ATTACHMENT 1

Updates
In This Submittal

Volume 3A

Updated Table of Contents

EP M-1 Revision 8

EP M-2 Revision 7

Volume 3B

Updated Table of Contents

EP EF-2 Revision 2

EP EF-3 On-The-Spot Change

EP RB-11 Revision 2

ATTACHMENT 2

Location of Bracketed
Privacy/Proprietary Information

Procedure M-1, Revision 8:

Phone numbers on page 1

All phone numbers on both pages 1 and 2 of the attachment "Safety, Health and Claims Personnel to be Contacted for Reporting of Injuries at Diablo Canyon"

All phone numbers in Appendix Z "Emergency Procedure Notification Instructions"

Procedure M-2, Revision 7:

Phone numbers on page 1

All phone numbers in Appendix Z "Emergency Procedure Notification Instructions"

CURRENT

EMERGENCY PLAN

IMPLEMENTING PROCEDURES

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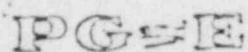
PGⴂE   Pacific Gas and Electric Company

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REVISION 8
DATE   1/14/83
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DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

TITLE: EMERGENCY PROCEDURE
EMPLOYEE INJURY OR ILLNESS (NONRADIOLOGICAL)

APPROVED: R C Thornley   2/3/83
           PLANT MANAGER   DATE

SCOPE

This procedure describes the actions which are to be taken in the event of an illness or injury to an employee which does not involve radioactive contamination or overexposure. Injuries in which radiological considerations are involved are discussed separately in the R series of Emergency Procedures.

APPLICABILITY

This procedure is to be followed for incidents involving Nuclear Plant Operations personnel, or other company employees at the plant site at the request of the Nuclear Plant Operations Department. In the event of an incident involving any other company employee (such as a General Construction Employee), perform only the asterisked (*) steps in this procedure.

IMMEDIATE ACTIONS

The employee(s) who are at the scene shall:

*1. Render all necessary first aid.
*2. Notify the control room (Shift Foreman) as soon as practical.

SUBSEQUENT ACTIONS

The Shift Foreman shall direct all subsequent actions until relieved by the long term Site Emergency Coordinator if the emergency warrants it. Such actions should include the following:

*1. Sound emergency signal, code override, or other general warning signal to clear the area if the situation warrants it.

*2. Dispatch additional first aid personnel such as the project construction EMT (Extension _____) to the scene of the injury or illness if required. Personnel who have not been instructed to provide assistance at the scene should remain on their jobs and stay clear of the affected area.

DIABLO CANYON POWER PLANT UNIT NO(S)   1 AND 2

NUMBER EP M-1
REVISION 3
DATE   1/14/83
PAGE   2 OF 4

TITLE: EMPLOYEE INJURY OR ILLNESS (NONRADIOLOGICAL)

*3. Transport the injured person to a Company panel physician or hospital if the situation warrants it (refer to the attached list). If possible, the employee is to be accompanied by a supervisor. The practices which are to be followed if this step is necessary are given in the following section of this procedure.

4. Secure the names and addresses of all witnesses (both Company and non-Company).

*5. Perform the notifications required by Appendix Z.

6. Complete the appropriate accident report(s) and forward to the office supervisor for processing.

   a. Form 62-4587, "Report of Industrial Injury to Employee" in cases where no medical treatment was required other than minor first aid at the plant.

   b. Form 62-4586, "Employer's Report of Occupational Injury of Illness" in all cases requiring medical treatment (including doctor referral) other than first aid or results in lost time beyond the day of injury.

   c. Form 62-5542, "Report of Automobile Accident" if appropriate.

TRANSPORTATION OF INJURED PERSONNEL

1. The preferred mode of transportation for injured persons is by Company panel ambulance service. Company or private vehicles should only be used in cases where the delay associated with securing an ambulance might result in significant deterioration of the injured person's condition, or when the injury is of a minor nature where use of an ambulance is not warranted.

2. When requesting ambulance service (refer to the attached list), provide the following information to the ambulance service.

   a. Name of caller

   b. Company affiliation

   c. Phone number of caller (where he can be reached)

   d. Name of injured or ill person

DC0152   2VII

e.   Where the patient is located

f.   Where the patient is to be transported

g.   Nature of injury or illness

h.   Any other medical information which might be pertinent to transporting the injured person

Record this information on Form 69-9221, "Emergency Notification Record", or other log.

*3. If ambulance or medical personnel are to enter the site, notify the security force at the Port San Luis entrance and alert them. It is necessary to have an escort accompany the ambulance personnel from the Security Building to the patient.

4. If possible, have a supervisor accompany the injured person to the hospital (or doctor's office). If this is not practical, call a supervisor and have him meet the patient at the hospital (or doctor's office). The supervisor should inform the doctor about the Company's light duty program.

5. If possible, call ahead to the hospital (or doctor) and provide the following information:

a.   Name of caller

b.   Company affiliation

c.   Phone number of caller (where he can be reached)

d.   Name of injured or ill person

e.   Age of injured or ill person (approximate if not known)

f.   Extent of injury, illness or symptoms

g.   Medical history (if known)

h.   Radiological conditions.[1]

[1]If the injury or illness is involved with radiation, see "R" Emergency Procedures. However, the hospital should also be informed when radiation is not involved, because in the absence of such knowledge, they will assume that radiation is involved.

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DIABLO CANYON POWER PLANT UNIT NO(S)   1 AND 2

NUMBER EP M-1
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PAGE   4 OF 4

TITLE: EMPLOYEE INJURY OR ILLNESS (NONRADIOLOGICAL)

Record this information on Form 18-9221, "Emergency Notification Record", or other log.

6. A medical referral, Form 62-6015, shall be completed and sent to the hospital (or doctor) with the injured person along with a copy of the Light Duty Program Letter (copy attached). These forms should be taken by the accompanying supervisor, the patient, or the ambulance driver, as appropriate.

REFERENCES

1. Rule 16, PGandE Accident Prevention Rules.

2. PGandE Standard Practice 250.

3. NRC Information Notice 80-06, "Notification of Significant Events."

ATTACHMENTS

1. Form 62-4587, "Report of Industrial Injury to Employee"

2. Form 62-4586, "Employer's Report of Occupational Injury or Illness"

3. Form 62-6015, "Medical Referral"

4. Form 62-4542, "Report of Automobile Accident"

5. Form 69-9221, "Emergency Notification Record"

6. Light Duty Program Letter

7. Company Panel of Physicians, Ambulance, and Hospitals serving the immediate area around Diablo Canyon.

8. Panel of Physicians, Ambulances and Hospitals, Coast Valley Division, SP 251.1-1.

9. Safety, Health and Claims Personnel to be contacted for Reporting of Injuries at Diablo Canyon.

10. Appendix Z, Emergency Procedure Notification Instructions

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PACIFIC GAS AND ELECTRIC COMPANY

Report of Industrial Injury to Employee

1. Name _____   6. Division _____

2. Address _____   ZIP _____

3. Telephone No. _____   7. Department _____

4. Social Security No. _____   8. Date of Accident _____

5. Occupation _____   9. Time of Accident _____

10. Location of Accident _____   11. Nature of Injury _____

12. What were you doing and how did accident occur? _____

_____

_____

13. Describe First Aid rendered: _____

14. Witnesses to accident

   1. _____

   2. _____

   3. _____   15. _____
                                             Signature of Employee

16. Date injury reported: _____

17. Date 30 days elapses: _____   18. _____
                     * See Over   Signature of Supervisor

INSTRUCTIONS: This report (Items 1 thru 15) should be *written* and *signed* by the employee personally and countersigned by the supervisor. It is for all Industrial Injuries and is in duplicate. The original is to be retained for Company records; the copy is to be detached after completion and given to the employee. Before signing in Item 18, the *supervisor* should fill in the date of the report (Item 16) and compute and notate the date *30 days* from the date the injury was reported (Item 17).

If the employee later requires treatment by a doctor or becomes disabled, Form 62-4585 must be prepared and forwarded to the Safety, Health and Claims Department *IMMEDIATELY* accompanied by the original of this report.

If the employee is unable to fill out or sign this report, it should be prepared, signed by the supervisor and the employee should be given a copy within 5 days as required by law.

If the injured employee cannot write English, the report may be made according to a verbal statement. If necessary, the employee may sign by a mark and a witness to the report should sign below the employee's mark.

INFORMATION FOR THE INJURED EMPLOYEE

This notice complies with the
California Labor Code

I. **General Information:** The Company has an extensive safety program to help its employees avoid injury. In the event of a work-related injury requiring medical care, special provision has been made for the best medical services available. The Company is very much concerned with its injured employees, and is proud to extend the medical program developed over years of experience for your benefit. Every reasonable effort will be devoted in minimizing the extent and duration of your industrial injury.

The Company is entirely self-insured for industrial injuries to its employees which arise out of and occur in the course of employment. All compensation benefits, including medical treatment, rehabilitation programs, and disability payments are administered by the Company. If questions arise, please contact your supervisor.

II. **Medical Benefits:** Through continuing efforts, the Company has utilized the talents of highly qualified physicians and specialists throughout PG&E system. A panel of doctors familiar with the various Company programs and benefits, including the light duty work program, has been established to provide a greater service to the injured employee.

You are entitled to receive medical, surgical, and hospital services and supplies reasonably required to cure or relieve you from the effects of your injury, including nursing care and such things as crutches and artificial limbs. Reasonable transportation expense incidental to treatment will also be provided.

III. **Selection of Treating Physician:** Treatment of industrial-injured employees is provided by the employer at the employer's expense with the employee having the opportunity to change physicians if desired. California law permits employees who sustained an industrial injury to be treated by a physician or at a facility of their choice within a reasonable geographic area commencing 30 days after the date injury is reported, or immediately by your personal physician, provided you notified the Company prior to your injury.

If you wish to continue your present treatment, you may do so. It is recommended that you continue with the physician that has been provided, but if you wish to change doctors, notify your supervisor. The Company's experience in this area is available to assist you in selecting the proper medical care. If you elect to change to another treating physician or facility after 30 days, you must notify your supervisor of the name and address of the physician or facility you have selected to continue treatment. You should show this document to the physician or facility so they will be notified of the immediate duty to report to the Company as required by Section 4600.2 of the Labor Code. If the facility or physician requests, you are required to sign a medical information release to permit reports of treatment to be rendered to the Company.

IV. **Amount of Indemnity Payable:** If your weekly wage exceeds $231.00, you are entitled to the maximum Temporary Disability indemnity of $154.00 per week, commencing on the 4th full day after injury. If the work-related injury results in hospitalization or more than 21 days of disability, payments will commence the 1st full day of disability. If your disability results in lost time for over two years or you lose time after two years, you will be paid temporary disability at the rate currently in effect. This applies only to injuries on or after 1-1-75. Permanent disability is paid at the rate of $70.00 per week.

V. **Rehabilitation:** Effective January 1, 1975, the employer must provide a rehabilitation program for any employee where the treating physician advises the Company that the employee will be unable to return to his usual and customary occupation at the time of injury, on a permanent basis.

This program provides services such as vocational evaluation, counseling, retraining, including on-the-job training and placement necessary to restore the injured employee to suitable employment, which is not confined to reemployment with PG&E. The Company works in conjunction with the California Rehabilitation Bureau.

VI. **Death Benefits:** If your injury results in death and you have a totally dependent spouse, the sum of $50,000.00 is the maximum benefit, except in cases involving a spouse and one or more dependent minor children, the maximum is $55,000.00. There is also a maximum burial allowance of $1,500.00. In cases of partial dependency, the death benefit will be a sum equal to four times the amount annually devoted to the support of the dependents not to exceed $50,000.00.

VII. **Further Information:** If you wish further information on your particular case, in addition to what your supervisor has provided, contact the Workers' Compensation Claims Section (415) 781-4211 Extension 3171.

Information and Assistance Officers located in the offices of the Division of Industrial Accidents, Workers' Compensation Appeals Board are a further source of information and services. The Workers' Compensation Appeals Board is the final arbiter of claims to workers' compensation.

If you wish to exercise your rights under item III of the information section, please separate this page and present it to your selected physician.

§ 9785. Duties of the Employee-Selected Physician. The physician or facility chosen by the employee who undertakes to provide treatment pursuant to Labor Code Section 4600 shall:

(a) Within 3 working days after undertaking to provide such treatment notify the employer of the name and address of such treating physician or facility, and

(b) Within 5 working days following initial examination shall submit a written report to the employer to include:

    (1) The name and address of injured employee;

    (2) The employee's medical history as obtained by the physician;

    (3) Findings on examination;

    (4) The subjective complaints reported by the employee;

    (5) The planned course, scope and duration of treatment;

    (6) If appropriate, the estimated return-to-work date;

    (7) An opinion as to whether residual permanent disability is to be anticipated and, if possible, an estimate of its extent;

    (8) An opinion as to whether the employee will eventually be able to engage in the occupation being performed at the time of injury.

(c) At reasonable intervals during active treatment submit progress reports to the employer and, particularly, report promptly to the employer when:

    (1) The employee's condition permits return to work;

    (2) The employee's condition requires him or her to leave work;

    (3) Hospitalization or surgery is indicated or recommended;

    (4) The employee's condition becomes permanent and stationary;

    (5) The employee's condition undergoes a previously unexpected significant change; (this report shall contain a statement of the proposed course of treatment required, if any, by that change);

    (6) The employee is referred to another physician for consultation;

    (7) The employee reasonably requests additional appropriate information.

48-4560 (Rev 7/78)

PACIFIC GAS and ELECTRIC COMPANY
Employer's Report of Occupational Injury or Illness
CONFIDENTIAL – For Use by Company Attorneys

DIVISION GENERAL OFFICE OR GENERAL CONSTRUCTION		
DEPARTMENT	DISTRICT, PLAN OR LOCAL OFFICE	A. C. NUMBER
LOCATION OR ITEM NUMBER	ACCOUNT NUMBER	JOB NUMBER

ACCIDENT REPORT NUMBER

ALPHA YEAR	NUMBER	S.I.P.A. SITE CODE

EMPLOYER

1. Firm Name **PACIFIC GAS AND ELECTRIC COMPANY**
77 BEALE STREET, SAN FRANCISCO, CA 94106

2. Mailing Address Phone 781-4211, Ext. 3171

4. Nature of Business **PUBLIC UTILITY – Gas & Electric**

3. Address and Phone Number of Reporting S.I.P.A. Location

5. Unemployment Insurance Account Number 002-2199

EMPLOYEE

6. Name

7. Social Security Number

8. Home Address

8a. Home Phone Number

9. Sex ☐ MALE ☐ FEMALE

10. Occupation / Job Title

11. Age

12. Department

13. Wages $ ☐ PER WEEK ☐ PER MONTH

13a. Length of Service with P.G. & E. Co. _____ YEARS

13b. Years of Experience

13c. How long has employee been employed in the present occupation?
A ☐ Less than Six Months B ☐ From Six Months to Five Years C ☐ Over Five Years

INJURY OR ILLNESS

14. Where did accident occur?   Number and Street   City or Town   County

15. On Employer's Premises ☐ YES ☐ NO

16. What was employee doing when injured? (Be specific)

17. How did accident or illness occur? (Use reverse side if necessary)

18. Obj., object or substance that directly injured employee?

19. Nature of injury or illness and part of body affected

20. Name and address of physician

21. Name and address of hospital, if hospitalized

22. Date of injury or illness

23. Time of day HOURS

24. The employee returned to work on any day after injury? ☐ YES – Give last workday ☐ NO

25. Has employee returned to work? ☐ YES – Give date returned ☐ NO Still off work
If answer to #24 or #25 has been answered, have weekly disability benefit payments been made? ☐ YES

26. Did employee die? ☐ YES – Give date ☐ NO
Date accident first reported   Under whose direction does employee work?

Report completed by (print or type name and title)

Filing of this report is not an admission of liability.
"... No report of injury required to be filed by an employer or insurer by this chapter shall be admissible as evidence in any adversary proceeding before the Workmen's Compensation Appeals Board."
Labor Code, Section 6412

Firm: PACIFIC GAS & ELECTRIC COMPANY

OFFICIAL POSITION: Mgr., Safety, Health & Claims Dept.

TELEPHONE: 781-4211   **EXTENSION:** 3171

PLEASE DO NOT USE THIS COLUMN

Report # _____ Date _____ , 19____

Dr. _____

Kindly give to bearer.

Mr./Ms. _____

medical attention, and forward a complete detailed report immediately to Manager, Safety, Health and Claims Dept., 245 Market Street, San Francisco, 94106. Your bills should be itemized and all bills and reports rendered in triplicate.

PACIFIC GAS AND ELECTRIC COMPANY

By _____ [RC #]

62-4019 (REV. 5/66)   Mgr. – Foreman – Supt.

PLEASE COMPLETE AND RETURN TO EMPLOYEE
(EMPLOYEE MUST HAVE COMPLETED CARD TO RETURN TO WORK)

Pacific Gas and Electric Co.:   Date _____ , 19____

Mr./Ms. _____

Occupation _____ Report # _____

Employed By _____ [RC #] Division.

Injured at _____ a.m. on _____ , 19____
                   p.m.

☐ Return to full work immediately _____

☐ Modified work until _____

☐ Unable to work until _____

☐ Restrictions or limitations _____

☐ Return Appt.   Date _____ Time _____

☐ Discharged from treatment _____

Signed _____ MD.

FORWARD REPORT TO:

Confidential

For Use by Company Attorneys Only
REPORT OF AUTOMOBILE ACCIDENT

① OTHER DRIVER

Name_____

Address_____
(Street, City, State)

Phone No._____ ☐ Male ☐ Female

Date of Birth_____ Operator's Lic. No._____ State_____

Insurance Company_____

② OTHER VEHICLE OR PROPERTY OWNER

Name_____

Address_____ Phone No._____

Vehicle: Make_____ Type_____ Year____ Lic. No._____ Color_____

ACCIDENT REPORT NUMBER

Alpha	Year	Seq. Number	Div. Use

③ PASSENGERS IN OTHER VEHICLES, WITNESSES, OR INJURED PERSONS

	NAME	ADDRESS	PHONE No.	PASSENGER	WITNESS	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	☐
4.				☐	☐	☐
5.				☐	☐	☐
6.				☐	☐	☐

④ PASSENGERS IN COMPANY VEHICLE

	NAME	ADDRESS	PHONE No.	EMPLOYEE YES	NO	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	☐
4.				☐	☐	☐

⑤ DATE, TIME AND LOCATION OF ACCIDENT

On_____ at _____ Hours, On_____
(Date)   (Time)   (Street or rural highway)

at/near_____ In _____
(Intersecting street, house number or highway location)   (City or County, State)

⑥ DESCRIPTION OF ACCIDENT

Complete details of how accident occurred

Other vehicle was ☐ stopped ☐ moving _____ on _____ at _____ MPH
(Direction)   (Street)   (Speed)

Company vehicle was ☐ stopped ☐ moving _____ on _____ at _____ MPH
(Direction)   (Street)   (Speed)

_____
_____
_____
_____
(If necessary, use additional sheet to complete story)

Describe weather, road and light conditions_____

Number of seat belts in Company vehicle_____ Number of seat belts in use at time of accident_____

Indicate which investigating agency will prepare a report. ☐ CHP ☐ Sheriff ☐ City Police ☐ None ☐ Other_____

⑦ VEHICLE & PROPERTY DAMAGE

DESCRIBE DAMAGE TO:
Other Vehicle(s) or Property _____

Cost if known   or estimate:
☐ Under $500
$_____   ☐ Over $500
☐ Over $1000

DESCRIBE DAMAGE TO: ☐ Company Vehicle ☐ Lease/Rental Vehicle ☐ Personal Vehicle   Cost if known   or estimate:
_____   ☐ Under $100(
$_____   ☐ Over $100(
☐ Over $500(

Were photos taken of accident scene and damage? ☐ Yes ☐ No

⑧ COMPANY DRIVER & VEHICLE INFORMATION

Company Driver _____ Home Address _____ Company Phone No._____

Age ____ Occupation _____ Reporting to Local Office at _____

Cal. Driver's Lic. No. _____ Class _____ Expiration Date _____

Division or G.O. Dept. _____ District _____ Department _____

Vehicle No. _____ Lic. No. _____ Lic. No. _____ Type_____ Year ____ Odometer Reading_____

Driver's Signature_____

of this report _____ 19___ Countersigned_____ Company Phone No._____
Mgr., Supt., Gen. Foreman, etc.

LOCATION OR ITEM No.	ACCOUNT No.	JOB IN PROGRESS AT TIME OF ACCIDENT (G.M., W.O., D.&C.)	JOB No. ISSUED TO COVER REPAIRS (W.O., W.O.&C.)	R.C. No.

INSTRUCTIONS

All accidents arising out of the operation of Company-owned, leased or rented vehicles, as well as employee-owned, leased or rented vehicles used on Company business, must be reported to the Supervisor in charge immediately. All injuries to persons or serious damage to property of others involving above vehicles must be reported to the Safety, Health and Claims Department Field Investigator or, if he is unavailable; the General Office Safety, Health and Claims Department. Such notification shall be by the fastest means of communication and this report prepared the same day. Answer each question fully. When blank spaces are not sufficient for full statements, answer each on separate sheets and attach hereto.

PREPARE A SKETCH OF ACCIDENT BELOW: Sketch should show:

1) POSITION OF VEHICLES, BUILDINGS, STRUCTURES, ETC.

2) STREET NAMES, DIRECTIONS OF TRAVEL, STOP OR WARNING SIGNS, ETC.

3) LANE WIDTHS, SKID MARKS, POINT OF IMPACT, INCLUDING MEASUREMENTS AS APPROPRIATE!

69-96. 3/82 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____   DATE _____   SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

PACIFIC GAS AND ELECTRIC COMPANY

PG*E — DIABLO CANYON POWER PLANT
PO. Box 56 · Avila Beach California 93424 · (805) 595-7311

R. C. THORNBERRY

PLANT MANAGER

Dear Dr.

Thank you for being one of our panel physicians that treat our employees. Our primary goal is to provide employees who sustain industrial injuries requiring medical attention with prompt, first-class treatment. Your assistance in this endeavor is appreciated.

There is an area of concern to us. While the number of employees that require treatment by a physician has remained stable or in some cases declined, the number of disabling injuries requiring time away from work, i.e., lost time injuries, has dramatically increased.

We believe that some of this time away from work might possibly be avoided if the availability of light (modified) duty or desk-type work were more widely known. Some physicians have stated that in some cases the patient will respond more rapidly to treatment if kept busy in a light-duty capacity. Productive, light-duty assignments are almost always available for employees released for work within the medical restrictions established by the physician.

It our policy to have an injured employee accompanied by a supervisor or other representative on the first doctor's visit. Should there be any question about the availability or type of light duty that can be provided, he or she will be able to answer for us.

Our employees' welfare is our main concern. Should you have any questions about our program, I will be glad to call on you at your convenience.

Sincerely,

R. C. THORNBERRY

RCT:kgo

Company Panel of Physicians, Ambulances, and Hospitals
Serving the Immediate Area Around Diablo Canyon[1]

Ambulance[2]

Name	Address	Phone	Remarks
San Luis Ambulance Service	358 Santa Rosa San Luis Obispo	543-2626	Radiation Exposure Patients
CENTRAL DISPATCH		543-7911	
Five Cities Ambulance Service	135 South Halcyon Rd. Arroyo Grande	489-4241	
CENTRAL DISPATCH		543-7911	
South Bay Fire/Ambulance	2315 Bayview Heights Los Osos	528-1414	
CENTRAL DISPATCH		543-7911	
Bay Ambulance	510 Bonita Morro Bay	772-2626	

Hospitals

Name	Address	Phone	Remarks
French Hospital	1911 Johnson Avenue San Luis Obispo	543-5353	Radiation Exposure Patients-Extern Defib. Equip.
Sierra Vista Hospital (20 minutes to clear for helicopter)	1010 Murray Avenue San Luis Obispo	543-6550	External Defibrillation Equipped
Arroyo Grande Community Hospital and Medical Center	345 South Halcyon Rd Arroyo Grande	489-4261	External Defibrillation Equipment

Physicans

San Luis Medical Clinic	1235 Osos Street San Luis Obispo	543-5600	
Richard E. Fleming	1235 Osos Street San Luis Obispo	543-5600	Industrial Injury Treatment
T. A. Beresky	100 Casa Street San Luis Obispo	543-6121	Eye
Physicians' Exchange		772-2727	

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1. This list extracted from Standard Practice No. 251.1-1, Panel of Physicians, Ambulances, and Hospitals, Coast Valleys Division, dated 6/16/82.

2. See also EP OR-1 "Offsite Support and Assistance" for Air Ambulance and Medical Support.

PACIFIC GAS AND ELECTRIC COMPANY
SAFETY, HEALTH, AND CLAIMS DEPARTMENT

PANEL OF PHYSICIANS, AMBULANCES, AND HOSPITALS

COAST VALLEYS DIVISION

SP 251.1-1
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TOWN TELEPHONE SERVICE	ADDRESS		

ARROYO GRANDE

Physicians's Exchange		(805)772-2727	
Five Cities Ambulance Service	135 South Halcyon Road	(805)489-4241	Ambul.
CENTRAL DISPATCH		(805)543-7911	Ambul.
A.G. Community Hospital and Medical Center	345 South Halcyon Road	(305)489-4261	Hosp. DEF

ATASCADERO

Doctors	See PASO ROBLES		
North County Medical Services (Emergency Medical Technician)	3886 El Camino Real	(805)466-1011	Ambul.
CENTRAL DISPATCH		(805)543-7911	Ambul.
Twin Cities Community Hospital	1500 Las Tablas, Templeton	(805)434-2813	Hosp DEF

BAYWOOD PARK - LOS OSOS

South Bay Fire/Ambulance	2315 Bayview Heights	(805)528-1414	Ambul
CENTRAL DISPATCH		(805)543-7911	Ambul

I	- Industrial Injury Treatment
E	- Preemployment Physical Examinations
EYE	- Eye Injuries
PM	- Paramedic Services
"DEF"	- Hospital Equipped with External Defibrillators
*	- Willing to Fly
**	- Helicopter Landing Facility Available
RAD	- Radiation Exposure Incidents

OC0152   10VI

TOWN	ADDRESS	TELEPHONE	SERVICE

CAMBRIA

Cambria Ambulance Service	1460 Main Street	(805)927-4221	Ambul
CENTRAL DISPATCH		(805)543-7911	Ambul

CARMEL (Area Code 408)

Red Cross Ambulance	Carmel Fire House, 6th & Delores Streets	624-3838	Ambul
Community Hospital of the Monterey Peninsula	Carmel & Pacific Grove Highway	624-5311	Hosp DEF

CARMEL VALLEY (Area Code 408)

C. Winter Van Horn	Village Medical Center	659-2288 375-9878	I-E
Paulino E. Tocchet	10 Del Fino Place	659-2271	I-E

CASTROVILLE (Area Code 408)

Donald M. Crosiar	10349 Merrit Street	633-2421	I
Joseph L. Kirch	11272 Merrit Street	633-5206	I-E
Bert Clair Eliason	10349 Merrit Street	633-2421	I-E

HOLLISTER (Area Code 408)

N.L. Currie	390 Seventh Street	637-9720	I-E
Martin M. Bress	931 Sunset Drive	637-5873	I-E
Stephens & Poletti Ambulance	328 Fourth Street	637-7474	Ambul
Hazel Hawkins Hospital	911 Sunset Drive	637-5711	Hosp DEF

KING CITY (Area Code 408)

Duane F. Hyde	210 Cana' Street	385-5471 (If no answer call 385-5491)	I-E
South County Ambulance	124 North Second Street	385-4841	Ambul
George L. Mee Memorial Hospital	300 Canal Street	385-5491	Hosp DEF

TOWN	ADDRESS	TELEPHONE	SERVICE

LOMPOC (Area Code 805)

Community Ambulance Service	410 East Locust	736-7547 736-8550	Ambul
Lompoc Hospital District	508 East Hickory Avenue	736-1201	Hosp DEF

LOS OSOS (Area Code 805)

South Bay Fire Department/Ambulance	Bayview Heights	528-1414	Ambul
CENTRAL DISPATCH		543-7911	

MONTEREY (Area Code 408)

W.A. Carnazzo	464 Pacific Street	375-5192	I-E
Nello P. Torri	1010 Cass Street	373-2459	I-E
Howard Press	172 El Dorado	373-1551	I-E
John J. D'Attilio	880 Cass Street	373-0183	Eye
George S. Campion	1010 Cass Street	373-4124	Eye
Physician's Exchange		373-3395	
Peninsula Medics	561 Redwood Avenue Sand City	394-4433	Ambul
Eskaton Health Care Center (24-hour Emergency Service)	576 Hartnell Street	375-2621	Hosp DEF
Peninsula Community	Carmel & Pacific Grove Highway, Carmel	624-5311	Hosp DEF

MORRO BAY (Area Code 805)

Bay Ambulance	510 Bonita	772-2626	Ambul

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TOWN	ADDRESS	TELEPHONE	SERVICE
PASO ROBLES (Area Code 805)			
*Stanley J. Kirk Physicians' Exchange	1305 Vine Street	238-0366 772-4463	I-E
Professional Ambulance Service	1035 Vine Street	238-2545	Ambul
CENTRAL DISPATCH		543-7911	Ambul
Twin Cities Hospital	1500 Las Tablas Road Templeton	434-2813	Hosp DEF
SALINAS (Area Code 408)			
W.H. Lawler, Jr.	110 John Street	424-7389 424-4848	I-E
Howard C. Miles	535 East Romie Lane	422-5353	I-E
Stanley G. Parker	535 East Romie Lane	424-2022	I-E
George J. Hinn	505 East Romie Lane	424-4302	I
Glenn H. Smith	230 San Jose Street	424-4805	Eye
E.O. Dong	535 East Romie Lane	424-7606	Eye
Physicians' Exchange		424-4848	
A-1 Ambulance Service	241 East Market Street	422-2020 EMERGENCY 911	Hosp DEF
Salinas Valley Memorial Hospital	450 East Romie Lane	424-2251	Hosp DEF
SAN LUIS OBISPO (Area Code 805)			
*Richard E. Fleming	1235 Osos Street	543-4800	I-E
T.A. Beresky	100 Casa Street	543-6121	Eye
SLO Medical Clinic	1235 Osos Street	543-4800	
Physicians' Exchange		772-2727	
San Luis Ambulance Service	385 Santa Rosa	543-2626	Ambul RAD
CENTRAL DISPATCH		543-7911	Ambul
French Hospital	1911 Johnson Avenue	543-5353	Hosp DEF RAD
**Sierra Vista Hospital (20 MInutes to clear for chopper)	1010 Murray Avenue	543-6550	Hosp DEF

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SP 251.1
Panel of Physicians, Ambulances and Hospitals
Coast Valleys Division

TOWN	ADDRESS	TELEPHONE	SERVICE
SANTA BARBARA			
St. Francis Hospital	601 East Micheltorena	(805)962-7661	Hosp DEF
		(805)966-1531	
SANTA MARIA			
Jules Bertero	201 West Cook Street	(805)925-4614	I-E
*Harry K. Lienke	217 East Fesler	(805)925-3511	I-E
*Donald E. Reiner	1414-D South Miller St.	(805)925-0961	I
D.D. Shepard	1414 South Miller St.	(805)922-3527	Eye
Industrial Medical Group of Santa Maria Valley			
Dr. Betty Suits Tibbs	3130 Skyway Drive, Suite 702	(805)922-8282	I-E
Dr. William J. Tibbs	3130 Skyway Drive, Suite 702	(805)922-8282	I-E
Physicians' Exchange		(305)925-2518	
911 Ambulance Service		(305)922-0493	PM
Santa Maria Ambulance Service	602 East Cook Street	(805)925-9555	Ambul
Police Department (For Emergency Only)	Santa Maria	(805)925-2631	Ambul
Marian Hospital	1400 East Church St.	(805)922-5811	Hosp DEF
Valley Community Hospital	505 East Plaza	(305)925-0935	Hosp
SOLEDAD			
Soledad Ambulance Service (County Emergency Services)	Soledad	(408)678-2611 911	Ambul

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TOWN	ADDRESS	TELEPHONE	SERVICE
SOLVANG			
F.A. Pedersen	2030 Viborg Road	(805)688-5531	I-E
W.B. Van Valin	2030 Viborg Road	(805)688-5531	I-E
Physicians' Exchange	Santa Maria	(805)925-2518	
Coast Ambulance Service	361 Alisal Road	(805)688-8911 EMERGENCY 911	Ambul
Santa Ynez Valley Hospital	700 Alamo Pintado Rd.	(805)688-6431	Hosp DEF
TEMPLETON			
Peter S. Davis	1400 Las Tablas, Suite 2	(805)434-1838	I-E
Willard Osibin	1400 Las Tablas	(805)434-1421	I-E
*R.A. Greenman	1400 Las Tablas	(805)434-1451	E
CENTRAL DISPATCH		(805)543-7911	Ambul
Twin Cities Hospital	1500 Las Tablas	(805)434-2813	Hosp DEF
WATSONVILLE			
*E.H. Eiskamp	850 Freedom Boulevard	(408)724-2211	I-E
P.K. Gilman	850 Freedom Boulevard	(408)724-2211	I-E
David E. Bushman	30 Brennan Street	(408)724-2433	I-E
Douglas A. Liddicoat	274 Green Valley Road	(408)724-1055	Eye
W. Webb Wilson	272 Green Valley Road	(408)722-2414	Eye
Physicians' Exchange		(408)724-7585	
A-1 Watsonville Ambulance	1046A Freedom Boulevard	(408)724-2455	Ambul
**Watsonville Community Hospital	Green Valley Road at Holohan Road	(408)724-4741	Hosp DEF

Safety, Health and Claims Personnel to be [1]
Contacted for Reporting of Injuries at Diablo Canyon [1]

EMPLOYEE INJURIES

In all cases o. serious employee injuries (for example, injuries involving
hospitalization, electric contact, hernia, amputation, fractures, or
injuries expected to result in lost time from work beyond the day of injury
or death, which occur while on the job, report should be made as follows:

During Working Hours:

T. B. Honey   PGandE local [   ]

(If Mr. Honey is not available, the person answering the telephone will take
the message and notify Mr. Honey or any other parties necessary in the
Safety, Health and Claims Department).

Any Other Time:

Report to one of the persons on the following list, trying each in order
until one is contacted:

1. T. B. Honey — Pinole
2. A. Thomas — San Francisco
3. C. B. Powell — San Francisco
4. P. S. Benitez — San Rafael
5. T. G. Scott — Oakland
6. L. Lasagna — Albany
7. C. W. Allen — San Francisco
8. B. L. Wade — Larkspur
9. J. A. Glimre — Danville
10. J. C. Vocke — Lafayette
11. W. A. Hutchison — San Carlos
12. M. C. Dolan — Oakland
13. M. W. Johnson — Walnut Creek
14. R. W. Hall — Richmond
15. I. M. Crawford — Hercules
16. R. G. Schumaker — El Granada
17. R. D. Fagg — San Rafael
18. P. C. Boettcher — Moraga
19. H. W. Reynolds — Sunnyvale
20. B. P. Sadler — Belmont

[1] This listing extracted from Safety, Health, and Claims memo regarding
Personnel to be Contacted for Reporting of Accidents, dated 01/13/83.

Safety, Health and Claims Personnel to be
Contacted for Reporting of Injuries at Diablo Canyon
Page 2 of 2

Non-Employee Injuries

C. 0. Schreil, San Luis Obispo,   office)
     (office)
     (home)

If he cannot be reached, contact one of the following in order of preference:

During working hours:

1. John C. Echols
2. Doug G. Keeler
3. George G. Perry (collection only)

After working hours on Monday through 8:00 a.m. on Friday, except holidays:

1. John C. Echols   Pleasant Hill
2. Douglas G. Keeler   Concord
3. John C. Vocke   Layfayette
4. Donald A. Rushton   San Mateo
5. William H. Bingaman   Novato
6. E. Anthony Giudici   San Carlos
7. J. Alec McCorquodale   San Ramon
8. Stanley W. Johnson   Fairfield
9. George G. Perry   Hayward
   (collection only)
10. Bruce P. Sadler   Belmont

After 5:00 p.m. on Fridays to 8:00 a.m. on Mondays and holidays:

Contact the Investigator delegated to stay on call for all emergencies. He may be reached through the System Dispatcher. If he is not available, the Dispatcher will follow the procedures for "After Working Hours."

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
IDABLO CANYON POWER PLANT UNITS NOS. 1 and 2

TITLE: EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

APPENDIX Z

1. When this emergency procedure has been implemented, and upon direction from the Shift Foreman, proceed as follows:

   *a. Notify the Plant Manager, Plant Superintendent, Supervisor of Chemistry and Radiation Protection or their designated alternates.

   b. Notify the Compensation Claims Representative, Department of Safety Health and Claims, per the attached list of personnel.

   *c. Designate this event a <u>significant event</u> if, in the opinion of the Shift Foreman, the injury will require treatment or observation which will last longer than 48 hours, or in any case of a fatality. Notify the NRC Bethesda Operation's Center within one hour, as a minimum, using the red phone in the Control Room. Gather sufficient information from all sources so that the phone call is meaningful. Refer to Operating Procedure O-4 "Operating Order (One hour report requirements to NRC)" for a suggested format for reporting. Notify the NRC that your call is pursuant to 10 CFR Part 50.72 (Notification of Significant Events).

   *d. In addition to the notification performed above, also notify the following if NRC is notified, Supervising Nuclear Generation Engineer (Personnel and Environmental Safety) or his alternate in the Department of Nuclear Plant Operation:

                 Mr. W. H. Fujimoto
                 PGandE
                 Plant Extension
                 Home

   <u>NOTE</u>: If the above General Office personnel cannot be promptly reached, request the Systems Dispatcher to contact alternate personnel.
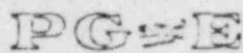
PG&E   Pacific Gas and Electric Company

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S)   1 AND 2

EMERGENCY PROCEDURE
TITLE: NONEMPLOYEE INJURY OR ILLNESS (THIRD PARTY)

NUMBER EP M-2

REVISION 7

DATE   12/15/82

PAGE   1 OF 3

APPROVED: _____ 1/25/83
            PLANT MANAGER   DATE

SCOPE

This procedure describes the actions which are to be taken in the event of an injury or illness involving a nonemployee which is incurred in connection with Company operations either on or in the vicinity of the plant site.

APPLICABILITY

This procedure is to be followed for incidents involving non-employees who are on or near the site at the request of the Nuclear Plant Operations Department (such as a Xerox serviceman). In the event of an incident involving other non-employees at or near the site (such as a construction worker), perform only the asterisked (*) steps in this procedure.

IMMEDIATE ACTIONS

The employee(s) who are at the scene shall:

*1. Render all necessary first aid.

*2. Notify the control room (Shift Foreman) as soon as practical.

SUBSEQUENT ACTIONS

The Shift Foreman shall direct all subsequent actions until relieved by the Long Term Site Emergency Coordinator (if the situation warrants it). Such actions should include the following:

*1. Sound emergency signal, code override, or other general warning signal to clear the area if the situation warrants it.

*2. Dispatch additional first aid personnel such as the project construction EMT (Ext. _____), to the scene of the injury or illness if required. Personnel who have not been instructed to provide assistance at the scene should remain on their jobs and stay clear of the affected area.

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DIABLO CANYON POWER PLANT UNIT NO(S)   1 AND 2

NUMBER EP M-2
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DATE   12/15/82
PAGE   2 OF 3

TITLE: NONEMPLOYEE INJURY OR ILLNESS (THIRD PARTY)

*3. Call an ambulance or physician if the situation warrants it. The practices which are to be followed if this step is necessary are given in the following section of this procedure.

4. Secure the names and addresses of all witnesses (both Company and noncompany).

*5. Perform the notifications required by Appendix Z.

6. An accident report should be completed as soon as practical either on Form 62-6226 "Report of Miscellaneous Accident," or Form 62-4542, "Report of Automobile Accident," as is appropriate. The accident report should be forwarded to the plant clerk for processing.

POLICIES TO BE FOLLOWED WHEN REQUESTING OUTSIDE ASSISTANCE

If a third party requires medical care, the following policies should be followed by Company personnel who secure assistance.

1. If the injured or ill individual is in a condition where he can speak for himself, call the physician which he requests. If an ambulance is required, call the ambulance which he requests.

2. If the injured or ill individual cannot speak for himself, but friends, relatives, or his employer are present, leave the matter of his care to them.

3. If an injured or ill individual cannot speak for himself, and friends, relatives, or employer, or public officials are not present or will not take change, call a local ambulance service and have the injured or ill person sent to the San Luis Obispo General Hospital for treatment.

4. Whenever a physician or an ambulance is called, it should be clearly stated by the employee making the call that this is not Company responsibility and is made not on behalf of the Company but of the injured or ill person or for his benefit, or until family, friends, employer, or public officials can take charge.

5. An injured or ill third party should only be transported in a Company vehicle in the event of an extreme emergency when the delay associated with securing an ambulance might result in a significant deterioration of the injured person's condition.

POLICIES TO BE FOLLOWED IN THE EVENT OF RADIOACTIVE CONTAMINATION

If the injured or ill individual is significantly contaminated with radioactive material or overexposed, the matter will be treated in the same manner as would a similar incident involving a Company employee (see Emergency Procedure R-1 "Personnel Injury (Radiologically related) and/or Overexposure).

REFERENCES

1. PGandE Standard Practice 250.
2. PGandE Claims Department Circular Letter No. 19, 10/1/49.
3. NRC Information Notice 80-06, "Notification of Significant Events."

ATTACHMENTS

1. Form 62-6226, "Report of Miscellaneous Accident."
2. Form 62-4542, "Report of Automobile Accident."
3. Appendix Z, Emergency Procedure Notification Instructions

62-4225 (REV 6/80)

PG&E

REPORT OF MISCELLANEOUS ACCIDENT

FORWARD REPORT TO:

ACCIDENT REPORT NUMBER

DEPARTMENT (CHECK)	GAS	ELECTRIC	STEAM	WATER	OTHER	ALPHA	YEAR	SEQ. NUMBER	DIV. USE
	1.	2.	3.	4.	5.				

CHECK #2 ELECTRIC — FOR ALL POWER PLANTS AND WATER COLLECTING
CHECK #3 STEAM HEAT — FOR COMMERCIAL STEAM HEAT ONLY

1. LOCATION OF ACCIDENT:
STREET, HIGHWAY, MILEPOST, OR OTHER SPECIFIC LOCATION, CITY, NEAREST TOWN, POWER HOUSE, ETC. AND COUNTY

2. DATE OF ACCIDENT: (MONTH—DAY—YEAR)   **3.** TIME _____ HOURS   **4.** DATE COMPANY WAS NOTIFIED: (MONTH—DAY—YEAR)

5. INCIDENT BEING REPORTED: ☐ CAR-POLE ☐ TRIP-FALL ☐ FIRE ☐ ELECTRIC CONTACT

☐ EXPLOSION ☐ MOTOR BURNOUT ☐ STORM ☐ DIG-IN ☐ OTHER _____

REPORT: If necessary, use reverse side of this form for explanatory sketch or additional information.

WERE PHOTOS TAKEN OF THE ACCIDENT? ☐ YES ☐ NO   WAS ANY PHYSICAL EVIDENCE SECURED IN CONNECTION WITH THIS INCIDENT? ☐ YES ☐ NO

6. NAME AND ADDRESS OF
1 INJURED PERSON 2. PERSON DAMAGING COMPANY PROPERTY OR 3 OWNER OF DAMAGED PROPERTY OTHER THAN PG&E PROPERTY.............
(INDICATE NUMBER IN SQUARE)

	NAME	ADDRESS	CITY, STATE	PHONE NUMBER
☐				
☐				
☐				

7. WITNESSES. IMPORTANT — Secure names, addresses and phone numbers of all witnesses—if no eye witness, give names of those who can give information. Show "NONE" if there were no witnesses.

PG&E EMPLOYEE'S NAME, DEPT., PHONE NUMBER:	NON-EMPLOYEE'S NAME, ADDRESS, PHONE NUMBER:

8. ESTIMATED TOTAL DOLLAR DAMAGE TO PG&E COMPANY PROPERTY $_____

9. WAS THERE ANY DAMAGE TO PROPERTY OF OTHERS? ☐ YES ☐ NO ☐ UNKNOWN   IF YES, ESTIMATE TOTAL DOLLAR DAMAGE. $_____

10. NAME OF FIRE SUPPRESSION UNIT ☐ USFS ☐ COUNTY ☐ FIRE DISTRICT ☐ CDF ☐ MUNICIPAL ☐ UNKNOWN ☐ NONE

11. IS COLLECTION ACTION BY THE COMPANY RECOMMENDED? ☐ YES ☐ NO

DIVISION, G.O. OR GENERAL CONSTRUCTION / DEPARTMENT	REPORT PREPARED BY (PRINT NAME)	REPORT REVIEWED BY (MANAGER, SUPT, FOREMAN, ETC.)
		SIGNED:
DISTRICT & TOWN	DATE	PRINT NAME:
	PHONE NO.:	PHONE NO.:

LOCATION OR ITEM NO.	ACCOUNT NO.	JOB IN PROGRESS AT TIME OF ACCIDENT (G.M. W.O. M. O. & C.)	JOB NO. ISSUED TO COVER REPAIRS (W.O. M. O. & C.)	A.C. NO.

no AND J 43-4033 REV. 4/80

Confidential

For Use by Company Attorneys Only

REPORT OF AUTOMOBILE ACCIDENT

FORWARD REPORT TO:

① OTHER DRIVER

Name _____

Address _____
(Street, City, State)

Phone No. _____ ☐ Male ☐ Female

Date of Birth _____ Operator' Lic. No. _____ State _____

Insurance Company _____

② OTHER VEHICLE OR PROPERTY OWNER

Name _____

Address _____ Phone No. _____

Vehicle: Make _____ Type _____ Year _____ Lic. No. _____ Color _____

ACCIDENT REPORT NUMBER

Alpha	Year	Seq. Number	Div. Use

③ PASSENGERS IN OTHER VEHICLES, WITNESSES, OR INJURED PERSONS

	NAME	ADDRESS	PHONE No.	PASSENGER	WITNESS	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	☐
4.				☐	☐	☐
5.				☐	☐	☐
6.				☐	☐	☐

④ PASSENGERS IN COMPANY VEHICLE

	NAME	ADDRESS	PHONE No.	EMPLOYEE YES	NO	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	☐
4.				☐	☐	☐

⑤ DATE, TIME AND LOCATION OF ACCIDENT

On _____ (Date) at _____ (Time) Hours, On _____ (Street or rural highway)

at/near _____ (Intersecting street, house number or highway location) in _____ (City or County, State)

⑥ DESCRIPTION OF ACCIDENT

Complete details of how accident occurred

Other vehicle was ☐ stopped ☐ moving _____ (Direction) on _____ (Street) at _____ (Speed) MPH

Company vehicle was ☐ stopped ☐ moving _____ (Direction) on _____ (Street) at _____ (Speed) MPH

_____
_____
_____
_____
(If necessary, use additional sheet to complete story)

Describe weather, road and light conditions _____

Number of seat belts in Company vehicle _____ Number of seat belts in use at time of accident _____

Indicate which investigating agency will prepare a report: ☐ CHP ☐ Sheriff ☐ City Police ☐ None ☐ Other _____

⑦ VEHICLE & PROPERTY DAMAGE

DESCRIBE DAMAGE TO:
Other Vehicle(s) or Property _____

Cost if known _____ $ _____

or estimate:
☐ Under $500
☐ Over $500
☐ Over $1000

DESCRIBE DAMAGE TO: ☐ Company Vehicle ☐ Lease/Rental Vehicle ☐ Personal Vehicle

Cost if known $ _____

or estimate:
☐ Under $1000
☐ Over $1000
☐ Over $5000

Were photos taken of accident scene and damage? ☐ Yes ☐ No

⑧ COMPANY DRIVER & VEHICLE INFORMATION

Company Driver _____ Home Address _____ Company Phone No. _____

Age _____ Occupation _____ Reporting to Local Office at _____

Cal. Driver's Lic. No. _____ Class _____ Expiration Date _____

Division or G.O. Dept. _____ District _____ Department _____

Vehicle No. _____ Lic. No. _____ Lic. No. _____ Type _____ Year _____ Odometer Reading _____

Driver's Signature _____

Date of this report _____ 19_____ Countersigned _____ (Mgr., Supt., Gen. Foreman, etc.) Company Phone No. _____

LOCATION OR ITEM No.	ACCOUNT No.	JOB IN PROGRESS AT TIME OF ACCIDENT (G.M. W.O., D.&C.)	JOB No. ISSUED TO COVER REPAIRS (W.O., M.O.&C.)	R.C. No.

INSTRUCTIONS

All accidents arising out of the operation of Company-owned, leased or rented vehicles, as well as employee-owned, leased or rented vehicles used on Company business, must be reported to the Supervisor in charge immediately. All injuries to persons or serious damage to property of others involving above vehicles must be reported to the Safety, Health and Claims Department Field Investigator or, if he is unavailable, the General Office Safety, Health and Claims Department. Such notification shall be by the fastest means of communication and this report prepared the same day. Answer each question fully. When blank spaces are not sufficient for full statements, answer each on separate sheets and attach hereto.

PREPARE A SKETCH OF ACCIDENT BELOW: Sketch should show:

　　1) POSITION OF VEHICLES, BUILDINGS, STRUCTURES, ETC.

　　2) STREET NAMES, DIRECTIONS OF TRAVEL, STOP OR WARNING SIGNS, ETC.

　　3) LANE WIDTHS, SKID MARKS, POINT OF IMPACT, INCLUDING MEASUREMENTS AS APPROPRIATE!

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 and 2

TITLE: EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

APPENDIX Z

1. When this emergency procedure has been implemented, and upon direction from the Shift Foreman, proceed as follows:

   *a. Notify the Plant Manager, Plant Superintendant, Supervisor of Chemistry and Radiation Protection or their designated alternates.

   b. Contact the Division Field Claims Investigator:

   > Mr. C. O. Schreil
   > at
   > Office
   > Home

   If the Field Claims Investigator cannot be promptly reached (at office, home, or on mobile division radio), the General Office Department of Safety, Health, and Claims shall be immediately notified in his place. A list of appropriate personnel is attached to Emergency Procedure M-1 or notification of appropriate personnel will be handled by the System Dispatcher if requested.

   *c. Designate this event a significant event if, in the opinion of the shift forman, the injury will require treatment or observation which will last longer than 48 hours, or in any case of a fatality. Notify the NRC Bethesda Operation's center within one hour, as a minimum, using the red phone in the Control Room. Gather sufficient information from all sources so that the phone call is meaningful. Refer to Operating Procedure O-4 "Operating Order (One Hour Reporting Requirements to NRC)" for a suggested format for reporting. Notify the NRC that your call is pursuant to 10 CFR Part 50.72 (Notification of Significant Events).

   *d. In addition to the notifications performed above, also notify the following, if NRC is notified, Supervising Nuclear Generation Engineer (Personnel and Environmental Safety) or his alternate in the Department of Nuclear Plant Operation:

   > Mr. W. H. Fujimoto
   > PGandE
   > Plant Ext.
   > Home

DCOA10 4VI

CURRENT

EMERGENCY PLAN

IMPLEMENTING PROCEDURES

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PG&E   **Pacific Gas and Electric Company**

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DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

EMERGENCY PROCEDURE
TITLE: ACTIVATION AND OPERATION OF THE OPERATIONS AND
OPERATIONAL SUPPORT CENTERS

APPROVED: _R C T_____ 1/28/83
PLANT MANAGER   DATE

SCOPE

This procedure describes the actions taken in the event it becomes necessary to activate the Operations Support Center and the Operational Support Center.

GENERAL

The Operations Support Center is designated as the access control and cold machine shop area located on the 85' elevation of the plant. This area is used for assembly of designated emergency response personnel and contains a variety of emergency support equipment which is immediately available for emergency support to the normal shift personnel. Personnel designated to report to the assembly area are identified in Emergency Procedure G-4 "Personnel Accountability and Assembly".

In addition an Operational Support Center is designated in the Security Building lunchroom. This area is used for assembly of emergency support personnel arriving from off-site or called in from out-of-plant assembly areas, prior to their dispatch into the plant. It has access to the portable emergency kits stored nearby. Both these areas are equipped with extensions of a dedicated telephone tie line to the Control Room and Technical Support Center and also have a CBX telephone extension with emergency facility priority access to telephone circuits.

INITIATING CONDITIONS

The Shift Foreman declares that the plant is in an Alert, Site Area Emergency, or General Emergency status as defined in Emergency Procedure G-1, "Accident Classification and Emergency Plan Activation", or determines that activation of onsite emergency centers is warranted and sounds the Site Emergency Signal or orders callout of plant staff personnel in accordance with Emergency Procedure G-2 "Establishment of the Onsite Emergency Organization".

DC0026   1IV

DIABLO CANYON POWER PLANT UNIT NO(S)   1 AND 2

NUMBER EP EF-2
REVISION 2
DATE 1/20/83
PAGE 2 OF 3

TITLE: ACTIVATION AND OPERATION OF THE OPERATIONS AND OPERATIONAL SUPPORT CENTERS

IMMEDIATE ACTIONS - NORMAL HOURS

1. When the site emergency signal is sounded, all personnel not engaged in critical operations or emergency recovery actions will report to their assigned assembly locations in accordance with Emergency Procedure G-4 "Personnel Accountability and Assembly." Upon completion of personnel accountability, personnel required for immediate emergency response may be dispatched from the Operations Support Center (Access Control/Cold Machine Shop Area). Assembly area supervisors will be called to supplement these response personnel as required.

IMMEDIATE ACTIONS - OFF NORMAL HOURS

1. Personnel required for emergency response will be called out in accordance with Emergency Procedure G-2 "Establishment of the Onsite Emergency Organization".

2. The Security Shift Supervisor will be notified of the personnel anticipated to arrive onsite and assure they are permitted access to the site.

3. The Security Shift Supervisor will assume the duties of Operational Support Center Supervisor (see Emergency Procedure G-2) until relieved by the person assigned.

4. The Security Shift Supervisor will hold the key to the OSC dedicated phone. He will unlock this phone and make it available for use.

SUBSEQUENT ACTIONS

1. The Operations Support Center (Access Control/Machine Shop) will be under the supervision of the Site Chemistry and Radiation Protection Coordinator for the duration the emergency organization is in effect. These duties are described in Emergency Procedure G-2.

2. The Operational Support Center (Security Building Lunchroom) will be under the supervision of the Operational Support Center Supervisor for the duration the emergency organization is in effect. These duties are described in Emergency Procedure G-2.

3. The TSC (or control room if the TSC is not yet manned) will be kept informed of the arrival of personnel at the Operational Support Center by the Operational Support Center Supervisor and he will also notify the TSC of the dispatch and destination of personnel.

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4.   Personnel called in to the plant for emergency response will initially report to the Operational Support Center (Security Building Lunchroom) and will remain there until assigned to an inplant location.

5.   The attached Operational Support Center Log or similar log will be maintained by the Operational Support Center Supervisor.

ATTACHMENT

Form 69-9639 Operational Support Center Log

SUPPORTING PROCEDURES

EP G-1 Accident Classification and Emergency Plan Activation

EP G-2 Establishment of the Onsite Emergency Organization

EP G-4 Personnel Accountability and Assembly

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DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

OPERATIONAL SUPPORT CENTER LOG

DATE _____

TIME ARRIVED	NAME	ORGANIZATION	DISPATCHED TO LOCATION	TIME DISPATCHED

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Procedure No. __EF-3__   Rev. __1__   Unit No. 1 ☐ 2 ☐ 1 & 2 ☒

Title __Activation and Operation of the E.O.F.__

Type of Change: ☒ PERMANENT (green)   ☐ TEMPORARY (yellow); Expiration Date _____

Requesting Department __Technical Assistant__   Originator __J. P. Franks__

Proposed Change: (Does this alter the intent of original procedure? ☐ Yes ☒ No)

(Does it constitute an unreviewed safety/environmental question? ☐ YES ☒ NO)

Add new paragraph, 6, to Subsequent Actions, page 2, to read:

6. When manned, status updates to San Luis Obispo County
   will be provided by the E.O.F. Changes in emergency
   classification or information on the estimated potential
   for time of or extent of a release will be immediately
   provided to offsite organizations as authorized.

Reason for Change: To clear a FEMA significant item from the October 20, 1982
Emergency Plan exercise.

Authorizations: _____ _____ 2/4/83
                (Plant Management Staff) (Plant Management Staff w/SRO License)   Date

Immediate distribution to the Control Room and affected work areas required? ☐ YES ☒ NO | Initial Distribution By:
Distributed To: ☐ Control Room ☐ Others _____

Date Received by Document Control __2/7/83__

PSRC Review and Plant Manager's approval no later than __2/18/83__   Date above *plus 14 days

Review Date _____

PSRC recommends approval ☐ Yes ☐ No

Meeting Number ☐☐ - ☐☐☐   Plant Manager's Approval   ☐ N/A

Follow-up To Rejected On-the-Spot Change ☐   Additional Information ☐

Action Taken/Remarks:

DISTRIBUTION: ☐ Same as Original   ☐ Others _____   Please see additional sheets ☐

DEPARTMENT OF NUCLEAR PLANT OPERATIONS   DATE   1/12/83

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EMERGENCY PROCEDURE

TITLE: EMERGENCY OFFSITE DOSE CALCULATIONS

APPROVED: _R C Thornberg_   1/28/83

        PLANT MANAGER   DATE

SCOPE

This procedure provides methods for estimating offsite dose rates and integrated doses to the whole body and thyroid in the event of a release of airborne radioactive material from the Diablo Canyon Power Plant (DCPP). Methodology is provided for use of the computerized Emergency Assessment Response System (EARS). Manual methods for estimating doses using a series of overlays and dose conversion factors in the event the EARS system is not operational are also provided.

GENERAL

Calculation of actual or projected doses at offsite locations provides a basis for a decision by the Site Emergency Coordinator for recommendation of appropriate protective actions for the general public to responsible offsite authorities (see EP RB-10).

The methods to calculate actual or projected dose are organized in this procedure as follows:

Section 1 - Emergency Assessment and Response System (EARS).

Section 2 - Dose Calculations using Dispersion Factor Overlays.

Section 3 - Formulas for Determination of Dose and Contamination Extent.

Section 4 - Meterological System.

EARS can be accessed at the Control Room, Technical Support Center (TSC), Emergency Operations Facility (EOF), Corporate Incident Response Center (CIRC), and State of California Office of Emergency Services.

A base map and dispersion factor overlays are located at the Control Room, Technical Support Center, Emergency Operations Facility, and Unified Dose Assessment Center.

EMERGENCY ASSESSMENT AND RESPONSE SYSTEM (EARS)

1. General

EARS provides near real-time calculations of offsite dose rates and doses, projected offsite dose rates and integrated doses, plume tracking, and advance dose projections, as well as the recording and visualization of offsite survey data. The calculational output from EARS is communicated to both onsite and offsite graphics terminals.

The primary program, EARAUT, operates on the TSC HP-1000 computer under the control of a terminal located in the Control Room, TSC, EOF, and CIRC. At any given time, one terminal may be the controlling data entry station; output information is transmitted to all other terminals in a fixed data string containing information about the accident, instrument readings, calculated dose results, and messages.

In the event of loss of the TSC HP-1000, and all digital communications, a backup procedure is used to allow dose calculations based on the EARMAN program, utilizing input data transmitted via telephone and recorded on a standard data form sheet.

The atmospheric dispersion model employed by EARS is a segmented, ground level release mode Gaussian Plume Model, which accommodates changes in wind direction, windspeed, and meteorological conditions over the period of calculation.

Dispersion calculations are performed for discrete time intervals, and for any given time period. The wind direction, wind speed, and atmospheric stability class are assumed to be constant for the area traversed by the plume during that segment of time. At the beginning of the next time period, changes in weather conditions are accommodated and a shift in wind direction, wind speed, and atmospheric stability, as appropriate to site conditions, are allowed. Each plume segment (that portion of the total plume travel and plume dimensions over a discrete time period) lies upon a straight line, and, as such, the whole plume consists of a series of straight plume segments joined at their ends.

2. Activation and operation of the EARS system is fully described in EP EF-6.

DOSE CALCULATIONS USING DISPERSION FACTOR OVERLAYS

1. Release Rates

Calculate the airborne release rates utilizing Emergency Procedure RB-9, "Determination of Airborne Release Rates." Enter the calculated release rate of key isotopes or mixtures, the method utilized to derive the release rates (i.e., Plant Vent Monitors, High Range Containment Monitor, or Curie Estimation), and the projected duration of the accidental release in Section 1 of worksheet 69-10556.

2. Meteorological Conditions

The purpose of this section of the procedure is to characterize the weather conditions which will influence the dispersion of the airborne release.

a. Utilizing output from the plant meteorological computer, enter the following parameters in Section 2 of the worksheet:

   1) WD (DEG) - horizontal wind direction in compass heading degrees (the direction from which the wind is blowing) at the 10m level.

   2) WS (MPS) - windspeed at the ten meter level in meters per second.

   3) DELT (DEG C/M) - temperature differential as a function of height, read from 76 meter level in °C/meter from upper level to lower level.

   NOTE: If the meteorological computer is down, go to Section 4 of this procedure for instructions on alternate methods to obtain meteorological data.

b. Stability classification - multiply the value "DELT" by 100 and enter on line four of Section 2 on the worksheet enter Table 1 to determine the atmospheric stability classification. Enter the resultant stability class (A-G) on line five of Section 2. Table 1 also shows alternate methods for determining the stability classification.

3. Atmospheric Dispersion Estimates

a. General Procedure

   Utilizing the wind direction and stability determined above, an atmospheric dispersion factor (X/Q) for any point of interest within the Extended Planning Zone may be estimated as follows:

   1) Select the proper atmospheric dispersion overlay (overlays are labeled according to the atmospheric stability class, A-G, determined on line 5 of Section 2).

   2) Situate the overlay upon the base map, placing the asterisk (*) from the overlay, which corresponds to the release point, upon the dot marking the DCPP site on the base map. Rotate the overlay such that the isopleth centerline is oriented in the direction of the compass heading that was on line 1 of Section 2. Compass headings are provided for a full 360° azimuth about the site.

NOTE: Data from the meteorological computer indicate the direction from which the wind is blowing. The compass headings on the base map are oriented such that direct use of the reported wind direction will align the overlays in the direction of plume travel. No manipulation of wind direction heading is required.

3) $(\chi \, u/\dot{Q})$ values on the overlay are shown as isopleth lines printed directly upon the overlay. Each isopleth line is labeled with a capital letter to indicate its relative strength. The numerical value corresponding to the letter is shown in the lower right corner of the overlay. Plume centerline values are marked by plus marks (+) directly along the centerline. Each plus mark corresponds to the downwind distance labeling the vertical edges of the figure. The $(\chi \, u/\dot{Q})$ associated with each centerline distance is indicated in the lower right corner of the overlay, directly to the left of the $(\chi \, u/\dot{Q})$ value associated with the isopleth lines (capital letter values). Utilizing these values, it is possible to interpolate $(\chi \, u/\dot{Q})$ values for any area bounded by the outermost isopleth of each overlay.

b. Key Receptor Locations

1) Once the dispersion overlay is placed upon the base map, it is clear which receptor locations may be in the path of the dispersing plume. In Section 3 of the worksheet, several lines are provided to list key receptor locations in the path of the plume.

2) Estimate the $(\chi \, u/\dot{Q})$ (m^{-2}) for each of the selected locations and enter the value in Section 3. It may be necessary to interpolate between isopleths.

3) Divide the $(\chi \, u/\dot{Q})$ value determined for each key receptor location by the 10 meter windspeed entered on line 2 of Section 1 of this worksheet. The quotient is the $(\chi/\dot{Q})$ value (sec/m^3) for the location. Enter this value in the next blank line, adjacent to the $(\chi \, u/\dot{Q})$ values.

4. Air Concentration Values

The release rates for key isotopes or mixtures are summarized in Section 1 of the worksheet. These values, $\dot{Q}$, are in units of Ci/sec. $\dot{Q}$, when multiplied by the value of $(\chi/\dot{Q})$ for the key receptor locations, yields an estimate of the air concentration (χ) of key isotopes or mixtures at each key location in units of Ci/m^3 for noble gases and I-131 on the lines provided in Section 3.

5. Transit Time Calculation

   a. Estimate the downwind distance to the receptor locations using a tape measure and a scale of 1 mile = 3/4 inch on the base map. Enter the estimated distance to the receptor location on Section 3 of the worksheet.

   b. Calculate transit time using the following equation:

   $$\text{Transit time (hours)} = \frac{\text{Distance (miles) x 1609 (meters/miles)}}{\text{Windspeed (meters/sec) x 3600 (sec/hour)}}$$

   NOTE: Transit time estimations for locations that are not directly upon plume centerline will be underestimates of the plume travel time to the receptor location. The magnitude of this effect is not great, and adds a degree of conservation to calculations.

6. Dose and Dose Rate Calculations

   a. Whole Body Gamma

      1) Whole Body Gamma Dose Rates

         a) "Effective age" at key receptor locations - "Effective age" consists of two time components: (1) "effective age" at the time of the release onset and (2) the transit time from the point of release to the arrival at the key receptor locations.

            (1) "Effective age" for a fuel release - Enter the time (hours) from reactor shutdown until the onset of release multiplied by the transit time into worksheet Section 4, as the "effective age" of the mixture at the time of release.

            (2) "Effective age" for a nonfuel release - An estimate of "effective age" of the released mixture for various accident scenarios is listed in Table 2. If Table 2 values are not applicable, assume that the onset of release is imminent, and utilize the time elapsed from reactor shutdown to the time of the calculation as the "effective age" of the mixture or use the actual "effective age." Enter value in Section 4. Do not multiply by transit time.

         b) Estimate the average gamma decay energy $(\overline{E}_\gamma)$ (Mev) released per disintegration of the mixture. Use Figure 1, which shows the average gamma decay energy for DCPP airborne releases as a function of the "effective age" of the mixture.

c) Enter the air concentration, (X), of noble gases at the key receptor locations from Section 3 onto worksheet Section 4. The Whole Body gamma dose rate at the various receptor locations is estimated as follows:

$$DR_{NG,L} = 9.0 \times 10^5 \cdot \overline{E}_\gamma \cdot X_{NG,L}$$

where,

$DR_{NG,L}$ = the gamma dose rate at receptor location L (mR/hr).

$\overline{E}_\gamma$ = average gamma decay energy (Mev/disintegration) for the isotopic mixture in the cloud.

$X_{NG,L}$ = the air concentration of noble gases (Ci/m^3 or uCi/cc) at receptor location L.

9.0×10^5 = Conversion factor to determine dose rate from air concentration and average decay energy.

$$\frac{mR\text{-}disintegrations\text{-}cc}{Mev\text{-}\mu Ci\text{-}hr}$$

or

$$\frac{mR\text{-}disintegrations\text{-}m^3}{Mev\text{-}Ci\text{-}hr}$$

The values to use for $\overline{E}_\gamma$ and $X_{NG,L}$ are presently shown on the worksheet. Substitute these values for the various receptor locations to determine the estimated Whole Body gamma dose rate at each location; enter the result on the worksheet.

2) Whole Body Integrated Gamma Doses

a) Based upon knowledge of the nature of the release or situation, estimate the projected duration of release or exposure and enter this value (hours) on the worksheet, Section 4.

b) Integrated Whole Body gamma dose of individuals at the receptor locations is the product of Whole Body gamma dose rate at the receptor location(s) multiplied by the projected duration of release or exposure for the receptor locations. Enter value in worksheet Section 4.

b. Inhalation Thyroid

1) Inhalation Thyroid Dose Rates

a) Obtain the receptor locations and "effective age" at reception for these locations as determined in Section 4 of the worksheet and reenter these values in Section 5.

b) Adult inhalation thyroid dose rates

(1) Adult I-131 inhalation thyroid dose rates - the adult I-131 inhalation thyroid dose rate* (no correction applied for transit decay) may be found as follows:

$$DR_{I-131,L} = (1.85 \times 10^6)(X_{I-131,L})$$

where,

$DR_{I-131,L}$ = the adult I-131 thyroid dose rate (rem/hr) at receptor location L.

$X_{I-131,L}$ = the I-131 air concentration (Ci/m^3 or $\mu Ci/cc$) at receptor location L.

(1.85×10^6) = Dose conversion factor* for I-131 inhalation by an adult at a "working" breathing rate, when the thyroid is the organ of interest ($Rem-m^3/hr-Ci$).

(2) The ratio of total inhalation thyroid dose from all radioiodines to inhalation thyroid dose from I-131 is a function of the "effective age" of the mixture at the receptor location, and may be determined using Figure 2. Determine this ratio at the various receptor locations, enter on the worksheet, Section 5, and multiply by the adult I-131 inhalation thyroid dose rates to obtain the total radioiodine thyroid dose rates at each receptor location.

c) To determine the total radioiodine inhalation thyroid dose rate for a child, simply double** the total for the adult; enter the result on the worksheet, Section 5.

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*Based on NRC Regulatory Guide 1.109, Rev. 1, Oct. 1977 and NUREG-0172, "Age Specific Dose Commitment Factors for a One Year Chronic Intake," Hoenes and Soldat, Nov. 1977.

**Wash-1400, Appendix VI, USNRC, October, 1975.

2) Integrated Thyroid Inhalation Doses

The integrated thyroid inhalation doses for both adults and children may be determined by multiplying the adult and child thyroid inhalation dose rates at the receptor locations (from worksheet Section 3 or Section 4) by the projected duration of the release or exposure. Enter the results on the worksheet Section 5.

FORMULAS FOR DETERMINATION OF DOSE AND CONTAMINATION EXTENT

1. Interpretation of External β/γ Dose Rate Measurements

   a. Whole Body Dose from Dose Rate Measurements

   If whole body γ dose rate is known, whole body γ dose is simply determined from:

   $$D_\gamma = (DR)_\gamma \times \Delta t_{exp} \qquad (1)$$

   where:

   D = gamma dose (mr or r)

   $(DR)_\gamma$ = gamma dose rate (mr/hr or r/hr)

   Δt_{exp} = exposure time (hr)

   b. Relationship Between Airborne Activity Concentration and Gamma Dose Rate

   If the activity concentration in a plume is known, it is possible to predict the β and γ dose rates which will exist. Conversely, if the dose rates are known, it is possible to back-calculate the activity concentration in the plume, and also the release rate.

   1) Basic Formula Involving Gamma Dose Rates and Doses and Airborne Concentrations

   $$(DR)_{\gamma,L} = 0.9 \times 10^6 \times \overline{E}_\gamma \times x_L \qquad (2)$$

   $$D_{\gamma,L} = 0.9 \times 10^6 \times \overline{E}_\gamma \times \Delta t_{exp} \quad x_L \qquad (3)$$

   where:

   $(DR)_{\gamma,L}$ = gamma dose rate at location L (mr/hr)

   $D_{\gamma,L}$ = total gamma dose at location L (mr)

   $\overline{E}_\gamma$ = average decay energy (mev/disintegration) for the isotopic mixture in the cloud, Figure 1

x_L = airborne concentration at location L (Ci/m^3 or $\mu Ci/cc$)

Δt_{exp} = duration of exposure to plume (hours)

$(x_L)(\Delta t_{exp})$ = integrated exposure to plume at location

L ($Ci-hr/m^3$) or ($\mu Ci-hr/cc$)

Equations (2) and (3) can be used for any mixture of gamma-emitting isotopes. It is based upon the "semi-infinite" cloud model, which means that the exposure comes from a cloud of infinite dimensions above the ground, but there is no exposure coming from below ground. In practice this gives reasonable results for any large cloud, but will overestimate the dose rate when the airborne activity is limited to a small space, such as a small room.

2) Basic Formula Involving Gamma Dose Rates, and Dose and Curie Release

$$(DR)_{\gamma,L} = 0.9 \times 10^6 \times \overline{E}_\gamma \times \dot{Q} \times x/\dot{Q}_L \qquad (4)$$

$$D_{\gamma,L} = \frac{0.9 \times 10^6 \ \overline{E}_\gamma \times Q \times x/\dot{Q}_L}{3600} \qquad (5)$$

where:

$\dot{Q}$ = total release rate (Ci/sec)

Q = total curie release (Ci)

$(x/\dot{Q})_L$ = downwind dilution factor at location L (sec/m^3)

$(DR)_{\gamma,L}$ = dose rate (mr/hr)

$D_{\gamma,L}$ = dose (mr)

3) Determination of Average Decay Energy

In order to use equations (2) through (5), the average decay energy must be known. There are two ways of obtaining this information.

(a) Case 1 - Isotopic Composition is Known

When the isotopic composition of the mixture is known, the average decay energy is obtained by calculating the weighted average decay energy for each isotope. That is:

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$$\overline{E}_{\gamma} = \Sigma_i \, f_i \, E_{\gamma,i} \tag{6}$$

where:

$E_{\gamma,i}$ = gamma decay energy for isotope i (mev/dis) from Table 3

f_i = fraction of isotope i in mixture, i.e., $(\mu Ci)_i / (\mu Ci)_{total}$

EXAMPLE: A release containing 0.1 Ci/sec of Xe-133 and 0.02 Ci/sec of Kr-85 takes place. What is $\overline{E}_{\gamma}$?

The total release rate is 0.12 Ci/sec, and so:

$$f_{133} = \frac{0.1}{0.12} = .833; \quad f_{85} = \frac{0.02}{0.12} = .167$$

Using $\overline{E}$ data from Table 3

$$\overline{E}_{\gamma} = (0.833)\,(0.045) + (0.167)\,(0.002)$$

$$= 0.037 \text{ mev/dis}$$

(b) Case 2 - Isotopic Composition is Not Known

Generally, the exact isotopic mixture is not known. However, if it is assumed that noble gases are the principal contributors, an estimate can be made using the "effective age" of the mixture. Figure 1 shows $\overline{E}_{\gamma}$ versus "effective age" of the mixture.

The composition of the mixture depends upon its "effective age" where an "effective age" of 0 hours refers to the mixture which is contained in the fuel pellets at the instant of shutdown. All accidents other than a fuel melt at the instant of shutdown would release an "older" mixture, i.e., one which is richer in long-lived Xe-133 and Kr-85.

Table 2, "Initial Effective Age for Various Postulated Accidents," gives the "initial effective age" for various postulated accidents.

EXAMPLE: What is the "effective age" and $\overline{E}_{\gamma}$, 10 hours after a fuel handling accident in containment which releases gap activity?

From Table 2, the "initial effective age" is 20 hours, so the "effective age" is 30 hours. From Figure 1, $\overline{E}_{\gamma}$ = 0.09 Mev.

c. Use of External Dose Rate Measurements to Predict Airborne I-131 Concentration

1) Basic Expression

Figure 4, "Estimated Thyroid Inhalation Dose as a Function of Gamma Dose Rate and Period of Exposure," shows the relationship between external gamma dose rate, gross iodine concentration, exposure time, and thyroid dose for a mixture characteristic of fuel melt accidents without any treatment. If you do not have this type of accident, correct the results using the information below.

2) Correction for Different Iodine/Noble Gas Ratios

Table 4, "Gross Iodine/Noble Gas Ratio for Various Postulated Accidents," gives the iodine/noble gas ratios for a variety of postulated releases. Find the ratio which is most appropriate for the existing accident.

Multiply the actual gamma dose rate by the correction factor to obtain a corrected gamma dose rate. Use this corrected value with Figure 4, to obtain the thyroid results.

d. Correlation Between Gamma Dose Rate and Ground Deposition

If there is known ground deposition of iodine and/or particulate, it is possible to estimate the gamma dose rate at a height of 3'. Similarly, given the gamma dose rate at 3', it is possible to estimate the ground deposition.[1]

The basic expression is as follows:

$$GD = K_i \times (DR)_{\gamma,3'} \qquad (7)$$

where:

GD = ground deposition $(\mu Ci/m^2)$

$(DR)_{\gamma,3'}$ = gamma dose rate at elevation 3' above ground (mr/hr)

K_i = conversion factor for isotope i from Table 5 $(\mu Ci/m^2)/(mr/hr)$

In addition, Column 1 of Table 6, "Dose Conversion Factors for Iodine and Particulate Isotopes," indicates the external dose, in rem produced by an initial deposition of 1 Ci/m² during the first day and first week.

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[1] A more accurate way to make this later determination, however, is to use ground survey results from a GM, as discussed in 2.b. below.

Most isotopes would produce 100-500 rem per Ci/m^2 in the first day. However, since we are dealing with external dose rate, knowledge of the isotopes involved is often unimportant, since the actual dose rate can be measured by the monitoring team.

It is interesting to note that for a major LOCA, the external dose received from deposited radionuclides during the first day can be the major contribution to whole body dose, exceeding that from direct exposure to the plume or from inhaltion. For the first week or so, the major contributors are iodines and Te-132. After that, cesiums and Ru-106 predominate.

Note also that the ground deposition resulting from the passing plume can be estimated from equations (11) and (12) in Section 3.

2. Interpretation of $\beta - \gamma$ Count Rate Measurements

$\beta - \gamma$ count rate and survey results using GM detectors are another series of measurements which can be easily obtained in any location of interest. As with the dose rate measurements, the information can be used in a variety of ways.

a. Use of Count Rate Measurements to Determine Dose Rate and Airborne Activity

Count rate measurements with a GM can be used to make <u>very rough</u> estimates of dose rate and/or airborne activity concentration if no other instrument is available. The expressions involved are:

$$(mr/hr) = \epsilon 4 (CR)_{net} \tag{8}$$

$$(\mu Ci/cc) = \epsilon 5 (CR)_{net} \tag{9}$$

where:

$\epsilon 4$ = probe efficiency factor from Table 7

$\epsilon 5$ = probe efficiency factor from Table 9

CR_{net} = net count rate (shield off), (cpm)

b. Determination of Ground Deposition

One of the standard measurements made by environmental monitoring teams is to make a survey 2" above the ground using a GM probe. Ground deposition is then calculated using the expression:

$$GD = \epsilon_1 \times CR_{net,\ 2"} \tag{10}$$

where:

GD = ground deposition ($\mu Ci/m^2$)

$CR_{net\ 2"}$ = net GM count rate 2" above ground (cpm)

ϵ_1 = probe efficiency factor from Table 9

In most cases, the teams will report the results directly in $\mu Ci/m^2$, so there is no need to use equation (10).

3. Relationship Between Airborne Exposure and Ground Deposition for Iodine and Particulates

The setting velocity from the plume to the ground of iodine and particulate materials has been experimentally determined in various laboratories. This enables a relationship to be developed between ground deposition and the integrated airborne exposure of an iodine or particulate isotope. The equations are:

$$(\mu Ci\text{-}hr/cm^3)_I = 5.6 \times 10^{-8} \times (\mu Ci/m^2)_I \qquad (11)$$

$$(\mu Ci\text{-}hr/cm^3)_{part} = 5.6 \times 10^{-7} (\mu Ci/m^2)_{part} \qquad (12)$$

These equations do not apply if it is raining as the iodine and particulates wash out of the plume at a much faster rate.

4. Determination of Thyroid Dose

For many accidents, thyroid dose is the limiting consequence, either due to short term inhalation dose or a longer term effect resulting from a food chain pathway. This section discusses various methods of estimating thyroid dose.

a. Determination of Thyroid Dose Due to Inhalation

If the airborne I-131 concentration or the gross iodine concentration are known, and the duration of the exposure is known, the thyroid dose is readily determined.

1) General Dose Equations for Adults

The inhalation dose equations (for adults) from the various iodine isotopes are given below (for exposure time $\leq$ 8 hours).[1]

$$D_{131} = (1.8 \times 10^6)\ (\chi 131)\ (\Delta t_{exp}) \qquad (13)$$

_____

[1] Equation (13) uses an old dose relationship for I-131. Newer data indicates the constant in equation (13) is closer to 1.5×10^6. However, the older value has been retained for conservation.

$$D_{132} = (2.5 \times 10^5)(\chi 132)(\Delta t_{exp}) \qquad (14)$$

$$D_{133} = (5 \times 10^5)(\chi 133)(\Delta t_{exp}) \qquad (15)$$

$$D_{134} = (3.1 \times 10^4)(\chi 134)(\Delta t_{exp}) \qquad (16)$$

$$D_{135} = (1.5 \times 10^5)(\chi 135)(\Delta t_{exp}) \qquad (17)$$

where:

D_i = thyroid dose from isotope i (rem) due to inhalation

χ_i = concentration of isotope i (μCi/cc or Ci/m^3)

Δt_{exp} = exposure (breathing) time (hr)

For exposure time > eight hours, the above relationships will overestimate the exposure by up to 50 percent. As discussed below, the above relationships will underestimate the dose to infants.

The total thyroid dose which would result from breathing a given I-131 concentration for a specified time is shown graphically in Figure 5. The figure is based upon a standard male thyroid (20 grams) and standard male breathing rate (10^7cc/8 hours during working hours and 2×10^7cc/24-hour day.

NOTE: If the I-131 concentration was calculated from the plant release data using ($\chi/\dot{Q}$), the maximum exposure time should not exceed the duration of the release. That is, if the release took place over a one-hour period, the exposure time of a person who resides continuously at the location of interest is assumed to be one hour. The exposure time may be less than one hour, however, if the person leaves the area. This upper limit on exposure time does not apply when the concentration was determined from an environmental measurement or extrapolated from a measurement made at another offsite location. In this case, the maximum duration of the plume must be estimated based upon the circumstances at the time.

2) Inhalation Dose to Children

Figure 5 is based upon the thyroid gland mass of a standard man (20 grams). The thyroid gland of a child is smaller, and because of this the iodine which is inhaled is more concentrated and the dose received is larger. The dose from a given exposure is approximately two times higher than that calculated for an adult.

3) Interpretation of Gross Iodine Field Measurements

Field measurements of iodine yield gross iodine values. From this data it is a relatively simple matter to obtain thyroid dose. The overall sequence of steps in making these calc??? ns is as follows: 1) determine the I-131 concentration ?? ?nich the person is exposed, 2) determine the dose due to I-131 alone, and 3) determine the total dose from all iodines.

a) How to Determine I-131 Concentration from Gross Iodine Data

(1) The composition of the mixture depends upon its "effective age," where an "effective age" of 0 hours refers to the mixture which is contained in the fuel pellets at the instant of shutdown. All accidents other than fuel melt at the instant of shutdown would release an "older" mixture, i.e., one which is richer in long-lived I-131. Table 2 gives the "initial effective age" for various postulated accidents.

EXAMPLES: What is the "effective age" 10 hours after a fuel handling accident in containment which releases gap activity? From Table 2, the "initial effective age" is 20 hours, so "effective age" is 30 hours.

(2) Determination of I-131 Concentration

Figure 7, "Ratio of I-131 Activity to Total Iodine Activity versus 'Effective Age' of Mixture," shows the ratio of I-131 activity to total iodine activity as a function of "effective age." The I-131 activity is obtained by multiplying the gross iodine concentration by this factor.

EXAMPLE: Gross iodine concentration is 6×10^{-7} µCi/cc, and effective age is 30 hours. What is I-131 concentration?

From Figure 1; $\chi 131 / \chi_{TOT} = 0.3$

$\chi 131 = (0.3) (6 \times 10^{-7}) 1.8 \times 10^{-7}$ µCi/cc

b) Determination of Thyroid Dose Due to I-131

Once the I-131 concentration is known, the thyroid dose due to this isotope is determined from equation (13) or Figure 5, whichever is most convenient.

c) Determination of Thyroid Dose from All Iodines

Once the dose from I-131 is known, the dose from all iodines can be determined from Figure 6, "Thyroid Dose from I-131 for Various Exposure Pathway versus I-13' Ground Deposition," if the "effective age" of the mixture is known. If the "effective age" was not determined above, determine it now from Table 2, "Initial Effective Age for Various Accidents," then multiply the I-131 dose by the factor from Figure 6,

EXAMPLE: For a mixture which is 30 hours old, what is the total thyroid dose if the dose due to I-131 alone is 1.1 rem?

From Figure 6, D_{TOT}/D_{131} = 1.4, so D_{TOT} = (1.1) (1.4) = 1.54 rem.

b. Determination of Thyroid Dose From Food Chains

Both iodine and particulate settle out of a plume and result in ground contamination. From here they enter the various food chains when either animals or humans eat contaminated foodstuffs. This results in irradiation of all organs, but the thyroid dose from iodine is usually limiting. In this section we will discuss the estimation of thyroid dose from iodine via the various food chains.

1) Grass-Cow Milk-Human Chain

The limiting case (i.e., the highest dose for a given ground deposition) is thyroid exposure via the grass-cow-milk-thyroid chain. Figure 6 shows a graph of thyroid dose versus ground deposition of I-131 and shows the dose which would be received if milk were drank exclusively from cows which grazed on the contaminated land.

The line labeled "dose from milk" on Figure 6 is drawn for a seven-month old infant, since children are the heaviest milk drinkers. The dose shown occurs over a three-week period if milk from this source is exclusively consumed. Once the deposition has occurred, the iodine concentration in the milk begins to slowly increase and peaks about two days later, decreasing gradually to zero over three weeks. Approximately 90 percent of the dose can be prevented if milk from this source is banned within two days.

The approximate relationship between ground deposition and peak iodine concentration in milk is:

$$(\mu Ci/liter)_{I,milk} = \frac{(\mu Ci/m^2)\, I,pasture}{8} \qquad (18)$$

NOTE 1: Figure 6 is drawn on the assumption that I-131 is the contaminant. A ground survey will yield gross iodine contamination rather than I-131 contamination. Although

"effective age" calculations can be performed in an analogous method to the technique discussed above, the increase in accuracy is seldom worth the effort. That is, it is recommended that the gross iodine data be assumed to be entirely I-1$\underline{31}$ for purposes of these calculations.

NOTE 2: Most of the activity on the ground will be either iodine or Te-132. In the absence of specific isotopic data, assume it is all iodine.

c. Feed-Chicken-Egg-Human Chain

Consumption of eggs from chickens which feed on the contaminated ground is another potential dose pathway shown in Figure 11. Approximately 90 percent of this dose can be eliminated if the eggs are banned within five days.

d. Vegetable - Human or Feed-Cow Chain

These chains are also shown on Figure 6. In the case of consumption of contaminated vegetables, it is necessary to ban the foods within one day to reduce the dose by 90 percent. Similarly, grazing cattle receive a thyroid dose due to consumption of contaminated feed, and it is necessary to remove the animals within one day to reduce the dose by 90 percent. Removing the animals within four days cuts the dose in half.

NOTE: There are no official maximum limits on the thyroid dose a cow can receive. However, most authorities recommend limiting the thyroid dose to the cows to 25 rem if it is convenient to do so.

5. Radiological Effects of Particulates

Because the various particulates vary so widely in their radiological and metabolic characteristics, the exact interpretation of particulate results requires that the isotopes be identified, and it is for this reason that particulate filters should always be returned to the counting room if practical.

Table 6 provides information which can be utilized to assess the radiological consequences of particulate releases.

a. Total Dose Due to Ingestion Via Food Chain Pathways

Column 3 of Table 6, "Dose Conversion Factors for Iodine and Particulate Isotopes," gives the total rem received to various organs per curie of isotope ingested via food chain pathway.[1] Only the six isotopes tabulated (Sr-89, Sr-90, I-131, I-133, Cs-134, and Cs-137) are ingested to any significant degree via food chain pathways.

The key to using this table is to estimate how much is actually ingested. There are two ways to do this, as discussed below.

1) Estimating Curies Ingested From Ground Deposition Data

Ground deposition can be measured by a monitoring team or can be calculated from release data using equation (12).

Various pathways have been studies to determined how much radioactivity is typically ingested when the ground is contaminated. This information is given in Column 2 of Table 6, for the grass-cow-milk-human pathway as well as for all other pathways such as direct eating of vegetables.

NOTE: This Table assumes you get all your food from the contaminated area, and is therefore an upper limit.

EXAMPLE: I-131 is deposited on the ground to a level of 1 $\mu Ci/m^2$. What is the thyroid dose via the milk pathway resulting from this deposition?

From Table 6, Column 2, the I-131 ingested via the milk pathway is 0.69 μCi.

From Table 6, Column 3, the resulting thyroid dose due to an adult from this ingestion is 1.68 rem. An infant would receive about seven times as much or ≈12 rem.

Note that for the milk pathway we could have used Figure 6, to predict a dose of ≈ 15 rem for the same deposition. This discrepancy comes from the fact that Figure 6 and Table 6 are from different reference books and the assumptions behind them are slightly different. However, this is a minor error for a calculation of this nature.

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[1] Use Column 3 for ingestion by means other than inhalation. Use Column 4 for ingestion by inhalation. The differences between the two tables result from the fact that some of the material inhaled is exhaled and not ingested.

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2) Estimation of Curies Ingested From Vegetation or Foodstuff Contamination

If a particular foodstuff is surveyed and its contamination level 1 (in µCi/gm, µCi/liter, etc.) is known, the total activity ingested can be determined if the daily intake of the foodstuff is known. The daily intake of various foodstuffs is given in Table 10, "Typical Daily Dietary Intakes."

EXAMPLE: Vegetables are found to have a contamination level of 1 µCi/kg of Cs-137. What annual whole body dose would result from eating these vegetables?

From Table 10 we find that the daily intake of vegetables in 0.1 kg/day. Thus our annual intake of Cs-137 is:

(1uCi/kg) (0.1 kg/day) (365 days/year)

= 36.5 µCi/year

b. Total Dose Due to Inhalation

Column 4 of Table 6 gives the total rem received to various organs per curie of isotope inhaled. The curies inhaled is given by:

$$C_{i, \text{ inhaled}} = (x_i) \ (BR) \ (\Delta t_{exp}) \qquad (19)$$

where:

x_i = airborne concentration (µCi/cc or Ci/m³)

BR = breathing rate (m³/hr)

= 0.83 m³/hr average for periods $\geq$ 8 hours

= 1.25 m³/hr average for periods $\leq$ 8 hours

Δt_{exp} = exposure time (hr)

EXAMPLE: What is the thyroid dose resulting from breathing I-131 at 10⁻⁶ µCi/cc for 1 hour?

From equation (19):

$$C_{i, \text{ inhaled}} = (10^{-6}) \ (1.25) \ (1) = 1.25 \times 10^{-6}$$

From Table 6, Column 4:

$$rem = (1.25 \times 10^{-6})(1.4 \times 10^{6}) = 1.75$$

Note that for I-131 we could have achieved essentially the same result using equation (13) or Figure 5.

6. Beta Dose Calculations

Although they are normally not of much interest, beta dose calculations from airborne emitters are done in a completely analogous fashion to gamma dose calculations. The beta dose rate is given by:

$$DR_\beta = 0.8 \times 10^{-6} \, \overline{E}_\beta \, \chi \qquad (20)$$

where:

DR_β = beta dose rate (mrem/hr)

$\overline{E}_\beta$ = average β decay energy (Mev/disintegration) from Table 3, "Average Gamma and Beta Energy per Disintegration"

χ = airborne concentration ($\mu Ci/cc$ or Ci/m^3)

METEOROLOGICAL SYSTEM

This section explains in detail the use of the information provided by the meteorological computer.' Also, it explains how to obtain this information if the meteorological tower or computer is inoperable.

If the release rate of radionuclides from the plant is known, it is possible to estimate the ground level airborne activity concentration at any downwind location of interest using calculated atmospheric dilution factors. The dilution factors depend upon wind speed and atmospheric turbulence and can be estimated from a rather complex formula given data on wind speed, temperature, and variation in wind direction. An onsite meteorological tower is provided to gather the raw data, and a computer makes the necessary calculations. Results are printed out in the Control Room every 15 minutes.

1. Explanation of Meteorological Computer Output

Table 11 shows a typical output from the Meteorological Computer. A line-by-line description of the terms is given below: The line numbers correspond to those on the Primary Tower printout:

a. Line 1

The local time; whether in Pacific Standard Time or Pacific Daylight Savings Time; the present date.

'There are two meteorolgical towers each with an independent computer. The following information applies to either the Primary Tower and Computer (Located east of the plant intake structure) or backup Tower and computer (located along access road south of the plant with the computer in the TSC). The backup Tower data is used only when the primary tower or computer is inoperable. Either may be selected in the Control Room and the other is printed out in the TSC.

b. Line 2

Line 2 is a heading line with the following information:

1) LEVEL - The meteorological tower level at which meteorological parameters are monitored (height, in meters, above ground level).

2) WD (DEG) - Wind direction (the direction from which the wind is coming) in degrees.

3) SIGMA A (DEG) - Standard deviation of the azimuth (horizontal) wind direction in degrees.

4) WS (MPS) - Wind speed in meters per second.

5) TEMP (DEG C) - Ambient temperature in degrees Celsius.

6) DELT (DEC C/M) - Delta temperature between an upper and lower meteorological tower level in degrees Celsius per meter.

c. Line 3

Meteorological data measured or computed at the 10M (10-meter) level. These parameters are WD, SIGMA A, WS, TEMP (A-primary temperature, B-backup temperature0, and DELT (——indicates that DELT is not computed at this level).

d. Line 4

Meteorological data measured or computed at the 46M (46-meter) level. The only parameter measured at this level is TEMP; DELT is computed between the 46M and 10M levels.

e. Line 5

Meteorological data measured or computed at the 76M (76-meter) level. These parameters are WD, SIGMA A, WS, TEMP, and DELT; DELT is computed between the 76M and 10M levels.

f. Line 6

1) DEW PT (DEG C) is dewpoint measured at the 10M level and expressed in degrees Celsius.

2) PCTP SFC (CM) is total surface (ground-level) precipitation accumulated since the recorders was last reset to 0.00 or since 2.50 cm was exceeded; measured in centimeters.

3) VIS (KM) is visibility measured in kilometers.

g. Line 7

Line 7 is a heading line with the following information:

1) DIST (KM) - downwind distance from the plant in kilometers.

2) CHI/Q (SEC/M**3) - downwind centerline dilution factor in units of (sec/m^3).

3) SIGMA Y (M) - the distance of one standard deviation from the plume centerline in meters. This value is sometimes called the lateral cloud dimension and is computed as function of downwind distance and atmospheric stability.

h. Line 8 through 12

These are the values of CHI/Q and SIGMA Y at each downwind distance. Line 12 also has the value of the MIXING DEPTH in meters. This is the depth of the turbulent layer of air adjacent to the ground surface in which turbulent mixing and dilution of effluent plumes occur. Mixing depth is measured between the ground and the base of an inversion layer.

i. Line 13

This indicates what stability categories were used in the calculation of SIGMA Y and SIGMA Z (the standard deviation of the vertical cloud dimension). Atmospheric stability can be determined by use of SIGMA A or DELT. If SIGMA A is used, the level is indicated. If DELT is used, the upper and lower levels are indicated.

2. Determination of $(\chi/\dot{Q})$ when Meteorological Computer is Operable.

NOTE: A Work Sheet (Form 18-9230) has been developed to make these calculations.

a. The meteorological computer directly yields values for $(\chi/\dot{Q})$ for the plume centerline as a function of downwind distance. These can be entered on the Work Sheet and plotted on the graph. A smooth curve can be drawn through the points to yield centerline $(\chi/\dot{Q})$ at any downwind distance of interest.

NOTE: For distances beyond 50,000 meters, it is permissible to extrapolate a curve of $(\chi/\dot{Q})$ versus distance to obtain the necessary values. For distances less than 800 meters, such an extrapolation may lead to large errors. This is particularly true when the release is elevated. The plume from the plant vent will normally travel several hundred meters before it broadens sufficiently to intersect the ground. Therefore, calculational predictions of the dose rate at lesser distances than where the plume intersects the ground are nearly meaningless. In general, the $(\chi/\dot{Q})$ data is unreliable at distances much closer than about 500 meters.

b. If the point of interest is not on the centerline, it is necessary to make an additional calculation, using the equation:

$$(\chi/\dot{Q})_L = (\chi/\dot{Q})_{CL,x} \, \exp - (\frac{y^2}{2\sigma_y^2}) \qquad (21)$$

where:

$(\chi/\dot{Q})$ = downwind dilution factor at location L (sec/m^3)

$(\chi/\dot{Q})_{CL,x}$ = downwind centerline dilution factor at distance x. Distance x is determined by drawing a perpendicular line from location L to the downwind centerline. x is the distance from the point of release to the intersection of the perpendicular and the centerline, as shown below.

y = length of the perpendicular line drawn from location L to the downwind centerline (m)

σ_y = lateral cloud dimension (meters)

DOWNWIND
CENTERLINE

POINT OF RELEASE
RELEASE
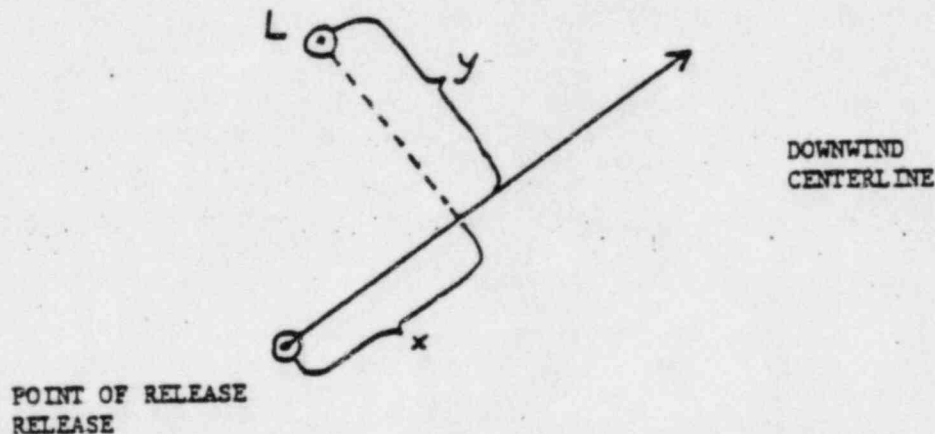
Provisions for solving this equation are included on page 2 of the Work Sheet.

3. Determination of $(\chi/\dot{Q})$ When Met Tower is Inoperable

The meteorological facility will continue operating on battery power for one week if the normal power supply fails. After this period, the batteries supplying power to the meteorological system instruments and microprocessor will die. In case the system is lost, proceed as follows:

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a. Use the data from the last printout for an additional hour.

b. If only the microprocessor has failed, the wind direction and speed can be read at the meteorological tower instrument building.

c. If everything is lost, or after 24 hours on battery power, begin operating the Meteorological Research, Inc. mechanical weather station in its mount. (See item 4.)

d. Compute the centerline $(x/\dot{Q})$, using the equation:

$$(x/\dot{Q})_{CL} = \frac{1}{(WS)\ (\pi)\ \sigma_y\ \sigma_z} \tag{22}$$

where:

$(x/\dot{Q})_{CL}$ = Centerline dilution factor at downwind distance of interest.

WS = Wind speed (meters/sec).

σ_y = Horizontal standard deviation at downwind distance of interest (meters). σ_y is plotted as a function of distance and stability category in Figure 8.

σ_z = Vertical standard deviation at downwind distance of interest distance of interest (meters.) σ_z is plotted as a function of distance and stability category in Figure 9.

4. If the primary and backup meteorological tower is lost and or near the end of battery life, begin operating the Meteorological Research, Inc. mechanical weather station as follows:

(a) Place the station in the mount provided (see figure 10), or provide a mount as described in the instrument instructions.

(b) Start the recorder on the hour mark and note the start time on the strip chart.

(c) Compute the wind speed by using the plastic template provided with the unit to correct wind run (see Figure 11) to miles per hour.

(d) To determine the 15 minute wind direction range, R-15, locate the last 15 minute period (see Figure 11) within the hour on the wind direction portion of the strip chart. For this period, estimate the second highest and second lowest value of wind direction and calculate the difference. Define atmosphereic stability using the appropriate column of Table 1; e.g., an R-15 of 60° equates to a C stability.

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(e) The temperature scale (see Figure 11) has two calibrated scalers that are field selectable: -30° to 120°F and -90° to 60°F. For this climate, it is appropriate to select the -30° to 120°F scale.

f. Off-center values of $(\chi/\dot{Q})$ are computed in the normal manner, using Equation (21).

5. How to Use $(\chi/\dot{Q})$

a. Calculate Downwind Concentration Given Release Rate

If the release rate, $\dot{Q}$, is known, the downwind ground level concentration is given by:

$$X_{i,L} = \dot{Q}_i \, (\chi/\dot{Q})_L \qquad\qquad (23)$$

where:

$X_{i,L}$ = Concentration of isotope i at downwind location L ($\mu Ci/cc$ or Ci/m^3)

$\dot{Q}_i$ = release rate of isotope i (Ci/sec)

$(\chi/\dot{Q})_L$ = dilution factor for location L (sec/m^3)

Equation (23) has three important limitations:

1) Radioactive decay is not included. Thus, if the plume transit time from the point of release to location L is comparable to the radioactive half-life of isotope i, equation (23) will overestimate the concentration.

2) As far as iodine and particulates are concerned, equation (23) assumes no rain. These isotopes are washed out of the plume by rain, and equation (23) does not account for this.

3) If the release rate lasts for a finite time, t release, all calculations using equation (23) must assume that the downwind concentration, $X_{i,L}$, persists for the same length of time. There may be a time delay due to plume transit between the start of the release and the appearance of $X_{i,L}$, at a downwind location, but the durations of Q_L and $X_{i,L}$ are the same.

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EXAMPLE: We release I-131 at an average rate of 0.02 Ci/sec for a period of 3 hours. What is the I-131 concentration at 10,000 meters (outer edge of LPZ)? Assume $(\chi/\dot{Q})_{10,000} = 2.2 \times 10^{-6}$ sec/m^3. Wind speed is 1.5 m/sec (3 mph).

$$\chi_{131,10KM} = (0.02)(2.2 \times 10^{-6}) = 4.4 \times 10^{-8} \text{ Ci/m}^3 \text{ or } \mu\text{Ci/cc}$$

This concentration will appear after a transit time delay of 6,700 seconds (1.8 hours) and will persist for 3 hours.

b. Extrapolation of Dose Rates or Doses to Other Locations

If a dose or dose rate value is available at one location in the environment, it may be extrapolated to another location if the respective $(\chi/\dot{Q})$ values are known.

$$(DR)_A = \frac{(\chi/\dot{Q})_A \ (DR)_B}{(\chi/\dot{Q})_B} \qquad (24)$$

or

$$(D)_A = \frac{(\chi/\dot{Q})_A \ (D)B}{(\chi/\dot{Q})_B} \qquad (25)$$

where:

DR = dose rate (μR/hr, mR/hr, R/hr)

D = dose (μR, mR, R)

A,B = locations A and B

EXAMPLE: The 800 meter (site boundary) dose rate is 500 mR/hr. What is the estimated dose rate at 10,000 meters (outer edge of LPZ). Assume $(\chi/\dot{Q})_{800} = 5.3 \times 10^{-3}$ and $(\chi/\dot{Q})_{10,000} = 2.2 \times 10^{-6}$ sec/m^3.

$$(DR)_{10,000} = \frac{(\chi/\dot{Q})_{10,000} \ (DR)_{800}}{(\chi/\dot{Q})_{800}}$$

$$(DR)_{10,000} = \frac{(2.2 \times 10^{-6}) \ (500)}{(5.3 \times 10^{-3})} = 0.21 \text{ mR/hr}$$

c. Calculate Downwind Plume Exposure Given Total Release

Often we know the total curie release, in which case Equation (23) is modified slightly to yield:

$$X_{i,L} \, \Delta t_{release} = \frac{Q_i \times (x/\dot{Q})_L}{3,600} \qquad (26)$$

where:

$X_{i,L} \, \Delta t_{release}$ = downwind plume exposure for isotope i at location L (μCi-hr/cc) or (Ci-hr/m^3) assuming a person remains at location L throughout the passage of the plume.

EXAMPLE: What is the site boundary (800M) plume exposure to I-131 if 10 Ci are released? Assume $(x/\dot{Q})_{800} = 5.2 \times 10^{-4}$ sec/m^3.

$$(\mu Ci\text{-}hr/cc)_{131,800} = \frac{(10)(5.2 \times 10^{-4})}{(3,600)} = 1.4 \times 10^{-6}$$

Equation allows you to determine the thyroid dose from this exposure. That is:

$$D_{131}(rem) = (1.8 \times 10^6) \, (\mu Ci\text{-}hr/cc)_{131}$$

$$D_{131,800} = (1.8 \times 10^6) \, (1.4 \times 10^{-6}) = 2.5 \text{ rem}$$

SUPPORTING PROCEDURES

RB-9, "Calculation of Release Rate and Integrated Release"

RB-10, "Protective Action Guidelines."

RB-8, "Emergency Off-site Radiological Environmental Monitoring Program."

TABLES

1. Classification of Atmospheric Stability

2. Initial Effective Age for Various Postulated Accidents

3. Average Gamma and Beta Energy per Disintegration

4. Gross Iodine/Noble Gas Ratio for Various Postulated Accidents

5. Conversion Factor for Relating Ground Deposition and Dose Rate

6. Dose Conversion Factors for Iodine and Particulate Isotopes

7. Efficiency Factors, $\epsilon 4$, for GM Probes

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8. Efficiency Factors, $\epsilon5$, for Estimating Airborne Surveys

9. Efficiency Factors, $\epsilon1$, for Ground Surveys

10. Typical Daily Dietary Intakes

11. Typical DCPP Printer Listing of Quarter-Hour Average Meteorological and Dispersion Data

FIGURES

1. Total Gamma Decay Energy Versus Time for Noble Gas Mixtures

2. Ratio of Thyroid Dose From all Iodines to Thyroid Dose From I-131 Versus "Effective Age" of Mixture

3. Gamma Radiation Exposure Rate Correction Factor vs. Iodine to Noble Gas Activity Ratio

4. Estimated Thyroid Inhalation Dose as a Function of Gamma Dose Rate From Plume and Projected Time Period of Exposure

5. Thyroid Dose Due to Inhalation of I-131

6. Thyroid Dose from I-131 for Various Exposure Pathways vs. I-131 Ground Deposition.

7. Ratio of I-131 Activity to Total Iodine Activity vs. "Effective Age."

8. Sigma Y as a Function of Distance and Stability

9. Sigma Z as a Function of Distance and Stability

10. Figure showing approximate location of backup met tower foundation.

11. Figure showing strip chart for the Mechanical Weather Station.

ATTACHMENTS

1. Form 69-10566, "Worksheet for Manual Offsite Dose Calculations"

2. Form 69-9320, "Worksheet for Determination of $(x/\dot{Q})$.

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TABLE 1

IDENTIFICATION OF STABILITY CLASSES

Relation to Wind Direction Fluctuations

Class	Designation	Sigma A (Deg.)	15-Minute Direction Range (Deg)
A	Extremely Unstable	Sig A ≥ 22.5	R ≥ 85.0
B	Moderately Unstable	22.5 > Sig A ≥ 17.5	65 ≤ R < 85
C	Slightly Unstable	17.5 > Sig A ≥ 12.5	50 ≤ R < 65
D	Neutral	12.5 > Sig A ≥ 7.5	40 ≤ R < 50
E	Slightly Stable	7.5 > Sig A ≥ 3.8	23 ≤ R < 40
F	Moderately Stable	3.8 > Sig A ≥ 2.1	15 ≤ R < 50
G	Extremely Stable	2.1 > Sig A	R < 15

Relation to Vertical Temperature Gradient

Class	Designation	Temperature Changes with Height (°C/100m)
A	Extremely Unstable	< -1.9
B	Moderately Unstable	-1.9 to -1.7
C	Slightly Unstable	-1.7 to -1.5
D	Neutral	-1.5 to -0.5
E	Slightly Stable	-0.5 to -1.5
F	Moderately Stable	1.5 to 4.0
G	Extremely Stable	> 4.0

Relation to Weather Conditions

A - Extremely unstable conditions   D - Neutral Conditions[1]
B - Moderately unstable conditions   E - Slightly stable conditions
C - Slightly unstable conditions   F - Moderately stable conditions

Surface wind speed, m/sec	Daytime Solar Insolation[2]			Nighttime conditions Thin overcast or ≥ 4/8 cloudiness[3]	≤ 3/8 cloudiness
	Strong	Moderate	Slight		
<2	A	A-B	B	E	F
2	A-B	B	C	E	E
4	B	B-C	C	D	E
6	C	C-D	D	D	D
>6	C	D	D	D	D

[1] Applicable to heavy overcast, day or night.
[2] The solar insolation is the solar radiation deposition per unit surface area and is related to the angle of the sun from the horizon and the atmospheric conditions.
[3] The degree of cloudiness is defined as that fraction of the sky above the local apparent horizon which is covered by clouds.

TABLE 2

INITIAL EFFECTIVE AGE FOR VARIOUS POSTULATED ACCIDENTS

	Initial Effective Age (Hours)
1. Blackout	65
2. Small LOCA	60
3. Major LOCA (No core melt)	40
4. Major Steamline Break	65
5. Major Feedwater Line Break	65
6. Tube Rupture	65
7. Locked Rotor	50
8. Fuel Handling Accident (FHB)	600
9. Rod Ejection	40
10. Gas Decay Tank Rupture	80
11. Liquid Holdup Tank Rupture	60
12. VCT Rupture	60
13. Core Melt	1
14. Gap Activity Release (fresh fuel)	20

TABLE 3
AVERAGE GAMMA AND BETA ENERGY PER DISINTEGRATION
(FROM FSAR TABLE 11.1-1)

ISOTOPE	T1/2 (hrs)	E_γ (Mev/dis)	E_β (Mev/dis)
Kr-83m	1.86	0.0005	0.039
Kr-85	94100	0.0022	0.221
Kr-85m	4.4	0.160	0.252
Kr-87	1.3	0.764	1.34
Kr-88	2.8	2.03	0.372
Xe-133m	55.2	0.021	0.207
Xe-133	127	0.045	0.155
Xe-135	9.2	0.262	0.304
Xe-135m	0.26	0.421	0.104
Xe-138	0.23	1.28	0.579
I-131	193	0.392	0.183
I-132	2.4	2.28	0.485
I-133	21.0	0.624	0.493
I-134	0.87	2.58	0.941
I-135	6.7	1.56	0.316
Te-132	77.9	0.231	0.061

TABLE 4
GROSS IODINE/NOBLE GAS RATIO FOR VARIOUS POSTULATED ACCIDENTS

ACCIDENT	Gross Iodine/Noble Gas Ratio	
	DESIGN BASIS	EXPECTED
1. Blackout	0.00033	0.00093
2. Small LOCA	0.0018	0.000085
3. Major LOCA	0.035	0.0017
4. Major Steamline Break	0.0033	0.0093
5. Major Feedwater Line Break	0.00033	0.00093
6. Tube Rupture	0.00019	0.00029
7. Locked Rotor	0.0051	0.0064
8. Fuel Handling Accident (FHB)	0.0086	0.0000083
9. Rod Ejection	0.0016	0.00053
10. Gas Decay Tank Rupture	0	0
11. Liquid Holdup Tank Rupture	0.028	0.028
12. VCT Rupture	0.013	0.013
13. Core Melt, No Treatment, 25% I_2 Release	0..33	0.33
14. Gas Activity Release, No Treatment, 25% I_2 Release	0.27	0.27
15. Reactor Coolant, No Treatment	0.034	0.034

TABLE 5
CONVERSION FACTOR FOR RELATING GROUND DEPOSITION AND DOSE RATE AT 3' ELEVATION

ISOTOPE	$(\mu Ci/m^2{}^{k_1})/(mR/hr)$
Te-132	35
I-131	200
Cs-137	130

TABLE 6
DOSE CONVERSION FACTORS FOR IODINE AND PARTICULATE ISOTOPES

ISOTOPE	HALF-LIFE (DAYS)	EXTERNAL WHOLE BODY DOSE FROM CONTAMINATED GROUND ($rem/Ci/m^2$)		INGESTION FROM DEPOSITS ON GROUND $Ci/(Ci/m^2)$	
		1 DAY EXPOSURE	7 DAY EXPOSURE	VIA MILK	VIA OTHER PATHWAYS
Co-58	71	3.3×10^3	2.2×10^3	≈ 0	≈ 0
Co-60	1920	8.5×10^2	5.9×10^3	≈ 0	≈ 0
Sr-89	52.1	0	0	0.4	0.4
Sr-90	1×10^4	0	0	0.6	0.5
Ru-103	39.5	1.8×10^2	1.2×10^3	≈ 0	≈ 0
Ru-106	366	6.5×10^1	4.6×10^2	≈ 0	≈ 0
Te-132	3.25	6.8×10^2	3.1×10^3	≈ 0	≈ 0
I-131	8.05	1.3×10^2	7.1×10^2	0.69	9
I-132	0.096	1.1×10^2	1.1×10^2	≈ 0	≈ 0
I-133	0.0875	1.6×10^2	3.1×10^2	0.004	≈ 0
I-135	0.28	2.5×10^2	2.9×10^2	≈ 0	≈ 0
Cs-134	750	5.3×10^2	3.6×10^3	4.2	8.4
Cs-137	1.1×10^4	1.9×10^2	1.3×10^3	4.2	8.4
Ba-140	12.8	2.1×10^2	3.7×10^3	≈ 0	≈ 0

TABLE 6 (Continued)

DOSE CONVERSION FACTORS FOR IODINE AND PARTICULATE ISOTOPES

ISOTOPE	TOTAL DOSE TO ADULT DUE TO INGESTION (Rem/Ci ingested)				TOTAL INHALATION DOSE TO ADULT (Rem/Ci inhaled)			
	BONE MARROW	LUNG	GI TRACT	THYROID	BONE MARROW	LUNG	GI TRACT	THYROID
Co-58	-	-	-	-	3.1×10^3	6.1×10^4	7.2×10^3	1.6×10^3
Co-60	-	-	-	-	5.8×10^4	1.3×10^6	1.9×10^4	4.4×10^3
Sr-89	5.26×10^3	5.81×10^2	$8.53.10^4$	5.81×10^2	1.3×10^4	7.8×10^3	1.4×10^4	1.2×10^3
Sr-90	2.87×10^5	3.74×10^3	8.12×10^4	3.26×10^3	7.3×10^5	1.8×10^4	1.6×10^4	2.8×10^3
Ru-103	-	-	-	-	1.1×10^3	5.4×10^4	1.1×10^4	6.6×10^2
Ru-106	-	-	-	-	6.2×10^3	3.9×10^6	1.3×10^5	1.0×10^3
Te-132	-	-	-	-	1.0×10^3	3.0×10^4	6.1×10^3	9.7×10^4
I-131	2.87×10^2	3.56×10^2	1.91×10^3	1.68×10^6	1.9×10^2	2.4×10^3	3.6×10^2	1.4×10^6
I-132	-	-	-	-	5.0×10^1	1.0×10^3	6.0×10^1	6.6×10^3
I-133	1.48×10^2	1.58×10^2	1.82×10^2	3.21×10^5	9.4×10^1	3.1×10^3	3.3×10^2	1.8×10^5
I-135	-	-	-	-	9.1×10^1	2.5×10^3	2.2×10^2	4.4×10^4
Cs-134	7.34×10^4	7.31×10^4	9.33×10^4	7.33×10^4	4.8×10^4	5.1×10^4	1.8×10^4	1.4×10^4
Cs-137	5.61×10^4	5.59×10^4	6.64×10^4	5.55×10^4	3.7×10^4	4.0×10^4	1.1×10^4	9.5×10^3
Ba-140	-	-	-	-	3.4×10^3	6.3×10^3	1.6×10^4	1.2×10^3

TABLE 7
EFFICIENCY FACTORS, $\epsilon 4$, FOR G-M PROBES

$\epsilon 4$ (mR/hr/cpm) (shield off)

PROBE	EFFECTIVE AGE OF MIXTURE = <100 HRS	EFFECTIVE AGE OF MIXTURE = >100 HRS
HP-240	3.3×10^{-4}	3.3×10^{-5}
HP-260	2.0×10^{-4}	2.0×10^{-5}
HP-210	2.0×10^{-4}	2.0×10^{-5}

TABLE 8
EFFICIENCY FACTORS, $\epsilon 5$, FOR ESTIMATING AIRBORNE ACTIVITY LEVELS FROM G-M READING

$\epsilon 5$ (μCi/cc/cpm) (shield off)

PROBE	EFFECTIVE AGE OF MIXTURE = <100 HRS	EFFECTIVE AGE OF MIXTURE = >100 HRS
HP-240	3.3×10^{-9}	1.8×10^{-9}
HP-260	2.0×10^{-9}	1.1×10^{-9}
HP-210	2.0×10^{-9}	1.1×10^{-9}

TABLE 9
G-M PROBE EFFICIENCY FACTORS, $\epsilon 1$, FOR GROUND SERVEYS

PROBE	$\epsilon 1$ (μCi/m^2/cpm)
HP-240	0.0041
HP-260	0.0012
HP-210	0.0011

TABLE 10
TYPICAL DAILY DIETARY INTAKES

| | Daily Intake (in Kg) For Any Food Item in The Group | |
	Infant	Adult
1. Milk (liquid)	0.7 to 1.0	0.25
2. Water	---	0.2
3. Meat, bakery products, potatoes and sweet potatoes, fresh vegetables, fresh fruit, beverages (excluding those individually listed), and other milk products	---	0.1
4. Fats and oils, flour and cereal, poultry, eggs, sugar and sweetners, canned, frozen and dried vegetables, fruit juices	---	0.05
5. Condiments, spices and flavoring agents, fish and shellfish, canned frozen and dried vegetables, vegetable juices, soups and gravies, nuts and peanut butter	---	0.02
6. Total Intake	1	2.2

PRIMARY

Time 1200 Local Time   Month/Day/Year   02/16/71

Level	WD(Deg)	Sigma A (Deg)	WS(MPS)	Temp(Deg C)	Delt (Deg C/M)
10M	308.1	5.0	5.9	13.5	-------------
46M	----	----	----	13.3	-.0058
76M	310.4	2.3	6.4	13.1	-.0066

Dew PT@10M   (Deg C)   12.7   PCTP SFC   (CM)   .00   VIS SFC (KM)   5.8

Dist(KM)	Chi/Q(Sec/M**3)	Sigma Y(M)	Dist(KM)	Chi/Q(Sec/M**3)	Sigma Y(M)
.80	.379E-4	45.0	8.00	.128E-5	342
1.00	.276E-4	54.3	10.00	.936E-6	414
2.00	.989E-5	101.0	25.00	.267E-6	886
4.00	.355E-5	188.5	50.00	.106E-6	1555
6.00	.194E-5	267.7	Mixing Depth (M) 600		

************E-Horiz   from Sigma A @ 10M   D-Vert from Delt 76-10***************

BACKUP

Time 1200 Local Time   Month/Day/Year   02/16/82

Level	WD(Deg)	Sigma A (Deg)	WS(MPS)	Temp (Deg C)	Delt (Deg C/M)
10M	285.4	8.5	5.4	14.9	-------------
60M	300.9	6.9	5.6	13.4	-.0317

Dist(KM)	Chi/Q(Sec/M**3)	Sigma Y (M)	Dist(KM)	Chi/Q(Sec/M**3)	Sigma Y(M)
.80	.411E-5	61.6	8.00	.321E-6	476.8
1.00	.208E-5	74.8	10.00	.264E-6	579.6
2.00	.110E-5	139.2	25.00	.121E-6	1267.3
4.00	.579E-6	259.3	50.00	.699E-7	2194.5
6.00	.413E-6	370.7	Mixing Depth (M) 600		

************D-Horiz from Sigma A @ 10M   A-Vert From Delt 60-10*************

TABLE 11

TYPICAL DCPP METEOROLOGICAL PRINTER LISTING OF
QUARTER-HOUR AVERAGE METEOROLOGIDAL AND DISPERSION DATA

FIGURE 1

AVERAGE GAMMA DECAY ENERGY FOR NOBLE GAS MIXTURES
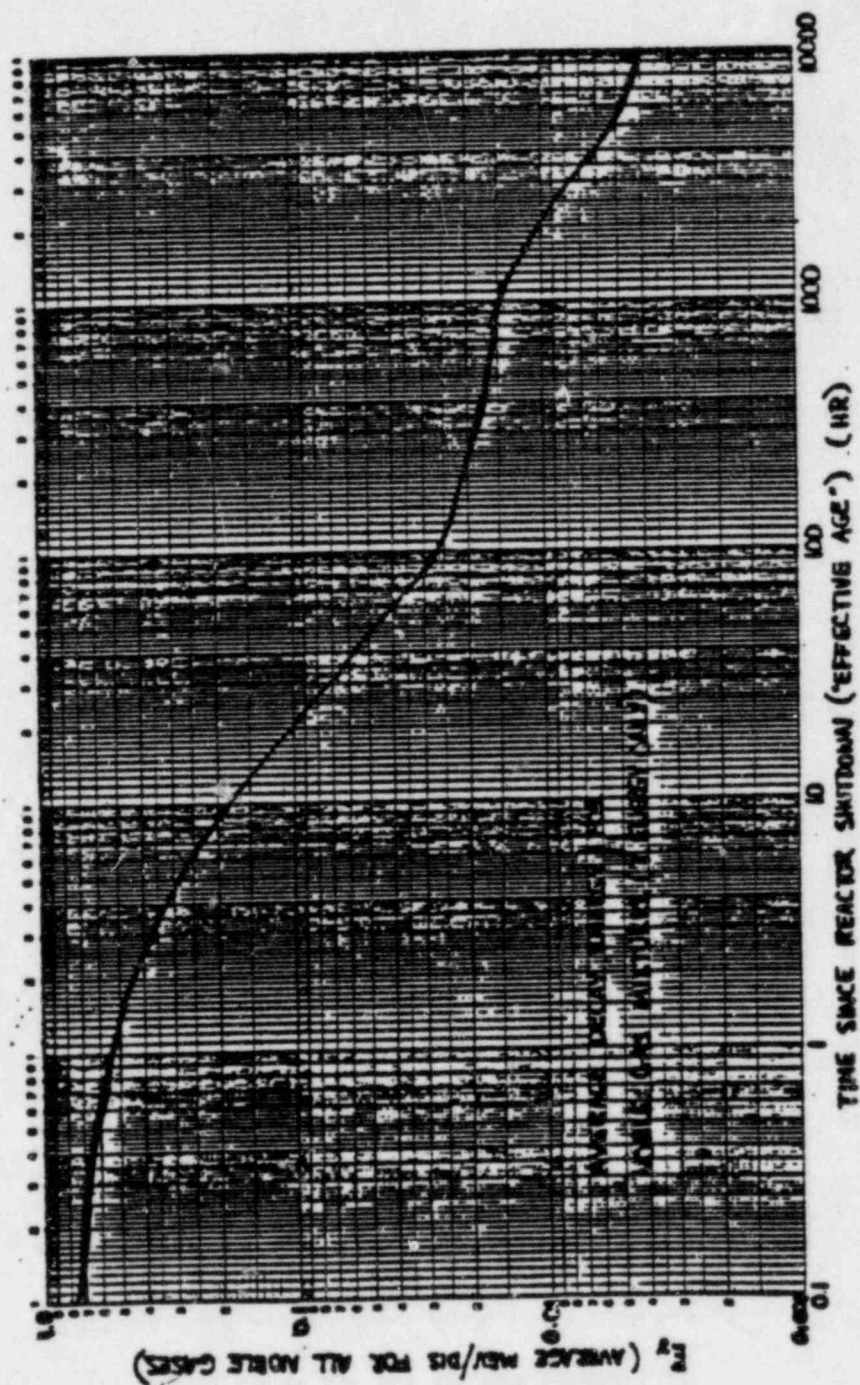
FIGURE 2

RATIO OF THYROID DOSE FROM ALL IODINES TO
THYROID DOSE FROM I-131 VERSUS
"EFFECTIVE AGE" OF MIXTURE
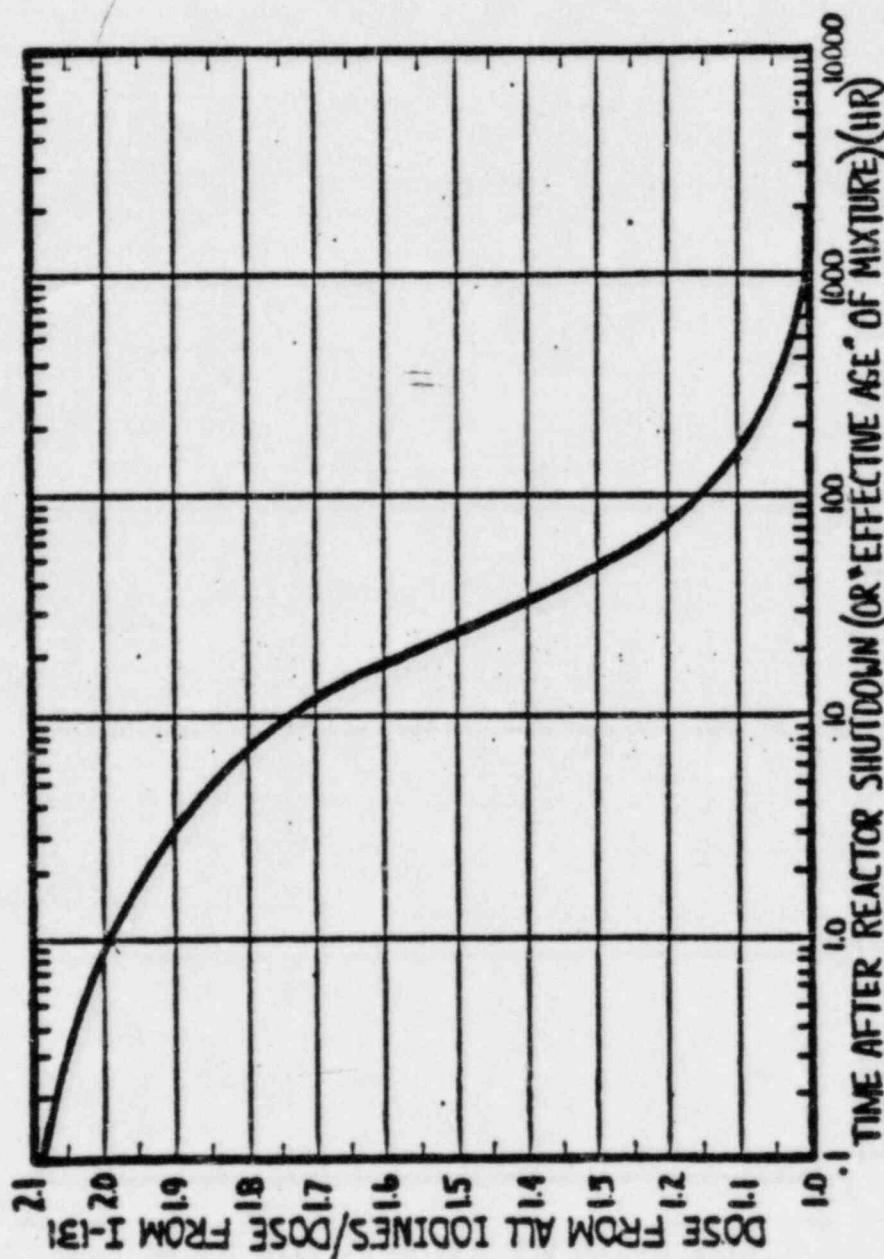
FIGURE 3

GAMMA RADIATION EXPOSURE RATE CORRECTION
FACTOR VERSUS IODINE TO NOBLE GAS ACTIVITY RATIO
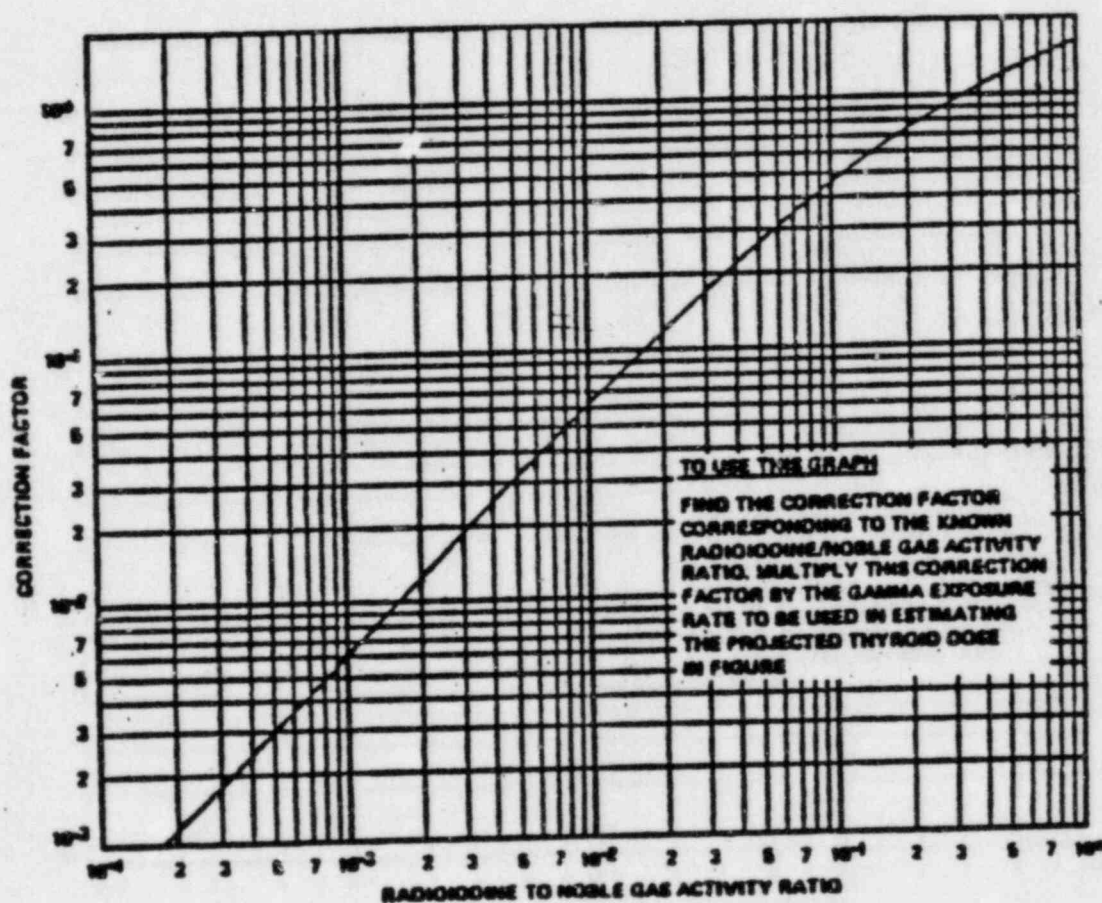
TO USE THIS GRAPH

FIND THE CORRECTION FACTOR CORRESPONDING TO THE KNOWN RADIOIODINE/NOBLE GAS ACTIVITY RATIO. MULTIPLY THIS CORRECTION FACTOR BY THE GAMMA EXPOSURE RATE TO BE USED IN ESTIMATING THE PROJECTED THYROID DOSE IN FIGURE

CORRECTION FACTOR

RADIOIODINE TO NOBLE GAS ACTIVITY RATIO

FIGURE 4

ESTIMATED THYROID INHALATION DOSE AS A FUNCTION OF GAMMA DOSE RATE FROM PLUME AND PROJECTED TIME PERIOD OF EXPOSURE

FIGURE 5

THYROID DOSE DUE TO INHALATION OF I-131

Atrborne I-131 Concentratton (µCt/cc)
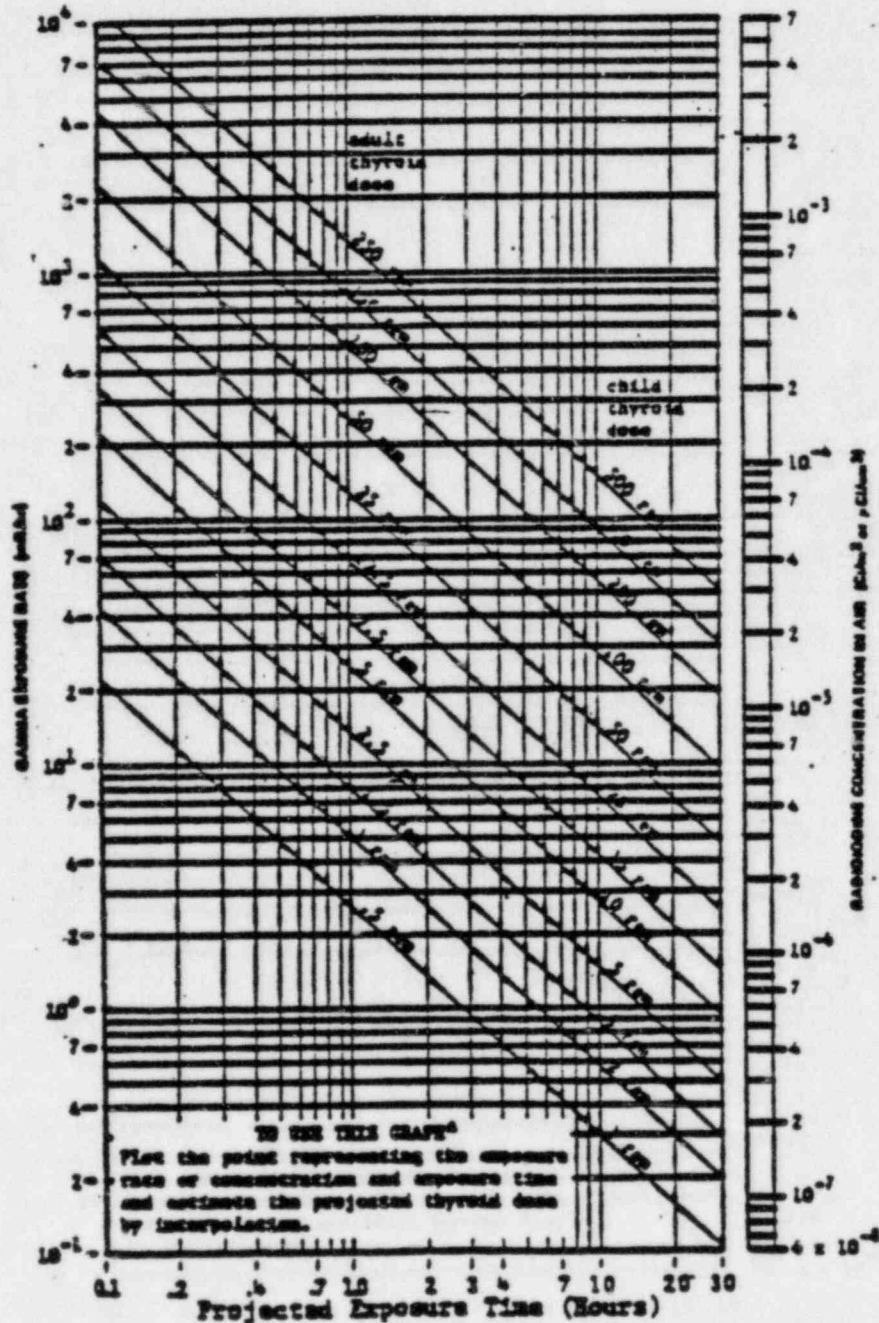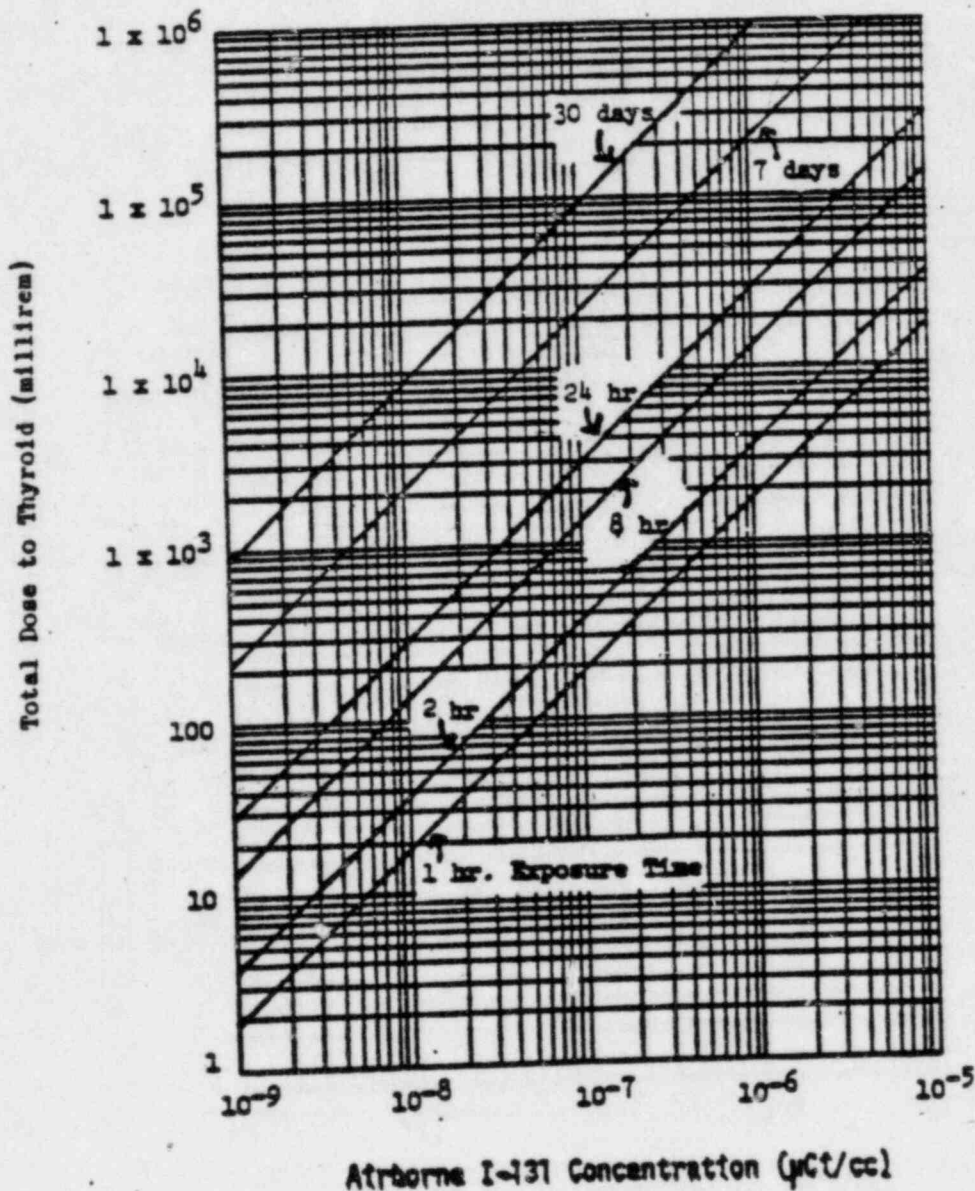
FIGURE 6

THYROID DOSE FROM I-131 FOR VARIOUS EXPOSURE PATHWAY
VERSUS I-131 GROUND DEPOSITION
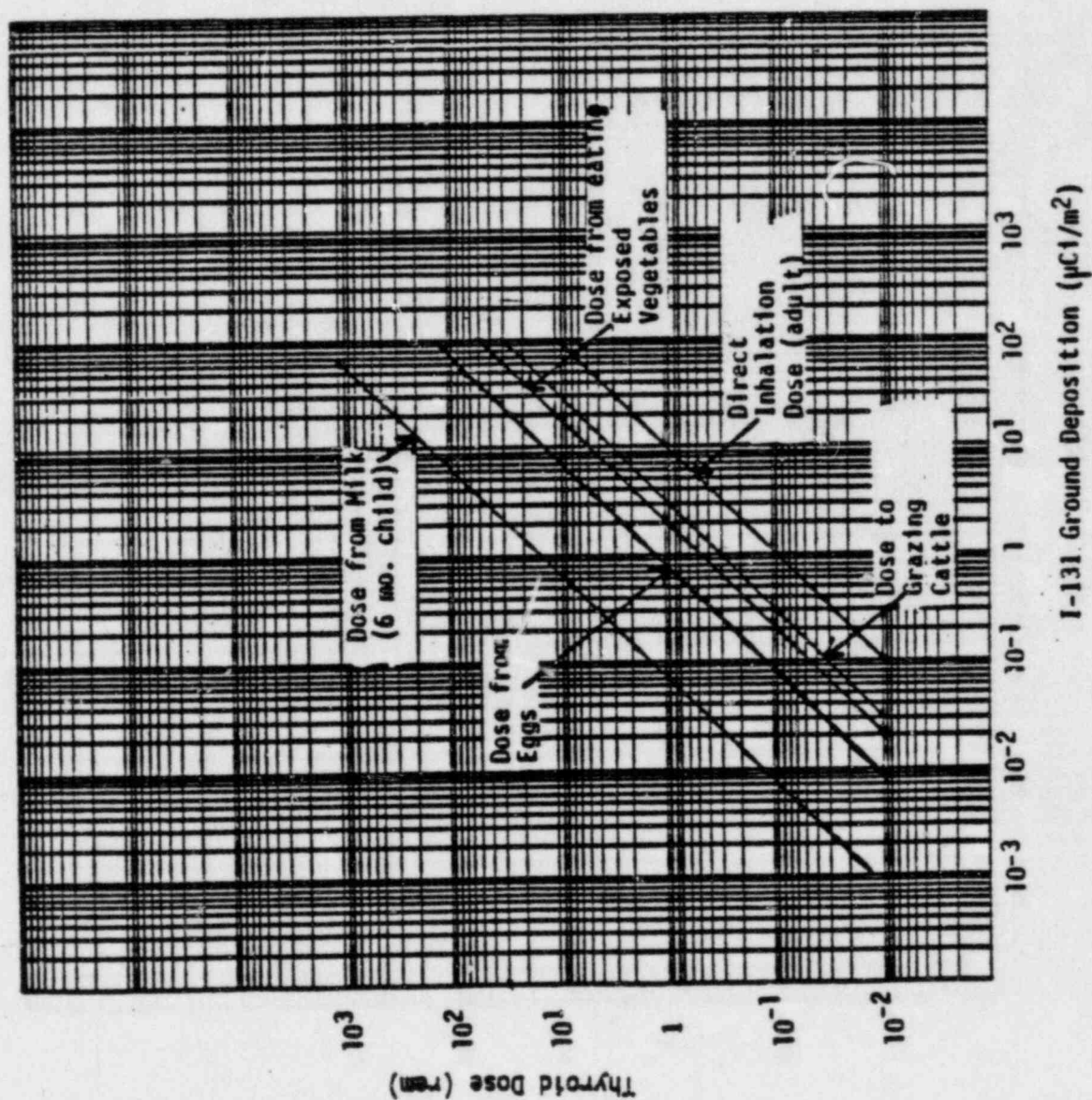
FIGURE 7

RATIO OF I-131 ACTIVITY TO TOTAL IODINE ACTIVITY VERSUS "EFFECTIVE AGE" OF MIXTURE

DIABLO CANYON POWER PLANT UNIT NO(S) 1 and 2

TITLE: EMERGENCY OFFSITE DOSE CALCULATIONS

NUMBER ___ EP-R8-11
REVISION   2
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FIGURE 8

SIGMA Y AS A FUNCTION OF DISTANCE AND STABILITY
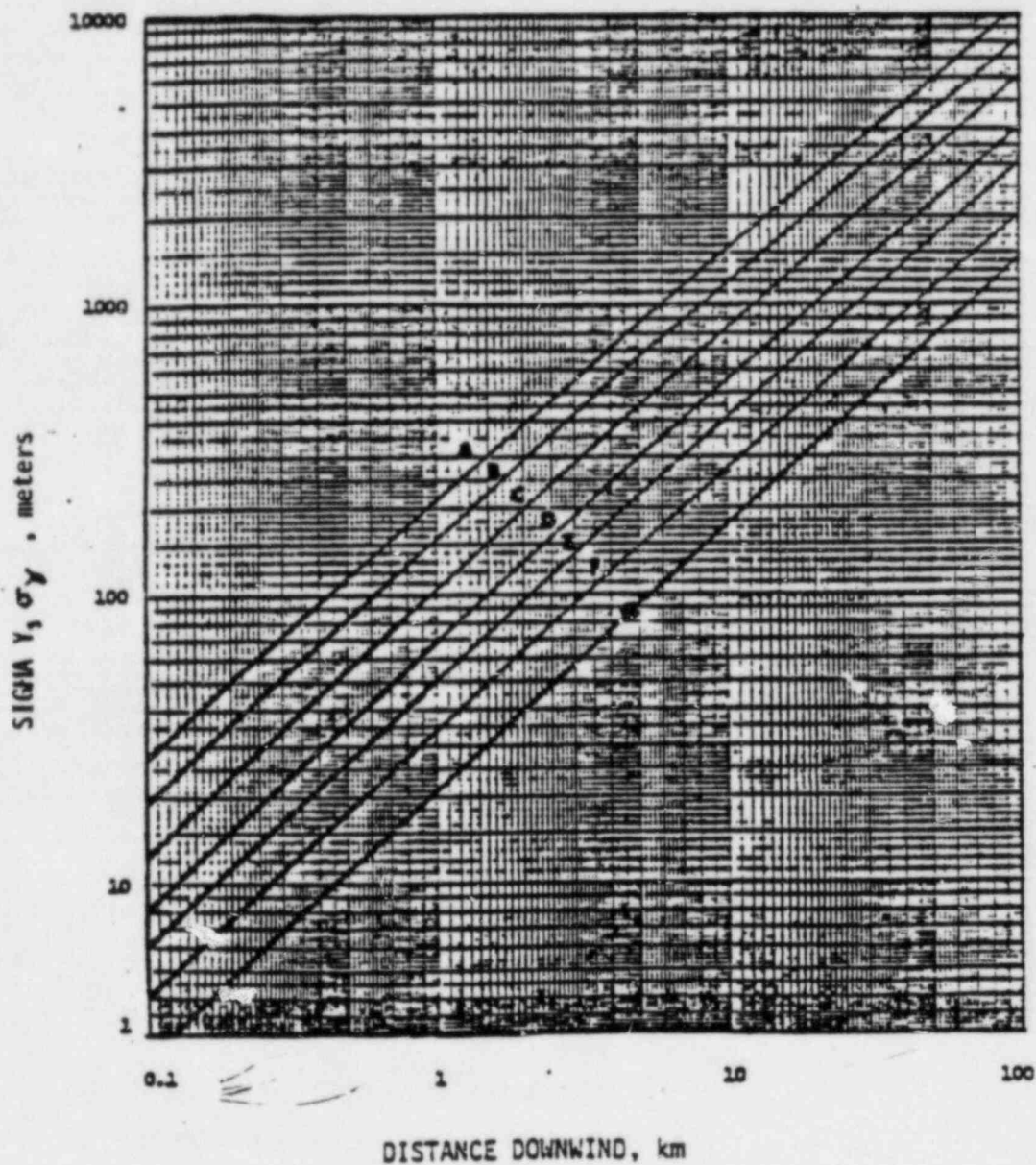
DIABLO CANYON POWER PLANT UNIT NO(S)   1 and 2

NUMBER   EP RB-11
REVISION   2
DATE   1/12/83
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TITLE: EMERGENCY OFFSITE DOSE CALCULATIONS.

FIGURE 9

SIGMA Z AS A FUNCTION OF DISTANCE AND STABILITY
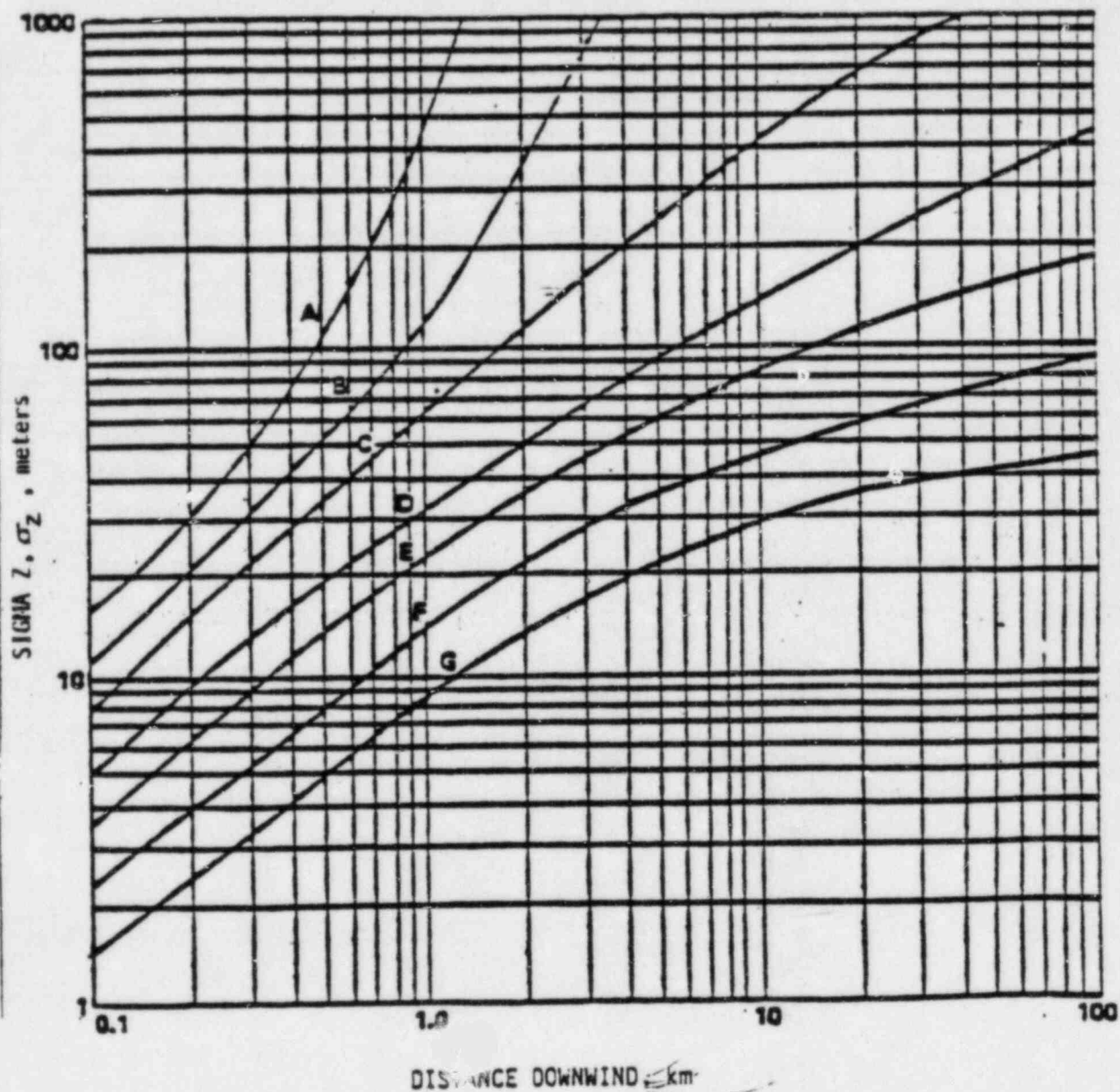
FIGURE 10

230KV
SWITCHYARD

CONSTRUCTION
WAREHOUSE

BATCH
PLANT

POWER PLANT

8.5 MILES
TO AVILA BEACH

COOLING
WATER
DISCHARGE

PRIMARY
METEOROLOGICAL
TOWER

MECHANICAL
TOWER MOUNT

BACKUP
METEOROLOGICAL
TOWER

COOLING
WATER
INTAKE

PACIFIC   OCEAN

0   400   800   1200   1600

SCALE IN FEET
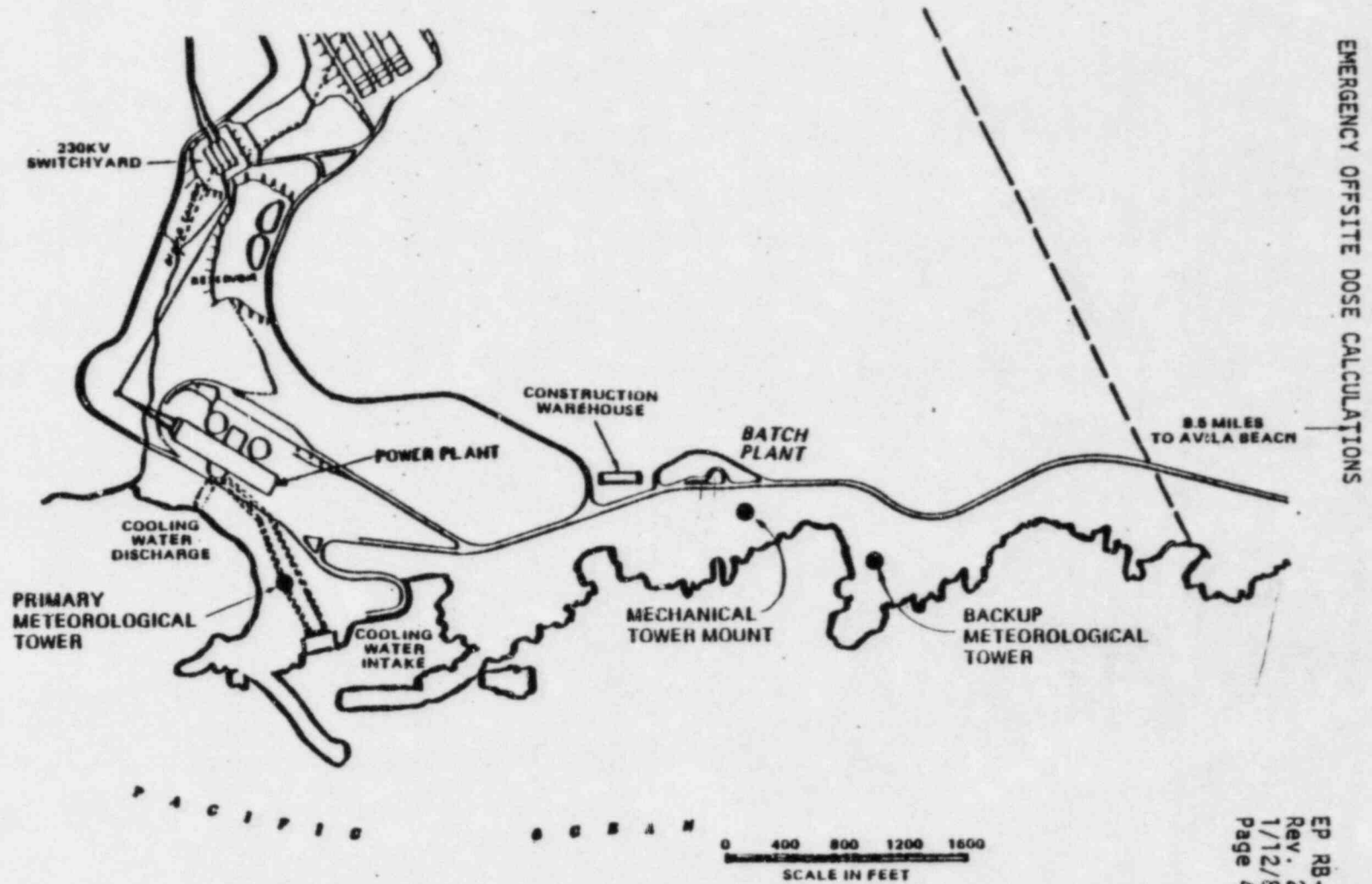
DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER   EP RB-11
REVISION   2
DATE   1/12/83
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TITLE: EMERGENCY OFFSITE DOSE CALCULATIONS

FIGURE 11

Pacific Gas and Electric Company
Department of Nuclear Plant Operations
Diable Canyon Power Plant Unit No(s) 1 and 2

WORKSHEET FOR MANUAL OFFSITE DOSE CALCULATIONS

1. Release Rate and Duration

ISOTOPE OR MIXTURE	SOURCE OF RELEASE	(a) RELEASE RATE $\dot{Q}$ (Ci/sec)	(b) TOTAL RELEASE Q (Ci)	(c) PROJECTED RELEASE OR EXPOSURE DURATION t(hrs)
Noble Gases				
I-131				

2. Meteorological Conditions

(a) WIND DIRECTION (HORIZONTAL) @ 10 METER LEVEL (o)	(b) WINDSPEED @ 10 METER LEVEL u (m/sec)	(c) DELTA T (76 METER TO 10 METER LEVEL) (^{o}C/m)	(d) DELTA T PER 100 METERS (^{o}C/100m) 2(c) x 100	(e) ATMOSPHERIC STABILITY CLASSIFICATION TABLE 1

3. Atmospheric Dispersion and Air Concentrations at Key Receptor Locations

(a) DOWNWIND DISTANCE (meter)	(b) RECEPTOR LOCATIONS	(c) $\chi u/\dot{Q}$ (m^{-2})	(d) $\chi/\dot{Q}$ (sec/m^{3}) 3(c)/2(b)	ISOTOPE OR MIXTURE	(e) AIR CONCENTRATION χ (Ci/m^{3}) 3(d) x 1(a)	(f) TRANSIT TIME TO RECEPTOR LOCATION (hr) 3a ÷ (2b x 3600)
				Noble Gases		
				I-131		
				Noble Gases		
				I-131		
				Noble Gases		
				I-131		
				Noble Gases		
				I-131		
				Noble Gases		
				I-131		
				Noble Gases		
				I-131		
				Noble Gases		
				I-131		
				Noble Gases		
				I-131		

4. Gamma Whole Body Dose and Dose Rate Calculations

RECEPTOR LOCATIONS	(a) EFFECTIVE AGE OF MIXTURE @ ONSET OF RELEASE (hours)	(b) EFFECTIVE AGE OF MIXTURE @ RECEPTOR LOCATION 4(a) or (4(a)×3(f))	(c) AVERAGE GAMMA DECAY @ RECEPTOR LOCATION E_γ (MeV/dis) Figure 1	(d) WHOLE BODY DOSE RATE @ RECEPTOR LOCATION (mR/hr) $(9\times10^5)\times4(c)\times3(e)$	(e) WHOLE BODY DOSE (mR) 4(d)×1(c)

5. Thyroid Dose and Dose Rate Calculations

RECEPTOR LOCATION	(a) ADULT I-131 DOSE RATE @ RECEPTOR LOCATION (Rem/hr) $(1.85\times10^6)\times3(e)$	(b) TOTAL RADIOIODINES (ADULT) DOSE RATE @ RECEPTOR LOCATION (Rem/hr) 5(a) × Fig.2	(c) ADULT THYROID DOSE (Rem) 5(b) × 1(c)	(d) TOTAL RADIOIODINES (CHILD) DOSE RATE @ RECEPTOR LOCATION (Rem/hr) 2 × 5(b)	(e) CHILD (THYROID) DOSE (Rem) 2 × 5(c)

WORKSHEET FOR MANUAL OFFSITE DOSE CALCULATIONS

WHOLE BODY GAMMA DOSE (mR) AND DOSE RATES (mR/hr)

1. $DR_{\gamma,L} = 9 \times 10^5 \times E_\gamma \times X_L$

2. $DR_{\gamma,L} = 9 \times 10^5 \times E_\gamma \times \dot{Q} \times (X/Q)_L$

3. $D_{\gamma,L} = 9 \times 10^5 \times E_\gamma \times X_L \times t$

4. $D_{\gamma,L} = \dfrac{9 \times 10^5 \times E_\gamma \times Q \times (X/Q)_L}{3600}$

THYROID DOSE (Rem) AND DOSE RATES (Rem/hr)

1. $DR_{131,L} = 1.86 \times 10^6 \times X_{131,L}$

2. $DR_{131,L} = 1.85 \times 10^6 \times \dot{Q} \times (X/\dot{Q})_L$

3. $D_{131,L} = 1.85 \times 10^6 \times X_{131,L} \times t$

4. $D_{131,L} = \dfrac{1.85 \times 10^6 \times Q \times (X/\dot{Q})_L}{3600}$

UNITS

$9 \times 10^5 = \dfrac{mR\text{-}dis\text{-}m^3}{MeV\text{-}Ci\text{-}hr}$

$1.85 \times 10^6 = \dfrac{Rem\text{-}m^3}{Ci\text{-}hr}$

$\dot{Q} = Ci/sec$

$Q = Ci$

$X/Q = sec/m^3$

$t = hours$

$x = Ci/m^3$

$E_\gamma = MeV/dis$

$L = $ Location or Distance

$3600 = sec/hr$

$\mu Ci/cc = Ci/m^3$

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2
EMERGENCY PROCEDRUE RB-11

WORK SHEET FOR DETERMINATION OF (X/Q)

DATE _____ TIME _____

BY _____

REMARKS _____

_____

_____

1. METEOROLOGY COMPUTER DATA

WD(DEG)	WS(MPS)	σ_A(DEG)
_____	_____	_____

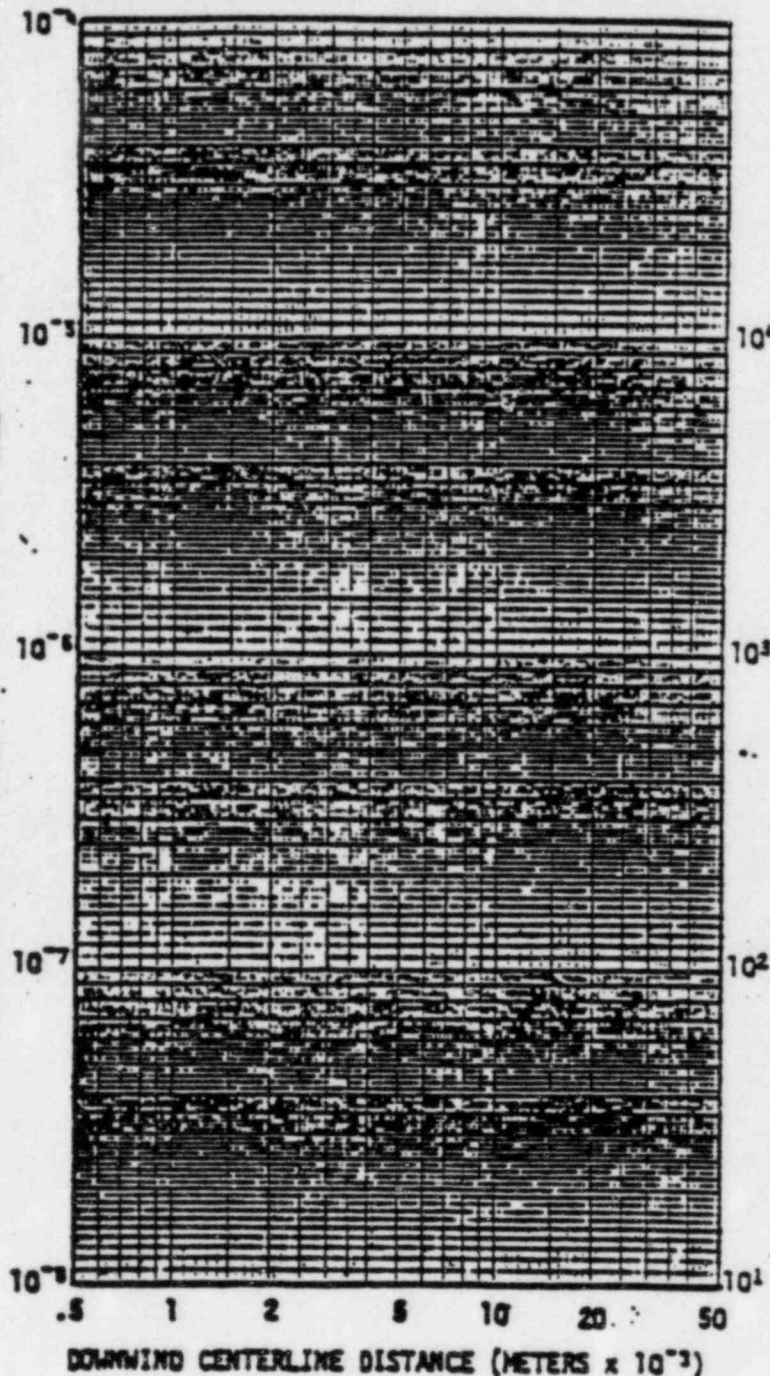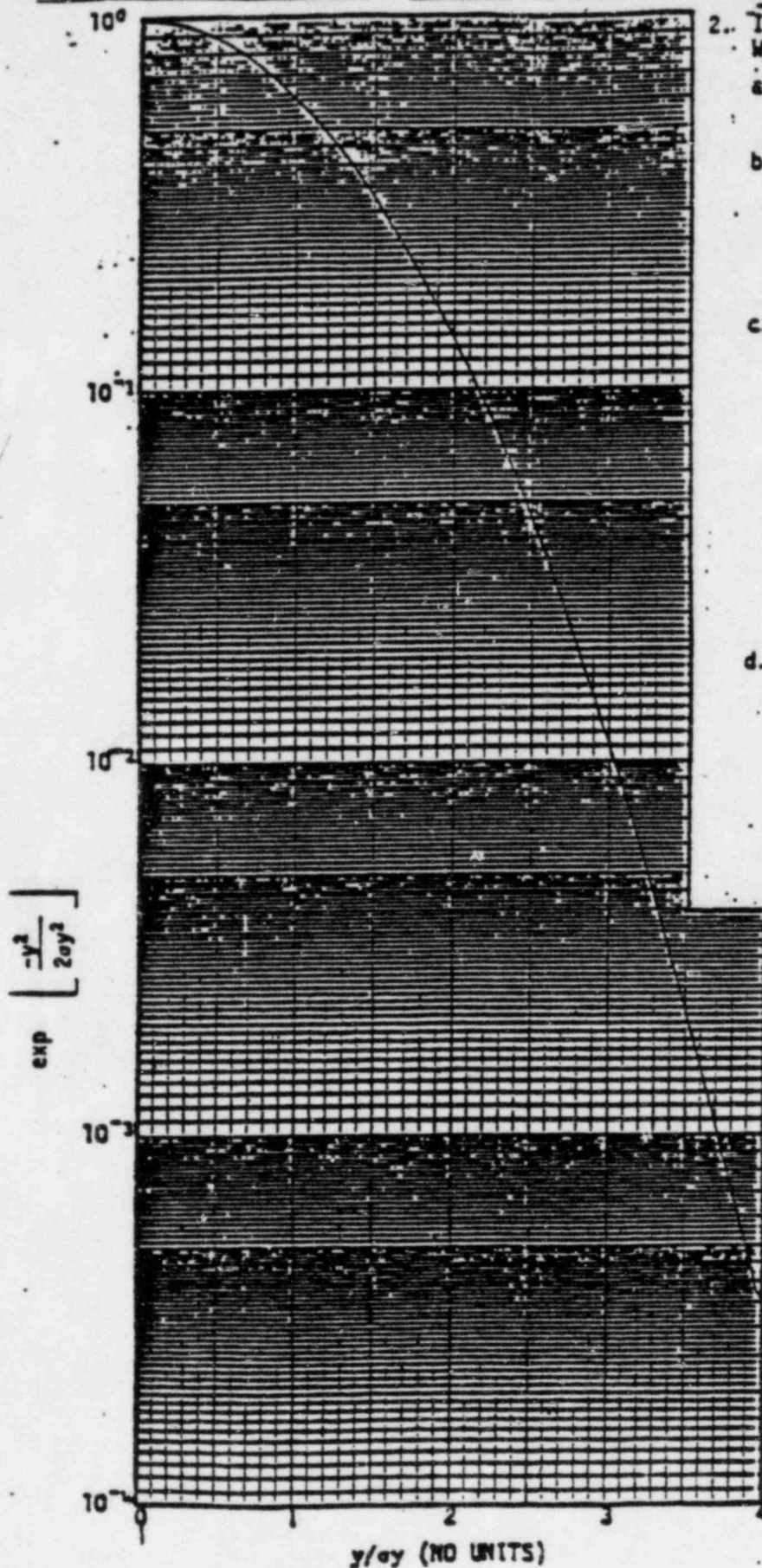| DIST(M)	X/Q(SEC/M³)	σy(M)
0.8	_____	_____
1.0	_____	_____
2.0	_____	_____
4.0	_____	_____
6.0	_____	_____
8.0	_____	_____
10.0	_____	_____
25.0	_____	_____
50.0	_____	_____

PLOT (X/Q) AND σy OUTPUT ON
LOG-LOG PLOT. DRAW A SMOOTH
CURVE THROUGH POINTS TO
DETERMINE (X/Q)$_{CL}$ AND σy AT
ANY DOWNWIND DISTANCE.

DOWNWIND CENTERLINE DISTANCE (METERS x 10⁻³)

Y-axis label: $\exp\left[\dfrac{-y^2}{2\sigma_y^2}\right]$

X-axis label: y/σ_y (NO UNITS)

Y-axis values: 10^0, 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}

X-axis values: 0, 1, 2, 3, 4

2. IF POINT OF INTEREST IS NOT ON DOWN-WIND CENTERLINE, PROCEED AS FOLLOWS:

&. IDENTIFY POINT OF INTEREST

b. ON A MAP, CONSTRUCT THE DOWNWIND CENTERLINE BY DRAWING AN ARROW ... THE DOWNWIND DIRECTION (WIND DIRECTIONS ARE GIVEN AS THE DIREC-TION FROM WHICH THE WIND IS BLOWING).

c. CONSTRUCT A PERPENDICULAR LINE FROM THE POINT OF INTEREST TO THE DOWNWIND CENTERLINE. DETERMINE THE FOLLOWING:

1) DOWNWIND CENTERLINE DISTANCE TO INTERCEPT POINT: _____ M

2) PERPENDICULAR DISTANCE TO CENTERLINE INTERCEPT (y) _____ M

3) $(\chi/\dot{Q})_{CL}$ _____ SEC/M^3

4) σ_y _____ M

d. DETERMINE THE FOLLOWING

y/σ_y = _____

$\exp-\left[\dfrac{y^2}{2\sigma_y^2}\right]$ = _____ (from graph)

$(\chi/\dot{Q}) = (\chi/\dot{Q})_{CL} \times \left(\exp-\left[\dfrac{y^2}{2\sigma_y^2}\right]\right)$

= _____ SEC/M^3