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PHYSICAL PROTECTION OF NUCLEAR FACILITIES

Progress Report
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PHYSICAL PROTECTION OF NUCLEAR FACILITIES

Progress Report

SUMMARY

In-house activities during May included (1) continuation of vital area analyses of operating reactor facilities, (2) addition of the Form New Fault Tree (FRMNEWFT) procedure to the Set Equation Transformation System (SETS) code which provides extensive capabilities for merging and altering fault trees, and (3) continued development of a Brief Adversary Threat Loss Estimator (BATLE) Graphics code. Work continues on the preparation of the SAFE Users Manuel and the "Brief Adversary Threat Loss Estimator (BATLE) User's Guide."

Contractual support continued to be provided by Science Applications, Inc. (SAI) and Pritsker & Associates, Inc. SAI continued to assist in the expansion and revision of generic sabotage fault trees (GFSTs) developed by Sandia National Laboratories, Albuquerque (SNLA). These revisions will facilitate the use of the fault trees. SAI also completed the software modifications needed to efficiently evaluate reactor sabotage using the Matrix Analysis of the Insider Threat (MAIT) method. Pritsker & Associates, Inc. emphasized analysis of the input/output (I/O) capabilities of the Safeguards Network Analysis Procedure (SNAP).

FACILITY CHARACTERIZATION

In-House Activities

Vital Area Analyses

The vital area analyses of operating reactor facilities, which are being performed jointly with the Los Alamos National Scientific Laboratory (LANSL) and Sandia National Laboratories (SNL) for the U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards (NRC/NMSS), continued during May. Three pressurized water reactor (PWR) and three boiling water reactor (BWR) facilities were analyzed during the month. The current status of these analyses is as follows:

1. Cards were received from LANSL and analyses rerun for PWR Nos. 19 and 20,

2. Changes were received and an analysis rerun for BWR No. 7,

3. Initial changes were received and analyses rerun for PWR No. 18; subsequent changes have been received for this facility and a reanalysis is in progress, and

4. Event/location analyses have been performed for specified double locations for BWR Nos. 11 and 13.

The FRMNEWFT procedure has been added to the SETS code. This procedure provides extensive capabilities for merging and altering existing fault trees. These features will be useful in making changes to the trees for those facilities which require reanalysis.

Contractual Support

SAI continues to assist in the expansion and revision of GSFTs developed by SNLA. These revisions are being made in order to improve the utility of the trees and to reduce analyst time required for their application. During May, a three-volume report, "Basic Elements of a Methodology for the Development of Component Sabotage Fault Trees," was completed and delivered to Sandia for review. The report consists of (1) GSFTs, logic files (used to develop SETS input), and dictionary files (used in fault tree plotting), (2) GSFT questionnaires and answer

sheets for components and support functions, and (3) instruction sheets for application of GSFTs. This information will be the basis used for computer automation of some of the work currently being performed manually.

EVALUATION METHODOLOGY

In-House Activities

Automation of System Evaluation

SAFE Applications -- Passwords which will be used to access the Sandia Network Operating System (NOS) time-sharing computer system were obtained for seven NRC/NMSS staff members. Modifications were made to the password IDs to allow the creation of direct access files which are used in SAFE. These IDs will be used by NRC in their applications of SAFE to reactors.

SAFE Documentation -- Further work has been done on Volume III: "Example Application" of the SAFE Users Manual. All sections of this volume have been completed and are being reviewed. Volume I: "Executive Summary" and Volume II: "Method Description" of the users manual have been completed and are currently being edited for final review.

Computer Code Modifications -- A report, "Brief Adversary Threat Loss Estimator (BATLE) User's Guide," is currently being written. This document will provide guidance on the use of the BATLE model and describe the required input and the types of output that can be obtained. In order to facilitate the use of BATLE, all free-formatted output from the code has been changed to formatted write statements.

Work on a BATLE Graphics code continues. A condensed version of BATLE which does not include input and output sections has been developed. This version will be used to study parametric perturbations on a baseline scenario. A list of potential variables and the types of plots required for the parametric study is being compiled.

SAFE/SEAD Interface -- The present overlay structure of the inter-
face between SAFE and SEAD will not load on the NOS computer system
within the existing memory restrictions. However, a section of the SEAD
program has been identified at which the program can be divided to allow
an overlay to fit within the established core memory. Work is underway
to divide the interface program at this point prior to revising the
overlay structure.

Contractual Support

SNAP Application Development

SNAP Graphics I/O -- The analysis of the I/O capabilities required
for an efficient user interface to the SNAP simulation package was
emphasized during May by Pritsker & Associates, Inc. Work on the design
of the I/O editing capabilities continued. The design of the necessary
computer files has been completed, and the relationship of the separate
computer files to one another analyzed. It is anticipated that the
design of the I/O graphics capabilities will be completed during June.
Upon completion of the I/O capability design, the graphics work will
concentrate on the output side of the SNAP package. Then an efficient,
general method for displaying adversary and guard movement in a graphi-
cally digitized facility will be designed.

Insider Reactor Sabotage Analysis

During May, SAI completed the software modifications necessary to
efficiently evaluate reactor sabotage using the MAIT method. No diffi-
culties were encountered as a result of incorporating these modifica-
tions into MAIT.

Analyses of the baseline PWR and BWR facilities have been com-
pleted. The results of these studies substantiate earlier judgements
concerning safeguards at the baseline facilities.

A meeting was held on 19 May 1980 between SAI and Sandia personnel
to discuss progress on the insider reactor sabotage analysis. On 21
May, a project status briefing was given to NRC staff members.