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MARTIN MARIETTA

# A Technical Review of the Oak Ridge Y-12 Plant Non-Radiological Effluent and Environmental Monitoring Program

February 1986

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
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# A TECHNICAL REVIEW OF THE OAK RIDGE Y-12 PLANT NON-RADIOLOGICAL EFFLUENT AND ENVIRONMENTAL MONITORING PROGRAM

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# A TECHNICAL REVIEW OF THE OAK RIDGE Y-12 PLANT NON-RADIOLOGICAL EFFLUENT AND ENVIRONMENTAL MONITORING PROGRAM

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## CONTENTS

# A TECHNICAL REVIEW OF THE OAK RIDGE Y-12 PLANT NON-RADIOLOGICAL EFFLUENT AND ENVIRONMENTAL MONITORING PROGRAM

## 1. EXECUTIVE SUMMARY

A thorough technical review of the Oak Ridge Y-12 non-radiological effluent and environmental monitoring and sampling program was conducted July 8 through 12, 1985. This review was conducted by staff of Martin Marietta Energy Systems, Inc. (Energy Systems) plants to permit interchange of expertise as well as evaluate the Y-12 program. Based on information reviewed, Y-12 has some very strong areas such as chain-of-custody forms and compliance work on the new NPDES permit.

During the review a number of areas were revealed that need to be upgraded. This review has resulted in a number of recommendations, most of which are major needs. The recommendations are divided into eighteen categories. In order to assist in the preparations of the action plan and to help in the division of responsibility, some recommendations are repeated in several categories (e.g., QA plan). Furthermore, many of the concerns identified during this audit have been or are currently being addressed. As such, the number of recommendations is not an indication of the overall status of the Oak Ridge Y-12 Plant non-radiological effluent and environmental monitoring program. Knowing that all of these recommendations cannot be completed at one time, a priority system for evaluation has been established from one to five with one being the highest priority and five being the lowest. Each recommendation is also divided into major or minor categories as an indication of the resources estimated to complete this recommendation. The areas needing the most improvement are air monitoring, QA/QC, field procedures, documentation, groundwater sampling, spill prevention control and countermeasures plan and biological monitoring. The table on the next page is a summary of the number of recommendations by category and by priority.

Interface between representatives of different Energy Systems plants results in valuable transfer of information. It is intended that what was learned at Y-12 can be of value to the other Energy Systems facilities in evaluating their programs and continuing the upgrading of environmental monitoring.

The Y-12 staff were of great help during this review. The coordination of P. M. Pritz and J. D. Gass was most helpful. A copy of the draft of this report has been provided to Y-12 staff and they have already taken actions to implement many of these recommendations.

### 1.1 RECOMMENDATIONS

The following is a list of recommendations from the review listed by section. The priority is also listed in these sections.

**Summary of recommendations**

| Category | Priority | | | | | Total | Resources required | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | Major | Minor |
| General Recommendations | | | | | | | | |
| General | 11 | 4 | 2 | 4 | 1 | 22 | 16 | 6 |
| Specific Recommendations | | | | | | | | |
| Procedure review | 2 | 0 | 2 | 3 | 0 | 7 | 4 | 3 |
| DOE orders | 1 | 1 | 0 | 1 | 0 | 3 | 3 | 0 |
| Surface water | 2 | 2 | 1 | 1 | 2 | 8 | 6 | 2 |
| Mercury sampling program | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| NPDES compliance | 2 | 3 | 0 | 1 | 0 | 6 | 2 | 4 |
| Emergency sampling | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| SPCC plan | 6 | 4 | 3 | 0 | 1 | 14 | 7 | 7 |
| Air monitoring | 4 | 2 | 0 | 1 | 0 | 7 | 6 | 1 |
| Groundwater | 3 | 2 | 3 | 0 | 0 | 8 | 8 | 0 |
| Sample container preparation | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 |
| Analytical chemistry | 2 | 0 | 1 | 1 | 0 | 4 | 3 | 1 |
| Biological monitoring | 1 | 3 | 2 | 2 | 2 | 10 | 8 | 2 |
| QA/QC in the laboratory | 1 | 3 | 1 | 0 | 0 | 5 | 5 | 0 |
| QA/QC in sample preparation | 0 | 0 | 1 | 1 | 0 | 2 | 2 | 0 |
| QA/QC data | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Sample chain-of-custody | 0 | 1 | 1 | 0 | 0 | 2 | 2 | 0 |
| Hazardous waste | 0 | 7 | 4 | 2 | 0 | 13 | 10 | 3 |
| Total | 35 | 33 | 24 | 17 | 7 | 116 | 86 | 30 |

| Priority | Ref. No. | General Recommendations |
|---|---|---|

Some general recommendations may be the same as specific topical recommendations.

| | | |
|---|---|---|
| 1 | 1a. | A clear statement of the objectives of each monitoring or sampling program must be developed and documented (Major). |
| 1 | 1b. | A sampling plan should be developed for each monitoring or sampling program (Major). |
| 1 | 1c. | Detailed procedures must be developed for all aspects of the effluent and environmental monitoring program (Major). |
| 2 | 2. | A program must be implemented for routine inspections and testing of all monitoring systems (air and water) (Major). |
| 1 | 3a. | An overall QA plan must be developed for the laboratory activities (Major). |
| 1 | 3b. | An overall QA plan must be developed for all field sampling activities (Major). |

| | | |
|---|---|---|
| 2 | 4. | Analytical Quality Control for the following should be integrated in a total quality control program: separation of function and levels of activity, reagent quality, laboratory contamination, sample protection, reagent and sample blank control charts, standard reference materials, natural matrix materials, blind replicates, spiked samples and blanks, laboratory intercomparison, and calibration standards (Major). |
| 4 | 5. | A written job description for each position related to the sampling and monitoring program should be completed and available for audit teams (Minor). |
| 1 | 6. | A training program for field sampling staff must be developed and documented (Major). |
| 1 | 7. | Integrated sampling and monitoring programs at Y-12 should be considered (Major). |
| 1 | 8a. | Integrated sampling procedures for characteristics and compliance monitoring should be considered (Major). |
| 1 | 8b. | The date, place, and time of sampling, and the name of the person collecting all environmental samples must be recorded in an official notebook. For soil, vegetation, and sediment samples, the sampling site should be recorded. Unusual conditions should be recorded (Major). |
| 1 | 9. | A system should be developed to track the progress on all recommendations or suggestions of environmental audits (Major). |
| 1 | 10a. | A system must be developed for the Y-12 environmental monitoring data submission on schedule for the annual environmental monitoring report (Major). |
| 1 | 10b. | More explanatory written material for the annual environmental monitoring report should be developed (Major). |
| 1 | 10c. | A documented quarterly review of the quality of environmental monitoring data should be implemented (Major). |
| 4 | 11. | The responsibilities for sampling drinking water at Y-12 should be clarified through documentation (Minor). |
| 5 | 12. | Noncompliance reporting time under the NPDES permit should be reviewed to determine if the information is being reported within 10 working days after knowledge of the noncompliance (Minor). |
| 4 | 13. | A review of all PCB-containing transformers should be conducted to determine if located within 100-year floodplain (Minor). |
| 1 | 14. | Statistical quality control techniques (control charts, run charts) should be applied to environmental monitoring and sampling programs (Major). Quality assurance and control principles should be applied to environmental monitoring and sampling program (Major). |
| 3 | 15. | Methods for handling uncertainties, significant figures, zeros and negative values should be reviewed (Major). |
| 2 | 16. | All sampling procedures should be reviewed (at least every two years) and cross-referenced to other procedures. This review should be documented (Major). |

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| 1 | 17. | Where appropriate, DOE guidelines entitled "A Guide for Effluent Measurements at DOE Installations" DOE/EP-0023 and "A Guide for Environmental Radiological Surveillance at U.S. Department of Energy Installations" DOE/EP-0096 should be applied to the non-radiological program (Major). |
| 4 | 18. | Past audit reports and follow-up on recommendations were provided to this audit team and should be provided to future audit team members (Minor). |
| 2 | 19. | A consolidated agreement should be established which delineates the responsibilities for assuring environmental compliance and monitoring for facilities and activities of ORNL at the Y-12 Plant (Major). |
| 1 | 20. | Document the data on aqueous transuranics and fission product discharges to ensure that source terms are properly characterized and that monitoring is adequate (Minor). |
| 3 | 21. | Develop a written protocol for all sediment/soil sampling conducted during decontamination procedures (Major). |
| 1 | 22. | Standardized chain-of-custody procedures should be developed for all environmental samples (Major). |

## Specific Recommendations

These are specific recommendations for each category.

### Waste Management Procedure Review

| | | |
|---|---|---|
| 1 | 1. | All field, waste management and laboratory management procedures must be updated annually to reflect any relevant organizational or operational changes that have occurred since these procedures were written (Minor). |
| 4 | 2. | The procedures on asbestos and beryllium must have a section on sampling and must state the responsibility for environmental reporting (Major). |
| 1 | 3. | The Y-12 internal procedure for reporting spills must be made consistent with the Energy Systems procedure to include a reporting chain for DOE and Energy Systems Central ESH and state what criteria are used for determining DOE reportable spills (Major). |
| 3 | 4. | Dike procedures must also include sampling steps, responsibility for sampling, reporting limits, and concentrations of liquid materials that can be released from dikes (Major). |
| 3 | 5. | The procedure on PCB must include responsibility and procedure for sampling PCB containers (Minor). |
| 4 | 6. | A procedure to document an overall TSCA responsibility must be written (Major). |
| 4 | 7. | Responsibility for sampling must be added to the Procedure on Kerr Hollow Quarry (Minor). |

### DOE Orders

| | | |
|---|---|---|
| 1 | 8a. | The training required by DOE order 5480.1 must be completed (Major). |
| 1 | 8b. | Training programs must be documented (Major). |

| | | |
|---|---|---|
| 2 | 9a. | Internal Audit Procedures required by DOE order 5482.1A must be developed (Major). |
| 2 | 9b. | Internal audit procedures must be documented (Major). |
| 4 | 10. | A person should be assigned responsiblity for determining compliance with DOE orders related to monitoring and sampling (Major). |

Surface Water

| | | |
|---|---|---|
| 1 | 11a. | A computerized system should be installed for entering the NPDES administrative data presently being organized by hand (Major). |
| 1 | 11b. | This computer program should also include, or a separate program be developed for, the analytical data being supplied by the laboratory (Major). |
| 1 | 12. | To complete the chain-of-custody requirement, a method for documenting the date and time of a composite sample activation should be developed (Major). |
| 2 | 13. | Training for sampling methods should be performed for new employees and documented (Major). |
| 4 | 14. | Permanent sampling equipment should be installed where appropriate (Major). |
| 3 | 15. | A procedure should be written to cover the activities performed by Electrical Maintenance personnel. Documentation of these activities should also be initiated (Major). |
| 2 | 16. | All calibration activities should be scheduled and documentation provided (Major). |
| 5 | 17. | The weirs at Kerr Hollow and Rogers Quarry should be frequently inspected and cleaned out (Minor). |
| 5 | 18. | Signs should be installed at the sampling locations, which include certain sinks inside buildings, to alert people against tampering with the sample (Minor). |

Mercury Sampling Program

| | | |
|---|---|---|
| 2 | 19. | A sampling procedure should be developed for the collection of water samples since the sampling has been performed by the Environmental Engineering Group and may be performed by the Environmental Monitoring Group in the future (Major). |

NPDES Compliance

| | | |
|---|---|---|
| 1 | 20. | The new NPDES monitoring line item project should be integrated into the Energy Systems Information Data Base (Major). |
| 1 | 21. | A procedure which includes all aspects of the NPDES sampling program should be developed (Major). |
| 4 | 22. | Weirs should be calibrated to determine if they measure with accuracy within 10 percent of the actual flow as required by the NPDES permit (Major). |

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| 2 | 23a. | Use of statistical quality control methods might be a beneficial tool for evaluating the variability between HACH test methods and lab analytical data in the interest of using the former as an indicator of process control at CPCF-I (Minor). |
| 2 | 23b. | Use of statistical quality control techniques with all NPDES discharge data can help to identify trends before non-compliance occurs, and can possibly be used later as a justification to relax stringent monitoring requirements (Minor). |
| 2 | 24. | Since some analytical work is being done both at K-25 (process control) and Y-12 (compliance), it is essential to assure reasonable agreement between lab results and ultimately avoid a non-complying discharge. The audits of the laboratories QA/QC programs should be documented. Each laboratory should exchange samples with the other laboratory (Minor). |
| 2 | 25. | The compliance sampling points for all wastewater treatment facilities should be reviewed to assure that they are defined and accessible. If found to be inadequate, provisions can be made in facility designs now in progress less expensively than retrofitting at a later date (Minor). |

Emergency Sampling

| | | |
|---|---|---|
| 3 | 26. | The Plant Shift Superintendent should have a minimal supply of sample bottles and sufficient instructions to sample for common materials used within the plant. Preservation of spill evidence could be hampered by inability to call people in rapidly enough to obtain a representative sample (Major). |

Spill Prevention Control and Countermeasure (SPCC) Plan

| | | |
|---|---|---|
| 1 | 27. | The SPCC plan should be finalized and published (Major). |
| 2 | 28. | The plan should contain information on training programs for personnel and security measures in effect to prevent spills (Major). |
| 1 | 29a. | The plan must be certified by a registered professional engineer and each revision must also be certified (Minor). |
| 1 | 29b. | The plan must be reviewed and recertified at least every three years (Minor). |
| 2 | 30. | The plan should include emergency response training programs and procedures (Major). |
| 1 | 31. | The plan should include a listing and description of storage tanks (underground and aboveground) and include a PCB inventory list (Minor). |
| 3 | 32. | A section on sampling during spills should be added to the plan (Major). |
| 2 | 33. | Location of tanker truck loading and unloading area should be listed in the plan (Minor). |
| 5 | 34. | Photographs of tanks may be useful to include in this plan (Major). |
| 1 | 35. | The plan should be declassified or a declassified version should be published (Minor). |
| 1 | 36. | The plan should include state requirements (Major). |

| | | |
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| 2 | 37. | The plan should include a spill reporting procedure (Minor). |
| 1 | 38. | The plan should include written procedures for inspections (Minor). |
| 1 | 39. | Drills should be conducted testing the SPCC plans. The results of these drills should be documented (Major). |
| 3 | 40. | The contingency and security plan for each hazardous TSD facility must be included in the SPCC plan (Major). |

Air Monitoring

| | | |
|---|---|---|
| 1 | 41. | All strip charts should be changed to digital systems (Major). |
| 1 | 42. | Documentation of procedures, techniques, findings, and results must be improved (Major). |
| 1 | 43. | A concerted effort to document the sampling procedures, QA/QC plans and monitoring philosophy must be started and completed (Major). |
| 4 | 44. | The $SO_2$ data system should be computerized and automated (Minor). |
| 2 | 45. | New monitor locations for the East $SO_2$ and West TSP monitors are required (Major). |
| 1 | 45. | The entire air monitoring system must be evaluated, and appropriate location for all monitors should be determined based on actual data (Major). |
| 1 | 47. | The meteorological system must be finished and tested, and must be integrated into the Energy Systems Environmental Information Database (Major). |

Groundwater

| | | |
|---|---|---|
| 1 | 48. | The planned geohydrologic characterization should be completed at the facilities which have not had detailed investigations (Major). |
| 2 | 49. | Plans should be developed and implemented to perform geohydrologic tests, water table monitoring, and water quality surveys to determine direction and rate of groundwater flow in the vicinity of the facilities, and to determine whether groundwater quality has been adversely affected by the disposal facilities (Major). |
| 1 | 50. | Construct monitor wells which satisfy EPA requirements for compliance monitoring at all waste disposal sites. Routine compliance type monitoring must be initiated at all sites to document groundwater quality conditions (Major). |
| 1 | 51. | Use of the PVC wells for sampling and analysis of water quality should be reviewed because of undocumented well construction, the likely contributions or organic contamination from the PVC and the possibility that these wells have been contaminated by introduction of non-decontaminated equipment in previous sampling procedures (Major). |
| 3 | 52. | Dedicated, gas driven, teflon bladder pumps should be considered for purging use in well sampling. Prior to using pumps to obtain samples which may be used in the compliance context, written approval should be obtained from EPA Region IV and the TDHE (Major). |

3 53. Closed bailers should be obtained and used for VOA sampling. Samples should be obtained as soon as the well recovers sufficiently to provide the required sample volume. The complete list of priority pollutants should be analyzed on samples from selected wells which are properly constructed and sampled to allow such analyses. Monitoring wells should be locked or sealed (Major).

3 54. The HSEA staff must implement computer data storage and analysis for groundwater monitoring data (Major).

2 55. If the staff is required to perform all compliance monitoring, data analysis, and reporting, manual data management will be overwhelming. Reporting and statistical analysis should be used in developing the Y-12 groundwater data management system (Major). A reference for this is The EPA Groundwater Technical Enforcement Guidance Document (Draft, March 21, 1985) which includes two chapters which discuss data management (Major).

Sample Container Preparation

5 56. Sample container preparation could probably be handled more efficiently by the Environmental Monitoring Group. The responsibility of sample container preparation should be reviewed (Minor).

3 57. If a decision is reached that sample container preparation is the responsibility of the Environmental Monitoring Group, then trained staff and appropriate facilities must be made available and documented sample preparation procedures should be developed (Major).

Analytical Chemistry

1 58. The EPA method number used and the time of analysis must be put on laboratory work cards (Major).

3 59. Complete the installation of the Environmental Data System (ENDS) for record keeping and data handling (Major).

1 60. Work toward incorporation of ENDS into the Oak Ridge area environmental data base system should be completed (Minor). This will be coordinated by Energy Systems Central ESH staff.

4 61. Monitor construction progress to minimize delays in consolidation of environmental analytical chemistry work in Building 9769 (Major).

Biological Monitoring

1 62. Develop written protocols for all routine laboratory and field procedures (Major).

4 63. Dedicate a Biological Monitoring laboratory notebook to maintaining a record of chain-of-custody of all samples (Major).

| | | |
|---|---|---|
| 3 | 64. | Register master logbooks used to record samples. Provide an explanation in these logbooks explaining entries, so that non-users can track samples if necessary. Identify field notebooks with investigator names and notebook numbers, and cross reference field notes to appropriate sections of registered laboratory notebooks when field data are not transferred to the laboratory notebooks. Keep written records of all sampling activities (for minor as well as major sampling projects), preferably on a daily basis (Major). |
| 4 | 65. | Plan now to audit all Environmental Sciences Division tasks after these tasks have been initiated and procedures are more clearly defined (approximately 6–12 months from this audit) (Major). |
| 5 | 66. | Publish results in the peer-reviewed literature whenever possible (Minor). |
| 5 | 67. | Store all samples for each task in a freezer that is clearly labelled and dedicated to the project in order to minimize chances for losing or incorrectly storing samples (Minor). |
| 2 | 68. | Implement the planned program for documenting changes in sample custody (Major). |
| 2 | 69. | Install the lyophilizing (freeze drying) unit to help alleviate space problems in storage of fish, deer, and vegetation samples (Major). |
| 3 | 70. | Develop a plan for maintaining archived samples, specifying the types of samples to be kept, appropriate storage conditions, duration of retention, and method of disposal (Major). |
| 2 | 71. | Establish a QA/QC program for biological monitoring (Major). |

QA/QC in the Laboratory

| | | |
|---|---|---|
| 3 | 72. | Examine the temperature control/recording systems on the two walk-in refrigerator rooms used for sample storage in Building 9769. The maintenance of 4°C for storage of certain samples is mandatory (Major). |
| 1 | 73. | The documentation of QC activity must be more complete, so that it is readily traceable and retrievable with the analytical data held in storage (Major). |
| 2 | 74. | Review the condition and redundancy of much needed laboratory equipment, such as ovens and water baths, so that a faulty system can be promptly replaced or taken out of service for repair (Major). |
| 2 | 75. | Relieve the QA Officer in the Environmental Analysis area of other duties as soon as possible so that he can spend full time with the QA program (Major). |
| 2 | 76. | Establish an action plan for the development and installation of the analyst training and qualification program, giving early attention to the environmental analysis area (Major). |

QA/QC in Sample Preparation

| | | |
|---|---|---|
| 4 | 77. | Laboratory space and equipment should be provided and trained staff made available to implement QA/QC within the Environmental Monitoring Group (Major). |

3 78. Documented QA/QC procedures to validate sampling results should be developed and implemented (Major).

QA/QC Data

3 79. Standard statistical practices should be used to extract additional information from the environmental data (Major).

Sample Chain-of-Custody

3 80. The chain-of-custody procedures utilized by the Environmental Monitoring Group should be documented and all sampling personnel trained in these procedures (Major).

2 81a. Laboratory staff should examine the total chain-of-custody responsibilities within each lab building and between buildings to judge whether the present traceability and protective measures are adequate and auditable (Major).

3 81a. Confirmation should be obtained so that current laboratory chain-of-custody procedures are acceptable to EPA and state regulatory agencies or documented chain-of-custody procedures should be developed and implemented (Major).

3 81c. Analysis completion times should be recorded by each analyst; this is especially important for some parameters which have short holding times (Major).

3 81d. Each time the sample goes to a different analyst, the signature of the analyst should be recorded (Major).

Hazardous Waste

2 82. A weekly inspection of PCB storage areas should be initiated to comply with DOE Order 5480.2 (Major).

3 83. The reported PCB spill of 400 gallons and other PCB spills should be cleaned up according to the PCB Deminimus Levels Procedure as written by Environmental Engineering Group, October 4, 1984 (Major).

2 84. PCB spill should have been cleaned up with a solvent and not diluted with mineral oil (Major).

2 85. Labels must remain on all transformers >50 ppm PCB. Reference was made during the audit, that when a transformer was below 500 ppm the PCB label was removed (Major).

2 86. Field personnel who are involved with PCBs should be trained for the internal procedure "PCB Spill Clean-Up Standards and Procedures" (Major).

2 87. Review the system for completing a purchase order for hazardous waste disposal to determine how they can be completed in a more timely manner to reduce holding time (Major).

4 88. A review of the location of PCB transfer (pure PCB) should be conducted to see if close to air ventilation system in building (Major).

3 89. A review of the procedure for disposal of PCB materials >500 ppm and pure PCB should be conducted (Minor).

| | | |
|---|---|---|
| 3 | 90. | A review of the funding levels for the disposal of PCB liquids from old transformers should be completed to determine if the level is appropriate for timely disposal (Major). |
| 3 | 91. | Contingency plans should be developed in case Y-12 Plant RCRA land units are shutdown because of lack of groundwater wells. If units have approved RCRA wells in place, no action is required (Minor). |
| 4 | 92. | Review of the UCN-2109 disposal form log should be conducted to make certain that a statement is added when forms are not completed (Minor). |
| 2 | 93. | A review of the storage space for waste waiting offsite shipment should be conducted. This review should include storage time required for normal purchase orders and should determine if the available spaces meet all needs (Major). |
| 2 | 94. | A standard disposal form for all Oak Ridge Plants should be developed (Major). |

# 2. PURPOSE AND SCOPE OF AUDIT

## 2.1 PURPOSE

A comprehensive technical review and audit of the effluent and environmental monitoring programs for all non-radioactive effluents to air, water, and land at the Oak Ridge Y-12 Plant was conducted July 8 through 12, 1985, by a team of eleven senior environmental scientists, engineers, and analytical chemists.

## 2.2 GENERAL SCOPE

This review included sampling and analytical procedures and the observation of field and laboratory techniques. It covered ambient air, stack discharges, water discharges, groundwater, stream and surface runoff water, soil, sediment, vegetation, biological monitoring, bioaccumulation studies and waste sludges. A review of the use of the resulting data, as well as Quality Assurance/Quality Control (QA/QC) and reliability and maintenance ability programs was also included.

The audit team members were:

Thomas W. Oakes, Team Leader–Audits, Quality Assurance/Quality Control

Tommy A. Bowers, Water Pollution Monitoring and Control and Hazardous and Radioactive Waste Management

Richard H. Ketelle, Hydrogeology, Hydrology, Groundwater Monitoring

Frank C. Kornegay, Nonradioactive Air Pollution Monitoring and Control

William R. Laing, Analytical Procedures

R. Keith Owenby, Sample Collection

Conard L. Stair, Surface Water Compliance and Emergency Sampling

W. Van Winkle, Biological Monitoring

Barbara T. Walton, Bioaccumulation Studies, Soil, Sediment, and Vegetation Sampling

Charles W. Weber, Analytical QA/QC

## 2.3 DETAILED SCOPE

Specific tasks undertaken by the audit team included: Identify the methodologies used in monitoring; determine the degree of compliance with applicable codes, standards, and "good engineering practice." Provide written findings as well as recommendations for any needed improvements on a periodic basis (frequency to be determined by DOE once the review plan is organized by the contractor) to the Environmental Protection Branch.

Areas addressed included, but were not limited to, those listed below for each of the three media (i.e., air, water, land or where otherwise designated):

1. Sampling
    a. Identify the method of selecting sampling locations (representativeness).
    b. Determine sampling frequency.
    c. Identify the method of determining flow and flow profiles for air and water.
    d. Identify the sampling equipment used.
    e. Determine the sampling rate in relation to effluent volume.
    f. Identify sampling protocols used.
2. Analyses
    a. Determine the method of sample analyses (reference analytical procedures).
    b. Identify the analytical equipment used.
3. Results
    a. Identify the calculation methods and/or computer programs used.
    b. Identify the data interpretation and statistical significance methodologies.
    c. Identify whether trend analyses are being conducted and what methods are being used.
4. Quality Assurance, Quality Control, Reliability, and Maintainability
    a. Verify inclusion in an overall contractor quality assurance program. Assess the adequacy of the quality assurance elements being used.
    b. Assess the reliability of the existing systems. Review failure rates. Examine the need for redundancy and backup.
    c. Assess the use or feasibility of statistical methods to demonstrate the measurement systems are in a state of control relative to design standards.
    d. Affirm that activities affecting quality including procurement, receiving, storing, installing, maintenance, testing, repairing, modifying and operating contribute to satisfactory performance in service.
    e. Verify the measurement accuracy of all systems that are used for the purpose of quantifying releases.
    f. Examine random and systematic error estimates.
5. Policy and Procedures
    a. Training
    b. Knowledge of regulatory requirements
6. Records and Reporting

The components of the environmental monitoring review included, but were not be limited to, the following list. The methodologies used in each of the six areas above were identified and reviewed.

1. Soil and vegetation sampling
2. Sampling of terrestrial and aquatic animals
3. Sediment sampling
4. Ambient air monitoring
    a. Source characterization studies
5. Groundwater monitoring/sampling
6. Continuous monitoring for purposes of detecting unusual occurrences.

Assurance was needed on the appropriateness of the monitoring locations, frequencies, methodology, equipment, procedures, data reduction, interpretation, trend analyses, quality assurance, quality control, reliability, records, and reporting. The audit team was also asked to identify other potential environmental problems with the operation of the facility that became apparent during the audit.

The team reviewed environmental and effluent sampling and monitoring compliance status, commitments made to federal and state agencies, permits and applications, monitoring reports, notification records, plans for spill prevention and control, emergency response plans, process and waste information, waste flow diagrams, sampling procedures, laboratory procedures, laboratory reports, hydrogeologic data, meteorologic system data, recordkeeping, and reporting.

Lines of inquiry directed at determining the adequacy of the environmental programs were used for interviewing members of the environmental staff and operating and maintenance personnel. Field observations were made of sampling sites and equipment, environmental control equipment, waste sites, National Pollutant Discharge Elimination System (NPDES) outfalls, ambient air monitoring stations, wells for groundwater monitoring, receiving streams, and other areas pertinent to the environmental monitoring and sampling program.

## 2.4 Y-12 PLANT BACKGROUND

The Oak Ridge Y-12 Plant was originally constructed for the U.S. Army Corps of Engineers in 1943 as a part of the highly classified Manhattan Project. The plant was one of three constructed in the Oak Ridge area, the other two being the Oak Ridge National Laboratory (ORNL) and the Oak Ridge Gaseous Diffusion Plant (ORGDP).

The Y-12 Plant's original mission was to separate fissionable isotopes of uranium (U-235) by the electromagnetic process. Today, the Y-12 Plant is managed under contract with the U.S. Department of Energy (DOE) by Martin Marietta Energy Systems, Inc. (Energy Systems), and has progressed from its single mission of 1943 to become a highly sophisticated weapon component manufacturing and development engineering organization.

The primary missions of the Oak Ridge Y-12 Plant are:

1. production of nuclear weapon components,
2. manufacturing support to DOE's weapon design laboratories,
3. processing of source and special nuclear materials,
4. support for ORNL facilities and Energy Systems' General Staff located at the Y-12 Plant site, and
5. support for other government agencies.

The plant's primary mission of producing nuclear weapon components involves the fabrication of various materials into components, certification of the fabricated components, and the production of subassemblies from some of these components. As a part of this mission, the Y-12 Plant also provides manufacturing support for the DOE weapon design laboratories at Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories (SNL). For these facilities, the Y-12 Plant produces components for design evaluation and most of the test devices that are used at the Nevada test site.

Of significant importance to the primary mission is the processing of special nuclear materials. For example, enriched uranium in the form of uranyl nitrate solution and uranium oxide is processed into uranium metal at the Y-12 Plant.

From time to time other government agencies utilize the expertise and specialized capabilities of the Y-12 Plant. For example, the plant designed and fabricated the geological sample boxes used by the National Aeronautics and Space Administration (NASA) in the Apollo moon landing missions. The plant has also produced highly reflective metal mirrors for applications ranging from fusion energy research to astronomy.

The population of the Y-12 Plant is subject to fluctuation. Recently the plant has experienced a growth from a population of about 7,000 in 1981 to a current level of approximately 9,100. Table 2.1 shows the projected breakdown of the Y-12 Plant population for Fiscal Year 1985.

**Table 2.1 Total Y-12 Plant population[a]**

| | |
|---|---|
| Y-12 Plant Operation | 6,603 |
| Engineering[b] | 611(480) |
| ORNL at Y-12 (including guests) | 1,100 |
| Computing and Telecommunications | 260 |
| Rust Engineering | 800 |
| General Staff and DOE | 171 |
| Total | 9,545 |

[a]*Source*: Fiscal Year 1987 Annual Budget.

[b]Engineering totals include ORNL Engineering at the Y-12 Plant; ( ) is Y-12 Engineering total.

## 2.5 LOCATION AND SITE

The Y-12 Plant is adjacent to the city of Oak Ridge, Tennessee, which lies in a valley between the Cumberland and Southern Applachian mountains in eastern Tennessee (see Fig. 2.1). The plant is located on 37,000 acres of federally owned land along with two other major DOE facilities, ORGDP and ORNL. The three DOE Oak Ridge facilities are situated in the foothills between two mountain ranges and bordered on one side by the Clinch River. The Cumberland Mountains rise to an elevation of 3,000 feet or more about 10 miles to the northwest; 70 miles to the southeast, the Great Smoky Mountains reach over 6,600 feet.

The Y-12 Plant site is located three miles from the population center of the City of Oak Ridge. Bear Creek Road, the principal access to the site, runs east and west along the northern side of the plant (see Fig. 2.2). The main Y-12 Plant area is situated in Eastern Bear Creek Valley and is bounded on the south by Chestnut Ridge and on the north by Pine Ridge. Scarboro Road marks the eastern boundary. The plant occupies an area approximately ⅔ mile wide by 3.2 miles long, with the longer axis being essentially parallel to the ridges. The plant site area contains 811 acres with about 600 acres enclosed by perimeter security fencing.

Physically, the site is analogous to an industrial city with a working population of about 9,100 people. There are approximately 233 principal buildings at the Y-12 Plant site (excluding cooling towers, pump houses, and buildings under 1,000 square feet). In addition to an extensive street system and support services, such as dispensary, cafeteria, fire and security departments, vehicle fleet, mail delivery, and others, this "city" has its own utilities infrastructure including electrical substations, and steam plant.

## 2.6 PLANT ADMINISTRATION AND ORGANIZATION

The management and operation of the Oak Ridge Y-12 Plant is under the direction of Mr. G. G. Fee, Plant Manager and Vice President (Fig. 2.3). The Manager of Health, Safety, Environment and Accountability Division is Ms. M. L. Jones, who reports to Dr. J. C. White, Manager of General Plant Services (Fig. 2.4) and has the primary responsibility for environmental monitoring, controls, and protection.

As shown in Fig. 2.5, Ms. Jones manages Y-12's environmental responsibilities through four departments. These departments are: Environmental Technology headed by T. R. Butz; Environmental Compliance headed by W. G. Butturini; Waste Treatment Operations headed by H. D. Whitehead, Jr.; and, Waste Transportation, Storage, and Disposal headed by J. K. Bailey. Ms. Jones also has management responsibility for two other departments that perform some environmental monitoring. These are: Radiation Safety headed by W. T. Mee and Industrial Hygiene headed by G. L. Bean.

Additional organizations involved in environmental monitoring or sampling are: The Plant Laboratory (Fig. 2.6) headed by Ms. J. G. Dorsey, who reports to J. W. Garber, manager of Product Certification Division; Development Division (Fig. 2.7) headed by W. H. Dodson; Safeguards and Security Division (Fig. 2.8) headed by G. W. Evans; and, Maintenance Division (Fig. 2.9) headed by H. C. Beeson.

The organization with the major responsibility for monitoring is Environmental Monitoring (Fig. 2.10) headed by Ms. P. M. Pritz.

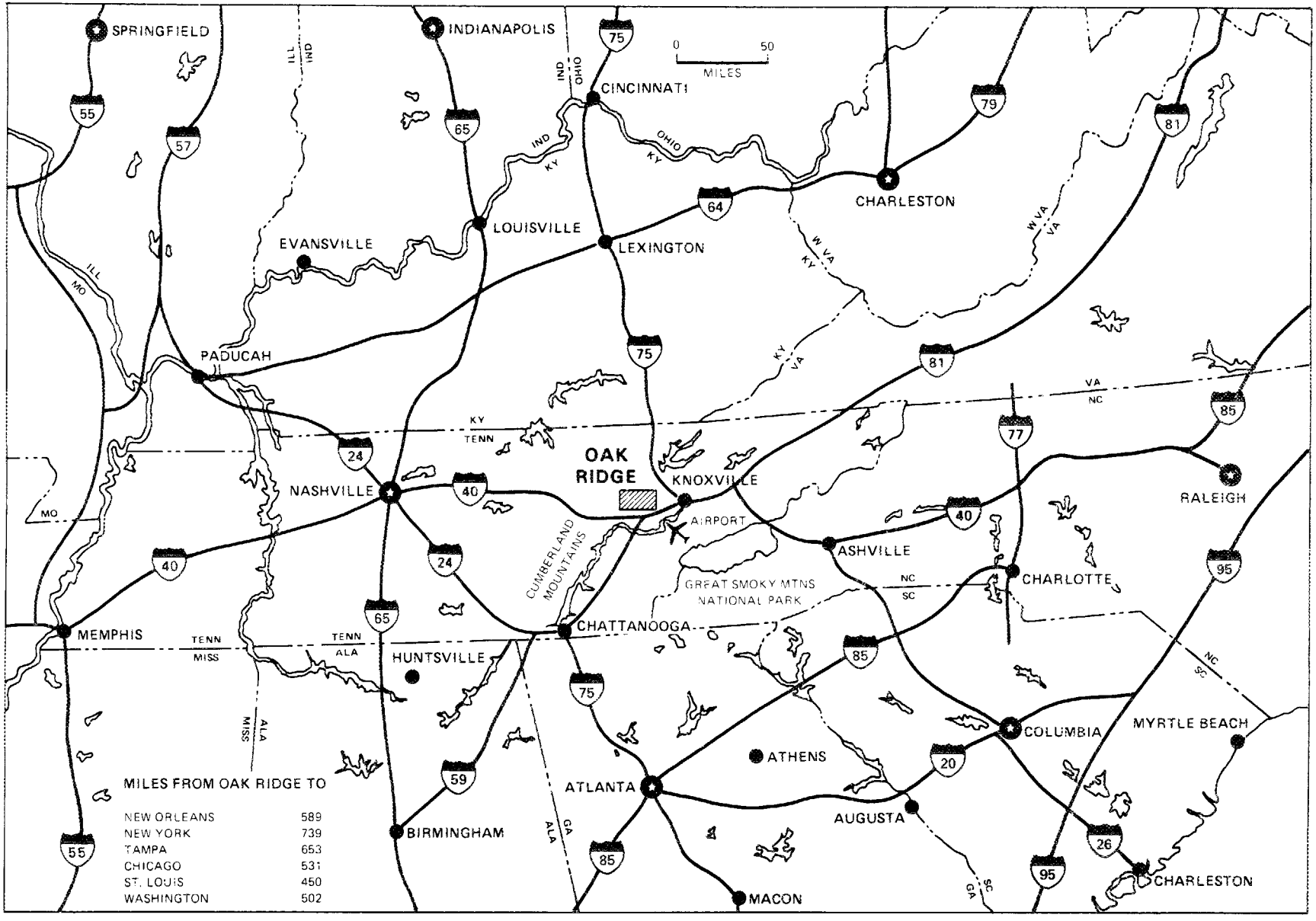



**Fig. 2.1. Regional Map.**

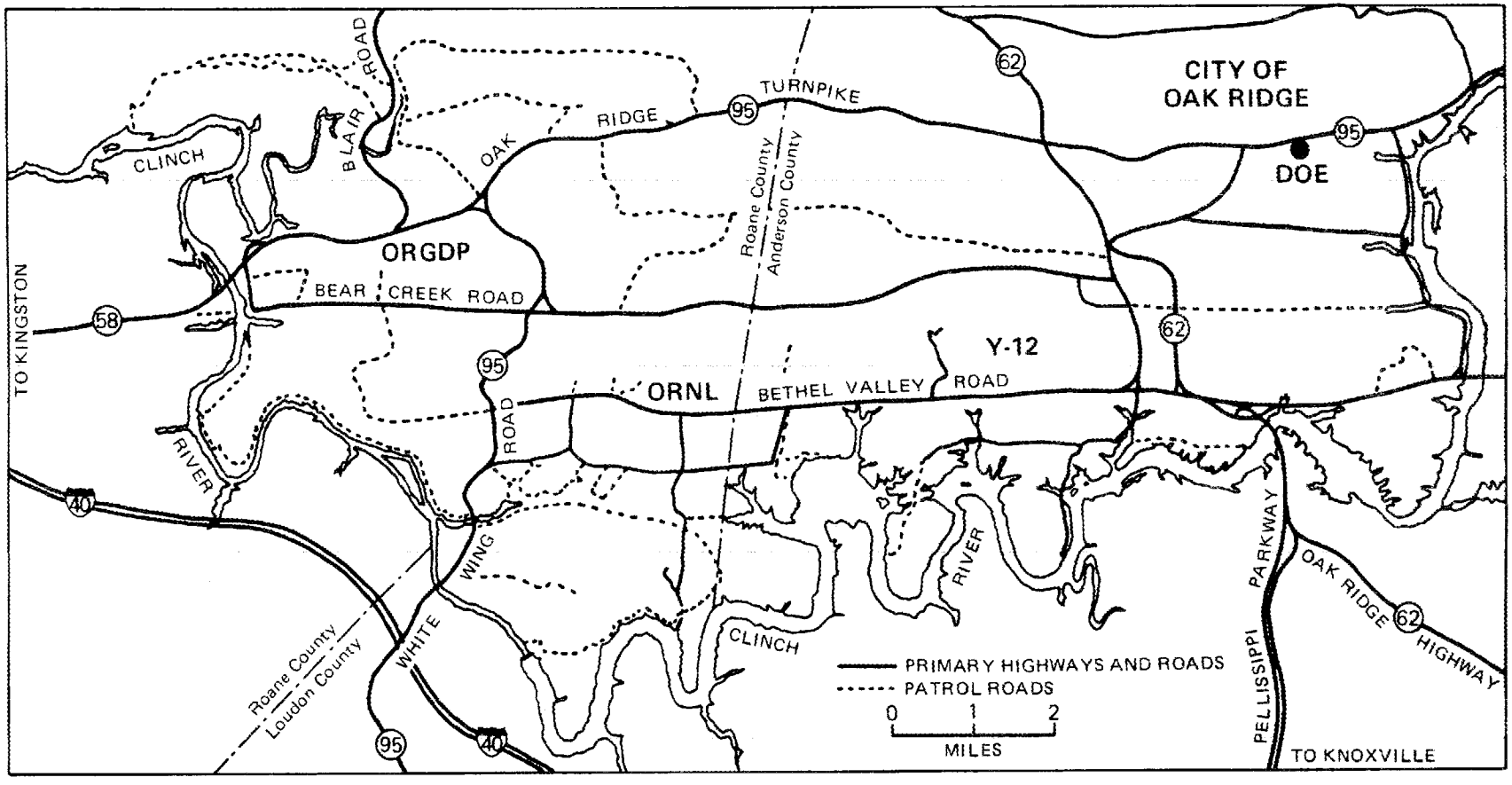
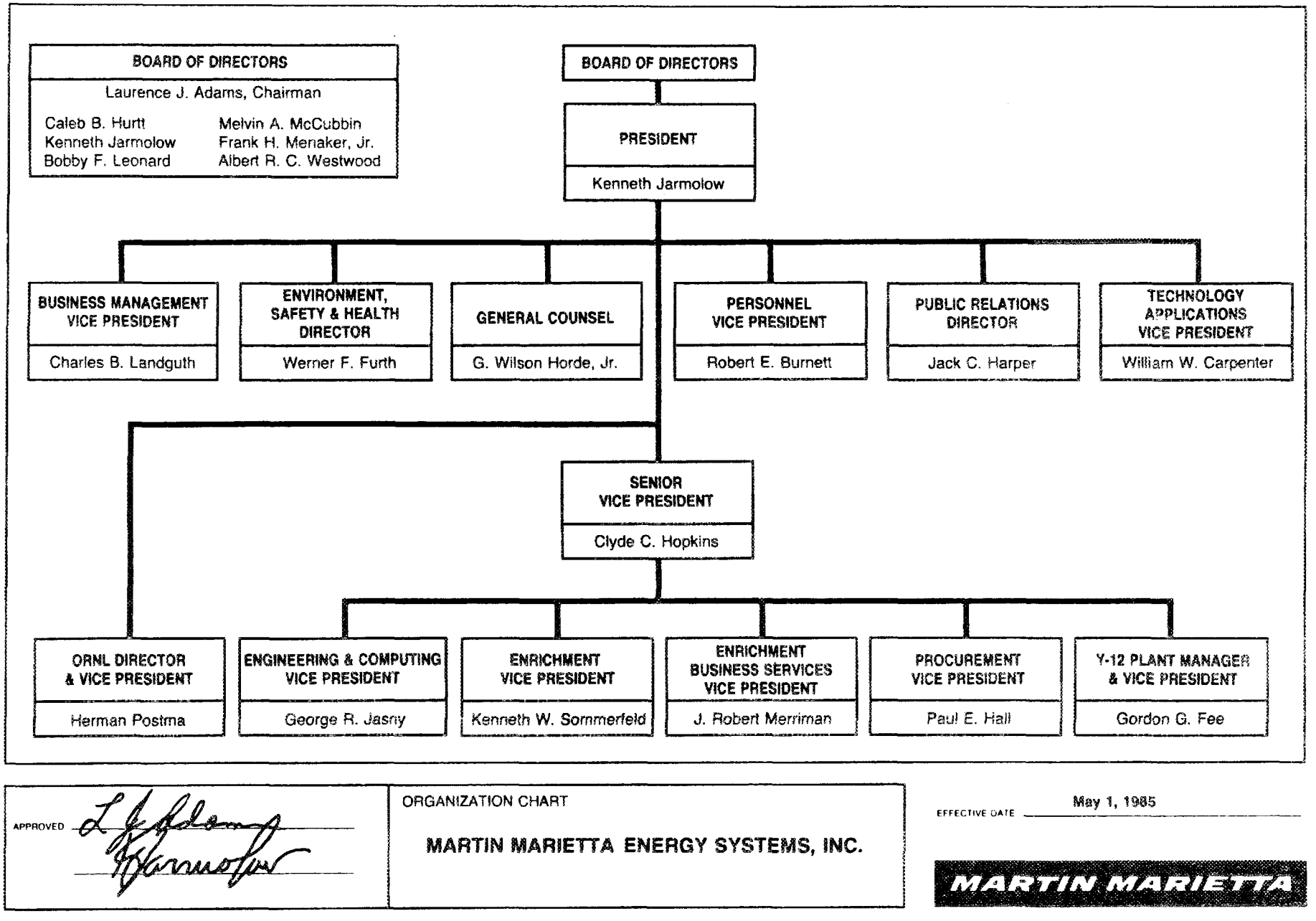

CITY OF
OAK RIDGE
DOE
TURNPIKE
BLAIR ROAD
CLINCH
OAK RIDGE
Roane County
Anderson County
ORGDP
BEAR CREEK ROAD
TO KINGSTON
Y-12
ORNL
BETHEL VALLEY ROAD
WING ROAD
RIVER
WHITE
Roane County
Loudon County
CLINCH
RIVER
PARKWAY
OAK RIDGE HIGHWAY
PELLISSIPPI
TO KNOXVILLE
PRIMARY HIGHWAYS AND ROADS
PATROL ROADS
0 1 2
MILES

**Fig. 2.2.**


BOARD OF DIRECTORS
Laurence J. Adams, Chairman
Caleb B. Hurtt
Kenneth Jarmolow
Bobby F. Leonard
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ENRICHMENT BUSINESS SERVICES VICE PRESIDENT
J. Robert Merriman
PROCUREMENT VICE PRESIDENT
Paul E. Hall
Y-12 PLANT MANAGER & VICE PRESIDENT
Gordon G. Fee
APPROVED
ORGANIZATION CHART
MARTIN MARIETTA ENERGY SYSTEMS, INC.
EFFECTIVE DATE May 1, 1985
MARTIN MARIETTA

Fig. 2.3.

## REPORTS TO VICE PRESIDENT AND Y-12 PLANT MANAGER

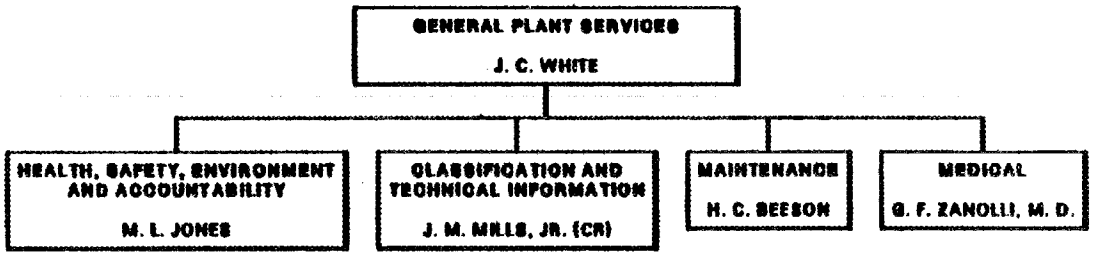



Fig. 2.4.

APPROVED _____

EFFECTIVE DATE JANUARY 1986

ORGANIZATION CHART:
GENERAL PLANT SERVICES
MARTIN MARIETTA ENERGY SYSTEMS, INC.

MARTIN MARIETTA

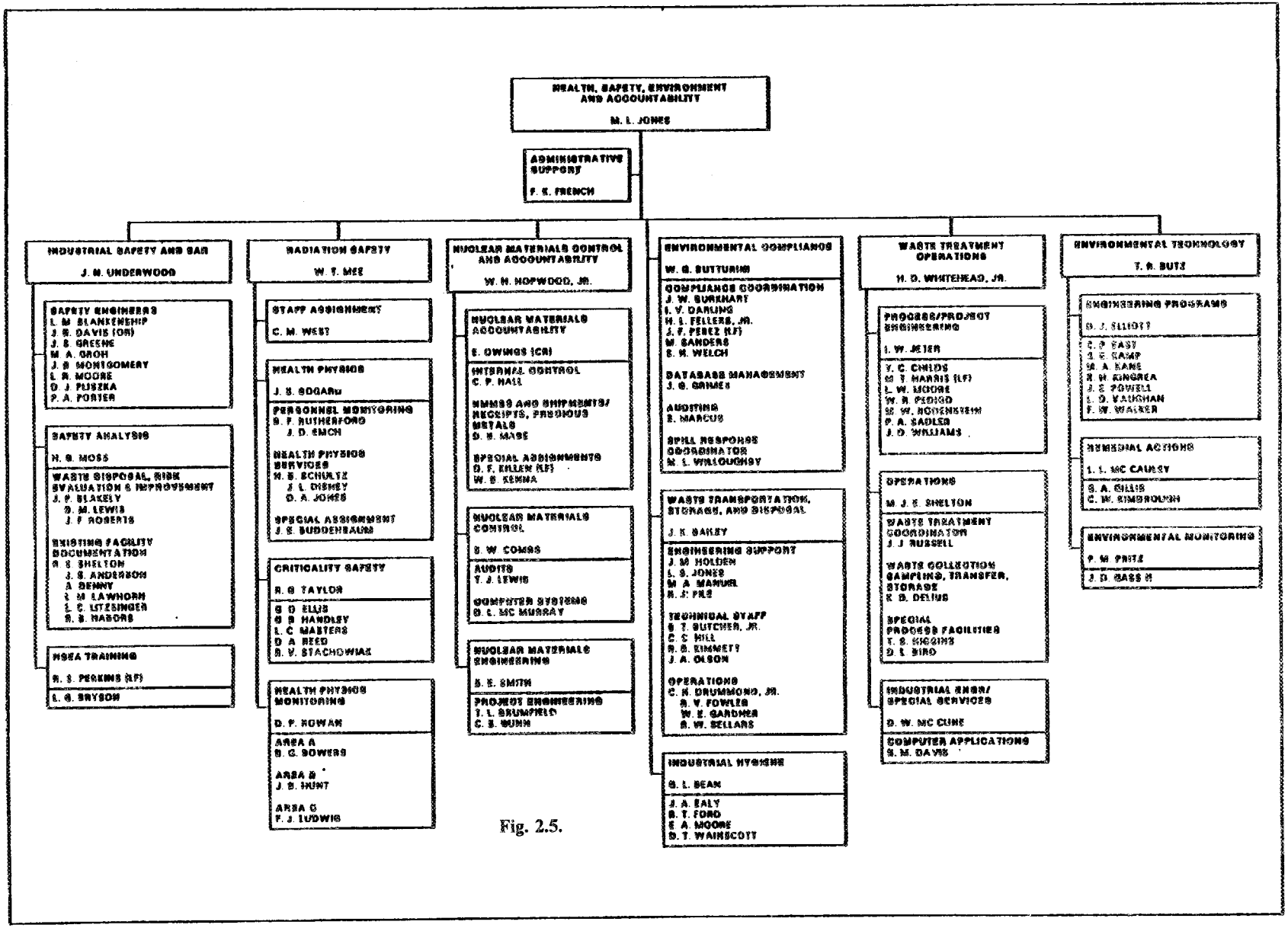



Fig. 2.5.

APPROVED M. L. Jones

EFFECTIVE DATE JANUARY 1985

ORGANIZATION CHART:
HEALTH, SAFETY, ENVIRONMENT
AND ACCOUNTABILITY DIVISION
MARTIN MARIETTA ENERGY SYSTEMS, INC.

MARTIN MARIETTA

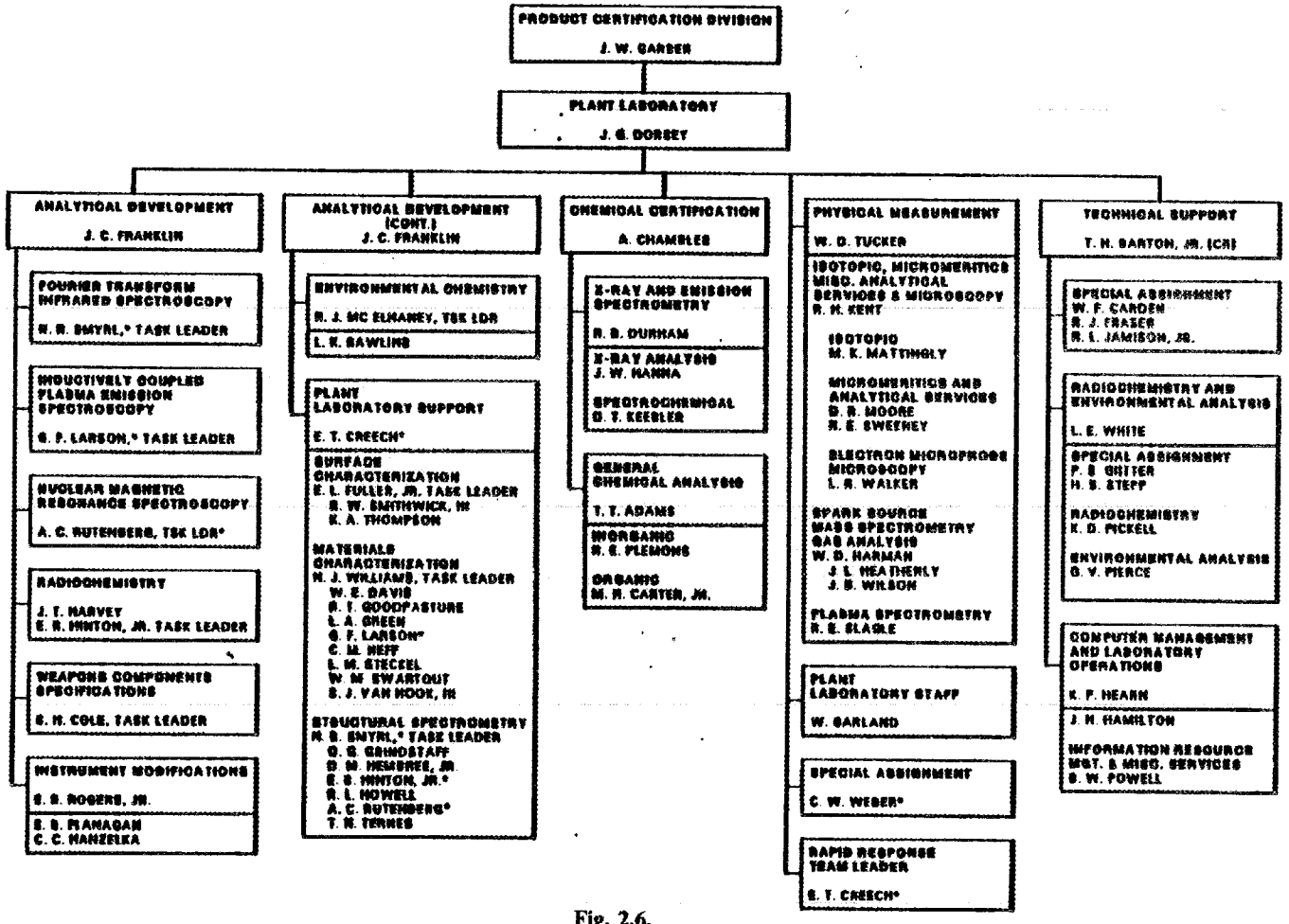



Fig. 2.6.

APPROVED Jon. Barden

EFFECTIVE DATE JANUARY 1985

ORGANIZATION CHART:

PRODUCT CERTIFICATION DIVISION

MARTIN MARIETTA ENERGY SYSTEMS, INC.

MARTIN MARIETTA

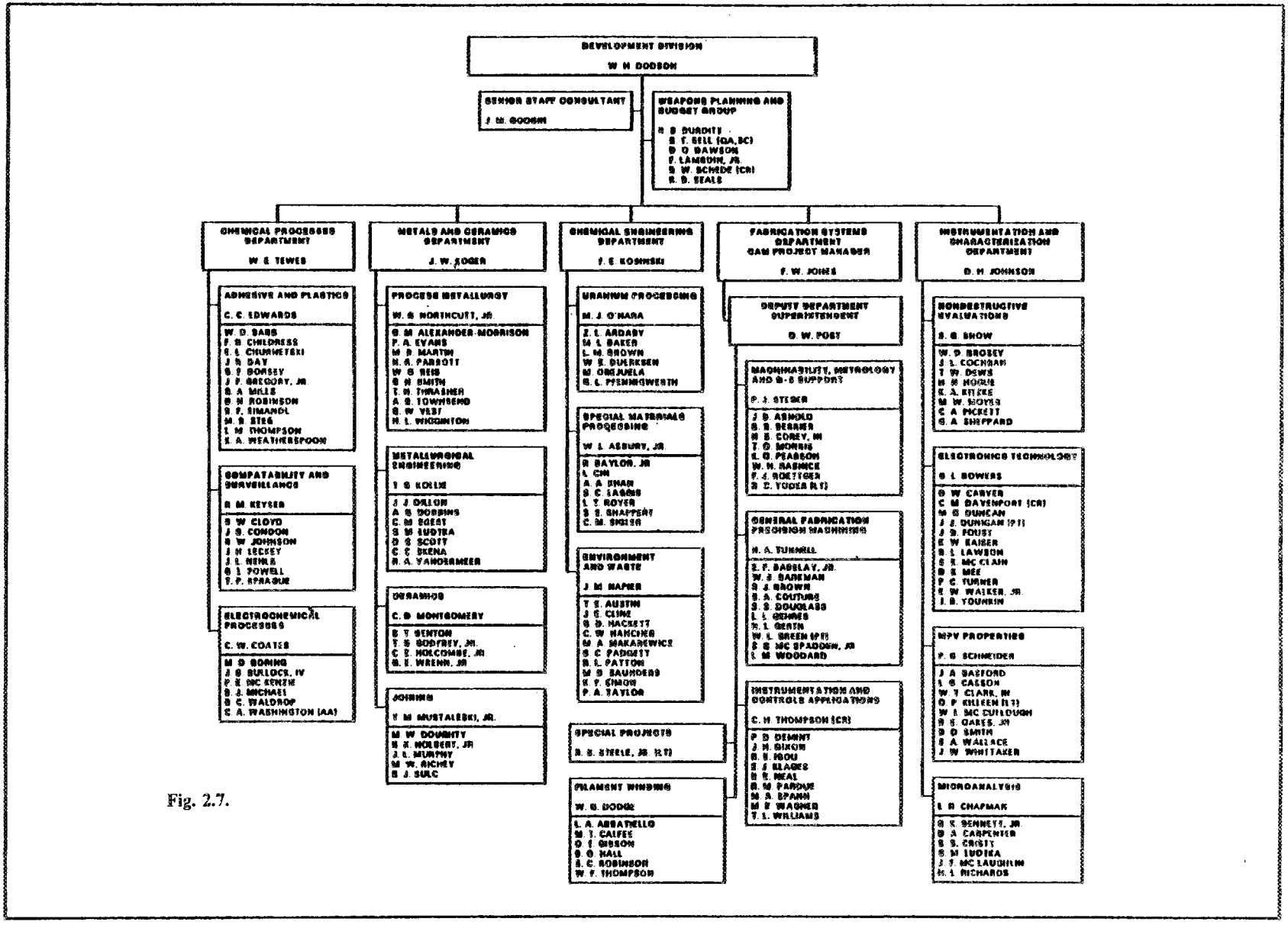



Fig. 2.7.

APPROVED _____

EFFECTIVE DATE JANUARY 1985

ORGANIZATION CHART:

DEVELOPMENT DIVISION

MARTIN MARIETTA ENERGY SYSTEMS, INC.

MARTIN MARIETTA

## REPORTS TO VICE PRESIDENT AND Y-12 PLANT MANAGER

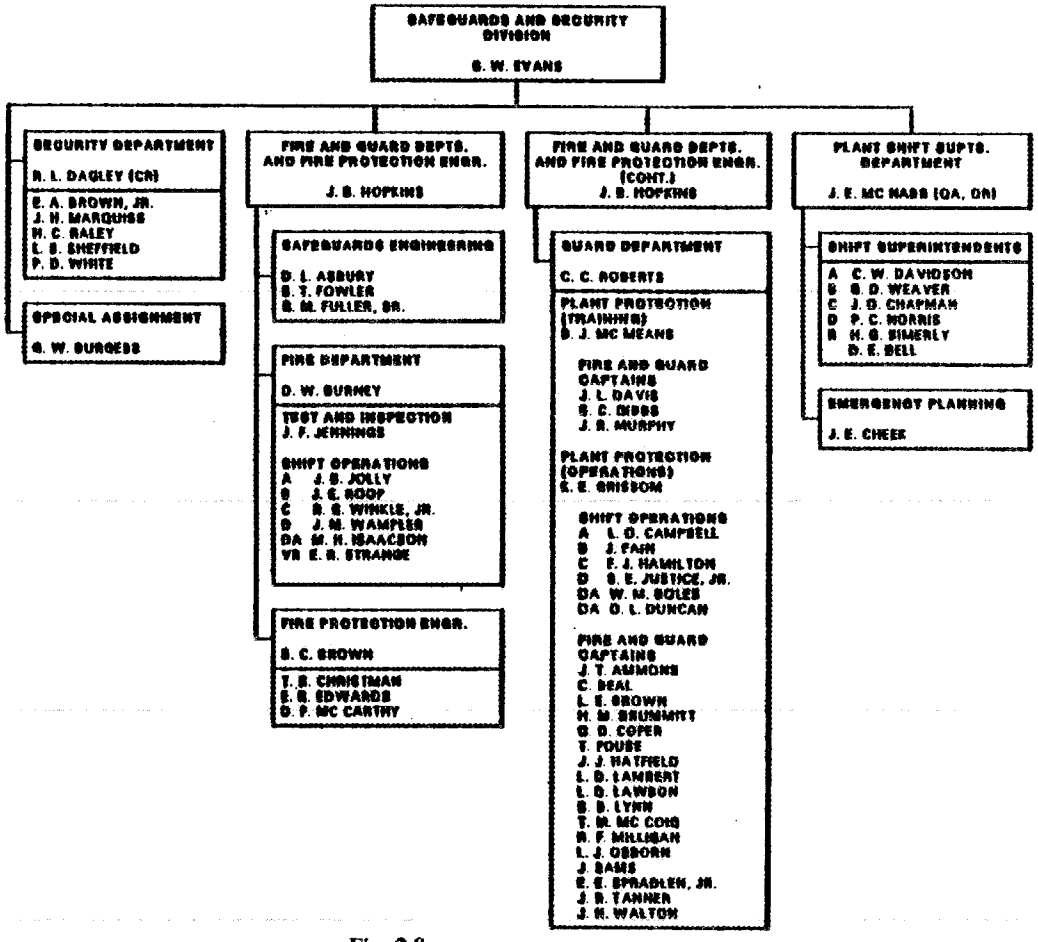



Fig. 2.8.

APPROVED G.W. Evans

EFFECTIVE DATE JANUARY 1985

ORGANIZATION CHART:
SAFEGUARDS AND SECURITY
DIVISION
MARTIN MARIETTA ENERGY SYSTEMS, INC.

MARTIN MARIETTA

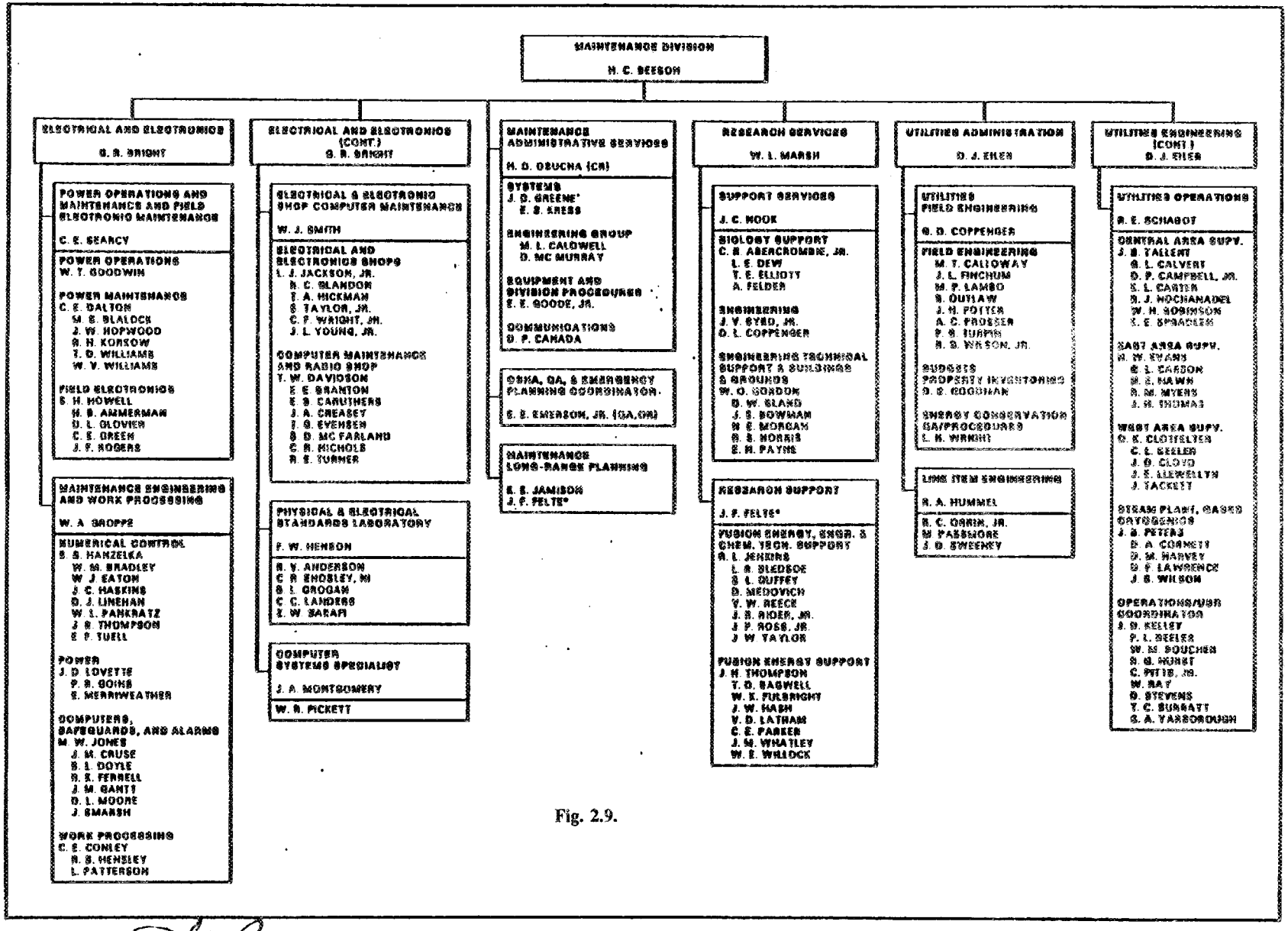



Fig. 2.9.

APPROVED

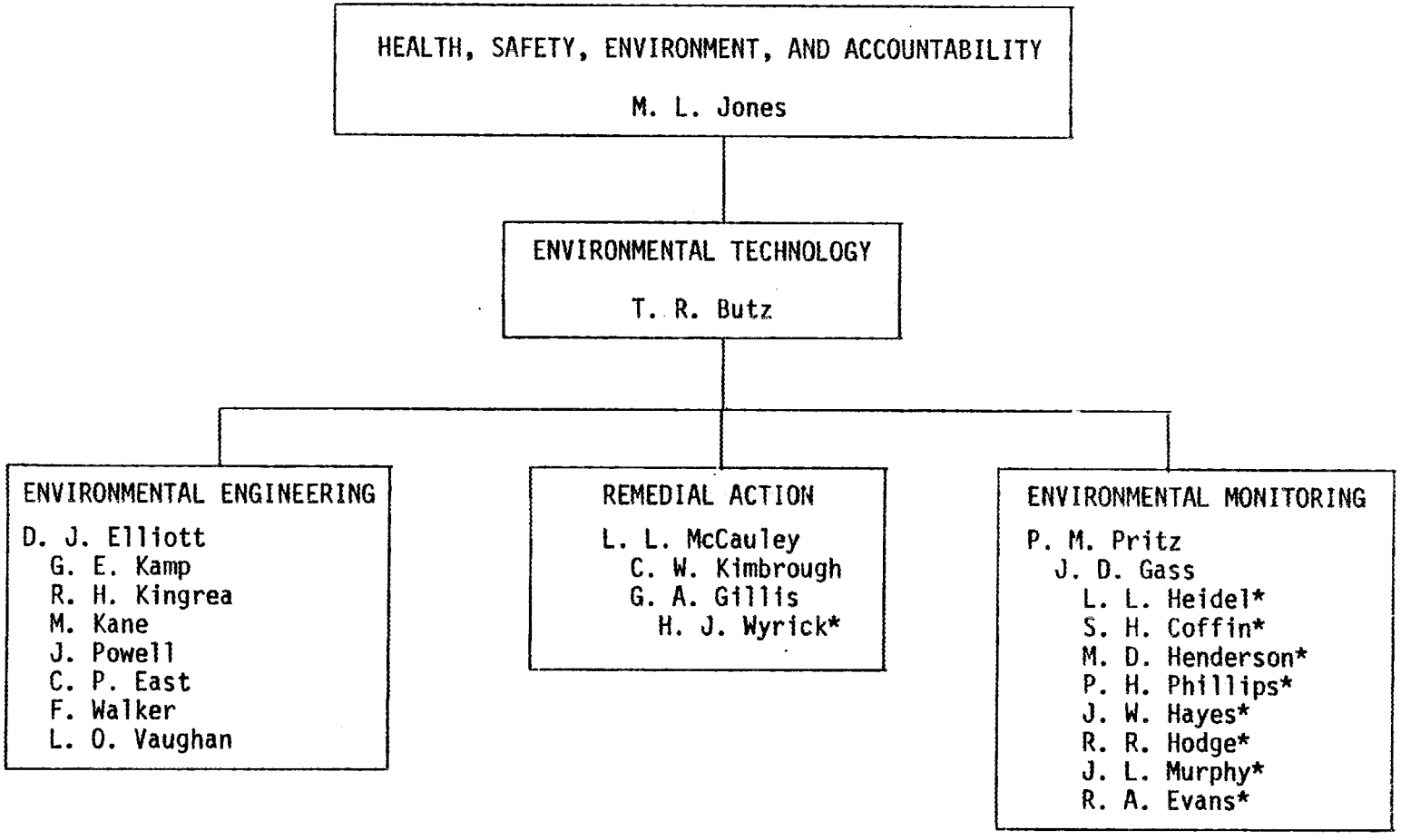
EFFECTIVE DATE JANUARY 1985

ORGANIZATION CHART:

MAINTENANCE DIVISION

MARTIN MARIETTA ENERGY SYSTEMS, INC.

MARTIN MARIETTA




*Nonexempt

July 10, 1985

Fig. 2.10.

# 3. REVIEW OF PAST AUDIT REPORTS, PROCEDURES AND DOE ORDERS

## 3.1 PAST AUDIT REPORTS

This section is included because many of past audit recommendations are related to the scope of this review.

### 3.1.1 Fiscal Year 1984—DOE Environmental Management Review Y-12 Plant

#### 3.1.1.1 Summary

An Environmental Management Review of the Y-12 Plant covering the period since the April 1983 appraisal was conducted from May 21 through 23, 1984.

#### 3.1.1.2 Recommendations

84M-1 A formal procedure should be established for the testing of high efficiency particulate air (HEPA) filters.

84M-2 A consolidated agreement should be established which delineates the responsibilities for assuring environmental compliance for facilities and activities of ORNL at the Y-12 Plant.

84M-3 Establish an identification and handling system for non-RCRA hazardous bulk chemicals to ensure their safe disposal.

84M-4 For those facilities without adequate containment establish interim spill control measures until the Spill Prevention Control and Countermeasures (SPCC) Plan is prepared and implemented.

84M-5 Existing data on aqueous transuranics and fission product discharges should be reviewed to ensure that source terms are properly characterized and that monitoring is adequate.

### 3.1.2 Internal Environmental Audit Program—Y-12

#### 3.1.2.1 Summary

A Y-12 Plant internal audit of the Environmental Monitoring group was conducted on December 6, 1984. The recommendations from this audit are listed below.

#### 3.1.2.2 Recommendations

84D-1 A well documented quarterly sampling schedule detailing the monitoring requirements as stated in the NPDES permit is needed with details such as, sample type, sampling interval and frequency, and the names of the individuals responsible for each sample. A system is needed to better highlight the required samples not yet taken. (7)

84D-2 Documentation of the analytical procedures used both at on-site and off-site laboratories should be kept on file, and reviewed regularly noting modifications to the methods or equipment used. (6)

84D-3 The use of equipment blanks and duplicates taken in the field is to be implemented as soon as possible. (10)

Also provided were items for consideration. No action or written response was required.

The addition of personnel with skills in biological identification taxonomy provides the capability to expand the scope of the parameters sampled. The purchase of a microscope would allow these skills to be put to use.

Fixed delivery times should be established and arrangements made with the laboratory to receive samples not included in the delivery schedule.

### 3.1.3 Performance Audit Inspection of Y-12 Plant by EPA and TDHE

#### 3.1.3.1 Summary

During the week of June 18, 1984, representatives of the U.S. Environmental Protection Agency (US-EPA) and the Tennessee Department of Health and Environment (TDHE), conducted a performance audit inspection at the Oak Ridge Y-12 Plant.

#### 3.1.3.2 Recommendations

84-J1 *Flow Monitoring—Outfall 004 (Bear Creek)*
"To assure accurate discharge measurements certain requirements for the design of weirs should be adhered to: (a) the depth of the weir pool (upstream of the weir plate) should be maintained at a minimum of one foot and (b) the crest of the weir must be kept clean of debris and other material."

84-J2 *Sampling Procedures—Outfall 003 (New Hope Pond) and Outfall 004 (Bear Creek)*
"Twenty-four hour composite samples for BOD and COD should be collected as required by the permit. Also BOD samples should be refrigerated (4°C) during the compositing period. COD samples should be preserved as soon as possible in the field after being collected, or in the laboratory if analysis is to be delayed. Also, the quantity of sample should not exceed one or two times the amount needed for analysis."

84-J3 *Record Maintenance and Reporting Procedures*
"... flow data were being incorrectly calculated... The correct procedure for determining monthly flow data is to calculate flows for each 24-hour sampling period, then calculate the monthly data (maximum and average flows) using the daily flow data."

84-J4 "Develop a written protocol for sediment/soil sampling with decontamination procedures."

84-J5 "When purging wells, once the well is pumped dry, it is not necessary to remove more water after recharge before sampling."

84-J6 "Monitoring the purge water for pH and specific conductance until stabilization occurs."

84-J7 "Develop a written protocol which is consistent with other DOE-Oak Ridge sediment/soil sampling programs."

84-J8 "Use only stainless steel push tubes for collecting samples for organic analysis. Do not use any plastic sheets to hold samples or any plastic sampling devices."

84-J9 "As part of the sampling protocol, a standard size sieve and sieve material, stainless steel for organics, nylon or plastic for metals, should be selected. A stringent decontamination cleaning step should be included in the laboratory use of sieves."

84-J10 "Sample containers should be rinsed with either acetone, methanol, or isopropanol, inverted and allowed to air dry. Do not rinse with methylene chloride."

84-J11 "Standardized chain-of-custody procedures should be developed for all environmental samples that are collected by ORNL."

84-J12 *Bear Creek Burial Ground Groundwater Monitoring*
"When permanent monitoring wells are established, only stainless steel casings should be used."

84-J13 "Decontaminate pump (Bennett Pump or similar air displacement type) with phosphate free detergent and brush. Rinse several times with distilled water. Rinse with isopropanol, rinse with deionized water and air dry."

84-J14 "Decontaminate bailers using the same procedure as used with the pump. If dedicated bailers are used, clean in the laboratory using a hot tap water rinse followed by isopropanol rinse and final rinse with deionized water. Air dry and wrap in aluminum foil."

84-J15 "Water level readings should be made prior to purging. Pump approximately three to five well volumes from well or until dry. Monitor pH and specific conductance until stabilized. Discard bailer line after sampling each site."

84-J16 "Use closed top teflon bailer to collect sample."

84-J17 "Develop a standard chain-of-custody form for all environmental samples."

84-J18 "If at all possible, preparation areas and instrumentation used for low level analysis of environmental samples should be segregated from that used for process analysis in Building 9769."

84-J19 *Sample Containers, Preservation, and Holding Times*
"Sample preservation techniques and maximum holding times for all NPDES parameters must meet EPA standards as shown in Table 1 of the March 1983 revision of 'Methods for Chemical Analysis of Water and Wastes,' EPA-600/4-79-020."

84-J20 *Analytical Methodology*
"The procedure manual should be updated to include EPA method designation numbers and/or descriptions."

84-J21 *Analytical Quality Assurance and Data Documentation*
"Distill standards or fortified samples for fluoride and TKN procedures to determine distillation and/or digestion efficiency."

### 3.1.4 1983 DOE Interim Environmental Management Appraisal

#### 3.1.4.1 Summary

An Interim Environmental Management Appraisal of the Oak Ridge Y-12 Plant was conducted on April 19 and 20, 1983.

#### 3.1.4.2 Recommendations

Recommendations have been completed.

### 3.1.5 General Recommendations—Review of Past Audits

These recommendations resulted from the review of past audit recommendations related to monitoring and not completed.

1. A tracking system should be developed for recommendations and suggestions from audits (Major).
2. Post audit reports and follow-ups on recommendations should be provided to audit team members (Minor).
3. A consolidated agreement should be established which delineates the responsibilities for assuring environmental compliance and monitoring for facilities and activities of ORNL at the Y-12 Plant (Major).
4. Collect and review data on aqueous transuranics and fission product discharges to ensure that source terms are properly characterized and that monitoring is adequate (Major).
5. Develop a written protocol for sediment/soil sampling conducted during decontamination procedures (Major).
6. Standardized chain-of-custody procedures should be developed for all environmental samples (Major).

## 3.2 PROCEDURE REVIEW

The following procedures were received and the findings and recommendations on these procedures are given in this section.

Health Physics and Environmental Control Standards Procedure, Dec. 12, 1983.

Asbestos Standard for Personnel Protection Procedure, Aug. 1, 1983.

Beryllium Procedure, Jan. 18, 1977.

Disposals at Kerr Hollow Quarry Procedure, July 21, 1977.

Control, Handling, and Disposal of PCB Procedure, Sept. 28, 1982.

Dike-Construction, Inspection, and Testing Procedure, Nov. 19, 1984.

Disposal of Hazardous Material Procedure, Sept. 28, 1982.

Disposal of Oil-Bearing Liquid Waste Procedure, Sept. 28, 1982.

Environmental Pollution Control Procedure, Sept. 28, 1982.

Identification and Control of Hazardous Materials Procedure, Sept. 28, 1982.

Reporting Spills of Oil and Hazardous Substances Procedure, Sept. 28, 1982.

Waste Management-Radioactive and Toxic Wastes Procedure, Sept. 28, 1982.

### 3.2.1 Findings

These written procedures are for waste disposal. Many of these procedures are out of date.

### 3.2.2 Recommendations

1. All field, waste management, and laboratory procedures must be updated annually to reflect any relevant organizational or operational changes that have occurred since these procedures were written (Minor).
2. The procedures on asbestos and beryllium must have a section on sampling and must state the responsibility for environmental reporting (Major).
3. The Y-12 internal procedure for reporting spills must be made consistent with the Energy Systems Procedure to include a reporting chain for DOE, and Energy Systems Central ESH (Major).
4. Dike procedures must also include sampling steps, responsibility for sampling, reporting limits, and concentration of liquid materials that can be released from dikes (Major).
5. Procedure on PCB must include responsibility and procedure for sampling PCB containers (Minor).
6. A procedure to document overall TSCA responsibility must be written (Major).
7. Responsibility for sampling must be added to Procedure on Kerr Hollow Quarry (Minor).

## 3.3 U.S. DEPARTMENT OF ENERGY ORDERS

The following orders were reviewed and the findings and recommendations on these orders are given in this section.

- DOE Order 5440.1B, Implementation of the National Environmental Policy Act (May 14, 1982).
- DOE Order 5480.1 Environmental Protection, Safety, and Health Protection Program for DOE Operations.
  *Chapter I* Environmental Protection, Safety, and Health Protection Standards.
  *Chapter XII* Prevention, Control, and Abatement of Environmental Pollution.
- DOE Order 5480.2 Hazardous and Radioactive Mixed Waste Management.
- DOE Order 5482.1A Environmental, Safety, and Health Appraisal Program.
- DOE Order 5484.1 Environmental Protection, Safety, and Health Protection Information Reporting Requirements.

  *Chapter I* Notification of Occurrences.
  *Chapter II* Investigation Requirements.
  *Chapter III* Effluent and Environmental Monitoring Program.
  *Chapter IV* Environmental Protection, Safety, and Health Protection Reports.
- DOE Order 5484.2 Unusual Occurrence Reporting System.
- DOE Order 5500.2 Emergency Planning, Preparedness, and Response for Operations.
- DOE Order 5500.6 Public Affairs Policy and Planning Requirements for Emergencies.

### 3.3.1 Findings

Compliance with the requirements of DOE Orders was difficult to audit, because of the lack of documentation.

### 3.3.2 Recommendations

1a. The training required by DOE Order 5480.1 must be completed (Major).

1b. Training programs must be documented (Major).

2a. Procedures required by DOE Order 5482.1A must be developed to guide the internal audit program (Major).

2b. Internal Audit Procedures must be documented (Major).

3. A person should be assigned responsibility for compliance with DOE Orders (Major).

# 4. SURFACE WATER

## 4.1 NPDES SURFACE WATER SAMPLING

The NPDES sampling program was reviewed to ensure that the monitoring and sampling methods were performed in accordance with the EPA regulations and guidelines. Specific areas of review included chain-of-custody procedures, field sampling procedures, sample preparation, and data handling. These areas of interest became more important since the revised NPDES permit was issued in May due to the increased numbers of sampling locations and individual analysis which are required.

The revised NPDES permit was also reviewed to insure compliance with the administrative requirements, such as the Best Management Practice plans and the Toxicity Control and Monitoring programs.

### 4.1.1 Findings

1. The requirements specified in the revised NPDES permit are being met by the existing program being performed by the Environmental Monitoring group at Y-12. The personnel interviewed during the audit were knowledgeable of the permit requirements, and the sampling methods are performed to collect a representative sample. A schedule has been developed for the routine samples to be collected which includes when the sample should be collected, location of sample, and the analysis to be performed. A system is also in place which allows for sample tracking from the point of collection to the analytical result. It was found that this method allowed for data retrieval. The existing method does require a considerable amount of time and a great deal of hand work. The discharge monitoring reports (DMR) which are prepared at the end of each month are done by hand and require at least three data transfers from the analyst to the final report. There should be cross checking. When the waste treatment facilities come on line, the permit calculations for these facilities will become more time consuming because mass loading calculations must be performed.

2. The chain-of-custody procedures are adequate for the collection of NPDES samples from the point of sample collection to delivery to the lab, except documenting the time that a composite sampler was activated for sample collection. This is necessary to verify that a 24-hour composite sample has been collected.

3. The audit also found that procedures for NPDES sampling are not written. This procedure should include sampling methods, chain-of-custody procedures, sampling plans, training, and should reference EPA procedures.

4. Training of the technician has not been documented and should be performed in accordance with the above mentioned procedure.

5. The sampling equipment used by the sampling group is appropriate for collecting the required samples. However, the portable equipment presently being used should be replaced by permanent equipment. Some of the sampling locations visited during the tour should be cleaned.

6. The equipment maintenance is performed by Electrical Maintenance personnel. There is not a procedure in place documenting calibration procedures, or the maintenance procedures and schedule.

### 4.1.2 Recommendations

1a. A computerized system should be installed for entering the NPDES administrative data presently being organized by hand. This has been initiated by the monitoring group and should include all the information collected since the beginning of the new permit (Major).

1b. This computer program should also include, or a separate program be developed, for the analytical data being supplied by the laboratory. This will eliminate some of the hand work presently being performed (Major).

2. To complete the chain-of-custody requirements, a method for documenting the date and time of a composite sample activation should be developed (Major).

3. Training for sampling methods should be performed for new employees and documented (Major).

4. Permanent sampling equipment should be installed where appropriate (Major).

5. A procedure should be written to cover the activities performed by Electrical Maintenance personnel. Documentation of these activities should also be initiated (Major).

6. All calibration activities should be scheduled and documentation provided (Major).

7. The weirs at Kerr Hollow and Rogers Quarry should be frequently inspected and cleaned out (Minor).

8. Signs should be installed at the sampling locations (which include certain sinks inside buildings) to alert people against tampering with the sample (Minor).

## 4.2 MERCURY SAMPLING PROGRAM

### 4.2.1 Findings

A program has been developed and implemented for the mercury contamination location program which exists at Y-12. Even though the program was not designed to determine the exact location of the problem, it did determine the greatest area of concern. The program identified the Alpha-4 area as being the main contributor of mercury to the environment. A plan has been implemented for reducing the mercury discharged from this area.

### 4.2.2 Recommendations

1. A sampling procedure should be developed for the collection of water samples since the sampling has been performed mainly by the Environmental Engineering Group and may be performed by the Environmental Monitoring Group in the future (Major).

## 4.3 NPDES MONITORING AND SAMPLING FACILITIES PROJECT

### 4.3.1 Findings

As part of the BMP requirements in the new NPDES permit, a very good program has been initiated which will allow for continuous monitoring of 16 locations inside the Y-12 facility. The program will allow for real-time water monitoring of storm drains and will be beneficial in detecting spills and unauthorized discharges of materials into the storm drain system. This program is on schedule.

### 4.3.2 Recommendations

None

## 4.4 NPDES COMPLIANCE

### 4.4.1 Findings

The Y-12 Plant is currently operating under NPDES Permit No. TN0002968, which was issued and became effective on May 24, 1985. The current permit has 236 monitoring points each having specific monitoring and reporting requirements; and samples are currently being collected and data reported as required by the permit. The compliance sampling for NPDES compliance will result in an increase in the number of samples being collected from 120/week in 1985 to 275/week in 1986. There are currently three technicians assigned to collection of NPDES samples.

The effluent limits for the NPDES permit are based on the following state and federal effluent limitation guidelines and regulations: Tennessee Water Quality Criteria, Metal Finishing BAT, Steam Electric Power Generation BAT; specific limits have been set based on Best Professional Judgement, Effluent Toxicity Testing Results, and Instream Biological Monitoring Results. The Best Management Practices Plan (BMP), Toxicity Control and Monitoring Program (TCMP), Biological Monitoring and Abatement Program (BMAP), and other engineering and development support documents required by the permit are being prepared and are on schedule. There are 8 wastewater treatment facilities required to achieve compliance with the final discharge limits. These are in various stages of design and construction; however, all are programmed to meet the compliance schedules specified in the Federal Facilities Compliance Agreement which is part of the permit and all are currently on schedule.

In support of the NPDES monitoring effort there is currently a 1.9-million-dollar line item project funded to install 16 monitoring stations. These stations will allow isolation and characterization of area source pollution, as well as enhance emergency response capability. These stations include real time sensors that continuously monitor parameters such as pH, conductivity, temperature, turbidity, and flow. Data will be telemetered to the Shift Superintendent Office where an alarm will be triggered if preset limits are exceeded. Some of the stations will be equipped with flow proportional composite samplers.

Review of the waste treatment facilities revealed analyses of the process control of the Central Pollution Control Facility I (CPCF-I) will be done colorimetrically with a HACH field test kit and verified by running duplicate samples through the K-25 lab. Once sufficient data have been collected to validate the use of the HACH method, duplicates

will be reduced to a less frequent basis. NPDES compliance samples for all treatment facilities (i.e., CPCF-I, S-3) will be collected by the Environmental Monitoring Group and analyzed in the Y-12 lab. The physical location for the collection systems of the compliance sample at CPCF-I will not be accessible to maintenance, according to present design.

### 4.4.2 Recommendations

1. Use of statistical quality control methods might be a beneficial tool for evaluating the variability between HACH test methods and lab analytical data in the interest of using the former as an indicator of process control at CPCF-I (Minor).

1a. Use of statistical quality control techniques with all NPDES discharge data can help to identify trends before non-compliance occurs, and can possibly be used later as a justification to relax more stringent monitoring requirements (Minor).

2. Since some analytical work will be done at both ORGDP (process control) and Y-12 (compliance), it is essential to ensure reasonable agreement between lab results and ultimately avoid a non-complying discharge. A procedure should be established to ensure reasonable agreement between ORGDP and Y-12 labs. The audits of the laboratory QA/QC program should be documented. Each laboratory should exchange samples with the other laboratory (Minor).

3. The compliance sampling points for all wastewater treatment facilities should be reviewed to assure that they are defined and accessible. If found to be inadequate provisions can be made in facility designs now in progress less expensively than retrofitting at a later date (Minor).

## 4.5 EMERGENCY SAMPLING

### 4.5.1 Findings

The Plant Shift Superintendent serves as the Emergency Response Coordinator for emergencies. The emergency response assignments of all designated personnel throughout the plant are clearly defined in Health and Safety Procedure 70-912 which was revised 6-11-85.

Spill samples are collected by Environmental Monitoring personnel only; and if none are on site they are called in as needed. Lab analysts are also called in on an as-needed basis to assure that samples are properly preserved or analyzed within procedurally accepted holding times.

### 4.5.2 Recommendations

The Plant Shift Superintendent should have a minimal supply of sample bottles and sufficient instructions to sample for common materials used within the plant. Preservation of spill evidence could be hampered by inability to call people in rapidly enough to obtain a representative sample (Major).

## 4.6 SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN

The SPCC Plan is required and guidance for preparation of the plan is given in 40 CFR 112. The draft plan does follow 40 CFR 112 in most cases.

### 4.6.1 Findings

The SPCC Plan is in draft form and has been for over ten months. The draft plan was reviewed and the following recommendations are a result of this review.

### 4.6.2 Recommendations

1. The SPCC Plan should be finalized and published (Major).
2. The Plan should contain information on training programs for personnel and security measures in effect to prevent spills (Major).

3a. The Plan must be certified by a registered professional engineer and each revision must also be certified (Minor).

3b. The Plan must be reviewed and recertified at least every three years (Minor).

4. The Plan should include emergency response training programs and procedures (Major).
5. The Plan should include a listing and description of storage tanks (underground and aboveground) and include a PCB inventory list (Minor).
6. A section on sampling during spills should be added to the Plan (Major).
7. Location of tanker truck loading and unloading area should be listed in the Plan (Minor).
8. Photographs of tanks may be useful to include in this Plan (Major).
9. The Plan should be declassified or a declassified version should be published (Minor).
10. The Plan should include state requirements (Major).
11. The Plan should include a spill reporting procedure (Minor).
12. The Plan should include written procedures for inspections (Minor).
13. Drills should be conducted testing the SPCC Plan. Results of these drills should be documented (Major).
14. The contingency and security plan for each Hazardous Treatment, Storage, or Disposal facilities must be included in the SPCC Plan (Major).

# 5. AIR SAMPLING

## 5.1 SUMMARY

Nonradiological air monitoring at Y-12 consists of two particulate (hi–vol) samplers, two continuous $SO_2$ monitors, 11 fluoride samplers, six opacity monitors, and Industrial Hygiene monitoring for beryllium, mercury, and asbestos. No routine meteorological monitoring program is presently operational, but towers and instruments are now being installed.

A complete source inventory of all operating facilities is maintained. The database is organized by emission point as well as by pollutant.

The overall program is generally adequate, with some deficiencies. The program does sample for the pollutants emitted by the facility, and the sampling procedures are, for the most part, proper. However, present monitor locations need to be reviewed, and documentation of both procedures and results requires upgradings.

## 5.2 AMBIENT MONITORING NETWORK

The ambient monitoring system consists of 2 particulate monitors, 2 $SO_2$ monitors, and 11 fluoride monitors. All monitor locations were observed, and all monitor types were investigated.

The $SO_2$ monitors are of the continuous type, with data recorded on strip charts. In the past, the data were telemetered to a central location, but this option is not presently operational. The instruments are calibrated weekly. The East monitor is located in the middle of an area used by heavy trucks, while the West monitor is near the fire training facility.

The particulate (hi–vol) monitors are also located east and west of the facility. The samplers operate every sixth day (a recent change), and samples are taken on filters weighed at the Y-12 lab, installed in the monitors, and reweighed at the lab. The samples are kept in bags marked with the appropriate sample identifier and dates, with flow data from the pumps recorded on circular charts. Flows are calibrated using a nanometer and the manufacturer's calibration chart. Calibration is presently done annually, but quarterly calibration is planned for all future work. Data are entered on forms by hand, and filed for further use. A simple program to calculate geometric means is used in reporting data. An analysis of the data from the West sampler indicated that material from the fire training facility was indeed affecting the data on occasion.

The fluoride monitors are colocated with certain radiation monitors, sharing a common pump. Samples are taken for 7 consecutive days each month. Air is drawn through a sample holder, through treated sample paper, and discharged. The pumps are checked for flow rate, with a selected value of "2" used to adjust flow through the filters. Treated paper is placed in a holder, with both ends sealed. The unit is attached to the pump, with the ends open. Following the sampling period, the ends are sealed, and the holder is detached from the pumps. The holders are placed in tagged bags, and delivered to the lab. Results are obtained from the lab within ~7–10 days.

### 5.2.1 Recommendations

1. All strip charts should be changed to digital systems. Chart systems may not be cost effective (Major).

## 5.3 SOURCE EMISSION INVENTORY

Three hundred points of emission exist at the Y-12 facility. Eighty permits are presently active, with an additional 20 construction permits on file. The remaining sources are in various stages of review at the present, with all applications to be made by October 1, 1985. At present, no continuous source monitoring is required at any facility other than the Steam Plant, which must monitor plume opacity (by instrument measurement). Data from beryllium monitoring reports are primarily used for worker health and are available from the Industrial Hygiene Department.

An emission inventory for the facility is available. All sources of pollutants, their locations, emissions, permitting status, and emission characteristics are contained in an easily updated computerized database. Emissions are either estimated from engineering information or from grab sampling. To date, five stacks have been sampled by outside contractors to determine emissions of nonradioactive materials.

An extensive emission reduction program is under way at the Y-12 facility. The program, estimated to extend over the next 8 years, will reduce VOC emissions by 700 tons per year, HF emissions from ~20 tpy to 2 tpy, and reduce $NO_x$ and particulate emissions. This program will assure compliance with all applicable air quality regulations, and approach the desired ALARA levels.

## 5.4 EMISSION MONITORING

The only source presently monitored to demonstrate compliance with permit requirements is the Steam Plant. The 1982 Federal Facilities Compliance Agreement required installation of baghouses on the Steam Plant, to reduce emissions of particulates from thousands of tons per year (tpy) to ~43 tpy. The current permit requirement is 0.17 lb particulates/million Btu's. This upgrade has been completed on two of the four boilers, with actual emissions of 0.1 lb particulates/million Btu's measured during state certification. The opacity monitored on the first stack, which serves the two boilers with upgraded baghouses, was operating at the time of this audit, with opacity levels of ~7% being recorded. The instrument is self-calibrated hourly, and the data are recorded on strip charts (should be digitized). Excursions over 20% opacity, regardless of the length of time, are reported to Y-12 personnel. Strip charts are collected, correlated with plant start-up conditions, and kept for one year. Similar monitors are in place on the individual baghouses, and the data are used to determine cause of excursions in the stack. An identical system is in place for the second stack, which is due on line in late 1985, and will be certified by the state shortly thereafter.

Excursions recorded at the Steam Plant have occurred during hot start conditions. Plans to use natural gas for start-up are presently under review.

Five stacks at the facility have been sampled to quantify certain emissions. This sampling was conducted by an outside contractor, using EPA-approved methods. Two

stacks at 9206, and one each at 9212, Beta-4, and Alpha-5 were sampled. Complete sampling logs, including sampling QA/QC were maintained by the contractor and made available to Y-12 staff. Beryllium monitoring, in the form of continuous stack sampling in the breathing zone and downstream of the HEPA filters in 16 locations of 9202 and Alpha-5, is conducted by Industrial Hygiene personnel. The results are provided by the Y-12 Lab, and a computerized report is generated monthly. Complete results for the beryllium monitoring program are available, and documentation of the results is kept by IH personnel.

No other stack sampling is presently required. Contract personnel will likely be used for any infrequent sampling that may be requested.

## 5.5 METEOROLOGICAL DATA

No meteorological data are presently used in environmental monitoring at Y-12. A wind speed/wind direction system collects data from a utility pole near the PSS office, but the data are not representative of the facility as a whole, the instruments are not routinely calibrated, and the data are not checked and archived. A new system, designed to provide adequate meteorological data for the entire facility, is under construction. The system will measure the atmosphere from two locations, a 100-m tower to the east of the plant and a 60 m tower to the west of the plant. The system is designed to provide data for permit compliance and submissions, climatology of the site, and be a source of real-time data for an emergency response modeling effort. The specifications, locations, and construction details of the system have been reviewed, and the system appears to be adequate.

Software to use the data from the towers for dose assessments, permit compliance, and emergency response activities is being written and tested, and has been evaluated in this audit. The entire system will be a useful addition to the overall environmental program when the system is complete in October 1985.

## 5.6 GENERAL FINDINGS AND RECOMMENDATIONS

### 5.6.1 Statement of Findings

The overall program is basically adequate. With some modification, the program could be upgraded to provide more useful information, and bring the facility into compliance with all applicable regulations for both emissions and monitoring.

### 5.6.2 Recommendations

Documentation of procedures, techniques, findings, and results must be improved (Major). Although staff can answer questions concerning the program, no record is available for review by outside agencies, and any changes in personnel would result in a drastic loss in efficiency. A concerted effort to document the sampling procedures, QA/QC plans, and monitoring philosophy is needed (Major).

The present manual reduction of the $SO_2$ data is not cost effective, and could lead to inaccurate data recording and reporting. The system should be computerized (Major), with the strip charts maintained as back-up equipment. The entire $SO_2$ monitoring system is being reviewed, with new equipment planned. This new system should be automated, with

more frequent calibration, and a more rigorous system of data analysis, reduction, and archiving implemented (Minor).

New monitor locations for the East $SO_2$ and West TSP monitor are required (Major). The East $SO_2$ monitor is influenced by the truck exhaust fumes, and should be relocated. The East TSP monitor is presently being raised, and should comply with siting guidance. Colocation of the East $S0_2$ monitor could be of value. The West TSP monitor is influenced by the fire training facility. This monitor must be moved. A suitable site to the west of the Plant should be found, and the instrument relocated. However, an objective monitoring relocation plan is not presently possible, due to the lack of site-specific meteorological data. Upon the development of a suitable period of record from the new meteorological towers, the entire monitoring system should be evaluated, and appropriate locations for all monitors should be determined, based on actual data (Major).

The meteorological system must be finished, tested, and integrated into the overall Energy Systems program (Major). In addition to providing guidance for monitor relocation, the system can be used to demonstrate compliance with air quality regulations as well as providing input to an emergency response system.

# 6. GROUNDWATER MONITORING PROGRAM

## 6.1 SUMMARY

A technical review of the groundwater monitoring program was conducted as part of the non-radiological audit at Y-12. The purpose was to review methods used, available equipment, scope of the analytical program, data management, and reporting practices, and compliance of the overall groundwater monitoring program with EPA requirements.

The developing groundwater monitoring program conducted by the HSEA staff has achieved significant improvements over previous monitoring practices. An understanding and documentation of the Bear Creek Valley geohydrologic setting have been obtained during the last two years of investigation.

Several currently and previously used waste disposal sites have had little or no attention placed on their characterization and impact assessment. Additional studies are needed in these areas. The number, location, and construction of monitor wells need improvement at several sites. Deficiencies have been identified in the groundwater sampling techniques and data management practices. Recommendations are offered which may aid the staff in further improvement of the Y-12 groundwater monitoring program.

## 6.2 GEOHYDROLOGIC CHARACTERIZATION

Geohydrologic investigations have been in progress at several of the Y-12 waste disposal areas for the past three years. The groundwater around Bear Creek Valley waste disposal facilities has been characterized in detail by Geraghty and Miller Inc. Several other facilities located within the plant area and on Chestnut Ridge, south of the plant, have had only reconnaissance investigations to date.

### 6.2.1 Statement of Findings

An extensive scope of investigations has been performed by subcontractors in the vicinity of the Bear Creek Valley Waste Disposal Facilities. These investigations are providing a very detailed understanding of groundwater flow directions and the extent of contaminant migration in that area.

In contrast to the detailed investigations performed in Bear Creek Valley, several sites located on Chestnut Ridge to the south of the plant, and at least two formerly used areas within the plant have had little or no geohydrologic characterization.

Investigations performed at the Chestnut Ridge Sludge Disposal Basin, the Chestnut Ridge Security Pits, and the UNC Disposal Site have consisted of drilling a limited number of exploratory borings and installing PVC monitor wells. The direction and rates of groundwater flow at these sites cannot currently be determined accurately. Plans have been developed for conducting additional exploratory drilling and installing water quality monitoring wells. However, plans have not included hydrologic testing, other than water level observation, or water quality evaluation.

Hazardous materials are known or suspected to have been disposed in the Kerr Hollow Quarry and fly ash in Rogers Quarry. The potential for waste constituent migration into the groundwater flow system exists at both sites. Characterization investigations for

geologic conditions are planned. However, geohydrologic and water quality testing plans do not currently exist.

Two sites within the plant, the Ravine Disposal Site and the S-2 Pond Site, were formerly used for waste disposal. No investigations have been performed at either of these sites to date.

### 6.2.2 Recommendations

1. The planned geohydrologic characterization should be completed at the facilities which have not had detailed investigations (Major).
2. Plans should be developed and implemented to perform geohydrological tests, water table monitoring, and water quality surveys to determine direction and rate of groundwater flow in the vicinity of the facilities, and to determine whether groundwater quality has been adversely affected by the disposal facilities (Major).

## 6.3 WELL SYSTEM

The well system which exists at Y-12 waste disposal facilities includes large diameter PVC wells and small diameter stainless steel wells. Not all sites have wells located and constructed in compliance with EPA monitoring requirements.

### 6.3.1 Statement of Findings

The Y-12 HSEA staff obtains groundwater samples quarterly from approximately 26 PVC cased wells located in the vicinity of several waste disposal areas. The casing material and lack of documentation of well completion details render this well network inadequate for water quality sampling wells for purposes of compliance monitoring. The number and placement of these wells are also inadequate to comply with EPA requirements.

Subcontractors have installed many 2-inch diameter stainless steel wells in the vicinity of the several waste disposal facilities in Bear Creek Valley and have performed sampling and analysis on those wells. This work was performed as a part of characterization studies to define the geohydrologic system and determine the extent of contamination which has resulted from past waste disposal activities. Well materials and construction of these wells are generally compatible with the EPA requirements for water quality monitoring wells.

At several sites which are known or suspected to have received hazardous wastes, inadequate well networks and inadequate geohydrologic characterization studies exist. These sites include the Chestnut Ridge Sludge Disposal Basin, the Kerr Hollow Quarry, the Rogers Quarry (fly ash only), the Chestnut Ridge Security Pits, and the UNC Disposal Site. Plans have been developed to perform characterization drilling and well installation at these facilities. Plans have not yet been developed to initiate hydrologic and water quality testing in the new wells at these sites or to locate and install additional compliance monitoring wells which may be indicated on the basis of information obtained from the characterization wells.

Additionally, at least two formerly used sites, the Ravine Disposal Site, and the S-2 Pond Site have had no investigation regarding inventory of disposal materials, geohydrologic characterization, or groundwater monitoring.

### 6.3.2 Recommendations

1. Construct monitor wells which satisfy EPA requirements for compliance monitoring at all waste disposal sites. Routine compliance type monitoring must be initiated at all sites to document groundwater quality conditions (Major).
2. Use of the PVC wells for sampling and analysis of water quality should be reviewed because of undocumented well construction, the likely contribution of organic contamination from the PVC, and the possibility that these wells have been contaminated by introduction of non-decontaminated equipment in previous sampling procedures (Major).

## 6.4 SAMPLING METHODS AND ANALYTICAL PARAMETERS

Well purging, sampling methods, and analytical parameters included in the non-radiological monitoring program are discussed in this section.

### 6.4.1 Statement of Findings

The well purging procedure (used to remove stagnant water from the well casing) employed by the Y-12 HSEA staff consists of using one of several gas driven submersible pumps. This type of equipment is suitable for well purging. The purged water volume removed (three well volumes for continuously producing wells or pump to dryness for low capacity wells) complies with EPA recommended procedures. A formal written procedure for groundwater sampling is not available for HSEA sampling activities.

Samples are obtained using the same pumping equipment and often are collected 24 hours after well purging. Samples are pumped into bottles containing the necessary preservatives and are stored on ice or refrigerated until they are delivered to the analytical laboratory. This sampling technique is appropriate for parameters not sensitive to volatilization; however, the method is not appropriate for volatile organic analysis (VOA) sampling. For metals analyses, introduction of sample water containing suspended solids into a bottle containing nitric acid preservative may be inappropriate because such samples require filtration prior to preservation (unless total species rather than soluble species are to be measured). The EPA Groundwater Technical Enforcement Guidance Document (Draft, March 21, 1985) clearly states that samples be collected within the first three hours of well recovery. When full recovery exceeds three hours, samples must be extracted in order of their volatility as soon as sufficient volume is available for a sample for each parameter.

EPA Region IV guidance for VOA sampling specifies that two vials be collected from each well so that a duplicate is available in the event that a faulty cap seal allows entry of air into the sample or loss of gases out of the sample. The EPA Region IV suggests that samples should be obtained using dedicated bailers constructed of stainless steel or teflon and VOA organic samples should be obtained using a closed bailer constructed of teflon.

Pumping equipment is decontaminated between wells. However, use of non-dedicated pumps as a sample collection tool introduces the possibility of contamination of samples. Blank samples of deionized water pumped through the sampling pump are not analyzed to check for possible residual contamination in the pump or hose.

Adequate field logs are maintained by the sampling technicians to document field measurements of depth to water, computation of required purge volume, field pH, temperature, and specific conductance. The routine analytical parameters include the standard EPA-RCRA metals and a short standard list of organic parameters. The EPA priority organic pollutant list is not routinely analyzed. Sampling methods and scope of analyses performed by Geraghty and Miller Inc. in their investigations of groundwater contamination appear to have been performed in compliance with EPA protocols.

### 6.4.2 Recommendations

1. Dedicated, gas driven, teflon bladder pumps should be considered for purging and sampling. Prior to using pumps to obtain samples which may be used in the compliance context, written approval should be obtained from EPA Region IV and the TDHE. Blank deionized water should be pumped through the sampling equipment and analyzed for a baseline (Major).
2. Volatile organic samples should be used for VOA's which need to be obtained as soon as the well recovers sufficiently to provide the required sample volume. The complete list of priority pollutants, or preferably RCRA Appendix VIII constituents should be analyzed on samples from selected wells which are properly constructed and sampled to allow such analyses. Groundwater procedures should be documented (Major).

## 6.5 CONTAMINATION ASSESSMENT AND DATA MANAGEMENT

### 6.5.1 Statement of Findings

Analytical results from the HSEA monitoring program are stored on paper copy and are summarized in the annual monitoring report. The statistical summary of data includes reporting the minimum, the maximum, and the mean concentration for each parameter at each monitored waste disposal site.

Trends of variation in groundwater quality are not formally analyzed or interpreted to document changes which may have occurred.

Extent of contamination in groundwater at the Bear Creek Valley Disposal areas has been well documented in the Remedial Alternatives Report prepared by Geraghty and Miller. Assessment of groundwater contamination at other waste disposal sites is incomplete.

### 6.5.2 Recommendations

1. The HSEA staff must implement computer data storage and analysis for groundwater monitoring data (Major). If the staff is required to perform all compliance monitoring, data analysis, and reporting, manual data management will be overwhelming. The EPA Groundwater Technical Enforcement Guidance Document (Draft, March 21, 1985) includes two chapters which discuss data management, reporting and statistical analysis which should be used in developing the Y-12 groundwater data management system (Major).

# 7. SAMPLE CONTAINER PREPARATION PROCEDURES

## 7.1 SUMMARY

Selection and preparation of containers, preservatives, holding times, etc., is currently the responsibility of the Y-12 Plant Laboratory that will analyze the samples. Proper guidance is being utilized in the selection of containers, preservatives, and holding times, and this phase of the Environmental Monitoring Program appears generally adequate.

## 7.2 METHODS AND PROCEDURES

Selection of containers, preservatives, and allowable holding times are based on appropriate guidelines. National Pollutant Discharge Elimination System (NPDES) samples utilize guidance set forth under 40 CFR, part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act" that is contained in the Friday, October 26, 1984, Federal Register. The Resource Conservation and Recovery Act (RCRA) samples utilize containers and preservatives in accordance with procedures contained in SW-846.

## 7.3 STATEMENT OF FINDINGS

The Environmental Monitoring Group (EMG) provides clean sample bottles to the analytical laboratory, who upon request, will select sample containers and add required preservatives to the bottles based on the requested analyses. It appears that appropriate guidance is being utilized for selection of containers and preservatives and that holding times are appropriate. The system, however, does not appear optimal and could possibly lead to time delays in the collection and/or preservation of samples. This could be especially critical when compliance monitoring or emergency situations are involved.

At this time, the EMG does not have appropriate laboratory facilities for the preparation of sample collection containers. A properly equipped laboratory would provide them with this capability and would also be advantageous in the development of quality assurance/quality control measures (i.e., submission of blanks, split, and spiked samples).

## 7.4 RECOMMENDATIONS

1. Sample container preparation could probably be handled more efficiently by the Environmental Monitoring Group. The responsibility of sample container preparation should be reviewed (Minor).
2. If a decision is reached that sample container preparation is the responsibility of the Environmental Monitoring Group, then trained staff and appropriate facilities must be made available and documented sample preparation procedures should be developed (Major).

# 8. ANALYTICAL CHEMISTRY

## 8.1 SUMMARY

All analytical procedures used are EPA or other accepted methods from recognized organizations. Staff is trained and qualified. Facilities and equipment are modern and well maintained. QA meets EPA requirements. A new data management system is being installed to improve record keeping and documentation.

## 8.2 FACILITIES AND EQUIPMENT

The main environmental laboratory is located in Building 9769. It is an old building but is being renovated to current laboratory standards. When construction is completed, staff from two other areas will be brought to this location. This will minimize sample transfer and increase efficiency.

Sample storage is adequate and includes two walk-in refrigerators.

Analytical instrumentation is state-of-the-art with several pieces of equipment being recent purchases. Major instrumentation includes inductively coupled plasma (ICP) (with access to others, if needed), two gas chromatograph/mass spectrometers and three gas chromatographs with specialized detectors. Only one instrument, an ICP in Building 9995, is equipped with an automatic sample changer. All major instrumentation will accept changers when the workload warrants this addition.

## 8.3 METHODS AND PROCEDURES

Analytical methods are based on published, widely accepted standard methods. EPA procedures are the methods of choice and only when these are not available or applicable are other sources used. These sources include the Energy Systems Environmental Manual, Standard Methods for the Examination of Water and Wastewater and Y-12 procedures. A compilation of procedures is in the lab office and individual copies are located at each analytical instrument.

Quality control follows accepted EPA practice and comprises at least 25% of the sample load. Internal QC samples as well as material from EPA, Environmental Measurements Laboratory and Environmental Resource Associates are used. Additional information on quality control is found in Section 10.

This laboratory is certified by the State of Tennessee for the analysis of drinking water. They also participate in the EPA, NPDES, and EML sample programs. The lab was recently audited by EPA with a satisfactory report.

## 8.4 SAMPLE AND WORK FLOW

Environmental samples are brought to Building 9769 and the chain-of-custody forms signed. Samples are stored under the conditions required by EPA. The work request sheet is taken to Building 9995 where the information is entered into the computer system. Work cards are generated for all requested analyses. Work required for NPDES permits is printed on green stock so the analyst is aware of the special significance of these samples.

The analyst performs the work and enters all data on the work card along with his/her name and date of analysis. QC samples are recorded either on the work card or in a notebook.

When all work is completed, a report is prepared. The original is sent to the customer and a copy, along with all work cards, is retained in lab files, for an indefinite period (>3 years).

The samples are retained for one month following completion of the report. If no rechecks have been requested during this time, the samples are sent to waste.

## 8.5 PERSONNEL

Staff support for the non-radiological environmental analytical program is 21 persons. Many analysts are young but have experienced supervision. The staff understands the job and the necessity for the high QC level and the importance of quality work. Increased workload will require the addition of 4–6 analysts in the next year.

## 8.6 TRAINING

There is a semi-formal training program for analysts. Sufficient time is allowed for thorough training and the feeling of the analysts interviewed was that the training was adequate. The review team also feels the training is adequate. They know the location of procedures and could point to the exact step in progress at that time. They had a reasonable knowledge of the theory of the method. Formal documentation of training was lacking although there was a notebook record of training and qualification. Continued qualification is based on performance of QC samples.

A training coordinator has been appointed and is in the process of developing a formal training program.

## 8.7 DATA MANAGEMENT

Currently the existing computer system is used to generate work cards for the required analyses but all further records are kept by hand.

A new VAX computer has been installed in Building 9769 and is expected to be operational by October 1985. It will use software called the Environmental Data System (ENDS) to perform most of the functions now done by hand. It will incorporate terminal data entry, QC records, analyst qualification, reports and daily backlog generation. The addition of this system will greatly improve data management, record keeping and efficiency.

## 8.8 STATEMENT OF FINDINGS

The analytical procedures used are appropriate and are followed exactly. QC is up to EPA standards as is most record keeping and documentation. Facilities and instrumentation are good, as is training. Consolidation of all environmental work in Building 9769 will improve efficiency. A new ENDS data system will fulfill all data requirements.

## 8.9 RECOMMENDATIONS

1. The EPA method number used and the time of analysis must be put on the work card (Major).
2. Complete the installation of the Environmental Data System (ENDS) for record keeping and data handling (Major).
3. Work toward incorporation of ENDS into the Oak Ridge area environmental data base system should be completed, if feasible (Minor).
4. Monitor construction progress to minimize delays in consolidation of environmental analytical chemistry work in Building 9769 (Major).

# 9. BIOLOGICAL MONITORING

## 9.1 SUMMARY OF TOXICITY MONITORING

A multi-tiered, integrated approach to biological monitoring is being implemented as the basis of the NPDES Biological Monitoring Plan involving both East Fork Poplar Creek (EFPC) and Bear Creek (BC). The Plan consists of four tasks: toxicity monitoring, bioaccumulation studies (EFPC only), biological indicator studies (EFPC only), and instream monitoring. These tasks combine well-established monitoring methods with more innovative state-of-the-art techniques to establish regulatory compliance.

Samples from the Y-12 site are collected by personnel from both the Environmental Sciences Division and the Environmental and Occupational Safety Division of ORNL at X-10. Facilities of both divisions were toured during the audit. The sampling and analyses by the Environmental and Occupational Safety Division are strictly in support of discharge permits. Much of the sampling and analyses by the Environmental Sciences Division also is in support of discharge permits, but some of their studies go beyond permitting requirements and are being done at the request of Y-12 to provide a more comprehensive evaluation of the transport, fate, and effects of effluents. The data will provide a basis for evaluating the effectiveness of future cleanup programs.

Overall the program to sample living organisms and their abiotic environments (soil, sediments, water) as part of the ecological and toxicological monitoring at Y-12 is technically sound and is being carried out by well-qualified staff using the best available methods. Assistance and support from staff in the Health, Safety, Environment and Accountability Division at Y-12 have been very helpful.

Within the Environmental Sciences Division, personnel training for most jobs is done by personal instruction rather than through formal classroom instructions and detailed manuals. Participation in training programs and skill mastery is documented in annual employee performance appraisals. Within the Environmental and Occupational Safety Division, personnel training is accomplished both by personal instruction and by maintaining an active continuing education program for both technical and supervisory personnel. Records are maintained of courses taken and taught.

Most of the chemical analyses associated with the tasks described below are done by the Analytical Chemistry Division at ORNL. Soil and sediment analyses, however, are done by the Plant Laboratory at Y-12. There are no QA/QC procedures at present comparing results between these two analytical groups.

Procedures for sample storage and disposal are not adequately defined for any of the tasks described below, and storage space is or will become a problem in the near future.

In following sections we briefly describe the scope for each task and comment on procedures. Recommendations are listed in Section 9.7.

The toxicity monitoring task consists of seven subtasks being performed by the Environmental Sciences Division: effluent toxicity tests, toxicity persistence tests, effluent variability study, point-source toxicity evaluation, ambient toxicity tests, sediment toxicity tests, and periphyton community effects studies. Most of these subtasks involve two newly developed "mini-chronic" toxicity tests: the seven-day fathead minnow larval growth test and the *Ceriodaphnia* life-cycle test. Frequency of these tests varies from monthly to

annual to "as needed." The toxicity monitoring task is just getting started. As described by Giddings and Whitmore of this division and in documents made available to the audit team, it appears that details relating to procedures are well defined and are being carefully followed, but in several cases they are still evolving. The laboratory where the bioassays are to be performed was visited, but time did not permit a first-hand review of all steps in the procedure, such as collection of effluent samples and certain aspects of record keeping and data analysis.

The NPDES requirements of the State/EPA require biomonitoring. This type of monitoring is new and involves development of new monitoring protocols as an alternative process. This process actually bridges the gap between research and well established methodology.

## 9.2 BIOACCUMULATION STUDIES (EFPC ONLY)

The objectives of this Environmental Sciences Division task are (1) to monitor the bioaccumulation of contaminants in EFPC biota during and following the period in which advanced waste treatment alters water quality, and (2) to understand the dynamics of accumulation of contaminants in EFPC biota, with particular emphasis on bioavailability and the role of sediments as a continuing source of contaminants. The description of this task (Loar et al., 1985a) indicates that considerable thought and planning have already been invested, but as of July 1985, studies had not yet been initiated.

## 9.3 BIOLOGICAL INDICATORS OF CONTAMINANT-RELATED STRESS (EFPC ONLY)

The objective of this Environmental Sciences Division task is to use biological indicators, such as the liver function of fish, to assess and evaluate the responses of fish populations and communities in EFPC to Y-12 effluents and changes in effluent chemistry over time. The description of this task (Loar et al., 1985a) indicates that considerable thought and planning have been invested. Some fish samples have been collected and processed, but no results were available as of July 1985.

## 9.4 INSTREAM MONITORING

The instream monitoring tasks involve field sampling of the benthic invertebrate and fish populations in EFPC and BC. The objectives of these studies are (1) to characterize spatial and temporal patterns in the distribution and abundance of these populations downstream of the burial grounds in BC, and (2) to document the effects of new wastewater treatment facilities on community structure and function in EFPC. Intensive sampling to characterize the benthic invertebrate and fish communities is being conducted during the first year. Based on the results of these and other studies sampling frequencies and locations may be modified. Identification of the benthic invertebrate samples has been subcontracted to TVA. The operational details of sending samples and evaluating TVA's performance seem adequate.

## 9.5 SOIL AND SEDIMENT

Soils to be analyzed for non-radioactive contaminants are collected according to ASTM procedures by the Environmental Sciences Division and the Environmental and Occupational Safety Division. Only ESD personnel collect sediments. The sampling methods are fully documented in protocol manuals maintained by each group. The manuals include clarifications and modifications of published procedures from which they are derived; the manuals were up to date at the time of the audit. Field studies where samples are taken are recorded on maps, and the sites are now being designated in the field with permanent markers. Adequate sample coding exists within both groups; however, neither group maintains a fully documented procedure for recording when custody of a sample is transferred.

## 9.6 VEGETATION AND WILDLIFE

This task is performed by the Environmental and Occupational Safety Division and involves semiannually collecting grass and pine needles around the various air monitoring sites at Y-12 for fluoride analyses and periodically collecting fish and deer samples for mercury and PCB analyses. Methods are described in procedure manuals.

## 9.7 RECOMMENDATIONS

Environmental Sciences Division

1. Develop written protocols for all routine laboratory and field procedures (Major).
2. Dedicate an Environmental Science laboratory notebook to maintaining a record of chain-of-custody of all samples (Major).
3. Register master logbooks used to record samples. Provide an explanation in these master logbooks explaining entries, so that non-users can track samples if necessary. Identify field notebooks with investigator names and notebook numbers, and cross reference field notes to appropriate sections of registered laboratory notebooks when field data are not transferred to the laboratory notebooks. Keep written records of all sampling activities (for minor as well as major sampling projects), preferably on a daily basis (Major).
4. Plan now to have an internal audit of all Environmental Sciences Division tasks after these tasks have been initiated and procedures are more clearly defined approximately 6–12 months from now (Major).
5. Publish results in the peer-reviewed literature whenever possible (Minor).
6. Store samples for each task in a freezer that is clearly labelled in order to minimize chances for losing or incorrectly storing samples (Minor)

Environmental and Occupational Safety Division

1. Implement the planned program for documenting changes in sample custody (Major).
2. Install a lyophilizing (freeze-drying) unit to help alleviate space problems in storage of fish, deer, and vegetation samples (Major).

Both Divisions

1. Develop a plan for maintaining archived samples, specifying the types of samples to be kept, appropriate storage conditions, duration of retention, and method of disposal (Major).
2. Establish a QA/QC program for biological monitoring (Major).

# 10. QUALITY CONTROL AND QUALITY ASSURANCE

## 10.1 SUMMARY

The Quality control and Quality Assurance Program of Environmental Sampling and Laboratory were reviewed. The Laboratory QC/QA is meeting requirements in most cases with few recommendations. However, the field environmental sampling needs a major upgrade to meet requirements.

## 10.2 ENVIRONMENTAL SAMPLING

### 10.2.1 Findings

Only few Quality Control activities in the field sampling were found.

### 10.2.2 Recommendations

Since these recommendations are given to all sampling, they are listed in the Executive Summary under General Recommendations.

## 10.3 QA/QC IN THE LABORATORY

The analytical services for the Y-12 Environmental Monitoring and Protection Program, furnished by the Y-12 Plant Laboratory, are supported by a respectable quality control system. As a part of an overall Laboratory Quality Assurance Program, a QA Plan has been drafted for the Environmental Analysis function. The plan identifies general departmental responsiblities and procedures applicable to the sampling activity, laboratory sample handling (other than chemical preparation or analysis), instrument calibration, specific analytical procedures (about 80), data reduction, validation and reporting, quality control, preventive maintenance procedures and schedules, data precision and accuracy, and corrective action contingencies. This draft document presents the current status of these fundamental aspects of the laboratory support and indicates that QA is a well recognized responsibility in the lab. Detailed discussions with seven supervisory or professional members, and tours which allowed direct contact with several analysts or technologists, confirmed that QA/QC is quite in place in the laboratory and effecting a generally high quality of support to the environmental program.

The Plant Laboratory presently prepares sample bottles with appropriate preservatives on request for the Environmental Monitoring group. It is anticipated, however, that the monitoring group will become appropriately equipped and assume this responsibility eventually, so that the responsibility for the QA of that activity will reside with the group which actually uses the containers.

The storage of samples prior to analysis in Building 9769 is accommodated in two walk-in refrigerator rooms, equipped with recording temperature systems. It was observed that the temperature recorder was not in operation in one room and the recorder in the other room indicated close to 10°C. The direct temperature through-the-wall probes, however, indicated 39°F (4°C), as required by EPA regulations.

The use of analytical work cards seems to be adequately supported by QA. A special feature is the selective use of green cards (rather than the usual white) to indicate the need

for especially prompt attention with respect to turnaround time, e.g., for NPDES samples. The documentation of analysts, by unique code numbers, is clearly shown on the completed work card, so that, with the coupled use of logbooks, the individuals responsible for chemical preparation, measurement, and supervisory approval are fully traceable. The raw data are generally attached to the work card for eventual storage, except for strip-chart recordings which are large and more conveniently stored separately; in this case such raw data are appropriately labeled and dated for ready association with the work card in the future.

The retrievability of supporting QC data specially associated with stored analytical work cards is generally good; however, in four random tests of such QC retrieval for data reported in late 1984, the supporting information was found for three cases but not found for one. It is believed that the QC support work was conducted for that fourth case but not recorded.

The quality control activity is quite high in the Environmental Analysis Section. Spike additions and duplicates account for about 15% of the work load and external QC programs required about 20% of the effort; this includes the Y-12 Quality Division Program which delivers blind samples, often in conjunction with real sample traffic, and includes the commercial (ERA) QC solutions, processed quarterly, which cover about 40 parameters of special interest to NPDES permit compliance measurements. In the latter case, the laboratory results are treated statistically in the Y-12 Quality Division and compared with results from the other Energy Systems plants and with the certified values. The laboratory has continued to perform competently in these external programs, although in this audit no time was given to the close examination of each parameter. In a few cases, it was pointed out, multiple analyses or measurements by several independent methods have helped to identify deficiencies in the nominal "true" value of the commercial ERA QC solutions and the Quality Division samples. The Y-12 Environmental Analysis staff has participated in interplant discussions of QC source materials, to help ensure a generally strong program. They have also recently generated a supply of well blended mercury-contaminated reference soils at two concentration levels, which have been divided into several hundred vials for QC convenience. The three Energy Systems analytical laboratories in Oak Ridge and that at Oak Ridge Associated Universities (ORAU) facilities, have shared in the analysis and general certification of these "standards." They have served already to help identify an instrument deficiency at the Y-12 labs.

The emphasis on Quality Assurance (QA) in the Environmental Analysis function has increased over the past year. More operational factors, such as weighing balance checks, oven temperature stability, and water bath temperature control are examined regularly, using daily records of key parameters. It is apparent, however, that optimum use is not always made of such records; in one examination of temperature records of a water bath, the range of values was from 3° to 9° lower than the required temperature for several days. The analyst and supervisor involved both recognized the variance, but the equipment was still in use while efforts were being made to repair or replace it. Apparently there is a need for more redundancy in some equipment.

The full range of QA responsibilities in this laboratory support function has continued to grow. This is recognized by laboratory management and it is planned to establish a full

time position of QA Officer in the environmental analysis area. The individual to be assigned is already working in the QA program, but he should be relieved of other duties as soon as possible.

A key element in assuring quality in environmental analysis is the use of qualified analysts and a training program to support that requirement. The audit team was pleased to learn from the laboratory Training Officer of the progress made toward that objective. Because the laboratory has been pursuing this particular goal for at least two years, it seems that an action plan should be written, with specific target dates and responsibilities for achieving important steps. With the regulatory requirement of ensuring that qualified analysts are conducting the environmental analytical work, this particular function should receive the earliest attention in the qualification and training program. It is suggested that the programs at other Energy Systems laboratories be closely examined for possible adoption of similar features.

The general responsibility for QA in the Y-12 Plant Laboratory was very well demonstrated recently in its concern for the quality of data generated at another plant. Certain waste materials being transported to ORGDP for treatment and disposal are analytically characterized by the ORGDP Laboratory. Because a long-term responsibility may remain with Y-12, the Plant Laboratory organized an audit of the ORGDP Environmental Analysis functions. The findings were generally positive and the audit report presented several specific recommendations which were addressed in a written response to the audit report.

### 10.3.1 Recommendations

1. Examine the temperature control/recording systems on the two walk-in refrigerator rooms used for sample storage in Building 9769. The maintenance of 4°C for storage of certain samples is mandatory (Major).
2. The documentation of QC activity must be more complete, so that it is readily traceable and retrievable with the analytical data held in storage (Major).
3. Review the condition and redundancy of much needed laboratory equipment, such as ovens and water baths, so that a faulty system can be promptly replaced or taken out of service for repair (Major).
4. Relieve the QA Officer in the Environmental Analysis area of other duties as soon as possible so that he can spend full time with the QA program (Major).
5. Establish an action plan for the development and installation of the analyst training and qualification program, giving early attention to the environmental analysis area (Major).

## 10.4 QC/QA SAMPLE PREPARATION PROCEDURES

It appears that there is essentially no effort on the part of the Environmental Monitoring Group to validate sampling results. There was no evidence of submission of blind samples, splits, blanks, and spikes for analysis.

### 10.4.1 Recommendations

1. Laboratory space and equipment should be provided and trained staff made available to implement QA/QC within the Environmental Monitoring Group (Major).
2. Documented QA/QC procedures to validate sampling results should be developed and implemented (Major).

## 10.5 QC/QA DATA

Quality control data from the analytical chemistry laboratory are reported to Materials Quality Control. Weekly, monthly, and quarterly reports are prepared and discussions are held with laboratory supervision on out-of-control situations. Annual reports are prepared for the Environmental Resources Associates control samples. Reports are received from the state and from EPA on their samples.

The data from Y-12 environmental samples are reported to the Environmental Technology Department and are used in the preparation of reports. This information is not used in any quality applications and much of its value is lost. Standard QC practices such as statistical calculations, trend analysis, variance, plots, etc. should be made using these data. When the Oak Ridge area environmental data base is established, it will be easier to process this information.

### 10.5.1 Recommendation

1. Standard statistical practices should be used to extract additional information from the environmental data (Major).

## 10.6 SAMPLE CHAIN-OF-CUSTODY

### 10.6.1 Summary

The present chain-of-custody form and verbally outlined procedures for the Environmental Monitoring Group appear adequate. However, evidence exists to indicate this procedure is not always followed. Documented chain-of-custody does not exist in the laboratories analyzing the samples after the laboratories have accepted custody of the samples. However, the laboratories do attempt to maintain sample integrity by locking up samples in secured laboratory areas.

### 10.6.2 Statement of Findings

The Environmental Monitoring Group implemented the use of chain-of-custody forms in January 1985. While the verbally outlined procedures appear adequate, the procedures are not documented and evidence indicated that the procedures were not always consistently followed. Some chain-of-custody forms contained sample collection times while others did not.

When the sample is delivered to the Plant Laboratory, it is accompanied by a chain-of-custody form which is signed by laboratory personnel to indicate receipt of the samples. The date and time the samples are received and the date, time, and signature of the person

relinquishing the samples are also recorded. The chain-of-custody form is then returned to the Environmental Monitoring Group. Beyond that point, the sample custody trail is followed by less direct means. Laboratory chain-of-custody is traceable by analyst and supervisor signatures or initials on all work cards and through final approvals of completed work. Samples are secured from unauthorized access. Laboratory staff stated that EPA had reviewed this procedure in their last audit and found that the procedure provided adequate sample integrity. Usually, unsealed samples may be considered of unquestionable integrity only if chain-of-custody is maintained. Sealed samples also help to ensure sample integrity; however, none of the observed samples were sealed. All compliance monitoring samples must maintain proper chain-of-custody. The chain-of-custody record becomes extremely important if a sample is to be introduced as evidence in a court litigation.

### 10.6.3 Recommendations

1. Chain-of-custody procedures are designed to establish the documentation necessary to trace sample possession from its conception, in order to ensure the integrity of the sample. The chain-of-custody procedures utilized by the Environmental Monitoring Group should be documented and all sampling personnel trained in these procedures (Major).

2a. Laboratory staff should examine the total chain-of-custody responsibilities within each lab building and between buildings to judge whether the present traceability and protective measures are adequate and auditable (Major).

2b. Confirmation that current laboratory chain-of-custody procedures are acceptable to EPA and state regulatory agencies should be obtained or documented chain-of-custody procedures should be developed and implemented (Major).

2c. Times should be recorded by each analyst when each analysis is completed. This is especially important for some parameters which have short holding times (Major).

2d. Each time the sample goes to a different analyst, the signature of the analyst should be documented (Major).

# 11. HAZARDOUS WASTE

Hazardous waste at Y-12 is the responsibility of the Waste Transportation, Storage, and Disposal Department. During 1984, this department's staff handled about 685,000 $ft^3$ (radioactive), 2,839,000 $ft^3$ of industrial and sanitary wastes, and other hazardous wastes.

## 11.1 FINDINGS

The time to get purchase orders for the disposal of the PCBs should be reviewed to reduce holding time. In addition, PCB spill procedures are not being followed. All disposal forms (Form UCN-2109) are logged out with dates. Offsite shipment time is causing backlog in wastes.

## 11.2 RECOMMENDATIONS

1. A weekly inspection of PCB storage areas will be initiated to comply with DOE Order 5480.2 (Major).
2. The reported PCB spill of 400 gallons and other PCB spills should be cleaned up according to the PCB Deminimus Levels Procedure, October 4, 1984 (Major).
3. PCB spills should be cleaned up with a solvent and not diluted with mineral oil (Major).
4. Labels must remain on all transformers >50 ppm PCB. Reference was made during the audit, that when a transformer was below 500 ppm that, the PCB label was removed (Major).
5. Field personnel who are involved with PCBs should be trained for the internal procedure "PCB Spill Clean-Up Standards and Procedures" (Major).
6. Review the system for completing purchase orders for hazardous waste disposal to determine how they can be completed in a more timely manner to reduce holding time (Major).
7. A review of the location of PCB transfer (pure PCB) should be conducted to see if it is close to the air ventilation system in the building (Major).
8. A review of the procedure for disposal of PCB materials >500 ppm and pure PCB should be conducted (Minor).
9. A review of the funding levels for the disposal of PCB liquids from old transformers should be completed to determine if the level is appropriate for timely disposal (Major).
10. Plans should be developed in case the Y-12 Plant RCRA land units are shutdown because of lack of groundwater wells (Minor). If units have approved RCRA wells in place no action is required.

11. Review of the UCN-2109 disposal form log should be conducted to make sure that when the forms are not completed a statement is added (Minor).

12. Review of the storage space for waste awaiting offsite shipment should be conducted. This review should include storage time required for normal purchase orders and should determine if the available space meets all needs (Major).

13. A standard disposal form for all Oak Ridge Plants should be developed (Major).

## Appendix A

## LIST OF Y-12 STAFF INTERVIEWED DURING NON-RADIOACTIVE EFFLUENT AND ENVIRONMENTAL MONITORING

## Appendix A

## LIST OF Y-12 STAFF INTERVIEWED DURING NON-RADIOACTIVE EFFLUENT AND ENVIRONMENTAL MONITORING

**Environmental Monitoring Group**
**Environmental Technology Department**
**Health, Safety, Environment and Accountability Division**

P. M. Pritz
J. D. Gass
M. D. Henderson
C. S. Haase (ESD-ORNL)
P. H. Phillips
S. H. Coffin

**Remedial Actions Group**
**Environmental Technology Department**
**Health, Safety, Environment and Accountability Division**

C. W. Kimbrough
G. A. Gillis

**Engineering Programs Group**
**Environmental Technology Department**
**Health, Safety, Environment and Accountability Division**

J. E. Powell
R. H. Kingrea
L. O. Vaughan
G. E. Kamp
C. W. Gehrs (ESD-ORNL)
G. R. Southworth (ESD-ORNL)
J. M. Giddings (ESD-ORNL)
J. M. Loar (ESD-ORNL)

**Environmental Compliance Department**
**Health, Safety, Environment and Accountability Division**

W. G. Butturini
S. H. Welch

**Compliance Coordination Group**
**Environmental Compliance Department**
**Health, Safety, Environment and Accountability Division**

H. L. Fellers, Jr.
S. H. Welch

**Emergency Planning Group**
**Plant Shift Superintendents Department**
**Safeguards and Security Division**

J. E. Cheek

**Process/Project Engineering Group**
**Waste Treatment Operations Department**
**Health, Safety, Environment and Accountability Division**

I. Jeter
P. Sadler

**Technical Staff Group**
**Waste Transportation, Storage and Disposal Department**
**Health, Safety, Environment and Accountability Division**

B. T. Butcher, Jr.
R. R. Kimmett

**Power Maintenance Program**
**Power Operations and Maintenance and Field Electronic Maintenance**
**Electrical and Electronics Department**
**Maintenance Division**

M. S. Blalock

**Plant Laboratory**
**Product Certification Division**

D. L. Beidleman
D. W. Chandler
T. A. Corea
J. D. Davies
J. G. Dorsey
P. S. Giitter
Q. G. Grindstaff
K. S. Gunter
J. T. Harvey
J. N. Jones
R. H. Kent
L. N. Litton

R. J. McElhaney
T. A. Neal
G. V. Pierce
T. N. Ternes
J. C. Vance
L. E. White

**Environmental Sciences Division, ORNL**

C. W. Gehrs
J. M. Giddings
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G. R. Southworth
R. R. Turner
D. K. Whitmore

**Environmental and Occupational Safety Division, ORNL**

H. Hung
J. T. Kitchings

## Appendix B

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