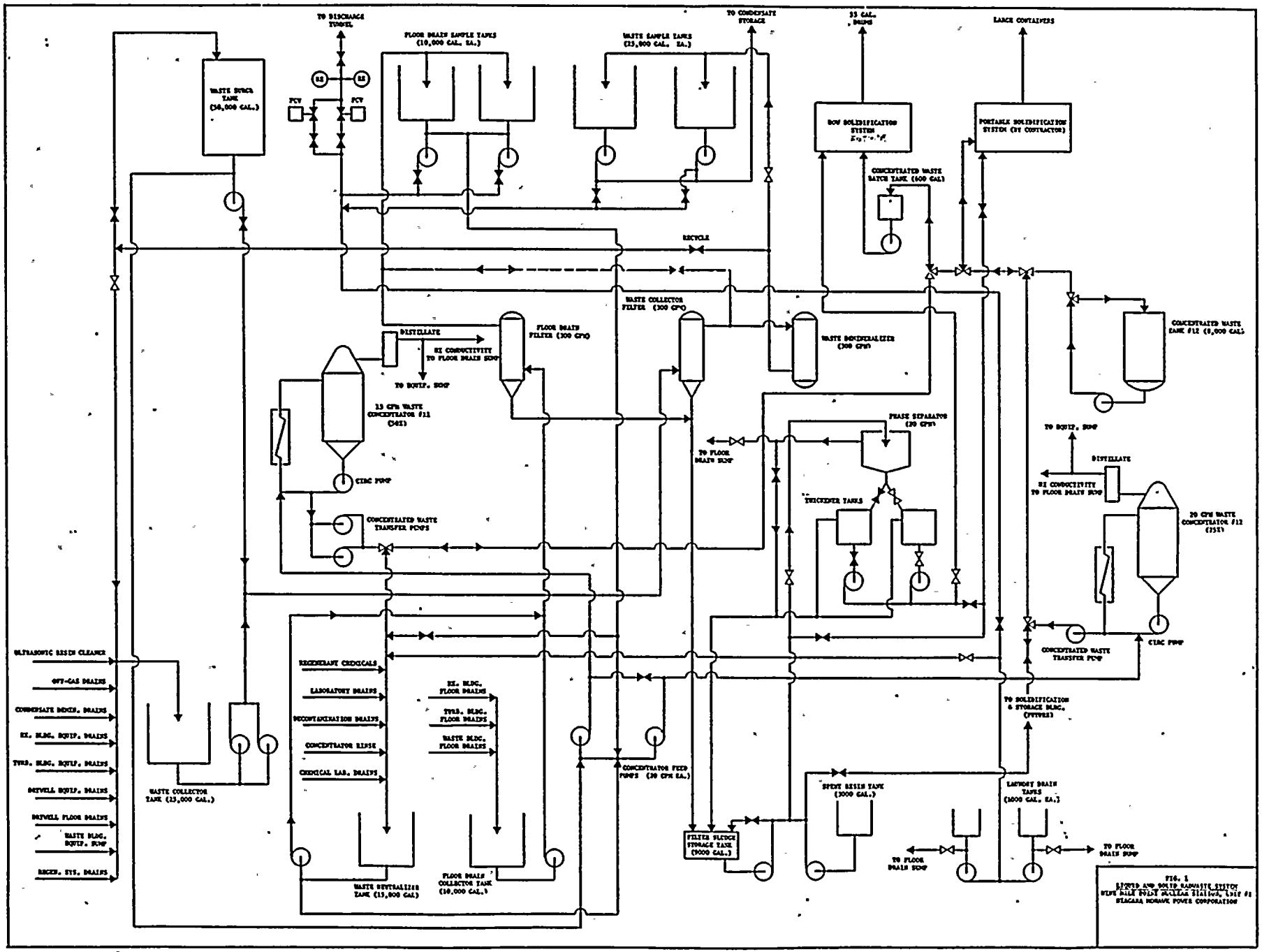
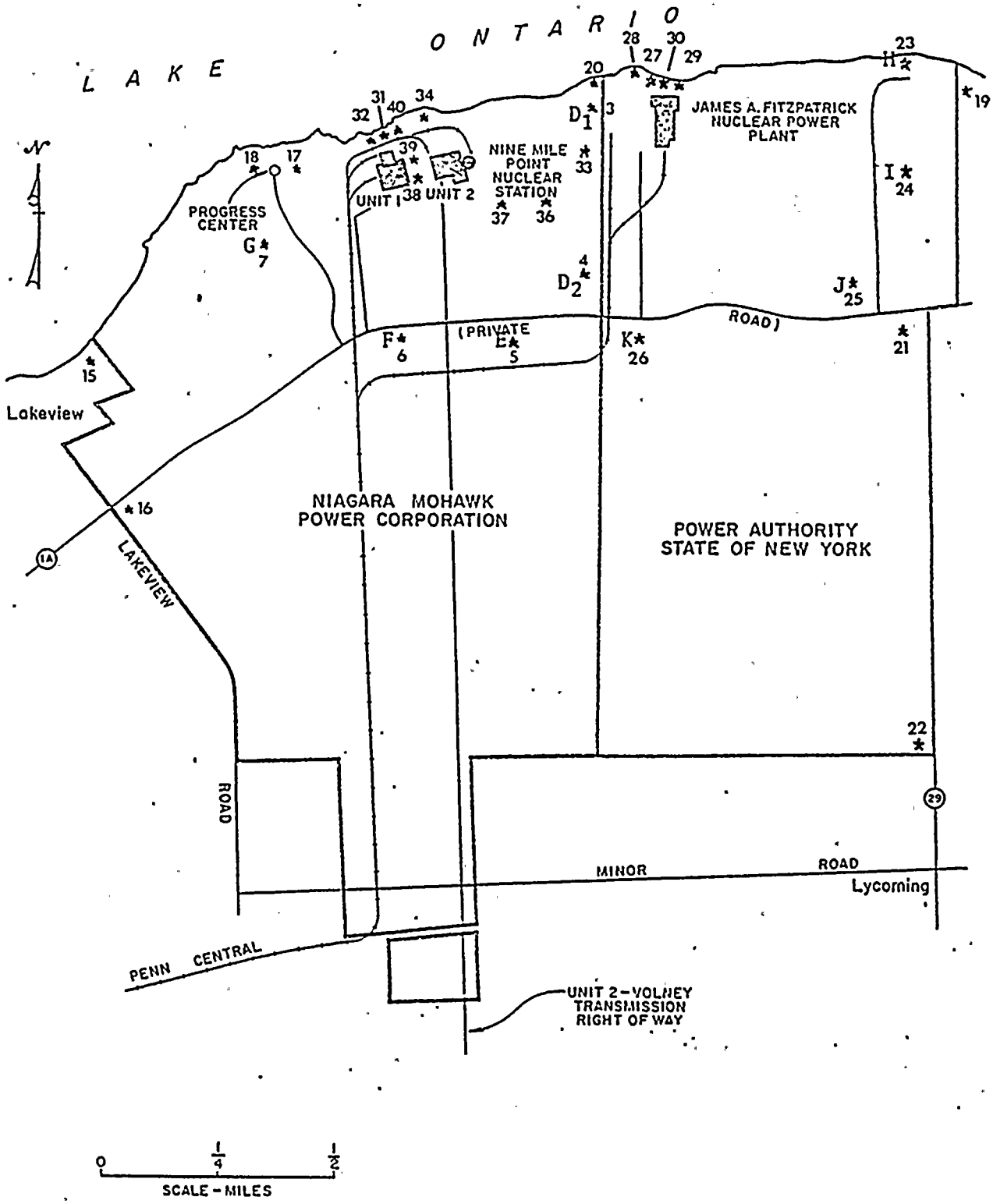


FIG. 1
LIQUID AND SOLID RADWASTE SYSTEM
NINE MILE POINT NUCLEAR STATION, UNIT #1
NIAGARA MOHAWK POWER CORPORATION

FIGURE 2



SITE VICINITY MAP
ON-SITE ENVIRONMENTAL STATION AND TLD LOCATIONS
*-TLD's
Letters - Stations