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INTERIM REPORT

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Nuclear Systems Safety/Safeguards Program

Material Control Project

Monlthly Letter Report for April, 1980

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INTERACTION WITH THE NRC/TECHNICAL MEETINGS

A. J. Poggio attended a meeting at Nuclear Regulatory Commission (NRC) Headquarters on April 11, 1980, to participate in planning the RES program for FY'81-86.

Plans were made for a briefing session for Task 2.1 (Data Base For Representative Facility) and Task 2.2 (Alarm Resolution) with W. Altman and B. Mendelsohn of NMSS to be held the first week of May. The purpose of this session is twofold: 1) to report on and review our progress in these tasks to date (contract deliverable) and 2) to receive guidance from the NRC staff on the MC&A Upgrade Rule alternatives to be analyzed. The meeting was cancelled, however, due to lack of funds for t avel at the NRC. Continued discussions were held with W. Altman and B. Mendelsohn via telephone. We anticipate the next meeting to be held at the NRC in June.

The second data elicitation session for Task 2.1 was held this month with the Babcock and Wilcox (B&W) Lynchburg Accountability Staff. This session represents a continuation of the week-long meeting held at Lynchburg in March. In this meeting we validated the data that was collected earlier and collected the additional data needed for our Data Base. A third meeting with the B&W staff is anticipated sometime in July (provided that adequate and timely guidance is provided by the NRC on the upgrade alternative and an agreement on the scope and level of details provided by our data base from Vallecitos Nuclear Center [VNC] and Lynchburg).

D. Dunn, J. McDonnel, and R. Mullen visited with G. Doyle and D. Hyde, Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee, on April 15. They also visited with W. Altman, G. Sparks, and R. Gramann of NMSS, J. Blalock of IE, and R. Shepard of RES, on April 16. The primary purpose of these visits was to collect and verify information on Nuclear Materials Management Safeguards System (NMMSS) in support of Task 5.

D. Dunn and J McDonnel met with W. Altman, R. Dube, and B. Mendelsohn, NMSS; and with R. Shepard, RES, on April 17 to discuss progress on Task 4. J. McDonnel presented some of the accounting procedures and controls under development which can protect the material accounting system presently being analyzed (viz. Generic Minimal Material Accounting System [GMMA], cf. Lim and Huebel report NUREG/CR-1192, November 1979) against data falsification by one or two individuals. We emphasized that to generalize the GMMA results

to other accounting systems may be difficult, but that the methodology was applicable and should be used to assess several typical material accounting systems.

TASK 1. ASSESSMENT METHODOLOGY APPLICATIONS AND DEVELOPMENT

Contributors: W. Orvis, C. Patenaude, A. Poggio, and P. Wahler

TECHNICAL ACTIVITIES

The technical activities in April, 1980, focused on the early stages of an assessment of the SLIP facility and on further upgrading the Structured Assessment Approach (SAA).

Assessment of the SLIP Facility

On April 16 Lawrence Livermore National Laboratory (LLNL) received the SLIP physical security system data from the NRC. This material primarily consisted of the original diagrammatically-compiled information generated during the technology transfer meeting conducted by A. Parziale, E. McAlpine and R. Shepard at NRC during February 11-15.

We spent several days transferring the physical security data on the SLIP facility into the computer input format needed for an SAA assessment. In the near future we plan to run the SAA to determine monitor coverage, weak collusion, and single failure sensitivity of the SLIP facility.

A document describing the material accounting and measurement system was also received. It gave a reasonable overview of the management structure, the accounts and forms used, and the flow and storage of data and material.

Upgrading the Structured Assessment Approach

As mentioned in earlier monthly letter reports, the nine week hiatus following the technology transfer meeting at NRC had been used for upgrading the SAA. The SAA input package was given attention during April.

This package consists of two portions, one dealing with the collection of pertinent facility data and the other dealing with the preprocessing of the data to prepare it for the vulnerability analysis. The effort during April in the latter area included:

- adapting the Safeguards Vulnerability Analysis Program (SVAP) module dealing with facility description for use with the SAA. This effort was completed.
- defining the entire set of data files required by the SAA. Implementation in the SAA of coding which eliminates redundant data entries and unused data blocks.

In the former area, that relating to data collection, the effort included:

- developing questionnaires to assist in compiling material accounting and measurement data.
- using the questionnaires with the SLIP facility data.

Efforts in developing the partitioning algorithm and the bit vector approach were curtailed during April so that the SLIP assessment could be undertaken.

TASKS 2 AND 3. DEVELOPMENT OF VALUE-IMPACT METHODOLOGY

Contributors: R. Al-Ayat, B. Judd*, and M. Schrot

TECHNICAL ACTIVITIES

On April 30 a memo entitled "Analytical Arguments for Confirmation Performance Measures' was forwarded to W. Altman in response to his request for further discussion to support our choice of the performance measures delineated in our Value-Impact (V-I) analysis. This memo is a follow-on to our earlier discussion paper, "Measuring the Confirmation Performance of an MC&A System telexed to W. Altman on March 14, 1980."

Several modifications to the Aggregated Systems Model (ASM) Code have been implemented this month to generate the output tables that are needed for V-I support of the MA Upgrade Rule. More specifically, output is displayed at several levels of detail:

- performance of alarm and resolution are measured by: 1)adversary type, 2) location (e.g., vault, scrap recovery, fuel fabrication, or the analytical lab), and 3) quantity (small or large).
- the probabilities and times for both alarms and resolution functions are also generated, conditioned on the alarm type (external or internal alarm) and on the initiating event (diversion, falsification, or error condition).

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TASKS 4 & 5. IMPROVED GUIDANCE CAPABILITIES FOR MC&A SYSTEMS AND ANALYSIS OF INTERFACILITY MATERIAL ACCOUNTING

Contributors: P. Chilton**, D. Dunn, G. Kufahl**, J. McDonnel**, R. Mullen**, and A. Vergari**

TECHNICAL ACTIVITIES

Task 4

The principal information flow change mechanism, which has been developed as a recommended upgrade procedure, is Skip Echelon Verification. Skip Echelon Verification requires that duplicate information be forwarded by the producers of data to the normal receiver and to a control receiver. The result of implementing this procedure on the GMMA system is to significantly decrease the vulnerability of that system for the theft scenarios considered.

Task 5

The external material accounting data flows of both the Safeguards Status Report System (SSRS) and the NMMSS are being evaluated.

We have conducted interviews on SSRS with NRC Region 5 personnel. We have also interviewed others knowledgeable in nuclear material accounting at Boeing Computer Services, San Jose, CA; Union Carbide Corporation, Oak Ridge, TN; and NRC Headquarters, Silver Spring, MD. These interviews served to clarify various unresolved points concerning the information flow, operation, and utility of the SSRS, and to provide additional information concerning these points which had not been obtained from previous interviews or from reviews of pertinent literature. In part, these interviews also served to provide a more complete perspective of perceived NRC requirements for material accounting data flows, the actual and potential safeguards relevances of those flows, and the relationships of the SSRS to NRC safeguards goals and objectives for material accounting systems.

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