UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555
October 22, 1991

Docket No. 50-410

LICENSEE: Niagara Mohawk Power Corporation

FACILITY: Nine Mile Point Nuclear Station, Unit 2

SUBJECT: MEETING MINUTES REGARDING THE AUGUST 22, 1991, MEETING TO DISCUSS THE FINAL RESOLUTION OF THE SECONDARY CONTAINMENT DRAWDOWN ISSUE AT NINE MILE POINT 2

A meeting was held in the NRC One White Flint North Office in Rockville, Maryland, with Niagara Mohawk Power Corporation (NMPC) and NRC staff representatives to discuss the initial analysis and design concepts associated with final resolution of the secondary containment drawdown issue. Enclosure 1 is a list of meeting attendees. The handout material used by the licensee during the meeting is attached as Enclosure 2.

By letter dated August 26, 1988, NMPC transmitted to the NRC staff a revised secondary containment drawdown analysis and a revised loss of coolant accident (LOCA) radiological analysis. The original drawdown and LOCA radiological analyses were described in Sections 6.2.3.3 and 15.6.5 of the Final Safety Analysis Report, respectively. These analyses were revised after the licensee determined that several assumptions used in the original drawdown analysis were nonconservative. More specifically, the original drawdown analysis assumed a maximum rather than minimum differential between the reactor building air and service water pump discharge temperatures (Delta-T) and a single failure assumption that, although consistent with Standard Review Plan guidance, did not produce the most limiting drawdown time. The initially assumed Delta-T (23°F) imposed a limitation on plant conditions in that deliberate heating of the reactor building was required in the summer to maintain the assumed Delta-T.

The revised drawdown analysis (Revision 1) incorporated a more conservative single failure assumption and extended the drawdown time from 129 seconds to six minutes. Drawdown time is the time necessary to reestablish a negative pressure of 0.25 inch water gauge in the secondary containment following a LOCA. The six-minute drawdown time was required to minimize the Delta-T requirement on the plant. In essence, operating limits were placed on Delta-T based upon existing outdoor air temperature. These operating limits were developed using measured Standby Gas Treatment System (SGTS) exhaust flow and reactor building inleakage rates, and included a ten percent margin to account for any degradation in the secondary containment pressure boundary that might occur over an 18-month operating cycle. The licensee implemented several hardware changes pursuant to 10 CFR 50.59 to support Revision 1 of the drawdown analysis. A modification was performed to automatically trip

nonessential lights on a LOCA signal in order to reduce heat loads in the reactor building. The reactor building unit coolers were modified to automatically initiate upon receipt of a LOCA signal in order to accelerate the heat removal process. Revision 1 of the drawdown analysis did not include heat loads from the spent fuel pool and its associated cleanup and cooling equipment. The revised analysis was, therefore, valid only for the first plant operating cycle when there was no spent fuel being stored in the spent fuel pool.

The revised LOCA radiological analysis utilized the same assumptions and methodology as the original analysis with several exceptions. The extended secondary containment drawdown time of six minutes was used along with revised, but more conservative, dispersion factors for releases from the SGTS building to the control room. More realistic assumptions were also used for the bypass leakage calculation. The revised LOCA radiological consequences remained within the regulatory guidance of 10 CFR Part 100 for offsite doses and GDC-19 for the control room doses. The NRC staff evaluated this revised analysis and found it to be acceptable. The evaluation was described in an enclosure to a memorandum from LeMoine J. Cunningham to Marylee M. Slosson dated June 12, 1989. The bases for the staff's determination were the use of (1) the revised atmospheric dispersion coefficients as presented in Supplement No. 2 to the Nine Mile Point Unit 2 Safety Evaluation Report (SER) and (2) the fission product attenuation credits in the main steam lines as described and justified in Supplements Nos. 2 and 4 to the SER. A recommendation was made at that time that a license amendment be issued to incorporate the revised drawdown time. This recommendation was not pursued with the licensee since measurement of actual drawdown time would require the duplication of LOCA conditions within the secondary containment. The ability of the SGTS to reduce secondary containment pressure in an acceptable period of time is demonstrated every 18 months pursuant to Technical Specification (TS) 4.6.5.1.c.1. Each SGTS system must drawdown the secondary containment to greater than or equal to 0.25 inch of vacuum water gauge in less than or equal to 120 seconds when starting at a pressure no less than zero psig.

By letter dated June 7, 1990, the licensee advised the NRC staff of studies that had been conducted to alleviate the continuing Delta-T restrictions that resulted from Revision 1 of the drawdown analysis. These studies determined that substantially increased SGTS flow would be required to remove these operational restrictions from the unit. The licensee indicated at that time that the schedule for closeout of the drawdown issue and completion of any required permanent modifications had been changed to prior to startup following the fourth refueling outage presently scheduled to end in June 1996.

The licensee informed the NRC staff in a letter dated September 7, 1990, that submittal of details regarding a second revision of the drawdown analysis was scheduled for prior to restart from the first refueling outage. Although the licensee had intended to incorporate the heat loads from three cycles of operation into the existing drawdown analysis, it was determined that this would result in unreasonable operating restrictions. The licensee explained

that the drawdown analysis was currently being revised to account for the actual heat loads from spent fuel that would be present at startup from the first refueling outage. The modeling of secondary containment humidity was being refined as part of that effort to account for the effects of cooler outside air temperatures and their correspondingly lower moisture content. The licensee also described other actions that were going to be taken to mitigate the effects of Delta-T requirements on plant operations. Secondary containment unit coolers were to be tested and cleaned, as required, to restore them to their assumed design efficiencies. Secondary containment inleakage was to be reduced by the addition of or replacement of seals at individual openings. Since the effectiveness of these mitigating actions could not be quantified until completion during the first refueling outage, the submittal of the details of the second revision of the drawdown analysis had been rescheduled for prior to startup from that outage.

By letter dated January 10, 1991, NMPC provided the NRC staff with a discussion of Revision 2 of the secondary containment drawdown analysis. Revision 2 incorporated the effects of spent fuel heat loads from the first refueling and revised assumptions concerning relative humidity, distribution of containment inleakage, and unit cooler efficiencies. Assumptions concerning relative humidity were revised to account for the dominance of outside air humidity in determining secondary containment humidity. Assumptions concerning inleakage were revised to account for inleakage from areas above ground level that had previously not been considered. Based on the results of recirculation unit cooler testing during the first refueling outage, Revision 2 of the drawdown analysis utilized the original design heat removal capacity of the unit coolers. The licensee planned to test additional secondary containment coolers by June 1, 1991, to assure that the outage testing yielded results that reflected the aggregate performance level of all unit coolers. Based on Revision 2 of the drawdown analysis, the licensee developed a new Delta-T versus outside air temperature curve for use in plant operations. This new curve was valid for reactor building temperatures of less than or equal to 85°F and operation was to be restricted to this condition. The drawdown analysis was to be revised further to provide an additional curve for secondary containment temperatures greater than 85°F once testing of the unit coolers was complete. The analysis to support operation at secondary containment temperatures greater than 85°F was scheduled to be completed prior to June 1, 1991. The licensee further stated in the letter of January 10, 1991, that studies to provide a long-term resolution of the secondary containment drawdown issue were continuing. Pending completion of a final resolution, NMPC would continue to administratively ensure adequate Delta-T based upon outside air temperature. The drawdown analysis was to be revised as necessary to account for heat load changes associated with spent fuel and changes in reactor building inleakage and unit cooler performance.

During the subject meeting on August 22, 1991, NMPC initially reviewed the secondary containment design basis, parameters affecting drawdown time, and the history of the drawdown time issue. The licensee also reviewed its initial plan for achieving a permanent solution to the drawdown time issue.

This plan involved the addition of a 6,000 CFM SGTS train to each division to increase the total SGTS capacity of each division to 10,000 CFM. This approach would have eliminated Delta-T requirements but would have required the construction of a new SGTS building. An alternate permanent solution was identified in 1991. This alternate solution would involve increasing the capacity of each SGTS train from 4,000 to 8,000 CFM. This approach would also eliminate Delta-T requirements and the modification could be made within the existing structure. The licensee stated that they currently plan to implement this alternate solution during the 1993 refueling outage. Several TS change requests will likely be submitted to support this modification. More specifically, the licensee anticipates changing the required SGTS flow rate from 4,000 to 8,000 CFM, changing the maximum secondary containment inleakage from 3,190 to 2,850 CFM, and replacing the surveillance drawdown time requirement of 120 seconds with a curve that restricts surveillance drawdown time based upon reactor building inleakage. The licensee is also considering the possible submittal of a one-time TS exception request to require only one SGTS train to be operable during core alterations in order to facilitate completion of the modification. During the discussions of the potential TS exception request, NRC staff stated that the licensee should consider possible compensatory measures that could be implemented during the period of time that only one SGTS train is operable. At the conclusion of the meeting, NMPC stated that proposed TS changes related to this modification will likely be submitted by June 1, 1992, and that NRC review will be needed by January of 1993.

The NRC staff has concluded that NMPC's actions to address the secondary containment drawdown issue have been conservative. All staff activities related to TAC No. 65850 are considered complete.

John E. Menning

John E. Menning, Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. List of Attendees
2. Licensee Handout Material

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Original signed by:

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ENCLOSURE 1

ATTENDANCE LIST

August 22, 1991 Meeting With Niagara Mohawk Power Corporation to Discuss the Final Resolution of the Secondary Containment Drawdown Issue at Nine Mile Point 2

Name	Position	Organization
Donald S. Brinkman	Senior Project Manager	NRC/NRR/PDI-1
Robert A. Capra	Project Director	NRC/NRR/PDI-1
John E. Menning	Project Manager	NRC/NRR/PDI-1
Jack Kudrick	Section Chief	NRC/NRR/SPLB
John Monninger	Reactor Engineer	NRC/NRR/SPLB
Tom Fay	Licensing Engineer	NMPC
W. D. Baker	Licensing Program Director	NMPC
Dave Studley	System Engineer	NUS
Yoshihiko Horikawa	Washington Representative	Kansai Electric Power
Robert Temps	Resident Inspector	NRC/Rgn I
Surjit S. Pabby	Lead Mechanical Engineer	NMPC
Edward R. Klein	Project Manager	NMPC

ENCLOSURE 2

SECONDARY CONTAINMENT DRAWDOWN

NIAGARA MOHAWK POWER CORP

and

NUCLEAR REGULATORY COMMISSION

August 22, 1991

PURPOSE

Present the initial analysis and design concepts associated with final resolution of the drawdown issue

SECONDARY CONTAINMENT DESIGN BASIS

- Minimize unfiltered leakage from primary to outside atmosphere during LOCA

- Achieve & maintain a negative pressure of -0.25" W.G. following LOCA

SECONDARY CONTAINMENT DRAWDOWN ANALYSIS

- Parameters affecting drawdown time
  - SGTS flow rate
  - Secondary Containment inleakage
  - Secondary Containment volume
  - Secondary Containment heat load
  - Secondary Containment heat removal rate which is a function of:
    - Secondary Containment air temperature
    - Service water (i.e., Lake) temperature
    - # of unit coolers in service
  - Outside air temperature

PROBLEM IDENTIFICATION
July 1987 - Design Error Discovered

- Original NMP2 drawdown analysis calculated a drawdown time of 129 seconds

- Differential temperature assumed to be 23°F
  - Service Water temperature assumed to be 81°F (Design Maximum)
  - Secondary Containment air temperature assumed to be 104°F at start of LOCA

- Actual differential temperature was 4°F
  - Secondary Containment air temperature (controlled by unit cooler thermostats) was approximately 85°F

- Consequently, because of post-LOCA heat loads, secondary containment could not be drawn down to - 0.25" W. G. in 129 seconds

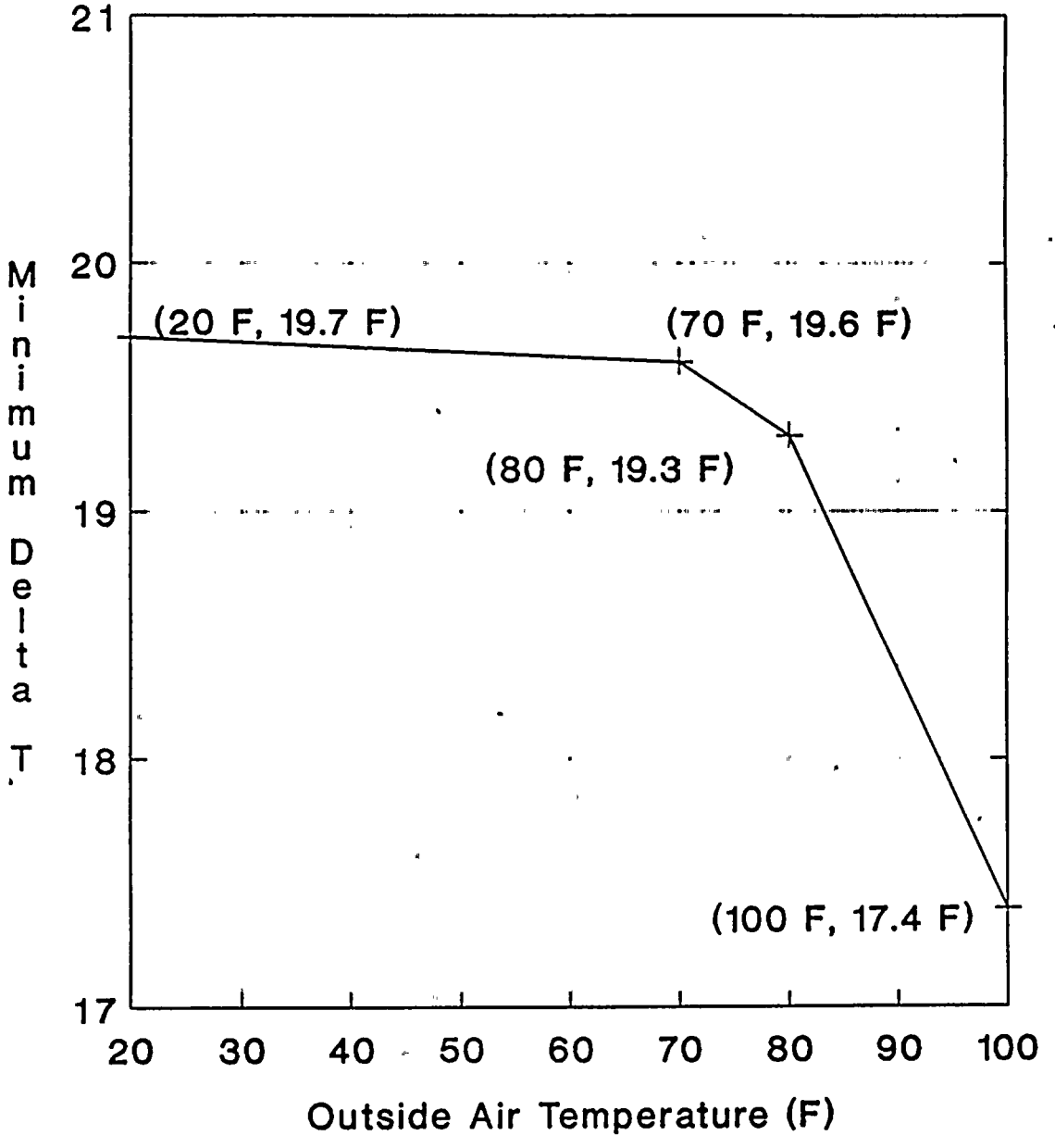
IMMEDIATE ACTIONS

- Minimum differential temperature (Delta-T) established as operating requirement
- Design inleakage established from surveillance tests
- Post-LOCA drawdown time revised from 129 seconds to 360 seconds
- Actual spent fuel heat loads utilized in analysis
- Above discussed in Aug. 26, 1988 Submittal

CURRENT DESIGN BASIS

- Required Delta-T varies between winter and summer
- Design inleakage established from surveillance tests
- Unit cooler performance based on test data
- Actual spent fuel heat loads utilized in analysis
- Above discussed in September 7, 1990, and January 10, 1991, submittals

NMP2 Secondary Containment Delta-T
2nd Refueling Cycle
SC Temperature ≥80 & ≤100 F.



INITIAL RESOLUTION PLAN

- A 1989 study was conducted to identify a permanent solution
  - An additional 6000 CFM SGTS train was to be added to each Division
  - Total SGTS capacity would be 10,000 CFM per Division
  - Eliminates Delta-T requirement
  - Would require construction of new Category I SGTS building

- Modification scheduled for implementation during 1996 refueling outage

REVISED RESOLUTION PLAN

- 1991 study identified an alternative solution
  - Increase capacity of SGTS trains to 8000 CFM (Current capacity 4000 CFM)
  - Still eliminate Delta-T requirements
  - Modification could be made within existing structure

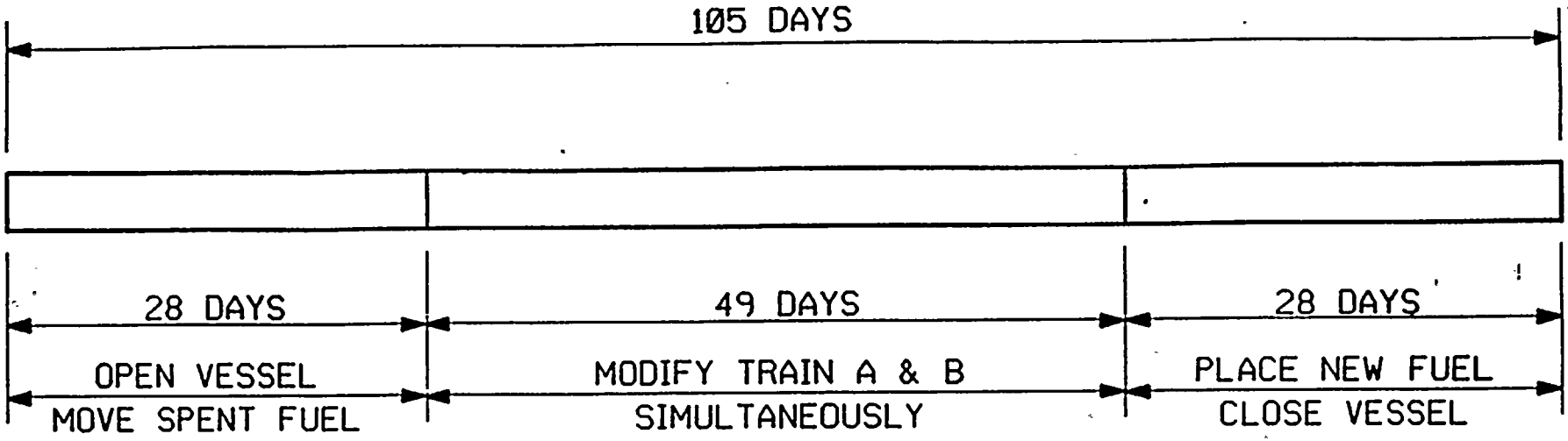
- Modification scheduled for implementation during 1993 refueling outage

PROPOSED DESIGN PARAMETERS

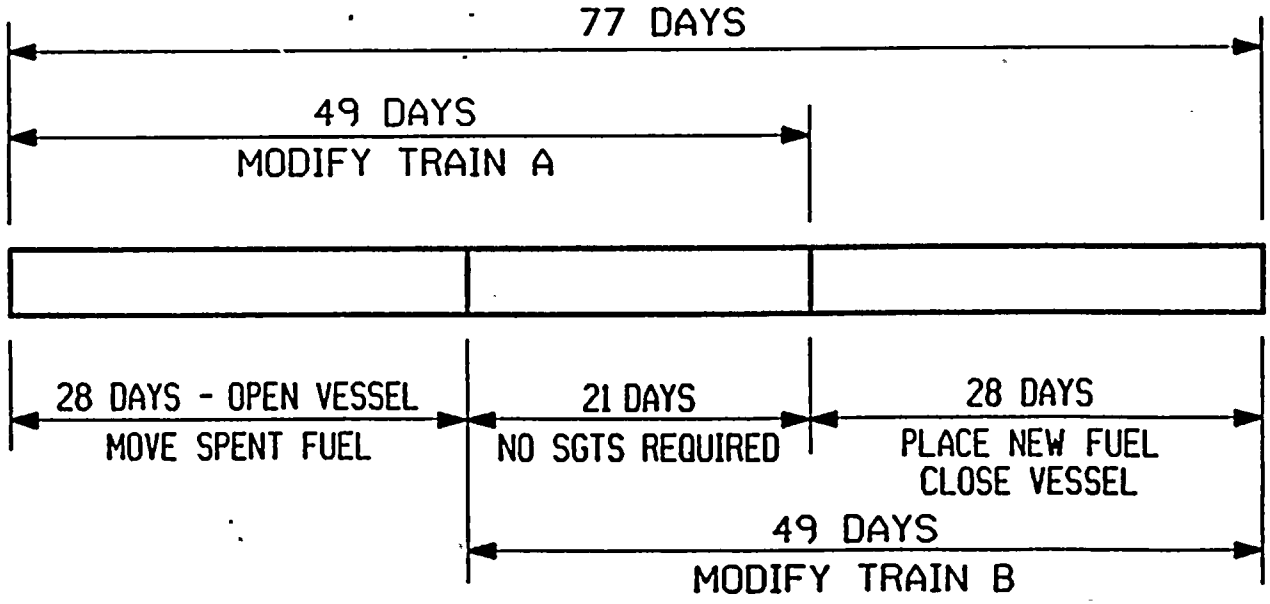
- Analysis assumptions
  - 2850 CFM inleakage (one Secondary Containment air change per day)
  - 7500 CFM net exhaust (8000 CFM at blower)
  - 75% R. H. in Secondary Containment
  - 14.4 MBTU/HR heat load from spent fuel pool (Max heat load per USAR)
  - 5% increase in heat loads to account for power uprate
  - Six unit coolers in service
  - Unit Coolers operate at 90% capacity
  - Secondary Containment air temp ≥ Service water temp
- Preliminary analysis results in a drawdown time of approximately four minutes
- Radiological consequences will still be based on six minute drawdown

INSTALLATION

- Installation time is estimated to be 49 days per train
- Tech Specs require both trains of SGTS OPERABLE during Core Alterations
- With both SGTS trains OPERABLE during Core Alterations, minimum outage length is 105 days
- With just one train of SGTS OPERABLE during Core Alterations, minimum outage length drops to 77 days
- Submittal will propose a one time exception to require only one SGTS train OPERABLE during Core Alterations



PROPOSED R-3 WITH TWO TRAINS OF SGTS AVAILABLE



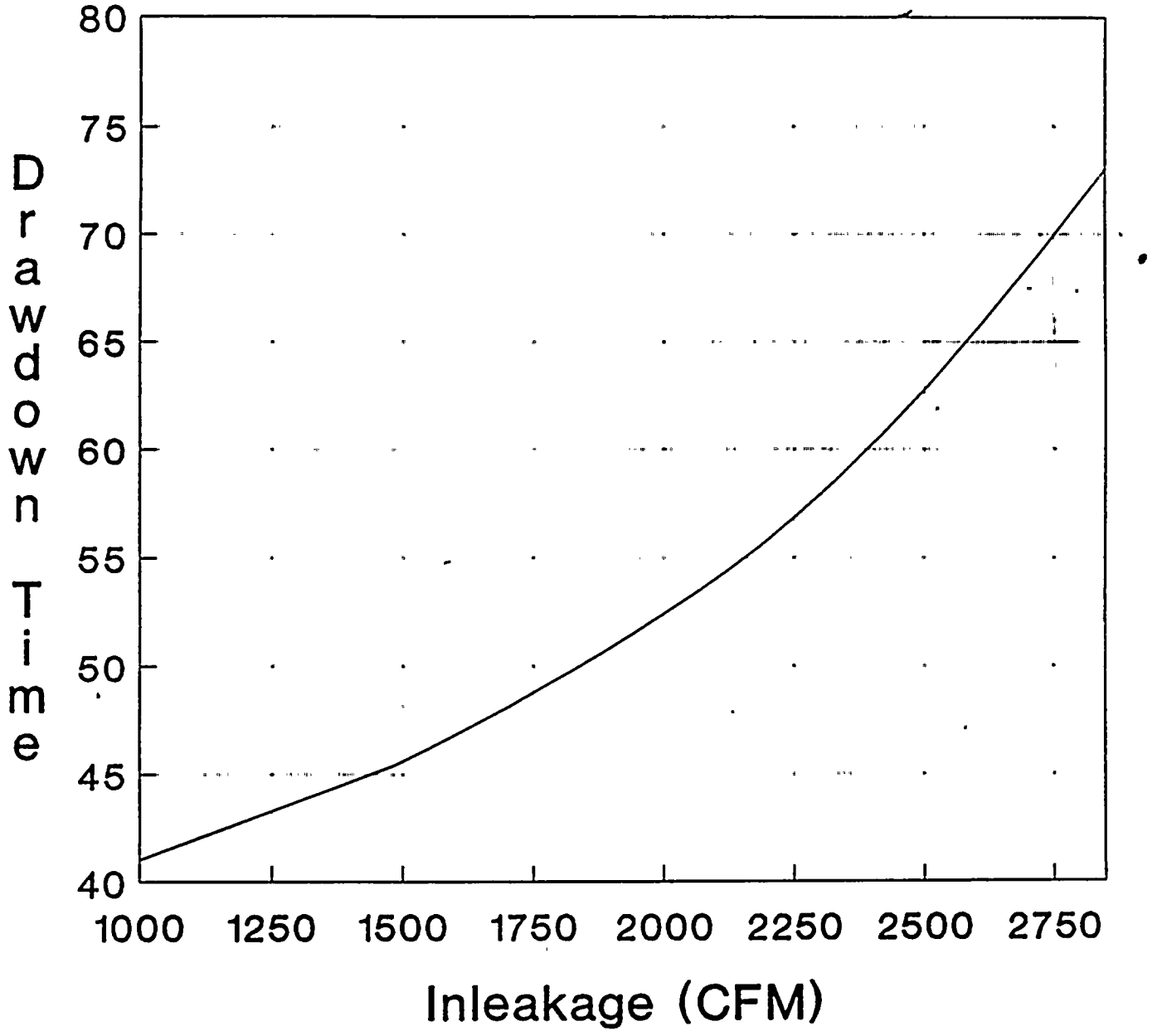
PROPOSED R-3 WITH ONE TRAIN OF SGTS AVAILABLE

REQUIRES TEMPORARY TECH. SPEC. CHANGE FROM NRC

LICENSING SCHEDULE

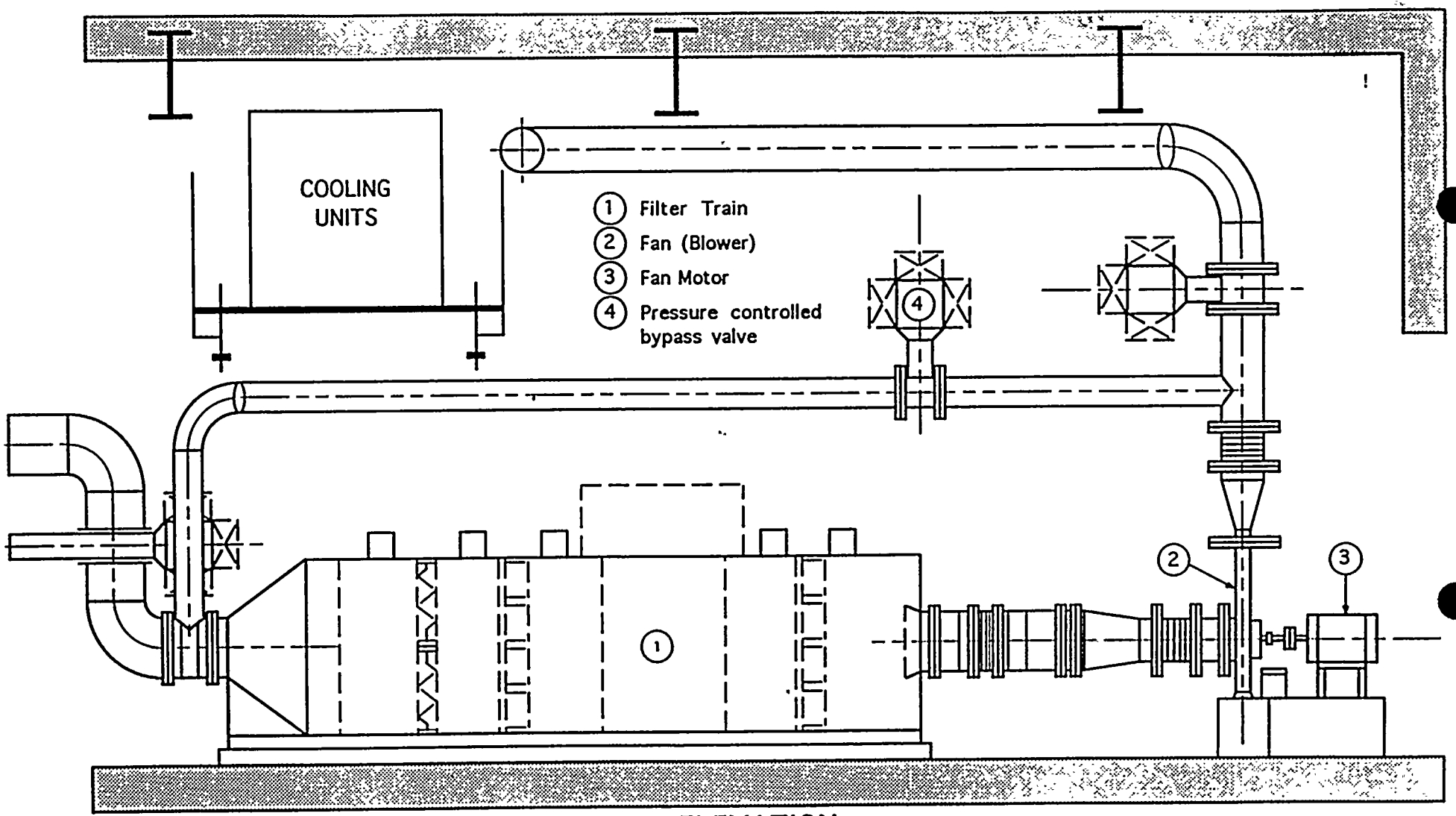
- Proposed Tech Spec changes and design details to be submitted by June 1, 1992
  - Change SGTS flow from 4000 CFM (±10%) to 8000 CFM (±10%)
  - Change allowable inleakage from ≤3190 CFM to ≤2850 CFM
  - Replace surveillance drawdown time of 120 seconds with inleakage vs. drawdown time curve
  - One time exception for one SGTS out of service during core alterations
- Request NRC review by Jan 1993
- Installation Fall 1993

NMP2 Drawdown Test
Drawdown time vs. Inleakage
(Typical Values)



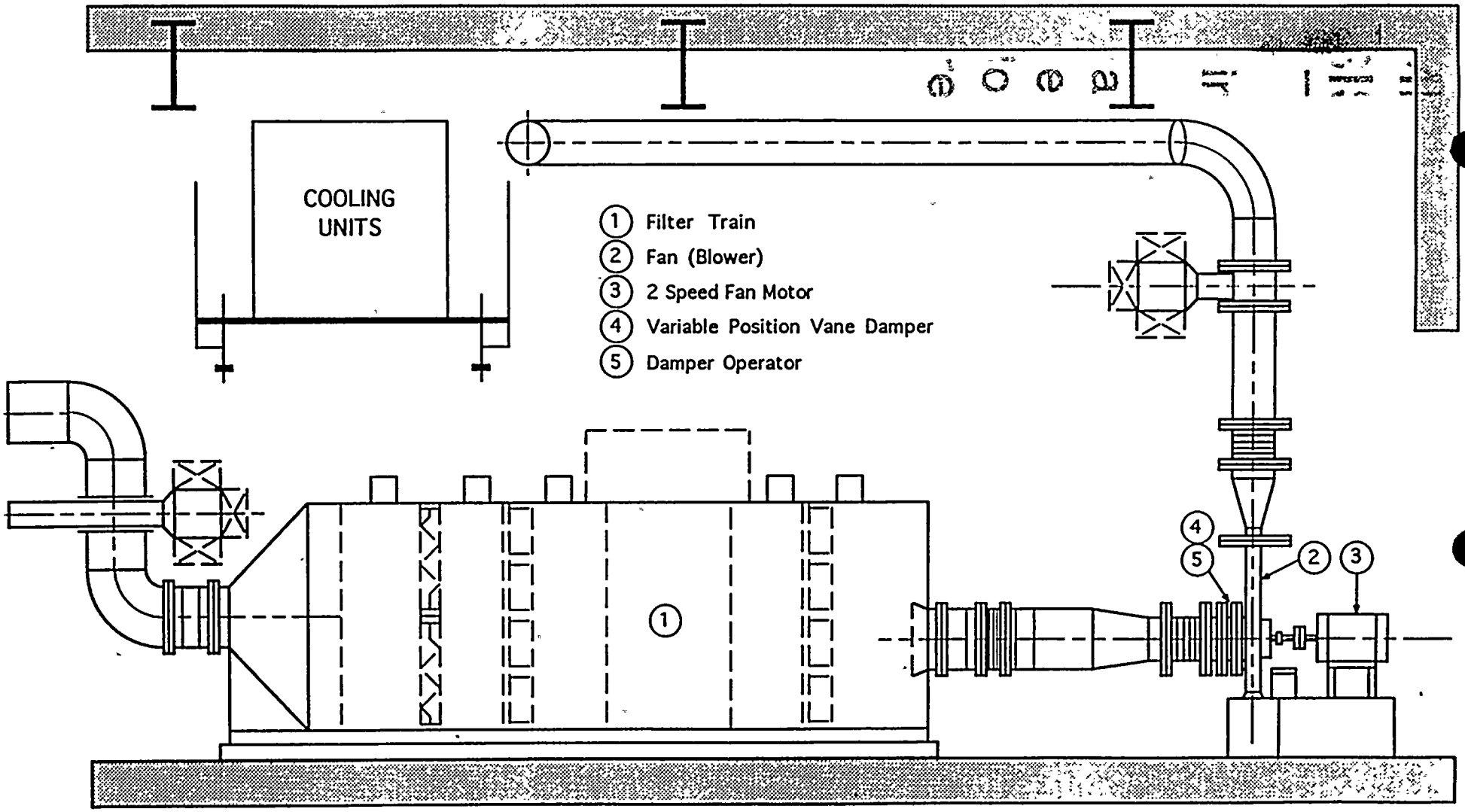
Graph to replace existing
120 second Tech Spec limit

EXISTING CONFIGURATION



ELEVATION

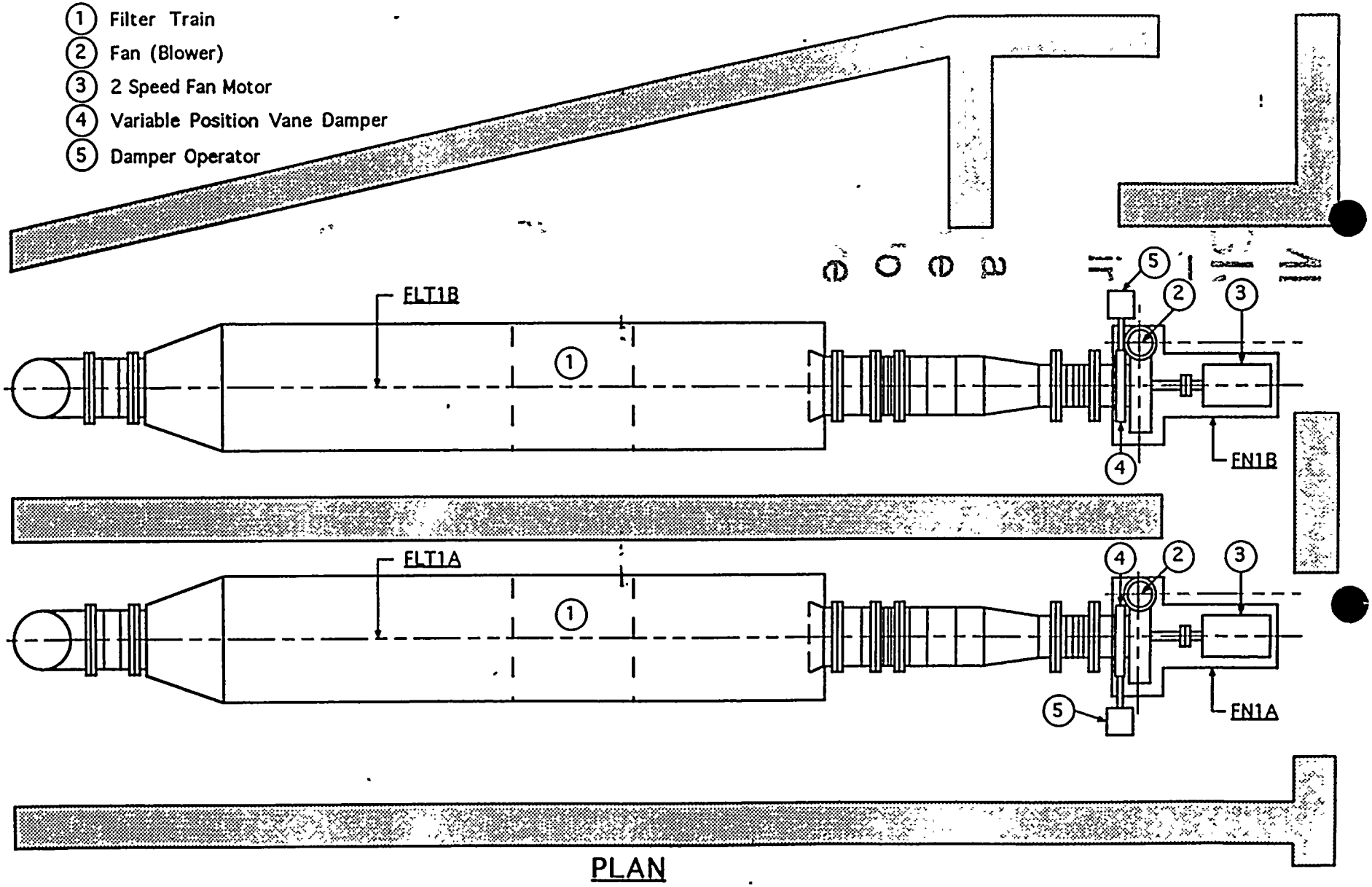
PROPOSED MODIFICATION



ELEVATION

PROPOSED MODIFICATION

1. Filter Train
2. Fan (Blower)
3. 2 Speed Fan Motor
4. Variable Position Vane Damper
5. Damper Operator



PLAN