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PERRY NUCLEAR POWER PLANT

Al Kaplan

VICE PRESIDENT
NUCLEAR GROUP

September 20, 1988
PY-CEI/NRR-0912 L

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Perry Nuclear Power Plant
Docket No. 50-440
Responses on Offsite Dose
Calculation Manual, Rev. 2

Gentlemen:

Attachment 1 contains our responses to the questions listed in the Technical Evaluation Report for the evaluation of Revision 2 to the Offsite Dose Calculation Manual (ODCM) conducted by EG&G Idaho, Inc. (Reference your letter dated March 9, 1988 from T. Colburn to A. Kaplan).

The most current revision to the Perry ODCM is Revision 3, with TC-1 and TC-2. This was submitted as an attachment to the Semiannual Radiactive Effluent Release Report, letter PY-CEI/NRR-0906 L, dated August 30, 1988.

All the changes to the ODCM described in Attachment 1 are in the process of being incorporated, and will be provided to the NRC as an attachment to the next submittal of the Semiannual Radioactive Effluent Release Report.

Please feel free to call if you have any questions or comments.

Very truly yours,

A. Kaplan

Al Kaplan
Vice President
Nuclear Group

Attachments
AK:njc

cc: T. Colburn
K. Connaughton
USNRC Region III

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RESPONSE TO NRC REVIEW COMMENTS ON THE PNPP OFFSITE DOSE CALCULATION MANUAL

Major Discrepancies

1. In Section 2.1.1.4, it is uncertain if the ratio f_{max}-to-f_{act} should be included in the expression for determining the setpoint. If the ratio is not included, then the monitor could guard against inadvertently releasing an incorrect tank. If the ratio is included, it may be possible to inadvertently release a tank having higher activity than the intended tank and still be within the limiting radiation setpoint calculated for the intended tank.

   Response: ODCM Section 2.1.1, Monitor Alarm Setpoint Determination, was written and is implemented to ensure Technical Specification 3.11.1.1 (10 CFR Part 20, Appendix B) compliance. Furthermore, ODCM calculations limit liquid radwaste releases to 1/10 of these Technical Specification limits. The primary means of limit control is provided by the liquid radwaste discharge **flow monitor** alarm setpoint (for which procedural guidance includes an additional factor of two conservatism by reducing the specified liquid radwaste tank discharge flow rate to half of the calculated allowable value.) The f_{max}-to-f_{act} factor was included in the liquid radwaste discharge **radiation monitor** setpoint as an adjustment factor (to account for the difference between the actual radwaste discharge flow rate to be used and the maximum allowable radwaste discharge flow rate) in order to allow operational flexibility, i.e., minimization of setpoint changes, and to eliminate spurious alarms. Administrative controls are in place to preclude the chance of the inadvertent release of an unintended tank.

2. The product $M_p F$ in the denominator of Equations 2.3-1, 2.3-2, and 2.3-3 should be replaced with F, where F is defined as the average dilution flow during the reporting period times an adjustment factor.

   Response: The evaluation section of the Technical Evaluation Report for the Evaluation of ODCM Revision 2, discusses agreement of liquid dose calculation methodologies between the ODCM and NUREG-0133. The F term used in our ODCM includes the actual dilution flow provided by the Service Water and Emergency Service Water Systems during the period of liquid radwaste release. This term does not exceed the 1000 cfs limit included in NUREG-0133. The M_p term (as outlined in Regulatory Guide 1.109) accounts for the dilution that occurs once the effluent leaves the area of the plant discharge structure, as covered in Section 4.3.1 of NUREG-0133 (term D_w of the dose factor equation).

3. The definition for Q_i in Section 3.2.3 should be defined as the average release rate based on the analysis of charcoal and particulate samplers that are collected on a weekly basis as required by Technical Specification Table 4.11.2.1.2-1 instead of being defined as the annual average release rate.

   Response: The Q_i term in ODCM Equation 3.2-1 is the release rate of radionuclide i in μCi/s. The actual values used for calculations are those of the actual release period. For the purpose of calculating an annual dose rate, the release rates for the sample period are assumed to continue at the respective levels for a year, hence the wording "annual average" release rate.

4. The equations in Sections 3.3.3.a and 3.3.3.b calculate air dose rate in mrad/year instead of dose in mrad. A time factor must be included in the equations to calculate the monthly dose.

   Response: Sections 3.3.3.a and 3.3.3.b calculate gamma and beta air dose to evaluate 10CFR50 Appendix I compliance. 10CFR50 Appendix I limits are based on an annual period, i.e., dose limits are in the units of mrad per year. (Per 10CFR50, Appendix I, quarterly values one half the annual limits require written notification.) These equations are written to evaluate this annual limit. Doses are actually calculated for the period of release, using meteorological conditions concurrent with that release and the duration of release, and that dose is then compared to the annual limit. These calculations are performed at least monthly, as required by Technical Specifications. The equations are written, however, to evaluate the annual limits.

5. χ/Q in Sections 3.3.3.a and 3.3.3.b is defined as the normal relative dispersion factor which is the product of the highest annual average χ/Q for the point of concern times the occupancy factor. For these calculations, the occupancy factor must be set to 1 to calculate the maximum dose to air. Therefore, the χ/Q term must be redefined as the highest annual average relative dispersion factor.

   Response: The χ/Q term in Sections 3.3.3.a and 3.3.3.b is defined as "the normal relative dispersion factor". These χ/Q values are calculated using conditions present during the period of release, as stated in the response to the preceding discrepancy. Occupancy factors are not applied here. Confusion, related to occupancy factors, may have been caused by the discussion in Section 4.3, Dose to Members of the Public While Onsite, where a "relative χ/Q" term is used. The "relative χ/Q" used in Section 4.3 calculations, which incorporates an occupancy factor correction to an annual average χ/Q, is not the same χ/Q as that used in Section 3.3.3.a and 3.3.3.b calculations. The χ/Q term used in Sections 3.3.3.a and 3.3.3.b is the χ/Q term that is defined in Appendix A. A reference to Appendix A will be added to the Section 3.3.3a and b. χ/Q terms, to clarify this point.

6. In Section 3.3.3, the method for time integration should be explained for converting dose rate to dose for I-131, I-133, tritium and radionuclides in particulate form with half-lives greater than 8 days.

Response: Annual dose rates resulting from the release of I-131, I-133, tritium and radionuclides in particulate form with half-lives greater than 8 days, as well as noble gas gamma and beta air dose, are calculated using the equations specified in the text. Dose values are obtained by applying the dose rates over the appropriate surveillance or sampling period. The ODCM is in the process of being revised to reflect this wording.

Additional Discrepancies

1. Figure 3.0-1 (probably page 29) showing the gaseous effluent release points is missing from the ODCM.

Response: As noted in the NRC cover letter forwarding this TER, Figure 3.0-1 was found by the NRC and was reviewed. The NRC requested that this complex figure be replaced with a simplified block diagram. This figure has therefore been redrafted, for inclusion in the ODCM, to improve clarity. This redrafted figure is enclosed for your information as Attachment 2 to this letter.

2. Section 3.2.2 states that the controlling location for the dose rate limit due to the release of I-131, I-133, tritium, and radionuclides in particulate form with half-lives greater than eight days is a function of the highest relative deposition, D/Q. Since the dose rate is via the inhalation pathway as stated in the bases statement for Technical Specification 3.11.2.1.b, then the dose rate is dependent on the χ/Q and not D/Q.

Response: Dose rate calculations for the release of I-131, I-133, tritium, and radionuclides in particulate form with half-lives greater than eight days include contributions from several pathways. Per ODCM Table 3.2-3, these pathways include ground shine, vegetables, meat, milk and inhalation. Calculations for all pathways other than inhalation use D/Q; inhalation pathway calculations use χ/Q. Section 3.2.2 of the ODCM is in the process of being revised to include χ/Q in this discussion.

3. Section 3.2.2 contains Equation (3.2-1), a general equation for the dose rate via several pathways. The section would be considerably simpler, if the dose rate calculation were limited to the child's thyroid via inhalation pathway for consistency with the bases statement of Technical Specification 3.11.2.1.

Response: Dose rates are calculated for several pathways, age groups, and organs (specified in Tables 3.2-1 through 3.2-3); one combination of which is the thyroid dose rate to child via the inhalation pathway. By calculating other dose rates, we are ensuring more complete Technical Specification compliance

assessment. This combination was taken from the text of NUREG-0473 as part of an attempt to remain as consistent as possible to wording in that Guide. Dose rate compliance is evaluated for the above mentioned combination, among others, in the calculations outlined in this section.

4. Q_i in Sections 3.3.3.a and 3.3.3.b should be defined as the average release rate of radionuclide i during the reporting period instead of the release rate of radionuclide i.

   Response: As stated above, doses, per Sections 3.3.3.a and 3.3.3.b, are calculated for the period of release (and concurrent meteorological conditions) and those doses compared to the annual limit. Hence, the actual release rate for isotope "i" is used.

5. The data in Table 3.2-5 referenced in DFG_{ij} in Section 3.2.3.c are identical to the data in Table 2.3-9.

   Response: External dose factors are used for liquid and gaseous calculations. Tables of these factors are included in both sections for ease of user reference and to keep each section (liquid and gaseous) separate, yet complete entities.

6. The data in Tables 3.2-10 through 3.2-13 referenced in DFI_{aij} in Section 3.2.3.d are identical to the data in Tables 2.3-5 through 2.3-8, respectively. It is not clear why two sets of identical tables are included in the ODCM.

   Response: See response to Additional Discrepancy 5.

7. A simplified diagram illustrating the discharge pathways for the radioactive gaseous waste systems is not included in the ODCM.

   Response: See response to Additional Discrepancy 1.

8. A simplified diagram illustrating the solid waste treatment system is not included in the ODCM.

   Response: All matters pertaining to solidified waste treatment (and dewatering) are contained in Perry's Process Control Program (PCP) which has been previously submitted under a separate cover.

9. Table 5.1-1 of the ODCM does not include control location 28 for the milk sample.

   Response: REMP Location 28, a water sample control, is contained in the waterborne sampling media portion of Table 5.1-1.

10. Figures 5.1-1, 5.1-2, and 5.1-3 containing Temporary Change 5 to the Environmental Monitoring Program map are missing in the ODCM. The available maps, updated through Temporary Change 4, do not identify sample locations 29, 44, 48, 52, 53, 54, 55, and 56.

Response: As noted in the NRC cover letter forwarding this TER, Figures 5.1-1, 5.1-2, and 5.1-3 were found by the NRC and have been reviewed. The REMP figures in the current version of the ODCM are up to date and include all locations listed in the REMP tables.

Suggestions

1. In Equation 2.3-3 the exponential buildup term includes a 20 year value for t_b, the period of time for which the sediment is exposed to the contaminated water. The 20 years is a conservative value and could probably be replaced with a lesser value which would be increased as the plant ages.

   Response: The twenty year exponential build up term was incorporated at the request of our original NRC (NRR) ODCM reviewers.

2. In Table 2.3-4, the bioaccumulation factor of 1.0E+05 for phosphorous could be replaced with a lesser value of 3.0E+03.

   Response: The bioaccumulation factor of 1.0E+05 for phosphorous was taken from Regulatory Guide 1.109, Revision 1, Table A-1, freshwater fish. We were not aware of the 3.0E+03 value and would appreciate identification of its source.

3. Table 2.3-10 lists current values for the dilution ratios M_D. If the adjustment factor allowed by NUREG-0133 is included in the dilution terms in the equations of Section 2.3.1, then Table 2.3-10 can be deleted from the ODCM.

   Response: Perry plans to use the dilution ratios specified in Table 2.3-10 for liquid radioactive effluent dose calculations. See the response to Major Discrepancy 2 for elaboration.

4. If the next revision to the ODCM includes only the inhalation pathway for the dose rate calculation in Section 3.2.3, then a better location for all the dose rate expressions of Section 3.2.3 would be in Section 3.3 where they are used in the dose calculation due to the release of I-131, I-133, tritium and radionuclides in particulate form with half-lives greater than eight days.

   Response: Perry opts to use the organs, age groups, and pathways specified in Tables 3.2-1, 3.2-2, and 3.2-3, respectively, for dose rate compliance assessment. This approach is considered more conservative, see the response to Additional Discrepancy 3 for elaboration.

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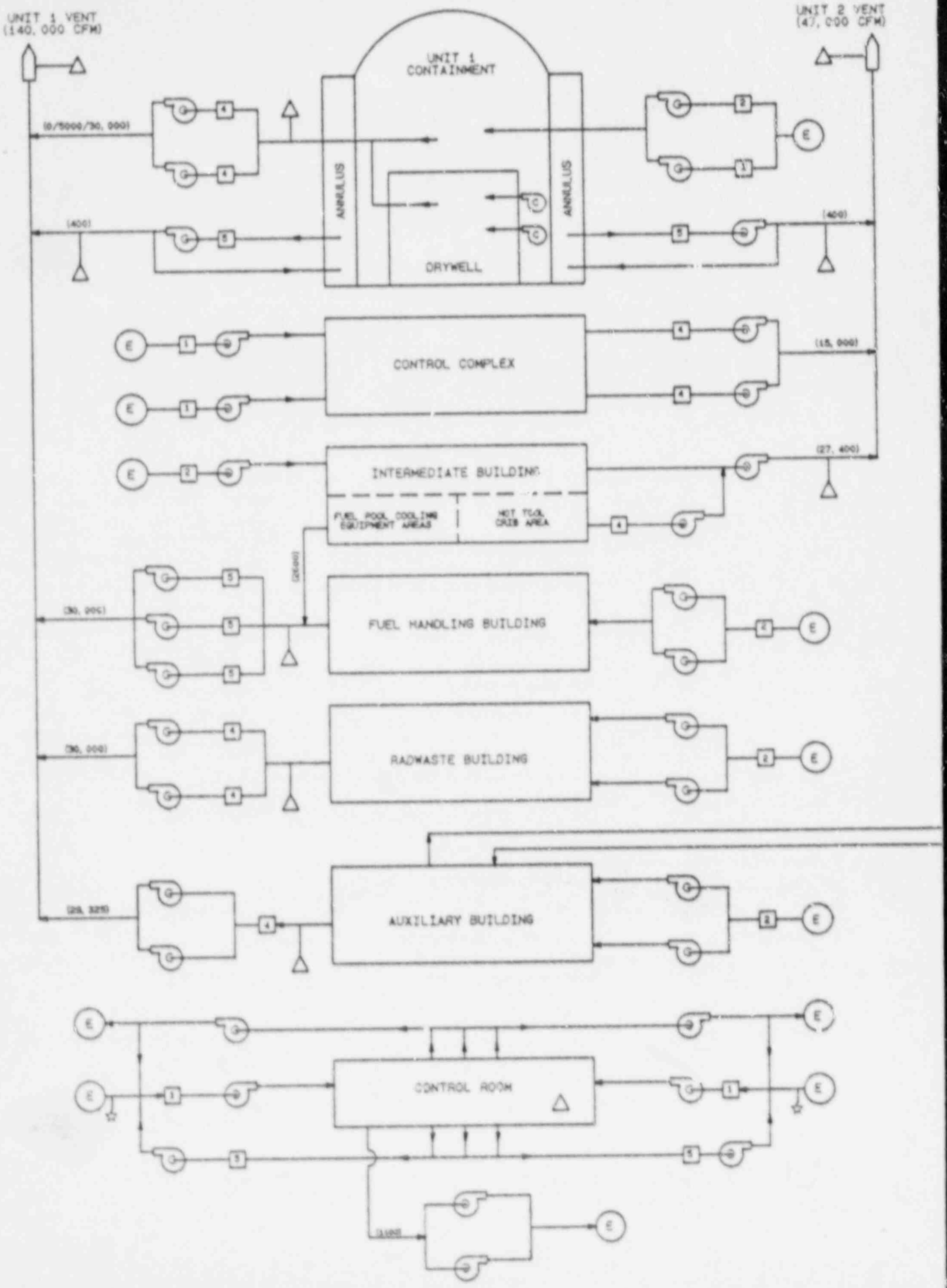
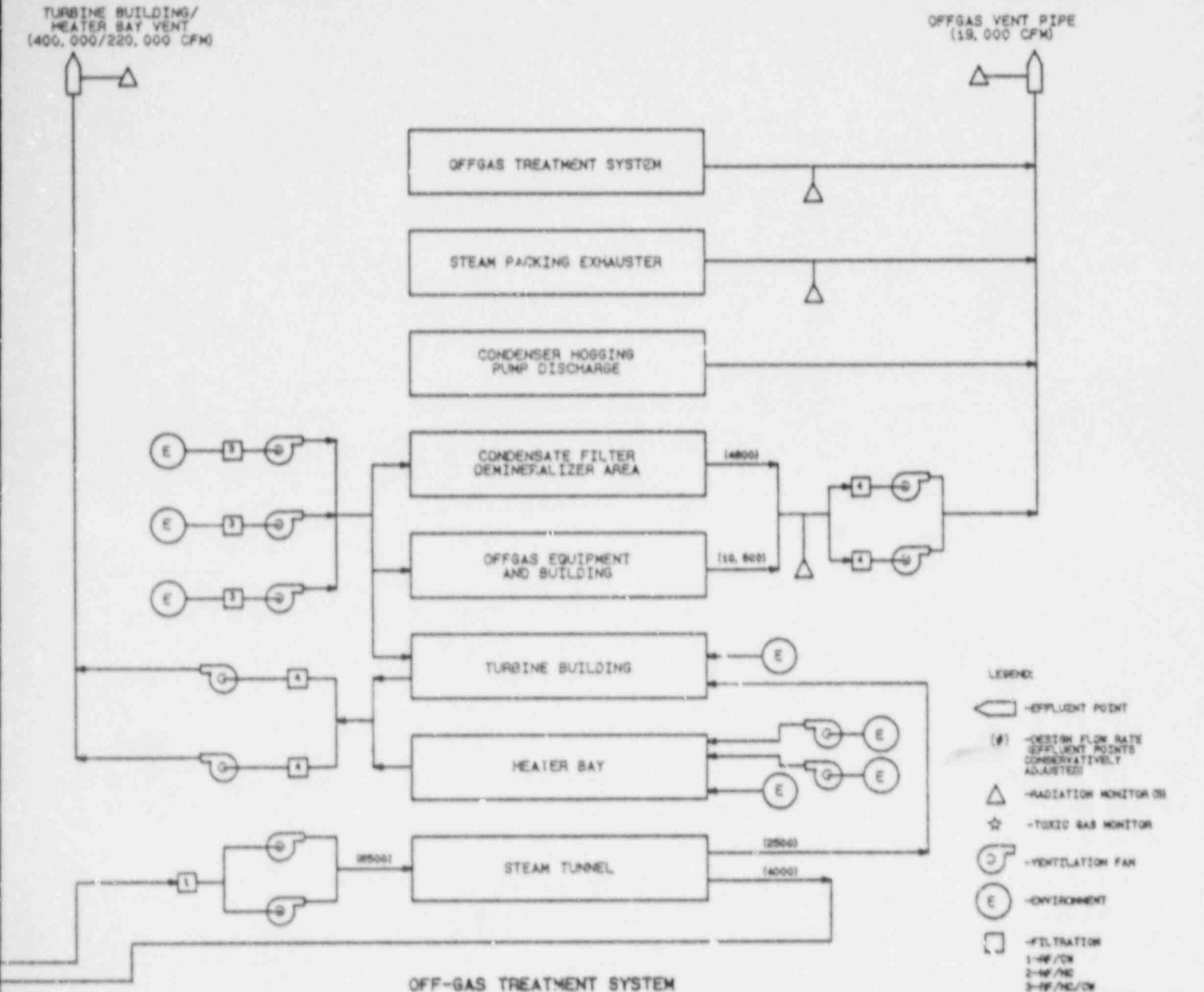
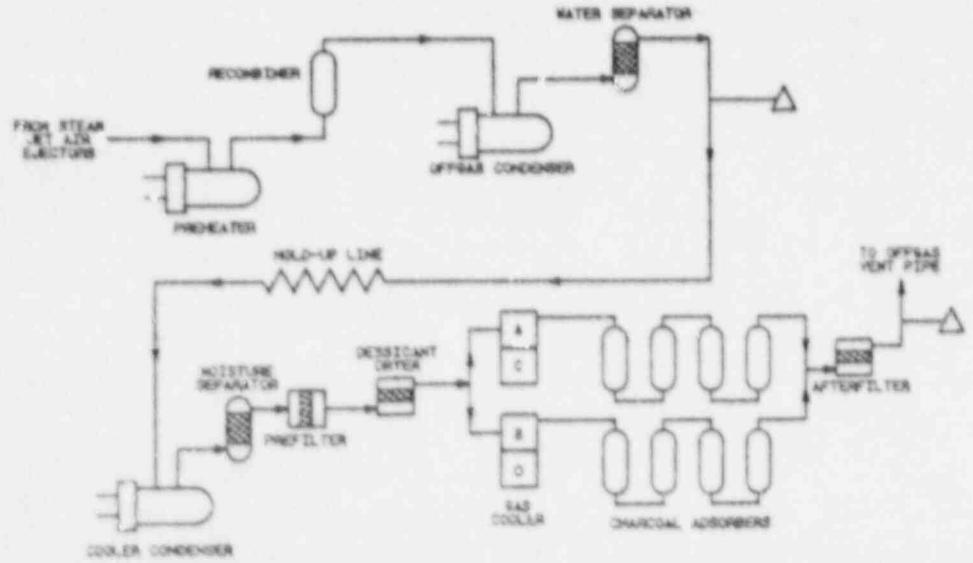


IGURE 3.0-1
ENT SYSTEM FLOW DIAGRAM

Attachment 2
PY-CE1/NRR-0912 L



OFF-GAS TREATMENT SYSTEM



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