

INTERIM REPORT

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Robert L. Shepard, Safeguards Research Branch, SAFER:RES

This document was prepared primarily for preliminary or internal use. It has not received full review and approval. Since there may be substantive changes, this document should not be considered final.

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INTERIM REPORT

NRC Research and Technical
Assistance Report

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LAWRENCE LIVERMORE LABORATORY

May 9, 1980
MC 80-05-05-LR

Dr. Robert L. Shepard
Technical Support Branch
Division of Safeguards, Fuel Cycle
and Environmental Research
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue, Willste Bldg.
Silver Spring, MD 20910

Dear Bob:

Enclosed are ten copies of the monthly letter report for
March 1980.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Andy".

ANDREW J. POGGIO
Program Leader
NSS Safeguards Program

skm

Enclosures

Copy To:
R. Al-Ayat
D. R. Dunn
A. W. Olson

NRC Research and Technical
Assistance Report

MC 80-05-05-LR

NRC Safeguards Material Control Project
Monthly Letter Report for March 1980

A. J. Poggio
Program Leader

NRC Research and Technical
Assistance Report

Assessment Methodology Applications & Development - Task 1

(Contributors: C. J. Patenaude, A. A. Parziale, W. J. Orvis, P. S. Wahler,
A. J. Poggio)

Technical Activities

The technical activities in March, 1980, focused on upgrading the Structured Assessment Approach (SAA), that is, the CLAMOR code, the front end, and the applications.

- SAA Upgrade - CLAMOR

Development continued on the detailed tamper analysis code for the SAA. We are developing three very promising techniques to increase our ability to analyze complex material control systems. These techniques are: the partitioning algorithm, which is 90% complete, the bit vector storage method, which cuts the needed computer time in half, and the condensation algorithm, which drastically reduces the number of elements in a matrix.

- SAA Upgrade - Front End

Work continued on making SAA more user-oriented. We began the data gathering task for the SAA code by defining the data needed, and continued developing the "Data-Gathering Handbook for the SAA".

- SAA Applications

Work continued on the material accounting section of SAA as part of our SAA upgrade and in anticipation of receiving needed information from NRC.

A paper, "The Structured Assessment Approach - A Procedure for the Assessment of Fuel Cycle Safeguard Systems" was prepared and appropriate poster presentation aids were used for its delivery at the Second ESARDA Symposium on Safeguards and Nuclear Materials Management in Edinburgh, Scotland, March 26-28, 1980.

Aggregated Systems Model (ASM) Tasks 2 & 3

(Contributors: R. Al-Ayat, M. Schrot, G. Corynen, B. Judd (ADA),
J. Huntsman (ADA))

- 1) Rokaya Al-Ayat, Bruce Judd and Jean Huntsman attended a meeting from March 3 to March 7 at the Babcock and Wilcox (B&W) Fuel Fabrication Facility in Lynchburg. Bill Altman and Mark Killinger of the NRC attended the first two and a half days of the meeting. The meeting consisted of:
 - a. describing NRC's and LLNL's roles in MC&A upgrade rule development by Bill Altman,
 - b. presenting overview of LLNL's Value-Impact analysis, presented to the management of B&W by Rokaya Al-Ayat,
 - c. visiting the site, including the scrap recovery facility,
 - d. collecting data on the types of alarms. The alarm resolution procedures and possible adversary strategies consumed the major part of the visit.
- 2) Bill Altman and Mark Killinger met with us during the same week to discuss Tasks 2.1 and 3.1, in particular, confirmation. Bill Altman presented his views on confirmation and requested that we develop performance measures similar to those we developed for the alarm and the resolution functions of an MC&A system. In response, we forwarded a technical memorandum "Measuring the Confirmation Performance of an MC&A System", to Bill Altman and Barry Mendelsohn on March 14, describing our ideas on confirmation and possible choices of measures of performances for the confirmation function. In a telephone conversation, Bill agreed with the ideas proposed. A memo describing the technical reasoning behind our proposed measures should be completed by late April.
- 3) Mary Schrot visited NRC March 18, 1980. With Bill Altman and Barry Mendelsohn, she discussed the ideas in their updated drafts on the Upgrade Rule and the place of alarm resolution in the MC&A Upgrade Rule.
- 4) On March 19 and 20, Rokaya Al-Ayat, Mary Schrot, Richard Schechter, and Bruce Judd of ADA, and Barry Mendelsohn and Carl Withee of NRC, visited the General Electric Fuel Fabrication Plant in Wilmington, NC. The purpose of the visit was to become familiar with their Manufacturing Information and Control System (MICS). Since the MICS is a near real-time system, it is believed that such a system can play an important role in timely resolution of MC&A alarms. The discussion covered the role of the MICS system in localizing and resolving the material theft incident which occurred in 1979. The incident is of particular interest, because it made clear the facility's resolution procedure for:
 - a. the external alarm generated by the letter the adversary sent to GE management.
 - b. the internal alarm generated by the system because of the missing material.

- 5) Jean Huntsman and Rich McCord of ADA began developing algorithms to sort data and improve the output display of the Value-Impact results.
- 6) Guy Corynen completed a survey of the literature on Alarm Resolution. Except for the initial and suggested approach of Al-Ayat, et al., (report in progress), a rational and organized method for resolving the various alarms associated with managing Special Nuclear Material does not exist. At first sight, this approach is a good start and may constitute a good first step toward the more detailed and specific approach needed.

Improved Guidance Capabilities for MC&A and
Analysis of Interfacility Material Accounting
Tasks 4 & 5

(Contributors: D. R. Dunn, J. McDonnel, Paul Chilton, R. Mullin (ATA))

Task 4 - Technical Activities

Task 4 is now 50% complete. We have completed analyzing protective path elements for the many possible protective path sets for the generic minimal material accounting system previously developed by Lim and Huebel, UCRL-52734, NUREG/CR-1192. We decided upon reasonable protective measures involving 'Skip Echelon Verification' and 'Controls on Controls'.

We are preparing a draft report on upgrading the generic minimal material accounting system in which we graphically display the changes. We prepared Boolean equations for the SETS routine which include the upgrades. Vulnerability results from a SETS analysis then can be compared to those in the Lim-Huebel report.

Task 5 - Technical Activities

Task 5 is 20% complete. We established the following objectives for Task 5:

- 1) to examine the material balance data flows external to licensee operations; i.e., material accounting data flows between licensees (and licensee/contractors) and NRC users,
- 2) to examine the characteristics of these flows in terms of how they contribute to various overall material accounting system qualities of user utility, timeliness, bases in regulations, vulnerabilities, and compatibility between systems,
- 3) the safeguards relevance of the data contained in these systems,
- 4) to formulate information based on the above to support ongoing NRC activities relative to the organization and structure of material accounting upgrade rules.

We gathered and reviewed a substantial amount of data on the Safeguards Status Report System. To resolve uncertainties in the data we met with the audit group of NRC Region 5 and later with Bob Shotwell, the principal author of the Boeing Computer Services ISIS report. A first draft paper, "Safeguards Relevance of the Safeguards Status Report System," has been completed.