UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
LONG ISLAND LIGHTING COMPANY	)	Docket No. 50-322 O.L.
(Shoreham Nuclear Power Station, Unit 1)	)	

PREPARED DIRECT TESTIMONY OF RICHARD B. HUBBARD AND GREGORY C. MINOR ON BEHALF OF SUFFOLK COUNTY AND THE SHOREHAM OPPONENTS COALITION

REGARDING

SUFFOLK COUNTY CONTENTION 27

AND

SOC CONTENTION 3

POST-ACCIDENT MONITORING

May 25, 1982

SUMMARY OF TESTIMONY ON

SC CONTENTION 27 AND SOC CONTENTION 3

The Shoreham instrumentation to assess plant and environs conditions during and following an accident has not been demonstrated as providing control room operators with the required instrumentation to monitor radioactivity releases, thus violating the NRC's General Design Criteria, the post-TMI requirements of Revision 2 of Regulatory Guide 1.97, and the emergency preparedness planning standards of NUREG-0654.

Evidence of deficiencies in LILCO's ability to demonstrate compliance with the post-accident monitoring requirements is provided in this testimony. Reg. Guide 1.97, Revision 2 is a result of one of the highest priority lessons from the TMI-2 accident. Because of the acknowledged safety significance of the post-accident monitoring instrumentation, compliance with Revision 2 of the Guide should be demonstrated prior to the issuance of an operating license for Shoreham. If that is not possible, LILCO should be required to provide assurance to the NRC Staff that each requirement of the Reg. Guide can and will be complied with by the Staff's July, 1983 implementation date. To date, LILCO has failed to demonstrate that there is a reasonable liklihood that Shoreham will comply with Reg. Guide 1.97, Revision 2 requirements by June, 1983. Such a demonstration

should be required prior to the issuance of an operating license.

Attachments

1. NUREG-0654, "Planning Standards Pertaining to Post-Accident Monitoring."

PREPARED DIRECT TESTIMONY OF
RICHARD B. HUBBARD AND GREGORY C. MINOR
REGARDING
SUFFOLK COUNTY CONTENTION 27 AND SOC CONTENTION 3
POST-ACCIDENT MONITORING

Q1. State your names and company affiliation.

A1. My name is Richard B. Hubbard and my name is Gregory C. Minor. We are employed by MHB Technical Associates at 1723 Hamilton Avenue, Suite K, San Jose, California. A statement of our qualifications and experience has been provided earlier in a separate submittal to this Board.

Q2. State the Contention.

A2. Suffolk County Contention 27 was accepted by the Board as follows:

> The recent Revision 2 of Reg. Guide 1.97, "Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant Environs Conditions During and Following an Accident", details needed devices and qualifications of instruments. Shoreham is deficient in the following areas:
>
> (a) Radiation Exposure Rate Monitoring (Item 18, Table 1; Items 20 and 41, Table 2);*/
> (b) Radioactivity Concentration or Radiation Level in Circulating Primary Coolant (Item 11, Table 1; Item 14, Table 2);
> (c) Continuous On-Line Monitoring of Halogen in Effluent (Item 39, Table 1; Item 43, Table 2);

*/ The item and table numbers used in this contention refer to the information provided in the Affidavit of Brian R. McCaffrey submitted in support of LILCO's Motion for Summary Disposition of SOC Contention 3, dated July 13, 1981.

(d) Secondary Containment Area Radiation Monitor (Item 36, Table 1; Item 17, Table 2);

(e) Reactor Coolant System Soluble Boron Concentration (Item 3, Table 1; Item 4, Table 2);

(f) Analysis of Primary Coolant (Gamma Spectrum) (Item 12, Table 1; Item 15, Table 2);

(g) Drywell Spray Flow and Suppression Chamber Spray Flow (Items 21 and 24, Table 1; Items 23 and 23A, Table 1; Item 37, Table 2);

(h) Standby Liquid Control System Flow (Item 28, Table 1; Item 37, Table 2):

(i) Plant and Environment Radiation Monitoring (Item 40, Table 1; Item 45, Table 2);

(j) Post-Accident Sampling Capability (Item 42, Table 1; Item 47, Table 2); and

(k) BWR Core Thermocouples (Item 5, Table 1; Item 13, Table 2).

To the extent that these words are essentially identical to SOC Contention 3, the following testimony addresses both contentions and is jointly authored.**/

Q3. What is the purpose of your testimony?

A3. To emphasize the importance of post-accident monitoring equipment in nuclear plants, to comment on the status of Shoreham's response to Reg. Guide 1.97 and, particularly, the lack of evidence that LILCO will satisfy Reg. Guide 1.97, Rev. 2, by June, 1983, and to explain why compliance with Reg. Guide 1.97 should be demonstrated at Shoreham prior to the issuance of an operating license.

**/ G. C. Minor is the primary author and R. B. Hubbard is the supporting author.

Q4. What are the NRC requirements for instrumentation to assess plant and environs conditons during and following an accident?

A4. The chief NRC requirements relevant to this testimony are as follows:

(a) General Design Criterion (GDC) 13 of Appendix A requires, in part, that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety.

(b) GDC 19 of Appendix A requires, in part, that a control room be provided from which actions can be taken to maintain the nuclear power unit in a safe condition under accident conditions, including loss-of-coolant accidents, and that equipment, including the necessary instrumentation, at appropriate locations outside the control room be provided with a design capability for prompt hot shutdown of the reactor.

(c) GDC 64 of Appendix A requires, in part, that means be provided for monitoring the reactor containment atmosphere, spaces

containing components for recirculation of loss-of-coolant accident fluid, effluent discharge paths, and the plant environs for radioactivity that may be released from postulated accidents.

Following the TMI-2 accident, the NRC advised LILCO that:[1/]

> "The applicant will be expected to upgrade post-accident monitoring instrumentation in accordance with Revision 2 to Regulatory Guide 1.97... The schedules and specific implementation requirements for this upgrading are discussed in NUREG-0737 and Commission Memorandum and Order (CLI-80-21). An evaluation of the applicant's new instrumentation to meet these requirements will be issued upon submittal of an acceptable design..."

LILCO has not yet formally submitted its complete design to the NRC. Thus, the NRC Staff has not evaluated the LILCO proposal for post-accident monitoring.

Q5. What is the importance of post-accident monitoring equipment?

A5. Post-accident monitoring equipment can be of great importance to an operator in mitigating a reactor accident. Accurate information about the plant variables listed in Reg. Guide 1.97 can assist the operator in assessing the nature of an accident and in measuring the effectiveness of his actions. Conversely, the lack of such information,

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1/ NUREG-0420, Shoreham SER, p. 7-13.

even for just one or two key variables, could exacerbate the course of an accident.

Q6. Did the TMI accident, in your opinion, document the importance of accurate and reliable post-accident monitoring equipment?

A6. Yes. The reviews after TMI showed that the original regulatory guidance on post-accident monitoring equipment was insufficient. During the TMI accident, some monitoring equipment showed off-scale readings; other variables which would have been desirable for the operator to know were not being monitored.

Q7. In your opinion, is Reg. Guide 1.97, Revision 2, designed to address these problems?

A7. Yes. Reg. Guide 1.97, Revision 2, is meant to address these shortcomings. The NRC considered it essential that "degraded conditions and their magnitude be identified so that operators can take actions that are available to mitigate the consequences".[2/] The NRC also felt it essential that "required instrumentation be capable of surviving the accident evironment in which it is located for the length of time its function is required".[3/] For these reasons, Reg.

2/ Regulatory Guide 1.97, Revision 2, December, 1980, Nuclear Regulatory Commission, p. 2.

3/ Ibid 2, p. 2.

Guide 1.97, Revision 2, contained an expanded list of plant variables to be measured, over wider ranges than before, and with upgraded qualification requirements. The "Discussion" which precedes the revised Guide states that the list of plant variables is a minimum list.[4/] I understand this to mean that none of the items is "optional"; all are essential and important to safety.[5/] Thus, in the implementation of Reg. Guide 1.97 requirements, operators of nuclear plants should establish with reasonable certainty that all requirements will be met in a complete and timely manner.

Q8. Describe the Reg. Guide 1.97 requirements and schedules for post-accident monitoring equipment as they apply to Shoreham.

A8. Table 1 (which begins on the following page) lists the variables to be monitored according to Reg. Guide 1.97. For each variable, the NRC Staff's required implementation date is given, as well as LILCO's current schedule for completion. Also, for each variable the Table shows the modifications (if any) needed at Shoreham to measure

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4/ Ibid 2, p. 3.

5/ The safety priority rankings in Appendix B to NUREG-0660, "NRC Action Plan Developed as a Result of the TMI-2 Accident," shows two of the four highest ranked items (each with 210 priority points), are "Additional Accident Monitoring Equipment" and "Identification of and Recovery from Conditions Leading to Inadequate Core Cooling".

TABLE 1: REVIEW OF R.G. 1.97

ITEMS APPLICABLE TO SHOREHAM

	Item*/Variable	Reg. Date[6]	Lilco Date[7]	Modification[8]	Status[9] (4/6/82)
1.	Neutron Flux	6/83	Later	Upgrade qualifications, power supply and equipment	Awaiting GE generic solution
2.	Control Rod Position	6/83	---	None	Complete
3.	RCS Boron Concentration	6/83	6/83	Need new instrument	Post-accident Sampling System[10]
4.	Coolant Level, Reactor	Fuel Load	Later	Qualify transmitter, recorders; upgrade power supply	Awaiting GE generic solution
5.	BWR Thermocouples	6/83	Later	Approx. 16 Thermocouple Loops	LILCO believes they are not necessary.
6.	RCS Pressure	6/83	6/83	Qualify transmitters and recorders	Qualification in progress
7.	Primary Containment Pressure, Drywell	Fuel Load	Fuel Load	Qualify recorder ; expand range	11/
8.	Drywell Sump Level	Fuel Load	Later	New qualified equipment (instrumentation)	Awaiting GE generic solution. LILCO believes not necessar

* Numbering follows LILCO's 7/13/81 Table 1 of B. McCaffrey's Affidavit.

	Item/Variable	Reg. Date	LILCO Date	Modification	Status (4/6/82)
9.	Primary Containment Pressure, Suppression Chamber	Fuel Load	Fuel Load	Qualify recorder	11/
10.	Primary Containment Isolation Valve Position	6/83	6/83	Qualify Limit Switches and Lights	Qualification in progress.
11.	Radioactivity Concentration Primary Coolant	6/83	Later	New activity monitor or shielding modification	Awaiting GE generic solution
12.	Primary Coolant Analysis	Fuel Load	Fuel Load	New instrumentation.	P.A.S.S. 10/
13.	Primary Containment Area Radiation	Fuel Load	Fuel Load	Qualify equipment; expand range	11/
14.	Suppression Pool Water Level	Fuel Load	Fuel Load	Qualify transmitters, recorders; relocate taps, additional instrumentation to expand range	Schedule dependent on timely delivery of equipment on order
15.	Containment/Drywell Hydrogen Concentration	Fuel Load	Fuel Load	Qualify recorder; expand range	Range expansion in progress
16.	Containment/Drywell Oxygen Concentration	Fuel Load	Fuel Load	Qualify recorder	Range expansion in progress
17.	Containment Efflucent Radioactivity, Noble Gases	Fuel Load	Fuel Load	Upgrade qualification; expand range	Some analysis complet

	Item/Variable	Reg. Date	LILCO Date	Modification	Status (4/6/82)
18.	Radiation Exposure Rate	6/83	Later	Portable radiation monitoring equipment	Awaiting GE generic solution, LILCO plans to request exemption
19.	Main Feedwater Flow	6/83	---	None	Complete
20.	Condensate Storage Tank Level	6/83	---	None	Complete
21.	Suppression Chamber Spray Flow	6/83	Later	New qualified instrumentation	Awaiting GE generic solution
22.	Suppression Pool Water Temperature	6/83	6/83	Qualify recorders, RTD's; expand range	11/
23.	Drywell Atmosphere Temperature	Fuel Load	Fuel Load	New qualified temperature element	Installation in progress
24.	Drywell Spray Flow	6/83	Later	New qualified instrumentation	Awaiting GE generic solution
25.	MSIV Leakage Control System Pressure	6/83	6/83	Upgrade qualification	Qualification in progress
26.	SRV Position	Fuel Load	Fuel Load	Qualify transmitter	11/
27.	RCIC, HPCI, Core Spray, and RHR Systems Flow	6/83	6/83	Qualify transmitter and indicator	Qualification in progress
28.	LPCI and SLCS Systems Flow	6/83	Later	New instrumentation	Awaiting GE generic solution

	Item/Variable	Reg. Date	LILCO Date	Modification	Status (4/6/82)
29.	SLCS Storage Tank Level	6/83	Later	Upgrade qualification	Awaiting GE generic solution
30.	RHR Heat Exchanger Outlet Temperature	6/83	6/83	Qualify thermocouples and recorder	Qualification in progress
31.	Cooling Water Flow to ESF System Components	6/83	6/83	Qualify transmitters and indicators	Qualification in progress
32.	Cooling Water Temperature to ESF System Components	6/83	6/83	Qualify thermocouples and recorder	11/
33.	High Radioactivity Liquid Tank Level	6/83	---	None	Complete
34.	Emergency Vent Damper Position	6/83	6/83	Upgrade qualification	11/
35.	Status of Power Sources	6/83	6/83	Upgrade qualification	Qualification in progress
36.	Secondary Containment Area Radiation	6/83	Later	New Monitor	Awaiting GE generic solution, LILCO plans to request exemption
37.	Sump Level in Spaces of Equipment Required for Safety	6/83	6/83	Upgrade qualification	11/

	Item/Variable	Reg. Date	LILCO Date	Modification	Status (4/6/82)
38.	Effluent Radioactivity Noble Gases, Station Vent	Fuel Load	Fuel Load	Upgrade qualification and power supply	Partial exemption
39.	Effluent Radioactivity, Halogens and Particulates	Fuel Load	Fuel Load	None	11/
40.	Plant and Environs Radiation	6/83	6/83	High range survey equipment	No progress. No qualification require
41.	Plant and Environs Radioactivity	6/83	6/83	None (however, this contrasts with 4-6-82 Table).	No progress. No qualification require
42.	Post Accident Sampling	Fuel Load	Fuel Load	New equipment system	P.A.S.S. 10/
43.	Wind Direction	6/83	--	None	Complete
44.	Wind Speed	6/83	---	None	Complete
45.	Estimation of Atmospheric Stability	6/83	---	None	Complete
46.	Environs Radioactivity Exposure Rate	6/83	Later	New monitoring stations	There is some confusi about the true conten of this requirement.1

	Item/Variable	Reg. Date	LILCO Date	Modification	Status (4/6/82)
47.	Environs Radioactivity, Radio Halogens and Particulates	6/83	6/83	Provide portable equipment	No progress. No qualification require
48.	RBSVS Flow		---	Upgrade qualification	Complete

6/ "Reg. Date" from testimony of B. McCaffrey, LILCO Motion for Summary Disposition of SOC Contention 3, July 13, 1981, Table 1.

7/ "LILCO Date" From April 6, 1982, Table, "SNPS Conformance to Reg. Guide 1.97, Revision 2".

8/ Ibid 6/, Table 2.

9/ Ibid 7/.

10/ Post Accident Sampling System - means that this requirement will be taken care of by the PASS, which is to be designed, procured, qualified, built, and installed. We don't know how far along LILCO is.

11/ No progress has been made in the relevant area, or, if it has, LILCO's April 6, 1982 table doesn't mention it.

12/ LILCO's April 6, 1982 Status Report Table refers the reader to the July, 1981 Errata to Rev. 2 of Reg. Guide 1.97.

that variable. Finally, LILCO's current status of compliance is given.

Q.9. What is your opinion of the status of LILCO's response to Reg. Guide 1.97 with regard to Shoreham?

A.9 As demonstrated by the preceeding Table, the LILCO response is incomplete and, indeed, one cannot assess at this point when - if ever - LILCO will meet certain necessary requirements.***/ Indeed, since the contention was originally drafted, LILCO's areas of deficiency have increased over those enumerated in the contention.

Q10. Describe the details of post-accident monitoring items you feel are incomplete at Shoreham.

A10. The April 6, 1982 LILCO update of Reg. Guide 1.97 issues shows only eight items are complete, out of nearly fifty.15/ Of the remaining items, only 15 clearly show progress. The remaining 24 items, which may or may not have been addressed at all, fall into two classes. For 12

***/ In his July 13, 1981 Affidavit supporting Summary Disposition of SOC Contention 3, Brian McCaffrey stated that "Shoreham is being modified as necessary to meet (Reg. Guide 1.97), with a few exceptions". 13/ (Emphasis added) Recently, LILCO updated the status of each item from Reg. Guide 1.97. Again, there were some items where LILCO apparently does not intend to comply. 14/ The LILCO commitments in the status reports on virtually all items were vague and specific dates were absent.

13/ Ibid 6, p. 2.

14/ Ibid 7.

15/ Ibid 7.

issues, LILCO is waiting for a BWR Owners' Group resolution. In some cases, LILCO hopes to support an exemption request based on Owners' Group conclusions. For 12 additional items, the status update comments: "Required instrumentation already included in design". However, these same items call for upgraded qualification at Shoreham, and no mention is made of progress in that area.[16/]

Based on this sketchy information, it is impossible to assess whether LILCO can meet the June, 1983 deadline for implementation. In its original assessment of the impact of Reg. Guide 1.97, LILCO estimated that virtually all of the items would take at least a year to complete.[17/] The average estimated completion time was 15-18 months. Therefore, there is reason to question whether some items can be purchased and installed in approximately 12 months, which remains between now and June, 1983. The items of most concern at this time are those for which LILCO has stated may be subject to delay due to difficulties in delivery scheduling.

Q11. Please comment on the cases where LILCO is relying on the BWR Owners' Group position to provide an exemption from the Reg. Guide 1.97, Revision 2 requirements.

16/ Ibid 7.

17/ LILCO letter to NRC, SNRC-460, January 30, 1980.

A11. There are five requirements in Reg. Guide 1.97, Revision 2 for which LILCO is seeking exemptions by virtue of the BWR Owners' Group position. These are: in-core thermocouples, standby liquid control system flow, secondary containment area radiation monitor, radiation exposure rate, and drywell sump level.[18] The Owners' Group report has been completed for the thermocouple issue, but the remaining four issues are still being studied. If these studies and reports are completed but the NRC rejects the Owners' Group findings, LILCO would then have to comply with the Reg. Guide 1.97, Revision 2 requirements. In all of the above five cases, the Reg. Guide requirements result in new equipment to be purchased and incorporated into Shoreham's design.[19] LILCO has estimated the time needed for compliance with Reg. Guide 1.97, Revision 2 in three of the five cases as follows:

a)	Radiation exposure rate	18 months
b)	Drywell sump level	18-24 months
c)	In-core thermocouples	21-32 months[20]

For the other two items, no estimate of implementation time was made by LILCO. However, judging from the requirements of Reg. Guide 1.97, Revision 2, the modifications would be significant. There is no assurance at this point that the

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18/ Ibid 6, p. 2.

19/ Ibid 17.

20/ Ibid 17.

NRC Staff will find the Owners' Group position acceptable for any of the five items. Thus, there is a significant question as to whether these five requirements of Reg. Guide 1.97, Revision 2, can be satisfied by June, 1983, as required.

Q12. Are there other Reg. Guide 1.97, Revision 2, requirements from which LILCO may seek relief?

A12. Yes. In Mr. McCaffrey's July 13, 1981 Affidavit, five items from the Reg. Guide were identified as "subject to potential implementation delays, largely because of possible constraints on equipment availability."[21/] Those items are: neutron flux, RCS boron concentration, drywell spray flow, suppression chamber spray flow, and post-accident sampling system. LILCO may need to extend its implementation dates for some or all of these items, again raising a question whether LILCO can meet the June, 1982 completion date.

Q13. Will you summarize your comments on the status of Shoreham's response to Revision 2 of Reg. Guide 1.97?

A13. Of the total list of Reg. Guide 1.97 requirements, only eight items are claimed as being completed by LILCO. However, these items must still be reviewed by the NRC before any of the items are considered to be complete.[22/] Of the

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21/ Ibid 6, p. 2.

22/ "NRC Staff Answers to SOC's First Set of Interrogatories and Requests for Production of Documents", August 12, 1981, Contention 3, response 1.a.(3).

remaining items, the status is as follows:

a. Five requirements may be delayed because of projected difficulty in obtaining equipment.

b. Five other requirements are the subjects of LILCO requests for regulatory relief, based on BWR Owners' Group studies. There is no evidence that the equipment will be obtained or that the NRC will find the Owners' Group studies acceptable. If the NRC rejects the studies and requires LILCO to comply with the Reg. Guide 1.97, Revision 2 requirements, the estimated time of implementation could be 18 months or more.

c. Seven other requirements are being studied by the BWR Owners' Group. Although LILCO is not seeking relief on these items at this time, it is awaiting the results of the Owners' Group studies. There is no evidence that the results will be available in time to be implemented at Shoreham before June, 1983.

d. For twelve other requirements, LILCO's April 6, 1982 status update table does not provide any indication of progress to date. The status of these items, and the time needed to comply with the Reg. Guide requirements, cannot be determined.

e. Ten requirements are clearly being worked on by LILCO, although again there is insufficient data to assess how long it will be before these requirements are satisfied.

Thus, of the total list of forty-seven requirements, none has been officially satisfied.

Q14. In your opinion, then, has LILCO demonstrated a basis to believe that Reg. Guide 1.97, Revision 2 requirements will be complied with by June, 1983?

A14. No.

Q15. Does LILCO's failure to meet Reg. Guide 1.97 have implications beyond the specific regulatory guide items?

A15. Yes. This uncertainty and possible delay in implementing Reg. Guide 1.97, Revision 2 may also have a harmful effect on Shoreham's emergency planning. For example, the NRC's checklist for NUREG-0654 criteria calls for post-accident monitoring equipment in three of the planning criteria, (including eleven separate items), specifying:

a. Meteorological phenomena monitors (on and off-site).
b. Radiological monitors (process, area effluent, portable, and sampling).
c. Process monitors (system temperature and pressures, flow rates, levels, etc.).
d. Off-site radiological monitors.
e. Identification of parameters to be used in assessing the severity of reactor incidents. 23/

23/ NUREG-0654/FEMA REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Preparedness in Support of Nuclear Power Plants", November, 1980.

Attachment 1 lists NUREG-0654 planning standards and criteria which pertain to post-accident monitoring. These planning standards include a number of the Reg. Guide 1.97, Revision 2 items. Since compliance with applicable on-site emergency planning criteria is a prerequisite to fuel load, compliance with Reg. Guide 1.97, Revision 2 appears also to be appropriate prior to fuel load.

Q16. Please summarize your conclusions.

A16. The safety significance of the post-accident monitoring issue has been mentioned earlier in the testimony. Reg. Guide 1.97, Revision 2 results from the highest priority TMI-2 lessons. In the interest of providing the public with a safe and reliable plant, compliance with Reg. Guide 1.97, Revision 2 should be demonstrated before the issuance of an operating license. If that is not possible, LILCO should at least be required to provide considerably more assurance to the NRC Staff that each requirement of the Reg. Guide can and will be satisfied by June, 1983. To date, LILCO has failed to demonstrate that there is a reasonable liklihood that Shoreham will comply with Reg. Guide 1.97, Revision 2, requirements prior to June, 1983. In our opinion, such a demonstration should be required before any operation license is issued.

ATTACHMENT 1

NUREG-0654 REQUIREMENTS PERTAINING TO

POST-ACCIDENT MONITORING

ATTACHMENT 1

NUREG-0654 REQUIREMENTS PERTAINING TO

POST-ACCIDENT MONITORING

The requirements of NUREG-0654[1/] state, in part:

H.5. Each licensee shall identify and establish onsite monitoring systems that are to be used to initiate emergency measures in accordance with NUREG-0654 as well as those to be used for conducting assessment.

The equipment shall include:

a. geophysical phenomena monitors, (e.g., meteorological, hydrologic, seismic);

b. radiological monitors, (e.g., process, area, emergency, effluent, wound and portable monitors and sampling equipment);

c. process monitors, (e.g., reactor coolant system pressure and temperature, containment pressure and temperature, liquid levels, flow rates, status or lineup of equipment components); and

6. Each licensee shall make provision to acquire data from or for emergency access to offsite monitoring and analysis equipment including:

1/ The material in this attachment is reprinted from NUREG-0654, Rev. 1/FEMA REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans in Support of Nuclear Power Plants", Nuclear Regulatory Commission, November, 1980. Numbering follows the NUREG format.

a. geophysical phenomena monitors, (e.g., meteorological, hydrologic, seismic);

b. radiological monitors, including rate-meters and sampling devices. Dosimetry shall be provided and shall meet, as a minimum, the NRC Radiological Assessment Branch Technical Position for the Environmental Radiological Monitoring Program.

7. Each organization, where appropriate, shall provide for offsite radiological monitoring equipment in the vicinity of the nuclear facility.

8. Each licensee shall provide meteorological instrumentation and procedures which satisfy the criteria in Appendix 2, NUREG-0654, and provisions to obtain representative current meteorological information from other sources.

9. Each licensee shall provide for an onsite operations support center (assembly area) which shall have adequate capacity and supplies, including, for example, respiratory protection, protective clothing, portable lighting, portable radiation monitoring equipment, cameras and communications equipment for personnel present in the assembly area.

I.1 Each licensee shall identify plant system and effluent parameter values characteristic of a spectrum of off-normal conditions and accidents, and shall identify the plant parameter values or other information which correspond to the example initiating conditions of NUREG-0654. Such parameter values and the corresponding emergency class shall be included in the appropriate facility emergency procedures. Facility emergency procedures shall specify the kinds of instruments being used and their capabilities.

2. Onsite capability and resources to provide initial values and continuing assessment throughout the course of an accident shall include post-accident sampling capability, radiation and effluent monitors, in-plant iodine instrumentation, and containment radiation monitoring in accordance with NUREG-0578, as elaborated in the NRC letter to all power reactor licensees dated October 30, 1979.

3. Each Licensee shall establish methods and techniques to be used for determing:

a. the source term of releases of radioactive material within plant systems. An example is the relationship between the containment radiation monitor(s) reading(s) and radioactive material available for release from containment;

b. the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors;

4. Each licensee shall establish the relationship between effluent monitor readings and onsite and offsite exposures and contamination for various meteorological conditions.

5. Each licensee shall have the capability of acquiring and evaluating meteorological information sufficient to meet the criteria of NUREG-0654. There shall be provisions for access to meteorological information by at least the nearsite Emergency Operations Facility, the Technical Support Center, the Control Room and an offsite NRC center. The licensee shall make available to the State suitable meteorological data processing interconnections which will permit independent analysis by the State, of facility generated data in those States with the

resources to effectively use this information.

D.1 An emergency classification and emergency action level scheme as set forth in NUREG-0654 must be established by the licensee. The specific instruments, parameters or equipment status shall be shown for establishing each emergency class, in the in-plant emergency procedures. The plan shall identify the parameter values and equipment status for each emergency class.