AEOD TECHNICAL REVIEW REPORT*

UNITS: Fermi 2
DOCKET NOs: 50-341
LICENSEE: Detroit Edison

TR REPORT NO.: AEOD/T-806
DATE: 5/18/88
EVALUATOR/CONTACT: T. Wolf

SUBJECT: RECENT OPERATIONAL EXPERIENCE TRENDS AT FERMI 2

SUMMARY

With the cooperation of Oak Ridge National Laboratory and Idaho National Engineering Laboratory, AEOD has conducted a study of the recent operational event history at Fermi 2. It was found that while the number and types of events at Fermi 2 are not that much different from the rest of the industry, a preponderance of the events are associated with personnel and procedural problems. This preponderance is unlike that of the industry as a whole or that of plants which have been licensed within the last two years. This experience is continuing in spite of programs agreed to be instituted in late 1985 to address similar problems identified by Region III. Thus, the area of procedure development and control at Fermi 2 appears to require additional attention.

DISCUSSION

In preparation for the latest regional management meeting, a study was performed of the recent operational experience at Fermi 2. Special emphasis was placed on identifying causal patterns and characterizing the degree to which procedure inadequacies and human errors contributed to reportable events at Fermi 2. The review was based on event information provided in both the 10 CFR 50.72 Immediate Notification reports (INs) and the 10 CFR 50.73 Licensee Event Reports (LERs) submitted during all of 1987 and, to date, in 1988.

This study was conducted by utilizing the resources of the Trends and Patterns Analysis Branch (TPAB) of AEOD, including the assistance of TPAB contractors at Oak Ridge National Laboratory (ORNL) and at Idaho National Engineering Laboratory (INEL). In conducting this study, the contractors were requested to review the information available to them in their respective LER databases, e.g., SCSS at ORNL and the TPAB Trends and Patterns Section (TPS) files at INEL. In addition, TPS personnel reviewed the latest INs to bring the data up to the current time.

At INEL, the TPS datafiles on reactor scrams, engineered safety feature (ESF) actuations, technical specification (T.S.) violations, and safety system failures were queried to determine how the basic types of events being experience at Fermi 2 compare with the industry. Graphical

*This document supports ongoing AEOD and NRC activities and does not represent the position or requirements of the responsible NRC program office.

presentations of the data were then constructed. To get a feel for the basic causes for the most recent of these events, i.e., those events that occurred in 1987 and, to date in 1988, percentage distributions were tabulated. The cause distributions were determined for plants which had operated for more than two years and were considered to be mature, plants which were in their first two years of licensed operation and considered to be new, and for Fermi 2 by itself. The graphical presentations were developed only for Fermi 2 itself and for the plants considered to be new. The basic event graphical results are shown in Attachment 1 and the basic cause distributions are tabulated in Attachment 2. Only percentages for the three main causal factors of personnel error, procedures, and equipment faults are included in the table. The remaining percentages were associated with miscellaneous causes such as environmental and unknown.

As may be seen in the graphs, the number and type of events which have been occurring at Fermi 2 are comparable with the industry. However, a study of the tabulated data shows that Fermi 2 has a basic cause factor percentage distribution unlike the mature or new plants. The percentage of equipment failures at Fermi 2 is normally lower than that of the mature or the new plants while the personnel and procedure percentages, and especially the procedure percentages, are much higher.

The personnel at ORNL were asked to review the LERs submitted by Fermi 2 from January 1987 through mid-February 1988. Included in this review was an evaluation of the Fermi 2 events during this time period which could be precursors to core damage as classified by the AEOD Accident Sequence Precursor (ASP) program. The results of this review are documented in Attachment 3.

Based on LER reportability codes, Fermi 2 is nearly identical to that of all BWRs for the type of events that have recently occurred. Fermi 2 also did not experience a significant difference in specific event types, such as RPS actuations, from units having similar licensing dates.

From the ASP study, one event was found to be potentially a precursor. In this event a governor bearing oil supply valve was found closed in the HPCI system. While no definitive determination could be made of when the valve was closed, one of the corrective actions was to modify the surveillance procedure to include a check of the oil pressure to assure that the valves are in their proper position.

Upon review of the data in SCSS along with a review of the actual LERs, ORNL found that there was one consistent problem area of procedures/experience. This problem area is not new, having been identified by Region III in a December 1985 letter to Fermi 2. The actions committed to by the licensee to address the concerns raised by the letter included retraining of personnel, revision of procedures, and an independent review of the management and operation of Fermi 2. However, the LER data from 1987 and 1988 indicates that procedure problems were still prevalent and primarily the result of trying to use existing procedures in situations that were not expressly addressed in the procedures, errors in the procedures introduced by those preparing them, and personnel failing to follow procedures exactly.

Because of the time lag involved in submitting formal LERs, the INEL and ORNL LER databases have event information through approximately the middle of February 1988. To capture the latest event information, TPS reviewed the INs submitted by Fermi 2 from February 1988 through mid-April 1988. A summary of the events reviewed is included as Attachment 4. This review showed that the basic event characteristics found in the INEL and ORNL studies were continuing, especially with regards to problems associated with procedures and job planning.

RESULTS

Detailed analysis of the events reported by Fermi 2 during 1987 and so far in 1988 leads to two basic findings:

- The frequency of the various types of events, e.g., scrams, ESF actuations, safety system failures, experienced at Fermi 2 during this time period is not unusually high when compared to the rest of the industry or plants from the same NSSS vendor.

- Even though the event frequency is not unusually high, Fermi 2 does show a greater preponderance of events which are related to procedural deficiencies and personnel errors.

The characterization of the procedural and personnel problems being experienced recently at Fermi 2 indicate that they are caused by three basic weaknesses:

- Existing procedures are being used in situations that were not expressly addressed in the original procedures.

- Procedural errors are being introduced by the personnel preparing the procedures and are not being caught and corrected before the procedures are used.

- Personnel when implementing the procedures are failing to follow the procedures exactly.

These problems are readily identifiable in the available 1987 and 1988 LERs and the recent 50.72 reports indicate that they are continuing.

CONCLUSIONS

The nature of the difficulties presently being experienced at Fermi 2 which are leading to reportable events may be indicative of a willingness to begin, conduct and/or end a plant evolution without having quality procedures or quality procedure controls. The following examples illustrate this point:

LER 87-007 (Mode 3, 0% power, March 17, 1987)
In order to establish shutdown cooling, it was necessary to pre-warm the residual heat removal (RHR) system from an alternate injection

line. As a result the RHR was being drained using a four-inch line while being fed with a one-inch line. This caused steam flashing in the RHR system. The resulting level transient caused an RPS and ESF actuation. The cause of this event was an inadequate procedure which did not describe this operational mode.

LER 87-022 (Mode 1, 38% power, June 1, 1987)
The control center heating, ventilating and air conditioning system shifted to recirculation mode when a fuse was removed in order to replace a solenoid valve. A licensed utility personnel did not adequately identify all equipment affected by removing the fuse when preparing the work package. The licensed utility person was counseled.

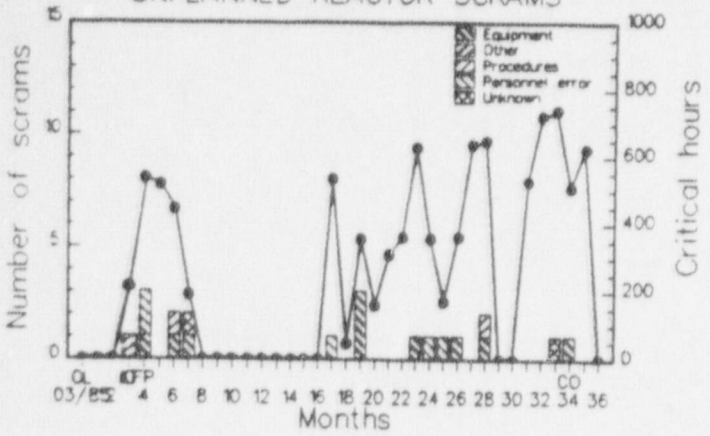
LER 87-036 (Mode 4, 0% power, August 2, 1987)
Due to operator error while attempting to fill and vent the RHR system, a level three scram signal was received due to low reactor pressure vessel water level. Six steps in the procedure were not performed that were required prior to an attempt to fill and vent the RHR system. The personnel involved in this incident were counseled.

Thus, the area of procedure development and control at Fermi 2 appears to require additional attention.

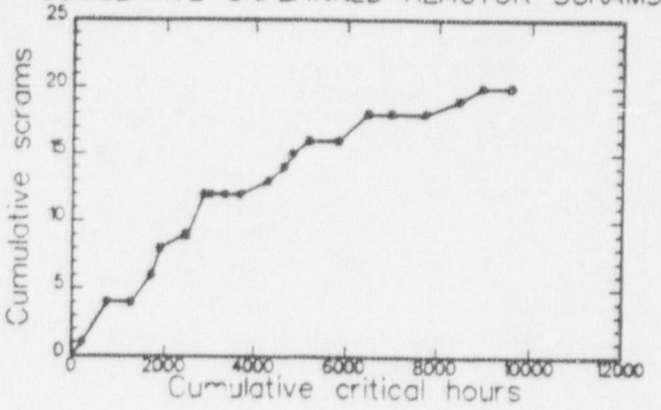
ATTACHMENT 1
CUMMULATIVE EVENT GRAPHS FOR FERMI 2 AND NEW PLANTS

FERMI 2

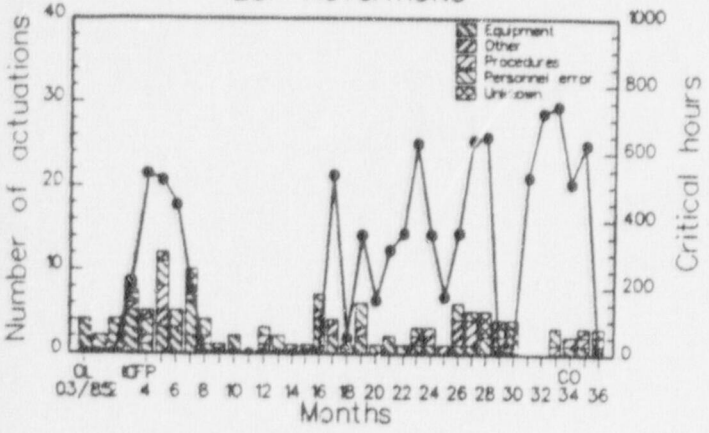
UNPLANNED REACTOR SCRAMS



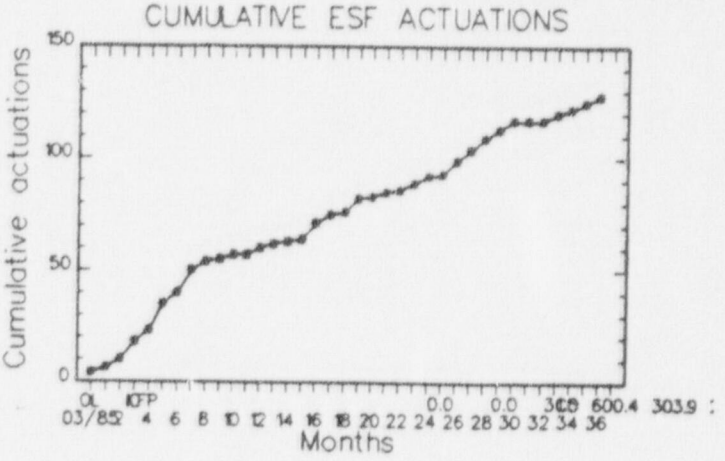
CUMULATIVE UNPLANNED REACTOR SCRAMS



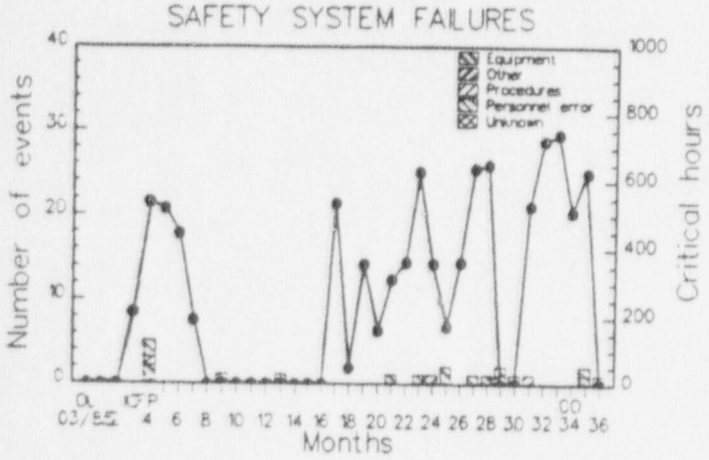
ESF ACTUATIONS



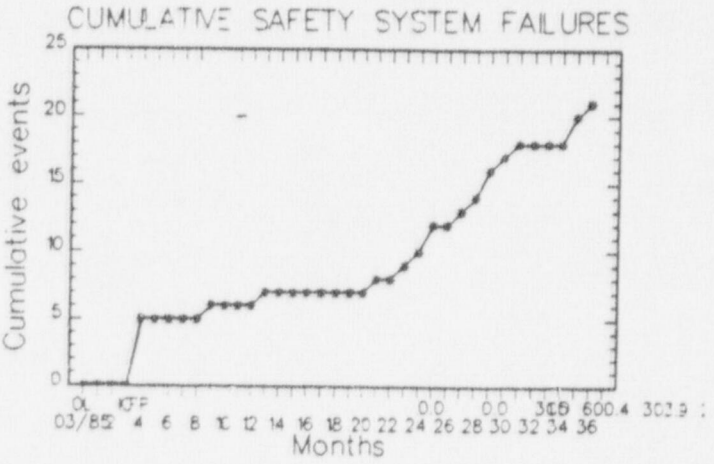
CUMULATIVE ESF ACTUATIONS



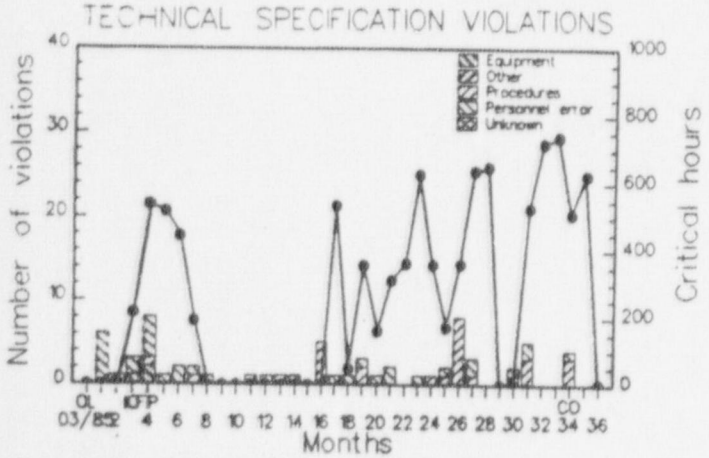
SAFETY SYSTEM FAILURES



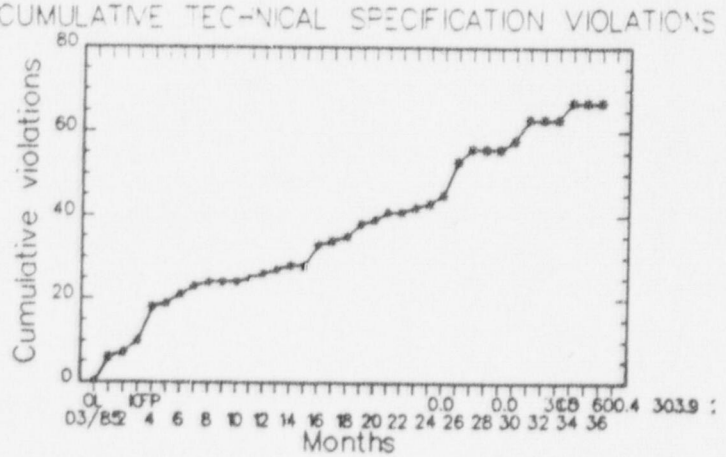
CUMULATIVE SAFETY SYSTEM FAILURES



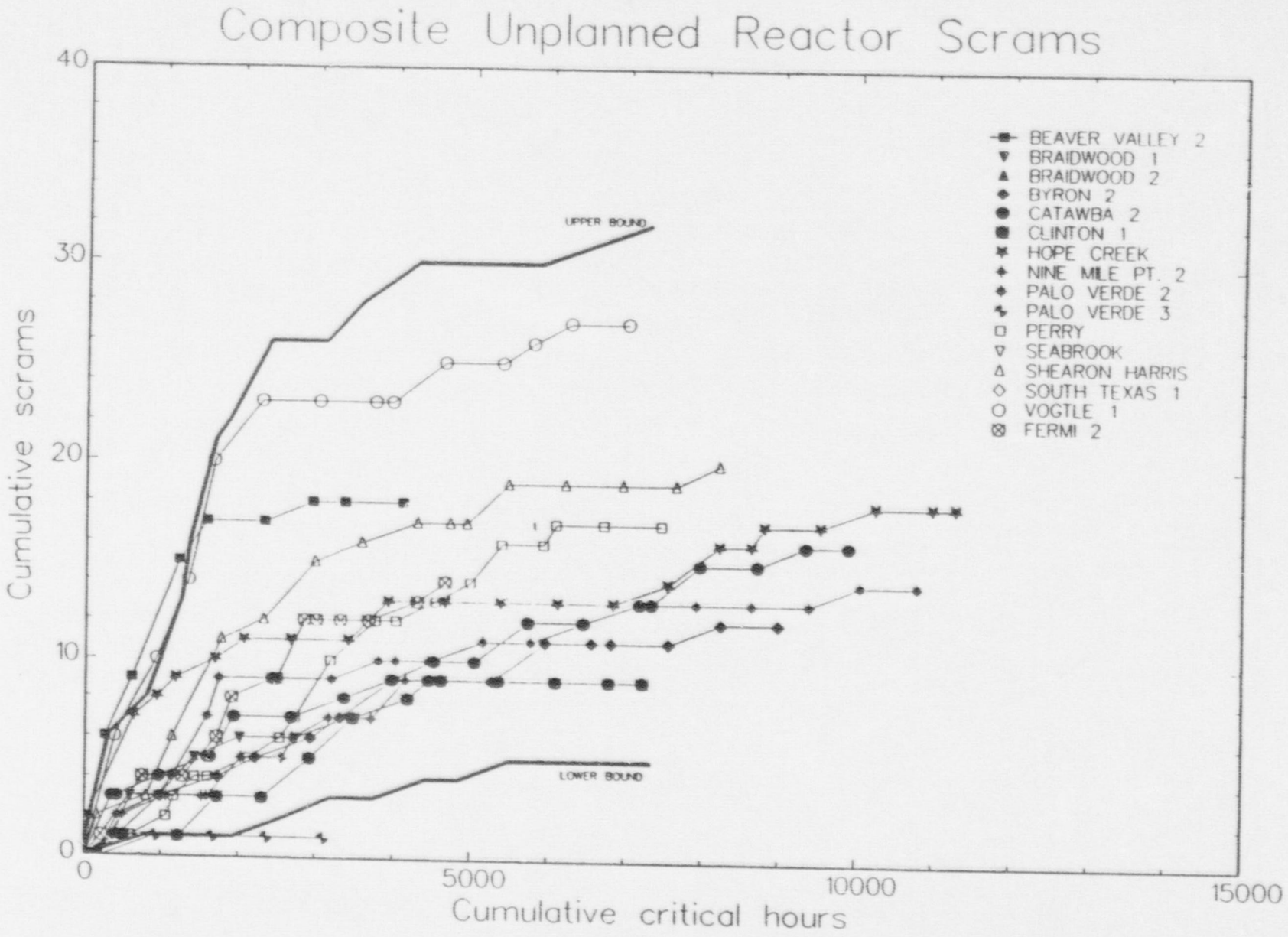
TECHNICAL SPECIFICATION VIOLATIONS



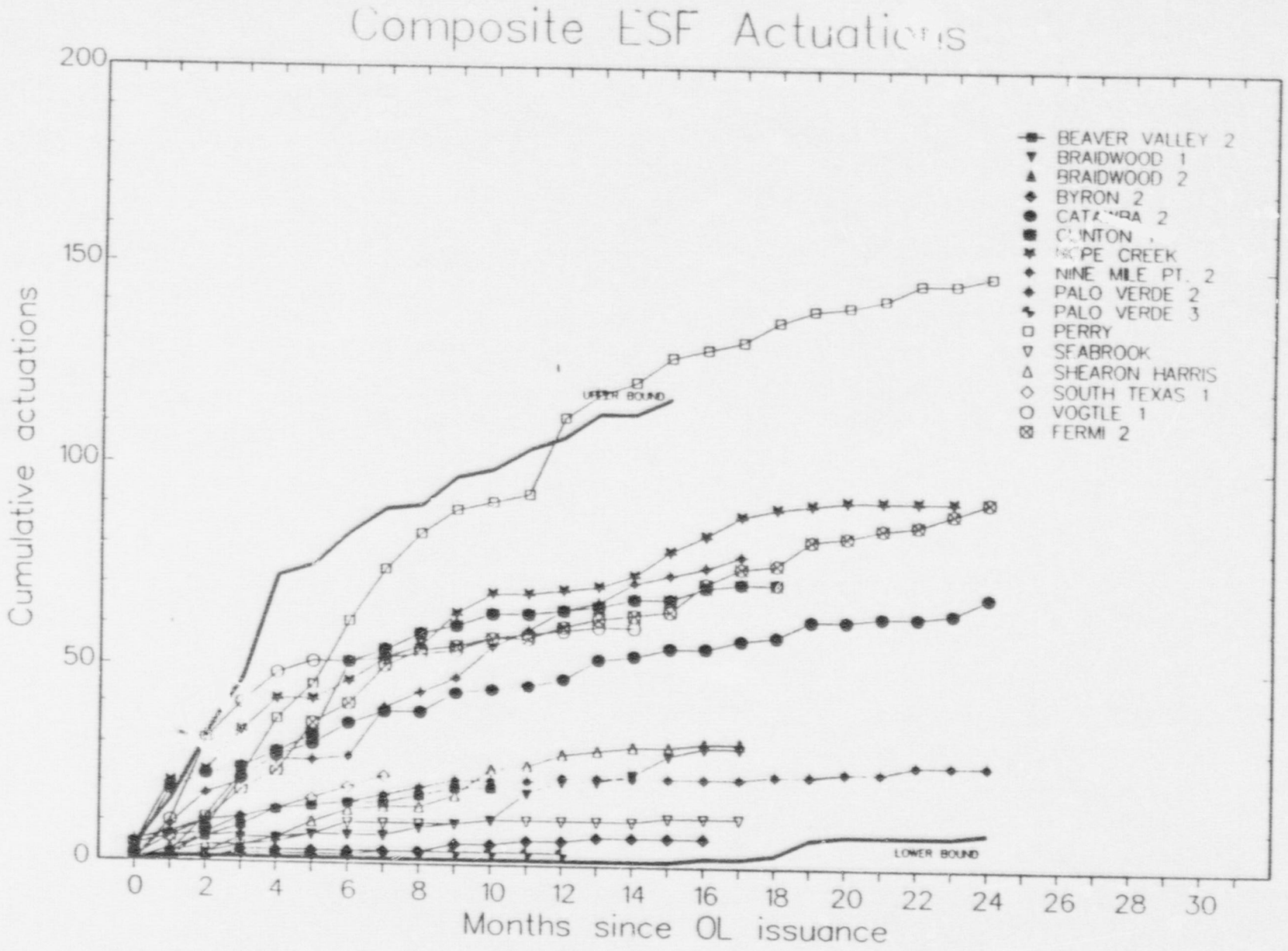
CUMULATIVE TECHNICAL SPECIFICATION VIOLATIONS



Idaho National Engineering Laboratory, EG&G Idaho, Inc.
03/04/88



Idaho National Engineering Laboratory, EG&G Idaho, Inc.
05/04/88



Idaho National Engineering Laboratory, EG&G Idaho, Inc.
05/04/86