NRC Research and/or Technical Assistance Report

INTERIM REPORT

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ORNL/HASRD-143

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NRC Individual and NRC Office or Division to Whom Inquiries Should be Addressed:	Dr. Carl J. Withee Office of Nuclear Material Safety and Safeguards

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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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Washington, D. C. 20555
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Oak Ridge, Tennessee
operated by
Union Carbide Corporation
for the
U. S. Department of Energy

INTERIM REPORT

MONTHLY PROGRESS REPORT
FOR OCTOBER 1981

SAFEGUARDS ANALYSIS FOR BYPRODUCT MATERIALS AND SMALL QUANTITIES OF SNM

Health and Safety Research Division
Oak Ridge National Laboratory

PRINCIPAL SCIENTIST: R. O. Chester

OBJECTIVE:

The principal objective of this analysis is to examine the question of whether the risk and consequences of theft or sabotage of facilities or vehicles containing small quantities of special nuclear materials (SNM), and byproduct materials are such that licensees should be required to adopt further measures to safeguard them. Phase 1 of this study was an initial screening of these materials. From this screening, candidates for further consideration were identified. In the course of Phase 2, a detailed examination will be made of the conditions of possession, use, and shipment of materials identified in Phase 1. The characterization of the conditions of possession, use, or shipment will identify any current conditions of the referenced materials that contribute significantly to either the protection from or vulnerability to potential attempts at theft, diversion, or sabotage.

TECHNICAL PROGRESS:

Subtask 1.a(1) Description of various possible delivery methods. This subtask has been completed.

Subtask 1.a(2) Description of adversary capabilities and resources. Work on this subtask is being started in terms of adversary traits, training, and experience, and in terms of minimum required "make-do" or specialized equipment. Information on the availability of commercial equipment has been collected and has been assessed for inclusion in the final report.

Subtask 1.a(3) Analysis and description of the material conditions and processing operations necessary. This subtask has been completed. Camera-ready masters for the final document (ORNL/NUREG-69) have been sent to NRC.

Subtask 1.a(4) Analysis and description of the impact of meteorology. This subtask has been completed.

Subtask 1.b. Perform a literature review of the acceptable/unacceptable threshold level of consequences. This subtask has been completed with report (ORNL/HASRD-137) mailed to NRC Project Manager, C. J. Withee, in September 1981.

Subtask 1.c. Project status reports, monthly, interim, and final. This series of reports is up-to-date. Drafting of the final report, despite a slow-down because of illness and recovery of a principal author (M. L. Randolph), is more than half completed.

Subtask 2.a. Update the material screening list of Phase 1 using the results of Task 1. This subtask is complete with issuing of formal documentation (ORNL/NUREG-69) imminent [see Subtask 1.a(3)].

Subtask 2.b. Develop a plan to obtain the necessary information for characterizing the conditions of possession and shipment of potentially hazardous radionuclides. This subtask has been completed, and is described in a Topical Progress Report, *Summary of Docket File Survey*, ORNL/HASRD-89, August 1980, covering Subtasks 2.b. and 2.c.

Subtask 2.c. Upon NRC approval or modification of the plan developed in Subtask 2.b., gather the needed data from the docket files. This subtask is complete and has been reported in detail in Topical Progress Report, *Summary of Docket File Survey*, ORNL/HASRD-89. (Also see Subtask 2.f.)

Subtask 2.d. Prepare a list of industry contacts for formal survey and specify information to be collected. This subtask has been completed and serves as the basis for Subtask 2.e.

Subtask 2.e. Upon NRC approval of contacts, obtain the information indicated in Subtask 2.d. The set of site visits has been completed. A summary draft report on these visits has been completed. As agreed at the time of making the arrangements for site visits, those portions of the report pertaining specifically to individual licensees have been mailed to the individual licensees for corrections before submission of the report to NRC. Replies, have been received from all but one of the licensees and suitable, all minor, revisions made. The remaining licensee promises to reply early in November.

Subtask 2.f. Analyze results of information-gathering effort and produce an updated list of hazardous radionuclides. A report (NUREG/CR-2203) has been drafted and is now in review at ORNL. This report gives an updated list of most hazardous radionuclides based on criteria described therein and nuclide availability data from three surveys [Simmons et al., *Survey of Radioactivity Material Shipments in the U. S.* (BNWL-1972, 1979); Randolph et al., *Summary of Docket File Survey* (ORNL/HASRD-89, 1980); and Burlison and Laidler, *...DOE ... Customer ... Radioisotope Shipments* (PNL-2930, 1979)]. This report uses health hazard commitment factors based on dose equivalent commitment factors and organ weighting factors recommended by ICRP-26 (1977). Also, as mentioned in Section 2.e., a summary report on the results of the licensee site visits has been prepared.

Subtask 2.g. Perform the final analysis of the (25 or less) most hazardous radionuclides. See special note "Milestone Revision" which follows Subtask 3.b.

Subtask 2.h. For those radionuclides or scenarios that are not well enough characterized or understood, provide a description of the research to produce the needed basic information. See special note "Milestone Revision" which follows Subtask 3.b.

Subtask 3.a. Based on the results of Tasks 1 and 2, identify the feasible malevolent options for each radionuclide of interest. Conclusions on this topic are being developed for inclusion in the final report.

Subtask 3.b. Based on the results of Tasks 1 and 2, identify and characterize the commercially available radionuclides which should be reconsidered for their safeguards provisions. Conclusions on this topic are being developed for inclusion in the final report.

MILESTONE REVISION

Submission of NRC Form 173 by R. S. Brown, Jr. (NRC) to R. J. Hart (Oak Ridge Operations Office) on April 15 provides for deletion of Subtasks 2.g. and 2.h. from the current statement of work. In accordance with this order: (1) we do not proceed further on these two subtasks or report them in this or subsequent monthly reports; and (2) a revised 189 proposal with a new milestone chart has been prepared and forwarded to NRC. This gives more realistic projections allowing for the inevitable slippage in Milestone 2.d. and subsequent work and for deletion of Milestones 2.g. and 2.h.

BUDGET AND TECHNICAL MANPOWER EXPENDITURES (FY 1982)

Reporting Period	Project Costs, $	Technical Support, Man-months
October 1981	67	0.0
Total to Date	76,188	6.2
Estimated Cost to Completion	812	

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9-10. Carl J. Withee, Office of Nuclear Material Safety and Safeguards, Mail Stop SS-881, Nuclear Regulatory Commission, Washington, D.C. 20555

11. Office of the Director, Nuclear Material Safety and Safeguards, Nuclear Regulatory Commission, Washington, D.C. 20555 (Attn: Program Support)

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