

INTERIM REPORT

Accession No. _____

ORNL/CSD/INF-80/8

Contract Program or Project Title:

Program for Standardized Analysis of Fuel Shipping Containers

Subject of This Document: Technical Progress

Authors: G. E. Whitesides and C. V. Parks - Computer Sciences Division

Date of Document: October 29, 1980

Responsible NRC Individual and NRC Office or Division:

D. E. Solberg
Fuel Cycle Research Branch
Div. of Safeguards, Fuel Cycle and Environment
Office of Nuclear Regulatory Research

NOTICE This document contains information of a preliminary nature.
It is subject to revision or correction and therefore does not represent a
final report.

Prepared for
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Under Interagency Agreement DOE 40-550-75
NRC FIN No. B-0172

UNION CARBIDE CORPORATION, NUCLEAR DIVISION
operating the
Oak Ridge Gaseous Diffusion Plant • Oak Ridge National Laboratory
Oak Ridge Y-12 Plant • Paducah Gaseous Diffusion Plant
for the
DEPARTMENT OF ENERGY

INTERIM REPORT

8012100 146

NRC Research and Technical
Assistance Report

RECEIVED DISTRIBUTION
SERVICES UNIT
1980 DEC 3 AM 8 51
NRC
INFORMATION SERVICES
BRANCH

PROGRAM FOR THE STANDARDIZED ANALYSIS
OF FUEL SHIPPING CONTAINERS

Quarterly Summary

July 1, 1980, to September 30, 1980

Personnel Time -- 468 man-hours

(a) This Quarter	\$12,135*
(b) Fiscal Year-to-Date.....	281,436
(c) Projected to End of Fiscal Year.....	281,436
(d) Obligated for FY 1981.....	35,846

*Includes \$9,300 in credit received from BNL.

QUARTERLY REPORT ON PROGRAM FOR THE STANDARDIZED
ANALYSIS OF FUEL SHIPPING CONTAINERS

All activity during this quarter has been solely directed towards documentation of various portions of the SCALE manual. Some work was performed in July on finalizing the documentation for the control modules CSAS1 and CSAS2. Then, with the supplemental funding provided in September, documentation efforts on MORSE-SGC/S, MARS, JUNEBUG, ORIGEN-S, AND KENO-V were resumed. The MARS subroutine library is the geometry package used in MORSE-SGC/S and JUNEBUG.

A meeting between UCC-ND staff and NRC staff was held at ORNL on September 29 to discuss the status of this program and the SCALE project in general. Attendees at the meeting were:

W. R. Lahs, NRC
R. H. Odegarden, NRC
C. V. Parks, UCC-ND
G. E. Whitesides, UCC-ND
W. D. Turner, UCC-ND
T. J. Hoffman, UCC-ND
S. K. Iskander, UCC-ND
W. E. Ford, UCC-ND

Items discussed at this meeting which apply directly to this program are listed below.

- 1) The format for the SCALE manual was reviewed and agreed upon. A draft of the Table of Contents for the SCALE manual is attached as Appendix A.
- 2) It was determined that the CSAS1/CSAS2 documentation (NUREG/CR-2000) should be revised to conform to the agreed-upon format for the SCALE manual.
- 3) A general discussion was held on the research needs for cask analysis in the areas of heat transfer and shielding.
- 4) W. R. Lahs provided S. K. Iskander with an updated version of the MARC code.

NRG Research and Technical
Assistance Report

APPENDIX A

SCALE MANUAL

Section and Page Numbering Scheme

- Objectives:
1. Overall sequential continuity.
 2. Potential for insertions on the page, section, and module level.
- Approach:
- Label criticality safety control module writeups
C1, C2, ...; shielding control module writeups
S1, S2, ...; heat transfer control module write-
ups H1, H2, ...; functional module writeups
F1, F2, ...; miscellaneous writeups M1, M2,
- Section #'s C1.1, ...C1.10.
- Page #'s by section C1.1.1, C1.1.2.
- Appendices will be denoted as C1.A, C1.B, etc.
- Features:
- Allows
1. add-on of modules by type,
 2. add-on of sections by module, and
 3. insertion of pages by section,
additional pages will require renumbering
section or adding suffix to page number,
e.g., C1.1.23a.

<u>Section</u>	<u>Title</u>	<u>Page</u>
C1.1	Introduction to CSAS1: One Dimensional Criticality Safety Analysis	C1.1.1
C2.1	Introduction to CSAS2: Multidimensional Criticality Safety Analysis	C2.1.1
C3.1	Introduction to CSAS3: Optimum Concentration Criticality Safety Analysis	C3.1.1
C4.1	Introduction to CSAS4: Optimum Pitch Criticality Safety Analysis	C4.1.1

<u>Section</u>	<u>Title</u>	<u>Page</u>
S1.1	Introduction to SAS1--One-Dimensional Shielding Analysis with User Specified Source Terms	S1.1.1
S2.1	Introduction to SAS2--One-Dimensional Shielding Analysis of Spent-Fuel Shipping Casks with Radiation Source Terms from Fuel-Burnup Analysis	S2.1.1
S3.1	Introduction to SAS3--Multidimensional Shielding Analysis with User-Specified Source Terms	S3.1.1
S4.1	Introduction to SAS4--Multidimensional Shielding Analysis of Spent-Fuel Shipping Casks with Radiation Source Terms from Fuel-Burnup Analysis	S4.1.1
H1.1	Introduction to HTAS1--Multidimensional Conductive Heat-Transfer Analysis	H1.1.1
H2.1	Introduction to HTAS2--Multidimensional Radiative Heat-Transfer Analysis	H2.1.1

<u>Section</u>	<u>Miscellaneous</u>	<u>Page</u>
M1	The SCALE System Driver	M1.1
M2	The SCALE System Subroutine Library	M2.1
M3	The SCALE System Freeform Input	M3.1
M4	Neutron Cross Section Libraries	M4.1
M5	Neutron-Photon Cross Section Libraries	M5.1
M6	ORIGEN-S Data Libraries	M6.1
M7	Material Properties Libraries	M7.1
M8	Standard Compositions Library	M8.1
M9	The MARS Subroutine Library	M9.1

<u>Section</u>	<u>Functional Modules</u>	<u>Page</u>
F1.1	Introduction to BONAMI-S: Resonance Shielding by the Bondarenko Method	F1.1.1
F2.1	Introduction to NITAWL-S: Resonance Shielding by the Nordheim Method, Working Library Production	F2.1.1
F3.1	Introduction to XSDRNPM-S: One-Dimensional Discrete-Ordinates Transport Analysis	F3.1.1

<u>Section</u>	<u>Title</u>	<u>Page</u>
F4.1	Introduction to XSDOSE: Surface Integration of Angular Fluxes to Determine Dose Levels in External Voids	F4.1.1
F5.1	Introduction to KENO-IV/S: An Improved Monte Carlo Criticality Program	F5.1.1
F6.1	Introduction to COUPLE: Problem-Dependent Cross Section and Neutron Spectral Data for ORIGEN-S Analyses	F6.1.1
F7.1	Introduction to ORIGEN-S: Fuel Depletion Analysis with Actinide Transmutation, Fission Product Buildup and Decay and the Production of Associated Radiation Sources	F7.1.1
F8.1	Introduction to ICE-S: Macroscopic Multigroup Constants for Transport Analyses with Super-Grouping	F8.1.1
F9.1	Introduction to MORSE-SCC/S: Multigroup Neutron and Photon Monte Carlo Transport Analysis with Super-Grouping and Advanced Geometry Features	F9.1.1
F10.1	Introduction to HEATING6: Three-Dimensional Heat Conduction Analyses with the Finite-Difference Formulation	F10.1.1
F11.1	Introduction to KENO-V: An Improved Monte Carlo Criticality Program with Super-Grouping and Advanced Geometry Features	F11.1.1
F12.1	Introduction to JUNEBUG: A Tool to Verify and Validate Three-Dimensional Geometry Models	F12.1.1