LILCO, October 12, 1982

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 (OL)
	)	(Emergency Planning --
(Shoreham Nuclear Power Station, Unit 1)	)	Phase I)
	)	

TESTIMONY OF BRANT AIDIKOFF, H. MARK BLAUER, MATTHEW CORDARO, EDWARD LIEBERMAN, AND JAMES RIVELLO ON BEHALF OF THE LONG ISLAND LIGHTING COMPANY ON PHASE I EMERGENCY PLANNING CONTENTION EP 4 -- PROTECTIVE ACTIONS

PURPOSE

The purpose of this testimony is to refute Suffolk County's Phase I emergency planning Contention EP 4, which asserts that LILCO lacks sufficient knowledge to make sound protective action recommendations -- that is, to advise Suffolk County officials to instruct the public to evacuate or to take shelter when a radiological emergency occurs or threatens to occur. The substance of this testimony is that protective action recommendations depend on projections of offsite dose that are made during the early stages of an emergency and periodically during the course of the emergency. When projected offsite doses exceed doses specified by a U.S.

Environmental Protection Agency (EPA) Protective Action Guide (PAG), LILCO's procedures call for the company to recommend the actions (sheltering or evacuation) specified by the PAG. Consistency with the EPA PAG's is required by NRC regulations. That the methods, systems, and equipment for making offsite dose projections are adequate is shown by the LILCO testimony on a different contention, EP 14.

Attachments to this Testimony:

4-1	Resume of Brant Aidikoff	
4-2	Resume of H. Mark Blauer	
4-3	Resume of Matthew C. Cordaro	
4-4	Resume of Edward Lieberman	
4-5	Resume of James Rivello	
4-6	LILCO Emergency Plan section 6.4, "Protective Actions"	
4-7	SP 69.013.01	Unusual Event
4-8	SP 69.014.01	Alert
4-9	SP 69.015.01	Site Area Emergency
4-10	SP 69.016.01	General Emergency
4-11	SP 69.022.01	Determination of Offsite Dose
4-12	SP 69.021.01	Onsite Surveys
4-13	SP 69.020.01	Downwind Surveys
4-14	SP 69.026.01	Protective Action Recommendations (presently undergoing revision)

4-15	SP 69.023.01	Thyroid Dose Commitment Using TCS Air Sampler
4-16	Pages 2.3 and 2.5 of EPA 520/1-75-001	
4-17	SAND 77-1725, Appendices B and C	

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Identification of Witnesses

Q1. Will the witnesses please identify themselves?

A1. [Aidikoff] My name is Brant Aidikoff. I am an Engineer - Power with Stone & Webster Engineering Corporation - New York. My business address is One Penn Plaza, 250 West 34th Street, New York, New York 10119. A copy of my professional qualifications is attached (Attachment 4-1). My knowledge about this contention is based upon my assistance to LILCO in the development of LILCO's protective action recommendation procedure and my experience as detailed in my statement of professional qualifications.

[Blauer] My name is H. Mark Blauer. My business address is 175 East Old Country Road, Hicksville, New York 11801. I am LILCO's Emergency Planning Coordinator and Chairman of LILCO's Emergency Planning Task Force. A copy of my professional qualifications is attached to this testimony (Attachment 4-2).

[Cordaro] My name is Matthew C. Cordaro. I am Vice President, Engineering for LILCO. My business address is 175 East Old Country Road, Hicksville, New York 11801. A copy of my professional qualifications is attached (Attachment 4-3). I am included on this witness panel to assure the ASLB that LILCO management regards emergency planning as of the utmost importance. My role in emergency planning is to ensure that LILCO's emergency planning needs are being met and that management is kept apprised of emergency planning needs and problems.

[Lieberman] My name is Edward Lieberman. My business address is 300 Broadway, Huntington Station, New York 11746. I am a Vice President and principal of KLD Associates, Inc., which performs traffic planning studies for LILCO in connection with emergency planning for the Shoreham Station. A copy of my professional qualifications is attached to this testimony (Attachment 4-4).

[Rivello] My name is James Rivello. My business address is Shoreham Nuclear Power Station, P.O. Box 628, Wading River, New York 11792. I am employed by LILCO as Plant Manager of the Shoreham Station. A copy of my professional qualifications is attached to this testimony (Attachment 4-5). I am on this witness panel because it is my responsibility, upon receiving a recommendation from the Radiation Protection Manager in an emergency, to recommend protective actions to State and County officials.

Contention EP 4

Q2. What is EP 4?

A2. [Aidikoff, Blauer] Contention EP 4, as modified by the Atomic Safety and Licensing Board's Supplemental Prehearing Conference Order of September 7, 1982, reads as follows:

EP 4: PROTECTIVE ACTIONS
(SC, joined by NSC and SOC)

> Suffolk County contends that LILCO has not met the requirements of 10 CFR § 50.47(b)(10), 10 CFR Part 50, Appendix E, Item B, or NUREG 0654, Item II.J with respect to development and implementation of a range of protective actions for emergency workers and the public within the plume exposure pathway EPZ and with respect to development of guidelines for the choices of such actions in that the LILCO plan and procedures do not adequately discuss the bases for the

> choice of recommended protective actions (i.e., the choice between various ranges of evacuation vs. sheltering vs. other options) for the plume exposure pathway EPZ during emergency conditions. Thus, LILCO does not have sufficient knowledge and information to provide reliable, accurate protective action recommendations.

Q3. What appears to be the crux of this contention?

A3. [Aidikoff, Blauer] The fundamental proposition of the contention is that LILCO has not adequately discussed the "bases" for choosing which protective actions to recommend. In explaining its Contention EP 4.A, counsel for Suffolk County, in an August 5, 1982 letter to LILCO counsel, said the following:

> <u>CONTENTION EP [4]</u>. As we understand 10 C.F.R. §50.47(b)(10) and NUREG 0654, Item II.J, LILCO is required to set forth in its plan a "range of protective actions" and discuss the "bases" for making recommendations within that range under various emergency conditions. In our view LILCO has failed to do so. Had LILCO done so, we assume it would have been possible for one to assess the relative benefits of the various protective actions which would be set forth in the plan.

An implicit part of this contention, apparently, is that there is no "discussion of the relative benefits of sheltering in the types of homes found on Long Island," as the County put it on page 9 of its August 30, 1982, response to LILCO's and the NRC Staff's objections to the Phase I contentions.

LILCO Emergency Plan

Q4. Where in the LILCO emergency plan are protective actions discussed?

A4. [Aidikoff, Blauer] In section 6.4, "Protective Actions." A copy of that section is attached to this testimony as Attachment 4-6. The crux of that section is the following:

> LILCO will make a protective action recommendation to Suffolk County and New York State authorities for the population at risk. The various protective action options available are detailed in the New York State and Suffolk County emergency response plans. The protective action recommendation is based upon dose projection calculations, field monitoring data, EPA protective action guidelines, sheltering factors offered by local dwellings and evacuation time estimates for ambient conditions. The emergency plan procedure, "General Emergency" immediate implementing actions, contains protective actions to be recommended during events that are deteriorating rapidly based upon conditions in accordance with NUREG 0654, Appendix 1. The details of this decision process are contained in the EPIPs. [Emphasis added.]

Thus, the "bases" for protective actions that the County alleges the LILCO plan does not adequately discuss are the following:

1. Dose projection calculations,
2. Field monitoring data,
3. EPA protective action guides,
4. Sheltering factors offered by local dwellings, and
5. Evacuation travel time estimates for a range of local conditions.

We believe that the County intends to litigate nos. 3, 4, and 5 of these bases under EP 4. As for the other two, the dose projection calculations are discussed under Contention EP 14, "Accident Assessment and Dose Assessment Models," and the field monitoring data are discussed under Contention EP 10, "Accident Assessment and Monitoring." Former contention EP 22, "Accident Assessment Equipment," has not been admitted to this proceeding. The Board has indicated that some of the issues raised by former contention EP 1 (local conditions) may be addressed under this contention (EP 4) or under EP 14.

Q5. The discussion in LILCO plan section 6.4 is somewhat limited. Please give additional information about how LILCO will go about making protective action recommendations.

A5. [Aidikoff, Blauer] The information in the plan is brief because NUREG-0654 states that the plan should be concise. NUREG-0654 on page 29 states this:

> Applicable supporting and reference documents and tables may be incorporated by reference, and appendices should be used whenever necessary. The plans should be kept as concise as possible.

The plan is not an implementing document that is actually used in an emergency. Rather it is a summary document that lays out the basic elements of the plan for the benefit of reviewers such as the NRC Staff.

The working details of how protective action recommendations are made are contained in the emergency plan implementing procedures. For each of the four emergency classifications (Unusual Event, Alert, Site Area Emergency, General Emergency) (see SP 69.013.01, 69.014.01, 69.015.01, and 69.016.01), the procedure for calculating projected offsite doses, SP 69.022.01, is initiated, and in the case of an Alert, Site Area Emergency, or General Emergency, an onsite survey is performed using SP 69.021.01. Additional personnel are requested to report to augment the onsite staff in the case of an Alert or higher level emergency. If the protected offsite dose calculation or the onsite survey indicates the need for it, the downwind survey procedure

(SP 69.020.01) is initiated. It is the projected offsite doses, measured or calculated in accordance with these procedures, that are used to determine protective action recommendations under SP 69.026.01. Also, SP 69.023.01, "Thyroid Dose Commitment Using TCS Air Sampler," provides instructions for obtaining a thyroid dose commitment value from field team survey results. These procedures are Attachments 4-7, 4-8, 4-9, 4-10, 4-11, 4-12, 4-13, 4-14, and 4-15 to this testimony. This testimony is based upon a revision of SP 69.026.01 that is now in progress; a copy of the revised procedure will be submitted to the Board as soon as it is completed and approved. Attachment 4-14 is the present version of SP 69.026.01, before the revision has taken place, but is still useful to illustrate the methods discussed in this testimony.

Appendix 1 of NUREG-0654 says that predetermined protective actions should be established for rapidly developing General Emergency initiating conditions. In Appendix 6.1 of SP 69.016.01 (Attachment 4-10) LILCO has developed protective action recommendations based only upon plant conditions, to be used when there is insufficient time available to complete the other previously mentioned procedures.

In short, what are needed to make protective action recommendations are (1) the projected offsite doses and (2) the EPA Protective Action Guides that describe which actions should be taken when the projected doses reach certain specified levels. LILCO's ability to make the offsite dose projections is addressed in LILCO's testimony on Contention EP 14.

Protective Action Guides

Q6. So in this testimony you are going to talk about EPA's Protective Action Guides. What are "Protective Action Guides"?

A6. [Aidikoff, Blauer] The EPA defines a protective action guide (PAG) on page 1.1 of its Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, EPA 520/1-75-001, September, 1975 (revised June 1980):

> After a nuclear incident occurs, an estimate is made of the radiation dose which affected population groups may potentially receive. This dose estimate is called the projected dose. A protective action is an action taken to avoid or reduce this projected dose when the benefits derived from such action are sufficient to offset any undesirable features of the protective action. The Protective Action Guide (PAG) is the projected dose to individuals in the population which warrants taking protective action.

Q7. What is a Protective Action Recommendation?

A7. [Blauer, Aidikoff] A Protective Action Recommendation (PAR) is a recommendation from LILCO to State and County officials to implement protective actions (either sheltering or evacuation) that will reduce the exposures that might otherwise occur. It is a governmental responsibility to implement these protective actions. In no case can LILCO give such an order directly to the public.

Q8. How does LILCO arrive at a Protective Action Recommendation?

A8. [Blauer, Aidikoff] In order to reflect changes in plant or meteorological conditions, LILCO continually determines the projected dose to downwind zones using either calculations or field monitoring procedures. Using the projected dose as an input into the Protective Action Recommendation procedure SP 69.026.01, the thyroid and whole body doses to the population at risk are determined for each of the protective actions under consideration. The results of these calculations are shelter doses and evacuation doses for whole body and thyroid exposure. These doses are compared to the EPA Protective Action Guides as follows:

- No action is recommended in Emergency Response Planning Areas (ERPA's) where the projected whole body dose is less than 1 rem or the projected thyroid dose is less than 5 rem.

- Sheltering is recommended in ERPA's where the projected dose is 1 to 5 rem whole body or 5 to 25 rem thyroid; evacuation will be recommended if as the accident develops it becomes clear that the evacuation dose would be less than the sheltering dose.

- Evacuation is recommended in ERPA's where the evacuation dose is less than the sheltering dose and the sheltering dose is greater than 5 rem whole body and greater than 25 rem thyroid.

Q9. Where did you get these dose guidelines?

A9. [Aidikoff, Blauer] The dose guidelines come from the Environmental Protection Agency's Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, EPA 520/1-75-001, September 1975 (revised June 1980). The relevant pages, pages 2.3 and 2.5, containing Tables 2.1 and 2.2, are Attachment 4-16 to this testimony.

Q10. Who told you to use the EPA PAG's?

A10. [Aidikoff, Blauer] The NRC. Section 50.47(b)(10) of 10 C.F.R. reads as follows:

> (b) The onsite and offsite emergency response plans for nuclear power reactors must meet the following standards [footnote omitted]:
>
> . . . .
>
> (10) A range of protective actions have been developed for the plume exposure pathway EPZ for emergency workers and the public. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed [emphasis added].

Similarly, NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Rev. 1, Item II.J (page 60 of the document) says this:

> 7. Each licensee shall establish a mechanism for recommending protective actions to the appropriate State and local authorities. These shall include Emergency Action Levels corresponding to projected dose to the population-at-risk, in accordance with Appendix 1 and with the recommendations set forth in Tables 2.1 and 2.2 of the Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA-520/1-75-001). As specified in Appendix 1, prompt notification shall be made directly to the offsite authorities responsible for implementing protective measures within the plume exposure pathway Emergency Planning Zone [emphasis added].

Thus, 10 C.F.R. § 50.47(b)(10) says that guidelines for protective actions are to be "consistent with Federal guidance." NUREG-0654 says that the mechanism for recommending protective actions should be in accordance with EPA's Manual of Protective Action Guides.

Q11. Are you aware of any commercial nuclear power plants in this country that do not employ the same EPA PAG's that LILCO uses?

A11. [Blauer, Aidikoff] No.

Sheltering

Q12. What factors determine how effective a building is at shielding a person from radioactivity?

A12. [Aidikoff, Blauer] The principal factors for whole body dose are (1) the building materials (stone or wood frame) and (2) whether the house has a basement. For thyroid dose the principal factor is the infiltration rate of outside air into the interior of the house.

Q13. What sheltering factors do you use for different buildings?

A13. [Aidikoff, Blauer] For the whole body dose, represntive shielding factors are listed in Appendix 12.4 to SP 69.026.01 (Attachment 4-14). For the purpose

of this procedure LILCO will use a 0.7 shielding factor for houses in Suffolk County. The shielding factors in SP 69.026.01 are based on a document called "Public Protection Strategies for Potential Nuclear Reactor Accidents: Sheltering Concepts With Existing Public and Private Structures," SAND 77-1725 (printed February 1978), by David C. Aldrich, David M. Ericson, Jr., and J. D. Johnson, prepared by Sandia Laboratories. For thyroid dose a dose reduction of two-thirds is assumed for the first two hours. This is based upon information in the EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, EPA 520/1-75-001, September, 1975 (revised June, 1980); EPA, "Protective Action Evaluation, Part I, The Effectiveness of Sheltering as a Protective Action Against Nuclear Accidents Involving Gaseous Releases," EPA 520/1-78-001A (April 1978) by George H. Anno and Michael A. Dore; and "Protective Action Evaluation, Part II, Evacuation and Sheltering as Protective Actions Against Nuclear Accidents Involving Gaseous Releases," EPA 520/1-78-001B (April 1978, revised 8-78), by George H. Anno and Michael A. Dore.

Q14. Are the sheltering factors from SAND 77-1725 used in the emergency plans for other nuclear power plants in this Country?

A14. [Aidikoff, Blauer] Yes, they are used by many other nuclear power plants, including Zimmer, Salem, and River Bend.

Q15. How are these shielding factors incorporated into the protective action recommendations that LILCO makes?

A15. [Aidikoff, Blauer] The projected dose is reduced by the amount of protection offered by the type of structures for whole body dose and the standard amount for thyroid dose.

Q16. Have you determined a Suffolk County-specific sheltering factor based upon the Sandia Labs report?

A16. [Aidikoff, Blauer] Yes. We contacted the Suffolk County Planning Department, and they informed us that about 75% of Suffolk County homes have basements and about 90% are wood frame. LILCO weighted the SAND 77-1725 sheltering factors with these data and determined that a shielding factor of 0.7 is representative of the Suffolk County area. This is consistent with SAND 77-1725, which indicates that housing in the Northeast offers the most protection (see Appendices B and C of SAND 77-1725, which are Attachment 4-17 to this testimony).

Evacuation Time Estimates

Q17. You testified that another basis of your protective action recommendations is the evacuation time estimates. How did LILCO use evacuation time estimates in setting up the thyroid guidance chart and whole-body guidance chart in Appendix 12.5 of SP 69.026.01?

A17. [Aidikoff, Blauer] SP 69.026.01 (Attachment 4-14, prior to revision) is a procedure for evaluating to what extent the projected dose will be reduced by implementing various protective actions. The evacuation time estimates are used to determine how long the population at risk might be required to stay within the plume during an evacuation and what the consequent dose might be. This "evacuation dose" is compared to a "shelter dose," and the protective action guides are utilized to determine a recommended protective action.

Q18. What is the basis for the evacuation time estimates in Appendix 12.3 of SP 69.026.01?

A18. [Aidikoff, Blauer, Lieberman] These estimates were developed by Suffolk County Planning Department personnel and were reviewed by KLD Associates. This review considered the assumptions and estimates employed and determined that the resulting time estimates were

reasonable. The KLD work is continuing and may be submitted as evidence in Phase II of the litigation of emergency planning issues, depending on what contentions are raised in Phase II. If because of new information the evacuation time estimates are revised, the only change to SP 69.026.01 will be to the tables of evacuation times; the procedure will remain the same.

Range of Protective Actions

Q19. Are LILCO's procedures flexible enough to allow you to recommend partial evacuation (that is, evacuation of only certain sectors or evacuation of only certain especially vulnerable groups of people such as children and pregnant women) to the offsite authorities? What about selective sheltering (sheltering of individuals who may be more adversely affected by evacuation than by potential contamination)?

A19. [Aidikoff, Blauer] LILCO's procedures provide for the projection of doses in each downwind sector out to 2, 5, or 10 miles. Thus it is possible to provide a protective action recommendation specifically determined for each of these areas. The County or State may choose to limit the recommendation to selected portions of the public.

Conclusions: Compliance with NRC
Regulations and Guidance

Q20. In your judgment, has LILCO complied with 10 C.F.R. § 50.47(b)(10), which is quoted earlier in this testimony?

A20. [Aidikoff, Blauer, Cordaro, Rivello] Yes, a range of protective actions for each of the downwind sectors has been developed for the plume exposure pathway EPZ for the public. Guidelines for the choice of protective actions during an emergency are developed and in place, in SP 69.026.01 (Attachment 4-14, prior to revision). They are consistent with federal guidance, namely the EPA Protective Action Guides. The evacuation time estimates are developed for downwind combinations of the 19 ERPA's.

Q21. What does 10 C.F.R. Part 50, Appendix E, Item IV.B, say?

A21. [Blauer, Aidikoff] That part of Appendix E reads, in pertinent part, as follows:

> B. Assessment Actions.
> The means to be used for determining the magnitude of and for continually assessing the impact of the release of radioactive materials shall be described, including . . . the emergency action levels that are to be used for determining when and what type of protective measures should be considered . . . outside the site boundary to protect health and safety.

Q22. Do LILCO's plans for recommending protective actions to the offsite authorities comply with 10 C.F.R. Part 50, Appendix E?

A22. [Aidikoff, Blauer, Cordaro, Rivello] Yes. As specified in IV.B of Appendix E, the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety are described in the LILCO plan and procedures.

Q23. What about protective actions for "emergency workers"?

A23. [Aidikoff, Blauer] Apart from the words "emergency workers" in the contention, we have seen no indication that the County wishes to litigate protection of emergency workers within the scope of Contention EP 4. A different contention, EP 9(C), addresses guidelines for ensuring that emergency workers do not receive excessive radiation exposures. Therefore, this EP 4 testimony does not address protective actions for emergency workers.

Q24. What about the "ingestion exposure pathway"?

A24. [Aidikoff, Blauer] The County has not indicated a desire to address the ingestion pathway under Contention EP 4. Therefore this testimony does not address the ingestion pathway.

Q25. What about protective action guides for waterborne releases?

A25. [Aidikoff, Blauer] The County has not indicated any desire to litigate issues about waterborne releases. Therefore this testimony does not address waterborne releases.

Q26. Are LILCO's plan and procedures consistent with NUREG-0654, Item II.J?

A26. [Aidikoff, Blauer] Yes. In particular, LILCO's plan and procedures comply with Item II.J.7, which recommends that each licensee establish a mechanism for recommending protective actions to the appropriate State and local authorities and which is the only part of II.J. that the County appears to have put into contention.

PROFESSIONAL QUALIFICATIONS

BRANT AIDIKOFF

Engineer - Power Division

STONE & WEBSTER ENGINEERING CORPORATION

My name is Brant Aidikoff. My business address is Stone & Webster Engineering Company (SWEC), 1 Penn Plaza, 250 West 34th Street, New York, New York 10119. I am currently involved with Nuclear Power Plant Emergency Planning. I have been employed by SWEC since 1979.

I was awarded a Bachelor of Science degree in Energy Conversion in 1975 and a Master of Engineering degree in 1976, both from Cornell University.

I am currently the Responsible Engineer for the group providing emergency planning support for LILCO's Shoreham Nuclear Power Station (Shoreham). This effort involves detailed reviews of the Shoreham emergency plan and corresponding procedures. As a result of these reviews, my group developed an emergency organization, emergency plan sections, and implementing procedures. In addition, all non-radiological Emergency Action Levels were developed for use in emergency classification. Presently, a comprehensive training and drill program is being implemented to prepare for an emergency response exercise to be witnessed by the Nuclear Regulatory Commission.

Prior to my involvement with this group, I led two groups that prepared radiological emergency response Standard Operating Procedures (SOPs) for the Radiation Control Branch in the State of Kentucky and the Clermont County Disaster Services Agency in Ohio. These SOPs contained overall descriptions and detailed instructions for the State's emergency response to the offsite radiological aspects of an accident at a nuclear power plant. Procedures were provided for notification, mobilization, offsite dose projection, radioactive release monitoring and sampling, equipment use, and decontamination. This effort involved extensive interaction with State officials responsible for radiation control and emergency response. I coordinated the development of the offsite dose projection methodology for the Zimmer Nuclear Power Station and for the States of Ohio and Kentucky.

I also led a task force that directly supported the efforts of PSE&G of New Jersey to respond to the NRC Appraisal Program Findings prior to Salem II licensing. This support consisted of a reevaluation of Salem's emergency organization, Emergency Action Levels, and protective action recommendations; development of a personnel training program and associated documentation; and a complete review of all documents and plans for consistency. My support included meeting with NRC Region I representatives to explain the direction and intent of PSE&G's efforts. This task force played a significant role in the successful licensing of Salem II Generating Station.

I also led the development of the Emergency Plan Implementing Procedures (EPIPs) for the W. H. Zimmer Nuclear Power Station. This effort consisted of developing a set of procedures that would direct the Station and Corporate emergency response personnel in their responsibilities during an accident. Frequent dealings with site, corporate, and contractor personnel were necessary.

In addition, I have led the efforts that developed radiological procedures for the States of New Jersey and Delaware. These efforts were noted for the timeliness with which they were effected and the delicacy of the dealings with State officials. Documents produced have been in accordance with numerous regulatory guides, including NUREG-0654/FEMA REP 1, FEMA REP 2, NUREG-0696, and EPA Manual of Protective Action Guides. These documents, in support of PSE&G's Salem Nuclear Power Station, have been submitted to FEMA.

I was also responsible for the FSAR Section 13.3 Emergency Plan for the Gulf States Utility River Bend Station Nuclear Power Plant. The project involved writing the site emergency plan based upon applicable NRC and FEMA regulations; development of the emergency response organization; and coordination of required technical and geopolitical input. This document is presently undergoing final preparation for FSAR submittal to the NRC. Moreover, I coordinated the initial development of the emergency plan implementing procedures.

This effort consisted of a comprehensive liaison with the plant operating staff to develop site-specific procedures that would be used by the emergency personnel during an emergency event.

I continue to be a member of the Stone & Webster Corporate Group that reviews emergency plans developed for various nuclear utilities. This group analyzes the emergency plans for content and acceptability relative to currently applicable NRC and FEMA regulations.

I am a registered Engineer-in-Training in the State of New York.

PROFESSIONAL QUALIFICATIONS

H. MARK BLAUER

Chairman, Emergency Planning Task Force

Emergency Planning Coordinator

LONG ISLAND LIGHTING COMPANY

My name is H. Mark Blauer. My business address is Long Island Lighting Company, 175 East Old Country Road, Hicksville, New York 11801. I am Chairman of the Emergency Planning Task Force and Emergency Planning Coordinator. In this capacity, I report to the Vice Presdient, Nuclear, and the Vice President, Engineering. I also report to the Manager, Nuclear Engineering Department. My duties include overall technical and administration responsibility for the Emergency Planning Task Force. The Task Force is responsible for developing and maintaining the Shoreham Nuclear Power Station Emergency Plan; Emergency Training curriculum, manuals, and lesson plans; qualification and selection of emergency response personnel; Emergency Plan procedures; onsite and offsite emergency support facilities; the Prompt Notification System; the interfacing with Federal (NRC, DOE, FEMA, Coast Guard), State (Department of Health, Disaster Preparedness Commission) and Local (Suffolk County,

hospitals and fire departments) authorities as well as other nuclear industry support groups (INPG).

I received my Bachelor and Master of Science degrees from the State University of New York at Stony Brook in 1968 and 1971, respectively. I received my Doctorate in Nuclear Chemistry from the University of Glasgow, Scotland in 1977.

From 1971 to 1975 I was a Research Assistant (U.S. equivalent: Assistant Professor) at the University of Glasgow teaching nuclear chemistry and researching low-level tritium techniques. I was a Research Assistant (U.S. equivalent: Assistant Professor) at University College, London from 1975 to 1977 teaching isotope geology, researching major and trace element techniques and acting as consultant to several water authorities. During this period the following were published:

Anderson, A., Blauer, H. M. and Baxter, M.S. (1977). A controlled power supply for the electrolytic enrichment of tritium, J. Physics, V10, pp. 1286-1294.

Beckinsale, R.D., Bowles, J.F.W., Pankhurst, R.J., Wells, M.K. and Blauer, H.M. (1977). Rubidium-strontium age studies and geochemistry of acid veins in the Freetown complex, Sierra Leone, Mineralogical Magazine, V41, pp. 501-511.

Blauer, H.M., Baxter, M.S. and Anderson, A. (1978). An improved technique for the electrolytic enrichment of tritium, Analyst, V103, pp. 823-829.

Hope, C.A., Blauer, H.M. and Reiderer, J. (1980). Recent analysis of 18th dynasty pottery in "Studien zur Altagyptischen Keramic," edited Dorothea Arnold, Philip von Zabern, Mainz.

In 1977 I returned to the United States and assumed the

position of Assistant Professor at the University of Pittsburgh, Department of Radiation Health from 1977 to 1980. I taught radiation health, radiation chemistry and nuclear chemical separation techniques; researched bioassay techniques and low-level environmental measurement techniques; directed an EPA certified radio-chemical laboratory; and consulted with several major uranium producers. During this period the following were published:

Dennis, Nancy A., Blauer, H. Mark, and Kent, Jacqueline E. (1981). Dissolution fractions and half-times of single source yellowcake in simulated lung fluids, Health Physics, V41.

Culp, P. and Blauer, H.M. (1979). Dissolution rates of radionucleides from coal and coal ashes, Twenty-fourth Annual Meeting of the Health Physics Society, Philadelphia, PA.

Dennis, N.A. and Blauer, H.M. (1979). Dissolution rates of uranium in yellowcake in simulated lung fluids, Twenty-fourth Annual Meeting of the Health Physics Society, Philadelphia, PA.

Padezanin, T. and Blauer, H.M. (1979). Comparison of uranium urinalysis methods, Twenty-fourth Annual Meeting of the Health Physics Society, Philadelphia, PA.

Blauer, H.M. and Dennis, N.A. (1979). Dissolution rates of uranium from single source yellowcake in both simulated interstitial and surfactant lung fluids, Twenty-fifth Annual Conference on Bioassay, Enviromental and Analystical Chemistry, Las Vegas, N.Y.

Maitz, A.H. and Blauer, H.M. (1980). Pure uranium oxides: their dissolution rates plus relationship to yellowcake dissolution characteristics, Twenty-fifth Annual Meeting of the Health Physics Society, Seattle, WA.

Blauer, H.M. and Brown, S.H. (1980). Physical and chemical parameters affecting dissolution

characteristics of yellowcake in simulated lung fluids, Twenty-fifth Annual Meeting of the Health Physics Society, Seattle, WA.

Brown, S.H. and Blauer, H.M. (1980). Characterization of yellow-cake (U308) from multiple sources and some implications regarding uranium mill bioassay, Twenty-fifth Annual Meeting of the Health Physics Society, Seattle, WA.

From 1980 to 1981 I was Environmental Scientist at Three Mile Island Nuclear Generating Station responsible for audits, the Radiological Environmental Monitoring Program, offsite dose calculations and health effects studies. During this period the following positions and procedures were written:

Blauer, H. Mark (1981). Three Mile Island Nuclear Station, Comments on the Articles "The First Casualty at TMI" and "The Lethal Path of TMI Fallout" by Ernest J. Sternglass.

Blauer, H. Mark (1981) TMI Enviromental Controls REMP Procedure, Determination of REMP investigation levels and subsequent actions, ECP 1507, Rev. 1.

Blauer, H. Mark (1981) TMI Environmental Controls Emergency REMP Procedure, operating procedure for the CRT, ECP 1601, Rev. 0.

Blauer, H. Mark (1981) TMI Environmental Controls Emergency REMP Procedure Determination of Off-Site Dose, ECP 1602, Rev. 1.

Blauer, H. Mark (1981) TMI Environmental Controls Procedure Ge(li) detector system using series 80, ECP 1719, Rev. 0.

I joined LILCO in 1981 as Senior Scientist, Nuclear Licensing Division. My responsibilities include providing support to corporate and plant staff in the areas of Radiation

Protection, Health Physics, ALARA, Emergency Planning and REMP. In 1982 I became Chairman of the Emergency Planning Task Force responsible for all technical and administrative functions. During this period, the following courses and procedures were prepared:

General Physics - BWR Familiarization Course (1 week)

LILCO - BWR Familiarization Course (2 weeks)

Blauer, H. Mark (1981) REMP data receipt and running tables, RP 4.2, Rev. 0

Blauer, H. Mark (1981) Anomalous data results - LLD and positive value exceptions, RP 4.3, Rev. 0

Blauer, H. Mark (1982) Acceptance Criteria, RP 4.4, Rev. 0

Blauer, H. Mark (1982) Determination of REMP investigation levels and subsequent actions, RP 4.5, Rev. 0.

I am certified by the American Chemical Society and a member of the American Geophysical Union and Health Physics Society.

PROFESSIONAL QUALIFICATIONS

MATTHEW C. CORDARO

Vice President of Engineering

LONG ISLAND LIGHTING COMPANY

My name is Matthew C. Cordaro. My business address is Long Island Lighting Company, 175 East Old Country Road, Hicksville, New York 11801. I am currently Vice President of Engineering and have held this position since the spring of 1978. As Vice President of Engineering, I am responsible for all of LILCO's engineering activities. This includes responsibility in the areas of facility planning and engineering for nuclear and fossil electric generating plants, as well as electric and gas transmission and distribution systems. In addition, I am responsible for assessing the environmental impacts of all LILCO operations.

I received my Bachelor of Science degree in Engineering Science from C. W. Post College in 1965. I received my Master of Science degree in Nuclear Engineering from New York University in 1967. I received my Doctorate in Applied Nuclear Physics from the Cooper Union School of Engineering and Science in 1970. I was awarded the Atomic Energy Commission Special Fellowship in Nuclear Science and Engineering.

My past professional affiliations include a position as Guest Research Associate at Brookhaven National Laboratory, Adjunct Associate Professor of Nuclear Engineering at Polytechnic Institute of New York and Adjunct Assistant Professor at C. W. Post College.

I joined LILCO in 1966 and from 1966 to 1970 I held the positions of Assistant Engineer (1966), Associate Engineer (1967), Nuclear Physicist (1968) and Senior Environmental Engineer (1970). In these earliest positions with LILCO I was involved as a principal in all phases of nuclear power plant design, licensing and fuel management. I was also a lead witness for the Company in Federal and State licensing proceedings for the Shoreham and Jamesport Nuclear Power Stations.

In 1972 I assumed the position of Manager of Environmental Engineering. In this capacity I was responsible for the environmental impact of all LILCO operations. This position involved the supervision, administration and direction of all environmental programs aimed at demonstrating compliance with applicable standards.

I am a member of a number of related professional organizations including: the Board of Directors, Adelphi University's Center on Energy Studies; and the Council of Overseers, C. W. Post College. Other related professional

affiliations are: the Technical Resources Advisory Council to the New York State Department of Environmental Conservation; the New York Power Pool Environmental Committee; Advisory Task Forces and Committees of the Atomic Industrial Forum; the Long Island Association of Commerce and Industry Environmental Committee; the Advisory Board to Environmental Technology Seminar; the Environment and Energy Committee of the Edison Electric Institute; and the HSA Environmental Task Force. I have also been a member of the Research Planning Advisory Committee for the New England River Basins Commission Study of Long Island Sound, the Marine Advisory Council to the New York State Sea Grants Seminar, and the Nassau-Suffolk Health Systems Agency (HSA), Suffolk County Council.

In addition, I am a member of the American Nuclear Society, the Health Physics Society and the Environmental Technology Seminar.

My most recent publications include a paper on methodology for power plant site selection, papers presented at the World Energy Conference on space heating alternatives and power plant cooling systems, a paper related to power plant waste heat utilization, and a paper on the transportation of nuclear wastes. I have also published journal articles in the fields of environmental science and nuclear science, as well as

numerous studies and reports related to the environmental effects of energy production.

I recently testified before Congressional Committees on Nuclear Waste Transport and the Economics and Environmental Impacts of Coal Utilization.

PROFESSIONAL QUALIFICATIONS

EDWARD LIEBERMAN

Vice President

KLD ASSOCIATES, INC.

My name is Edward Lieberman and my business address is KLD Associates, Inc., 300 Broadway, Huntington Station, New York 10007. I am presently Vice President of KLD Associates, Inc.

I received my Bachelor of Science degree in Civil Engineering in 1951 from Polytechnic Institute of Brooklyn. I was awarded my Master of Science degrees in Civil Engineering in 1954 from Columbia University and in Aero Engineering in 1967 from Polytechnic Institute of Brooklyn. I subsequently worked on a Doctorate degree in Transportation Planning at Polytechnic Institute of New York. I am a member of Chi Epsilon Honorary Fraternity.

With almost 30 years of professional experience, I have managed numerous major projects. I pioneered the development and application of traffic simulation models, making major innovations in the state-of-the-art in the Traffic Engineering profession. I have also been responsible for many engineering studies involving data collection and analysis and design of traffic control systems to expedite traffic flow and relieve congestion.

I have developed simulation models to study traffic performance on urban networks, freeways, and freeway corridors. I am currently working on a traffic simulation model for two-lane, two-way rural roads. These programs include consideration of pedestrians' interaction with vehicular traffic, truck and bus operations, special turning lanes, and vehicle fuel consumption and emissions; both pretimed and actuated traffic signal controls are represented.

I was responsible for the theoretical development of DYNEV, a DYnamic Network EVacuation model. The DYNEV model consists of two major components: an equilibrium traffic assignment model and a macroscopic dynamic traffic simultation model designed for all types of roadway facilities (urban streets, freeways, rural roads).

DYNEV is designed to be used as a tool to develop and organize evacuation plans needed as part of general disaster preparedness planning. DYNEV was used to analyze an existing evacuation scenario at the Con Edison Indian Point Nuclear Power Station and is currently being used to develop an extensive evacuation plan for the LILCO Shoreham Nuclear Power Station on Long Island, New York.

In developing this evacuation plan for LILCO's Shoreham Nuclear Power Station, my activities include definition of evacuation scenarios, definition of the evacuation network,

development of traffic control treatments and of traffic routing patterns, analysis of trip tables, analysis of simulation results, optimization of evacuation strategies and the preparation of formal documentation.

I was also responsible for the designs of the NETSIM microscopic urban traffic simulation model (formerly UTCS-1) and of the SCOT freeway traffic simulation model. The NETSIM microscopic traffic simulation model developed for the Federal Highway Administration, enables agencies to evaluate traffic operations in urban environments. The SCOT model was developed for the Transportation Systems Center of the Department of Transportation. This program includes a dynamic traffic assignment algrithm which routes traffic over a network in response to changing traffic flow characteristics to satisfy a specified origin-destination table. In addition, I have developed advanced traffic control policies for urban traffic for the FHWA-sponsored UTCS Project, as well as a bus preemption policy to enhance the performance of mass transit operations within urban environs.

I designed and programmed the advanced "Third Generation" area-wide, cycle-free control policies for moderate and congested traffic flow for computer-monitored real-time systems. I also developed a cycle-based, off-line computational procedure named SIGOP-II, to optimize traffic signal timing patterns to minimize system "disutility."

I led a group of traffic engineers and systems analysts in developing a system of macroscopic traffic simulation models designed to evaluate Transportation Systems Management (TSM) strategies. This software system, named TRAFLO, also includes an equilibrium traffic assignment model. This model has been distributed to other agencies including FEMA.

I designed an "Integrated Traffic Simulation System," named TRAF, which will eventually incorporate all the best traffic simulation models available. Using structured programming techniques, TRAF will integrate: NETSIM, TRAFLO, INTRAS (a microscopic freeway traffic simulation model), and a microscopic rural-road simulation model.

I served as Principal Investigator on NCHRP Project 3-20 entitled, "Traffic Signal Warrants." This project involved both field data collection and the application of the NETSIM model to study intersection delay as a function of traffic volume, type of control and geometrics. In turn, I developed and documented new signal warrants which wll be incorporated in the next version of the Manual on Uniform Traffic Control Devices (MUTCD).

Under NHTSA sponsorship, I directed a research study to evaluate a Driver Vehicle Evaluation Model named DRIVEM. This model simulates the resonse of motorists to hazardous events. The effort included analysis of the model formulation and

software and sensitivity testing. A workshop was designed, organized, scheduled and conducted by myself and other KLD professionals; experts from all over the U.S. were invited to recommend specific NHTSA research activities for the further development of the model. A recommended research program constituted the major output of the contract.

Over the years I have been involved in a number of other studies to evaluate traffic operations on large-scale road networks, using one or more of the models described above.

Prior to 1960 I applied my skills to the areas of stress analysis, vibrations, fluid dynamics and numerical analysis of differential equations. These analyses were programmed for the IBM 7090 and System 360, CDC 6600 and 7600, G.E. 625 and UNIVAC 1108 digital computers in assembly language, FORTRAN and PLI. I also designed the logic and real-time programming for a sonar simulator built for the Department of Navy and monitored by a PDP-8 process-control digital computer.

I am a member of the American Society of Civil Engineers, the Institute of Transportation Engineers, the Association of Computing Machinery and the Transportaton Research Board (TRB). I am also a member of the Capacity Committee and of the Traffic Flow Theory and Characteristics Committee of the TRB. I am a licensed Professional Engineer in New York, Maryland, and Florida.

The following list comprises selected publications of my studies and findings:

"DYNET - A Dynamic Network Simulation of Urban Traffic Flow," Proceedings, Third Annual Simulation Symposium, 1970.

"Simulation of Traffic Flow at Signalized Intersections: the SURF System," Proceedings, 1970 Summer Computer Simulation Conference, 1970.

"Dynamic Analysis of Freeway Corridor Traffic," ASME paper, Trans. 70-42.

"Simulation of Corridor Traffic: The SCOT Model," "Highway Research Record No. 409, 1972.

"Logical Design and Demonstration of UTCS-1 Network Simulation Model," Highway Research Record No. 409, 1972 with R. D. Worrall and J. M. Bruggerman).

"Variable Cycle Signal Timing Program: Volumes 1-4," Final Report of Contract DOT-FH-11-7924, June, 1974.

"Traffic Signal Warrants," KLD TR-51, Final Report on NCHRP Project 3-20/1, December 1976 (with G. F. King and R. Goldblatt).

"Rapid Signal Transition Algorithm," Transportation Research Record No. 509, 1974 (with D. Wicks).

"Subnetwork Structuring and Interfacing for UTCS Project-Program of Simulation Studies," KLD TR-5, January, 1972.

"Development of a Bus Signal Preemption Policy and a System Analysis of Bus Operations," KLD TR-11, April 1973.

"SIGOP-II - Program to Calculate Optimal, Cycle-Based Traffic Signal Timing Patterns, Volumes 1 and 2," Final Report, Contract DOT-FH-11-7924, KLD TR-29 and TR-30, December 1974. Summary report in Transportation Research Record 596, 1976 (with J. Woo).

"Developing a Predictor for Highly Responsive System-Based Control," Transportation Research Record 596, 1976 (with W. McShane and R. Goldblatt).

"A New Approach for Specifying Delay-Based Traffic Signal Warrants," Transportation Research Special Report 153 - Better Use of Existing Transportation Facilities, 1976.

"Network Flow Simulation for Urban Traffic Control Systems," Vols. 1-5, PB230-760, PB230-761, PB230-762, PB230-763, PB230-764, 1974 (with R. Worrall). Vols. 2-4 updated 1977, KLD TR-60, TR-61, TR-62 (with D. Wicks and J. Woo).

"Extension of the UTCS-1 Traffic Simulation Program to Incorporate Computation of Vehicular Fuel Consumption and Emissions," KLD TR-63, 1976 (with N. Rosenfield).

"Analysis and Comparison of the UTCS Second- and Third-Generation Predictor Models," KLD TR-35, 1975.

"Urban Traffic Control System (UTCS) Third Generation Control (3-GC) Policy," Vol. 1, 1976 (with A. Liff).

"Design of TRAFIC Operating System (TOS), KLD TR-57, 1977.

"Revisions to the UTCS-1 Traffic Simulation Model to Enhance Operational Efficiency," KLD TR-59, 1977 (with A. Wu).

"The Role of Capacity in Computer Traffic Control," in Research Directions in Computer Control of Urban Traffic Systems, ASCE, 1979.

"Traffic Simulation: Past, Present and Potential," in Hamburger, W.S. and Steinman, L., eds., Proceedings of the International Symposium of Traffic Control Systems, University of California, Berkeley, 1979.

"TRAFLO: A New Tool to Evaluate Transportation System Management Strategies," presented at the 59th Annual Meeting of the Transportation Research Board, 1980 (with B. Andrews).

"Determination of the Lateral Deployment of Traffic on an Approach to an Intersection," presented at the 59th Annual Meeting of the Transportation Research Board, 1980.

"Service Rates of Mixed Traffic on the Left-Most Lane of an Approach," presented at the 59th Annual Meeting of the Transportation Research Board, 1980 (with W. R. McShane).

"Development of a TRANSYT-Based Traffic Simulation Model," presented at the 59th Annual Meeting of the Transportation Research Board, 1980 (with M. Yedlin).

"Hybrid Macroscopic-Microscopic Traffic Simulation Model," presented at the 59th Annual Meeting of the Transportation Research Board, 1980 (with M. C. Davila).

"A Model for Calculating Safe Passing Distance on Two Lane Rural Road," presented at the 60th Annual Meeting of the Transportation Research Board, 1981.

PROFESSIONAL QUALIFICATIONS

JAMES RIVELLO

Plant Manager

LONG ISLAND LIGHTING COMPANY

My name is James Rivello. My business address is Long Island Lighting Company, Shoreham Nuclear Power Station, P. O. Box 628, Wading River, New York 11792. I am Plant Manager of the Shoreham Nuclear Power Station and have held this position since 1978. I am responsible for managing all plant activities in a manner which provides efficient overall plant operation and ensures the generation of the maximum amount of electric power at the highest plant efficiency, reliability, and availability. This objective must be achieved at the most economical cost consistent with prudent management. I am also responsible for ensuring that all plant activities are conducted in compliance with plant technical specifications, licenses, QA, nuclear safety, radiation control, health physics, environmental, security, and other factors. Plant operations must meet Nuclear Regulatory Commission (NRC), Federal, State, and Company Requirements, with the minimum radiation exposure to the general public and employees. I delegate responsibility to four subordinate Engineers. Each of these Engineers is responsible

for a particular facet of the plant operations requiring specialized knowledge and ability, and for coordinating their activities with those of the other Engineers to create a responsive and cohesive plant organization. I represent the Shoreham Plant in engineering, construction and testing activities as well as technical licensing efforts with federal, state and local regulatory groups. I formulate all policies to operate the nuclear plant within the requirements specified in the Technical Specifications, FSAR, Title 10 Code of Federal Regulations and other industry standards and guidelines. In the event of an accident I am Emergency Director of the Plant. I also chair both the Review of Operations Committee, which approves the performance of all safety related aspects of the plant, and the Joint Test Group during the Preoperational Phase to overview the Startup Staff Test Program.

I graduated from Manhattan College in 1963 with a Bachelor of Mechanical Engineering degree. I completed two years of the Nuclear Engineering Masters Program at Long Island University C. W. Post Campus (1967-69). In 1973 I completed specialized nuclear courses at the University of Michigan. I have also completed courses conducted by the General Electric Company in BWR Technology (August 1973) and BWR Simulator and have received Senior Reactor Operator Certification (December 1973).

Before assuming my present position, I was Startup Manager for the Shoreham Station (1974-1978). I developed the Startup Program, the Implementing Manual, and the Checkout and Initial Operations Test Program. My responsibility was to coordinate engineering, construction, and plant staff activities as they relate to system completion regarding design, construction, documentation of testing and compatibility of generated data in the respective organizations. I directly managed six Engineers, including the S&W lead Advisory Engineer, the General Electric Company Site Operations Manager, and four Lead Startup Engineers.

From December 1973 to November 1974 I was assigned to Commonwealth Edison Company's Dresden Nuclear Station as a Technical Staff Engineer (five months) and Project Engineer (six months). As a Technical Staff Engineer, one of my major duties was coordination of a refueling outage of D-3, not including basic maintenance work. I worked directly for the Lead Nuclear Engineer and Assistant Plant Manager. I participated in post refueling outage startup testing which included neutron monitoring overlap tests, flux shaping safety relief valve capacity tests, etc. I also provided substantial input to planning for the refueling outage of D-2 as a result of my past experience on D-3. I performed all activities of Technical Staff Engineer from unusual event reports (abnormal occurrences) to major and minor modification safety evaluations, engineering,

procurement, and operational testing (e.g., off-gas system installation and startup, SBLC and HPCI surveillance tests, shutdown margin tests, fuel sipping, RC pump "freeze plug" repair, integrated leak rate test, jet pump calibration, refueling jib crane replacement, control rod friction testing, nuclear materials safeguards program, hydraulic snubber inspections, torus level instrumentation replacement, etc.).

As a Project Engineer, I was directly responsible for the final construction schedule and initial operations testing of a major high conductivity drain waste concentration/evaporation system. I conducted and evaluated all tests on this system and recommended and implemented changes and met the EPA in-service date. I coordinated operator training on system operations and ran the system for one month under heavy demand conditions. Throughout this assignment, I performed many substantial projects for the onsite review committee and special nuclear systems testing and evaluations including, for example, evaluation of off-gas system explosions and installation of new Safety Relief Valves (Target Rock).

From April 1971 to May of 1973 I was Chief Engineer (Assistant Plant Manager) of a multi-unit 400 MW fossil fueled station. From June 1963 to May 1971 I held supervisory positions in four different fossil fueled stations, following the normal progression of Associate Engineer (entry level for engineers), Plant Engineer, Operating Engineer, Maintenance and I&C Engineer.

I am a member of the New England Nuclear Superintendents Association, the Edison Electric Institute Nuclear Operations Committee, and the American Nuclear Society.

Additionally, EPIP describes subsequent and/or supplemental corrective actions for the scope of potential situations within each of the emergency classifications. These EPIPs are designed to guide the actions of personnel to correct or mitigate a condition as early and as near to the source of the problem as feasible. Specific actions are described, for example, which may prevent or significantly reduce a potential release of radioactive material, provide for prompt fire control and ensure timely damage control and repair. These procedures are also utilized as emergency training media and are the basis for periodic emergency drills.

6.4 Protective Actions

6.4.1 Offsite Actions

The EPIP gives the details of which offsite authorities will be notified for each emergency class, information to be provided in accordance with the New York State Notification Fact Sheet and Dose Assessment Fact Sheet and verification practices to be used.

LILCO will make a protective action recommendation to Suffolk County and New York State authorities for the population at risk. The various protective action options available are detailed in the New York State and Suffolk County emergency response plans. The protective action recommendation is based upon dose projection calculations, field monitoring data, EPA protective action guidelines, sheltering factors offered by local dwellings and evacuation time estimates for ambient conditions. The emergency plan procedure, "General Emergency" immediate implementing actions, contains protective actions to be recommended during events that are deteriorating rapidly based upon conditions in accordance with NUREG 0654, Appendix 1. The details of this decision process are contained in the EPIPs. Regarding the protective actions taken on behalf of the general public, notification will be made of an emergency situation via the use of the Prompt Notification System set up throughout the ten (10) mile Emergency Planning Zone (EPZ).

This notification system, installed by LILCO, will be operationally tested and functional prior to fuel load and consistent with the criteria set forth in Appendix 3 to NUREG-0654.

Although the utilization of this system is the responsibility of Suffolk County (individual operating and administrative responsibilities for this system are described fully in the County's Emergency Response Plan Procedures), the system shall be maintained by LILCO. This system, made up of sirens for general population coverage and tone activated radios for special facilities (i.e., hospitals, nursing homes, nursery schools, etc.), shall alert the public within the 10 mile EPZ of a possible nuclear incident.

Upon notification of an emergency to the general public via the Prompt Notification System, the public shall be directed by previously disseminated information to tune to a specific radio station and await

informative instruction on what protective actions such as sheltering or evacuation, if any, should be taken for their respective Emergency Response Planning Area.

Informative pamphlets shall be located in strategic locations such as gas stations, motels and resorts for the purpose of supplying the transient population with emergency information. Public notification and education are reviewed in great detail in Section 8.4.

Evacuation routes are defined in the Suffolk County Emergency Plan; however maps of the EPZ and population distribution, in a sector format, are located on Figures 6-2 and 6-3, respectively.

As stated above, notification to the public as a whole will be made via the siren warning system. Incorporated into this system for the purpose of notifying those organizations with a large number of personnel, such as large businesses, hospitals, etc., are separately operated, tone-activated, alert radios which would be in accordance with the appropriate County procedures. At the same time, the population would be notified of the need for evacuation, buses would be dispatched to evacuate schools and special institutions, and road blocks would be set up for the purpose of restricting in-coming traffic in accordance with the Suffolk County Radiological Emergency Response Plan.

The basis for the choice of recommended protective actions from the plume exposure pathway is shown in the EPIP. Time estimates for the evacuation of the 10 mile EPZ are as delineated as in the attachment to LILCO's submittal to the NRC in SNRC-488, dated August 7, 1980 and as amended by the information found in Appendix C.

6.4.2 Plant Site Action

Protective action within the plant site will be initiated by actual or imminent radiological conditions or other habitability hazards such as toxic gas or fire. Upon assessment by the Emergency Director that a situation exists that requires evacuation of areas of the plant, an evacuation signal will be activated simultaneously with an announcement of the emergency condition over the party page system indicating the areas to be evacuated. Evacuated personnel will report to designated assembly areas consistent with implementing procedures.

When personnel have assembled, personnel accountability will then proceed following the guidance of the personnel accountability procedures. Accountability for onsite personnel will be accomplished within 60 minutes.

In the event of a site evacuation, Figure 6-1 details the onsite assembly areas with primary and secondary evacuation routes leading to the LILCO main access road. Transportation for onsite personnel shall be by personal vehical as well as car pooling where conditions warrant.

or evacuation, if any, should be taken for their respective Emergency Response Planning Area.

LILCO will provide supporting information for the preestablished written messages intended for the public to be disseminated by Suffolk County or New York State officials. These messages, consistent with the classification system described in Section 4 of this Plan are detailed in Appendix F.

Informative pamphlets shall be located in strategic locations such as gas stations, motels and resorts for the purpose of supplying the transient population with emergency information. Public notification and education are reviewed in great detail in Section 8.4.

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When personnel have assembled, personnel accountability will then proceed following the guidance of the personnel accountability procedures. Accountability for onsite personnel will be accomplished within 30 minutes.

The extent and nature of personnel and vehicle monitoring will depend on the amount and physical nature of the radioactive material released. If personnel exit the site via the portal monitors in the guardhouse, monitoring can be considered complete. If background levels preclude use of the portal monitors, monitoring should be performed at the offsite assembly area. If vehicle monitoring is performed, it should be performed along the LILCO main access road at the 69KV substation. Vehicles found to be contaminated should be directed into the substation for decontamination.

Individuals remaining on site or arriving on site following an emergency evacuation should be reporting to either the Control Room, Technical Support Center, or the Operational Support Center. These emergency response facilities shall have emergency equipment as described in Section 7.4.1 and Appendix E, including respiratory protective equipment, protective clothing, and radioprotective drugs.

Areas within the site boundary to which the public has access and which may require evacuation, include a small portion of the Wading River Creek marsh, the shorefront and jetties along the north boundary of the site, and the summer camp (St. Joseph's Villa, operated by the Diocese of Brooklyn) located on the Shoreham West property. Notification to the personnel at these locations would be achieved through use of the Prompt Notification System discussed in Section 6.4.1. Should conditions warrant at the discretion of the Emergency Director, notification to these public access areas shall be made by plant personnel through the use of public telephone, and/or the dispatch of a station employee with a power megaphone within 30 minutes of such a determination.

The initiation and implementation of protective actions are the responsibility of New York State and Suffolk County agencies. LILCO's responsibilities include:

1. The timely notification of agencies.

2. The assessment activities including dispatch of radiation monitoring teams needed to verify the estimated offsite consequences of radiation releases.

3. The providing of all information needed by the agencies for estimating offsite risks.

A detailed breakdown of the actions required to notify those persons

requiring evacuation and the time sequence, is shown and completely detailed and reviewed in the Suffolk County Plan. Following any large scale releases of radioactive material on site, access control points shall be established at those locations bounding the area(s) contaminated in excess of 1000 dpm/100 cm^2. If large area contamination exists that precludes use of the 1000 dpm/100 cm^2 criteria, then the Radiation Protection Manager, with the Emergency Director, shall establish an initial ingress and egress point to the

Shoreham site that allows frisking and access control of personnel entering and exiting the site. A secondary control point (e.g., Security Gate) inside the contaminated areas shall be established to provide a gross frisk for personnel contamination, and a security control of personnel entering the normal plant site environs. Food and water supplies shall be provided from areas outside the access control boundaries. The water shall be bottled and the food bagged. Specific areas inside the access control boundaries will be maintained at less than 1000 dpm/100 cm^2 loose surface Beta, Gamma radioactivity and less than $1x10^{-9}$ uCi/cc of Beta, Gamma airborne activity. Areas and items will be permitted return to normal use upon declaration of end of the emergency condition by the Emergency Director and concurrence by the Radiation Protection Manager. To the extent possible, emergency conditions permitting the normal contamination limits established in Health Physics procedures will be utilized.

6.5 Aid to Affected Personnel

6.5.1 Emergency Personnel Exposure Criteria

All reasonable measures shall be taken to maintain the radiation dose to emergency personnel as low as reasonably achievable and within 10 CFR Part 20 limits. Personnel performing emergency activities involving exposures which may or will exceed 10 CFR 20 limits shall be volunteers and shall be briefed on potential exposure consequences prior to receiving such dose. Authorization to exceed 10 CFR 20 limits shall be made only by the Emergency Director and/or the Radiation Protection Manager. Since this authorization is made only during declared emergencies, this capability is readily available on a 24-hour a day basis (see Section 5.1). Emergency Exposure Criteria, detailed in the Emergency Plan Implementing Procedures, are consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides (EPA 520/1-75-001). Table 6-4 depicts Emergency Exposure Criteria for various activities.

6.5.2 Decontamination

To the extent possible, the normal station contamination limits shall be adhered to. The personnel contamination limits are 100 cpm above background as measured by an RM-14/HP-210 or equivalent. Equipment contamination limits are less than 200 dpm/100 cm^2 removable Beta, Gamma.

Decontamination of emergency personnel wounds, supplies, instruments and equipment shall normally be conducted in the Personnel Decontamination Facility adjacent to the Health Physics office on the 15' elevation of the Turbine Building. This facility contains showers with controlled drains and the necessary materials for personnel decontamination. The Personnel Decontamination Facility contains a stainless steel sink and decon area which shall be used for contaminated minor wounds, equipment and instruments.

shall be established at those locations bounding the area(s) contaminated in excess of 1000 dpm/100 cm^2. If large area contamination exists that precludes use of the 1000 dpm/100 cm^2 criteria, then the Radiation Protection Manager, with the Emergency Director, shall establish an initial ingress and egress point to the Shoreham site that allows frisking and access control of personnel entering and exiting the site. A secondary control point (e.g., Security Gate) inside the contaminated areas shall be established to provide a gross frisk for personnel contamination, and a security control of personnel entering the normal plant site environs. Food and water supplies shall be provided from areas outside the access control boundaries. The water shall be bottled and the food bagged. Specific areas inside the access control boundaries will be maintained at less than 1000 dpm/100 cm^2 loose surface Beta, Gamma radioactivity and less than $1x10^{-9}$ uCi/cc of Beta, Gamma airborne activity. Areas and items will be permitted return to normal use upon declaration of end of the emergency condition by the Emergency Director and concurrence by the Radiation Protection Manager. To the extent possible, emergency conditions permitting the normal contamination limits established in Health Physics procedures will be utilized.

6.5 Aid to Affected Personnel

6.5.1 Emergency Personnel Exposure Criteria

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All personnel entering or working within the radiologically controlled Restricted Area shall be issued a Direct Reading Dosimeter and a
34 Thermoluminescent Dosimeter (TLD) subject to provisions contained in normal station health physics procedures. A TLD reader is maintained onsite to provide for 24 hr. per day capability to determine doses received by personnel.

6.5.2 Decontamination

To the extent possible, the normal station contamination limits shall be adhered to. The personnel contamination limits are 100 cpm above background as measured by an RM-14/HP-210 or equivalent. Equipment

Submitted: [signature] SP Number 69.Ø13.Ø1

Reviewed/OQA Engr:. [signature] Revision Ø

Approved/Plant Mgr.: [signature] Date Eff 7/09/82

UNUSUAL EVENT

1.0 CONDITION

1.1 An UNUSUAL EVENT has been declared based on the occurrence of events which indicate a potential degradation of the level of safety of the plant, as described in SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels.

2.0 IMMEDIATE ACTIONS

2.1 For All Initiating Events

2.1.1 Control Room Operator, implement corrective actions to contend with the situation and to mitigate possible deterioration in plant conditions in accordance with the SNPS Operating Procedures while simultaneously implementing this procedure.

2.1.2 Control Room Operator, announce over the page/party system the following:

2.1.2.1 "The plant is in an UNUSUAL EVENT condition" - repeat.

2.1.2.2 The location or general area affected.

2.1.2.3 Any operations/work to be halted.

2.1.2.4 Specific instructions to plant personnel as applicable.

2.1.3 Emergency Director, direct the Communicator to fill out a Notification Fact Sheet, (Appendix 12.1 of SP 69.ØØ9.Ø1, Notifications, using data derived from the initial assessment activities.

2.1.4 Communicator, implement SP 69.ØØ9.Ø1, Notifications after receiving the approved Fact Sheet from the Emergency Director, in order to:

2.1.4.1 Notify offsite agencies.

2.1.4.2 Notify additional station emergency response personnel as needed.

2.1.4.3 Notify the LILCO offsite emergency response organization.

2.1.5 Perform any of the following as necessary:

2.1.5.1 Airborne Release - Section 2.2

2.1.5.2 Waterborne Release - Section 2.3

2.1.5.3 Fire/Explosion - Section 2.4

2.1.5.4 Personnel Injury - Section 2.5

2.1.5.5 Natural Event - Section 2.6

2.2 For Initiating Event: Airborne Release

2.2.1 Inplant Radiation Monitoring Technician or designee, initiate and continue offsite dose projection activities as necessary in accordance with SP 69.Ø22.Ø1, Determination of Offsite Doses.

2.3 For Initiating Event: Waterborne Release

2.3.1 In-plant Radiation Monitoring Technician, determine the activity of the release by effluent monitor reading, or by estimate in accordance with normal station procedures.

2.3.2 In-plant Radiation Monitoring Technician, initiate SP 69.Ø24.Ø1, Waterborne Release Dose Projection.

2.4 For Initiating Event: Fire/Explosion

2.4.1 Control Room Operator, upon receipt of a report of a fire or valid alarm, direct fire brigade members to perform fire fighting efforts in controlled areas in accordance with the SNPS Fire Plan.

2.5 For Initiating Event: Personnel Injury

2.5.1 Control Room Operator, upon receipt of a report of injury/illness implement SP 69.Ø4Ø.Ø1, Personnel Injury or if a missing individual's location is not known, implement SP 69.Ø8Ø.Ø1, Search and Rescue.

2.6 For Initiating Event: Natural Event

2.6.1 Operations personnel, perform emergency measures in accordance with SP 29.ØØ1.Ø1, Acts of Nature

3.0 SUBSEQUENT ACTIONS

3.1 Emergency Director, direct the Communicator to fill out a Dose Assessment Fact Sheet (Appendix 12.2 of SP 69.ØØ9.Ø1, Notifications), using the most current data available at the time the form is completed.

3.2 When offsite agencies call back, Control Room Communicator provide

information from the approved Dose Assessment Fact Sheet as applicable to the emergency condition. Accept calls and provide information to only those organizations listed on the notification call-lists. Refer all other calls to LILCO public affairs personnel.

3.3 Emergency response personnel, perform emergency measures in accordance with the appropriate Emergency Plan Implementing Procedures (SP 69.xxx.xx series) and Emergency Operating Procedures (SP 29.xxx.xx series).

3.4 If plant conditions deteriorate, Emergency Director reclassify the emergency in accordance with SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels.

3.5 Emergency response personnel, continue emergency operations, including assessment activities, until such time as plant conditions have stabilized and other termination criteria of CIP-1Ø Recovery, have been satisfied.

4.0 FINAL CONDITIONS

4.1 Emergency measures are continuing for the Unusual Event, the emergency has been reclassified or the emergency has been terminated.

4.2 For initiating events related to Limiting Conditions of Operation (LCOs), the emergency condition can be considered terminated when the appropriate actions specified in the "action" section of the LCO have been taken, and all notifications have been completed.

5.0 DISCUSSION

5.1 Once an Unusual Event condition has been declared at SNPS in accordance with SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels, this procedure guides the Emergency Director in the performance of major actions and provides reference to other applicable Emergency Plan Implementing Procedures for further actions and more detailed instructions.

5.2 In the event of emergency conditions not adequately covered by this procedure, the Emergency Director has the responsibility and authority to take whatever action he considers required to prevent injury to personnel or damage to the plant or to equipment and to place the plant in a safe condition.

6.0 APPENDICES

N/A

Submitted: [signature] SP Number: 69.Ø14.Ø1 MC-1

Reviewed/OQA Engr.: [signature] Revision: 1

Approved/Plant Mgr.: [signature] Date Eff.: 7/09/82

ALERT

1.0 CONDITION

1.1 An ALERT has been declared based on the occurrence of events which indicate an actual or potential degradation of the level of safety of the plant, as described in SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels.

2.0 IMMEDIATE ACTIONS

2.1 For All Initiating Events

2.1.1 Control Room Operator, implement corrective actions to contend with the situation and to mitigate possible deterioration in plant conditions in accordance with SNPS Operating Procedures while simultaneously implementing this procedure. K1

2.1.2 Control Room Operator announce over the page/party system the following:

2.1.2.1 The plant is in an ALERT condition

2.1.2.2 The location or general area affected

2.1.2.3 Any operations/work to be halted

2.1.2.4 Specific instructions to plant personnel as applicable

2.1.3 Emergency Director, direct a Communicator to fill out Notification Fact Sheet (Appendix 12.1 of SP 69.ØØ9.Ø1, Notifications) using data derived from the initial assessment activities.

2.1.4 Communicator implement SP 69.ØØ9.Ø1 Notifications after receiving the approved Fact Sheet from the Emergency Director in order to:

2.1.4.1 Notify offsite agencies

2.1.4.2 Notify additional station emergency response personnel as needed

2.1.4.3 Notify the LILCO offsite emergency response organization

2.1.5 Emergency Director notify the Shift Security Supervisor to: K1

2.1.5.1 Implement SP 9x.xxx.xx, OSC Access Control

2.1.5.2 Implement SP 9x.xxx.xx, TSC Access Control

2.1.6 Perform any of the following as necessary: <1

2.1.6.1 Airborne Release - Section 2.2

2.1.6.2 Waterborne Release - Section 2.3

2.1.6.3 Fire/Explosion - Section 2.4

2.1.6.4 Personnel Injury - Section 2.5

2.1.6.5 Natural Event - Section 2.6

2.2 For Initiating Event: Airborne Release

2.2.1 Radiation Protection Manager or designee direct a Dose Assessment Staff Member to initiate and continue offsite dose projection activities as necessary in accordance with SP 69.Ø22.Ø1, Determination of Offsite Doses.

2.2.2 Radiation Protection Manager or designee call the OSC Supervisor for manpower in order to initiate an emergency onsite radiation survey in accordance with SP 69.Ø21.Ø1, Onsite Surveys.

2.2.3 If the results of the onsite survey indicate the need, Radiation Manager or designee initiate radiation surveys offsite in accordance with SP 69.Ø2Ø.Ø1, Downwind Surveys, and escalate the emergency classification as warranted.

2.2.4 Based on the results of the downwind dose projection activities, Radiation Protection Manager or designee recommend an appropriate protective action to offsite authorities as part of the initial and/or follow up notifications. Refer to SP 69.Ø26.Ø1, Protective Action Recommendations".

2.2.5 If the results of the radiation surveys or if area radiation monitors indicate the need, Emergency Director or designee, evacuate personnel from affected areas by implementing SP69.Ø3Ø.Ø1, Evacuations During an Emergency, provides guidance as to when an evacuation should be implemented. If an evacuation is implemented, also perform as applicable:

2.2.5.1 Emergency Director or designee account for personnel by implementing SP 69.Ø3Ø.Ø2, Personnel Accountability.

2.2.5.2 Radiation Protection Manager or designee, direct personnel monitoring efforts in accordance with SP69.Ø3Ø.Ø3, Monitoring of Personnel/Equipment During an Evacuation.

2.2.5.3 Radiation Protection Manager or designee, direct search and rescue efforts in accordance with SP 69.Ø8Ø.Ø1, Search and Rescue. <1

2.2.5.4 Radiation Protection Manager or designee, direct re-entry efforts in accordance with SP 69.Ø7Ø.Ø1, Re-entry.

2.2.6 If the results of downwind surveys at the site boundary indicates a dose rate exceeding 5Ø mr/hr for 1/2 hour or greater than 5ØØ mr/hr whole body for two minutes (or five times these levels to the thyroid), Emergency Director, reclassify the emergency as a Site Area Emergency and perform emergency measures in accordance with SP 69.Ø15.Ø1, Site Area Emergency. Immediately notify offsite authorities of the reclassification of the emergency.

2.3 For Initiating Event: Waterborne Release 1

2.3.1 In-plant Radiation Monitoring Technician, determine the activity of the release by effluent monitor reading, or by estimate in accordance with appropriate station procedures.

2.3.2 Radiation Protection Manager or designee, direct Inplant Radiation Monitoring Technician to implement SP 69.Ø24.Ø1, Waterborne Release Dose Projection.

2.3.3 Radiation Protection Manager or designee, direct Dose Assessment Staff members to implement SP 69.Ø26.Ø1, Protective Action Recommendations.

2.4 For Initiating Event: Fire/Explosion

2.4.1 Control Room Operator, upon report of a fire or valid alarm direct fire brigade members to perform fire fighting efforts in controlled areas in accordance with the SNPS Fire Plan.

2.5 For Initiating Event: Personnel Injury

2.5.1 Control Room Operator, upon receipt of a report of injury/illness implement SP 69.Ø4Ø.Ø1, Personnel Injury or if the missing individuals location is not known implement SP 69.Ø8Ø.Ø1, Search and Rescue.

2.6 For Initiating Event: Natural Event

2.6.1 Operations personnel perform emergency measures in accordance with SP 29.ØØ1.Ø1, Acts of Nature. 1

3.0 SUBSEQUENT ACTIONS

3.1 Emergency Director, direct a Communicator to fill out a Dose Assessment Fact Sheet (Appendix 12.2 of SP 69.ØØ9.Ø1, Notifications) known using the most current data available at the time the form is completed.

3.2 When offsite agencies call back, Communicator provide information from the Approved Dose Assessment Fact Sheet as applicable to the emergency condition. Accept calls and provide information to only those organizations listed on the notification call-lists. Refer all other calls

to LILCO public affairs personnel.

3.3 Emergency Director, coordinate emergency response activities in the LILCO emergency response facilities keeping all LILCO support personnel apprised of the emergency situation. <1

3.4 Emergency response personnel perform emergency measures in accordance with the appropriate Emergency Plan Implementing Procedures (SP 69.XXX.XX series) and Emergency Operating Procedures (SP 29.XXX.XX series).

3.5 If plant conditions deteriorate, Emergency Director escalate the emergency classification. Perform actions in accordance with the SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels. <1

3.6 Emergency Response personnel continue emergency operations, including assessment activities, until such time as plant conditions have stabilized and other termination criteria of CIP-10, Recovery have been satisfied.

4.0 FINAL CONDITIONS

4.1 Emergency measures are continuing for the Alert, the emergency condition has been escalated/downgraded, or the emergency condition has been terminated.

5.0 DISCUSSION

5.1 Once an Alert condition has been declared at SNPS in accordance with SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels, this procedure guides the Emergency Director in the performance of major actions and provides reference to other applicable Emergency Plan Implementing Procedures for further actions and more detailed instructions.

5.2 Although this procedure assigns all responsibility to the Emergency Director, the various activities will be performed by the individual emergency managers. Initially, and until the TSC staffing is available, the Emergency Director will direct all functions performed by the on shift compliment. As the staffing arrives, the individual emergency managers will be responsible for performing activities assigned in SP 69.ØØ1.Ø1, Emergency Organizations. The Emergency Director will coordinate the overall response using this procedure as a guide.

5.3 In the event of emergency conditions not adequately covered by this procedure, the Emergency Director has the responsibility and authority to take whatever action he considers required to aprevent injury to personnel or damage to the plant or to equipment and to place the plant in a safe condition.

6.0 APPENDICES

N/A

Submitted: NJ DiMascio

Reviewed/OQA Engr.: Robert L. Sherno

Approved/Plant Mgr.: J. Rivello

SP Number: 69.Ø15.Ø1

Revision: 1

Date Eff.: 7/09/82

SITE AREA EMERGENCY

1.0 CONDITIONS

1.1 A SITE AREA EMERGENCY has been declared based on the occurrence of events which involve actual or likely failures of plant functions needed for the protection of the public, as described in SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels.

2.0 IMMEDIATE ACTIONS

2.1 For All Initiating Events

2.1.1 Control Room Operator, implement corrective actions to contend with the situation and to mitigate possible deterioration in plant conditions in accordance with the SNPS Operating Procedures while simultaneously implementing this procedure. K1

2.1.2 Control Room Operator, announce over the page/party system the following:

2.1.2.1 The plant is in a SITE AREA EMERGENCY condition - Repeat

2.1.2.2 The location or general area affected

2.1.2.3 Any operations/work to be halted

2.1.2.4 Specific instructions to plant personnel as applicable

2.1.3 Emergency Director/Response Manager, direct a communicator to fill out a Notification Fact Sheet (Appendix 12.1 of SP69.ØØ9.Ø1, Notifications) using data derived from the initial assessment activities.

2.1.4 Communicator, implement SP 69.ØØ9.Ø1, "Notifications" after receiving the approved Fact Sheet from the Emergency Director/Response Manager in order to:

2.1.4.1 Notify offsite agencies

2.1.4.2 Notify additional station emergency response personnel as needed

2.1.4.3 Notify the LILCO offsite emergency response organization

2.1.5 Emergency Director notify the Shift Security Supervisor to: <1

2.1.5.1 Implement SP9X.XXX.XX, OSC Access Control

2.1.5.2 Implement SP9X.XXX.XX, TSC Access Control

2.1.6 Emergency Director, based upon evacuation guidelines contained in SP69.030.01 Evacuations During an Emergency, implement the following as necessary:

2.1.6.1 SP 69.030.01, Evacuations During an Emergency

2.1.6.2 SP 69.030.02, Personnel Accountability

2.1.6.3 SP 69.030.03, Contamination Control During Emergencies

2.1.6.4 If personnel are found to be missing from accountability Emergency Director or designee implement SP 69.080.01, Search and Rescue.

2.1.7 Radiation Protection Manager or designee, direct Health Physics personnel to perform radiation and airborne radioactivity surveys at the designated assembly areas. If the results of the radiation surveys at the primary assembly areas indicate radiation levels in excess of 10 mrem/hr or gross airborne radioactivity (less noble gases) in excess of 1E-9 uCi/cc, or if continued occupancy is expected to result in excess of 40 MPC-hours for the isotopic mix less noble gases, relocate to another assembly area, or if evacuation guidelines exist, inform the Emergency Dirctor to implement a site evacuation in accordance with SP 69.030.01, Evacuations During an Emergency. <1

2.1.8 Perform any of the following as necessary:

2.1.8.1 Airborne Release - Section 2.2

2.1.8.2 Waterborne Release - Section 2.3

2.1.8.3 Fire/Explosion - Section 2.4

2.1.8.4 Personnel Injury - Section 2.5

2.1.8.5 Natural Event - Section 2.6

2.2 For Initiating Event: Airborne Release

2.2.1 Radiation Protection Manager or designee direct a Dose Assessment Staff Member to initiate and continue offsite dose projection activities as necessary in accordance with SP 69.022.01, Determination of Offsite Doses.

2.2.2 Radiation Protection Manager or designee call the OSC Supervisor for manpower in order to initiate an emergency onsite radiation survey in accordance with SP 69.Ø21.Ø1, Onsite Surveys. K1

2.2.3 Radiation Protection Manager or designee call the OSC Supervisor for manpower in order to initiate radiation surveys offsite in accordance with SP 69.Ø2Ø.Ø1, Downwind Surveys, and escalate the emergency classification as warranted. K1

2.2.4 Based on the results of the downwind dose projection activities, Radiation Protection Manager or designee recommend an appropriate protective action to offsite authorities as part of the initial and/or subsequent follow-up notifications. Refer to SP 69.Ø26.Ø1, Protective Action Recommendations.

2.2.5 If the results of the downwind survey indicate a dose rate at the site boundary (not the protected area fence) exceeding 1 rem/hr W.B or 5 rem/hr thyroid, Emergency Director reclassify the emergency as a General Emergency and perform emergency measures in accordance with SP 69.Ø16.Ø1, General Emergency. Immediately notify offsite authorities of the reclassification of the emergency. K1

2.3 For Initiating Event: Waterborne Release

2.3.1 Liquid releases are not identified as initiating significant events for a Site Area Emergency since it is unlikely to have offsite doses in excess of EPA Protective Action Guides due to the release. A liquid release could occur, however, concurrent with the events which initiated the Site Area Emergency. Corrective and assessment measures for liquid releases are provided in Section 2.3 of SP 69.Ø14.Ø1, Alert. K1

2.4 For Initiating Event: Fire/Explosion

2.4.1 Control Room Operator, upon receipt of a report of a fire or valid alarm direct fire brigade members to perform firefighting efforts in accordance with the SNPS Fire Plan. K1

2.5 For Initiating Event: Personnel Injury

2.5.1 Control Room Operator, upon receipt of a report of injury/illness implement SP69.Ø4Ø.Ø1, Personnel Injury or if a missing individuals location is not known implement SP69.Ø8Ø.Ø1, Search and Rescue.

2.6 For Initiating Event: Natural Event

2.6.1 Operations personnel perform emergency measures in accordance with SP29.ØØ1.Ø1, Acts of Nature.

3.0 SUBSEQUENT ACTIONS

3.1 Emergency Director/Response Manager direct a Communicator to fill out a Dose Assessment Fact Sheet (Appendix 12.2 of SP69.ØØ9.Ø1, Notifications) using the most current data available at the time the form is completed. k1

3.2 When offsite agencies call back, Communicator provide information from the approved Dose Assessment Fact Sheet as applicable to the emergency condition. Accept calls and provide information to only those organizations listed on the notification call-lists. Refer all other calls to LILCO public affairs personnel.

3.3 Emergency Director/Response Manager, periodically disseminate information on the status of the onsite operations and conditions to the offsite authorities and to LILCO emergency response facilities. In particular:

3.3.1 Notify offsite authorities of any significant (>1ØØ mrem) change in dose projections, or other significant changes in plant status.

3.3.2 Provide a situation report (once an hour) to the Emergency Operations Facility.

3.4 Emergency Director/Response Manager coordinate emergency response activities in the LILCO emergency response facilities, keeping all LILCO support personnel apprised of the emergency situation.

3.5 Emergency response personnel, perform emergency measures in accordance with the appropriate Emergency Plan Implementing Procedures (SP69.XXX.XX series) and Emergency Operating Procedures (SP29.XXX.XX series).

3.6 If plant conditions deteriorate, Emergency Director/Response Manager shall reclassify the emergency in accordance with SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels.

3.7 Emergency response personnel continue emergency operations, including assessment activities, until such time as plant conditions have stablilized and other termination criteria of CIP-1Ø, Recovery.

4.0 FINAL CONDITIONS

4.1 Emergency measures are continuing for the Site Area Emergency, the emergency condition has been escalated/downgraded, or the emergency condition has been terminated.

5.0 DISCUSSION

5.1 Once a Site Area Emergency condition has been declared at SNPS in accordance with SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels, this procedure guides the Emergency Director in the performance of major actions and provides reference to other applicable Emergency Plan Implementing Procedures for further actions and more detailed instructions.

5.2 Although this procedure assigns all responsibility to the Emergency Director, the various activities will be performed by the individual emergency managers. Initially, and until the TSC staffing is available, the Emergency Director will perform all functions. As the staffing arrives, the individual emergency managers will be responsible for performing activities assigned in CIP-21, <u>Emergency Organizations</u>. K1
The Emergency Director will coordinate the overall response, using this procedure as a guide.

5.3 The Emergency Director/Response Manager is the only individual authorized K1
to determine and recommend a protective action to offsite authorities (directly or via Communications Coordinator). Therefore, the Emergency Director/Response Manager shall approve all initial and follow-up K1
notification messages for Site Area Emergency and General Emergency.

5.4 In the event of emergency conditions not adequately covered by this procedure, the Emergency Director/Response Manager has the responsibility K1
and authority to take whatever action he considers appropriate to prevent injury to personnel or damage to the plant or to equipment and to place the plant in a safe condition.

6.0 <u>APPENDICES</u>

6.1 N/A K1

Submitted: NJDiMascio (signature)
Reviewed/OQA Engr.: (signature)
Approved/Plant Mgr.: (signature)

SP Number 69.Ø16.Ø1
Revision: Ø
Date Eff.: 7/09/82

GENERAL EMERGENCY

1.0 CONDITION

1.1 A GENERAL EMERGENCY has been declared based on the occurrence of events which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity, as described in SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels.

2.0 IMMEDIATE ACTIONS

2.1 For All Initiating Events

2.1.1 Control Room Operator implement corrective actions to contend with the situation and to mitigate possible deterioration in plant conditions in accordance with Operating Procedures while simultaneously implementing this procedure.

2.1.2 Control Room Operator, announce over the page/party system the following:

2.1.2.1 The plant is in a GENERAL EMERGENCY condition - repeat.

2.1.2.2 The location or general area affected.

2.1.2.3 Any operations/work to be halted.

2.1.2.4 Specific instructions to plant personnel as applicable.

2.1.3 Emergency Director/Response Manager, direct a Communicator to fill out a Notification Fact Sheet (Appendix 12.1 of SP 69.ØØ9.Ø1, Notifications), using data derived from the initial assessment activities.

NOTE: Radiation Protection Manager or Designee, using the predetermined Protective Action Recommendations for General Emergency Classifications, (Appendix 6.1), notify the Emergency Director/Response Manager of the protective action and notify offsite authorities in accordance with SP 69.ØØ9.Ø1, Notifications.

2.1.4 Emergency Director/Response Manager, implement SP 69.ØØ9.Ø1, Notifications in order to:

2.1.4.1 Notify offsite agencies

2.1.4.2 Notify additional station emergency response personnel as needed

2.1.4.3 Notify the LILCO offsite emergency response organization

2.1.5 Emergency Director notify the Shift Security Supervisor to:

2.1.5.1 Implement SP 9x.xxx.xx, OSC Access Control.

2.1.5.2 Implement SP 9x.xxx.xx, TSC Access Control.

2.1.6 Emergency Director, based upon evacuation guidelines contained in SP 69.030.01 Evacuations During an Emergency, implement the following as necessary:

2.1.6.1 SP 69.030.01, Evacuations During an Emergency

2.1.6.2 SP 69.030.02, Personnel Accountability

2.1.6.3 SP 69.030.03, Contamination Control During Emergencies

2.1.6.4 If personnel are found to be missing from accountability Emergency Director or designee implement SP 69.080.01, Search and Rescue.

2.1.7 Radiation Protection Manager or designee, direct Health Physics personnel to perform radiation and airborne radioactivity surveys at the designated assembly areas. If the results of the radiation surveys at the primary assembly areas indicate radiation levels in excess of 10 mrem/hr or gross airborne radioactivity (less noble gases) in excess of 10 mrem/hr or gross airborne radioactivity (less noble gases) in excess of 1E-9 Ci/cc, or if continued occupancy is expected to result in excess of 40 MPC-hours for the isotopic mix less noble gases, relocate to another assembly area, or if evacuation guidelines exist, inform the Emergency Director to implement a Site Evacuation in accordance with SP 69.030.01, Evacuations During an Emergency.

2.1.8 Perform any of the following as necessary:

2.1.8.1 Airborne Release - Section 2.2

2.1.8.2 Waterborne Release - Section 2.3

2.1.8.3 Fire/Expolsion - Section 2.4

2.1.8.4 Personnel Injury - Section 2.5

2.1.8.5 Natural Event - Section 2.6

2.2 For Initiating Event: Airborne Release

2.2.1 Radiation Protection Manager or Designee, direct a Dose Assessment Staff Member to initiate and continue offsite dose projection activities as necessary in accordance with SP 69.Ø22.Ø1, Determination of Offsite Doses.

2.2.2. Radiation Protection Manager or Designee, call the OSC Supervisor for manpower in order to initiate an emergency onsite radiation survey in accordance with SP 69.Ø21.Ø1, Onsite Surveys.

2.2.3 Radiation Protection Manager or Designee, call the OSC Supervisor for manpower in order to initiate radiation surveys offsite in accordance with SP 69.Ø2Ø.Ø1, Downwind Surveys.

2.3 For Initiating Event: Waterborne Release

2.3.1 Liquid releases are not identified as initiating significant events for a General Emergency since it is unlikely to have offsite doses in excess of EPA Protective Action Guides due to the release. A liquid release could occur, however, concurrent with the events which initiated the General Emergency. Corrective and assessment measures for liquid releases are provided in Section 2.3 of SP 69.Ø14.Ø1, Alert.

2.4 For Initiating Event: Fire/Explosion

2.4.1 Control Room Operator, upon receipt of a report of a fire or valid alarm direct fire brigade members perform firefighting efforts in accordance with the SNPS Fire Plan.

2.5 For Initiating Event: Personnel Injury

2.5.1 Control Room Operator, upon receipt of a report of injury/illness implement SP 69.Ø4Ø.Ø1, Personnel Injury or if a missing individual's location is not known, implement SP 69.Ø8Ø.Ø1, Search and Rescue.

2.6 For Initiating Event: Natural Event

2.6.1 Operations personnel perform emergency measures in accordance with SP 29.ØØ1.Ø1, Acts of Nature

3.0 SUBSEQUENT ACTIONS

3.1 Emergency Director/Response Manager direct a Communicator to fill out a Dose Assessment Fact Sheet (Appendix 12.2 of SP 69.ØØ9.Ø1, Notifications) using the most current data available at the time the form is completed.

3.2 When offsite agencies call back, Communicator provide information from the approved Dose Assessment Fact Sheet as applicable to the emergency condition. Accept calls and provide information to only those

organizations listed on the notification call-lists. Refer all other calls to LILCO public affairs personnel.

3.3 Emergency Director/Response Manager, periodially disseminate information on the status of the onsite operations and conditions to the offsite authorities and to LILCO emergency response facilities. In particular:

3.3.1 Notify offsite authorities of any significant (>100 mrem) change in dose projections, or other significant changes in plant status.

3.3.2 Provide a situation report (one an hour) to the Emergency Operations Facility.

3.4 Emergency Director/Response Manager, coordinate emergency response activities in the LILCO emergency response facilities, keeping all LILCO support personnel apprised of the emergency situation.

3.5 Emergency response personnel, perform emergency measures in accordance with the appropriate Emergency Plan Implementing Procedures (SP 69.xxx.xx series) and Emergency Operating Procedures (SP 29.xxx.xx series).

3.6 Emergency response personnel continue emergency operations, including assessment activities, until such time as plant conditions have stabilized and other termination criteria of CIP-1Ø, Recovery have been satisfied.

4.0 FINAL CONDITIONS

4.1 Emergency measures are continuing for the General Emergency, the emergency condition has been downgraded, or the emergency condition has been terminated.

5.0 DISCUSSION

5.1 Once a General Emergency condition has been declared at SNPS in accordance with SP 69.Ø1Ø.Ø1, Classification of Emergency Action Levels, this procedure guides the Emergency Director in the performance of major actions and provides reference to other applicable Emergency Plan Implementing Procedures for further actions and more detailed instructions.

5.2 Although this procedure assigns all responsibility to the Response Manager/ Emergency Director, the various activities will be performed by the individual Emergency Managers. Initially, and until the TSC staffing is available, the Emergency Director will perform all functions. As the staffing arrives, the individual emergency managers will be responsible for performing activities assigned in CIP-21, Emergency Organization. The Emergency Director/Response Manager will coordinate the overall response, using this procedure as a guide.

5.3 The Response Manager/Emergency Director are the only individuals authorized to determine and recommend a protective action to offsite authorities (directly or via Communications Coordinator). Therefore, the Emergency/Director/Response Manager shall approve all initial and follow-up

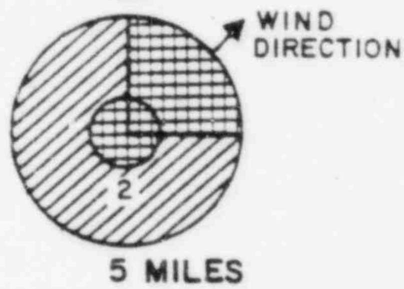
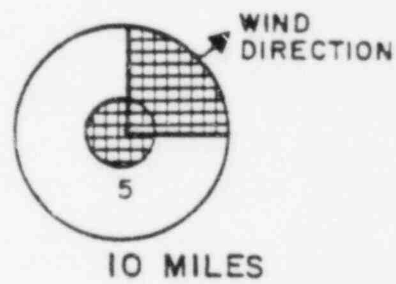
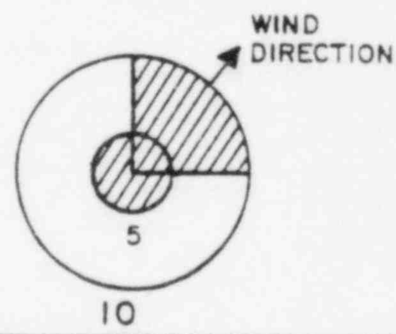
notification messages for all emergency classifications.

5.4 In the event of emergency conditions not adequately covered by this procedure, the Response Manager/Emergency Director has the responsibility and authority to take whatever action he considers appropriate to prevent injury to personnel or damage to the plant or to equipment and to place the plant in a safe condition.

6.0 APPENDICES

6.1 Predetermined Protective Action Recommendations for General Emergency Classifications.

PREDETERMINED PROTECTIVE ACTION RECOMMENDATIONS FOR GENERAL EMERGENCY CLASSIFICATIONS

	CORE FAILURE [1]	CONTAINMENT FAILURE [2]	PAR TO BE CONSIDERED
COND. I	NO	NO	
COND. II	YES	NO	
COND. III	YES	LIKELY BUT NOT WITHIN 3 HOURS	
COND. IV	YES	YES OR WITHIN 3 HOURS	

NOTE:

1. CORE FAILURE - RELEASE OF FISSION PRODUCTS INTO CONTAINMENT
2. CONTAINMENT FAILURE - RELEASE OF FISSION PRODUCTS INTO ATMOSPHERE

PROTECTIVE ACTION RECOMMENDATIONS B[illegible]RPA FOR GENERAL CLASSIFICATION

ND ROM	(DEGREES)	CONDITION I	CONDITION II	CONDITION III	CONDITION IV
N	348 TO 11	EVACUATE: ABCDE	EVACUATE: ABCDEFGHI SHELTER: J	EVACUATE: ABCDEFGHIJ KLMNORS	SHELTER: ABCDEFGHIJ KLMNORS
NNE	11 TO 34	EVACUATE: ABCDE	EVACUATE: ABCDEFGHI SHELTER: J	EVACUATE: ABCDEFGHIJ KLMNOQR	SHELTER: ABCDEFGHIJ KLMNOQR
NE	34 TO 56	EVACUATE: ABCDE	EVACUATE: ABCDEFGH SHELTER: IJ	EVACUATE: ABCDEFGHIJ KLMNQR	SHELTER: ABCDEFGHIJ KLMNQR
ENE	56 TO 79	EVACUATE: ABCDE	EVACUATE: ABCDEFGH SHELTER: IJ	EVACUATE: ABCDEFGHIJ KLMQR	SHELTER: ABCDEFGHIJ KLMQR
E	79 TO 101	EVACUATE: ABCDE	EVACUATE: ABCDEFG SHELTER: HIJ	EVACUATE: ABCDEFGHIJ KLQR	SHELTER: ABCDEFGHIJ KLQR
ESE	101 TO 124	EVACUATE: ABCDE	EVACUATE: ABCDEFG SHELTER: HIJ	EVACUATE: ABCDEFGHIJ KQ	SHELTER: ABCDEFGHIJ KQ
SE	124 TO 146	EVACUATE: ABCDE	EVACUATE: ABCDEF SHELTER: GHIJ	EVACUATE: ABCDEFGHIJ KQ	SHELTER: ABCDEFGHIJ KQ
SSE	146 TO 169	EVACUATE: ABCDE	EVACUATE: ABCDEF SHELTER: GHIJ	EVACUATE: ABCDEFGHIJ	SHELTER: ABCDEFGHIJ
S	169 TO 191	EVACUATE: ABCDE	EVACUATE: ABCDEF SHELTER: GHIJ	EVACUATE: ABCDEFGHIJ	SHELTER: ABCDEFGHIJ
SSW	191 TO 214	EVACUATE: ABCDE	EVACUATE: ABCDEF SHELTER: GHIJ	EVACUATE: ABCDEFGHIJ	SHELTER: ABCDEFGHIJ
SW	214 TO 236	EVACUATE: ABCDE	EVACUATE: ABCDEFJ SHELTER: GHI	EVACUATE: ABCDEFGHIJ P	SHELTER: ABCDEFGHIJ P
WSW	236 TO 258	EVACUATE: ABCDE	EVACUATE: ABCDEFIJ SHELTER: GH	EVACUATE: ABCDEFGHIJ OS	SHELTER: ABCDEFGHIJ OS
W	258 TO 281	EVACUATE: ABCDE	EVACUATE: ABCDEFIJ SHELTER: GH	EVACUATE: ABCDEFGHIJ OS	SHELTER: ABCDEFGHIJ OS
WNW	281 TO 303	EVACUATE: ABCDE	EVACUATE: ABCDEFHIJ SHELTER: G	EVACUATE: ABCDEFGHIJ NOS	SHELTER: ABCDEFGHIJ NOS
NW	303 TO 326	EVACUATE: ABCDE	EVACUATE: ABCDEFGHIJ SHELTER:	EVACUATE: ABCDEFGHIJ MNOS	SHELTER: ABCDEFGHIJ MNOS
NNW	326 TO 348	EVACUATE: ABCDE	EVACUATE: ABCDEFGHIJ SHELTER:	EVACUATE: ABCDEFGHIJ LR	SHELTER: ABCDEFGHIJ LR

Submitted: NJ DiMascio

Reviewed/OQA Engr.: [signature]

Approved/Plant Mgr.: J. Riello

Attachment 4 - 11

MC-1

SP Number 69.022.01
Revision: 0
Date Eff.: 7/09/82
TPC
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DETERMINATION OF OFFSITE DOSES

1.0 PURPOSE

The purpose of this procedure is describe the method to determine offsite doses.

2.0 RESPONSIBILITY

The Radiation Protection Manager/Radiological Control Manager shall be responsible for the implementation of this procedure.

3.0 DISCUSSION

3.1 This procedure is used to determine offsite doses based upon short term, abnormal release conditions. The dose calculations are based upon finite cloud analyses.

3.2 There are two methods described in this procedure. One makes use of the computerized radiation monitoring system (RMS), while the other is a manual method to be used in cases of RMS unavailability.

3.3 The computerized RMS method described in the procedure assumes that the software is running in the ACCIDENT mode. This mode is selected either manually or automatically by the RMS. It is important to note that initial dose assessment, prior to grab sample analyses, is based upon an assumed inventory mixture of nuclides (i.e. LOCA, fuel handling).

3.4 The manual method described in this procedure employs the use of nomograms for dose assessment. There are eight (8) nomograms from which to select. Each nomogram is based upon assumed LOCA nuclide release mixtures. When using this method, it is important to understand the bases and assumptions described on each nomogram.

3.4.1 Only whole body dose calculations are provided for the normal station ventilation exhaust monitor. These doses assume 100% noble gas LOCA mixtures.

3.4.2 Both whole body and thyroid dose calculations are provided for the reactor building standby ventilation system monitor. These doses assume 100% noble gas LOCA mixtures for the whole body, and 25% halogen LOCA mixtures with 99% filtration for thyroid doses.

3.5 This procedure details the method to obtain dose projection for one point from beginning to end. The Radiation Protection Manager/Radiological Control Manager can have several different people doing this calculation for different distances simultaneously. If this is the case, the worksheet (Appendix 12.1) is filled out until the atmospheric dispersion factor (item 13) is obtained. Once this is done the highest dose can be obtained by using the nomograms for situations where time limits are constrained. The RPM/RCM will use the best method for completing this procedure depending on staff availability.

3.6 Topics covered in this procedure:

Appendix 12.4 Plume Centerline Concentration (Xu/Q)
Appendix 12.5 Gaussian Puff Gamma (Xu/Q)
Appendix 12.6 Nomograms

4.0 PRECAUTIONS

N/A

5.0 PREREQUISITES

N/A

6.0 LIMITATIONS AND ACTIONS

6.1 Personnel using this procedure should be aware of the bases for the assumed nuclide mixtures used in the dose calculations.

7.0 MATERIALS AND EQUIPMENT

7.1 Radiation Monitoring System

8.0 PROCEDURE

8.1 Determination of offsite doses using the computerized radiation monitoring system. (RMS)

(LATER)

8.2 Determination of offsite doses using the nomograms.

8.2.1 Dose Assessment Staff Members or In-plant Radiation Monitoring Technician, obtain a copy of the Radioactive Effluent Monitor Nomogram Worksheet (Appendix 12.1) and fill out the worksheet using the following instructions:

8.2.1.1 Record the current date (item 1) and time (item 2)

8.2.1.2 Obtain wind speed (item 3) and wind direction (item 4) for both 150 ft. and 33 ft. tower levels from either the Control Room or local tower readouts. Convert wind speed to appropriate units. Determine affected downwind sector (item 4) by referring to the following table:

Indicated Wind Direction	Affected Downwind Sector
0 to 11.25	S
11.25 to 33.75	SSW
33.75 to 56.25	SW
56.25 to 78.75	WSW
78.75 to 101.25	W
101.25 to 123.75	WNW
123.75 to 146.25	NW
146.25 to 168.75	NNW
168.75 to 191.25	N
191.25 to 213.75	NNE
213.75 to 236.25	NE
236.25 to 258.75	ENE

Indicated Wind Direction	Affected Downwind Sector
258.75 to 281.25	E
281.25 to 303.75	ESE
303.75 to 326.25	SE
326.25 to 348.75	SSE
348.75 to 371.25	S
371.25 to 393.75	SSW
393.75 to 416.25	SW
416.25 to 438.75	WSW
438.75 to 461.25	W
461.25 to 483.75	WNW
483.75 to 506.25	NW
506.25 to 528.75	NNW
528.75 to 540.00	N

8.2.1.3 Determine atmospheric stability class (item 5a, b, or c) using one of the following methods:

.1 Obtain the 33-150 ft. temperature difference (item 5a) from the Control Room or local tower readout. Choose the correct stability class from the following table:

Delta-T (°F) 33-150 ft	Stability Class	Atmospheric Condition
Less than -1.22	A	Extremely Unstable
-1.22 to -1.09	B	Moderately Unstable
-1.09 to -0.96	C	Slightly Unstable
-0.96 to 0.32	D	Neutral
0.32 to 0.96	E	Slightly Stable
0.96 to 2.57	F	Moderately Stable
Greater than 2.57	G	Extremely Stable

NOTE: For borderline cases, choose the most stable class (e.g., if delta-T = 0.32, choose stability Class E).

.2 If the temperature difference (item 5a) is not available, record the standard deviation of wind direction fluctuation (sigma theta - item 5b) from either the 33-ft. level of the primary tower or the backup tower, and choose the correct stability class from the following list:

sigma theta (degrees) 33-ft. Level	Stability Class	Atmospheric Condition
Greater than 22.5	A	Extremely Unstable
17.5 to 22.5	B	Moderately Unstable
12.5 to 17.5	C	Slightly Unstable
7.5 to 12.5	D	Neutral
3.8 to 7.5	E	Slightly Stable
2.1 to 3.8	F	Moderately Stable
Less than 2.1	G	Extremely Stable

NOTE: For borderline cases, choose the most stable class (e.g., if sigma theta = 7.5, choose stability Class E).

.3 If no delta-T or sigma theta data is available, choose the stability class using the wind speed from item 3 and the following table:

33-ft Wind Speed (mph)	Day			Night	
	Incoming Solar Radiation			Degree of Cloudiness	
	Strong	Moderate	Slight	>50%	<50%
< 4	A	A-B	B		
4-7	A-B	B	C	E	F
7-11	B	B-C	C	D	E
11-14	C	C-D	D	D	D
>14	C	D	D	D	D

The degree of cloudiness is defined as that fraction of the sky above the local apparent horizon that is covered by clouds. The neutral Class D, should be assumed for heavy overcast conditions during day or night.

NOTE: For borderline windspeed, choose the most stable class (e.g. if windspeed = 11 mph, choose stability Class C for daytime with strong incoming solar radiation).

8.2.1.4 Determine the type of release (ground-level or elevated) by contacting the Control Room and obtaining the station vent average flow rate (item 6a). Calculate the exit velocity (item 6b) and the velocity ratio (item 6c). Circle the release type (item 6d).

8.2.1.5 Radiation Protection Manager, Radiological Control Manager, or In-plant Radiation Monitoring Technician, determine the distance to downwind receptor (item 7).

NOTE: Use judgement when picking valves at which to perform dose projection. Take into account factors such as windspeed, stability class, affected areas, and population density. Dose projection can only be done for distances given in Appendix 12.3. If dose assessment staff members are available, several calculations can be performed simultaneously at different distances. If this is the case the Radioactive Effluent Monitor Nomogram Worksheet (Appendix 12.1) can be completed for these different distances up to item 13 (atmospheric dispersion factor) and recorded on the Tabulated Dose and Protective Action Worksheet (Appendix 12.2) before using the nomograms and completing the worksheets.

8.2.1.6 Determine receptor elevation above mean sea level (MSL) by using Appendix 12.3 along with stability class (item 5) and distance to downwind receptor (item 7).

NOTE: THIS STEP FOR ELEVATED RELEASES ONLY.

8.2.1.7 Determine plume rise (item 9) for the appropriate stability class (item 5), and record the lowest valve using the guidance on the worksheet.

NOTE: THIS STEP FOR ELEVATED RELEASES ONLY

8.2.1.8 Calculate the effective plume height above receptor (item 10) and then choose the tabulated plume height closest to this value.

NOTE: THIS STEP FOR ELEVATED RELEASES ONLY

8.2.1.9 Contact the Control Room and determine the release point (item 11). Determine the type of exposure (item 12) by circling the system affected.

8.2.1.10 Determine the atmospheric dispersion factor for type of exposure (whole body gamma and/or thyroid) as follows:

.1 Select the gaussian puff gamma Xu/Q tables (Appendix 12.5) for whole body exposure or plume centerline concentration Xu/Q tables (Appendix 12.4) for thyroid exposure.

.2 From type of release (item 5) and/or tabulated plume height (item 10 - for elevated releases), choose the proper table for whole body and/or thyroid exposure.

.3 Find the proper Xu/Q value using the stability class (item 5) and distance to downwind receptor (item 7). Record the Xu/Q value (item 13) on the worksheet.

8.2.1.11 Contact the Control Room and determine the radiation monitor reading (item 14) in cpm. If the radiation monitor reading is offscale or inoperable obtain Xe-133 and I-131 dose equivalents from results of a grab sample.

NOTE: Inform RPM or RCM that a sample is needed if not already taken.

8.2.1.12 Based upon release point (item 11), type of exposure (item 12) and radiation monitor reading or dose equivalents (item 14) determine the proper nomogram(s) to use. Record the number(s) on the worksheet (item 15) and obtain a copy of the nomogram (Appendix 12.6).

Nomogram No.	Description
1	Station vent routine effluent monitor . noble gas release . wholebody gamma dose
2	Station vent high-range monitor . noble gas release . wholebody gamma dose
3	RBSVS low-range monitor . noble gas release . wholebody gamma dose
4	RBSVS low-range monitor . potential halogen release rate . potential thyroid dose rate
5	RBSVS intermediate-range monitor . noble gas release . wholebody gamma dose
6	RBSVS intermediate-range monitor . potential halogen release rate . potential thyroid dose
7	RBSVS high-range monitor . noble gas release . wholebody gamma dose
8	RBSVS high-range monitor . potential halogen release rate . potential thyroid dose rate

8.2.1.13 Contact the Control Room to determine the airflow at the duct sampled or monitored (item 16) and time of reactor scram (item 17). Determine time since reactor scram.

NOTE: If the reactor is not yet shutdown, the time since reactor scram is zero.

8.2.1.14 Use the selected nomogram and the following information to compute the radioactivity release rate and the dose rate (item 18) at the receptor of interest:

- Monitor reading or grab sample concentration (from Step 14)
- Vent flow (from Step 16)
- Time since reactor scram (from Step 17)
- Prevailing wind speed (from Step 3 in mph; use the 33-ft data for a ground-level release and the 150-ft data for an elevated release as determined in Step 6)
- The Xu/Q value (from Step 13)

8.2.1.15 <u>To Determine Dose Rate</u>

.1 Locate the monitor reading on the left hand axis. If monitor reading is unavailable, use grab sample dose equivalent and continue with Step 8.2.14.4.

.2 Move horizontally to the right until the slanted line corresponding to the flow rate is intercepted.

.3 Move vertically up until slanted line corresponding to time after reactor shutdown is intercepted.

.4 Move horizontally to the right until slanted line corresponding to wind speed is intercepted.

NOTE: For elevated releases, use elevated windspeed; for ground releases, use ground windspeed.

.5 Move vertically down until the slanted line corresponding to the atmospheric dispersion factor is intercepted.

.6 Move horizontally to the right and read off the dose rate.

8.2.1.16 <u>To Determine Release Rate</u>

.1 Locate the monitor reading on the left hand axis.

.2 Move horizontally to the right until the slanted line corresponding to the flow rate is intercepted.

.3 Move vertically down until slanted line corresponding to time after reactor shutdown is intercepted.

.4 Move horizontally to the left and read off the release rate.

8.2.1.17 Contact the Control Room and determine release duration (item 19).

8.2.1.18 Complete item 20 to determine whole body and thyroid dose for the point of interest. Record them on Appendix 12.1.

9.0 ACCEPTANCE CRITERIA

N/A

10.0 FINAL CONDITIONS

Projected whole body and/or thyroid doses for points of interest have been calculated.

11.0 REFERENCES

Shoreham Nuclear Power Station Emergency Plan

12.0 APPENDICES

12.1 Radioactive Effluent Monitor Nomogram Worksheet, SPF69.Ø22.Ø1-1

12.2 Tabulated Dose and Protective Action Worksheet, SPF69.Ø22.Ø1-2

12.3 Terrain Heights

12.4 Plume Centerline Concentration Xu/Q

12.5 Gaussian Puff Gamma Xu/Q

12.6 Nomograms

RADIOACTIVE EFFLUENT MONITOR NOMOGRAM WORKSHEET

Your Name:________________

1. Date:________________ 2. Time:________________

3. Wind speed: u(33-ft level)____mph; X Ø.447 = ________m/sec
   u(150-ft level)____mph; X Ø.447 = ________m/sec

4. Wind direction: 33-ft level________degrees; ________sector
   150-ft level________degrees; ________sector

   (See page 3 of procedure for affected downwind sector)

5. Atmospheric Stability (Pick one - use a, b, or c in that order. See Step 8.2.1.3 for instructions).

   a. Delta Temperature: (33-150 ft)________deg. F; stability________
   b. Sigma Theta (33 ft) ________; stability________

   c. Wind Speed (33 ft) ________mph;

   Time of Day (Choose one and circle appropriate condition in parenthesis)
   Day - Incoming Solar Radiation (Strong, Moderate, Slight)
   Night - Degree of Cloudiness (>50%, <50%)

   Stability____________

6. Release Type

   a. Station vent flow: F__________cfm

   b. Exit velocity : W_o = F(cfm) X 8.47 X 10^{-5} = ________m/sec

   c. Velocity ratio : R_v = W_o(m/sec) / u(150-ft; m/sec) = ________

   NOTE: If R_v is less than 5, the release is to be assumed to be at ground level; if R_v is greater than or equal to 5 the release is elevated.

   d. Release type (circle one): ground release elevated release

7. Distance to downwind receptor: X = __________miles

   NOTE: FOR GROUND RELEASE (item 6d) PROCEED DIRECTLY TO STEP 11

8. Receptor elevation: h_t = ______m above MSL (ELEVATED RELEASE ONLY) from Appendix 12.3; use stability class (item 5) and distance to downwind receptor (item 7).

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9. Plume rise: (FOR ELEVATED RELEASES ONLY)

Compute hpr(1) and hpr(2) for all stabilities:

$hpr(1) = 32.4\ (Rv^2\ X)^{1/3} =$ ______________ m

$hpr(2) = 7.98\ Rv =$ ______________ m

Compute hpr(3) and hpr(4) for stability classes E, F, and G only:

$hpr(3) = 30\ Wo^{1/2} =$ ______________ m (stability E)

$= 24\ Wo^{1/2} =$ ______________ m (stability F)

$= 21\ Wo^{1/2} =$ ______________ m (stability G)

$hpr(4) = 6.4\ (RvWo)^{1/3} =$ __________ m (stability E)

$= 5.5\ (RvWo)^{1/3} =$ __________ m (stability F)

$= 4.9\ (RvWo)^{1/3} =$ __________ m (stability G)

Choose the final plume rise (hpr) as follows:

Stabilities A, B, C, and D

h_{pr} = lesser of h_{pr} (1) and h_{pr} (2) = __________ m

Stabilities E, F, and G

h_{pr} = lesser of h_{pr} (1) through h_{pr} (4) = ______ m

10. Effective plume height above receptor (FOR ELEVATED RELEASES ONLY). Use hpr (item 9) and h_t (item 8)

he = 75.9 + hpr - ht

= 75.9 + __________ - __________ = __________ m

Tabulated plume height (H) closest to he is:

H (choose 35, 70, 105 or 140) = __________ m

11. Release point (circle one): Station Vent; RBSVS

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12. Type of exposure (circle release point): whole body (station vent or RBSVS)
thyroid (RBSVS only)

13. Atmospheric dispersion factor

<u>Type of exposure (item 12):</u>

Whole Body - Use gaussian puff gamma Xu/Q tables (Appendix 12.3)
Thyroid - Use plume centerline concentration Xu/Q tables (Appendix 12.4)

<u>Type of Release</u>:

(Ground or elevated. If elevated release use tabulated plume height from item 10. Use proper table for thyroid and/or whole body exposure).

Choose one: ground level release
elevated release (H = 35 m)
elevated release (H = 70 m)
elevated release (H = 105 m)
elevated release (H = 140 m)

<u>Stability and distance</u> (item 5 and 7)

Find the proper Xu/Q value for whole body and/or thyroid exposure using stability class (item 5) and distance to downwind receptor (item 7).

Xu/Q (whole body) = ____________ $(1/m^2)$
Xu/Q (thyroid) = ____________ $(1/m^2)$

<u>NOTE:</u> Record these values and distance (item 7) on Appendix 12.2

14. Radiation monitor reading: _______cpm; Xe-133 Dose Eq.____________uCi/cc
I-131 Dose Eq.____________uCi/cc

15. Number of nomogram selected: __________ (Whole Body)

__________ (Thyroid)

16. Air flow at the duct sampled or monitored: ______________cfm

17. Time of reactor scram:__________; Time since reactor scram__________hours
(24 hr clock)

18. a. Radioactivity release rate:________uCi/sec; noble gas

b. Offsite dose rate:______________mr/hr; whole body gamma

c. Radioactivity release rate:________uCi/sec; radioiodine

d. Offsite dose rate:______________mr/hr; thyroid

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19. Release duration: ________________hrs.

20a. Whole Body Dose = Item 18b x item 19

= ______ x _______ / 1000 = ________ rem

b. Thyroid Dose = Item 18d x item 19

= ______ x _______ / 1000 = ________ rem

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TABULATED DOSE AND PROTECTIVE ACTION WORKSHEET

DISTANCE (MILES)	DISPERSION COEFFICIENT		PROJECTED DOSE		EVACUATION DOSE		SHELTER DOSE		RECOMMENDATION	
	THYROID (XU/Q) ($10^{-6}m^{-2}$)	WHOLE BODY (XU/Q) ($10^{-6}m^{-2}$)	THYROID (REM)	WHOLE BODY (REM)	THYROID (REM)	WHOLE BODY (REM)	THYROID. (REM)	WHOLE BODY (REM)	THYROID	WHOLE BODY
SITE BOUNDARY										

TERRAIN HEIGHTS (METERS ABOVE MSL)

MILES	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
.19	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
.25	0	0	0	3	4	4	13	17	21	22	17	15	15	4	0	0
.50	0	0	0	3	1	4	18	30	31	32	17	26	27	13	0	0
.75	0	0	0	9	4	18	26	52	58	58	31	33	31	0	0	0
1.0	0	0	0	25	27	18	50	40	37	41	46	33	31	0	0	0
1.5	0	0	0	3	48	49	37	31	31	33	40	46	37	0	0	0
2.0	0	0	0	0	67	35	33	27	27	33	40	52	30	0	0	0
2.5	0	0	0	0	37	30	31	24	24	37	37	45	30	0	0	0
3.0	0	0	0	0	24	30	23	24	25	31	34	48	39	0	0	0
3.5	0	0	0	0	34	30	27	24	24	30	33	40	33	0	0	0
4.0	0	0	0	0	47	30	22	19	24	27	32	35	33	0	0	0
4.5	0	0	0	0	33	27	15	18	21	27	28	33	30	0	0	0
5.0	0	0	0	0	39	27	13	18	21	30	28	40	35	0	0	0
7.5	0	0	0	0	30	21	31	15	25	33	37	40	50	0	0	0
10.	0	0	0	0	21	12	76	33	27	40	44	45	37	0	0	0

SHOREHAM STATION - PLUME-CENTERLINE CONCENTRATION (X*U/Q) (1/M2)

GROUND-LEVEL RELEASE - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.18	73.824	142.587	218.895	451.874	733.325	1528.773	3529.499
.25	40.552	83.988	155.855	307.503	517.204	1038.091	2177.300
.50	6.336	25.814	56.855	134.300	203.135	428.881	848.132
.75	2.669	10.212	28.689	80.639	132.640	244.169	489.947
1.0	2.089	4.932	18.422	55.140	94.347	165.540	336.834
1.5	1.488	2.004	8.447	31.746	55.471	106.474	195.837
2.0	1.147	1.561	5.844	20.616	38.311	74.644	137.574
2.5	.945	1.295	4.019	14.791	28.672	57.294	106.706
3.0	.816	1.089	2.858	11.342	22.595	47.484	89.414
3.5	.720	.944	2.283	9.080	18.490	40.239	76.541
4.0	.644	.838	1.825	7.503	15.572	34.709	66.653
4.5	.585	.758	1.495	6.342	13.398	30.134	58.595
5.0	.536	.693	1.258	5.469	11.722	26.607	52.261
7.5	.368	.497	.713	3.206	7.151	17.112	34.340
10.0	.288	.390	.524	2.164	5.020	12.609	25.580
15.0	.214	.274	.360	1.204	3.036	8.009	16.872
20.0	.166	.215	.281	.811	2.185	5.881	12.691
25.0	.138	.179	.245	.603	1.709	4.592	10.209
30.0	.120	.155	.213	.478	1.415	3.783	8.580
35.0	.106	.136	.188	.393	1.203	3.225	7.408
40.0	.096	.122	.168	.333	1.044	2.800	6.526
45.0	.087	.110	.148	.291	.927	2.482	5.853
50.0	.080	.100	.135	.258	.829	2.222	5.302

SHOREHAM STATION - PLUME-CENTERLINE CONCENTRATION (X*U/Q) (1/M2)

ELEVATED RELEASE (H = 35 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.18	68.928	108.063	113.557	28.242	1.460	.000	.000
.25	39.738	81.890	109.985	58.158	12.023	.006	.000
.50	6.358	25.347	52.257	85.824	75.274	8.315	.021
.75	2.678	10.179	28.570	83.928	78.718	36.060	1.898
1.0	2.084	4.932	17.988	47.501	68.012	53.482	8.535
1.5	1.490	2.007	9.336	29.294	46.335	57.480	25.584
2.0	1.148	1.563	5.803	19.517	33.868	49.653	31.496
2.5	.945	1.296	4.000	14.188	26.067	42.113	34.222
3.0	.817	1.089	2.948	10.984	20.847	36.862	35.829
3.5	.720	.945	2.277	8.843	17.257	32.380	35.481
4.0	.644	.838	1.821	7.337	14.657	28.644	34.054
4.5	.585	.758	1.492	6.220	12.700	25.335	31.933
5.0	.536	.693	1.256	5.375	11.174	22.693	29.973
7.5	.368	.497	.713	3.169	6.917	15.173	23.013
10.0	.288	.390	.524	2.146	4.808	11.407	18.378
15.0	.214	.274	.360	1.187	2.976	7.488	12.814
20.0	.166	.215	.291	.808	2.149	5.485	10.097
25.0	.138	.179	.245	.601	1.685	4.338	8.305
30.0	.120	.155	.213	.476	1.397	3.601	7.063
35.0	.106	.136	.188	.392	1.189	3.073	6.159
40.0	.096	.122	.168	.332	1.033	2.878	5.470
45.0	.087	.110	.149	.291	.917	2.380	4.841
50.0	.080	.100	.135	.257	.821	2.137	4.503

SHOREHAM STATION - PLUME-CENTERLINE CONCENTRATION (X*U/Q) (1/M2)

ELEVATED RELEASE (H = 70 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.19	36.107	17.438	3.011	.000	.000	0.000	0.000
.25	29.850	29.170	12.598	.048	.000	.000	0.000
.50	6.220	20.704	27.534	7.216	.825	.000	.000
.75	2.678	8.557	20.869	15.801	5.276	.017	.000
1.0	2.094	4.811	14.825	18.538	10.678	.306	.000
1.5	1.490	2.005	8.453	17.158	15.615	2.668	.009
2.0	1.148	1.563	5.464	13.491	15.683	5.811	.065
2.5	.945	1.296	3.838	10.754	14.247	7.869	.218
3.0	.817	1.089	2.859	8.824	12.511	8.982	.548
3.5	.720	.945	2.223	7.383	11.092	9.448	.857
4.0	.644	.838	1.787	6.292	9.929	9.519	1.366
4.5	.585	.758	1.470	5.442	8.993	9.286	1.679
5.0	.536	.693	1.240	4.774	8.187	8.978	1.956
7.5	.368	.497	.711	2.928	5.563	7.417	2.955
10.0	.288	.390	.524	2.025	4.105	6.240	3.237
15.0	.214	.274	.360	1.155	2.611	4.668	3.058
20.0	.166	.215	.291	.786	1.830	3.687	2.878
25.0	.138	.179	.245	.588	1.535	3.046	2.639
30.0	.120	.155	.213	.468	1.283	2.600	2.382
35.0	.106	.136	.186	.386	1.100	2.272	2.181
40.0	.096	.122	.168	.328	.961	2.021	2.019
45.0	.087	.110	.149	.268	.857	1.829	1.891
50.0	.080	.100	.135	.255	.770	1.668	1.778

SHOREHAM STATION - PLUME-CENTERLINE CONCENTRATION (X*U/Q) (1/M2)

ELEVATED RELEASE (H = 105 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.18	12.281	.834	.007	.000	.000	0.000	0.000
.25	18.698	5.221	.340	.000	.000	0.000	0.000
.50	5.996	14.777	9.464	.116	.000	.000	0.000
.75	2.678	8.602	12.364	1.538	.057	.000	.000
1.0	2.094	4.617	10.730	3.864	.488	.000	.000
1.5	1.490	2.001	7.162	7.036	2.548	.016	.000
2.0	1.148	1.563	4.943	7.291	4.347	.163	.000
2.5	.945	1.296	3.583	6.768	5.205	.481	.000
3.0	.817	1.089	2.717	6.125	5.342	.854	.001
3.5	.720	.945	2.137	5.464	5.310	1.213	.002
4.0	.644	.838	1.731	4.871	5.188	1.518	.006
4.5	.585	.758	1.432	4.355	5.059	1.743	.012
5.0	.536	.693	1.215	3.919	4.876	1.915	.021
7.5	.368	.497	.707	2.566	3.869	2.250	.097
10.0	.288	.390	.523	1.837	3.070	2.283	.179
15.0	.214	.274	.360	1.087	2.100	2.124	.277
20.0	.166	.215	.291	.752	1.814	1.886	.355
25.0	.138	.179	.245	.567	1.313	1.690	.390
30.0	.120	.155	.213	.454	1.115	1.511	.389
35.0	.106	.136	.188	.377	.967	1.374	.387
40.0	.096	.122	.168	.321	.852	1.264	.383
45.0	.087	.110	.148	.282	.765	1.179	.381
50.0	.080	.100	.135	.251	.691	1.104	.378

SHOREHAM STATION - PLUME-CENTERLINE CONCENTRATION (X*U/Q) (1/M2)

ELEVATED RELEASE (H = 140 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.19	2.719	.012	.000	.000	0.000	0.000	0.000
.25	8.666	.470	.002	.000	.000	0.000	0.000
.50	5.698	9.216	2.122	.000	.000	.000	0.000
.75	2.678	7.424	5.842	.059	.000	.000	0.000
1.0	2.094	4.358	6.824	.430	.006	.000	.000
1.5	1.490	1.995	5.679	2.020	.201	.000	.000
2.0	1.148	1.563	4.295	3.080	.721	.001	.000
2.5	.945	1.296	3.254	3.539	1.271	.010	.000
3.0	.817	1.089	2.530	3.674	1.623	.032	.000
3.5	.720	.945	2.021	3.586	1.893	.069	.000
4.0	.644	.838	1.656	3.404	2.091	.116	.000
4.5	.585	.758	1.382	3.188	2.261	.168	.000
5.0	.536	.683	1.181	2.972	2.360	.220	.000
7.5	.368	.497	.702	2.134	2.327	.424	.001
10.0	.288	.390	.522	1.604	2.043	.559	.003
15.0	.214	.274	.360	1.000	1.548	.705	.010
20.0	.166	.215	.291	.706	1.258	.747	.019
25.0	.138	.179	.245	.540	1.056	.741	.027
30.0	.120	.155	.213	.435	.915	.707	.031
35.0	.106	.136	.188	.363	.806	.679	.034
40.0	.096	.122	.168	.312	.720	.655	.037
45.0	.087	.110	.149	.275	.652	.638	.041
50.0	.080	.100	.135	.246	.594	.618	.043

SHOREHAM STATION - GAUSSIAN PUFF GAMMA (X*U/Q) (1/M2)

GROUND-LEVEL RELEASE - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.18	39.619	60.088	77.110	113.774	144.894	205.887	302.182
.25	26.073	48.390	63.374	82.961	121.875	171.481	242.415
.50	5.648	18.542	33.169	57.965	73.815	110.505	155.705
.75	1.285	8.629	20.653	42.003	57.529	81.865	118.788
1.0	.974	4.483	14.175	32.469	46.310	65.668	87.599
1.5	.697	1.597	8.063	21.733	32.606	50.222	72.387
2.0	.539	.788	5.250	15.523	25.008	39.911	58.816
2.5	.445	.608	3.716	11.828	20.109	33.347	50.281
3.0	.384	.512	2.785	9.448	16.694	29.220	44.929
3.5	.339	.444	2.174	7.787	14.217	25.826	40.582
4.0	.304	.394	1.751	6.577	12.347	23.241	35.990
4.5	.276	.357	1.439	5.655	10.886	20.889	33.869
5.0	.253	.327	1.209	4.941	9.718	18.882	31.273
7.5	.174	.235	.630	3.005	6.301	13.348	23.056
10.0	.138	.184	.400	2.065	4.568	10.342	18.410
15.0	.101	.128	.217	1.168	2.854	7.032	13.192
20.0	.079	.102	.151	.793	2.084	5.264	10.389
25.0	.065	.084	.116	.591	1.644	4.208	8.627
30.0	.057	.073	.101	.469	1.368	3.520	7.409
35.0	.050	.064	.089	.385	1.169	3.022	6.503
40.0	.045	.058	.079	.326	1.016	2.643	5.803
45.0	.041	.052	.071	.283	.904	2.355	5.257
50.0	.038	.047	.064	.249	.810	2.118	4.803

SHOREHAM STATION - GAUSSIAN PUFF GAMMA (X*U/Q) (1/M2)

ELEVATED RELEASE (H = 35 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.19	39.247	58.930	72.641	80.560	77.485	73.502	72.221
.25	25.949	46.090	61.984	79.208	80.137	75.124	72.785
.50	5.664	18.585	33.349	58.822	72.218	80.618	77.128
.75	1.290	8.651	20.805	43.178	58.763	75.802	80.544
1.0	.977	4.505	14.285	33.443	48.144	68.050	79.403
1.5	.699	1.601	8.119	22.309	33.933	53.806	71.608
2.0	.540	.789	5.280	15.910	25.894	43.099	63.938
2.5	.445	.609	3.734	12.098	20.879	36.032	57.228
3.0	.385	.512	2.797	9.639	17.331	31.518	51.451
3.5	.339	.445	2.182	7.931	14.744	27.932	46.651
4.0	.304	.395	1.757	6.688	12.788	25.018	42.635
4.5	.276	.357	1.443	5.743	11.254	22.482	39.179
5.0	.253	.327	1.212	5.014	10.032	20.422	36.256
7.5	.174	.235	.632	3.040	6.471	14.320	26.714
10.0	.136	.184	.400	2.085	4.678	11.060	21.300
15.0	.101	.130	.217	1.178	2.812	7.472	15.242
20.0	.079	.102	.151	.787	2.121	5.564	11.951
25.0	.065	.085	.116	.584	1.671	4.430	9.880
30.0	.057	.073	.101	.471	1.389	3.699	8.474
35.0	.050	.064	.089	.387	1.184	3.167	7.427
40.0	.045	.058	.078	.327	1.030	2.784	6.615
45.0	.041	.052	.071	.284	.916	2.458	5.981
50.0	.038	.047	.064	.250	.820	2.206	5.454

SHOREHAM STATION - GAUSSIAN PUFF GAMMA (X*U/Q) (1/M2)

ELEVATED RELEASE (H = 70 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.19	28.871	33.441	32.128	28.762	27.885	27.372	27.171
.25	21.688	31.315	33.466	30.080	28.482	27.582	27.265
.50	5.481	16.452	26.065	33.428	32.223	29.087	27.838
.75	1.282	8.211	18.126	30.384	33.434	31.300	28.744
1.0	.973	4.391	13.055	26.114	31.873	32.973	29.989
1.5	.697	1.589	7.732	19.209	26.371	32.984	32.354
2.0	.539	.787	5.121	14.374	21.718	30.356	33.385
2.5	.445	.607	3.657	11.223	18.181	27.419	33.347
3.0	.384	.512	2.755	9.090	15.498	25.068	32.599
3.5	.339	.444	2.158	7.563	13.431	22.850	31.476
4.0	.304	.395	1.741	6.429	11.807	21.074	30.192
4.5	.276	.357	1.434	5.554	10.500	19.332	28.842
5.0	.253	.327	1.206	4.871	9.436	17.845	27.526
7.5	.174	.235	.63[illegible]	2.990	6.229	13.083	22.183
10.0	.136	.184	.400	2.063	4.554	10.332	18.487
15.0	.101	.130	.217	1.170	2.867	7.146	13.836
20.0	.079	.102	.151	.794	2.098	5.387	11.098
25.0	.065	.085	.116	.593	1.657	4.320	9.302
30.0	.057	.073	.101	.470	1.380	3.623	8.053
35.0	.050	.064	.089	.386	1.178	3.113	7.105
40.0	.045	.058	.079	.326	1.025	2.723	6.362
45.0	.041	.052	.071	.284	.912	2.426	5.775
50.0	.038	.047	.064	.250	.817	2.181	5.284

SHOREHAM STATION - GAUSSIAN PUFF GAMMA (X*U/Q) (1/M2)

ELEVATED RELEASE (H = 105 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.19	17.921	15.998	14.109	12.907	12.618	12.432	12.357
.25	16.204	17.623	15.548	13.309	12.818	12.509	12.393
.50	5.177	13.490	17.600	16.043	14.160	13.009	12.601
.75	1.267	7.521	14.463	17.823	16.022	13.734	12.901
1.0	.864	4.198	11.250	17.611	17.430	14.691	13.280
1.5	.693	1.565	7.122	15.042	17.661	16.737	14.235
2.0	.537	.781	4.857	12.160	16.216	17.827	15.262
2.5	.443	.604	3.524	9.909	14.493	17.823	16.249
3.0	.383	.510	2.681	8.240	12.896	17.367	17.048
3.5	.338	.443	2.113	6.980	11.515	16.699	17.574
4.0	.303	.393	1.712	6.010	10.347	15.938	17.849
4.5	.276	.356	1.414	5.243	9.356	15.105	17.920
5.0	.253	.326	1.192	4.632	8.518	14.306	17.836
7.5	.174	.234	.627	2.902	5.836	11.271	16.406
10.0	.136	.184	.399	2.022	4.346	9.226	14.660
15.0	.101	.129	.216	1.157	2.785	6.626	11.795
20.0	.079	.102	.151	.788	2.058	5.084	9.814
25.0	.065	.085	.116	.590	1.631	4.132	8.411
30.0	.057	.073	.101	.468	1.362	3.492	7.390
35.0	.050	.064	.088	.385	1.165	3.017	6.591
40.0	.045	.058	.078	.326	1.016	2.650	5.951
45.0	.041	.052	.071	.283	.905	2.369	5.438
50.0	.038	.047	.064	.249	.812	2.135	5.003

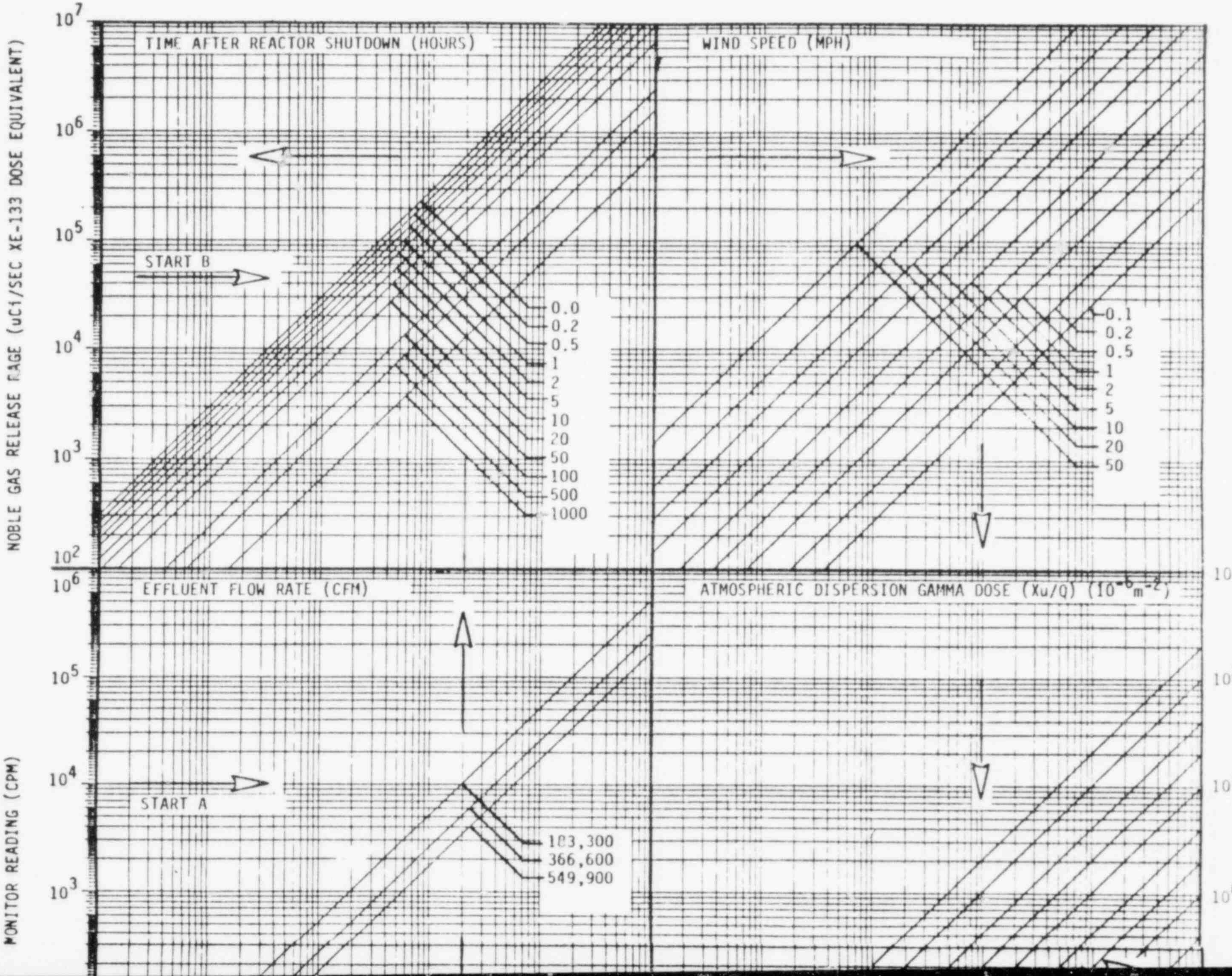
SHOREHAM STATION - GAUSSIAN PUFF GAMMA (X*U/Q) (1/M2)

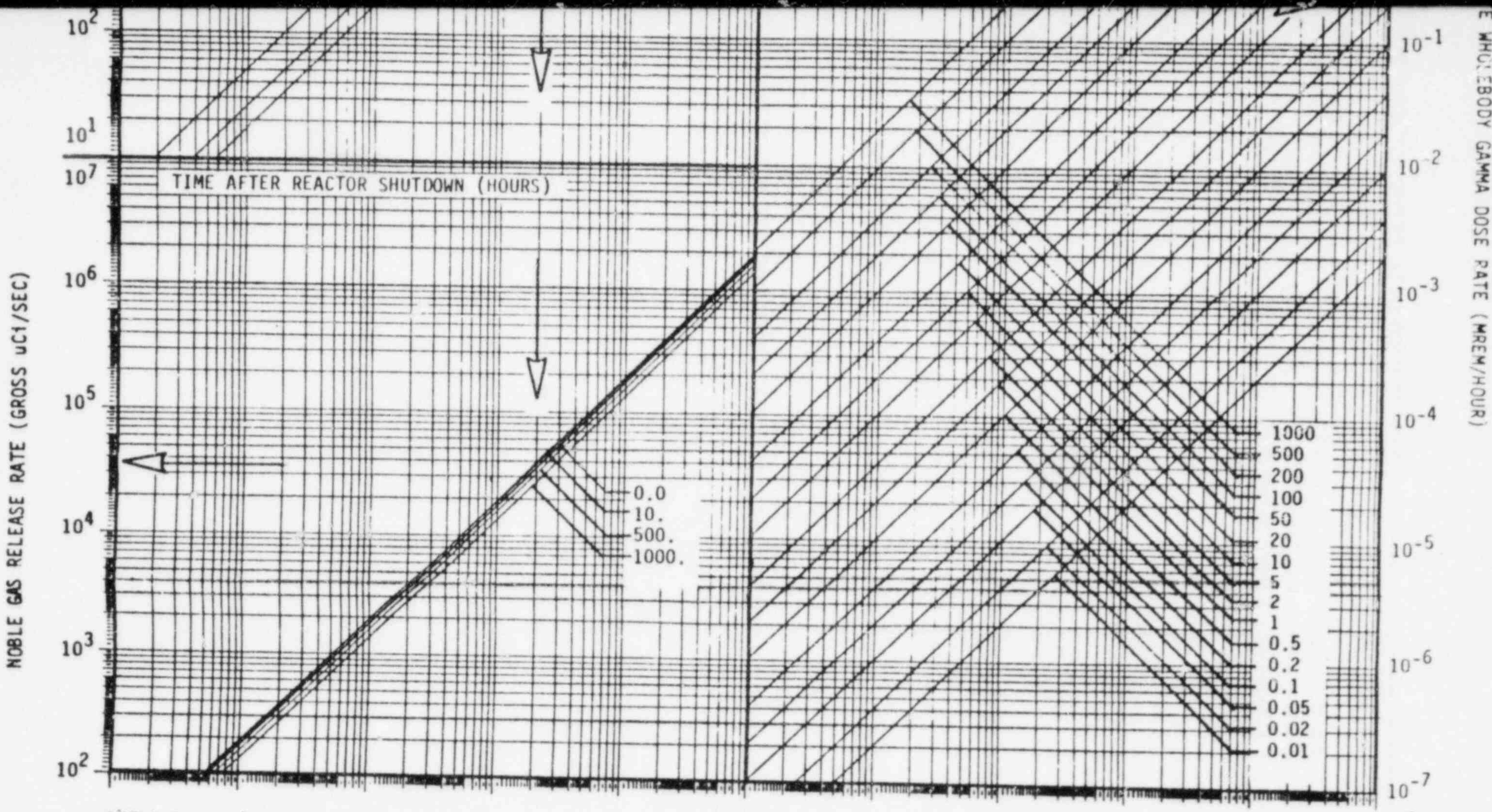
ELEVATED RELEASE (H = 140 M) - DIVIDE RESULTS BY ONE MILLION

MILES	A	B	C	D	E	F	G
.19	9.881	7.641	6.784	6.288	6.158	6.074	6.041
.25	10.931	8.996	7.408	6.460	6.247	6.109	6.057
.50	4.785	10.263	10.556	7.687	6.805	6.331	6.150
.75	1.245	6.662	10.612	9.371	7.655	6.634	6.283
1.0	.952	3.942	8.158	10.547	8.741	7.024	6.448
1.5	.886	1.530	6.357	10.770	10.499	8.109	6.835
2.0	.533	.773	4.512	9.651	10.931	9.381	7.274
2.5	.441	.600	3.345	8.341	10.621	10.273	7.786
3.0	.382	.506	2.578	7.195	10.007	10.714	8.358
3.5	.337	.440	2.050	6.247	9.307	10.908	8.925
4.0	.302	.392	1.671	5.475	8.619	10.917	9.442
4.5	.275	.355	1.387	4.840	7.978	10.784	9.890
5.0	.252	.325	1.173	4.320	7.395	10.562	10.247
7.5	.173	.234	.622	2.781	5.333	9.170	10.931
10.0	.138	.184	.397	1.984	4.072	7.888	10.670
15.0	.101	.128	.216	1.139	2.674	5.870	9.460
20.0	.079	.102	.151	.781	1.998	4.714	8.280
25.0	.065	.084	.116	.585	1.594	3.885	7.318
30.0	.057	.073	.101	.466	1.336	3.317	6.563
35.0	.050	.064	.089	.384	1.147	2.886	5.942
40.0	.045	.058	.079	.324	1.002	2.550	5.427
45.0	.041	.052	.071	.283	.894	2.289	5.003
50.0	.038	.047	.064	.248	.803	2.070	4.637

SHOREHAM NUCLEAR POWER STATION

STATION VENT LOW-RANGE EFFLUENT MONITOR - WHOLEBODY GAMMA DOSE NOMOGRAM



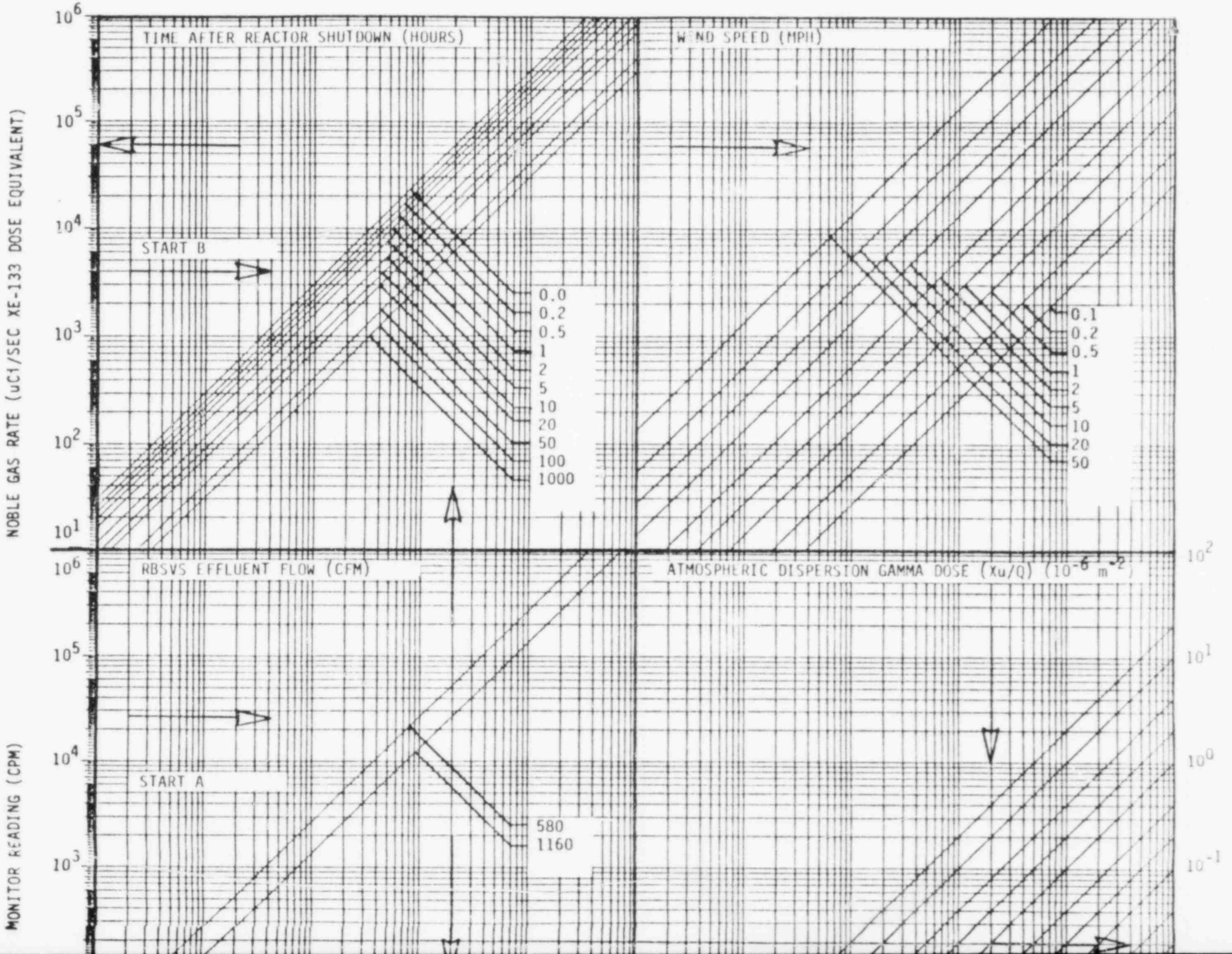


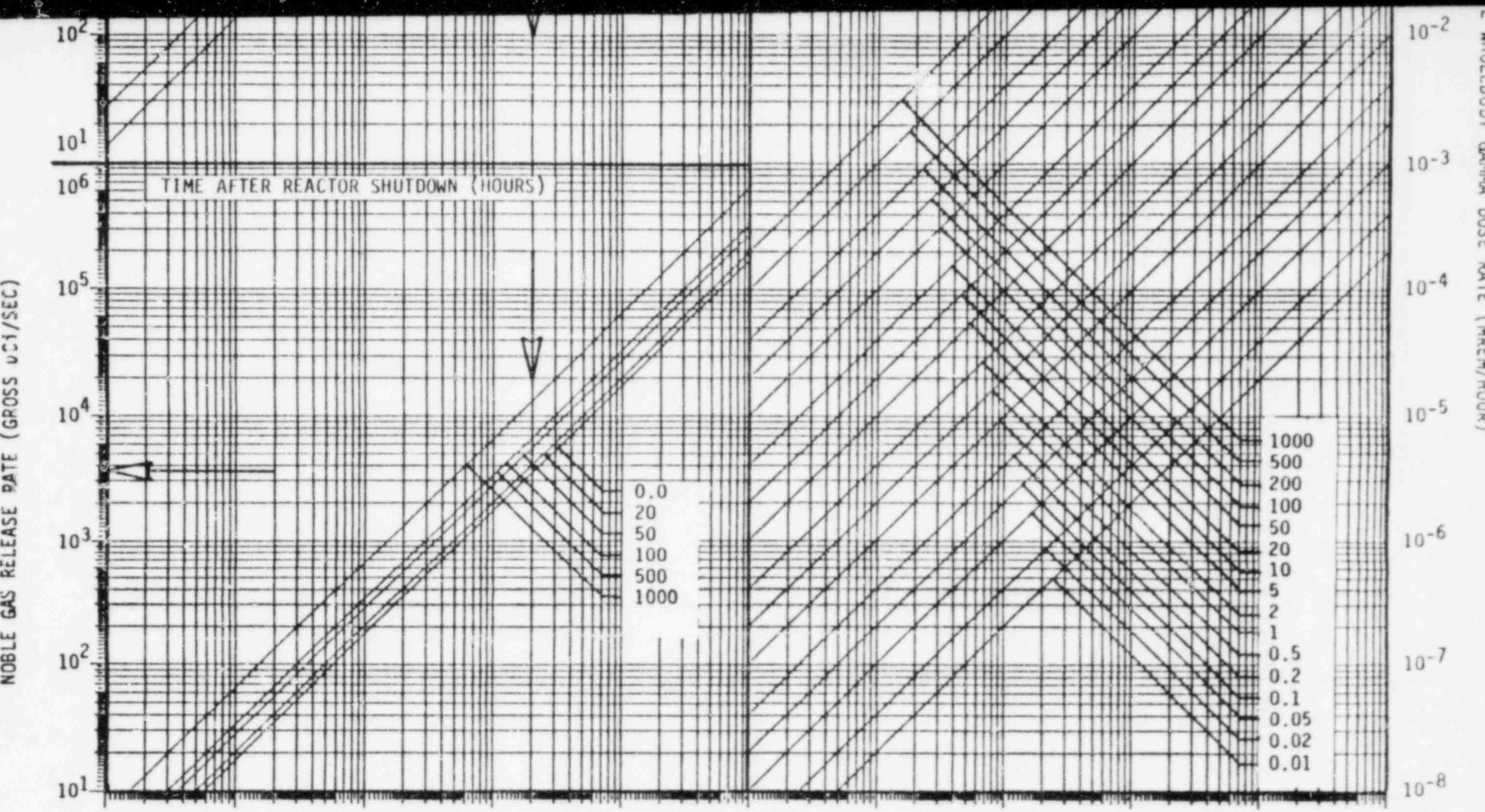
PRELIMINARY (MAY 17, 1982)

NOMOGRAM No. 1

S H O R E H A M   N U C L E A R   P O W E R   S T A T I O N

RBSVS LOW-RANGE EFFLUENT MONITOR - WHOLEBODY GAMMA DOSE NOMOGRAM



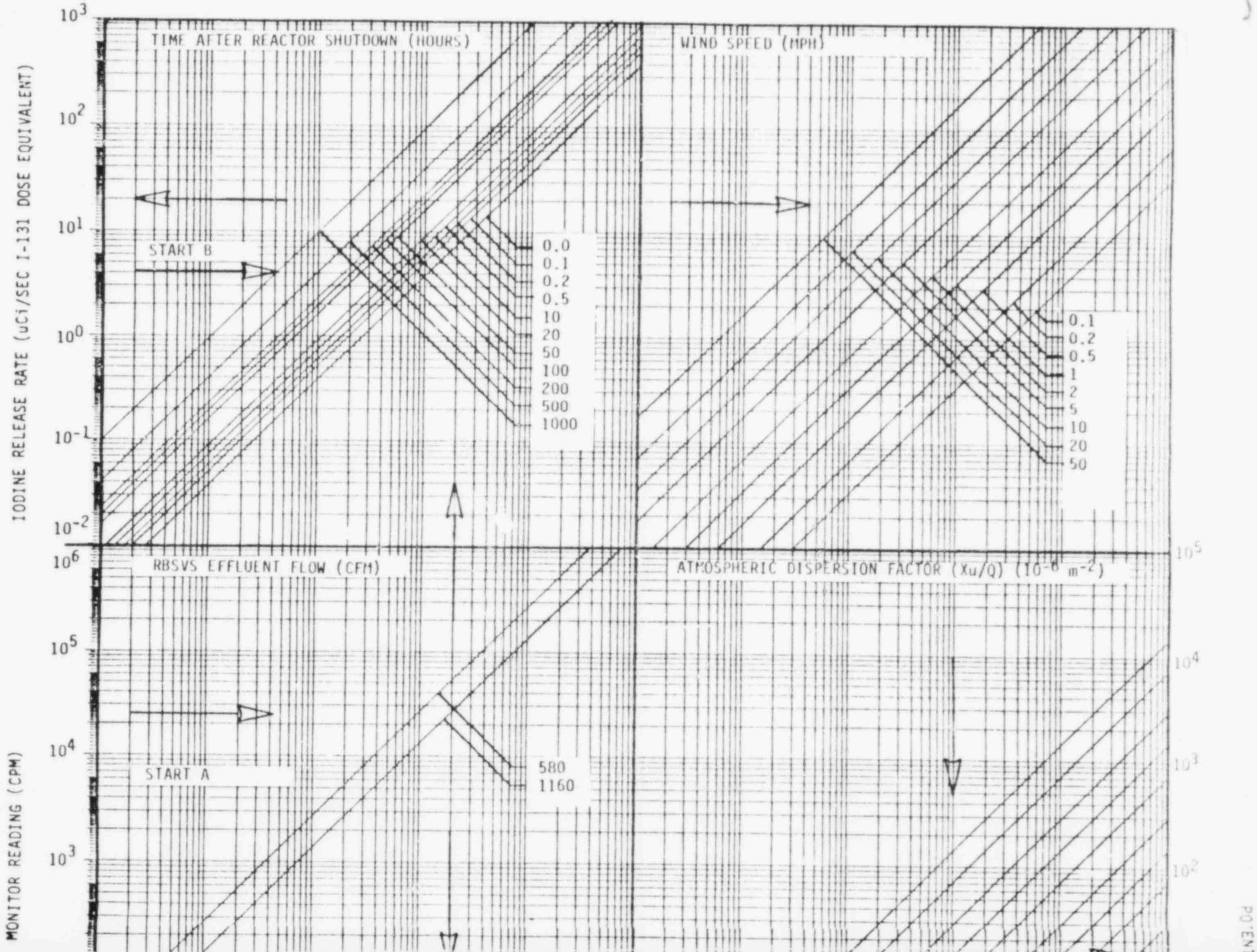


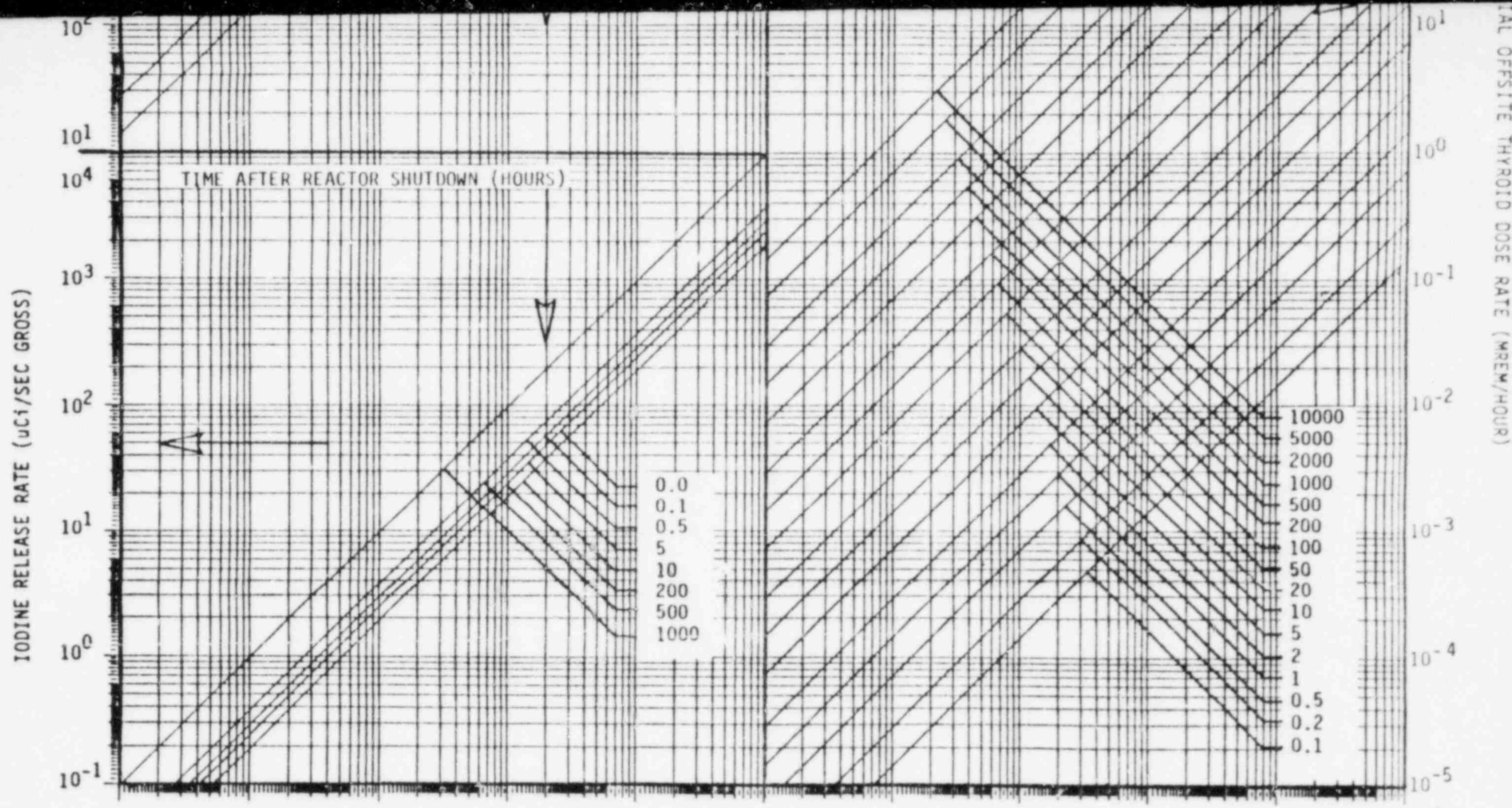
PRELIMINARY (MAY 17, 1982)

NOMOGRAM No. 3

SHOREHAM NUCLEAR POWER STATION

RBSVS LOW-RANGE EFFLUENT MONITOR - POTENTIAL THYROID DOSE NOMOGRAM



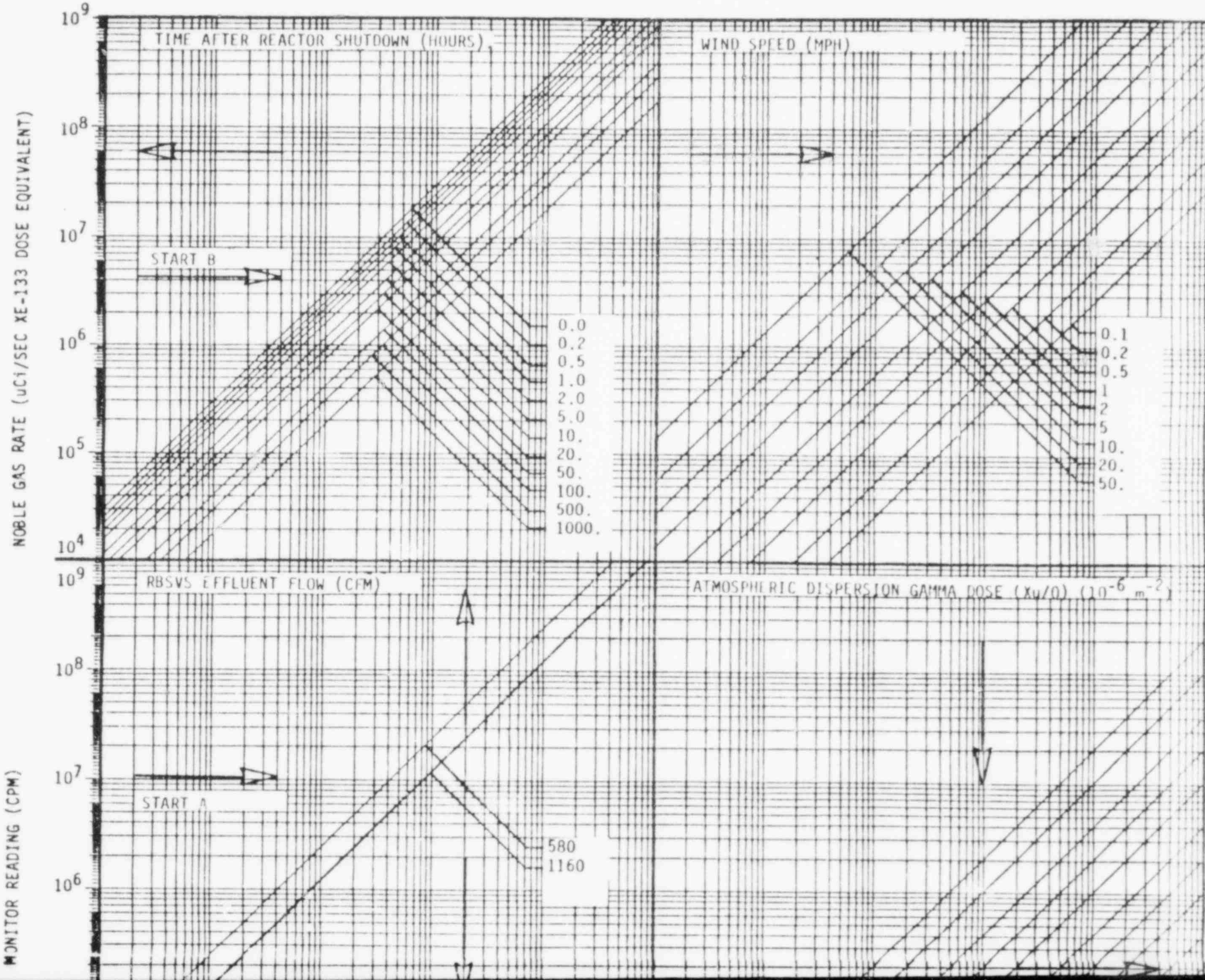


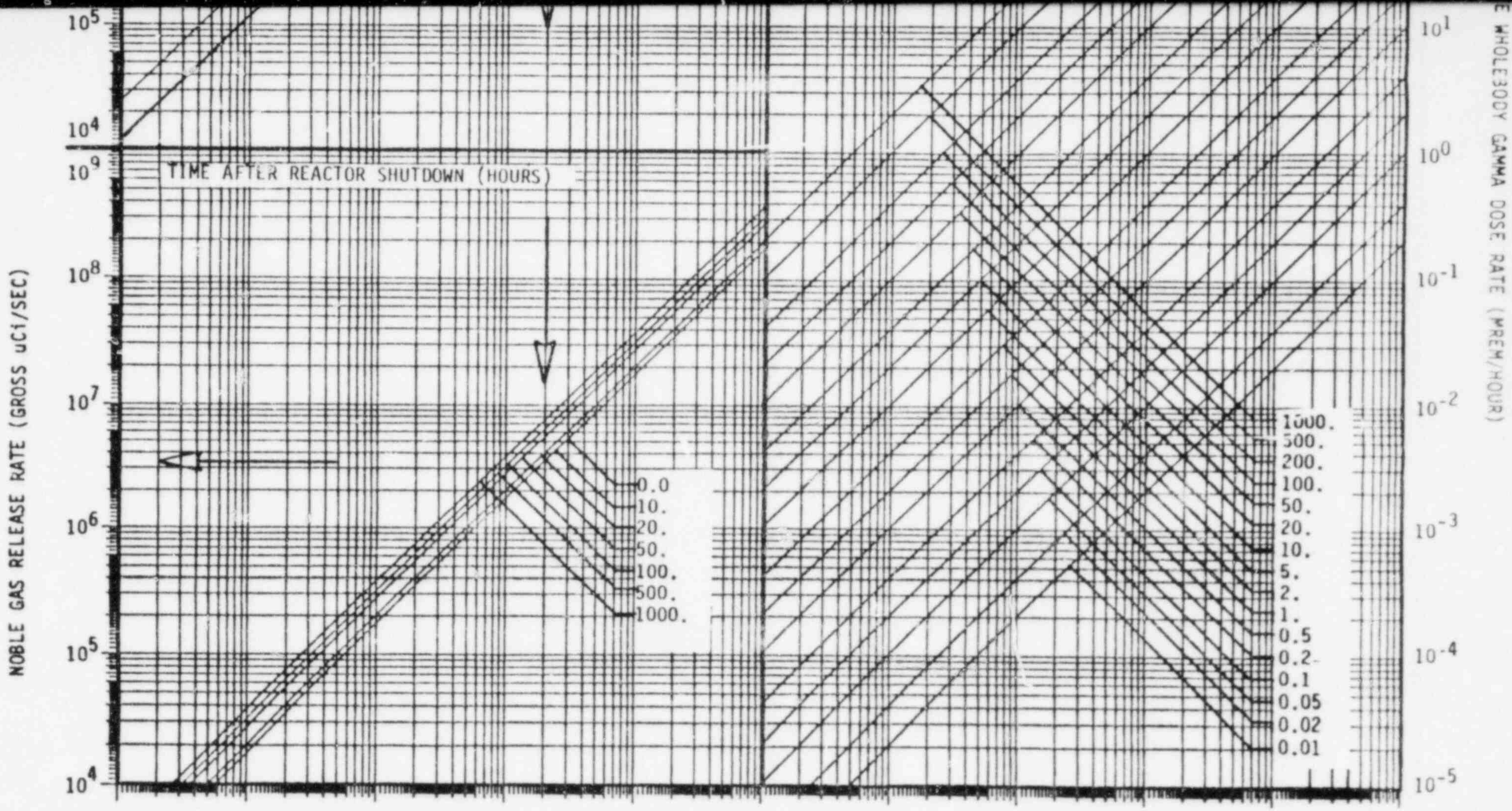
PRELIMINARY (MAY 17, 1982)

NOMOGRAM No. 4

SHOREHAM NUCLEAR POWER STATION

RBSVS INTERMEDIATE-RANGE EFFLUENT MONITOR - WHOLEBODY GAMMA DOSE NOMOGRAM



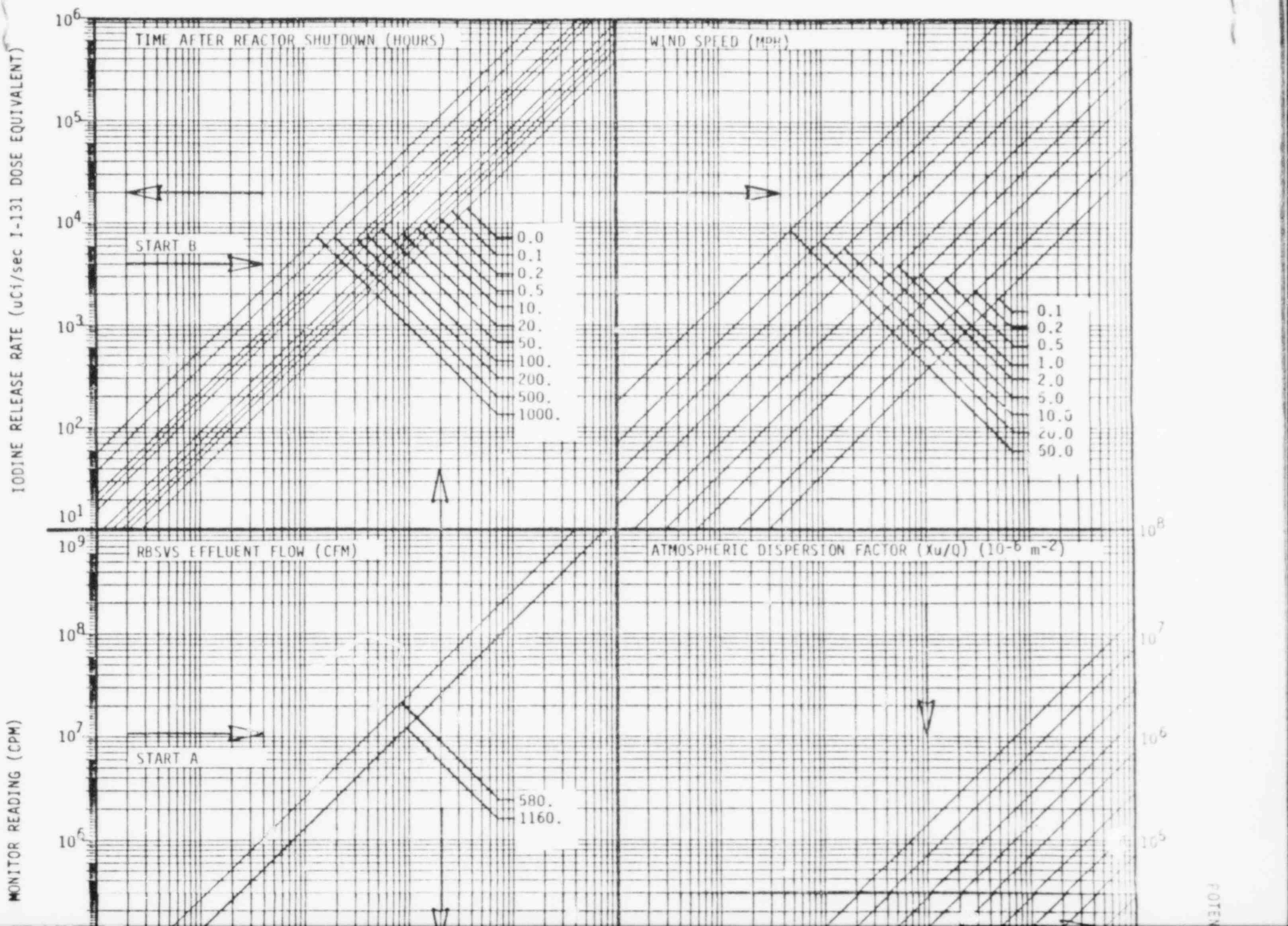


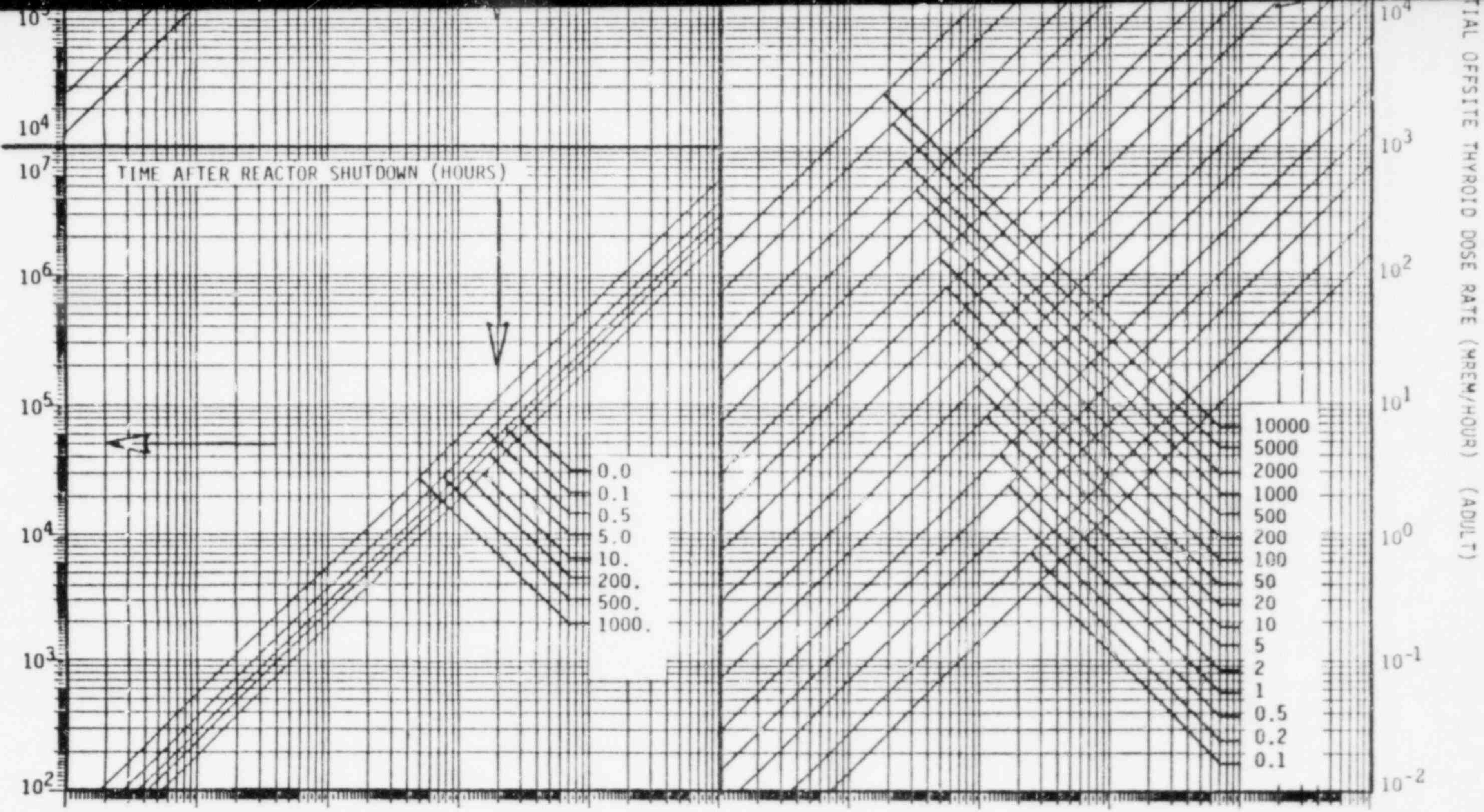
PRELIMINARY (MAY 17, 1982)

NOMOGRAM No. 5

SHOREHAM NUCLEAR POWER STATION

RBSVS INTERMEDIATE-RANGE EFFLUENT MONITOR - POTENTIAL THYROID DOSE NOMOGRAM





PRELIMINARY (MAY 17, 1982)

NOMOGRAM No. 6

Nomogram #2 (LATER)

Nomogram #7 (LATER)

Nomogram #8 (LATEX)

Submitted: [signature]

Reviewed/OQA Engr.: [signature]

Approved/Plant Mgr.: [signature]

MC-1

Attachment 4 - 12

SP Number 69.Ø21.Ø1
Revision: Ø
Date Eff.: 7/09/82
TPC
TPC
TPC

ONSITE SURVEYS

1.0 PURPOSE

To describe the procedures used by the Onsite Radiological Monitoring Teams to conduct onsite radiological surveys and samplings during a radiological emergency.

2.0 RESPONSIBILITY

The Radiation Protection Manager (RPM) is responsible for ensuring compliance with this procedure.

3.0 DISCUSSION

3.1 The main objective of an onsite survey is to collect dose rate and/or environmental samples for site personnel protective action decision information.

3.2 Emergency organization staffing is such that one team will be available at ALERT or higher emergency levels.

3.3 Summary of Overall Sequence of Actions:

3.3.1 RPM or designee, call the OSC Supervisor for manpower and team assignment

3.3.2 Survey team report to the TSC for briefing

3.3.3 After briefing, team members pick up equipment at the OSC or HP Access Control Point, and perform predeployment checks of equipment

3.3.4 At the preselected locations onsite, the survey team performs survey and sampling as required

3.3.5 Returning to the station, the survey team turns in samples to the Rad/Chem Lab and reports data back to the RPM at the TSC.

3.3.6 Topics covered in this procedure:

4.0 PRECAUTIONS

N/A

5.0 PREREQUISITES

5.1 An ALERT or higher emergency classification has been reached, and the Emergency Director or the RPM has determined an onsite survey is necessary.

6.0 LIMITATION AND ACTIONS

6.1 Onsite survey activities are limited to areas within the Protected Area Fence but outside of plant buildings.

7.0 MATERIAL AND EQUIPMENT

See Appendix 12.2, Onsite Survey Equipment Assembly Guide.

8.0 PROCEDURE

8.1 RPM/Designee Actions

8.1.1 Call the OSC Supervisor to form an Onsite Survey Team, and have the team report to TSC for briefing.

8.1.2 Complete the Onsite Survey Briefing Form (Appendix 12.1) to the fullest extent possible (see 8.1.4, 8.1.5, and 8.1.6).

8.1.3 Brief the team according to the Onsite Survey Briefing Form (Appendix 12.1). Based on survey results desired, instruct the team on what equipment to carry out, using the Onsite Survey Equipment Assembly Guide (Appendix 12.2) and have them check out the required items.

8.1.4 Protective Equipment

8.1.4.1 Require team to carry full-face mask protection for all emergencies where an airborne release is known to have happened or is impending.

8.1.4.2 When airborne release reaches the GENERAL EMERGENCY level or when the projected I-131 concentration at the protected area fence is 3×10^{-6} uCi/cc or greater, implement SP69.Ø51.Ø1, Thyroid Blocking to see if there is a need for KI administration.

8.1.4.3 Required donning of Hoods, Booties, Coveralls, and Gloves when airborne release occurs with prevailing precipitation. Use judgment in other cases (consider stability class and emergency level, etc.).

8.1.5 Exposure/Dose Limits

8.1.5.1 Normal health physics exposure limits described in SP61.Ø12.Ø1, Personnel Dose Limits and Guides apply for all members of the onsite survey team.

8.1.5.2 If for any reason the above limits must be raised, refer to SP69.Ø5Ø.Ø1, Radiation Dose During an Emergency for authorization and limits.

8.1.6 Communications

8.1.6.1 Make sure the team has obtained a radio from the OSC Supervisor and has designated a channel to be used.

8.1.6.2 Designate a team ID prior to survey team departure.

8.1.6.3 Maintain proper communications contact (identification, location at all times).

NOTE: If communications problems arise, survey team members can utilize plant extension phones or PA system because of close proximity to the plant.

8.1.7 If conditions warrant, outline for the survey team a route to approach the desired survey points with minimal exposure or safety risk. Mark this route on the Onsite Survey Map (Attachment 12.4).

8.2 <u>Onsite Survey Team - Equipment Check</u>

8.2.1 After briefing, proceed to assemble the necessary survey and protective equipment as checked off on Appendices 12.1 and 12.2. Pick up survey instruments at the OSC, HP Access Control Point, or elsewhere as directed by the Dispatcher.

8.2.2 Perform battery checks and operational checks on all equipment gathered; also check calibration dates.

8.2.3 Log predeployment personnel dosimeter readings onto the Onsite Survey Briefing Form (Appendix 12.1, item 11).

8.2.4 If air sampling is required, perform the following steps, otherwise proceed to Step 8.3.

8.2.4.1 Install a particulate filter and a Silver Zeolite cartridge on the RADeCO air sampler:

A. Use an open-face combination filter/cartridge holder;

B. Mark flow direction on the filter paper before installation.

8.2.4.2 After installation, check that filter is centered, has no tears or damage, and that both the filter and the cartridge are properly oriented and sufficiently tightened to prevent by-pass leakage.

8.2.4.3 Turn on the air sampler and observe the flow rate in the proper range. For the RADeCO unit, this is about 2-3 CFM.

8.2.4.4 Turn off the unit after checking and leave the filter/cartridge holder on the unit. Wrap the holder with a plastic bag to prevent contamination prior to sampling.

8.3 Onsite Survey Team - Survey

8.3.1 Proceed to the posted survey point following routes depicted on the Onsite Survey Map (Appendix 12.4).

8.3.2 While enroute: keep a survey instrument on and begin recording periodic open-window readings of 2 mR/hr or greater on the Onsite Survey Data Sheet (Appendix 12.3). Assign a number to any non-fixed points sequentially (starting with #17 and on). Mark the location and the number on the map, then enter the number and the exposure rate onto Attachment 12.3.

Take note of any abnormal events or conditions and record on Appendix 12.3.

8.3.3 Upon arrival at the survey point:

8.3.3.1 Downscale the survey meter to read the W.B. dose rate or the exposure rate first. Check readings at 3" and 4' off the ground with window open and closed. Record results on Appendix 12.3.

8.3.3.2 If air samples are not required, proceed to the next point and repeat steps 8.3.1 through 8.3.3 for all required survey points, then go to Step 8.3.5.

8.3.4 Air Sampling

8.3.4.1 Set sampler timer to 10 minutes, and place the sampler at about 4 feet above the ground. The RADeCO unit may be operated in any position provided that the intake and exhaust ports are free of obstructions. Take plastic wrap off the sample holder.

8.3.4.2 Start the sampler. Record start time and flow rate on Appendix 12.3. Monitor the run time to 10 minutes.

8.3.4.3 During the sampler run time, continue monitoring the dose rates in the vicinity and record any significant variations.

8.3.4.4 Before the sampler stops, note the final flow rate. Enter this and the stop time onto Appendix 12.3. Assign a ID number to the sample. If there is no more air sampling to do, place the entire sample holder into a plastic bag and mark the ID number on it. Otherwise retrieve the filter/cartridge and replace with new ones. Put the filter and the cartridge into separate bags and label them properly with the ID number.

8.3.5 When all completed, return to the HP Access Control Point. Remove protective clothing. Frisk each other out and check equipment/cart

for possible contamination. Bag any item suspected of being contaminated. If contamination is found, call the RPM at the TSC for further instructions.

8.3.6 Return samples to the Rad/Chem Lab for analysis. Note post-survey dosimeter readings on Appendix 12.1 and report with all survey data sheets to the RPM at the TSC.

8.3.7 Report back to the OSC Supervisor.

9.0 ACCEPTANCE CRITERIA

N/A

10.0 FINAL CONDITIONS

10.1 The RPM/designee shall, after examining them, forward all survey records to the Administrative Section for filing in accordance with permanent plant procedures.

10.2 Rad/Chem Lab and Health Physics: All samples and contaminated objects should be handled according to pertinent regular plant procedures.

10.3 All survey equipment should be returned to the original storage place in ready-to-use condition unless contaminated and being handled as outlined in 10.2 above.

11.0 REFERENCES

11.1 LILCO Shoreham Nuclear Power Station Emergency Plan

11.2 SP 61.Ø12.Ø1, Personnel Dose Limits and Guides

11.3 SP 69.Ø5Ø.Ø1, Radiation Doses During an Emergency

11.4 SP 69.Ø3Ø.Ø1, Contamination Control During Emergencies

11.5 SP 69.Ø51.Ø1, Thyroid Blocking

11.6 RADeCO Portable Battery Powered Air Sampler Instruction Manual, Sci. Appl., Inc. September, 1980

12.0 APPENDICES

12.1 Onsite Survey Briefing Form, SPF 69.Ø21.Ø1-1

12.2 Onsite Survey Equipment Assembly Guide, SPF 69.Ø21.Ø1-2

12.3 Onsite Survey Data Sheet, SPF 69.Ø21.Ø1-3

12.4 Onsite Survey Map

ONSITE SURVEY BRIEFING FORM

1. Date:________ Time:________ Briefing at:________ Team ID:__________

2. Survey requested by:________________ Briefed by:____________

3. Nature of Release:__________ Ground:__________ Elevated;__________Unkn.

4. Unusual Area/Env. Conditions:____

5. Communication Extensions:
RPM-TSC:______________ OSC:______________ C. Rm:______________

6. a. Primary Downwind Sector:_____ Adjacent Sectors: __________, __________

   b. Survey Locations/Points:______________________________________
   ____

7. Projected WB dose rates at survey area (if available):

At Pt_________ Sector________ Dose Rate_________mr/hr
At Pt_________ Sector________ Dose Rate_________mr/hr
At Pt_________ Sector________ Dose Rate_________mr/hr

8. Team member names & authorized doses (rem):

Lead__________________, dose____________________rem
Asst.__________________, dose____________________rem

9. Protective Equipment (check applicable):

(1) __________Dosimeters (200 mR & 5R)
(2) __________TLD (WB)
(3) __________F.F. Mask w I/P Canister
(4) __________Coverall
(5) _____Glove
(6) _____Bootie
(7) _____KI
(8) _____Hood
Other
____
____
____

10. Survey data to be collected:

(1) __________Whole Body Dose Rates
(2) __________Air I/P Sample
(3) __________Gross Beta/Gamma cpm or Exposure Rates
(4) __________Other (Specify)________________________________

11. Team dosimeter readings (Before/After Mission):

Lead (200 mR Scale) _____/_____: (5R Scale) _____/_____
Asst. (200 mR Scale) _____/_____; (5R Scale) _____/_____

12. Special Instructions:____
____
____

SPF 69.Ø21.Ø1-1 Rev. Ø

ONSITE SURVEY EQUIPMENT ASSEMBLY GUIDE

1. ______________ RO-2A

2. ______________ Victoreen 496 w/HP-270 Probe

3. ______________ Eberline RM-14 w/HP-210 Probe

4. ______________ A. RADeCO battery powered air sampler

   B. Open-face combination filter and cartridge holder for above air sampler

   C. Particulate filter papers and Silver Zeolite cartridges for above air sampler

   D. Plastic bags with labels for sealing up the air samples collected

   E. Onsite Survey Cart for mounting the air sampler and its battery

5. ______________ Radio with carrying belt

6. ______________ Flashlight(s) (for night or dawn only)

7. ______________ Clipboard with:

   a. This procedure with Attachment 1 completed as far as possible

   b. Marking pencil

8. ______________ Other (specify below):

   ____

   ____

   ____

SPF 69.Ø21.Ø1-2 Rev. Ø

ONSITE SURVEY DATA SHEET

1. Team members:______________, ______________ Date:______________

2. Time survey started:____________ Time survey completed:____________

3. Survey meter/probel type:____

4. Survey Results:

Time	Location/Survey Pt.	Ht. Above Gnd.	Window-Open	Window-Closed

5. Air Samples:

Time	Location/Survey Pt.	Sample ID#	Time Start/End	Flowrate Start/End
			/	
			/	
			/	
			/	
			/	
			/	

6. Notes/Remarks:

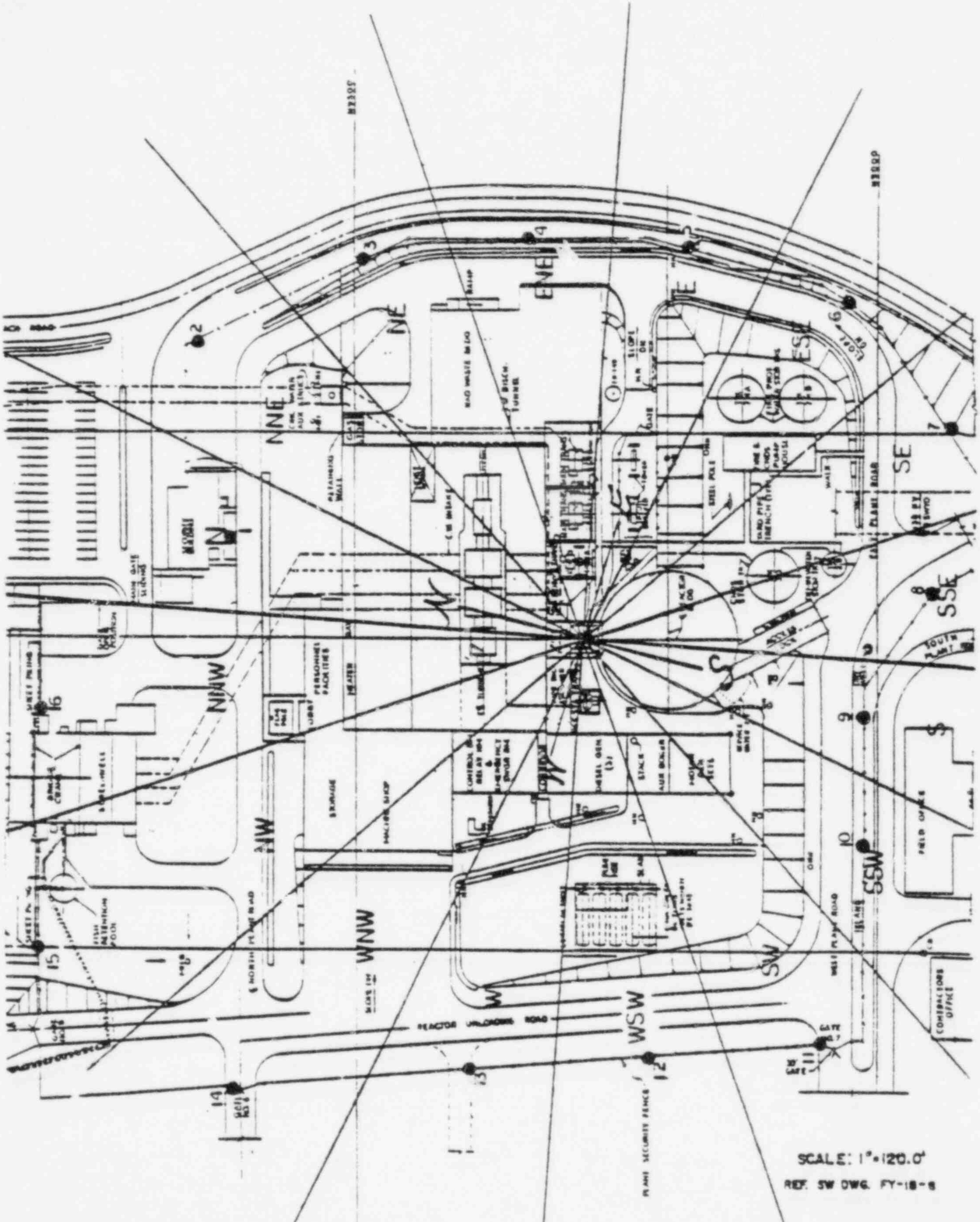
____

____

____

SPF 69.021.01-3 Rev. 0

ONSITE SURVEY MAP



Submitted: NJ DiMascio

Reviewed/OQA Engr.: Robert L. [illegible]

Approved/Plant Mgr.: J Riviello

MC-1

Attachment 4 - 13

SP Number: 69.020.01
Revision: 0
Date Eff. 7/09/82
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DOWNWIND SURVEYS

1.0 PURPOSE

To describe the procedures used by the Offsite Radiological Monitoring (ORM) teams to conduct downwind radiological surveys and samplings during an emergency.

2.0 RESPONSIBILITY

The Radiation Protection Manager (RPM)/ Radiological Control Manager (RCM), shall be responsible for ensuring compliance with this procedure.

3.0 DISCUSSION

3.1 Depending upon the class of emergency declared, the Radiation Protection Manager in the Technical Support Center (TSC) or the Radiological Control Manager in the Emergency Operations Facility (EOF), shall direct the activities of the Offsite Radiological Monitoring (ORM) teams. At the ALERT level class, the TSC is activated and RPM will direct any ORM teams dispatched. The RPM will continue to have command of the ORM teams until notified by the RCM that the EOF is activated, (usually Site Area and General classes of Emergency) at that time, the RCM is ready to assume control of offsite monitoring activites.

3.2 There are five major reasons for sending out an ORM team; it may be any one, or any combination, of the following:

3.2.1 To provide or confirm radiological EAL data at the appropriate site boundary.

3.2.2 To track down or verify the location, size and direction of a radioactive plume if there has been an airborne release.

3.2.3 To provide or confirm dose or exposure rates inside the plume exposure zone, which are needed by the Dose Assessment Group for protective action recommendations.

NOTE: Dose or exposure rates include whole-body and inhalation (thyroid), at the plume centerline and the plume boundaries.

3.2.4 To provide samples (air, soil, vegetation, etc.) taken from within the plume exposure zone, which will enable the Rad/Chem Lab staff to determine the plume composition and hence aid them in the further analysis of the release characteristics.

3.2.5 To check surface contamination, if any, that is above acceptable limits, due to fallout or precipitation from the plume within the plume exposure zone, for exposure control and recovery planning.

3.2 Staffing and emergency organization are such that one ORM team shall be available at ALERT level and two more available at SITE AREA or GENERAL EMERGENCY level.

3.3 When and where to send an ORM team is important. Selection of survey and sampling locations should consider the prevailing wind speed, and the estimated time of plume arrival over the selected area vs ORM team travel time.

NOTE: Routes planned for the team should avoid those utilized for planned or effected evacuation.

3.4 If extended duty for survey teams is anticipated, the Dispatcher should consider and coordinate efforts to relieve field teams at reasonable

intervals. He may also decide to dispatch personnel to meet a team in the field to:

3.4.1 Retrieve air or other environmental samples for detailed and timely lab isotopic analysis, and/or:

3.4.2 Replenish the teams with needed fresh supplies while keeping them in a mobile, field position.

3.5 For SITE AREA and GENERAL EMERGENCIES, at leaste one ORM team must be deployed within 6Ø minutes of the emergency declaration.

3.6 <u>Summary of Overall Sequence of Actions</u>

3.6.1 <u>Dispatch from TSC:</u>

3.6.1.1 RPM/designee issues an ORM request to the Dispatcher.

3.6.1.2 The Dispatcher at TSC calls the OSC Supervisor for manpower/team assignment.

3.6.1.3 After having received a radio from OSC Supervisor, the team reports to the TSC for briefing with the dispatcher.

3.6.1.4 After briefing, team members pick up equipment at the Main Security Bldg. and perform pre-deployment check of equipment and vehicle.

3.6.1.5 Before departure, ORM team establish radio communication with the Dispatcher and proceed according to preplanned routes to the survey area.

3.6.1.6 At preselected locations offsite, the ORM team performs survey and sampling as required.

3.6.1.7 Upon termination of mission, the ORM team returns to the site to submit survey records to the Dispatcher and turn in samples to the Rad/Chem Lab., check for equipment contamination and take note of individual exposure records.

3.6.2 <u>Dispatch from EOF:</u>

3.6.2.1 RCM/designee issues an ORM request to the dispatcher.

3.6.2.2 The Dispatcher at EOF calls available manpower for team assignment.

3.6.2.3 The team reports to the EOF for briefing with the Dispatcher.

3.6.2.4 After briefing, team members pick up equipment at the EOF and perform pre-deployment check of equipment and vehicles.

3.6.2.5 Before departure, team establishes radio communication with the Dispatcher and then proceeds according to preplanned routes to the survey areas.

3.6.2.6 At preselected locations offsite, the ORM team performs survey and sampling as required.

3.6.2.7 Upon termination of mission, the ORM team returns to the site, or EOF, to submit survey records to the Dispatcher and turn in samples to the Rad/Chem Lab, check for equipment contamination and take note of individual exposure records.

3.7 Topics covered in this procedure:

4.0 PRECAUTIONS

N/A

5.0 PREREQUISITES

5.1 An ALERT or higher Emergency Classification has been reached and an ORM request has been issued by the RPM/RCM.

5.2 The Dispatcher has gathered the necessary information to brief the ORM team (ORM Briefing Form, Appendix 12.1 and Offsite Survey Map).

6.0 LIMITATION AND ACTIONS

6.1 Site-responsible ORM activities are generally limited to within the 10 mile Emergency Planning Zone.

7.0 MATERIAL AND EQUIPMENT

7.1 Offsite Radiological Monitoring (ORM) Kit

8.0 PROCEDURE

8.1 RPM/Designee Actions

8.1.1 Check that Prerequisites 5.1 and 5.2 are met. If no Dispatcher is on duty, assign one. Dose Assessment Staff #1 n lly will be designated as the Dispatcher.

8.1.2 Contact OSC Supervisor for formation of an ORM team, and have team members assemble at the TSC for briefing. Team should obtain a radio from the OSC Supervisor prior to the briefing.

8.2 RCM/Designee Actions

8.2.1 If ORM activities are initiated at the EOF, perform Step 8.1.1 above and form an ORM team at the EOF.

8.3 ORM Dispatcher Actions

8.3.1 Complete Appendix 12.1 to the fullest extent possible. (See 8.3.4, 8.3.5 and 8.3.6).

8.3.2 On the Offsite Survey Map, outline a route to be followed by the team. An Offsite Survey Map for the team is located both in the company vehicle and ORM Kit.

8.3.3 Brief the team according to Appendix 12.1. Describe the release situation and types of survey/sampling desired over the survey area.

8.3.4 Protective Equipment

.1 Instruct team members to put on Full-face Mask when projected I-131 concentrations at downwind survey locations exceed 3×10^{-7} µCi/cc.

NOTE: For ORM activities near the site boundary, use Full-face Mask protection for all emergencies where an airborne release is know to have happened or is impending.

.2 For additional protection against thyroid exposure to radioiodines, execute SP 69.Ø51.Ø1, Thyroid Blocking, when either one of the following conditions is met, to determine whether there is a need for KI administration:

a. When a General Emergency is declared based upon exceeding radiological EAL's.

b. When projected downwind survey area I-131 concentration is 3×10^{-6} µCi/cc or greater.

.3 Consider donning of Hoods, Booties, Coveralls, and Gloves when airborne release occurs with precipitations. Use judgement in other cases.

8.3.5 Personnel Dose Limits

If for any reason normal health physics exposure limits described in SP 61.Ø12.Ø1, Personnel Dose Limits and Guides must be raised for survey team members, refer to SP 69.Ø5Ø.Ø1, Radiation Doses During An Emergency, for authorization and limits.

8.3.6 Communications

.1 Make sure the team has obtained a radio from the OSC Supervisor and has a designated channel to be used.

.2 Remind team to radio in prior to departure to report team color code ID (from the ORM Kit).

.3 ORM Dispatcher, use the following in radio communication to identify self:

At TSC: "Shoreham Dispatcher TSC"
At EOF: "Shoreham Dispatcher EOF"

8.3.7 After the briefing, designate a company vehicle for the team and provide the key or keys.

8.4 ORM Team Members - Equipment Check

8.4.1 ORM Tech. (Team Leader)

ORM Tech. has the responsibility of operating the Survey and Sampling equipment to obtain required results.

8.4.2 ORM Asst. (Team Member)

ORM Asst. has the responsibility of driving, logging results, and radio communication. Give assistance to the ORM Tech. when situation requires.

8.4.3 Ensure that survey points and routes to be taken as well as all needed information on Appendix 12.1 is filled out. Locations of survey points are both in the company vehicle and ORM Kit.

8.4.4 Proceed to the Main Security Building/EOF to sign out an ORM Kit.

8.4.5 Replenish any missing items from the inventory list. Install batteries if necessary. Perform source checks to observe proper meter response. Check equipment calibration stickers.

8.4.6 Use an AC source to check the TCS EAS-1 Air Sampler motor. Do not put on the filter canister.

8.4.7 Log pre-survey pocket dosimeter readings on Appendix 12.1.

8.4.8 Don protective clothing and dosimeters as required.

8.4.9 Proceed to the survey vehicle. Check for gas, cigarette lighter socket, lights, and operability. Start the engine and with it on, plug in the cable of the TCS EAS-1 Air Sampler (w/o the filter) and observe proper running (it should sound like a small vacuum cleaner). If airborne release has occurred, check outside of vehicle for possible contamination (see 8.8.3).

8.4.10 ORM Asst., establish radio communication with the Dispatcher, report the Teams's ID (color code on the ORM Kit picked up) and that the team is ready.

8.5 ORM Team - Survey

8.5.1 Proceed to the survey point using Offsite Survey Map.

8.5.2 While enroute: keep the RM-14 with HP-27Ø probe on and begin recording periodic readings of 1 mR/hr or greater on Appendix 12.3. (Assign a number to such non-fixed points sequentially, mark the location and exposure rate reading on the map, then enter the point number assigned and the exposure rate on Appendix 12.3.

NOTE: Report any abnormal events or conditions to the Dispatcher via radio.

8.5.3 Upon arrival at selected survey points, report to the Dispatcher with time and survey point number.

8.5.4 If plume tracking is not required, proceed to Step 8.5.7.

8.5.5 If "Plume Center Exp/Dose Rates & Location" (item 10 on Appendix 12.1) is checked, continue driving until the dose rate (open-window) appears to peak and begins to decrease. Return to the peak concentration area.

8.5.6 Report the maximum plume W.B. dose rate measured at 3 feet above the ground and the measurement location to the Dispatcher immediately, and mark this location on the map as well.

8.5.7 At the first survey location, obtain gamma measurements (closed-window) at 3 inches and 3 feet above the ground, and record these readings on Appendix 12.3.

.1 If the 3 feet reading is noticeably higher than the 3 inch reading, it should be assumed that the predominant gamma source is the airborne plume.

.2 If readings increase with decreasing height above the ground, assume that source is on the surface. In this case, take several smear samples (with gloves) of the ground, and/or a soil sample when conditions permit.

.3 Use a plastic bag for the soil sample and fill out a label to tag the bag. Label the envelopes for the smears with proper ID information.

.4 Periodically check beta reading at 3 inches and 3 feet above ground with probe window open. Record any readings significantly different from the window-closed readings.

8.6 ORM Team - Air Sampling

8.6.1 Obtain an air sample in center of the plume or at the fixed survey point as required (Appendix 12.1, item 10).

8.6.2 Leaving the vehicle engine running, plug in the TCS EAS-1 Air Sampler and run it for about 1/2 minute warm-up period without the filter/canister.

8.6.3 Pry open the quart can containing the canister. If the moisture check dot inside the can is not blue, replace lid and open another. Turn off the warmed up sampler and center the canister over the suction opening on the side of the sampler. Stretch the elastic retainer over the outer end of the canister and make sure the fit is tight.

8.6.4 Sampler should be placed or held about 4 feet above the ground away from the vehicle exhaust pipe.

NOTE: The ORM vans are equipped with a slide mount for the TCS Air Sampler to allow sampling from inside the van.

8.6.5 Set the timer for 5 minutes and adjust the flow rate to 5 CFM. Use a stop watch to verify run time is 5 minutes + 6 seconds.

8.6.6 When the air sample is completed, carefully remove the canister from the sampler and put it in a plastic bag. Avoid contacting the white filter cloth outside around the bare filter. Record start/stop times and flow rates on Appendix 12.3.

8.6.7 Connect the brass-shell GM-1 probe with a cable to the RM-14 count rate meter "DETECTOR" input BNC. Switch "RESPONSE" to "SLOW". In this position, allow 2Ø seconds meter response time at each measurement.

8.6.8 Using the above setup, measure the background at 4 feet above the ground or inside the vehicle. Record this background cpm on Appendix 12.3.

8.6.9 Insert the GM-1 probe into the center hole of the canister and downscale the RM-14 as necessary. Record the stabilized filter/canister reading (cpm) on Appendix 12.3. Remove the GM-1 probe.

8.6.10 Carefully remove the white fiber cloth which is wrapped around the canister by pulling down the red tape. Hold the canister in the plastic bag while doing this to avoid contacting the cloth, and to prevent silver gel crystal bits from falling out after the cloth wrapping is removed. Return the fiber cloth to the quart can.

8.6.11 Insert the GM-1 probe into the center hole of the canister and record the stabilized bare cannister reading and time of measurement on Apendix 12.3.

8.6.12 Place the bare canister with the plastic bag into the quart can. Put a label marked with the proper time, date, and sample # information on the sealed can. Air sample #'s should be assigned sequentially.

8.6.13 Report the information on Appendix 12.3 to the Dispatcher by radio.

8.6.14 If plume tracking is not required, go to Step 8.7.1 below. Otherwise, continue to drive through the plume and identify the other boundary of the plume (exposure rate, window open, at approximately 1 mR/hr). At this boundary, record and report the exposure or dose rate measured, and the location, to the Dispatcher.

8.7 ORM Team - Continuation

8.7.1 Check personnel pocket dosimeter readings and number of canisters remaining before continuing on. Report any over-exposure or shortage.

8.7.2 Continue on to the next survey point as preplanned and repeat Steps 8.5 through 8.7 or as otherwise directed by the Dispatcher.

8.8 ORM Team - Conclusion of Survey

8.8.1 When all survey and sampling activities are completed and the team receives no further ORM request through the Dispatcher, or the team is relieved by a second team, conclude the mission and return to the station unless instructed otherwise by the Dispatcher.

NOTE: If team is to return to EOF, request suitable locations to perform Steps 8.8.2 through 8.8.7, and report back to the RCM instead of the OSC Supervisor.

8.8.2 Upon arrival, notify the Dispatcher and take the site access road near the LILCO 69KV substation. Stop before the substation and perform a contamination check of the vehicle (inside and outside) using the RM-14/HP-21Ø.

8.8.3 If gross beta and gamma counts exceed 5Ø cpm above background, call in and wait for decontamination or other instructions/assistance from the Dispatcher (Reference SP 69.Ø3Ø.Ø1, Contamination Control During Emergencies).

8.8.4 If vehicle checks out clean, remove protective clothing and return to the Main Security Building.

8.8.5 Bag clothing, used masks and equipment suspected of being contaminated. Replenish ORM Kit items and return it in ready-to-use condition.

8.8.6 Frisk out each other using the RM-14/HP-21Ø. Frisk samples brought back to check for unusually high deposits before transporting to Rad/Chem Lab area for analysis.

8.8.7 Send all samples and bagged items in 8.8.5 to the Rad/Chem Lab.

8.8.8 Record post-survey dosimeter readings on Appendix 12.1, and send all records and data sheets to the Dispatcher.

8.8.9 Report back to the OSC Supervisor. Mission completed.

9.0 ACCEPTANCE CRITERIA

N/A

10.0 FINAL CONDITIONS

10.1 The Dispatcher shall examine all records and data sheets turned in by the team, make copies of those needed for dose assessment activities and forward all records to the Administrative Section for filing in accordance with permanent plant procedures.

10.2 Rad/Chem Lab and Health Physics: All field samples and contaminated clothing and equipment should be disposed of or decontaminated according to regular plant procedures.

11.0 REFERENCE

11.1 LILCO Shoreham Nuclear Power Station Emergency Plan

11.2 SP 69.Ø5Ø.Ø1, Radiation Doses During An Emergency

11.3 SP 69.Ø3Ø.Ø3, Contamination Control During Emergencies

11.4 SP 69.Ø51.Ø1, Thyroid Blocking

11.5 SP 61.Ø12.Ø1, Personnel Dose Limits and Guides

12.0 APPENDICES

12.1 Offsite Radiological Monitoring (ORM) Briefing Form, SPF69.020.01-1

12.2 Offsite Radiological Monitoring (ORM) Kit Inventory

12.3 Offsite Radiological Monitoring (ORM) Data Sheet, SPF 69.020.01-2

OFF-SITE RADIOLOGICAL MONITORING (ORM) BRIEFING FORM

1. Date:__________ Time:__________ Briefing at:__________

2. Survey requested by:__________ Briefed by:__________

3. ORM Dispatcher:__________ Back-up Tel #:__________

4. Team Radio Ch:__________ Team ID: "Shoreham__________"

5. Alternate Communication Tel. #:
   RPM-TSC:__________ RCM-EOF:__________ CONTROL RM:__________

6. a. Primary Downwind Sector:__________ Adjacent Sectors:__________,__________

   b. ORM/Survey Locations/Points:__________

7. Projected WB dose rates at survey area (if available):

   At ORM Pt__________ Sector__________ Dist__________mi, D/R__________mr/hr
   At ORM Pt__________ Sector__________ Dist__________mi, D/R__________mr/hr
   At ORM Pt__________ Sector__________ Dist__________mi, D/R__________mr/hr

8. Team member names and authorized doses (rem):

   ORM Tech:__________, dose__________rem
   ORM Tech:__________, dose__________rem

9. Protective Equipment (check applicable):

   (1) __________Dosimeters (200 mR & 5R)   (5) __________Glove   Other__________
   (2) __________TLD (WB)   (6) __________Bootie   __________
   (3) __________F.F. Maks w I/P Canister   (7) __________KI   __________
   (4) __________Coverall   (8) __________Hood   __________

10. ORM data to be collected:

    (1) __________Plume Center Exp./Dose Rates & Location
    (2) __________Plume Center Air I/P Sample
    (3) __________Plume Boundaries down to 1 mR/hr
    (4) __________Other (Specify)__________

11. Team dosimeter readings (Before/After Mission):

    ORM Tech. (200 mR Scale) ____/____: (5R Scale) ____/____
    ORM Asst. (200 mR Scale) ____/____: (5R Scale) ____/____

12. Special Instructions:__________

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OFF-SITE RADIOLOGICAL MONITORING (ORM) KIT INVENTORY

1. (1) Eberline RO-2A
2. (1) Eberline RM-14 w/HP-270 Probe
3. (1) Eberline RM-14 w/HP-210 Probe
4. (1) TCS EAS-1 Air Sampler w/one GM-1 Probe and 3 Canisters
5. (6) Spare TCS Air Sampling Canisters
6. (1) Shield Assy w/SH-4 Sample Holder
7. (100) Smears and Envelopes
8. (50) Plastic Sample Bags with Labels
9. (1) Check Source
10. (2) Flashlight w/Spare Bulb
11. (1) Portable 2-Way Radio (in Survey Van)
12. (1) Roll of Dimes, 50 per Roll
13. (1) Roll of Masking Tape
14. (1) Clipboard with:
    - a. This Procedure
    - b. Completed ORM Briefing Form
    - c. Survey Locations Diagram (Map)
    - d. (5) ORM Data Sheets (Blank)
    - e. (2) Writing/Marking Pens
15. Protective Equipment:
    - a. (2) 0-200 mR, (2) 0-5R Pocket Dosimeters
    - b. (2) Personnel TLD, (1) Control TLD
    - c. (1) DRD Dosimeter Charger
    - d. (2) F.F. Ultraview Mask w I/P Filter Canister
    - e. (1) Vial of KI
    - f. Protective Clothing, 2 each, of;
        - Coveralls
        - Pairs of Gloves w/Liners
        - Pairs of Booties
        - Hoods
16. Environmental Station:
    - (1) Key
    - (2) Replacement TLD
17. Spare Batteries, 4 each, of;
    - AA Size
    - A Size
    - B Size
    - C Size
    - D Size

OFF-SITE RADIOLOGICAL MONITORING (ORM) DATA SHEET

1. Team Members: ____________________, ____________________ Date: __________

2. _____ __________ Time Dispatched ______________ Time Returned

3. Air Sample Data

AIR SAMPLE #: ____________

Location (Mark Map) ____________
Canister # ____________
Time: Start/Stop ______/______
Flow Rate: Start/Stop ______/______
Background (cpm) ____________
Filter/Canister Reading (cpm) ____________
Bare Canister Reading (cpm) ____________
Time of Measurement (24 hr clock) ______
*REPORT ALL VALUES TO THE DISPATCHER

AIR SAMPLE #: ____________

Location (Mark Map) ____________
Canister # ____________
Time : Start/Stop ______/______
Flow Rate: Start/Stop ______/______
Background (cpm) ____________
Filter/Canister Reading (cpm) ____________
Bare Canister Reading (cpm) ____________
Time of Measurement (24 hr clock) ______
*REPORT ALL VALUES TO THE DISPATCHER

AIR SAMPLE #: ____________

Location (Mark Map) ____________
Canister # ____________
Time: Start/Stop ______/______
Flow Rate: Start/Stop ______/______
Background (cpm) ____________
Filter/Canister Reading (cpm) ____________
Bare Canister Reading (cpm) ____________
Time of Measurement (24 hr clock) ______
*REPORT ALL VALUES TO THE DISPATCHER

4. Dose Rate Measurements

Survey Point	O W Exp. Rate (mR/hr)	C W Exp. Rate (mR/hr)	HT. above grnd

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Attachment 4 - 14

MC-1

Submitted: NJ DiMascio

Reviewed/OQA Engr. Robert L. Llewer

Approved/Plant Mgr.: J. Riccelli

SP Number 69.Ø26.Ø1
Revision: Ø
Date Eff.: 7/09/82
TPC
TPC
TPC

PROTECTIVE ACTION RECOMMENDATIONS

1.0 PURPOSE

This procedure provides guidelines for determining protective action recommendations to be given to offsite authorities.

2.0 RESPONSIBILITY

The Radiological Control Manager, Radiation Protection Manager or In-plant Radiation Monitoring Technician is responsible for ensuring compliance with this procedure.

3.0 DISCUSSION

3.1 The decision process used in determining a recommended protective action is based upon a number of factors. These factors are: release duration; magnitude of release; plume travel time; evacuation time estimates; dilution factors; shelter factors; dose limits; and dose savings.

3.2 After determining a protective action, the Response Manager/Emergency Director will give approval to such an action before it is recommended to offsite authorities.

3.3 Radiological Control Manager/Radiation Protection Manager or his staff may be available to perform this procedure for different distances used in SP69.Ø22.Ø1 Determination of Offsite Doses. This procedure explains the methodology for determining protective actions for points sequentially.

3.4 Topics covered in this procedure include:

4.0 PRECAUTIONS

Because protective action recommendations could be influenced by factors not considered here, use this procedure with common sense and judgement.

5.0 PREREQUISITES

SP69.Ø22.Ø1, Determination of Offsite Doses and/or SP69.Ø24.Ø1, Waterborne Release Dose Projection have been initiated.

6.0 LIMITATIONS AND ACTIONS

The Emergency Director/Response Manager must approve of a protective action before it is given to offsite authorities.

7.0 MATERIALS AND EQUIPMENT

N/A

8.0 PROCEDURE

8.1 Waterborne Protective Actions

8.1.1 Dose Assessment Staff Member or In-plant Radiation Monitoring Technician, perform the following:

8.1.1.1 Compare projected swimming (whole body and skin) and boating doses obtained from SP 69.Ø24.Ø1, Waterborne Release Dose Projection with the Waterborne Protective Action Guidance Chart (Appendix 12.1).

8.1.1.2 After consultation with the Radiation Protection Manager /Radiological Control Manager (if available), give the filled out worksheets (Appendix 12.1 and SPF 69.Ø24.Ø1-1) to the Emergency Director/Response Manager for subsequent approval and transmission to offsite authorities in accordance with SP69.ØØ9.Ø1, Notifications.

8.2 Airborne Protective Actions

8.2.1 Dose Assessment Staff Member or In-plant Radiation Monitoring Technician, complete the Airborne Protective Action Guide Worksheet (Appendix 12.2) as follows:

8.2.1.1 Obtain distance (item 1a), direction and affected downwind sector (item 1b), expected release duration (item 2), ground or elevated windspeed (item 3) and projected doses (item 10) from SP69.Ø22.Ø1, Determination of Offsite Doses.

8.2.1.2 Using the distance (item 1a), the affected downwind sector (item 1b) along with the Protective Action Map (Appendix 12.5) determine the zone (item 1c).

8.2.1.3 Calculate the plume travel time (item 4).

8.2.1.4 Contact the Control Room and determine the time the release started (item 5b) or the time the release is expected to start (item 5g).

8.2.1.5 Enter the current time (item 5c or item 5h) and complete the remaining items (either items 5d-e or 5i-j) for the appropriate situation.

8.2.1.6 Determine the prevailing weather conditions and circle this in item 6. Adverse weather consists of conditions which will significantly reduce traffic speeds, such as rain or light snow. If severe weather (e.g., flooding or blizzard) conditions exist a separate evacuation time will have to be estimated.

8.2.1.7 Determine the evacuation time and record this in item 7. The evacuation time is found by turning to the correct table of Appendix 12.3 for the prevailing weather conditions (items 6a and 6b). Then with the affected downwind sector (item 1b), find the left most value that contains the zone (item 1c) and pick the evacuation time for either day or night (item 6c) conditions.

8.2.1.8 Complete items 8 and 9 to determine the time a person evacuating will be exposed to the plume (evacuation exposure period).

8.2.1.9 If field monitoring teams are deployed near the area of concern, record the whole body dose rate and thyroid dose commitment values in item 11.

NOTE: Thyroid dose commitment is obtained by converting air sampler cpm readings by use of SP69.Ø23.Ø1, Thyroid Dose Commitment using the TCS Sampler.

8.2.1.10 Determine most reliable projected dose (item 12) based upon reliability of field team measurements (if available). Record the projected dose (item 12) on SPF69.Ø22.Ø1-2 Tabulated Dose and Protective Action Worksheet.

8.2.1.11 Complete items 13-15, and circle the higher recommended protective action for item 16. Record these on the Tabulated Dose and Protective Action Worksheet SPF69.Ø22.Ø1-2.

8.2.1.12 Record the protective action on the Protective Action Map (Appendix 12.5).

8.2.1.13 Repeat this procedure for other distances used in SP69.Ø22.Ø1 Determination of Offsite Doses

.1 Consider recommending the same protective action for adjacent zones.

.2 Consider recommending the same protective action for adjacent zones as distance from the plant increases.

8.2.1.14 After consultation with the Radiation Protection Manager/Radiological Control Manager (if available) give the completed worksheets (Appendix 12.5 and SPF 69.Ø22.Ø1-2) to the Emergency Director/Response Manager for subsequent approval and transmission to offsite authorities in accordance with SP69.ØØ9.Ø1 Notifications.

9.0 ACCEPTANCE CRITERIA

N/A

10.0 FINAL CONDITIONS

A protective action recommendation has been determined and approved by the Emergency Director/Response Manager.

11.0 REFERENCES

11.1 Shoreham Nuclear Power Station Emergency Plan

11.2 SP69.Ø22.Ø1, Determination of Offsite Doses

11.3 SP69.Ø24.Ø1, Waterborne Release Dose Projection

11.4 SP69.Ø23.Ø1, Thyroid Dose Commitment using the TCS Air Sampler

11.5 SP69.ØØ9.Ø1, Notifications

12.0 APPENDICES

12.1 Waterborne Protective Action Guidance Chart

12.2 Airborne Protective Action Guide Worksheet, SPF69.Ø26.Ø1-1

12.3 Evacuation Times by Wind Direction

12.4 Shielding Factors from a Gamma Cloud Source

12.5 Thyroid and Whole Body Guidance Charts

12.6 Protective Action Map, SPF69.Ø26.Ø1-2

WATERBORNE PROTECTIVE ACTION GUIDANCE CHART

IF	THEN
Projected whole body or skin dose due to swimming is equal to or greater than 1 rem.	Instruct the U.S. Coast Guard to remove all swimmers within a 1 mile distance of the plant
Projected whole body dose due to boating is equal to or greater than 1 rem.	Instruct the U.S. Coast Guard to evacuate all boats and vessels within a 1 mile distance of the plant

AIRBORNE PROTECTION ACTION GUIDE WORKSHEET

1. Area of Concern

   a. Distance ________miles (from SP69.022.01)
   b. Direction ________degrees, Affected Downwind Sector____(from SP69.022.01)
   c. Zone ________(A-S, from Appendix 12.6)

2. Expected release duration__________hrs (from SP69.022.01)

3. Windspeed ________________miles/hr (from SP69.022.01)

   NOTE: For ground releases use 33 ft. windspeed; for elevated releases use 150 ft. windspeed.

4. Plume travel time = item la/item 3

   = ____________ / __________ = ___ _____hours

5. Time until exposure begins (choose a or f)

   a. If release has begun:

      b. Time release has started_________(use 24 hour clock)
      c. Time of calculation__________(use 24 hours clock)
      d. Time difference = item 5c - item 5b = __________hrs.
      e. Time = item 4 - item 5d = ____________hrs.

      NOTE: If item 5e is a negative number, enter zero hours.

   f. If release will begin later:

      g. Time release is expected to start__________(use 24 hour clock)
      h. Time of calculation_________ (use 24 hr clock)
      i. Time difference = item 5g - item 5h = __________hrs.
      j. Time = item 4 + item 5i = __________hrs.

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6. Weather condition and season (circle one for a,b and c):

   a. Ideal Adverse Severe
   b. Seasonal Non-Seasonal
   c. Day Night

7. Evacuation time:

   Use Appendix 12.3 along with information recorded in items 1 and 6 to determine the evacuation time. See procedure Step 8.2.1.7.

   Evacuation time _____hrs.

8. Exposure time = item 7 - (item 5a or 5f)

   = __________ - __________ = __________hrs.

   NOTE: If item 8 is negative, enter zero hours.

9. Evacuation Exposure Period:

   Smaller of item 8 or item 2: __________hrs.

	THYROID	WHOLE BODY
10. Projected Dose (from SP69.Ø22.Ø1)	10.________rem	10.________rem
11. Measured dose from field monitoring teams (if applicable):		
Monitoring Team Dose Rate X item 2		
______rem/hr WB x _______hrs.		11.________rem
Thyroid Dose Commitment from TCS Air Sampler (from SP69.Ø23.Ø1)	11.________rem	

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		THYROID	WHOLE BODY
*12.	Most reliable projected dose (item 10 or 11)	12._______rem	12._______rem

*13. Evacuation Dose

item 9 x item 12/item 2

_____ x _____ / ____(Thy.) 13._______rem

_____ x _____ / ____(WB) 13._______rem

*14. Shelter Dose

Thyroid (a or b)

a. For item 2 less than or equal to 2 hours

item 12 x 0.33 = ________ x 0.33

b. For item 2 greater than 2 hours

item 12 x (1 - 1.34/item 2)

_______ x (1 - 1.34/____)

14._______rem
(a or b)

Whole Body

Item 12 x Structural Shielding Factor
(Appendix 12.4)

________ x _________ 14._______rem

*Record these valves on SPF 69.Ø22.Ø1-2

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	THYROID	WHOLE BODY
*15. Refer to the Thyroid and Whole Body Guidance Charts (Appendix 12.5) and Circle the appropriate action for each	No Action	No Action
	Shelter	Shelter
	Evacuate	Evacuate

*16. Protective Action Recommendation (Circle One)

No Action   Shelter   Evacuate

17. Indicate item 16 on the Protective Action Map (Appendix 12.6) for the affected zone

* Record these valves on SPF 69.Ø22.Ø1-2

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EVACUATION TIMES BY WIND DIRECTION

SEASONAL (IDEAL CONDITIONS)

	0-2 MILES			0-5 MILES			0-10 MILES		
WIND DIRECTION (toward)	ZONE(S)	WEEK DAY	WEEK NIGHT	ZONES	WEEK DAY	WEEK NIGHT	ZONES	WEEK DAY	WEEK NIGHT
W by WNW	A	2.25	2.25	AF	5.08	5.08	AFKQ	5.58	5.58
W	A	2.25	2.25	AFG	5.08	5.08	AFGKQ	5.58	5.58
W by WSW	AB	2.50	2.50	ABFG	5.08	5.08	ABFGKQ	5.58	5.58
WSW	AB	2.50	2.50	ABFG	5.08	5.08	ABFGKQL	5.58	5.58
WSW by SW	AB	2.50	2.50	ABFG	5.08	5.08	ABFGKRL	5.17	5.17
SW	AB	2.50	2.50	ABG	3.00	3.00	ABGKRLM	4.33	4.33
SW by SSW	ABC	2.50	2.50	ABCGH	4.83	4.83	ABCGHKRLM	4.67	4.67
SSW	ABC	2.50	2.50	ABCGH	3.17	4.83	ABCGHRLMN	5.00	5.00
SSW by S	BC	2.42	2.42	BCGH	3.17	3.17	BCGHLMN	3.17	3.17
S	BC	2.42	2.42	BCGHI	3.17	3.17	BCGHIMNO	3.67	3.17
S by SSE	CD	2.17	2.17	CDHI	3.17	2.67	CDHIMNO	3.67	2.75
SSE	CD	2.17	2.17	CDHI	3.17	2.67	CDHINO	3.67	2.75
SSE by SE	CD	2.17	2.17	CDHI	3.17	2.67	CDHINO	3.67	2.75
SE	CDE	2.25	2.25	CDEIJ	4.67	4.08	CDEIJOS	4.67	3.83
SE by ESE	CDE	2.25	2.25	CDEIJ	4.67	4.08	CDEIJOPS	4.67	3.83
ESE	CDE	2.25	2.25	CDEIJ	4.67	4.08	CDEIJOPS	4.67	3.83
ESE by E	DE	2.17	2.17	DEIJ	4.67	4.08	DEIJOPS	4.67	3.83
E	E	2.00	2.00	EJ	4.00	3.33	EJOPS	4.08	.33
E by ENE	E	2.00	2.00	EJ	4.00	3.33	EJP	4.08	3.33
NO WIND	ABCDE	2.50	2.50	N/A			N/A		

TIMES ARE EXPRESSED IN HOURS AND INCLUDE 20 MIN. FOR MOBILIZATION

EVACUATION TIMES BY WIND DIRECTION

NON-SEASONAL (IDEAL CONDITIONS)

	0-2 MILES			0-5 MILES			0-10 MILES		
WIND DIRECTION (toward)	ZONE(S)	WEEK DAY	WEEK NIGHT	ZONES	WEEK DAY	WEEK NIGHT	ZONES	WEEK DAY	WEEK NIGHT
W by WNW	A	1.83	1.83	AF	4.75	4.75	AFKQ	5.33	5.33
W	A	1.83	1.83	AFG	4.75	4.75	AFGKQ	5.33	5.33
W by WSW	AB	2.50	2.50	ABFG	4.75	4.75	ABFGKQ	5.33	5.33
WSW	AB	2.50	2.50	ABFG	4.75	4.75	ABFGKQL	5.33	5.33
WSW by SW	AB	2.50	2.50	ABFG	4.75	4.75	ABFGKRL	4.92	4.92
SW	AB	2.50	2.50	ABG	3.00	3.00	ABGKRLM	3.92	3.92
SW by SSW	ABC	2.50	2.50	ABCGH	4.58	4.33	ABCGHKRLM	4.17	4.17
SSW	ABC	2.50	2.50	ABCGH	4.58	4.33	ABCGHRLMN	4.58	4.58
SSW by S	BC	2.42	2.42	BCGH	3.17	3.17	BCGHLMN	3.17	3.17
S	BC	2.42	2.42	BCGHI	3.17	3.17	BCGHIMNO	3.17	3.17
S by SSE	CD	1.33	1.33	CDHI	2.33	1.75	CDHIMNO	2.83	2.25
SSE	CD	1.33	1.33	CDHI	2.33	1.75	CDHINO	2.83	2.25
SSE by SE	CD	1.33	1.33	CDHI	2.33	1.75	CDHINO	2.83	2.25
SE	CDE	1.67	1.67	CDEIJ	2.83	2.83	CDEIJOS	2.83	2.83
SE by ESE	CDE	1.67	1.67	CDEIJ	2.83	2.83	CDEIJOPS	2.83	2.83
ESE	CDE	1.67	1.67	CDEIJ	2.83	2.83	CDEIJOPS	2.83	2.83
ESE by E	DE	1.67	1.67	DEIJ	2.83	2.83	DEIJOPS	2.83	2.83
E	E	1.50	1.50	EJ	2.33	2.33	EJOPS	2.33	2.33
E by ENE	E	1.50	1.50	EJ	2.33	2.33	EJP	2.33	2.33
NO WIND	ABCDE	2.50	2.50	N/A			N/A		

TIMES ARE EXPRESSED IN HOURS AND INCLUDE 20 MIN. FOR MOBILIZATION

EVACUATION TIMES BY WIND DIRECTION

SEASONAL (ADVERSE CONDITION)

	0-2 MILES			0-5 MILES			0-10 MILES		
WIND DIRECTION (toward)	ZONE(S)	WEEK DAY	WEEK NIGHT	ZONES	WEEK DAY	WEEK NIGHT	ZONES	WEEK DAY	WEEK NIGHT
W by WNW	A	2.67	2.67	AF	6.08	6.08	AFKQ	6.67	6.67
W	A	2.67	2.67	AFQ	6.08	6.08	AFGKQ	6.67	6.67
W by WSW	AB	3.00	3.00	ABFQ	6.08	6.08	ABFGKQ	6.67	6.67
WSW	AB	3.00	3.00	ABFQ	6.08	6.08	ABFGKQL	6.67	6.67
WSW by SW	AB	3.00	3.00	ABFQ	6.08	6.08	ABFGKRL	6.17	6.17
SW	AB	3.00	3.00	ABQ	3.58	3.58	ABGKRLM	5.17	5.17
SW by SSW	ABC	3.00	3.00	ABCGH	5.75	5.75	ABCGHKRLM	5.58	5.58
SSW	ABC	3.00	3.00	ABCGH	5.75	5.75	ABCGHRLMN	6.00	6.00
SSW by S	BC	2.83	2.83	BCGH	3.75	3.75	BCGHLMN	3.75	3.75
S	BC	2.83	2.83	BCGHI	3.75	3.75	BCGHIMNO	4.33	3.75
S by SSE	CD	2.58	2.58	CDHI	3.75	3.17	CDHIMNO	4.33	3.25
SSE	CD	2.58	2.58	CDHI	3.75	3.17	CDHINO	4.33	3.25
SSE by SE	CD	2.58	2.58	CDHI	3.75	3.17	CDHINO	4.33	3.25
SE	CDE	2.67	2.67	CDEIJ	5.58	4.83	CDEIJOS	5.58	4.58
SE by ESE	CDE	2.67	2.67	CDEIJ	5.58	4.83	CDEIJOPS	5.58	4.58
ESE	CDE	2.67	2.67	CDEIJ	5.58	4.83	CDEIJOPS	5.58	4.58
ESE by E	DE	2.58	2.58	DEIJ	5.58	4.83	DEIJOPS	5.58	4.58
E	E	2.33	2.33	EJ	4.75	4.00	EJOPS	4.83	4.00
E by ENE	E	2.33	2.33	EJ	4.75	4.00	EJP	4.83	4.00
NO WIND	ABCDE	3.00	3.00	N/A			N/A		

TIMES ARE EXPRESSED IN HOURS AND INCLUDE 20 MIN. FOR MOBILIZATION

EVACUATION TIMES BY WIND DIRECTION

NON-SEASONAL (ADVERSE CONDITIONS)

WIND DIRECTION (toward)	0-2 MILES ZONE(S)	0-2 MILES WEEK DAY	0-2 MILES WEEK NIGHT	0-5 MILES ZONES	0-5 MILES WEEK DAY	0-5 MILES WEEK NIGHT	0-10 MILES ZONES	0-10 MILES WEEK DAY	0-10 MILES WEEK NIGHT
W by WNW	A	2.17	2.17	AF	5.67	5.67	AFKQ	6.33	6.33
W	A	2.17	2.17	AFG	5.67	5.67	AFGKQ	6.33	6.33
W by WSW	AB	3.00	3.00	ABFG	5.67	5.67	ABFGKQ	6.33	6.33
WSW	AB	3.00	3.00	ABFG	5.67	5.67	ABFGKQL	6.33	6.33
WSW by SW	AB	3.00	3.00	ABFG	5.67	5.67	ABFCKRL	5.83	5.83
SW	AB	3.00	3.00	ABG	3.58	3.58	ABGKRLM	4.67	4.67
SW by SSW	ABC	3.00	3.00	ABCGH	5.58	5.17	ABCGHKRLM	5.00	5.00
SSW	ABC	3.00	3.00	ABCGH	5.58	5.17	ABCGHRLMN	5.58	5.58
SSW by S	BC	2.83	2.83	BCGH	3.75	3.75	BCGHLMN	3.75	3.75
S	BC	2.83	2.83	BCGHI	3.75	3.75	BCGHIMNO	3.75	3.75
S by SSE	CD	1.58	1.58	CDHI	2.75	2.08	CDHIMNO	3.33	2.67
SSE	CD	1.58	1.58	CDHI	2.75	2.08	CDHINO	3.33	2.67
SSE by SE	CD	1.58	1.58	CDHI	2.75	2.08	CDHINO	3.33	2.67
SE	CDE	2.00	2.00	CDEIJ	3.33	3.33	CDEIJOS	3.33	3.33
SE by ESE	CDE	2.00	2.00	CDEIJ	3.33	3.33	CDEIJOPS	3.33	3.33
ESE	CDE	2.00	2.00	CDEIJ	3.33	3.33	CDEIJOPS	3.33	3.33
ESE by E	DE	2.00	2.00	DEIJ	3.33	3.33	DEIJOPS	3.33	3.33
E	E	1.75	1.75	EJ	2.75	2.75	EJOPS	2.75	2.75
E by ENE	E	1.75	1.75	EJ	2.75	2.75	EJP	2.75	2.75
NO WIND	ABCDE	3.00	3.00	N/A			N/A		

TIMES ARE EXPRESSED IN HOURS AND INCLUDE 20 MIN. FOR MOBILIZATION

REPRESENTATIVE SHIELDING FACTORS FROM GAMMA CLOUD SOURCE (1)

STRUCTURE OR LOCATION	SHIELDING FACTOR (a)	REPRESENTATIVE RANGE
Outside	1.0	---
Vehicles	1.0	---
Wood-frame house (b) (no basement)	0.9	---
Basement of wood house	0.6	0.1 to 0.7 (c)
Masonry house (no basement)	0.6	0.4 to 0.7 (c)
Basement of masonry house	0.4	0.1 to 0.5 (c)
Large office or industrial building	0.2	0.1 to 0.3 (c), (d)

(a) The ratio of the dose received inside the structure to the dose that would be received outside the structure.

(b) A wood frame house with brick or tone veneer is approximately equivalent to a masonry house for shielding purposes.

(c) This range is mainly due to different wall materials and different geometries.

(d) The shielding factor depends on where personnel are located within the building (e.g. the basement or an inside room).

(1) Ref: Sand 77-1725 (Unlimited Release)

THYROID GUIDANCE CHART

IF	THEN
Projected dose (Item 12) is less than 5 rem	No action
Shelter dose (Item 14) is less than 25 rem	Shelter* for children and women of childbearing age.
Shelter dose (Item 14) equal to or greater than 25 rem and evacuation dose (Item 13) equal to or greater than shelter dose.	Shelter*
Sheltr dose (Item 14) equal to or greater than 25 rem and evacuation dose (Item 13) less than shelter dose.	Evacuate

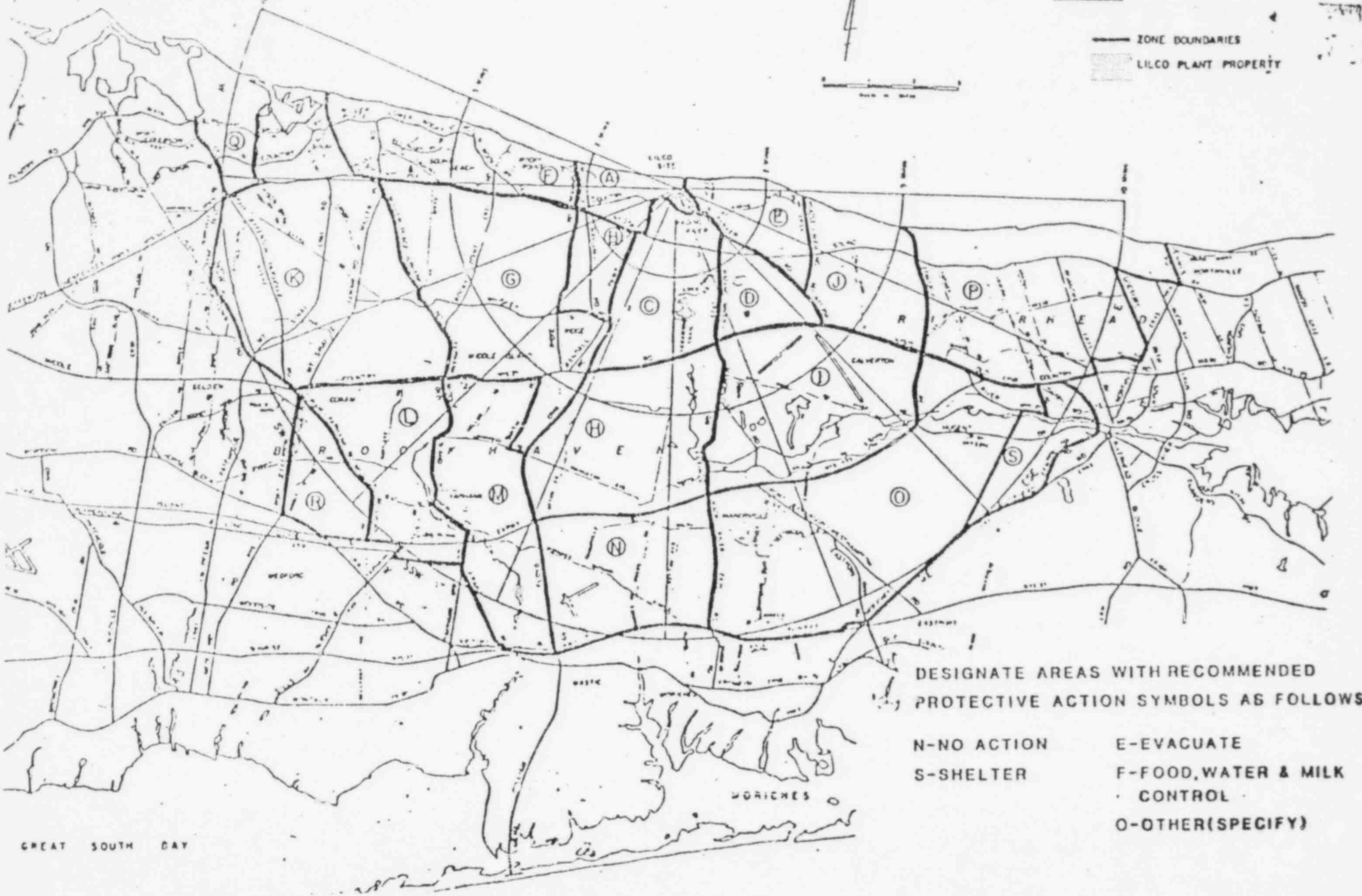
Shelter is to be with ventilation control. Ventilation control means turning off air conditioners or fans, closing doors and windows thus preventing access of outside air.

WHOLE BODY GUIDANCE CHART

IF	THEN
Projected dose (Item 12) less than 1 rem	No Action
Shelter dose (Item 14) less than 5 rem	Shelter*
Shelter dose (Item 14) equal to or greater than 5 rem and evacuation dose (Item 13) equal to or greater than shelter dose.	Shelter*
Shelter dose (Item 14) equal to or greater than 5 rem and evacuation dose (Item 13) less than shelter dose.	Evacuate

*Shelter is to be with ventilation control. Ventilation control means turning off air conditioners or fans, closing doors and windows thus preventing access of outside air.

PROTECTIVE ACTION MAP



DESIGNATE AREAS WITH RECOMMENDED PROTECTIVE ACTION SYMBOLS AS FOLLOWS:

N-NO ACTION

S-SHELTER

E-EVACUATE

F-FOOD, WATER & MILK CONTROL

O-OTHER(SPECIFY)

Submitted: [signature]

Reviewed/OQA Engr.: [signature]

Approved/Plant Mgr.: [signature]

Attachment 4 - 15

MC-1

SP Number 69.Ø23.Ø1
Revision Ø
Date Eff: 7/9/82
TPC
TPC
TPC

THYROID DOSE COMMITMENT USING TCS AIR SAMPLER

1.0 PURPOSE

The purpose of this procedure is to obtain a thyroid dose commitment value from field team survey results.

2.0 The Radiation Protection Manager/Radiological Control Manager is responsible for the implementation of this procedure.

3.0 DISCUSSION

3.1 This procedure is used to determine thyroid dose commitment from TCS air sampler measurements of airborne gross iodine samples taken by field survey teams.

3.2 Thyroid dose commitments is calculated by use of a nomogram once the following are known:

3.2.1 Filter/canister reading (cpm)

3.2.2 Bare canister reading (cpm)

3.2.3 Background reading (cpm)

3.2.4 Time of reactor shutdown (hrs)

3.2.5 Sample collection interval (min)

3.2.6 Duration of exposure (hrs)

3.2.7 Time of measurement (hrs)

3.2.8 Time of exposure (hrs)

3.3 Thyroid dose commitment is obtained from two components, gaseous and particulate iodine. In the accident case where core melt or fuel damage occurs, significant contribution from particulates exist. Particulate contribution is obtained from the net filter/canister reading while the gaseous contribution is obtained from the net bare canister reading.

4.0 PRECAUTIONS

N/A

5.0 PREREQUISITES

5.1 An offsite radiological monitoring (ORM) team has been dispatched in accordance with SP 69.020.01, Downwind Surveys and air sampling with the TCS EAS-1 has been requested.

6.0 LIMITATIONS AND ACTIONS

6.1 Personnel using this procedure should be aware of the basis for the calculations and nomogram. Specifically:

6.1.1 The operation of the air sampler; including flow rates and sampling times.

6.1.2 Values required to be reported by the survey team to calculate thyroid dose commitment.

7.0 MATERIALS AND EQUIPMENT

N/A

8.0 PROCEDURE

8.1 Dose Assessment Staff Member:

8.1.1 When an offsite radiological monitoring (ORM) team reports field measurements from the TCS EAS-1 Air sampler, all data listed on item 1 of the Thyroid Dose Commitment Worksheet (Appendix 12.1) is to be recorded.

8.1.2 Complete the remaining items on the thyroid worksheet as follows:

.1 Calculate sample collection interval (item 2), air sampler flow rate (item 3).

.2 Obtain net sample readings (items 4 and 5).

.3 Contact the control room to assess the possibility of core melt or fuel damage (item 6), determine the time of reactor shutdown (item 7), and determine the time the release started (item 9a).

.4 Calculate time between reactor shutdown and time of measurement (item 8), plume travel time (item 9b), time exposure started (item 9c), time after shutdown exposure started (item 10), and duration of exposure (item 11).

8.2 Dose Assessment Staff Member, using the Offsite Thyroid Dose Nomogram (Appendix 12.2) use the following steps to obtain thyroid dose commitment:

8.2.1 Bare Canister Component

.1 Locate the net bare canister iodine measurement (item 4) on the left hand axis. Move horizontally until the slanted line marked BARE CANISTER is intercepted.

.2 Move vertically up until the time between reactor shutdown and measurement (item 8) is intercepted; for time values greater than 72 hours, use the line marked I-131.

.3 Move horizontally to the right until the time between reactor shutdown and start of exposure (item 10) is intercepted; if the start of radiation exposure coincides with the time of measurement, move to the line marked Te = Tm.

.4 Move vertically down until the time between reactor shutdown and time of measurement (item 8) is intercepted;

if the start of radiation exposure coincides with the time of measurement, move to the line marked Te = Tm.

.5 Move horizontally to the right until duration of exposure (item 11) is intercepted.

Move vertically up until the sample collection interval (item 2) is intercepted.

Move horizontally to the right to read off the thyroid dose commitment for the bare canister. Record this in item 12.

8.2.2 <u>Filter Component</u>

NOTE: If core melt or fuel damage has <u>not</u> occurred, no iodine release in particulate form is expected and any filter radioactivity will be void of iodine (item 5 of Appendix 12.1 will be close to or equal to zero). The total dose commitment value (item 14) will be the bare canister component only. Otherwise, complete the steps below:

.1 Locate the net filter adsorber reading (item 5) on the left hand axis. Move horizontally until the slanted line corresponding to the number of hours between reactor shutdown and time of measurement (item 8) is intercepted.

.2 Move vertically up until the time between reactor shutdown and measurement (item 8) is intercepted; for time values greater than 72 hours, use the line marked I-131.

.3 Move horizontally to the right until the time between reactor shutdown and start of exposure (item 10) is intercepted; if the start of radiation exposure coincides with the time of measurement, move to the line marked Te = Tm.

.4 Move vertically down until the time between reactor shutdown and time of measurement (item 8) is intercepted; if the start of radiation exposure coincides with the time of measurement, move to the line marked Te = Tm.

.5 Move horizontally to the right until duration of exposure (item 11) is intercepted.

.6 Move vertically up until the sample collection interval (item 2) is intercepted.

.7 Move horizontally to the right to read off the thyroid dose commitment for the filter adsorber. Record this in item 13.

8.2.3 Total Dose Commitment

.1 Obtain total dose commitment by adding bare canister component (item 12) and the filter adsorber component (item 13). Record this value in item 14.

.2 Utilize results of survey data (if necessary) for input to SP 69.Ø26.Ø1 Protective Action Recommendations.

9.0 ACCEPTANCE CRITERIA

N/A

10.0 FINAL CONDITIONS

Thyroid dose commitment has been calculated.

11.0 REFERENCES

11.1 SP 69.Ø2Ø.Ø1 Downwind Surveys

11.2 SP 69.Ø26.Ø1 Protective Action Recommendations

12.0 APPENDICES

12.1 Throid Dose Commitment Worksheet, SPF 69.Ø23.Ø1-1

12.2 TCS Air Sampler Offsite Thyroid Dose Nomogram

THYROID DOSE COMMITMENT WORKSHEET

1. Input from survey teams.

   a. Air sample #__________
   b. Location______________; __________miles
   c. Canister #____________
   d. Sample collection
      Start Time____
      End Time______
   e. Flow Rate
      Start_________cfm
      End __________cfm
   f. Background reading____________cpm
   g. Filter/canister_______________cpm
   h. Bare canister reading_________cpm
   i. Time of measurement___________(use 24 hr clock)

2. Sample collection interval = difference between Start and End Time of item 1d.

   = __________ - __________ = __________min

3. Air sampler flow rate = average of Start and End Flow rate of item 1e.

   = (__________ + __________) 2 = ________cfm

4. Net Bare Canister Reading = item 1h - item 1f = ________cpm

5. Net Filter Adsorber Reading = item 1g - item 1h = ______cpm

6. Has core melt or fuel damage occurred? (circle one) yes no

7. Time of Reactor Shutdown _____________ date; _______ time

8. Time between reactor shutdown and time of measurement = item 7 - 1i = ______hrs

9. Time exposure started:

   a. Time release began:_____________ date; _______ time
   b. Plume travel time = item 1b/ground or elevated windspeed (mph)
      ________/ ________= ________jrs
   c. Time exposure started = item 9a + item 9b = ______date; ______time

10. Time after shutdown that exposure started

    = item 9c - item 7 = ___________hrs

11. Duration of radiation exposure _______hrs

SPF 69.Ø23.Ø1-1 Rev Ø

THYROID DOSE COMMITMENT WORKSHEET (Cont'd)

12. Thyroid Dose Commitment due to bare canister component (based on Offsite Thyroid Dose Nomogram)

    Bare canister component = ___________ rem.

13. Thyroid Dose Commitment due to filter/canister component (based on offsite Thyroid Dose Nomogram)

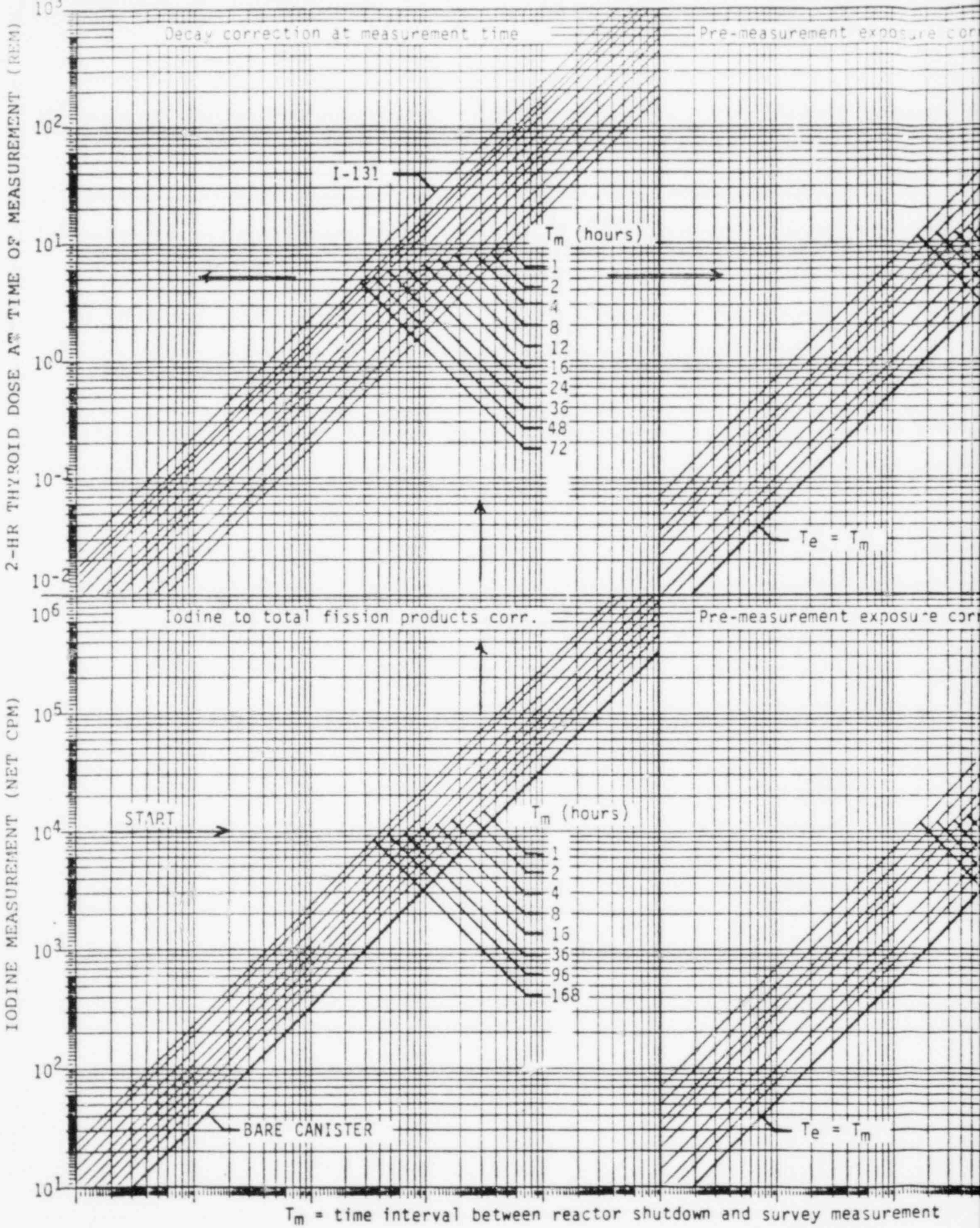
    NOTE: Filter/adsorber component for core melt or fuel damage only.

    Filter canister component = _________ rem.

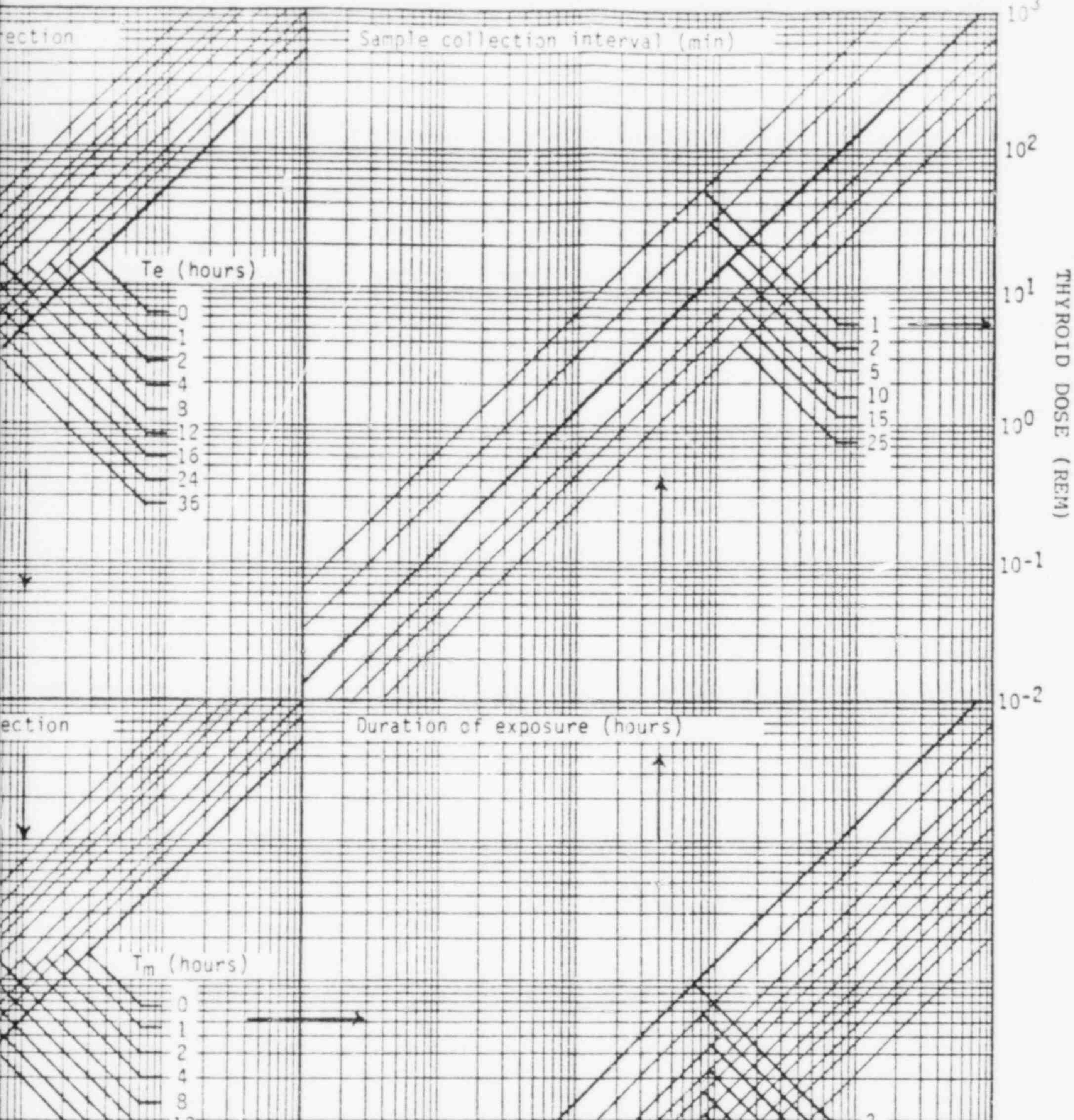
14. Total dose component = item 12 + item 13 = ________ rem

SPF 69.Ø23.Ø1-1 Rev Ø

TCS AIR SAMPLER OFFSITE THYRO:D



DOSE NOMOGRAM - SHOREHAM STATION



T_e = time interval between reactor shutdown and start of exposure

Table 2.2 Protective Action Guides for Thryoid Dose Due to Inhalation from a Passing Plume

Population at Risk	Projected Thyroid Dose rem
General population	5-25[a]
Emergency workers	125
Lifesaving activities	(b)

(a) When ranges are shown, the lowest value should be used if there are no major local constraints in providing protection at that level, especially to sensitive populations. Local constraints may make lower values impractical to use, but in no case should the higher value be exceeded in determining the need for protective action.

(b) No specific upper limit is given for thyroid exposure since in the extreme case complete thyroid loss might be an acceptable penalty for a life saved. However, this should not be necessary if respirators and/or thyroid protection for rescue personnel are available as the result of adequate planning.

Table 2.1 Protective Action Guides for Whole Body Exposure to Airborne Radioactive Materials

Population at Risk	Projected Whole Body Gamma Dose (Rem)
General population	1 to 5[a]
Emergency workers	25
Lifesaving activities	75

[a]When ranges are shown, the lowest value should be used if there are no major local constraints in providing protection at that level, especially to sensitive populations. Local constraints may make lower values impractical to use, but in no case should the higher value be exceeded in determining the need for protective action.

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Unlimited Release

PUBLIC PROTECTION STRATEGIES FOR POTENTIAL NUCLEAR REACTOR ACCIDENTS: SHELTERING CONCEPTS WITH EXISTING PUBLIC AND PRIVATE STRUCTURES

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Sandia Laboratories

APPENDIX B

Brick/Wood Housing Units

Data concerning the percentage of brick housing units within each state was presented in the Reactor Safety Study [1] and is repeated here. Figure B1 indicates graphically the percentages of family housing units that are brick for different parts of the country; the wide variation is conveniently categorized within five regions. Data for this figure were derived from the 1970 Census of Housing* and the 1971 FHA Homes, Data for States and Selected Areas** data book published by the Deparment of Housing and Urban Development (HUD). The HUD book gives statistics by state for existing single-family homes sold under the Federal Housing Administration (FHA) Section 203 program. These data show percentages of those existing (used) houses sold that have brick, stone, or concrete-block exteriors. These percentages have been assumed to be typical of all single-family houses within the state. The data were then adjusted to account for multifamily structures, which were assumed to be of heavy construction (i.e., brick). By using the housing census data on multifamily structures, the percentage of brick or equivalent housing units was estimated as follows:

(% multifamily units) + (% single-family homes) (fraction that are brick)

As for the basement data in Appendix C, representative percentages of housing units that are brick were estimated for seven geographic regions; Northeast, Great Lakes, Southwest, Midwest, Pacific Coast, Atlantic Coast and Southeast. The states comprising these regions are listed in Appendix C. The

*U.S. Department of Commerce, 1972, 1970 Census of Housing, Detailed Housing Characteristics, United States, Washington, D.C.

**U.S. Department of Housing and Urban Development, 1972, 1971 FHA Homes, Data for States and Selected Areas.

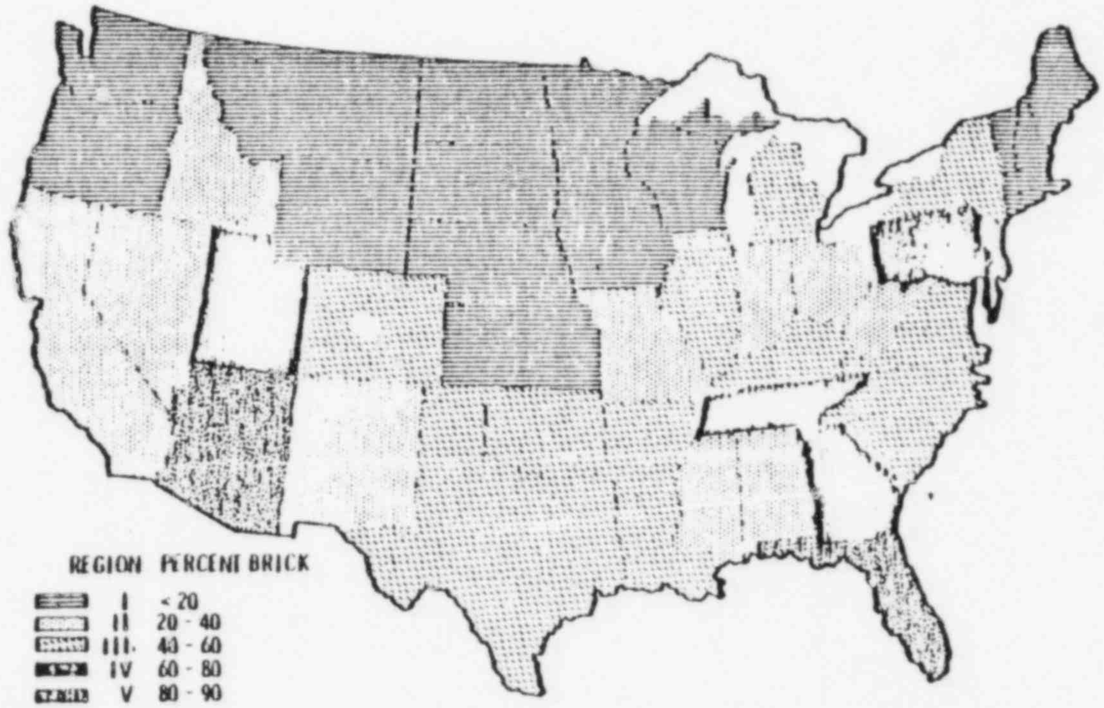

FIGURE B1. Percentage of Brick Housing Units by Region (from Ref. 1)

percentages for each state included within a region (mid-values were assumed for the ranges in Figure B1), weighted by the number of housing units in that state, were averaged to obtain the following regional percentages of brick housing units.

Region	% brick housing units
Northeast	47
Great Lakes	36
Southwest	40
Midwest	35
Pacific Coast	27
Atlantic Coast	45
Southeast	59

APPENDIX C

Basement Data

Basement data from the 1970 U.S. Housing Census* is presented for each state in Table C1. The total number of basements in each state was divided by the number of year-round housing units to estimate the percentage of homes with basements for that state. As indicated, over 50% of U.S. homes have a basement. Also note that there is no correlation available betweeen basements and type of house construction.

The percentages of homes with basements are typically similar for states within the same geographic area. Basement data for individual states were combined to estimate representative percentages for seven geographic regions: Northeast, Great Lakes, Southwest, Midwest, Pacific Coast, Atlantic Coast, and Southeast. The total number of basements in each region (i.e., the sum of the numbers for each state in the region) was divided by the total number of year-round housing units to estimate the percentage of homes with basements for that region. The states comprising each region, and the basement percentages calculated are listed below.

*U.S. Department of Commerce, 1972, 1970 Census of Housing, Detailed Housing Characteristics, United States, Washington, D.C.

Region	% homes with basements
Northeast	87

(Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont and West Virginia)

Great Lakes	77

(Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin)

Southwest	13

(Arizona, California, Nevada, New Mexico, Oklahoma, Texas, Utah and Wyoming)

Midwest	71

(Colorado, Illinois, Indiana, Iowa, Kansas, Montana, Nebraska, North Dakota, South Dakota and Idaho)

Pacific Coast	23

(California, Oregon and Washington)

Atlantic Coast	51

(Connecticut, Delaware, Florida, Georgia, Maine, Maryland, Massachusetts, New Jersey, North Carolina, Rhode Island, South Carolina and Virginia)

Southeast	16

(Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee)

TABLE C1. BASEMENT DATA FROM 1970 U.S. HOUSING CENSUS

	Year-round housing units	Basements	% homes w. basements
Alabama	1,214,845	160,677	14
Alaska	88,555	39,259	44
Arizona	578,771	25,116	4
Arkansas	672,967	52,260	8
California	6,976,261	1,170,214	17
Colorado	742,858	443,118	60
Connecticut	968,815	881,224	91
Delaware	174,990	112,713	64
Dist. of Columbia	278,390	233,146	84
Florida	2,490,838	82,237	3
Georgia	1,466,687	304,813	21
Hawaii	215,892	29,149	14
Idaho	238,293	130,456	55
Illinois	3,692,447	2,854,269	77
Indiana	1,711,896	999,320	58
Iowa	954,975	828,370	87
Kansas	787,508	435,365	55
Kentucky	1,060,689	440,674	42
Louisiana	1,146,105	34,701	3
Maine	339,440	280,264	83
Maryland	1,234,680	930,067	75
Massachusetts	1,839,028	1,708,242	93
Michigan	2,845,448	2,204,469	78
Minnesota	1,219,591	1,069,946	88
Mississippi	697,271	35,103	5
Missouri	1,665,506	1,094,080	66
Montana	240,755	155,521	65
Nebraska	511,473	405,688	79
Nevada	171,658	23,432	14
New Hampshire	248,799	213,815	86
New Jersey	2,305,293	1,915,056	83
New Mexico	322,294	31,084	10
New York	6,159,314	5,522,331	90
North Carolina	1,619,548	387,055	24
North Dakota	200,465	168,555	84
Ohio	3,447,860	2,621,202	76
Oklahoma	937,815	102,872	11
Oregon	735,631	265,237	36
Pennsylvania	3,880,102	3,466,494	89
Rhode Island	307,309	283,784	92
South Carolina	804,858	88,438	11
South Dakota	221,636	170,302	77
Tennessee	1,297,000	368,753	28
Texas	3,809,086	131,486	4
Utah	311,982	213,172	68
Vermont	149,762	127,767	85
Virginia	1,484,952	629,401	42
Washington	1,204,902	570,500	47
West Virginia	592,845	313,501	53
Wisconsin	1,416,427	1,272,087	90
Wyoming	114,572	67,224	59
U.S. Total	67,699,084	36,112,009	53