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SAFETY ANALYSIS AND REVIEW SYSTEM (SARS)
ASSESSMENT REPORT

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SAFETY ANALYSIS AND REVIEW SYSTEM (SARS)
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by
Ellen T. Browne

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ABSTRACT

Under DOE Order 5481.1, "Safety Analysis and Review System for DOE Operations," safety analyses are required for DOE projects in order to ensure that: (1) potential hazards are systematically identified; (2) potential impacts are analyzed; (3) reasonable measures have been taken to eliminate, control, or mitigate the hazards; and (4) there is documented management authorization of the DOE operation based on an objective assessment of the adequacy of the safety analysis. This report is intended to provide the DOE Office of Plans and Technology Assessment (OPTA) with an independent evaluation of the adequacy of the ongoing safety analysis effort. As part of this effort, a number of site visits and interviews were conducted, and FE SARS documents were reviewed. The latter included SARS Implementation Plans for a number of FE field offices, as well as safety analysis reports completed for certain FE operations. This report summarizes SARS related efforts at the DOE field offices visited and evaluates the extent to which they fulfill the requirements of DOE 5481.1.

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1. INTRODUCTION: DESCRIPTION OF PROJECT

The intent of this study was to assist in the overview of DOE ASFE Headquarters (HQ) Safety Analysis and Review System (SARS) requirements. This report summarizes observations and recommendations relative to SARS implementation to date, both at the HQ and field* levels.

As part of this task, site visits were conducted at the Laramie Energy Technology Center (LETC), the Chicago Operations and Regional Office (CORO), and the U.S. Army Engineer Division, Huntsville. In addition, health and safety personnel from the Grand Forks Energy Technology Center (GFETC) were interviewed in order to collect further data on SARS activities in the field. Several safety analyses which have been completed were reviewed so as to more specifically assess the adequacy of SARS actions in meeting DOE and ASFE requirements.

The following section of this report summarizes the major findings in regard to SARS implementation.

*As used herein, DOE "field offices" include Energy Technology Centers (ETCs), Operations Offices, and the U.S. Army Engineer Division, Huntsville.

2. OBSERVATIONS AND FINDINGS

2.1 HEADQUARTERS ASFE

The major problems in regard to SARS implementation activities at HQ ASFE arise due to two factors: (1) lack of sufficient HQ resources (i.e., staffing and funding); and (2) the failure to issue clear policy guidance for field offices to follow in their SARS activities. The issue of resource constraints has been covered extensively in another report prepared under this contract.* SARS implementation imposes a substantial workload upon ASFE. Thus, if it is found to be impossible to increase SARS funding and staffing at HQ, it is important that a decision be made in regard to the delegation of certain responsibilities to the field.

On the matter of policy guidance from HQ, the FE Order, "Requirements and Guidelines for the Safety Analysis and Review System (SARS)," has not yet been issued in final form, and the latest available draft is dated May 1980. This inaction on the part of ASFE HQ is causing considerable confusion at the field level. The field operations are bound by DOE 5481.1 to complete safety analyses for projects under their cognizance, but they have not received guidance from HQ in regard to such items as suggested content and format of safety analyses and proper routing of the reports through the system for review.

In regard to the scheduling and performance of independent reviews of the safety analyses, there are several problems. There is often an overall lack of communication between those performing the safety analyses and those expected to provide the reviews. This makes planning for the reviews very difficult, and often causes a bunching effect where many reviews are required in approximately the same time frame. Ultimately, these problems could result in project delays since SARS compliance is a prerequisite to project authorization. There needs to be a mechanism set up whereby HQ ASFE can monitor SARS progress for individual operations. Currently, there are gaps in the available data and there is no efficient means for identifying new projects which have SARS requirements in the contracts.

2.2 GRAND FORKS ENERGY TECHNOLOGY CENTER (GFETC)

GFETC is responsible for managing projects including fluidized bed combustion (FBC) and liquefaction pilot plants and a fixed bed slagging gasifier. Preliminary Risk Assessments (PRAs) performed on GFETC's

*"Evaluation of Alternative Review Plans for the Department of Energy Safety Analysis and Review System," February 1981.

projects have shown the gasifier and the liquefaction process to be high risk and the FBC unit to be moderate risk. The remaining low risk projects were reviewed at the field level and no problems were identified. Although the liquefaction process was determined to be high risk, its risks are enclosed and the probability of a major hazard occurring was felt to be sufficiently remote for the safety analysis to be reviewed and for the project to be authorized in-house.

The basic material for the gasifier's safety analysis was provided by the operating contractor, Stearns-Roger, and compiled by GFETC. Initially, approximately one hundred items were identified which needed to be corrected in the gasifier. Weekly meetings were held with both GFETC personnel and design, operating, and construction contractor personnel present to evaluate any problems and proposed changes.

The GFETC Health and Safety Manager directly reports to the facility Director. Therefore, this staff person is responsible for alerting the Director of any unacceptable health and safety risks due to any of the facility's operations. In addition, the Health and Safety Manager has the authority to act on his own where an immediate risk exists.

The intent at GFETC was to perform a portion of the gasifier's safety analysis review on site. However, since this would not ensure a totally independent review, and since the Draft FE Guidelines on SARS specify that HQ ASFE is to authorize high risk projects and arrange for review of them, the safety analysis report ultimately needed to be sent to HQ for review. A staff person at HQ was assigned to receive the report when complete.

At GFETC, the Health and Safety Manager still feels that there is a problem in getting HQ to take a serious view of SARS and assign a review person for each safety analysis. In certain areas, such as liquefaction programs, it is not clear who at HQ would be responsible for receiving and reviewing a safety analysis report. Since there are only a few people who are finally responsible for project authorization, it is felt that these personnel and their responsibilities need to be identified. This would avoid the problem of a field office completing the safety analysis and not knowing to whom at HQ to send it, and it also would facilitate the scheduling of reviews and open lines of communication between the report compiler and reviewer. This latter point is of utmost importance in the case of high risk projects since the review is often an iterative process. It would be inefficient for the reviewer to wait until the analysis were finalized before beginning the review; rather, the reviewer should be involved in the entire cyclical process.

2.3 LARAMIE ENERGY TECHNOLOGY CENTER (LETC)

As of October 1980, the time of the site visit to LETC, the LETC System Safety Review Committee was not operational. When activated, it could assist LETC in compliance with SARS requirements for industry projects which are managed by LETC under the decentralization program. Information obtained during the course of this site visit indicated that there is a need for more specific information and requirements regarding SARS in the DOE Project/Task Proposal Agreements (PTPAs) between HQ ASFE and the Energy Technology Centers such as LETC.

It appears that program opportunity notices being prepared by LETC include SARS as part of the ES&H requirement in a general way. However, work statements seem to be inadequate in this regard because of a lack of HQ guidance. There is also a problem at LETC in that some of its contracts are managed by the San Francisco Operations Office. These contracts may be negotiated between the San Francisco Operations Office and the contractor without further reference to the technical project personnel at LETC. It is evident that there is a need for a clarification of roles and responsibilities in this regard.

On the issue of safety analysis reviews, it appears that it will be extremely difficult to establish independent review panels at LETC. This is due to the fact that the LETC Safety Manager has been involved directly in project planning for safety analyses. Overall, there is a scarcity of qualified personnel who are not involved already in one manner or another in actual management of the several projects for which LETC is responsible.

There are also severe resource constraints in terms of staff and funds available to perform reviews, even if independence could be ensured. Thus far, the safety analysis and review of the Vernal Tar Sands experiment have been completed. The analysis was compiled by SAI, and was reviewed in-house by a LETC review panel since the project was deemed low risk.

2.4 CHICAGO OPERATIONS AND REGIONAL OFFICE (CORO)

CORO appears to have one of the best organized SARS review programs of those investigated during the course of this study. However, like other DOE field organizations, CORO is faced with serious personnel and budgetary constraints. Travel funds are critically limited, making it difficult for CORO to be utilized to perform reviews of certain high risk projects where site visits would be imperative.

At the time of the visit to CORO (late 1980), the office was performing the review of the safety analysis for the University of Tennessee Space Institute Magnetohydrodynamics Project. When the safety analysis first was delivered to CORO, the Safety Coordinator received it and evaluated it from a systems safety viewpoint. Then it was sent to other groups such as environmental and health protection for review. If any safety analysis review needs to cover areas in which the CORO staff lacks expertise (e.g., tornadoes or seismic effects), the analysis may be sent, for instance, to Lawrence Livermore Laboratories or to DOE HQ for further evaluation.

The review process for the MHD analysis is an iterative one. After comments are incorporated into the analysis, and the safety analysis report is considered acceptable, the Safety Coordinator will compile an evaluation report with all comments attached to outline the risks involved in the operation. Under contract to DOE, AFMA performed an informal safety analysis review of the MHD safety analysis report.* Overall, the following weaknesses were identified:

- Hazards were equated with equipment failures, the basic assumption being that hazards result from failures of equipment. Little or no consideration was given to general occupational hazards such as walkways, ladders, and other typically non-failure situations.
- Inadequate consideration was given to environmental hazards.
- Hazards analysis external to FMEA generally was absent. FMEA analysis alone is insufficient for SARS.

In general, it was found that resolution of the issues raised could require extensive revision of the safety analysis documentation.

As previously stated, the major problem encountered by CORO in regard to SARS implementation is due to resource constraints. In addition, there needs to be a better mechanism for ensuring that CORO is notified of reviews it is to be required to perform.

2.5 U.S. ARMY ENGINEER DIVISION, HUNTSVILLE (USAEDH)

Project management of the ICGG** and CONOCO*** programs utilizes the services of USAEDH, with whom DOE has a formal agreement, for day-to-day project management services. During the visit to USAEDH, it was learned

*"Informal Safety Analysis Review of the University of Tennessee Space Institute Magnetohydrodynamics Project," January 1981.

**High BTU Synthetic Pipeline Gas Demonstration Plant "B"

***High BTU Synthetic Pipeline Gas Demonstration Plant "A"

that it does not appear likely that SARS will be imposed on CONOCO, and that, in any event, it is too late a date to begin SARS implementation for the project. In the case of the ICGG project, an effort had been begun as of late 1980 to collect data necessary for a safety analysis to be compiled. Since ESAAB action on the ICGG project is scheduled for July 30, 1980, it is necessary for the completed safety analysis to be reviewed by that time. Thus, due to time constraints, only about one month will be allowed for independent review of the Preliminary Safety Analysis Report (PSAR) currently being prepared.

Two levels of review are planned. USAEDH or a contractor will provide the first level. There apparently has been a breakdown in communications between USAEDH and HQ ASFE in regard to who will provide the independent review (i.e., the second level of review). According to USAEDH, HQ ASFE could arrange for the independent review by drawing upon the services of, for example, the Army Toxic and Hazardous Materials Agency. USAEDH indicated that they would require a minimum of eight months prior notice to make arrangements for the independent review. When no response was received from HQ, USAEDH assumed that HQ ASFE planned to perform the ICGG review.

According to the Draft FE SARS Guidelines, the Office of Plans and Technology Assessment (OPTA) is charged with responsibility for managing the HQ review process. As such, they obviously should have been aware of the fact that USAEDH was expecting HQ to perform the review. However, this was not the case; OPTA staff had not been notified that they were expected to perform the review during July 1981. Clearly, some mechanism needs to be established so that this situation is avoided in the future. It would seem that OPTA should have been consulted before the decision was made for HQ to perform the review. In addition, there should be a system to ensure that OPTA is provided with sufficient lead time to establish review panels and hire any necessary consultants for those reviews which they are to be required to perform.

3. CONCLUSIONS

In summary, a greater degree of guidance and oversight of field SARS efforts is needed to ensure that implementation of DOE 5481.1 is consistent for all applicable FE operations. In addition, the following items need to be considered:

- There needs to be a system whereby projects with SARS requirements in their contracts can be identified. This will facilitate the funding and completion of the safety analysis and its review as well as the identification of projects' SARS milestones.
- Firm guidance is required from DOE HQ in regard to items such as safety analysis content and format. There should also be a decision made in regard to the delegation of review authority for moderate risk operations.
- Lines of communication should be identified so field office personnel are aware of to whom they should forward completed analyses for review.
- A detailed review of SARS requirements should be made in combination with a review of personnel and budgetary resources available to fill requirements, both at the field and HQ levels.