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HEALTH AND SAFETY RESEARCH DIVISION

Nuclear and Chemical Waste Programs
(Activity No. AH 10 05 15 0; ONLWC02)

QUALITY ASSURANCE PROGRAM PLAN FOR THE RADIOLOGICAL SURVEY ACTIVITIES PROGRAM - URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

S. J. Ramos - Quality Assurance Coordinator
B. A. Berven - RASA Program Manager
C. A. Little - RASA/UMTRA Project Manager

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Prepared by the
OAK RIDGE NATIONAL LABORATORY
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S. V. Kaye
HASRD Division Director

B. A. Berven
RASA Program Manager

C. A. Little
RASA/UMTRA Project Manager

P. B. Hoke
ORNL QA Director

S. J. Ramos
RASA/UMTRA Quality Assurance Coordinator

M. G. White
DOE/UMTRA Quality Assurance Manager

J. G. Themelis
DOE/UMTRA Project Manager

DOE/UMTRA Project Contracting Officer

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QUALITY ASSURANCE PROGRAM PLAN FOR THE RADIOLOGICAL SURVEY ACTIVITIES PROGRAM - URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT*

S. J. Ramos
C. A. Little
B. A. Berven

ABSTRACT

The Radiological Survey Activities (RASA) program at Oak Ridge National Laboratory (ORNL) is responsible for surveying designated sites in the vicinity of 24 inactive mill sites involved in the Department of Energy's (DOE) Uranium Mill Tailings Remedial Action Project (UMTRAP). The purpose of these surveys is to provide a recommendation to DOE whether to include or exclude the site from UMTRAP based on whether the onsite residual radioactive material (if any) originated from the former mill sites, and radiation levels onsite are in excess of appropriate Environmental Protection Agency (EPA) criteria.

This report describes the quality assurance program plan for the RASA program in conducting all activities related to the UMTRA project. All quality assurance provisions given by the DOE, DOE/UMTRA, and ORNL organizations are integrated into this plan. Specifically, this report identifies the policies and procedures followed in accomplishing the RASA/UMTRAP QA program, identifies those organizational units involved in the implementation of these procedures, and outlines the respective responsibilities of those groups.

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1. INTRODUCTION

The Radiological Survey Activities (RASA) Group of the Health and Safety Research Division (HASRD) at Oak Ridge National Laboratory (ORNL) currently participates in the Department of Energy's (DOE) Uranium Mill Tailings Remedial Action Program (UMTRAP) as the Inclusion Survey Contractor (ISC). The purpose of the ISC is to survey designated sites potentially contaminated with radioactive material originating from the 24 inactive uranium mill sites in UMTRAP and make recommendations as to

* The survey was performed by members of the Radiological Survey Activities Group of the Health and Safety Research Division at Oak Ridge National Laboratory under DOE contract DE-AC05-840R21400.

whether the site should be included in or excluded from further consideration by UMTRAP. These recommendations are based on radiological surveys conducted at these sites to ascertain if sufficient radioactive material is present to exceed the Environmental Protection Agency (EPA) criteria established for UMTRAP (40 CFR 192,)[2] as applied in the Summary Protocol - UMTRAP Vicinity Properties and the Vicinity Properties Management and Implementation Manual (VPMIM)[4]. Detailed radiological survey procedures and methodology employed by the RASA group for the UMTRA project are described in references [1,5-9].

1.1 PURPOSE

The purpose of this document is to provide general information as to the organization, conduct, and documentation of the RASA Quality Assurance Program Plan (QAPP) for the UMTRA project. This QAPP integrates quality assurance provisions given by DOE (DOE Order 5700.6A)[5], DOE/UMTRAP (UMTRAP Quality Assurance Plan)[6], and ORNL (ORNL Quality Assurance Manual)[7].

1.2 SCOPE

The RASA/UMTRAP QAPP applies to all activities performed by RASA for UMTRAP by ORNL or its subcontractors in support of RASA. Specifically, the RASA/UMTRAP QAPP will: (1) identity the organizational units involved in the implementation of this QAPP and outline their responsibilities and (2) identify the policies and procedures followed in accomplishing the RASA/UMTRAP quality assurance program.

2. QUALITY ASSURANCE PROGRAM PLAN DESCRIPTION

2.1 PROGRAM

The QA program for the RASA/UMTRA project is coordinated by the UMTRA QA Coordinator under the direction of the RASA/UMTRA Project Manager.

The elements contained in this QAPP are implemented through written procedures by the UMTRA QA Coordinator. These written procedures describe all activities of the ISC (RASA/UMTRA). The generic procedures for the ISC in the DOE/UMTRA project are provided in the "Summary Protocol - UMTRAP Vicinity Properties: Identification - Characterization - Inclusion."[3] The ISC responsibilities are defined and described in the "Vicinity Properties Management and Implementation Manual."[4] The specific methods and procedures employed by RASA/UMTRAP for the training of personnel and subsequent daily operations are given in the "RASA/UMTRA Procedures Manual"[8]. Appendix A of this QAPP provides a Quality Assurance Assessment (QAA), which is required by ORNL quality assurance procedures.[7]

All activities conducted within this RASA/UMTRA program will follow procedures specified in the above-referenced documents 3,4,7,8,9. Revisions to these documents will be documented and enacted by the RASA/UMTRA Project Director. Quality assurance activities to monitor the use of these procedures will also be documented with appropriate forms and a monthly report to the UMTRA Project Director.

2.2 ORGANIZATION AND RESPONSIBILITIES

This section describes the administrative, financial, and QA organizational structure for ORNL. The general administrative organization is shown in Figure 1. Under the ORNL Director there are four associate directors and one executive director. The HASRD Director is under the Associate Director for Biomedical and Environmental Sciences. The detailed administrative organization shown in Figure 2 shows the RASA group in the Dosimetry and Biophysical Transport Section of HASRD. Financially, the RASA program (see Figures 3 and 4) is under the Nuclear Waste Programs with the Associate Director for Nuclear Engineering Technologies. The RASA program is subdivided into the UMTRA project, FUSRAP project, and the Research and Development Projects (see Fig. 4). A detailed organization chart for the UMTRA project is provided in Figure 5. The Quality Assurance organization plan for ORNL down to HASRD is shown in Figure 6. Responsibility for QA in the RASA/UMTRA project is delegated to the RASA/UMTRA QA Coordinator. Problems and actions or

items affecting QA within the RASA/UMTRA project are reported directly to the RASA/UMTRA QA Coordinator.

The QA programs of ORNL[7] and this RASA/UMTRAP QAPP interface directly with the DOE UMTRA QAP[6] and DOE Order 5700.6A - Quality Assurance.[5] Conduct of the QA program follows the appropriate responsible individual for each of these organizations.

2.3 TRAINING AND POSITION SUPPORT

All personnel entering the RASA/UMTRA project will receive training to acquire necessary skills to perform their responsibilities. Training will consist of review of all appropriate procedure documents, References 3, 4, and 8, and on-the-job training by experienced RASA/UMTRA personnel. Successful completion of training will be documented by a detailed training record in the individual's personnel file. All subcontract personnel will be trained in similar fashion by the appropriate subcontract personnel, with acknowledgment in established personnel files.

All key personnel within the RASA/UMTRA organization will have a qualified, designated individual to serve as their replacement in the event of an extended absence. This organizational structure with designated backup personnel will be on file and updated on an as-needed basis at ORNL and the ORNL office in Grand Junction. In addition, a designated person will be authorized to sign official documentation when the RASA/UMTRA Project Manager is not available.

2.4 DESIGN CONTROL

Because of the nature of the RASA/UMTRA activities, the quality assurance element of "Design Control" is not deemed to be applicable.

2.5 PROCUREMENT DOCUMENT CONTROL

All items and services procured by contract will require the supplier to meet applicable specifications of the RASA/UMTRA project. The specifications will be written into the ORNL Purchase Order Agreement.

If needed, specifications will be discussed with the supplier at the time of contract award by representatives of the RASA/UMTRA project, to ensure that the specifications are clearly understood. Inclusion of appropriate specifications in the contracts will be the shared responsibilities of the RASA/UMTRA Project Director, RASA Program Manager, and the purchasing agent in the Martin Marietta Energy Systems Inc., Purchasing Department.

2.6 INSTRUCTIONS, PROCEDURES, DRAWINGS

All aspects of the RASA/UMTRA project from generic to specific are described in the UMTRA program documentation (references 3, 4, and 8, respectively). This includes all instructions, procedures, and requirements for drawings. These aspects encompass the following items:

- Procedures to identify properties that are potentially contaminated with material originating from former uranium mill sites.
- Procedures to acquire consent forms from property owners.
- Preparation of property drawings.
- Procedures to ensure dependability of detector equipment.
- Procedures used to conduct inclusion radiological surveys.
- Procedures used in analysis of samples collected in the field.
- Procedures to inspect and decontaminate personnel and equipment.
- Preparation of radiological survey reports.
- Procedures to ensure document control.
- Procedures to submit survey reports, inclusion/exclusion recommendations, and necessary data to DOE and appropriate DOE contractors.

All radiological survey documents and letters of inclusion/exclusion recommendation will be reviewed by the RASA/UMTRA Project Manager or his designated representative to ensure compliance with accepted procedures, and approval will be acknowledged by signature on the letter of transmittal to DOE or the inclusion/exclusion recommendation letter.

2.7 DOCUMENT CONTROL

All documents and correspondence issued by the ORNL/RASA program will be reviewed for adequacy and issued by either the RASA Program Manager or RASA/UMTRA Project Manager. All survey reports will be reviewed by at least two RASA staff members including the Team Leader who conducted the survey. An additional review of survey reports will be performed by the RASA/UMTRA Process Coordinator. Inclusion/exclusion letters of recommendation and issuance of radiological survey reports will be acknowledged by signature of the RASA/UMTRA Project Manager or his designee. For specific document control measures, refer to Section 15.10, Reference 8.

2.8 CONTROL OF PURCHASED ITEMS AND SERVICES

The procurement of items and services is controlled by RASA to assure conformance with specifications. The criteria on which to base compliance are specified in the contract purchase order prepared by RASA. The Purchasing Department of Martin Marietta Energy Systems, Inc. reviews the Purchase Order Agreement for completeness, and then bids the contract to qualified bidders according to procedures approved by the DOE. Supplier bids are reviewed by the purchasing agent, and the lowest qualified bid is recommended to RASA/UMTRA personnel. The qualifications and bids are reviewed by either the RASA/UMTRA Project Manager or RASA Program Manager for acceptance. All items with the exception of routine office supplies will be visually inspected by the individual using th item, with any nonconformance reported and documented in accordance with Section 15.11, Reference 8.

2.9 IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENTS

All equipment, spare parts, and high quality items such as computer, survey, or soil laboratory equipment will be controlled. Spare parts and items received in Oak Ridge will be identified and documented by the Instrumentation and Controls Division in the manner that provides direct traceability to the documentation that verifies the acceptability

of the items. High quality items received at the RASA/UMTRA project office will be identified, documented, and inspected by the item's user.

Any items improperly identified or defective in workmanship will be identified with "hold tags" and handled in accordance with Section 15.11 in Reference 8.

2.10 CONTROL OF PROCESSES

Processes affecting the quality of items will be controlled. Calibration of instruments and reference checks of analytical work are addressed in section 2.12 below. The Computer System Manager will provide a document control tracking system which will monitor a vicinity property file throughout all ISC activities. In addition, personnel and equipment will be protected from the risk of contamination. Specific procedures for decontamination are provided in Section 9.8, Reference 8.

2.11 INSPECTIONS

Inspections are required to verify conformance of items and activities to specified requirements. Overall inspection responsibilities are given to the RASA/UMTRA Project Manager. These responsibilities may be delegated to an appropriate individual; specific inspection responsibilities are given in the procedures manual[8]. Purchased equipment delivered to Oak Ridge is inspected by the Instrumentation and Controls Division according to specified procedures[7].

2.12 TEST CONTROL AND CONTROL OF MEASURING AND TEST EQUIPMENT

Conformance testing on equipment is conducted on a regular basis. Portable instrumentation is checked each day prior to use to assure correct response. Calibration of the gamma scintillometer is performed on each property by using a pressurized ion chamber (PIC) or an empirical conversion equation based on historical data. This calibration is used to convert the counts per minute (cpm) to microRoentgens per hour (μR/h). For specific procedures, see Sections 9 and 12, Reference 8.

Gamma scintillometer response is measured semi-annually by an appropriate agency (Bendix Field Engineering Corporation [BFEC] or Instrumentation and Controls Division [I&C] at ORNL) by using appropriate procedures. The response of PICs is measured semi-annually by BFEC. All calibrations will be appropriately documented.

Electronic diagnostic equipment used in the soil laboratory is tested by ORNL Instrumentation and Controls Division staff on an annual basis. The soil sample analytical system is checked at the beginning of each day of use to confirm reliability. Cross-checks of 5% of all samples analyzed are done either by RASA's high-purity germanium (HPGe) analysis system in Oak Ridge or in BFEC's Environmental Measurements Laboratory in Grand Junction. The cross-checks documentation will be maintained by the RASA/UMTRA Soil Sample Coordinator and transmitted to the Process Coordinator.

Radon and radon daughter analytical equipment will be calibrated on a semi-annual basis or as needed either at the appropriate calibration facility [Environmental Measurement Laboratory (BFEC), Mound Facility in Miamisburg Ohio,] or by the manufacturer.

The mobile gamma scanning van is tested by procedures outlined in References 8 and 10.

2.13 HANDLING, STORAGE, AND SHIPPING

Handling, storage, cleaning, packaging, shipment, and preservation of items will be controlled to prevent damage or loss to minimize deterioration. The individual in the RASA/UMTRA project performing these actions is responsible for ensuring proper coordination of this activity.

2.14 INSPECTION, TEST, AND OPERATING STATUS

The inspection, test, and operating status on all equipment is maintained by the Electronics Technician. Nonconforming equipment reports are maintained in a separate file, and the equipment is physically relocated where it cannot be accessed for use. All equipment used in the RASA/UMTRA project will have stickers indicating date of last

inspection and date of next inspection according to RASA/UMTRA requirements and procedures.

2.15 CONTROL OF NONCONFORMING ITEMS

Items that do not conform to specified requirements will be controlled to prevent inadvertent installation or use. Forms documenting items of noncompliance are provided in Appendix B, specific procedures for control and correction of noncompliance items are described in Reference 7.

2.16 CORRECTIVE ACTION

Conditions adverse to quality will be identified promptly and corrected as soon as practical. In the case of a condition significantly adverse to quality, the cause of the condition will be determined and corrective action taken to preclude recurrence. The identification, cause, and corrective action for significant conditions adverse to quality will be documented in the appropriate report and reported to appropriate levels of management. Follow-up action by the QA Coordinator will be taken to verify implementation of corrective action.

2.17 QUALITY ASSURANCE RECORDS

Records that furnish documentary evidence of quality, such as inspections, audits, and corrective actions, will be prepared and maintained in a file in the RASA/UMTRA project office in accordance with provisions in Reference 7. These records will be maintained until appropriate DOE representatives approve ultimate disposition.

2.18 AUDITS

Planned and scheduled audits will be performed internally by the Quality Assurance and Inspection Division, the ORNL Quality Assurance Coordinator for HASRD and the Nuclear and Chemical Waste Programs, and externally by the DOE UMTRA Project Office to verify compliance with all

aspects of the quality assurance program and to determine its effectiveness. Auditing of subcontractor performance will also be conducted. These audits are performed in accordance with written procedures or checklists by the RASA/UMTRA QA Coordinator or designee. The specific schedules, procedures, and documentation are provided in References 6-8. Audit results are documented and are reported to and reviewed by responsible management.[6-8] The Quality Assurance Assessment/Plan forms used during HASRD audits of the RASA program are shown in Appendix A. Follow-up action identified during the audit will be taken as needed. All follow-up action will be documented and properly filed in the RASA/UMTRAP QA file.

REFERENCES

1. U.S. Department of Energy, Background Report for the Uranium Mill Tailings Sites Remedial Action Program, DOE/EP-0011 (April 1981).

2. U.S. Environmental Protection Agency, "Standards for Remedial Action at Inactive Uranium Mill Processing Sites, "Federal Register, Code of Federal Regulations, Section 40, Part 192, Wednesday, January 5, 1983, pg. 590-606.

3. U.S. Department of Energy, Summary Protocal - UMTRAP Vicinity Properties: Identification - Characterization - Inclusion (September 1983).

4. U.S. Department of Energy, Vicinity Properties Management and Implementation Manual, UMTRA-DOE/AL-050601 (June 1984).

5. U.S. Department of Energy, DOE Order 5700.6 - Quality Assurance, U.S. DOE Oak Ridge Operations Office (March 1982).

6. U.S. Department of Energy, UMTRA Project Quality Assurance Plan, UMTRA-DOE/AL-185, Issue B (June 1983).

7. Oak Ridge National Laboratory, Oak Ridge National Laboratory Quality Assurance Manual (April 1974).

8. S.J. Ramos, B.A. Berven and C.A. Little, RASA/UMTRA Procedures Manual, ORNL/TM-9902 (draft).

9. G.H. Miller, Quality Assurance Assessment, Appendix A of the RASA/UMTRA Procedures Manual, ORNL/TM-8600 (draft)

10. T.E. Myrick, M.S. Blair, R.W. Doane, and W.A. Goldsmith, A Mobile Gamma-Ray Scanning System for Detecting Radiation Anomalies Associated with RA-226 Bearing Materials, ORNL/TM-8475 (November 1982).

Figure 1. General Administrative Organization
OAK RIDGE NATIONAL LABORATORY

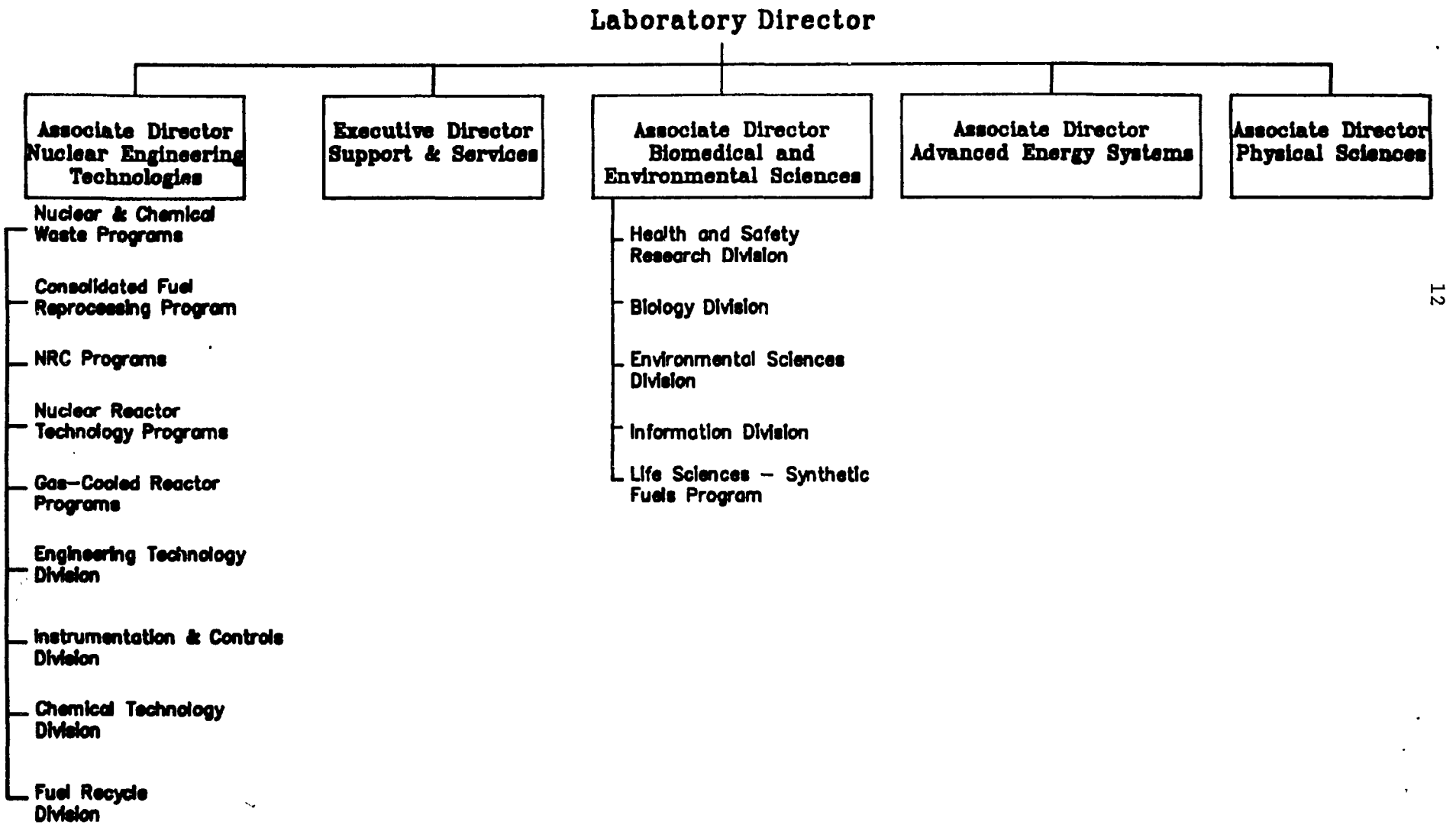


Figure 2. Administrative Organization

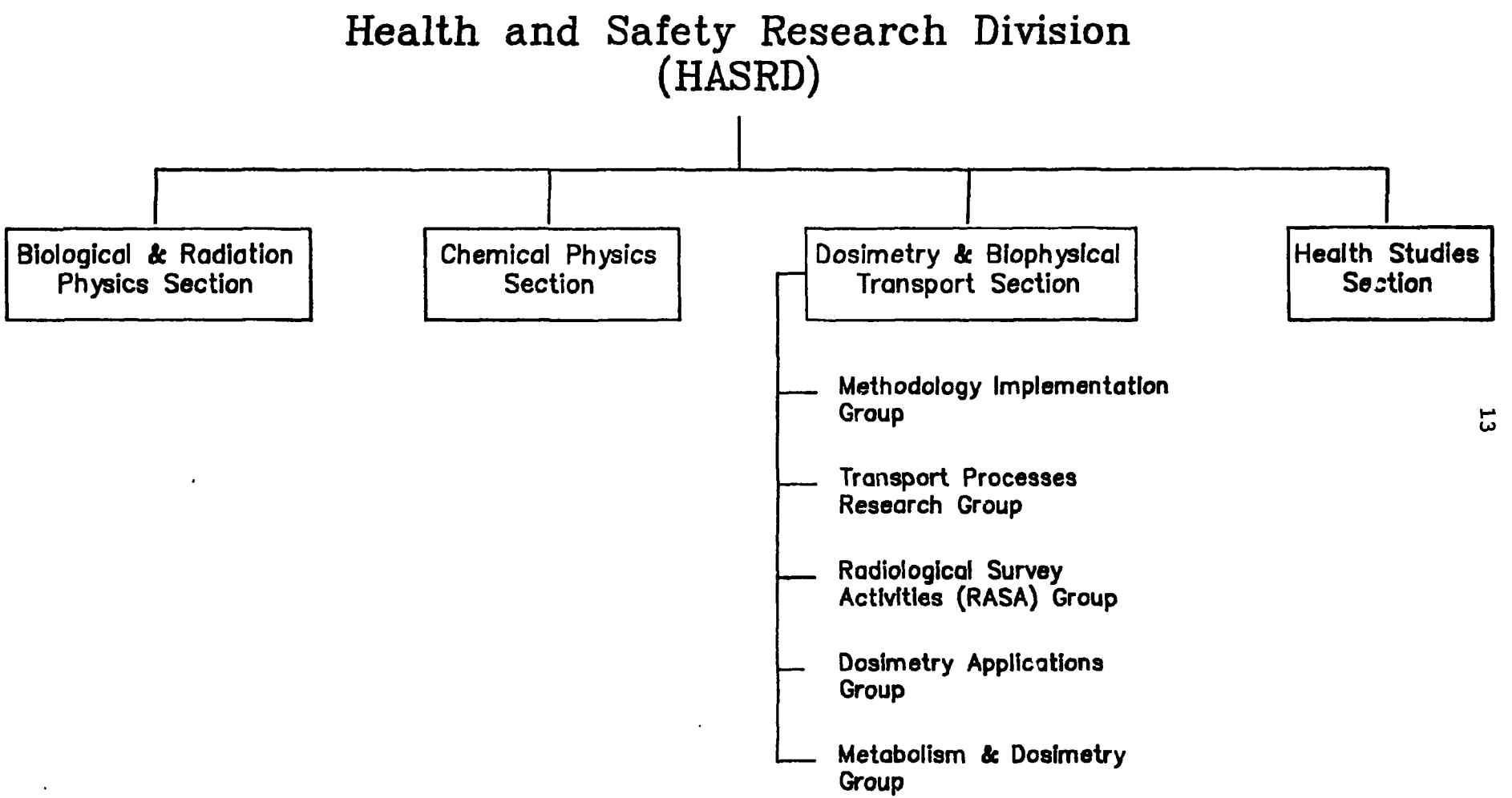


Figure 3. RASA Financial Organization

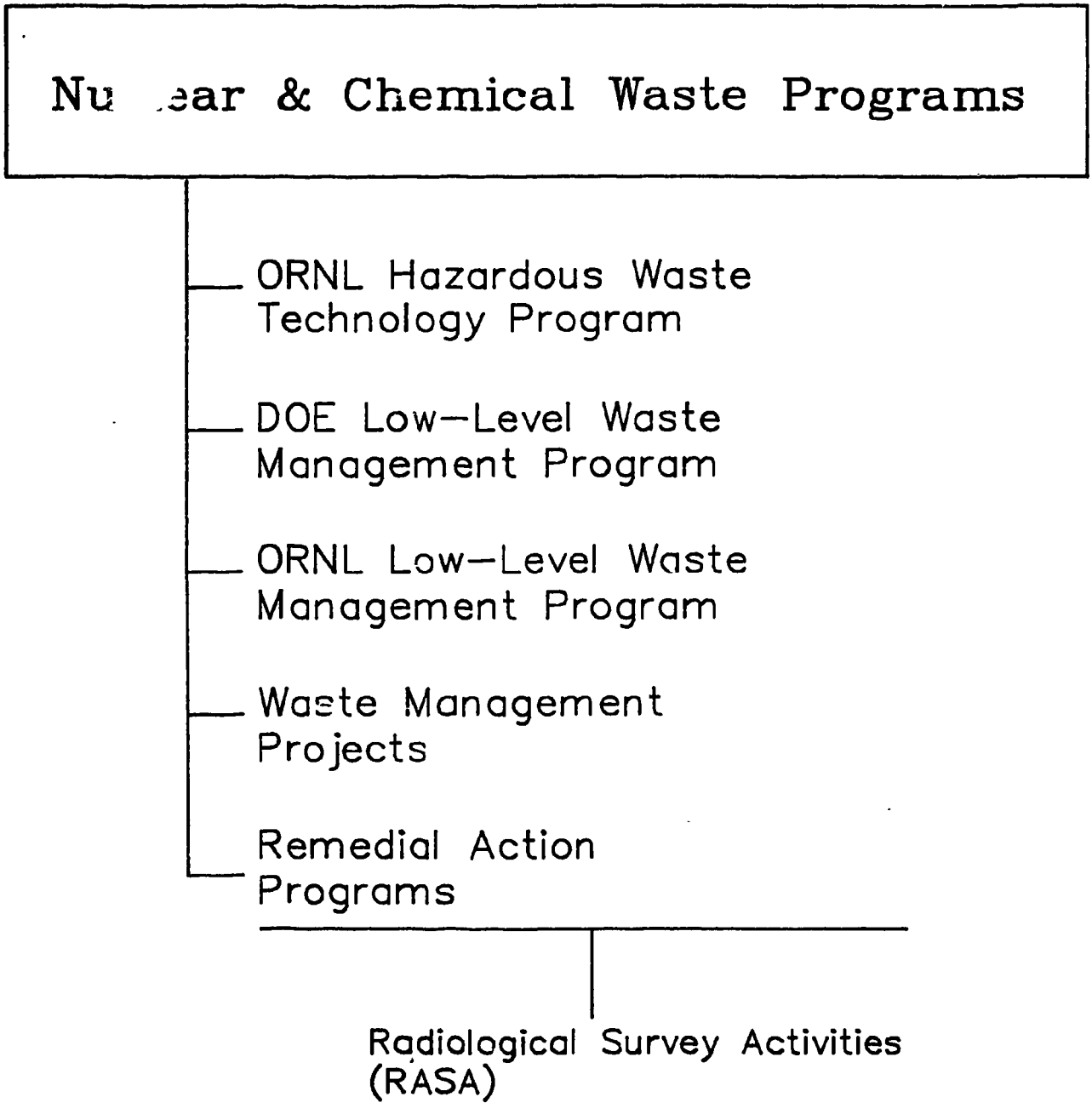


Figure 4. Components of RASA

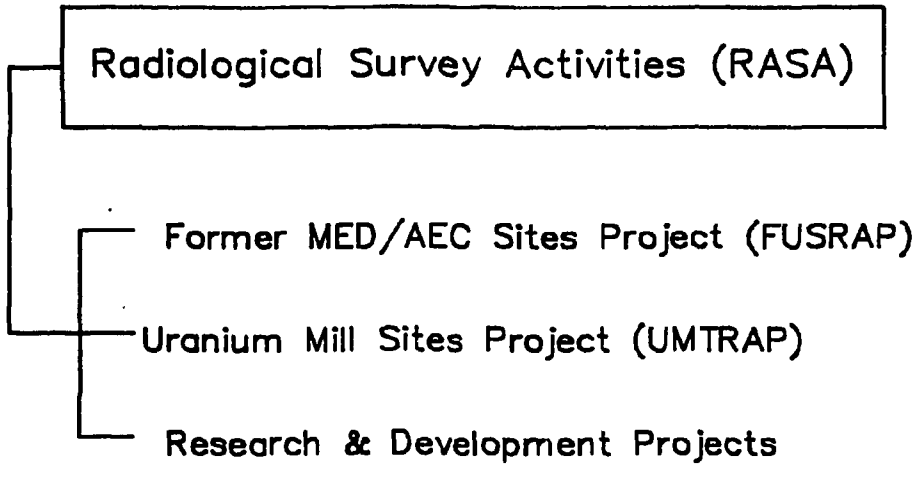


Fig. 5. Detailed organization of ORNL's Grand Junction office, RASA/UMTRA project.

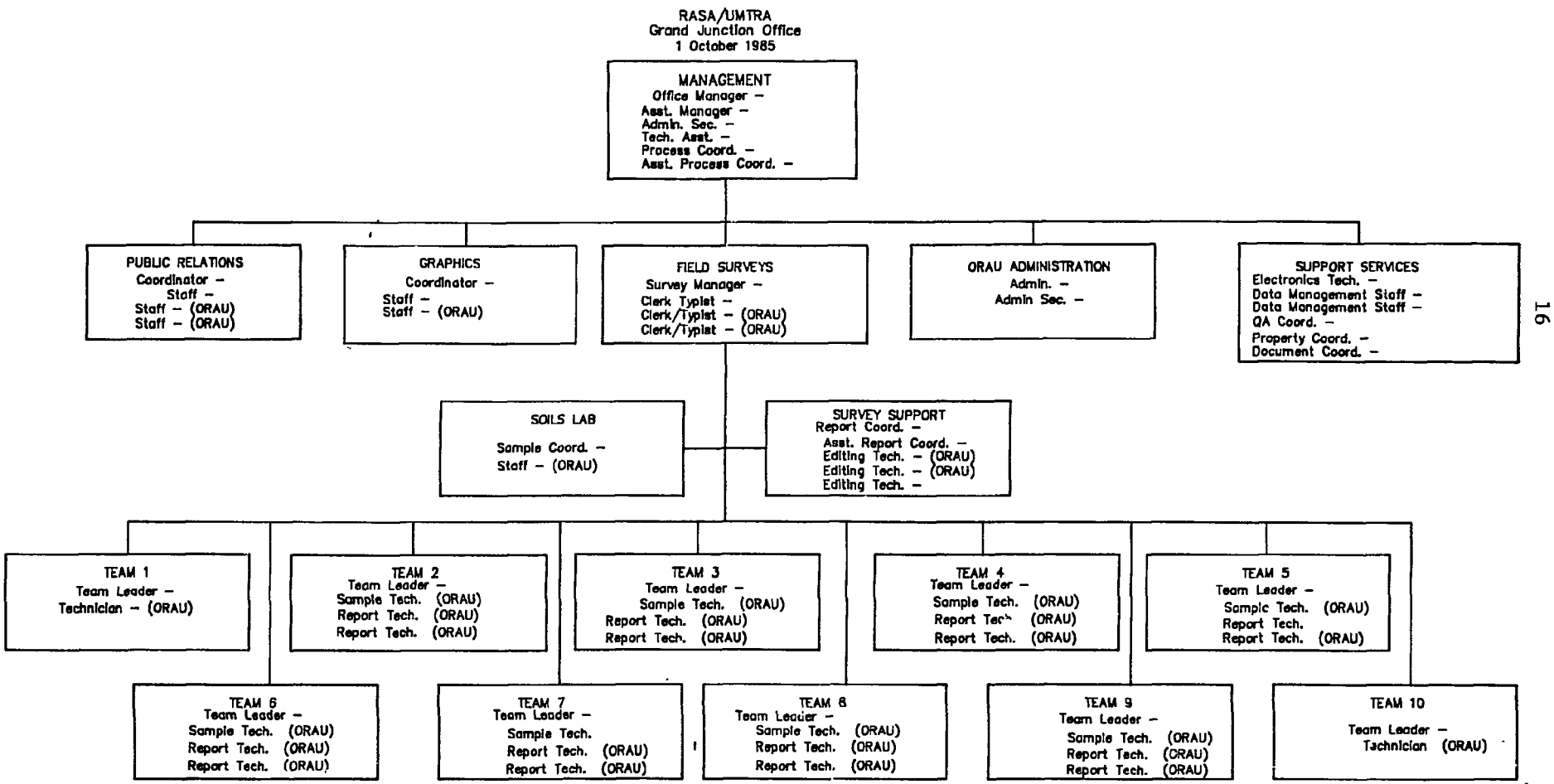
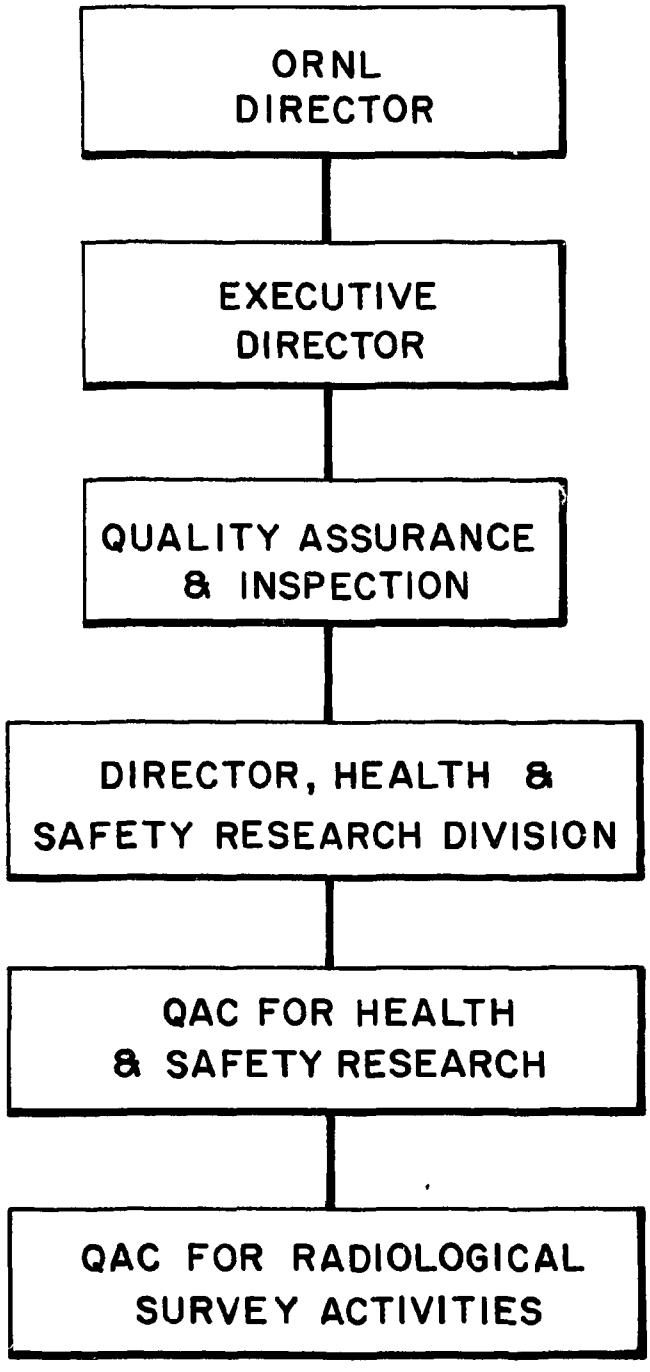


Fig. 6. ORNL Quality Assurance Organizational Plan



APPENDIX A

QUALITY ASSURANCE ASSESSMENT PLAN AND QA FUNCTIONAL RESPONSIBILITIES

QUALITY ASSURANCE ASSESSMENT/PLAN

Plant: ORNL at Grand Junction
Division/Facility: HASRD (8)
Assessment Plan No.: HASRD-QAP-001
Original Issue Date: April 29, 1985

Project Title: RASA-UMTRA Project

I. Project (Subproject) Description

II. Assessment Status

Initial

III. Assessment Conclusion (See Worksheets)

QA Plan Action(s) Required? Yes

IV. Individuals Attending Assessment Meeting Date: April 25, 1985

Chairperson: Gordon H. Miller, HASRD QA Coordinator
Sharon Ramos, RASA QA Coordinator
Craig Little, Project Director
Tom Carter, Assistant Project Director

V. Approvals

Stephen C. Kaye 1/13/86
S. V. Kaye
HASRD Division Director

Barry A. Berven 1/6/86
B. A. Berven
RASA Program Manager

VI. Assessment Review

Review	Scheduled Review Date
1	June 1985
2	Dec 1985
3	June 1986
4	Dec 1986

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Table A-1. Job elements, problem modes, and consequences of failure.

Job elements or action plan steps	Potential problems or failure modes	Effects	Consequence
1. Level of funding	(a) Decrease in funding by 20%	Lower rate of recommendations; remedial actions after 1990;	a S
	(b) Increase in funding by 20%	higher rate of recommendations; higher unit cost	S
2. Personnel	(a) Understaffed	Missed milestones;	S
	(b) Inadequate training	poor results or delays	S
3. Acquisition of consent-for-access	(a) Failure of property owner to respond (b) Consent-for-access lost in mail (c) Misfiling, incomplete package, incorrect computer entry (d) Inadequate document control	Missed milestones	S
4. Capital funding	(a) Lack of capital funding	Decreased efficiency; Missed milestones; higher ISC unit cost; much higher RAC unit cost	S
5. Survey protocol	(a) Change in the survey protocol	Longer duration; double unit cost	S
	(b) Data generated by instruments not in calibration	Inclusion/exclusion meaningless	S
	(c) Soil sample taken incorrectly	Invalidation of results	S
	(d) Qualification and training of personnel inadequate	Faulty results	S
	(e) Not all of property covered	Possible missed inclusion	S
	(f) Inability to compare work done by different teams	Inconsistent results	S

Table A-1. (continued)

Job elements or action plan steps	Potential problems or failure modes	Effects	Consequence
6. Graphics: drawings of properties	(a) Duplication of work	Excessive cost	S
	(b) Consent forms on file too long prior to being drawn	Delay of schedule	S
	(c) Measuring errors made in the field	Repeat of field work	I
7. Document control	(a) Loss of files by personnel	Missed milestones	S
	(b) File not acted upon within a reasonable time frame	Missed milestones	S
8. Mobile scanning for possible inclusion property	(a) Tracking over same ground twice or missing some ground	Excessive cost; property missed that should be cleaned up	S
	(b) False response due to 1) natural phenomenon, 2) instrument calibration done incorrectly	Invalid data - misrepresentation of results	S
	(c) Nonconforming items	Invalid data	S
	(d) Unsafe operation	Hazard to personnel	S
9. Soil analysis	(a) Loss of sample	Missed milestones	
	(b) Invalid result due to lack of procedures	Repeat of sample gathering	S
	(c) Loss of data	Excessive cost	
10. Computer Network	(a) Hardware requirements delayed or not met	Missed milestones	S
		Much higher ISC and RAC unit cost	S
	(b) System failure	Increase in cost	
		Delay in schedule	S

[a]S = Significant
I = Insignificant

Table A-2. Cause of problem, preventative action, and personnel responsibility.

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
1a. Congressional budget cuts	10%	A	(1) Congressional support for UMTRA is strong (2) RASA is in lead position. A delay would cascade down throughout UMTRA project. ISC program would be scaled to meet UMTRA guidance (3) Subcontractors would be dropped if a 20% cut in monies occurred	Proj. Mgr.	As needed
1b. Increase funding in budget	20%	A	(1) Short-term increases absorbed by hiring subcontractors (2) Long-term increases absorbed by hiring personnel	Proj. Mgr.	Same
2a. Inadequate hiring	20%	A	(1) An additional team can be created via subcontracting, hiring, or bringing in the team from Oak Ridge	Proj. Mgr.	Same
2b. Inadequate training	L	A	(1) Personnel hired have a bachelor's or better in an appropriate field and they undergo formal, documented training in-house as spelled out in procedures manual	Proj. Mgr.	Same
3a. 60% of letters sent out return; 40% do not respond	50%	U	(1) Computer prompt or monthly review of files will give how long since consent package has been mailed. If no response: - 60 days after 1st mailing, 2nd package sent.	Public Rel. Office	Monthly ~15th of each month

Table A-2. (continued)

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
			- 60 days after 2nd mailing, phone call is made. - 15 days after phone call is attempted, personal visit is made. - If all of the above fail, file placed in "dead" file for later negotiation with UMTRA office as to their disposition		
3b. Consent-for-access lost in mail	L	A	(1) Letter in 1st & 2nd mailing is certified	Pub. Rel. Coord.	Every mailing
3c. Misfiling, incomplete package, incorrect entry	L	A	(1) File and package created simultaneously off same computer file (2) Packages made in assembly line technique with each part present for making up the package (3) Computer entries done by qualified personnel who proof their work.	Same	
3d. No systematic method of locating a document and knowing who is responsible for it	U	U	(1) The computer network database will provide who the last person was to enter data on a file	Pub. Rel. Coord. Graphics Coord.	As needed
			(2) Files will be color-coded as well as located by status	Team leaders; clerical staff	

Table A-2. (continued)

Possible Causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
			(3) A box of markers will be available to mark position of CDH files		
4a. Monies withdrawn from project	20%	A	(1) If there is a lack of capital funds, there will be additional personnel added to maintain level of production	Proj. Mgr.	As needed
5a. Organization other than DOE insist on a change of protocol	10%	A	(1) It is unlikely that changes will be instigated considering the cost of redoing the 2000 properties already completed (2) If such a change does take place, ISC will completely reorganize to address the situation	Proj. Mgr.	As needed
5b. Instruments not checked and calibrated on routine schedule	L	A	(1) All instruments are calibrated by Bendix or I & C on a 6-month schedule and are labeled with calibration information. Calibration information is documented and kept in GJ/ORNL file for review and reference	Bendix (Electronics Laboratory)	6 mo.
			(2) ORNL performs field checks on the Bendix calibration by measuring background at a particular location, measuring a standard traceable to NBS, and logging these results as well as battery power and net reading of source	Team Leader	Prior to each day of use

Table A-2 (continued)

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
			(3) Back-up instruments taken in case of failure	Team Leader	Each survey
			(4) Inventory of equipment done prior to leaving	Team Leader	Each survey
5c. Incorrect labeling of sample	L	A	(1) Team leader inspects and initials sample for correct labeling prior to leaving the property	Team Leader	Each survey
Incorrect depth of sample	L	A	(1) Depth is measured and documented on data-sheets	Team Leader	Each survey
Sample not taken when needed	L	A	(1) Sample taken in all cases. A background is taken if property is excludable and a sample is always taken at the HOG	Team Leader	Each survey
			(2) Field forms are inspected for completeness prior to leaving property	Team Leader	Each survey
5d. Poor hiring practice and/ or inadequate in-house training	L	A	(1) A training program shall be instituted to teach new personnel (a) how to do a survey (b) what to do for soil preparation	Proj. Mgr.	As needed
			(c) how to write a report	Technical Assistant	As needed
			(2) All new personnel shall have at least a bachelor's degree in an appropriate field	Proj. Mgr.	As needed

Table A-2. (continued)

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
			(3) Clearly defined survey procedures available to all people involved in survey work		
5e. Team members believe another member covered part of property when in fact it has not been covered by anybody	L	A	(1) Team member shades in areas they covered on a copy of the map prior to leaving; this becomes a permanent part of the file	Team Leaders	Each survey
5f. Teams not using same procedures	L	A	(1) Written procedures are followed by survey teams so as to guarantee consistency of work done by all teams	Team Leader	Each survey
6a. Poor management of assigning work to be done	L	A	(1) A color code is used on each file to indicate its status (not drawn, being drawn, finished) and indicates who is doing the work. A computer file will be used later.	Graphics Coord.	As needed
			(2) In addition, Team Leaders will not have free access to files to survey; they will be assigned and subsequently monitored	Process Coord.	As Needed

Table A-2. (continued)

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
6b. Inadequate document control	L	A	(1) Files are reviewed and listed according to date consent form was signed, date drawing was assigned, when drawing was completed. A computer program will be used for this at a later date	Public Relations	As needed
6c. Mismeasured or recorded incorrectly	L	A	(1) These errors occur rarely due to the level of training of the personnel. The simpler, smaller properties are the only ones done by ORNL; other complex properties are done by subcontracted engineering firms. These errors show up on the drawing so rarely that it is more cost effective to go back for correction than inspect each drawing	Graphics Coord.	As needed
7a. (1) No means to trace the person who has possession of a particular file	L	A	(1) Computerized tracking system requires each person to input date the file was received and completed	Person who has file	As needed
(2) File lost or mixed while in use	L	A	(2) File is kept physically isolated from other paper work while being worked on	Report writers	As needed

Table A-2. (continued)

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
7b. No system to indicate status of file or to review due dates	L	A	(1) Computerized tracking system	Computer System Manager	As needed
			(2) Color code is utilized to indicate status of file	Person who has file	As needed
			(3) Files reviewed monthly for due dates	Public Relations Office	As Needed
8a. Inadequate records of properties that have been scanned	L	A	(1) Aerial photos of base map are used to plan and to trace track of scans	Team Leader	As needed
8b. Natural occurring changes in background			(1) Personnel are trained in natural sources; this training is documented for review and reference	Team Leader	As needed
			(2) Historical data are used to prevent duplication and to verify results		
			(3) Doubtful results are double-checked while in area of scan		
Instrumental failures	L	A	(1) Calibration is confirmed daily using three sources and background is measured at same location each day	Team Leader	As needed
			(2) Instruments and computers such as cleaning disk drives are maintained regularly every other day	Team Leader	As needed
			(3) Alarm sounds if optimal speed for scanning is exceeded.		

Table A-2. (continued)

Possible Causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
8c. Nonconforming items occur in the field as instruments break down or batteries weaken	L	A	(1) Instrumental calibration is verified daily (2) Nonconforming items are labeled and isolated to prevent accidental use	Team Leader	As needed
8d. Inadequate safety procedures	L	A	(1) In addition to following standard safety procedures, the van is also equipped with flashers on front and rear of the roof to be used when scanning at a slow speed. Extra window has been added to increase visibility	Team Leader	As needed
9a. Inadequate documentation	L	A	(1) Samples are stored in boxes labeled with the dates till they are stored in labeled drums (2) Samples are thoroughly documented in (a) data sheets of soil samples analysis (b) soil preparation log book (c) soil sample analysis log book (d) computerized files and accompanying hard copy (e) soil sample storage	Survey Team Members & Soil Sampling Coord.	As needed

Table A-2. (continued)

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
9b. Inadequate sample preparation	L	A	(1) Sample preparation is clearly spelled out in written procedures (2) Orientation program will include soil sample preparation	Soil Sampling Coord.	As needed
Inadequate calibration of soil analysis instrumentation	L	A	(1) I&C Division calibrates these instruments (2) Calibration is confirmed twice daily using a cesium source (3) Background is measured daily (4) Quality check samples are pulled for cross-check by a subcontractor. Results of crosschecks are given to the Process Coordinator and are kept on file. Five percent of all samples are cross-checked in this manner	Soil Sampling Coord.	Six months
9c. Inadequate documentation of results	L	A[a]	(1) Hard copy of results and multiple magnetic storage of data are made daily	Soil Sampling Coord.	As needed
10a. ORNL Procurement or vendor nonperformance	L	U	(1) The system will be implemented with what hardware is delivered	Computer System	As needed

Table A-2. (continued)

Possible causes	Prob	Risk	Preventative action or rationale statement	Responsibility	Schedule
10b. Loss of power, or a natural disaster (fire, flood, tornado)	L[b]	U[c]	1) Electrical protection	Electronic Technician (Jim Davidson)	As needed
			2) Data back-up	Computer System Manager	As) Needed

[a]A = Acceptable
[b]L = Low
[c]U = Unacceptable

Table A-3. Quality assurance responsibilities of UMTRA project staff.

Title/office	QA responsibilities
Project Mgr.	1. Decides on dropping or adding subcontractors. 2. Hires qualified personnel. 3. Adjusts or maintains organization of ISC in response to changes of budget, protocol, etc. 4. Initiates and maintains a training program that will include as a minimum: (a) how to perform a survey, (b) how to prepare a soil sample, and (c) how to write an inclusion/exclusion report. Completion of this training program will be documented and permanently placed in a personnel file 5. Ensures that all personnel have access to or possess a copy of the ORNL QA Plan and the RASA/UMTRA Procedures Manual
Project QAC	1. Monitors and plans the QA Program a. Reviews and updates QAP and QAA for project Redistribution of revision shall include DOE, HASRD management, and HASRD QAC b. Conducts internal audits c. Maintains audit log d. Follows up corrective actions and mandatory actions requested by divisional, ORNL, or DOE audits e. Provides input into evaluation of sellers and audits high-quality subcontractors f. Ensures that instrument calibration is taking place on schedule

Table A-3. (continued)

Title/office	QA responsibilities
	2. Investigates quality problem and reports a. Decides how problems shall be reported by one of the following (1) Nonconformance Report (NCR) (a) Reviews form for completeness (b) Determines if the NCR has an impact on the QAP and/or QAA and initiates a revision if required (2) Quality Investigation Report (QIR) (a) With the Project Manager conducts an investigation into QA problems. Major QIRs shall be reported to HASRD QAC and forwarded to ORNL QA Director. A major QIR may require a member of ORNL QA central office to be a part of the investigation. Reports any corrective action on form UCN-14431 (3) Unusual Occurrence Report (UOR) If occurrence meets with requirements of DOE Order OR5000.3, if the occurrence has a major programmatic impact, writes a UOR b. Tracks any corrective action or mandatory action or QA action scheduled in the DOE QAP or ORNL QAA/QAP and ensures the completion of these actions in a timely manner

Table A-3. (continued)

Title/office	QA responsibilities
	3. Supplier Nonconformance and Deviations a. Reviews supplier nonconformance reports. Supplier NCRs should be submitted on Form UCN-10816 when supplier intends to submit a nonconforming item to ORNL for acceptance b. Reviews supplier deviation request (form UCN-11025) when supplier wishes to deviate from ORNL specifications 4. Interfaces with staff, Division QAC, and Project Director (C. Little) a. Gives a presentation to staff during QA week b. Conducts and assists in QA awareness program for staff c. Reports periodically to Project Manager on the QA Program's effectiveness d. Submits a monthly report to Divisional QAC (Gordon Miller)
HASRD QAC	1. Provides support and assistance 2. Audits Grand Junction Operations twice a year 3. Moniters Grand Junction Operations QA program via monthly reports from RASA QAC 4. Maintains a calender and checks with Grand Junction Operations that planned actions are being executed on time

Table A-3. (continued)

Title/office	QA responsibilities
Pub. Rel. Office	1. Reviews files monthly to establish their status in regard to when the consent-for-access package was first mailed 2. Maintains a list that reflects the status of the reviewed files which will include: location (file) number, date consent-for-access package was sent and date it was received. 3. During review of files checks the color code and, if necessary, updates
Pub. Rel. Coordinator	1. Certifies all consent-for-access packages mailed out 2. Makes sure all packages are complete and that files and packages are in agreement 3. Regularly inspects check-out list for files and reports to C. Little any misuse of the check-out system 4. Regularly inspects and maintains a box of markers to mark file position of Colorado Department of Health (CDH) files when removed
Graphics Coordinator	1. Maintains a color code on all files to indicate the status of the drawing and who is performing the drawing 2. Reviews files and maintain a list including location (file) number, date consent form was received, date drawing was assigned, who is doing the drawing, and date drawing is completed

Table A-3. (continued)

Title/office	QA responsibilities
Team Leaders	1. Practice document control by (a) signing out files when removing them, (b) maintaining color code on file to indicate status, (c) keeping files physically isolated so as to prevent loss by mixing with other papers, and (d) using markers with CDH files and returning file to proper position when finished 2. Prior to performing a survey, performs and documents (a) a check on the calibration of all field instruments in accordance with calibration-check procedures in the RASA/UMTRA Procedures Manual and (b) inventories equipment prior to leaving the compound to ensure back-up instruments are present and functioning 3. During survey, (a) measures and records depth of soil sample taken, (b) takes a background sample in any case and takes a sample at the High Outdoor Gamma Area if applicable, (c) follows written procedures to ensure consistent results from team to team, and (d) confirms that team members have shaded areas they covered on a drawing of the property to ensure complete coverage of property 4. After survey, (a) inspects field form for completeness and (b) inspects soil samples for proper labeling and initials the label to indicate that the labeling is correct

Table A-3. (continued)

Title/office	QA responsibilities
Subcontractor	1. Calibrates field instruments to NBS tracable standards every six months and labels the instrument as to when calibration is done and due
Team Members	1. Attend training/orientation sessions 2. Follow written procedures on: • soil sample preparation • survey techniques • report writing 3. Practice document control by signing out files and maintaining the color code to indicate status of file. These files shall be kept physically isolated from other paperwork so as to prevent their loss
Soil Sample Coordinator	1. Follows written procedure for: • sample storage • calibration schedule of instruments in soil lab • calibration check of instruments in soil lab • quality check samples 2. Maintains the following documentation: • data sheet for soil analysis • soil sample preparation log book • soil sample analysis log book • soil sample storage • computerized files and hard copy of samples and data

Table A-3. (continued)

Title/office	QA responsibilities
Computer System Manager	1. Maintains a system log of equipment inventory, internal audits, and any nonconformances 2. Tests and verifies all programs 3. Provides data protection and security 4. Conducts personnel training in proper use of equipment and programs 5. Performs software utilization surveillance 6. Maintains and replaces hardware as needed 7. Provides for data archival storage
Survey Manager	1. Ensures that field procedures are followed 2. Performs field checks of team performance 3. Supervises report editors and Process Coordinator
Technical Assistant	1. Conducts regular training and technical workshops for field staff 2. Evaluates, updates, and implements changes in procedures and protocols at the request of the Project Manager 3. Serves as technical interface between field personnel and administrative staff

Table A-3. (continued)

Title/office	QA responsibilities
Process Co-ordinator	1. Assigns properties in logical order to team leaders 2. Provides technical direction and information to team writers and members 3. Provides input to writers regarding report quality 4. Responsible for review of all inclusion reports 5. Provides input to tracking and document control procedures 6. Interfaces with DOE regarding report recommendations
Electronics Technician	1. Maintains records of electronic equipment 2. Trouble-shoots equipment failures 3. Schedules equipment for calibration or servicing 4. Interfaces with BFEC electronics lab and procurement
Property Coordinator	1. Maintains records of non-electronic equipment 2. Interfaces with ORNL purchasing, BFEC procurement, and other vendors 3. Schedules vehicles for servicing and preventative maintenance

NONCONFORMANCE REPORT

NCR NO.

DIVISION

QA PROGRAM

TYPE: ☐ MATERIAL ☐ PART ☐ SYSTEM ☐ ASSEMBLY

PROJECT TITLE PROGRAM

ITEM NAME	DWG. / SPECIFICATION NO.
VENDOR/ SHOP	WORK / PURCHASE ORDER

DESCRIPTION AND CAUSE OF NONCONFORMANCE

NAME	TITLE	DATE

PROPOSED REMEDY AND JUSTIFICATION

PROPOSED DISPOSITION: ☐ USE UNCORRECTED ☐ REPAIR ☐ REWORK ☐ REJECT

NAME	TITLE	DATE

DISPOSITION:	☐ USE UNCORRECTED ☐ REPAIR ☐ REWORK ☐ REJECT		QI REPORT REQUIRED ☐ YES ☐ NO	
APPROVED BY:	TASK LEADER	DATE	OTHER	DATE
	LEAD DESIGNER	DATE	OTHER	DATE
	ITEM USER	DATE	QAC	DATE

QA REASSESSMENT REQUIRED ☐ YES ☐ NO

☐ APPROVED DISPOSITION COMPLETED

NAME TITLE DATE

UCN-10077
(23 1-85)

DOE 5000.3
11-7-84

UNUSUAL OCCURRENCE REPORT

NAME OF LABORATORY SITE OR CONTRACTOR

Page 1 of _____

1. UOR Number _____
2. Status and Date: Initial _____
   Interim _____
   Final _____

3. Division or Project:

4. Facility, System, or Equipment:

5. Date of Occurrence:

6. Time of Occurrence:

7. Subject of Occurrence:

8. Apparent Cause: Design _____ Material _____ Personnel _____
   Procedure _____ Other _____ (Explain in Item 14.)

9. Description of Occurrence:

10. Operating Conditions of Facility at Time of Occurrence:

11. Immediate Evaluation:

DOE 5000.3
11-7-84

Page 2 of _____

UOR No. _____

UOR Date _____

12 Immediate Action Taken and Results:

13. Is Further Evaluation Required:
Yes _____ No _____
If Yes, Before Further Operation: Yes _____ No _____
If Yes, By Whom? _____
When? _____

14. Final Evaluation and Lessons Learned:

15. Corrective Action:
Taken: _____ Recommended: _____ To Be Supplied: _____

16. Programmatic Impact:

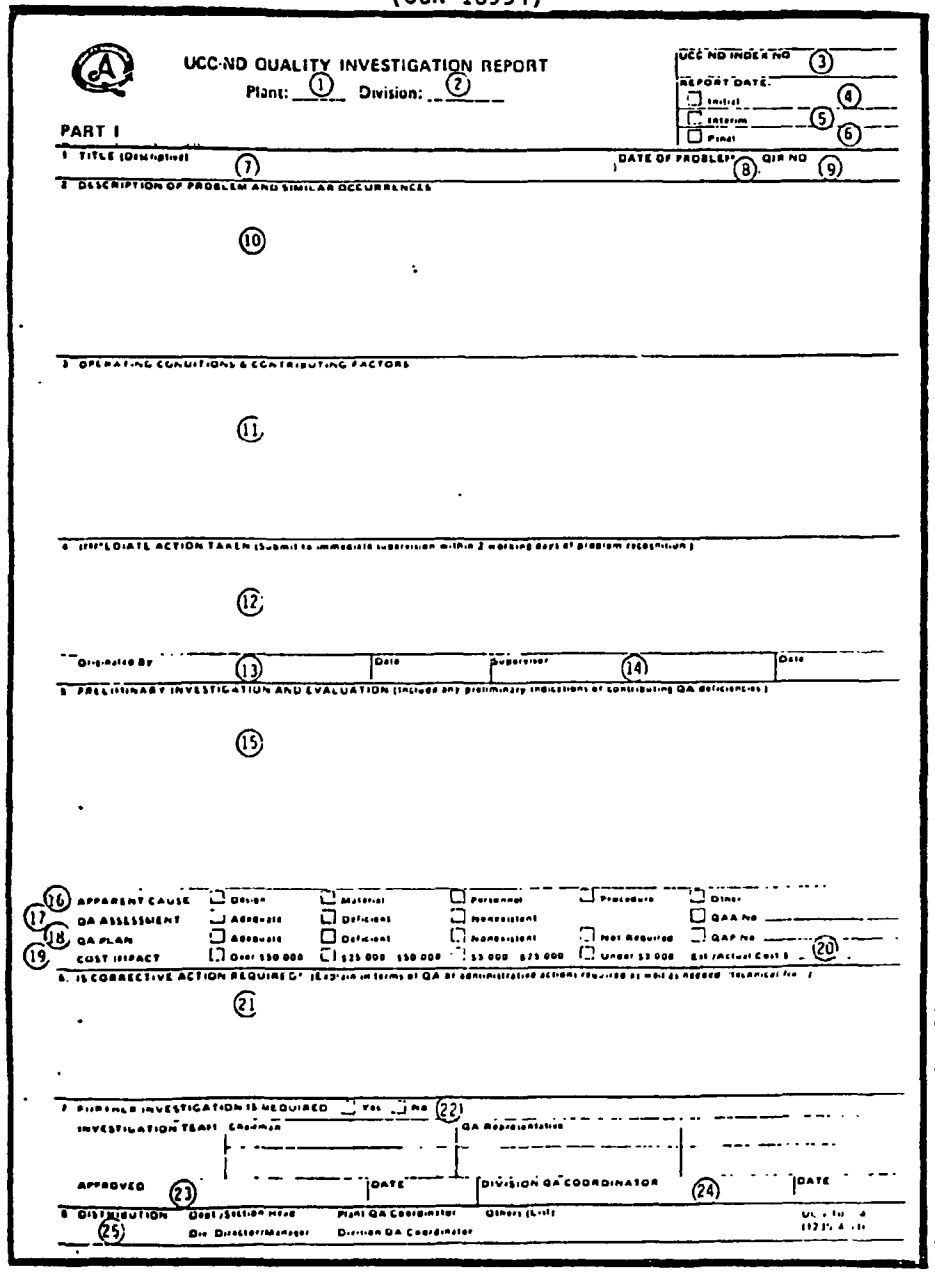
17. Impact Codes and Standards:

18. Similar Unusual Occurrence Report Numbers:

19. Signatures:
Originator _____ Date _____
Approved by _____ Date _____
Approved by _____ Date _____
Approved by _____ Date _____

QUALITY INVESTIGATION REPORT

(UCN-10994)


UCC-ND QUALITY INVESTIGATION REPORT

Plant: (1) Division: (2)

UCC-ND INDEX NO (3)

REPORT DATE: (4)

☐ Initial (5)

☐ Interim

☐ Final (6)

PART I

1 TITLE (Description) (7) DATE OF PROBLEM (8) QIR NO (9)

2 DESCRIPTION OF PROBLEM AND SIMILAR OCCURRENCES

(10)

3 OPERATING CONDITIONS & CONTRIBUTING FACTORS

(11)

4 IMMEDIATE ACTION TAKEN (Submit to immediate supervision within 2 working days of problem recognition)

(12)

Originated By (13) Date Supervisor (14) Date

5 PRELIMINARY INVESTIGATION AND EVALUATION (Include any preliminary indications of contributing QA deficiencies)

(15)

(16) APPARENT CAUSE ☐ Design ☐ Material ☐ Personnel ☐ Procedure ☐ Other

(17) QA ASSESSMENT ☐ Adequate ☐ Deficient ☐ Nonexistent ☐ QAA No

(18) QA PLAN ☐ Adequate ☐ Deficient ☐ Nonexistent ☐ Not Required ☐ QAP No

(19) COST IMPACT ☐ Over $50 000 ☐ $25 000 - $50 000 ☐ $5 000 - $25 000 ☐ Under $5 000 Est./Actual Cost $ (20)

6 IS CORRECTIVE ACTION REQUIRED? (Explain in terms of QA or administrative actions required or what is needed. Technical fix ...)

(21)

7 FURTHER INVESTIGATION IS REQUIRED ☐ Yes ☐ No (22)

INVESTIGATION TEAM: Chairman QA Representative

APPROVED (23) DATE DIVISION QA COORDINATOR (24) DATE

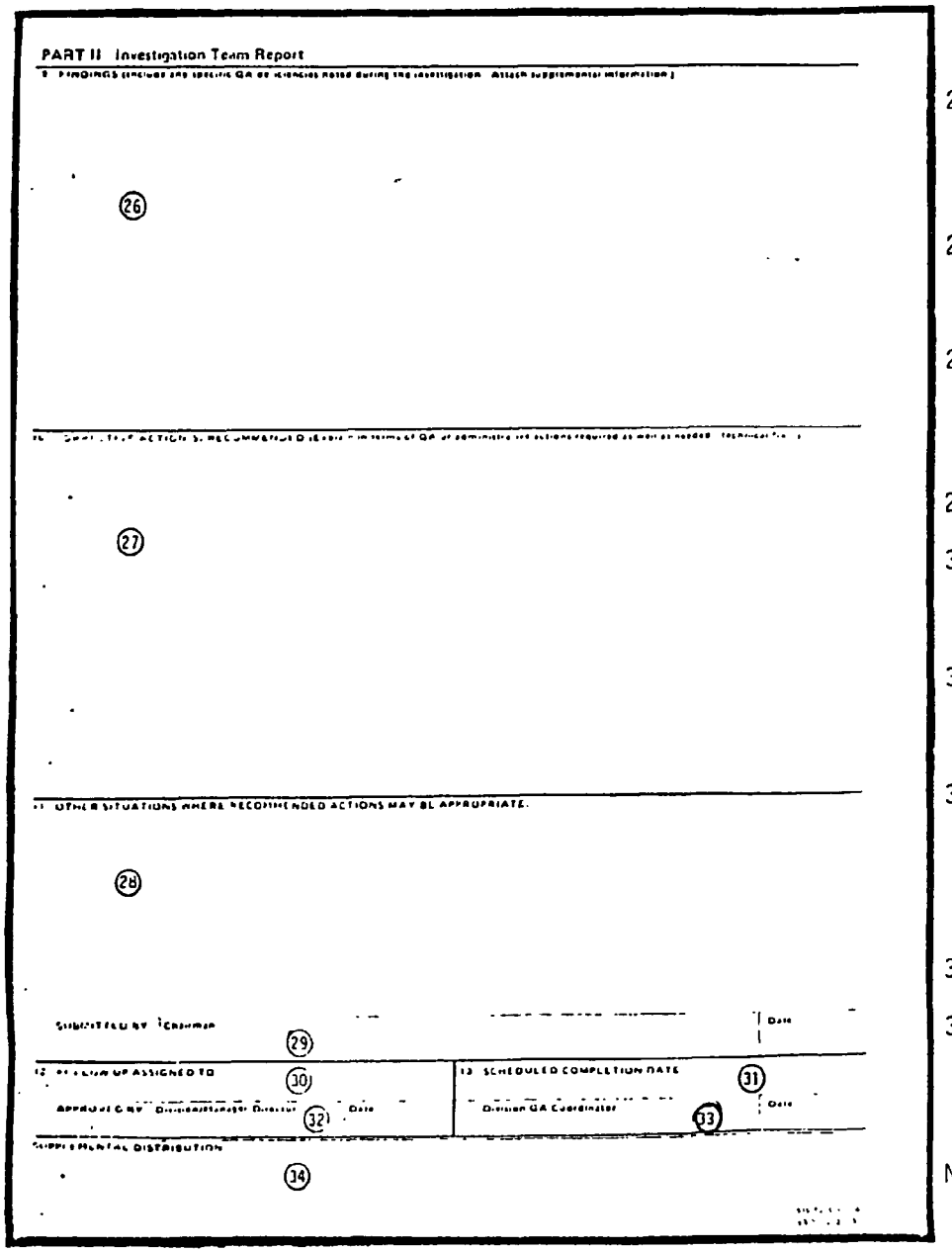
8 DISTRIBUTION (25) Dept./Section Head Plant QA Coordinator Others (List)

Div. Director/Manager Division QA Coordinator

GENERAL: Entries on the report shall be typed

1. Name of plant is ORNL.
2. Name of originating division within ORNL.
3. Index number for QIR. Note: Division QAC shall obtain index number by phoning UCC-ND Office of QA at time QAC signs QIR.
4. Date of initial report, which should be within <u>two</u> working days of problem (step 8 below).
5. Date of an interim or follow-up report.
6. Date of final report (may be same as date of initial report).
7. Short, descriptive, title for problem.
8. Date problem occurred or was discovered.
9. Identification number of QIRs assigned by originating division. This may be assigned by Division QAC.
10. Concise, but complete description of problem and of similar occurrences. Similar occurrences include previous or current, identical or similar, whether or not reported or investigated.
11. Concise, but complete, description of circumstances pertinent to problem. Such circumstances include both pre-existing and existing ones.
12. Concise, but complete, summary of actions taken immediately to mitigate, correct, or prevent recurrence of the problem. Include both QA actions and technical "fixes."
13. Signature of preparer of QIR. Note: Preparer is normally person responsible for subject project when problem is detected.
14. Signature of supervisor of preparer of QIR.
15. A summary of preliminary investigative efforts and initial conclusion reached. Record initial findings and evaluate them as to adequacy of QA planning and implementation.
16. Apparent cause of problem.
17. Evaluation of QA Assessment as to (1) existence & (2) adequacy.
18. Evaluation of QA Plan as to (1) existence & (2) adequacy if required.
19. Evaluation of impact as to cost category.
20. Cost category shall be indicated on "initial" report, if actual cost is not known. Actual cost shall be indicated on "final" report.
21. Summary of corrective QA, administrative & technical actions. If no actions are required, an explanation as to why not.
22. Definition of need for further investigation. If "yes" is checked, investigation team should be formed with chairperson & members shown.
23. Signature of division/program management in originating division.
24. Signature of QAC in originating division.
25. Distribution for initial report (see paragraph 100.8).

QUALITY INVESTIGATION REPORT
(UCN-10994)


PART II Investigation Team Report

(26)

(27)

(28)

(29)

(30)

(31)

(32)

(33)

(34)

SPECIAL INVESTIGATION TEAM REPORT

26. Concise, but complete summary, of the findings of the investigating team including, particularly any QA deficiencies. If a separate report is prepared, it may be referenced here and appended to the report.

27. Listing of recommended corrective QA, technical, and administrative action(s) (both short and long term) necessary to prevent recurrence of the problem.

28. Listing of other situations where recommended corrective action would be appropriate. Record previous or existing, similar or identical, problems which would benefit from information and recommendations resulting from this problem.

29. Signature of the chairperson of investigating team.

30. Name of person assigned to follow-up on the recommended corrective actions. This person is appointed by division/program management.

31. The scheduled completion date for recommended corrective action should always be recorded when follow-up action is required.

32. Signature of Division Manager or Director. This signature indicates acceptance of the investigation team report and a commitment to take appropriate action on each recommendation. Appropriate action may be "no action" due to extenuating or changing circumstances.

33. Signature of Division QAC.

34. Supplemental distribution list. Distribution of the final report should include all those listed in Section 8 (step 25) plus others listed here (see paragraph 100.8).

NOTE: Where any space on the form is too small, continuation on a supplemental sheet is encouraged.

APPENDIX B

QUALITY ASSURANCE FORMS (NCR, UOR, QIR)

INTERNAL DISTRIBUTION

1. J. A. Atencio
2. D. K. Barslund
3-4. B. A. Berven
5. D. M. Carpenter
6. T. E. Carter
7. R. O. Chester
8. W. D. Cottrell
9. C. Clark
10. A. G. Croff
11. K. S. Dickerson
12. M. L. Espegren
13. D. G. Fields
14. D. W. Greene
15. S. C. Hall
16. A. W. Hawthorne
17. P. B. Hoke
18. M. K. Jensen
19. S. V. Kaye
20. R. R. Knott
21. D. C. Landguth
22. R. P. Lenc
23. N. F. Lewis
24-25. C. A. Little
26. A. D. Luck
27. J. L. Marley
28. G. H. Miller
29. C. A. Muhr
30. P. T. Owen
31. D. A. Pickering
32. E. M. Pilz
33-39. S. J. Ramos
40. C. D. Retolaza
41. C. R. Richmond
42. A. S. Rood
43. T. H. Row
44. F. A. Santos
45. T. F. Scanlan
46. D. R. Smuin
47. S. A. Summers
48. G. H. Triplett
49. C. J. Tyler
50. T. M. Williams
51. M. J. Wilson
52. J. P. Witherspoon
53. D. A. Witt
54. K. M. Woynowskie
55-56. Central Research Library
57. Document Reference Section
58. Laboratory Records
59. Laboratory Records - RC
60. ORNL Patent Office

EXTERNAL DISTRIBUTION

61. Office of Assistant Manager, Energy Research and Development, Oak Ridge Operations Office, Oak Ridge, TN 37831

62-88. Office of Scientific and Technical Information, DOE, Oak Ridge, TN 37831

89. Merle E. Crew, U.S. Department of Energy, P. O. Box 2567, Grand Junction, CO 81501

90. K. Kosanke, Bendix Field Engineering Corporation, P. O. Box 1569, Grand Junction, CO 81502

91. D. Summers, Morrison-Knudson, Inc., P. O. Box 9136, Albuquerque, NM 87119

92-98. J. G. Themelis, UMTRA Project Office, U.S. Department of Energy, P. O. Box 5400, Albuquerque, NM 87115

99. M. G. White, UMTRA Project Office, U.S. Department of Energy, P. O. Box 5400, Albuquerque, NM 87115