7590 U-005-307.9

RFP, JC-97686, DATED JUNE 1, 1994, SUBMITTED BY SCIENTIFIC ECOLOGY GROUP (SEG) INC., OAK RIDGE, TN ON RECYCLE METAL MELT (RESTRICTED USE) COSTS - (USED AS A REFERENCE IN OU3 RI/FS/PP APPENDICES E & I) - (RESTRICTED AND PROPRIETARY INFORMATION)

06/01/94

RFP JC-97686
SEG
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RFP

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SCIENTIFIC ECOLOGY GROUP, INC.

FR-9404-111

June 1, 1994

FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT COMPANY
P. O. Box 398704
Cincinnati, OH 45239
Attn: J. E. Craig, Jr.

Dear Mr. Craig:

SUBJECT: Request for Proposal No. JC-97686, Recycling or Beneficial Reuse of Radioactively Contaminated Steel and Provision of Shipping Containers

The Scientific Ecology Group, Inc. (SEG) proposes to apply its integrated radioactive waste processing capabilities to process and disposition 700 tons of structural carbon steel and provide containers to FERMCO for packaging low level radioactive waste in accordance with the subject request for proposal.

SEG is an Oak Ridge-based firm with comprehensive experience in providing commercial radioactive waste processing services to clients in government and the nuclear utility industry. Our capabilities include decontaminating metals for free release and producing a variety of steel containers using virgin and contaminated steel. Based on this experience, we propose to transport the scrap steel from Plant 7 to SEG's Oak Ridge facility for decontamination to meet NUREG 1.86 criteria. Decontaminated material will be sold to a local broker, and credits will be provided to FERMCO for the purchase of new virgin carbon steel containers. The SEG Project Manager will be located at the FEMP, where he will also oversee packaging and transport of the scrap steel.

P.O. Box 2530
1560 Bear Creek Rd.
Oak Ridge, Tennessee 37831-2530
(615) 481-0222 Fax: (615) 482-7206

P.O. Box 2138
Carlsbad, New Mexico 88220
(505) 887-1673 Fax: (505) 885-4219

1234 Columbia Dr. S.E.
Richland, Washington 99352
(509) 736-0626 Fax: (509) 735-3085

In developing our approach, we relied on our in-depth knowledge of DOE waste minimization goals and FEMP waste management practices and needs. We have been assisting FERMCO since 1992, when SEG was awarded a contract to process and beneficially recycle more than 2,400 tons of radioactively contaminated metals. Additionally, we are performing a project under a DOE PRADA that entails melting contaminated metals for fabrication into LLRW containers.

The approach selected for this project will significantly reduce the amount of DOE scrap metal that must be disposed of in valuable burial space and demonstrate the feasibility of a large-scale recycling/beneficial reuse program for scrap steel. If this approach is selected for full scale processing, FERMCO can achieve its goals for recycling/beneficial reuse of its 400,000 ton scrap steel inventory on an accelerated schedule at the lowest possible cost.

If you have any questions, please contact me by phone at (615) 376-8032.

Sincerely,

Paula Jennings for

Bill Carder
Vice President, Government Sales

/plj

cc: Proposal File
Pat Hopper
Doug Moore

Enclosures: Volume 1, Technical Proposal (7 copies)
Volume 2, Cost/Price Proposal (5 copies)

Next 79 Pages Redacted

Contains Proprietary Information

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Department of Energy
Nevada Field Office
P.O. Box 98518
Las Vegas, NV 89193-8518

MAY 28 1993

Thomas J. Rowland, Acting Manager, DOE/FN, Cincinnati, OH

CONDITIONAL APPROVAL TO DISPOSE OF LOW-LEVEL WASTE STREAM NUMBER ONLO-000000008 FROM THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT AT THE NEVADA TEST SITE

Fernald Environmental Management Project (FEMP) has successfully completed the review and approval process for waste stream ONLO-000000008, "Low/High Grade Residues - Subcontracted." FEMP waste stream ONLO-000000008 consists of the same types of subwaste streams as identified in the currently approved FEMP waste stream ONLO-000000006, "Low/High Grade Residues," with the addition of a compaction process. FEMP has contracted Scientific Ecology Group, Inc. (SEG), in Oak Ridge, Tennessee, to perform the compaction activities.

Completion of this process included the following activities that were performed to ensure compliance to the requirements of the Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements, NVO-325, Revision 1:

1. DOE/NV reviewed application Addendum I package pertaining to waste stream ONLO-000000008. FEMP responses to DOE Nevada Operations Office (DOE/NV) comments were provided in a memorandum from Rowland to Flore, dated May 5, 1993. These responses were reviewed and determined to be adequate.

2. DOE/NV performed surveillance WMD-93-05 of the SEG facility on March 17-18, 1993. In addition, a follow-up surveillance WMD-93-10 was performed to verify corrective action on April 20, 1993. Both of these surveillances are closed.

With the completion of the above-noted activities, DOE/NV grants conditional approval for the shipment and disposal of FEMP waste stream ONLO-000000008 under the guidelines of NVO-325, Rev. 1; the FEMP Addendum I, dated April 1993; and the FEMP Application to Ship Waste to the Nevada Test Site, Revision 4.2, dated November 1992. Please note that the DOE/NV approval to FEMP to ship waste stream ONLO-000000006 granted on May 22, 1992, indicates approval of Revision 3 of the FEMP application. Since the time of that approval, the FEMP application has undergone revision, resulting in Revision 4.2. FEMP is currently following Revision 4.2 as guidance for their NVO-325 low-level shipping program.

The subject conditional approval will remain in place until such a time that the FEMP low-level waste shipping program successfully completes the forthcoming recertification process according to the requirements of NVO-325, Rev. 1. At that time, ONLO-000000008 will receive the appropriate approval from this office.

Prior to shipment of these waste streams, please notify Eugene W. Kendall, Waste Operations Department, Reynolds Electrical & Engineering Co., Inc., at (702) 295-5888 or (702) 295-6407 with the planned shipping date. Mr. Kendall will ensure that the necessary equipment and personnel will be available for disposal activities and will provide the coordination for the transfer of funds.

In addition, please telefax a copy of the "Low-level Waste Certification Statement" for the shipment to the Waste Management Division (WMD) at (702) 295-1810, Attention: Wendy A. Boutcher, prior to the shipment of each load.

I would like to commend Dave M. Rast, of your staff, as well as Jeff Rowe, Fernald Environmental Restoration and Management Company of Ohio (FERMCO), for their perseverance and dedication to the development of a successful NVO-325 program. Messrs. Rast and Rowe, as well as the capable FEMP personnel clearly demonstrate there is a strong commitment to a high quality NVO-325 waste certification program at FEMP. This dedication has allowed FERMCO to become the first Nevada Test Site (NTS) generator to develop a successful NVO-325 program at a commercial facility. This could not have been completed without considerable care, preparation, and attention to detail both from FEMP and SEG personnel. The successful inclusion of a commercial facility into the intense NVO-325 process will provide an example to other NTS generators who may need to use a commercial facility in the future.

For any questions, please contact Ms. Boutcher, WMD, at (702) 295-5751.

Nick C. Aquilina
Manager

WMD:WAB

7590

cc:
J. O. Boda, DOE/HQ (EM-322) TREV
W. D. Black, DOE/HQ (EM-322) TREV
Ray Hansen, DOE/FN, Cincinnati, OH
D. M. Rast, DOE/FN, Cincinnati, OH
H. W. Dickson, REECo, Las Vegas, NV
E. W. Kendall, REECo/WOD, Mercury, NV
M. B. Noland, REECo/EMD, Las Vegas, NV
E. P. Opelski, RSN, Las Vegas, NV

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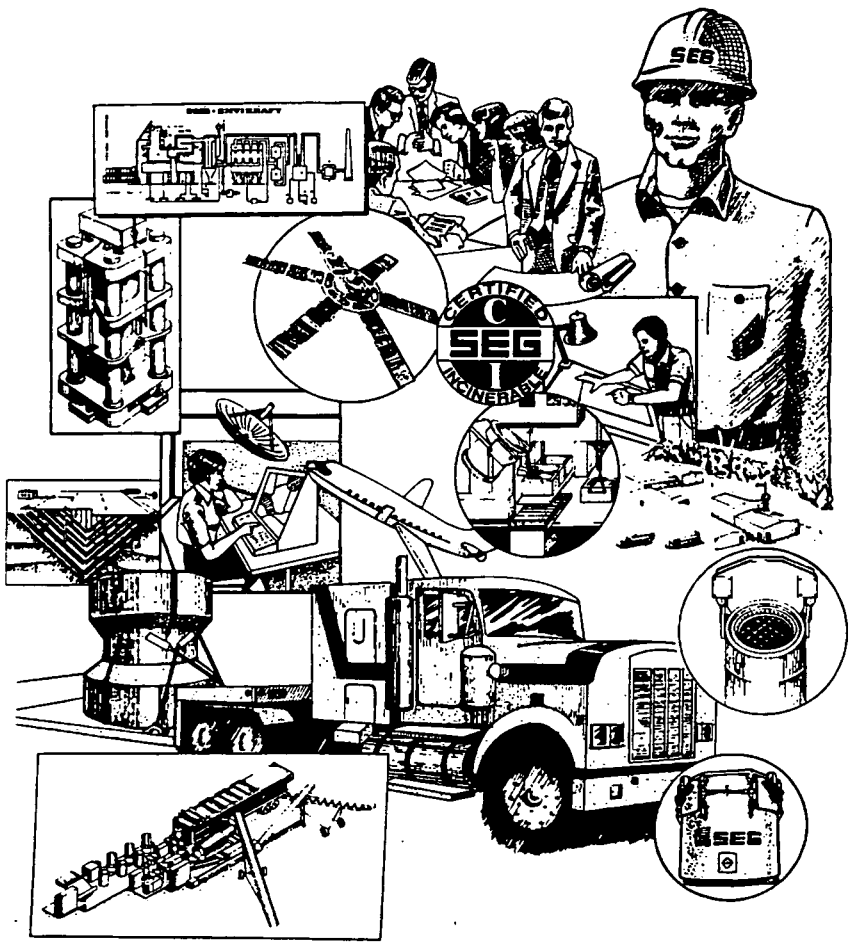
Statement of Capabilities to Provide Comprehensive Radioactive Waste Management Services



SCIENTIFIC ECOLOGY GROUP, INC.

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37831
(615) 481-0222

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1. Introduction to SEG Services

Scientific Ecology Group, Inc. (SEG), the world's leading low-level radioactive waste (LLRW) processing company, offers the most comprehensive radioactive waste management services available to the nuclear industry today. This document provides information about the company and the services that SEG currently offers to the nuclear industry.

Our Vision

To be the safest, highest performing, innovative waste management company in the world, accomplished by combining teamwork, exceptional customer service, the application of advanced technologies, and a commitment to excellence.

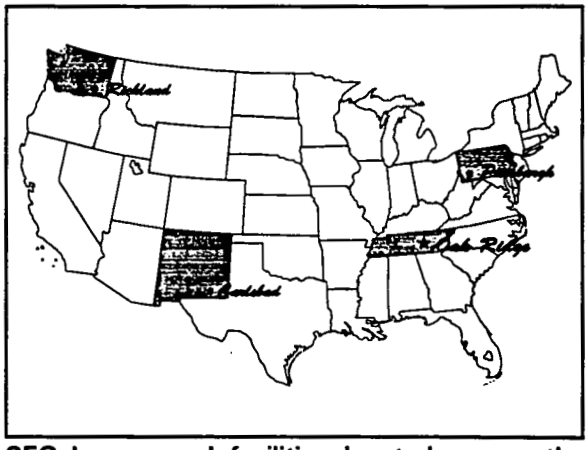
SEG
SCIENTIFIC ECOLOGY GROUP, INC.

1.1 *History*

SEG was organized in 1985 as a privately owned small business focusing specifically on problems associated with the management of commercially generated LLRW. The SEG Central Volume Reduction Facility (CVRF), located in Oak Ridge, Tennessee, began volume reducing LLRW in January 1986 to minimize burial allocation space and disposal costs for our customers.

In 1989, Westinghouse Electric Corporation acquired SEG as a wholly owned subsidiary. This action vastly expanded the financial, facility, engineering, and technological resources available to support SEG in its waste processing endeavors.

Since acquiring SEG, Westinghouse has extensively expanded the capabilities and services SEG can provide allowing us to offer a full line of low-level waste management services. Services provided by SEG include all types of off-site and on-site radwaste processing, packaging, transportation, and management services. Services are supplied through SEG offices located in Oak Ridge, TN, Pittsburgh, PA, Carlsbad, NM, and Richland, WA.



SEG has several facilities located across the country.

SEG also has several support organizations such as Hittman Transportation Services, Inc. (HTS), which was incorporated as a subsidiary of SEG in 1989. HTS maintains an operations office in Oak Ridge, TN, but is principally based in Greensburg, PA, outside of Pittsburgh. HTS operates the largest transportation fleet dedicated to the shipment of radioactive materials in the nation.

The Westinghouse Nuclear Waste Technology Group was incorporated into SEG in 1990. This group provides design engineering support for new waste processing technologies, cask and container analysis and qualification, soil washing technology, and site characterization equipment. This group is also located in Pittsburgh.

In 1992, SEG opened a Northwest office in Richland, WA. This office is staffed by over 50 employees and supports SEG operations and services for customers located in the Northwest.

In 1993, SEG acquired Gregory Environmental Services, Inc., and the TRUPACT II Assembly Facility, both located in Carlsbad, NM. SEG combined these facilities to create a company known as SEG Advanced Systems to manufacture a wide selection of radioactive and hazardous waste disposal and storage containers.

Today, SEG is the world leader in low-level radioactive waste management employing over 1,200 full-time employees in all aspects of radwaste processing, packaging, transportation, and disposal for the majority of the nation's nuclear power plant operators and commercial and government generators of radioactive waste.

1.2 *Capabilities*

The SEG mission is to provide the nuclear industry with LLRW processing services to minimize customer costs for disposal, while improving the characteristics and stability of the waste form. SEG personnel have extensive experience in the successful planning and implementation of waste processing activities for the nuclear industry. This experience includes the successful integration of equipment, personnel, and procedures in the construction and operation of several decontamination and volume reduction facilities. SEG processing and disposal services comply with all applicable rules, regulations, statutes, licenses, and disposal site criteria of the burial site states of South Carolina, Washington, Utah, and Nevada.

SEG has continuously improved available waste handling techniques. SEG personnel have considerable experience in nuclear and chemical waste management and the necessary licensing and permitting required by the NRC, DOT, agreement states, and EPA regulations.

As a company, SEG has many unique qualifications:

- **Licensed processing facilities** - SEG has a number of the most extensive licensed process facilities of any commercial enterprise in the U.S. These facilities process the largest variety and volume of waste streams. These facilities contain several types of decontamination, volume reduction, incineration, oil destruction, drying, metal melting, compaction, sorting, shredding, packaging, and solidification equipment for the greatest flexibility in dealing with customer waste.

- **Radioactive waste containers and transportation** - SEG has expertise in the packaging and transportation of hazardous, mixed, transuranic, LLRW, and spent fuel. SEG is now the premier producer of radioactive and hazardous waste containers in the U.S. and has an exemplary

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record in the nuclear industry for safe transportation of these materials.

- **Transuranic (TRU) waste handling** - SEG personnel are experienced with the contamination hazards of TRU waste and have successfully integrated equipment and procedures to process this waste safely and efficiently. For example, in 1987, SEG supercompacted and packaged TRU waste for interim storage at Idaho National Engineering Laboratory (INEL) and later disposal at the Waste Isolation Pilot Plant (WIPP). During this project, TRU waste was repackaged and supercompacted for the first time by a commercial company. Today, SEG routinely operates a supercompactor dedicated to TRU waste at our Oak Ridge facility.

1.3 *Future Services*

SEG has identified several technologies that will be added to our capabilities to help solve current and future waste challenges. The following services will be offered to the nuclear waste generator by SEG in the near future.

Mixed Waste Processing

In accordance with the applicable provisions of 40 CFR 261, SEG performs treatability studies on limited quantities of mixed waste. SEG has applied for a Resource Conservation and Recovery Act (RCRA) Part B permit at our Oak Ridge facility for storage and treatment of mixed wastes. This service will help alleviate the critical shortage that the nuclear industry faces in this area.

With the addition of a mixed waste treatment permit, SEG will be in a unique position to offer treatment options to mixed-waste generators that are not presently available in the United States. A limited number of RCRA-permitted treatment facilities possess radioactive material licenses. These facilities are generally limited in the variety and quantities of radionuclides that they can process and are also restricted to treating only liquid waste forms. Treatment capabilities for most solid mixed waste stored at waste generator sites currently do not exist. Because the EPA does not consider storage of mixed waste a viable option, the SEG RCRA Part B permit allowing treatment of solid mixed waste at our Oak Ridge site will provide a much-needed service to waste generators.

SEG is in the process of submitting a second Part B permit application to incinerate mixed waste. Once our RCRA Part B permits are approved, SEG will offer hazardous/mixed waste processing at our Oak Ridge site. These RCRA permits will afford mixed waste generators the treatment capabilities they require, and will help alleviate the problems associated with storage of leaking containers, inadequate contingency plans, and the related work created in protecting workers and the public. SEG's capacity to safely and efficiently treat hazardous and radioactive wastes will result in a cleaner, safer environment in the United States.

Interim Storage of Wastes

Because of the possibility that in the near future there will be no burial sites available for many waste generators, SEG is working to provide interim storage services for our customers at its licensed facilities.

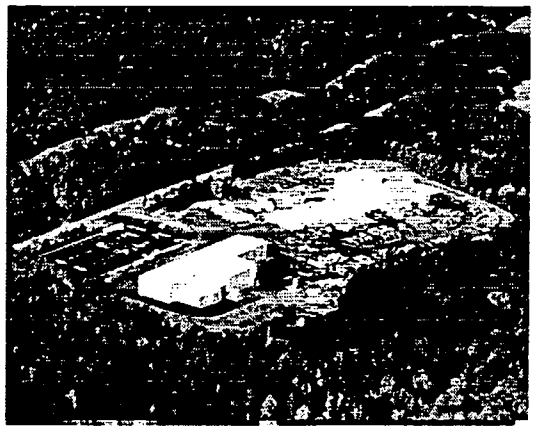
SEG is taking an active role in the future of radioactive waste disposal by formulating solutions to the following areas of concern.

- Radioactive waste from governmental agencies such as DOE and DOD.
- Mixed waste disposal by incineration, neutralization of hazardous constituents, volume reduction, solidification and adhesive bonding.
- International needs for volume reduction facilities.
- Reprocessing of waste that was buried in the 1950s and 1960s to produce environmentally stabilized disposal forms.

2. SEG Facilities and Equipment

Over 2,000,000 cubic feet of waste and 10,000 tons of metal are processed annually at the SEG low-level radioactive waste processing facility in Oak Ridge, TN. This facility is the first licensed, full-service volume reduction center in the United States.

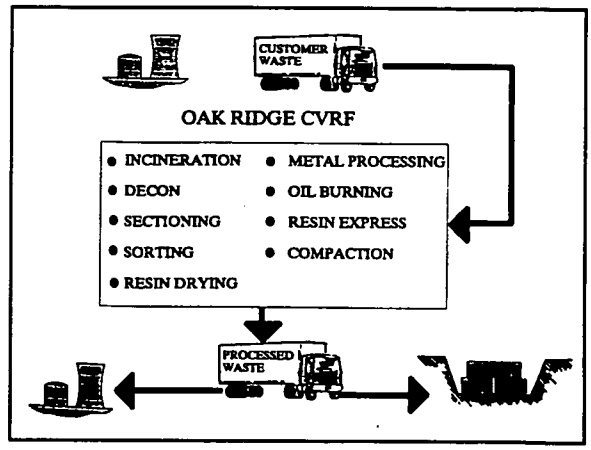
SEG's unique waste processing facilities include a 12,000 sq. ft. incinerator building, a 45,000 sq. ft. metal decontamination facility, and a 50,000 sq. ft. Central Volume Reduction Facility (CVRF). SEG also has a 250,000-square-foot facility in nearby Kingston, TN, for survey and free release of potentially clean waste, container manufacturing, wet waste processing, and equipment maintenance and storage.



Overview of the SEG Bear Creek facilities.

2.1 *Central Volume Reduction Facility*

The CVRF uses the most technologically advanced equipment available today to process LLRW in a cost-effective manner. Processing of LLRW at this facility reduces disposal costs to the waste generator and improves the environmental performance of the waste form for burial. SEG uses various techniques to accomplish these objectives including sorting to remove non-contaminated or non-conforming waste and valuable materials from the waste stream, volume reduction by super-compaction, incineration, decontamination, and other techniques.



The CVRF is equipped with a patented, computer-controlled, 5,000-ton Ultra-Compactor and material moving system that can process drums and boxes (the only compactor that can compact both).

The CVRF is also equipped with resin drying equipment, TRU waste compactor, size reduction equipment, high pressure

water spray, electropolishing and grit blasting equipment, and sludge processing equipment.

SEG has an on-site certified truck scale, full-size van and flatbed trucks, straddle cranes for handling large cargo containers (Sea/Lands), and various material handling fork trucks.

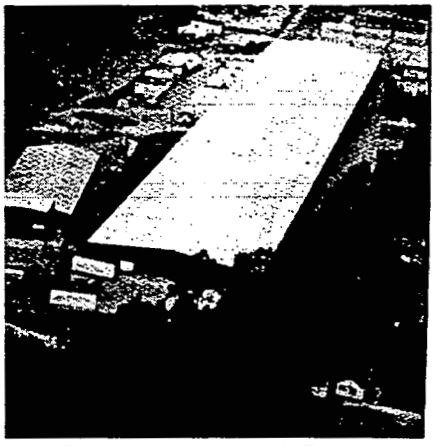
SEG maintains nearly 100,000 sq. feet of paved storage space for radioactive waste materials and over 10,000 sq. ft. of office space at this facility. The main plant also has an extensive array of installed and portable radiological monitoring equipment and a fully equipped radiochemistry laboratory with state-of-the-art gamma spectroscopy, gas chromatograph, liquid scintillation, and alpha/beta counting equipment. This laboratory is qualified to perform TCLP testing and routinely performs over 2,000 analyses and tests each year for waste processed at SEG. Ash that is sent to burial is certified by SEG to be nonhazardous under RCRA.

2.2 *Gallaher Road Facility*

The Gallaher Road Facility is an extension of the SEG CVRF. This 47-acre facility is located five miles from the SEG main plant and has over 250,000 sq. ft. of waste processing and storage, maintenance, and container fabrication space.

SEG employs a state-of-the-art, computerized, segmented gamma scanning system at this facility to survey and free release non-contaminated, potentially clean waste. This facility consists of several separate buildings including a 200,000 sq. ft. waste storage and processing building, a 35,000 sq. ft. maintenance facility, a records retention center, and 15,000 sq. ft. of office space.

The SEG Central Wet Waste Processing Facility, also located on Gallaher Road, is equipped to process a variety of high activity wet wastes and special wastes by solidification, dewatering, demineralization and encapsulation.



The Gallaher Road Facility

2.3 *Incinerator*

A principal means of volume reduction at SEG is incineration. Housed in a 12,000-square-foot building, SEG safely operates the first commercial low-level radioactive waste incinerator in the United States and the only one dedicated to radioactive materials. Commercial operation began in November 1989.

With temperatures of up to 2,200°F, SEG customers are assured of complete combustion of volatile material. Emission control equipment consists of a unique combination of carefully chosen technologies consisting of a heat recovery boiler for offgas temperature control, a baghouse filter and dual HEPA bank for particulate control, a wet scrubber for acid gas removal, and an

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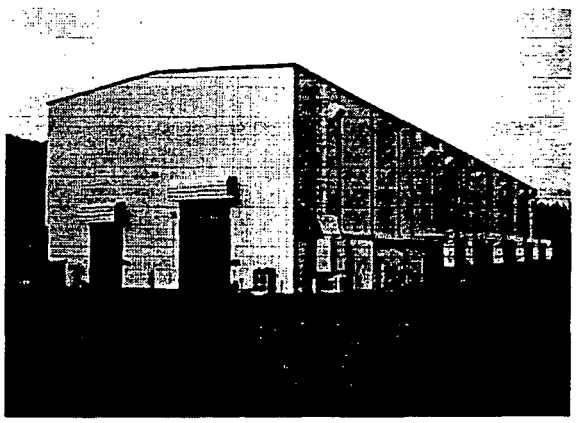
exhaust reheat system for stack plume suppression.

2.4 *Metal Processing Facility*

The SEG Metal Processing Facility is the only facility of its kind in the U.S. and the largest metal decontamination facility in the world. This 45,000-square-foot facility incorporates state-of-the-art metal processing and environmental monitoring equipment. At the heart of the facility is a 20-ton induction furnace. At a production capacity of six tons per hour, the SEG Metal Processing Facility produces customized shielding blocks, ingots for sheet metal, and other items for beneficial reuse. These items are transported to the nation's research facilities for shielding, and to other appropriate nuclear industry users.



The SEG Metal Processing Facility

SEG facilities have been designed with occupational, public, and environmental safety in mind. All air effluents are HEPA-filtered before release, and all liquids are pumped to tanks for future solidification or incineration. This design feature ensures that no inadvertent, uncontrolled release to the sanitary system can occur. Airborne emissions to the environment are automatically sampled by the SEG isokinetic stack sampling systems.

2.5 *Container Fabrication Facility*

SEG consolidated its special manufacturing operations into one organization known as SEG Advanced Systems. The primary function of SEG Advanced Systems is to design and build advanced-design containers for storage, disposal, shipment, or containment of radioactive and/or hazardous materials.

The Research, Development and Manufacturing facility in Carlsbad, NM, houses machining, welding and special manufacturing lines.

The facilities of SEG Advanced Systems are located at two sites in Carlsbad, NM, and consist of over 160,000 sq. ft. of manufacturing facilities and over 18 acres of fenced, secure storage space. The 100+ employees located in Carlsbad produce a variety of polyethylene, steel, and concrete containers.

SEG Advanced Systems' personnel have extensive experience in the production of specialty containers for radioactive and hazardous materials. For example, they supplied manpower to help produce all of the TRUPACT II casks, and they are

currently under contract to produce a variety of containers including composite (stainless steel and polyethylene) NRC-approved High Integrity Containers (HICs), polyethylene HICs, stainless steel and foam containers for chemical weapons for the U.S. Army, and 33,000 fissile materials storage containers for Russian nuclear warheads.

SEG Advanced Systems received orders for radioactive and hazardous material containers valued at more than $60 million during its first year of operation. This makes SEG the largest supplier of hazardous waste containers in the nation.

2.6 *SEG Northwest Facility*

The SEG Northwest office in Richland, WA, provides many of the same type of consulting services offered at the Oak Ridge and Gallaher Road facilities including some additional services.

SEG's Northwest Facility

The SEG Northwest office staff is housed in a 20,000-square-foot building and is dedicated to providing comprehensive services to both the commercial nuclear industry and government.

These services include geological and hydrogeological consulting, underground storage tank management, monitoring and well installation, geological and environmental engineering, management of hazardous wastes, soil and ground water remediation, air quality analyses, environmental risk assessments, and field sampling of soils, ground water, and other media.

2.7 *Nuclear Waste Technology Group*

The SEG Nuclear Waste Technology Group is located outside of Pittsburgh, PA. This organization provides SEG customers with specialty engineering support services and equipment such as a mobile soil washing system, burial site design services, in-situ detection and mapping of buried hazardous materials, and MC-10 dry fuel storage casks.

3. SEG-Site Services

SEG has attained a leadership role in the field of radioactive waste management by commercializing and using technologies in a cost-effective and environmentally acceptable manner. SEG currently provides radioactive waste processing services at its facilities in Oak Ridge, TN, to a majority of the nuclear power plants in the U.S.

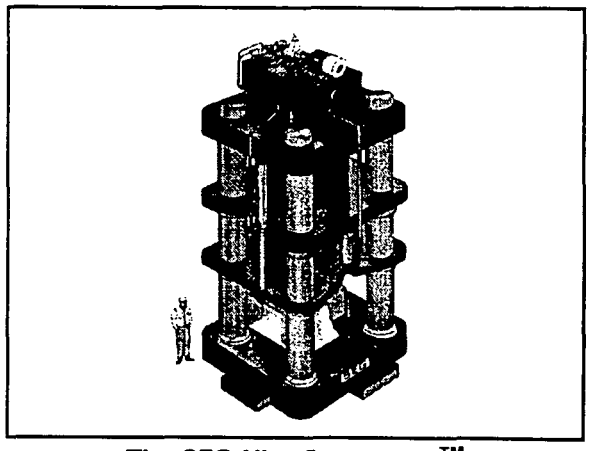
3.1 *Volume Reduction*

New and exclusive equipment and processes are constantly being added to our facilities enabling SEG to provide the most modern and innovative methods of volume reduction available to the nuclear industry today. Methods presently being used at the SEG facilities are described in the following sections.

☞ *UltraCompaction™*

One of the most significant SEG volume reduction techniques is supercompaction using a 5,000-ton press. This compactor has the unique capability of handling 52-gallon and 55-gallon drums or 4x4x3 foot boxes (a special SEG design). This one-of-a-kind press is the largest compactor in the world and the only one capable of compacting 4x4x3 foot boxes. Many items (such as motors, pumps, piping, and other metal objects), often considered non-compactable by normal standards, can be reduced to almost their theoretical maximum density with the SEG press. Because of these unique abilities, the SEG supercompaction process is called UltraCompaction.

SEG UltraCompaction services have been instrumental in reducing burial waste volumes for our customers since SEG began operations in 1986. Most of the operating nuclear power plants and most LLRW brokers have used SEG UltraCompaction services. Volumes received by SEG have increased steadily through the years, an indication of our customers' continuing satisfaction with SEG UltraCompaction services. The throughput capacity of the UltraCompactor is more than 2.5 million ft^3 of waste per year at a density of approximately 65 pounds/ft^3.



The SEG UltraCompactor™

Volume reduction of LLRW by the SEG UltraCompactor minimizes the customer's potential for risk, as well as environmental concerns, in several ways:

✔ Volume reduction by UltraCompaction means less waste handling at the disposal facility and lower operator exposure, due to automated processing.

- ✔ The SEG UltraCompactor produces a solid waste form with enhanced resistance to the environment. This stability provides greater assurance to the public that unexpected releases to the environment (either in transit or at the burial site) and subsidence in the burial trench will not occur.

- ✔ Less land is required for radioactive waste disposal which benefits the environment.

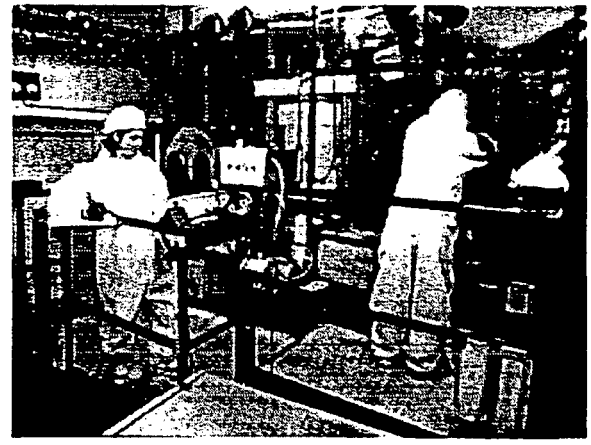
In summary, SEG UltraCompaction services have been instrumental in enabling customers to significantly reduce burial waste volumes through the years.

☞ *TRU Waste Compaction*

The SEG TRU-waste compactor is a smaller version of the UltraCompactor, with added features to address the hazards of processing TRU waste. The TRU Press is specifically constructed and licensed for the special processing and containment requirements of transuranic-contaminated dry active waste. The SEG TRU Press delivers the highest volume reduction ratios possible in the world for compacting TRU waste. SEG is the only commercial company in the United States to supercompact TRU waste.

A 520-ton hydraulic press provides the compaction force to compress waste packaged in 43-, 52-, and 55-gallon drums or 79- and 89-gallon leak-tight overpack containers. The TRU Press is computer-controlled in the same manner as the UltraCompactor, and incorporates many of the same features to ensure safe operation. The entire compactor unit is contained to preclude the spread of contamination, and negative pressure is maintained on the containment.

The TRU Press has been in operation since 1990 and is specifically dedicated to the compaction of transuranic waste. SEG has the experience of compacting over 4,000 cf of TRU waste, providing our customers with the lowest possible volume and improved container quality.



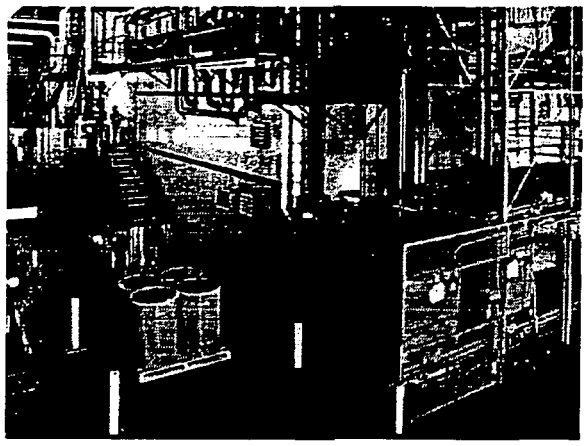
The SEG TRU Press

☞ *Incineration*

Incineration provides the highest volume reduction of low-level radioactive waste available in the radwaste processing industry. With the nation's only licensed commercial LLRW incinerator, SEG is the only processor that can provide this service. Achieving volume reductions greater than 100 to 1, SEG has offered incineration service since 1989.

The SEG incineration process has routinely produced a stabilized and environmentally safe waste form that offers a high degree of packaging flexibility for storage or disposal. In general, SEG compacts 60% of the DAW received at our facility and incinerates 40%. This allowed SEG to increase its overall volume reduction for all waste types to greater than 10 to 1 in 1992 to 12 to 1 in 1994.

The incinerator's enhanced air quality system includes features such as a three-second retention time in the secondary chamber, a waste heat boiler (quenching), bag house filtration, double HEPA filter positive particulate removal, and wet air scrubbing systems.



The SEG Incinerator

Because effluents from the incinerator are severely affected by processing items such as poly vinyl chlorides, C-14 producers, and tritium, it is important that customers work with SEG to remove such materials from their waste stream generation, or to identify them before shipment to SEG for incineration. SEG will work with the customer and with vendors to maximize these benefits by designating products that can be incinerated (for example, disposable protective clothing).

SEG also works with suppliers of disposable items to the nuclear industry to identify and mark products that are acceptable for burning through its Certified Incinerable Vendor Program. This helps increase the percentage of incinerables that can be burned in the SEG incinerator.

Since the incinerator began processing, SEG has greatly expanded the scope of material that can be successfully processed to include sludges, resins, and oily wastes, in addition to charcoal, wood, paper, and plastics.

The incinerator burns solid LLRW at the rate of 1,600 pounds per hour. SEG compacts incinerator hearth ash and solidifies fly ash to form a high density, non-dispersable solid that can be packaged for burial or for long-term, customer-site storage. This process yields an additional 2:1 volume reduction, resulting in a total volume reduction of well over 100:1 for many combustible wastes.

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SEG also plans to add ash vitrification to its list of industry-leading services. This service will bind incinerator ash into a solid glass-like waste form that will adhere to the highest levels of environmental safety. This service should be available by late 1994.

The addition of a second incinerator is planned at SEG by mid-1994. Both SEG incinerators will ultimately be licensed to process RCRA wastes. SEG has applied for and anticipates approval of its initial Part B permit to accept and process hazardous and mixed wastes by solidification and UltraCompaction. Once SEG obtains this

Part B permit, SEG will submit a second application for a Part B permit to incinerate hazardous and mixed wastes.

☞ *Oil Incineration*

The SEG waste oil incinerator (boiler) is a self-contained incineration package, complete with its own dedicated offgas scrubbing and filtering system. The oil burner can incinerate contaminated oil at the rate of 8-12 gallons per hour. Currently, the SEG oil burner processes about 60,000 gallons of oil each year.

The SEG Oil Express is the safest way to transport of oil.

The waste oil incinerator saves SEG customers burial costs and volume since oil, that once had to be solidified, can now be burned. In addition, thermal energy from burning the oil is beneficially reused to power other SEG volume reduction services.

SEG transports oil to its Oak Ridge facility in either six-drum oil bins, or the exclusive SEG Oil Express cargo container. This container will safely carry up to 2,000 gallons of contaminated oil, water or other liquids that can be incinerated. The Oil Express uses two double-walled tanks, each with a 1,000-gallon capacity, mounted inside a standard 20-foot cargo container. The Oil Express cargo container's safety features prevent pressure build up, shifting, and overfilling. SEG-supplied oil bins hold six 89-gallon overpacks (55-gallon fits inside) with catch basin and absorbent material.

☞ *Decontamination, Disposal, and Recycle Services*

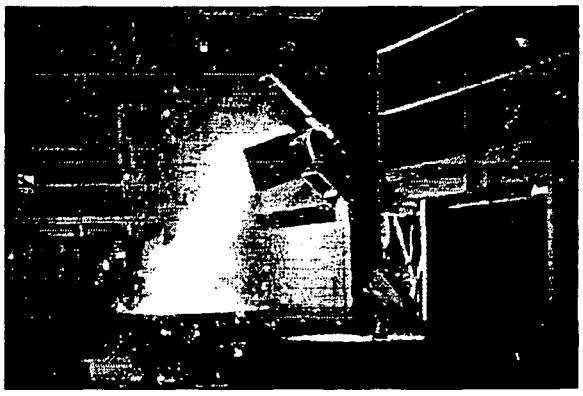
To help nuclear facilities control radwaste costs, SEG offers a multitude of effective and innovative decontamination methods that significantly reduce the total volume of non-compactable radioactive waste. SEG also uses resourceful decontamination methods for the recovery and recycling of contaminated metallic materials, such as lead. SEG decontamination facilities employ a number of innovative techniques and new approaches to waste management that can result in a net volume reduction of up to 40 to 1.

SEG has experience with a wide range of decontamination techniques. Various cleaning processes used for removing contaminants may require sequential application of several steps to reach the desired level of decontamination. The selection of the proper process depends on the applicable release criteria and the material being decontaminated. After reviewing all available techniques, SEG will recommend the most appropriate decontamination techniques to be used.

☞ *Metal Processing*

In 1992, SEG added another first to its list of innovative radwaste processing technologies with the start up of its Metal Processing Facility. This facility is the largest foundry in the western world dedicated to the processing of low-level radiologically contaminated metals.

Equipped with a 20-ton, 7,200 kilowatt induction furnace, the SEG Metal Processing Facility is the most technologically advanced metal decontamination facility in the world. This facility can process approximately 25,000,000 pounds of contaminated metals each year.



A pour at the SEG Metal Processing Facility.

SEG has always provided its customers with a safe, cost-effective service for volume reducing and disposing of all types of LLRW dry active waste. The SEG metal smelting process takes this philosophy a step further by providing a means of decontaminating, volume reducing, and beneficially reusing metals that previously could not be efficiently decontaminated or buried.

During the smelting process, the majority of the contamination is absorbed by the slag layer on top of the molten pool of metal. This contamination is removed with the slag layer. This process decontaminates the metal much more effectively than many other metal decontamination technologies available today. By combining this new process with the SEG Beneficial Reuse Program, SEG can efficiently recycle contaminated metals and produce useful products, totally eliminating the need to dispose of the base metal as radioactive waste.

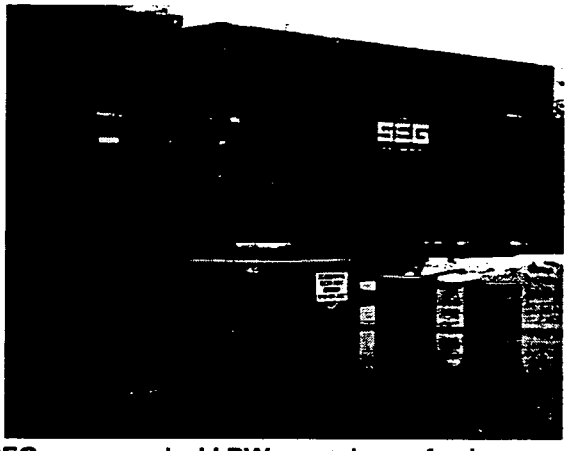
Two avenues of beneficial reuse are shield blocks for use in DOE High Energy Physics programs, and nuclear waste containers and shields for use at commercial nuclear power plants. By turning contaminated metals into useful products, SEG eliminates the need for costly burial of metal wastes. In fact, since SEG reforms the metal into products that have a resale value, the metal is not considered to be a waste by SEG. If requested by the customer, SEG takes title to the material when it arrives at the Metal Processing Facility, thereby releasing the generator from any liability associated with the processing or future use/disposal of the metal.

SEG accepts most types of surface-contaminated metals for processing through the Metal Processing Facility including carbon steel, stainless steel, copper, brass, and aluminum. All paint, coatings, and oily films are removed by burning the metal in a pre-heater before smelting. SEG can occasionally accept small quantities of slightly activated metals for processing through the facility, however, this requires prior notification and acceptance by SEG before the material is shipped to SEG.

The SEG Metal Processing Facility and Beneficial Reuse Program offer customers an inexpensive and simple method for disposing of radiologically contaminated metals. No other process can compare with the efficiency and cost effectiveness of this metal recycling program.

3.2 *SEG Leased Containers*

SEG provides customers with an extensive variety of waste containers for filling and returning to SEG as part of our complete disposal services. A vast number of boxes, drums, liners, Sea/Lands, and storage modules can be made available to SEG users. All SEG containers meet strong, tight Department of Transportation shipping requirements. (See Section 4., "Customer-Site Services," for information about purchased containers.)



SEG can supply LLRW containers for lease or purchase.

Virtually any size container, metal box, or Sea/Land container can be rented or purchased by our customers. The most common container sizes available from SEG include 55-, 79- and 89-gallon drums, 4x4x6 foot boxes, 2x4x6 foot boxes, and 8x8x20 or 8x8x40 foot Sea/Land containers. SEG inspects its Sea/Land containers before they are transported to our customers. SEG maintains the largest fleet of Sea/Land containers (more than 400) used for strong, tight LLRW containers in the nation.

SEG highly recommends boxes or larger containers over drums to increase packaging efficiency and to reduce customer packaging labor and cost. Whatever the customer's container preference, a benefit of SEG services is that waste in almost any container can be accommodated at our facilities.

3.3 *Specialty Containers*

A variety of specialty containers are available from SEG through SEG Advanced Systems in Carlsbad, NM. For example, SEG Advanced Systems fabricates chemical demilitarization containers, double-walled, foam-lined, stainless steel casks, designed to transport chemical weapons.

The TRUPACT II reusable shipping casks were fabricated at this facility and were designed to transport transuranic wastes. This cask was designed by DOE and certified by the NRC in accordance with requirements for Type B packages specified by 10 CFR 71.

The TRUPACT II cask was designed by DOE and fabricated at SEG Advanced Systems.

In the first year of operation, Advanced Systems has been awarded several government contracts valued at over $60,000,000 for the production of specialty containers for the storage and transport of

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radioactive material, chemical weapons, and disassembled nuclear weapons.

3.4 *Radwaste Transportation*

SEG operates the world's largest and most modern transportation fleet dedicated to the transport of radioactive waste materials.

SEG routinely makes over 3,000 shipments of radioactive materials each year and provides non-shielded radioactive material transportation services, as required, to support radioactive waste disposal operations for the majority of commercial nuclear power plants in the United States.

SEG tractors are equipped with satellite tracking and communications systems that allow SEG to be in constant communication with each driver and to schedule or immediately redirect equipment due to changing requirements or customer needs.

SEG regularly surveys the customer's needs to determine the most cost-effective handling methods and equipment required to properly support the customer. SEG routinely advises customers of any regulatory activity affecting radioactive waste material processing, transportation, or burial. SEG provides manuals which include detailed information concerning the handling and customer-site operation of SEG equipment and products.

3.5 *Wet Waste Processing*

The SEG Central Wet Waste Processing (CWWPF) Facility provides a number of processing methods that can be used to optimize volume reduction and to address other considerations, such as ALARA concerns. Wet wastes can be transported away from the customer's site to SEG where two plant areas have been licensed and assigned for this type of processing. The first of these sites, at the SEG Bear Creek facility, utilizes a large-capacity waste dryer for volume reduction of sludge, soils, resins, charcoal, and other wastes. Some wet wastes are also candidates for incineration at this site. The SEG Gallaher Road wet waste processing facility incorporates equipment, shielding and supplies for processing by grinding, solidification, and dewatering.

In-HIC solidification being performed at the SEG Central Wet Waste Processing Facility.

Our customers realize a number of advantages to sending wet wastes to SEG for processing as an alternative to mobile equipment or equipment installed at their site. This service saves our customers money by eliminating the labor associated with processing, training, procedure writing and approval, and equipment maintenance. Radiation exposures to utility workers are also reduced. Space at the site is conserved by eliminating equipment, consumables, and containers, if desired by the customer.

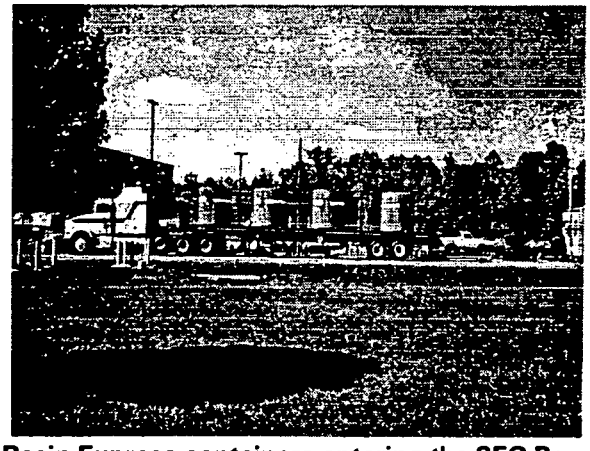
Transportation costs are minimized since empty Resin Express™ containers can be shipped to the customer's site with empty Sea/Land containers for shipment of dry

active waste (DAW); additionally, shipment of processed waste to the burial site is included in the price of processing.

3.6 *Resin Express™*

The SEG Resin Express program involves shipment of resin directly to the SEG CVRF in Oak Ridge. This program makes available to our customers all of the unique equipment SEG has to offer for processing to achieve the highest volume reduction possible.

Under this program, SEG can provide low-cost, reusable containers to transport resin to the CVRF. Once emptied, the containers are refurbished and reused. Low-level resins may be shipped unshielded or in SEG shielded casks and strong, tight containers. Such containers include the SEG Tandem Container Transport (TCT) which can accommodate two 215 cu. ft. carbon steel liners.



Resin Express containers entering the SEG Bear Creek Facility.

Processing may include drying the resins in the SEG wet waste dryer, compaction, solidification, or incineration. Volume reductions of up to 10:1 can be achieved by bead resin incineration, and up to 2:1 using the SEG UltraCompactor for powdered resins. These processing and disposal services are provided to the customer at rates that are less than the cost of burial alone. LLRW resin with activity of less than 200 mR/hr can be accepted for processing through incineration, while higher activity resin with levels of up to 100 R/hr may be accepted for processing at the SEG CWWPF by compaction, compression dewatering, and in-HIC solidification.

When resin can no longer be disposed of at commercial burial sites, SEG will process and return stabilized LLRW resins to the customer in a variety of customer-selected containers. If desired, SEG can also provide solidification for resin in HICs either at the SEG CWWPF or at the customer's site.

3.7 *Mixed Waste Processing*

SEG can provide technology that has been developed and successfully demonstrated on mixed waste projects. SEG is uniquely qualified to provide these waste processing services as its employees have extensive experience in the treatment, packaging, handling, and disposal of hazardous and radioactive materials. SEG has completed a number of customer-site projects for the packaging, removal, and shipment of radioactive and radioactive mixed wastes of various types.

SEG personnel have considerable experience in nuclear and chemical waste management, as well as the required licensing and permitting under NRC and EPA regulations. A few of the areas directly managed by or involving SEG personnel include remediation activities involving hazardous substances, management of a hazardous analytical technology development laboratory, and the management of several

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unique and involved decommissioning projects that include volatile organics, mixed wastes, RCRA-regulated wastes, and hazardous wastes.

SEG routinely performs "bench-scale" treatability tests to screen and evaluate environmental remediation technologies for RCRA-hazardous and radioactive contamination applications. SEG has direct access to treatability facilities at our Oak Ridge, TN, facility and at the Westinghouse Science and Technology Center (STC) where a complete treatability facility has been licensed through the EPA and the NRC.

SEG uses several criteria to perform extensive evaluations to select the best waste treatment technologies. Evaluation criteria include:

- ✓ waste characterization
- ✓ final waste form integrity
- ✓ volume reduction
- ✓ media costs
- ✓ system capital costs
- ✓ system operating costs
- ✓ technology risks
- ✓ rework of waste form

SEG experience in treatability includes:

- Treatability study for Martin Marietta Energy Systems, Inc., to decontaminate oil landfarm material contaminated with uranium, heavy metals, organics, and PCBs.

- Treatability study for Martin Marietta to decontaminate sediment/sludge contaminated with uranium, mercury, and other organics and heavy metals.

- Testing to verify that hazardous mixed waste fly ash from incinerator operations could be delisted by passing the EP tox test following treatment/stabilization.

- Testing to determine if electro-galvanic action would decontaminate heavy metals from soil.

3.8 *Lead Decontamination*

Lead is cleaned at the SEG CVRF through various techniques and is released for reuse in the nuclear industry after careful surveying.

The primary SEG decontamination technique is hydraulic jetting. Hydraulic jetting decontamination is performed in a large steel isolation compartment. This hydraulic jetting system features a 35,000 psi hydrolaser capable of operating with or without abrasives.

The secondary SEG decontamination technique uses multiple water pressure washing and chemical cleaning steps. The pressure wash removes bulk grit and loose surface contamination prior to the alkaline and acidic chemical cleaning steps. The alkaline step is corrosive to the thin oxide layer on lead surfaces, whereas the acidic step dissolves the remaining loosened film. The water spray and chemical decontamination system features process tanks with circulation pumps, heaters, and filtration system. The waste streams from the process solutions are ultimately concentrated to wet sludge.

Lead is decontaminated for unrestricted release in full compliance with our Radioactive Material License program, which meets all applicable requirements of

the State of Tennessee (an NRC agreement state) and other applicable rules and regulations. The secondary waste stream generated during the SEG lead decontamination process, which consists primarily of wet sludge and grit, becomes the responsibility of SEG.

Frequently, this secondary waste stream is tested as a characteristic hazardous waste due to the presence of lead. In accordance with Tennessee and EPA regulations, waste generators are allowed to accumulate hazardous waste on site without having a permit for a period not to exceed 90 days. SEG treats this sludge by solidification within the 90-day period following accumulation. The solidification process encapsulates the lead particles and subsequently removes the hazardous characteristic. Once the material is rendered nonhazardous, as determined by the Toxic Characteristic Leaching Procedure (TCLP), it is authorized for disposal at a commercial radioactive waste disposal site.

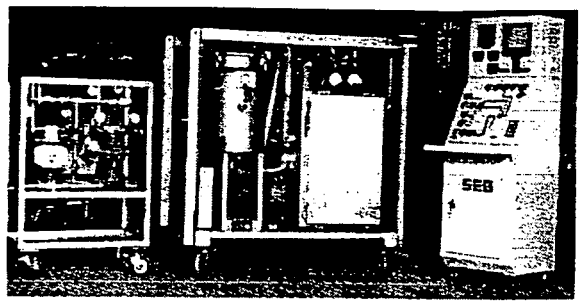
4. Customer-Site Services

SEG routinely provides a wide selection of mobile radwaste processing services to a number of radioactive waste generators. While SEG has operated as a fixed-base waste processor in Oak Ridge since 1985, the incorporation of Westinghouse Radiological Services (WRS) division provided SEG additional capabilities in customer-site radwaste processing. The following describes these services.

4.1 *Dewatering Services*

SEG provides several bead resin and filter sludge/powdered resin dewatering services. SEG provides a complete mobile dewatering system to the customer's site with dewatering liners or HICs. In addition, SEG provides operating procedures, process control program, and the services of qualified, experienced technicians.

SEG dewatering systems are designed and tested to ensure that resins or other filter media contained in HICs can be easily dewatered to less than 1.0% free water for HICs, when used as stable waste forms, and 0.5% free water for steel liners used as strong, tight containers, in accordance with NRC requirements (10 CFR 61) and burial site requirements. SEG has two NRC-approved topical reports for dewatering.



Components of mobile SEG vacuum compression dewatering equipment.

Processing Technologies

SEG has dewatered various types of radioactively contaminated waste resins, filter sludges, grit, and other filter media in HICs and carbon steel liners for utility customers.

SEG offers a broad selection of processes and containers for dewatering. The heart of the SEG dewatering processes is a patented fabric filter underdrain that efficiently dewaters all types of wet waste streams. This fabric filter underdrain system, combined with the SEG patented PressPak™ dewatering system, offers the most efficient volume reduction and shortest required processing times in the industry. This is accomplished with the use of a flexible compression membrane. SEG systems can be specifically tailored for each customer's waste streams.

The SEG Rapid Dewatering System is designed for a wide range of ion exchange and filter media waste streams, bead resin, powdered resin, and filter sludge, and most ultra-fine resin particles from ultrasonic

resin cleaners. The system is the most reliable and efficient in the industry. SEG has never failed disposal site acceptance criteria with a container processed in accordance with approved procedures. The system provides the ability to dewater all filter media expected to be generated, and provides the following advantages.

- ✓ Fastest dewatering in the industry
- ✓ Most volumetrically efficient underdrain systems available
- ✓ Redundant level-control systems
- ✓ ISOLOK™ system for remote waste sampling during transfer to process containers
- ✓ Most reliable direct dewatering verification in use
- ✓ An in-container camera for remote visual process monitoring

The SEG Compression Dewatering System (PressPak) provides complete dewatering and volume reduction for powdered resins, ground bead resins, filter media sludges, and filter aids. The service provided by SEG includes a mobile dewatering unit, dewatering HICs and/or liners, operating procedures, process control program, and the services of a qualified experienced on-site operator. All customer-site services are fully backed by an extensive SEG support staff in Oak Ridge.

The SEG PressPak system is the most effective technology available for maximizing the amount of waste placed in a container. The system offers an overall powdered resin volume reduction of up to 50 percent, depending upon the sludge mixture and processing method used.

System Components

SEG dewatering systems are small, modular systems, comprised of self-contained dewatering skids with pumps, valves, hoses, and control equipment. SEG provides quick disconnects and remote removable fill heads to minimize personnel exposure.

A remote-controlled and removable dewatering head can be employed for operations in high radiation areas that require personnel exposure controls. Remote dewatering heads are available upon request. SEG employs remote radiation monitors for monitoring resin transfers and all systems employ both resistance and in-container, remote-controlled cameras for level control.

SEG employs a skid-mounted sampling system to remotely sample the waste as it is transferred to the container for processing. SEG can also supply an optional radiation monitor to allow the operator to set a predetermined trip-point for automatic shutdown of the system. This feature minimizes the possibility of producing a container with dose rates exceeding those allowed for shipment in a specified cask.

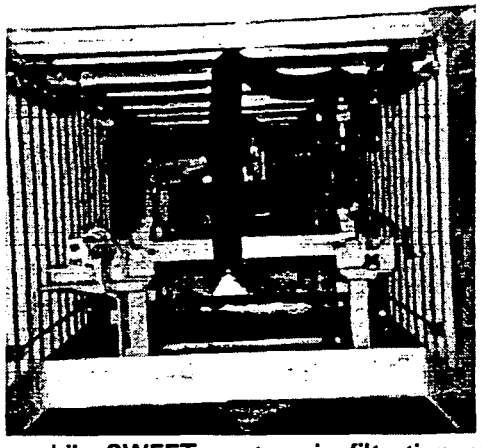
SEG maintains and supplies a variety of certified and uncertified casks for shipment of HICs or liners containing dewatered materials to burial sites. The SEG shielded transportation fleet consists of 45 casks including 10-142 Type B and Type A casks and a 3-82 Type B cask for shipment of containers with dose rates up to 1,000 R/hr. (See Section 4.6.)

4.2 *Sewage Sludge Processing*

SEG offers an all-inclusive service to process slightly contaminated plant sewage sludge. Recognizing the need to provide sewage sludge treatment and disposal services at a reasonable cost, SEG has designed and placed into operation a Sewage

Waste Extraction and Express Transportation (SWEET) Service.

SEG mobilizes its 40-foot mobile unit to your site and extracts and dewaters solids from sewage sludges (average lead time to schedule the mobile unit is only 6-8 weeks). The dewatered sludge is then transported to our CVRF to be processed/volume reduced. Finally, SEG transports the volume-reduced waste for disposal as LLRW. The SEG SWEET service is provided at a single price per gallon charge (price is based on a sliding scale, depending on the weight percent dry solids of the influents to the SWEET system).



The mobile SWEET system in filtration mode during waste container exchange.

Once at our site, the dewatered sludge can be dried and used as overfill material, dried and compacted, or incinerated. The method used is based on residue ash content, bulk density, and primary waste load factors.

SEG currently estimates that a 40:1 volume reduction (VR) of the sewage sludge can be achieved using the SWEET services (actual VR will depend on your waste composition, VR method used, etc.). The SWEET system processes waste at 20-30 gpm. SEG can provide temporary waste hold-up tanks, if needed.

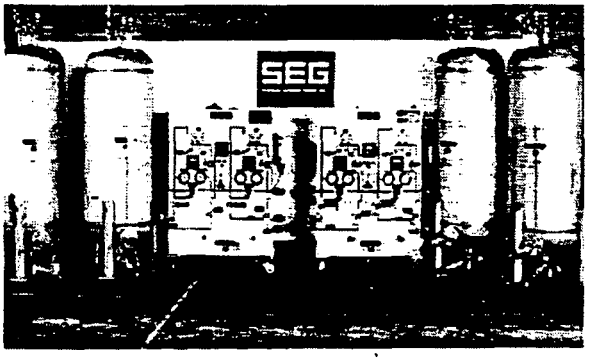
4.3 *Demineralization*

SEG provides proven demineralization systems and experienced personnel to meet your needs for the demineralization of contaminated waste waters or other liquid radwastes. SEG provides complete, mobile demineralization services called TRANSFIX™, for Transportable Filtration/Ion Exchange service. TRANSFIX is a pressurized system that uses either a disposable or sluiceable vessel.

Consider some of the benefits and experience SEG has along with our developmental capabilities to solve your liquid waste processing needs.

- The highest standards of quality in the industry
- The maximum volume reduction achievable on all by-product waste generated
- Full-time or on-demand services with lease and purchase options
- The largest technical support group in the industry
- Equipment footprint sized to space limitations
- ASME Section VIII Code stamped pressure vessels with standard sizes from 20 cf to 50 cf or larger in composite, carbon, or stainless steel
- Various types of shielding (slablead, right cylinder, concrete or water) in configurations to meet site ALARA requirements.
- Ion-specific media
- Minimization of or zero curies discharged to the site effluent stream
- Infinite logic selection for processing various liquid waste streams
- Top and bottom media and vessel sluice capabilities

The standard TRANSFIX system utilizes six reusable, stainless steel pressure vessels. Liquid radwaste from the plant's holdup tank, or other low-level radwaste sources, is pumped through the six-vessel array for processing and then to the plant's discharge holding tank.



SEG TRANSFIX™ demineralization equipment.

With the aid of SEG's exclusive Ultra Filtration technology, which in some applications virtually eliminates the use of mechanical filters, the TRANSFIX system offers the most effective colloidal particulate removal in the industry.

The design of the TRANSFIX system results in optimum resin utilization, as well as operational flexibility. The customer receives significant savings by optimizing resin throughput, maximizing the per-shipment volume of resin shipped to the burial site, and eliminating the repeated purchase of disposable vessels. The system can be lease-purchased.

SEG personnel and plant staff work closely together to develop an efficient waste processing schedule. Processing can be accomplished on either a batch or a continuous basis. The SEG technician closely monitors system decontamination factors, conductivity, and pH samples. The plant staff receives samples for isotopic analysis.

The selection of the right demineralization/ filtration service is highly dependent upon the specific waste type. SEG will work closely with the plant's engineering and operating personnel to develop the best approach. This includes the selection of the appropriate filter media and resin type(s) to be used.

4.4 *Solidification*

SEG solidification processes are recognized as some of the best offered in the industry. SEG personnel began as, and continue to be, industry leaders in mobile cement solidification offering some of the most versatile and compact equipment, the most powerful mixing systems available, and the most highly efficient process containers for packaging utility waste. For facilities with tight space requirements, SEG can offer solidification systems that require little space, and have an exceptional performance track record.

Solidification is generally used for concentrates, oils, and waste streams that are difficult to dewater, (i.e., sludges). Oil can also be handled efficiently and effectively by either incineration at SEG in Oak Ridge, or absorption for disposal.

SEG provides a complete mobile radwaste solidification service, available with either batch or bulk cement transfer systems. The service includes a mobile solidification unit, operating procedures, process control programs, and the services of qualified solidification technicians. Solidification systems are fully described in two NRC-approved topical reports available from

SEG. SEG mobile solidification equipment and trained operating personnel have consistently produced solidified waste forms that meet or exceed the requirements for burial at each of the commercial waste disposal sites.

The SEG Mobile Solidification Unit

The SEG high-capacity production Mobile Radwaste Solidification Unit is safe and easy to operate. When liners can be solidified and immediately moved to another shielded area for curing, more than 650 cubic feet of radwaste can be processed in a week. The mobile solidification unit includes all of the equipment required to solidify and dewater radwaste efficiently and safely.

Major system components include batch or bulk cement storage, cement conveying equipment, a mixing fill head, hydraulic power unit, self-contained ventilation systems, as well as remote controls, level controls, and camera for system operation. The solidification unit also has a built-in resin dewatering capability. The unit's decant system enables it to dewater filter sludge that is too fine for conventional filtration methods.

All components of the radwaste solidification system are designed, selected, and fabricated in accordance with the guidelines of NRC Regulatory Guides 1.143, 8.8 and 8.10.

Mobile, In-HIC Solidification

First to develop mobile in-container solidification systems, SEG has for over 12 years tested and introduced increasingly more versatile and powerful in-container mixing systems, while maintaining a compact and skid-mounted system. These systems facilitate processing large quantities of plant waste efficiently with minimal impact on plant operations. When processed, these large containers, or liners, are highly efficient with respect to the amount of waste contained versus the container burial volume and shipping cask size.

Recently, SEG introduced in-HIC solidification which permits solidification of resins, sludges, and concentrates in polyethylene HICs at extremely high packaging efficiencies while still achieving stability.

Grout Solidification

SEG has an encapsulation process that uses a grout formulation fully described in an NRC-approved topical report. The grout is approved at existing commercial disposal facilities as an encapsulation medium.

The radioactive waste to be encapsulated (e.g., filters, irradiated components) is placed in a process/burial container. The grout is pumped into the burial container and around the waste to encapsulate each component. This processing method is acceptable at all commercial disposal facilities and can be used in steel containers or polyethylene HICs.

Mixed Waste Stabilization and Solidification

SEG is also capable of processing mixed-waste streams at the customer's location. However, SEG has applied for a RCRA Part B license which will allow SEG to process mixed waste at its Oak Ridge facility. SEG has experience and expertise in the use of commercially available, as well as newly developed, proprietary processes. The same controls and procedures used in radioactive waste stabilization/solidification are used in mixed-waste processing.

4.5 *Containers*

SEG offers a wide selection of process, storage shipping and disposal containers to support a variety of customer needs. The flexibility of SEG containers allows many of their functions to be interchangeable.

SEG containers have a high volumetric efficiency (waste volume to burial envelope volume) and standard features to handle a variety of waste processing operations. SEG containers can be equipped for in-container solidification of all types of waste, as well as resin and filter sludge dewatering, demineralization and filtration services, and packaging and encapsulation of irradiated components, drums, and cartridge filters.

For waste processing, SEG containers can be equipped with optional internal systems to afford the user the maximum flexibility to process virtually any type and volume of waste. SEG also provides containers with special features to make plant-specific operations easier. Grapple rings, special openings, stacking features, higher pressure (or vacuum) ratings, and other requested features are available.

The following is an overview of some of the containers SEG offers.

Processing, Storage, Shipping, and Disposal Containers

▸ Barrier 55

This drum-sized, high-density polyethylene container has been qualified as a DOT Type A shipping container. The Barrier 55 is ideally suited for disposal of filters which do not require stability, i.e., contain < 1 μCi/cc total activity.

The container incorporates a full-diameter opening and a unique heat-seal closure. Its design permits the lid to be placed onto the container and heat-sealed to the container body, all accomplished remotely by the operator.

▸ RADLOK® 55 HIC

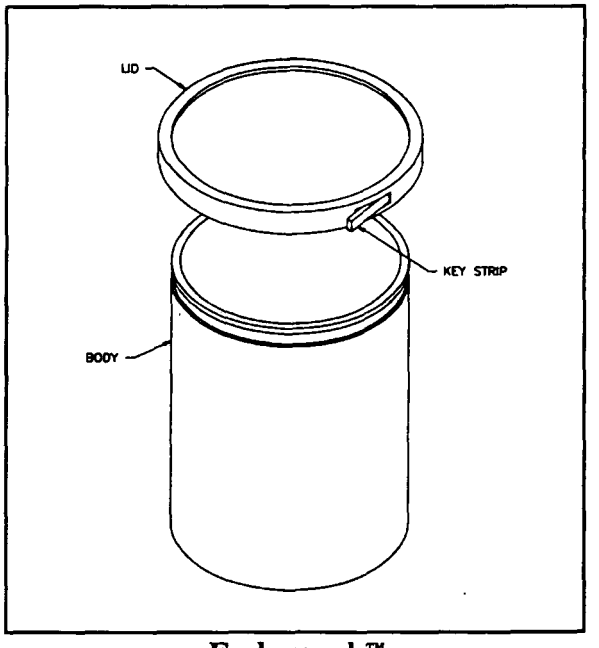
This drum-sized, high-density, polyethylene RADLOK 55 container has been qualified and approved by South Carolina DHEC as a High Integrity Container. It is primarily used for disposal of filters and resins which require stability, i.e., contain > 1 μCi/cc total activity.

The container incorporates a processing port and can be outfitted with dewatering underdrains for drying bead or powdered resins. The container is also qualified as a DOT Type A container.

▸ Enduropak™ Series

This high-density polyethylene container is a low-cost, primary waste container or drum overpack that is ideal for overpacking and for shipping compacted or non-compacted drums.

This container is certified by South Carolina DHEC as a High Integrity Container and is suitable for disposal of wastes that require stability due to total activity >1 μCi/cc. The Enduropak meets DOT Type A package requirements (IP-1, IP-2, and IP-3) and is UV light-protected which permits the container to be stored outside for many years. The Enduropak comes in three sizes (105-, 120- and 150-gallons) and is equipped with a patented quick-seal closure and has a full diameter opening.



Enduropak™

▸ Metal Box Series

The SEG metal box container is being qualified as a DOT Type A shipping container and is equipped with the SEG unique Angle-Lok™ (patent pending) closure which permits easy closure and re-opening. This container can also be equipped with a variety of options including removable legs, passive vents, shield inserts, and special coatings for long-term storage.

▸ Outerpack Series

This highly efficient steel container is normally used as an overpack for SEG UltraCompacted boxes containing metals, resins, and other compatible DAW. Waste processed by SEG is routinely placed into steel "innerpack" boxes for Ultra-Compaction. The compacted innerpack boxes are placed into this Outerpack for storage, shipment, and disposal at existing commercial burial sites. The Outerpack is currently undergoing DOT Type A qualification testing.

▸ Scrap Metal Box

This heavy walled container is designed for transport and storage of heavy objects and is routinely supplied by SEG to its customers for scrap metal shipments to the SEG Metal Processing Facility. This container has been qualified as a DOT Type A shipping container and incorporates many convenient features including swing-bolt closure and lifting lugs. This container can be equipped with a built-in access ladder and a corrosion resistant coating for long-term storage.

▸ Cargo Container Series

SEG supplies strong, tight cargo containers and will soon be able to provide DOT Type A cargo containers for the shipment and storage of bulk materials. These cargo containers incorporate many standard features including redundant door seals and cargo nets. Optional features include steel decks and removable tops.

▸ Steel Liner Series

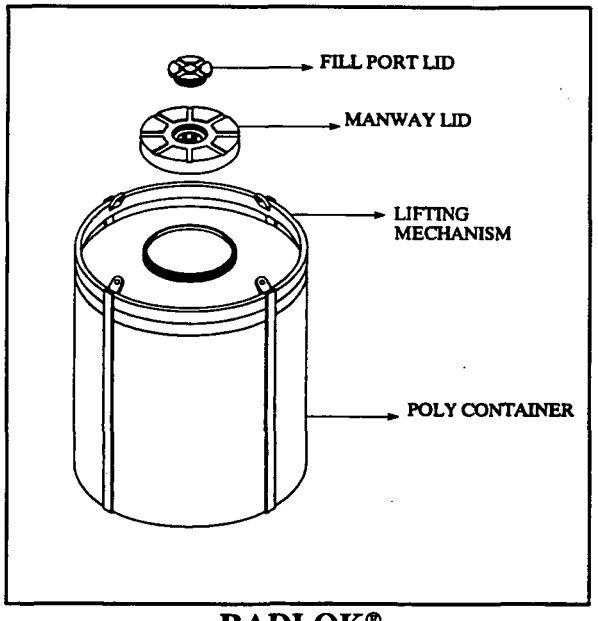
SEG provides a wide selection of steel liners for waste processing and disposal. Several designs have been qualified as DOT Type A containers with others currently qualified as

strong, tight containers undergoing Type A qualification testing. These containers are currently qualified as strong, tight containers but will soon be qualified as DOT Type A containers. These highly efficient steel liners incorporate many standard features including fill plates, processing ports, manway openings, remote closure lids, and passive vents.

Optional features include grapple rings, load tested slings, patented, high efficiency dewatering underdrains, final dewatering verification, standard or high-torque, full-diameter mixer blades, and special coatings for long-term storage.

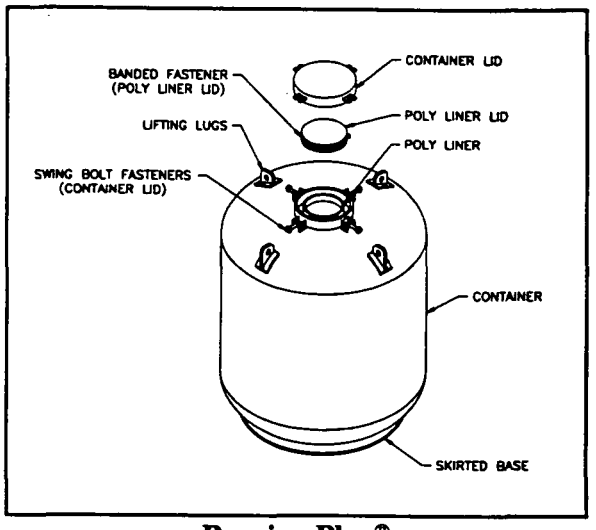
▸ RADLOK® Series

SEG provides five different large-size, high-density polyethylene containers. These containers have been qualified by South Carolina DHEC as High Integrity Containers.



RADLOK®

RADLOKS are primarily used for packaging and disposal of wastes that require stability, i.e., contain >1 μCi/cc total activity. All containers employ remotely sealable fill ports and large manway openings. These containers are equipped with basket-type lift mechanisms and passive vents, and routinely employ a fill-plate for quick disconnection of dewatering systems. Optional features include remote fill heads, grapple rings, patented, highly efficient dewatering underdrains, final dewatering verification, and disposable mixer blades for in-situ solidification of wastes.



Barrier Plus®

▸ Barrier Plus®

The SEG Barrier Plus container is an NRC-approved High Integrity Container that is constructed of a heavy stainless-steel shell with an internal polyethylene liner.

This container employs a quick closure lid and a four-point, load-tested sling lift mechanism. Optional features include a variety of highly efficient, patented dewatering underdrain systems and grapple rings for remote handling.

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▸ **Endurorok™ Series**

This low-cost transportation (Type A, IP-2 pending), storage and disposal container is made of concrete with imbedded reinforcing stainless steel fibers. The container's construction allows for the production of a low-cost, thin-wall (2-in. thick) container that is light enough to be practical for transportation and disposal of wastes yet an efficient storage shield for low-level wastes.

The Endurorok container is produced in several sizes to allow it to function as an overpack for a metal waste container, replacement for a metal waste container, or as a super-efficient overpack for compacted or incinerated waste pucks. This container is stackable and has been tested to five times the container's gross weight.

▸ **Unipak Series**

This multi-use, heavy-wall steel container is designed to be used as a process shield, storage module, Type A (IP-2) shipping container, and disposal container for medium or high level wastes.

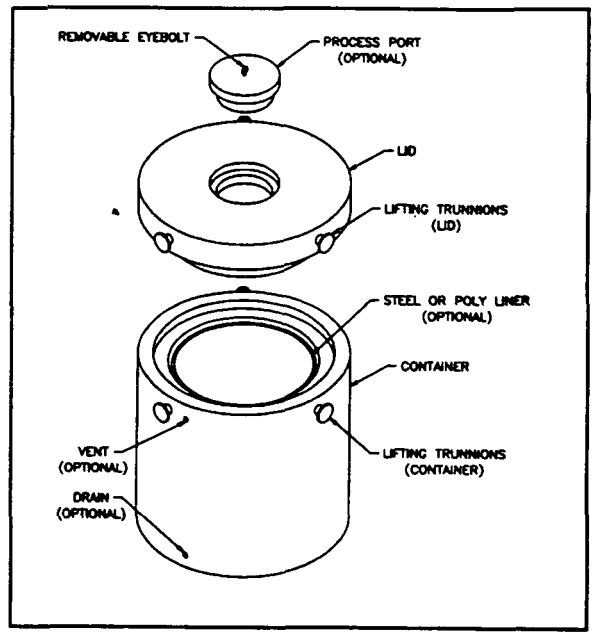
The Unipak is available in two wall thicknesses and two sizes and meets all anticipated requirements for disposal at future burial sites. The Unipak container can be fabricated from recycled metals and is available with a variety of optional features including corrosion-resistant coatings, shield inserts, polyethylene liners, processing ports, and passive vents.

The unique construction of the Unipak permits it to be used as a primary waste container when equipped with a mixer blade for solidification, or resin dewatering underdrain system, and as a processing shield, storage module, and shipping cask. This eliminates the need to purchase separate disposal containers, processing shields, storage modules and shipping casks, and reduces the users overall costs for waste packaging, storage, shipment and disposal.

Radwaste Storage Modules

▸ **Squarepak™ Series**

The Squarepak is a medium-cost, weather-resistant, steel-reinforced concrete overpack for waste metal boxes. It is sized to accommodate from one to four 90-ft^3 waste containers and may be stacked up to three high.



Ecorok™

▸ **Ecorok™ Series**

This low-cost, steel-reinforced concrete waste storage module is ideal for use as a processing shield or as a storage module for medium- or high-level wastes. The Ecorok can be supplied with steel inserts for improved shielding, and can be fabricated with an exclusive cast-in-place polyethylene lining that is bonded to the concrete sides, bottom, and top of the storage module.

▸ **Ecovault™**

This system of Ecorok-type storage modules allows for the erection of storage vaults (silos), either right circular cylinder or square-wall construction (box storage).

This concept allows for the construction of an on-site modular storage facility for low-, medium-, or high-level radioactive wastes on an as-needed basis. This low-cost system offers a wide selection of options which permit the addition of protective features for each vault that are matched to the hazards associated with each type of waste stored in each vault.

▸ **Surepak® Series**

The Surepak is a steel-reinforced concrete storage module that can be used as an on-site processing shield or as a storage module. The module is designed with hexagonal exterior walls to facilitate nesting in an array for increased shielding efficiency. The Surepak was originally designed as a burial module and incorporated the unique hexagonal shape to prevent subsidence of overburden soils that may be used to cover the burial modules.

The Surepak storage module has been extensively tested and a report is available to assist in the preparation of 10 CFR 50.59 reviews. The Surepak storage module is available in three wall thicknesses and incorporates many standard features such as labyrinth seal, stainless steel lifting hardware and neoprene weather seals. A variety of optional features are available including polyethylene liners, processing ports, sample ports, shield inserts and impermeable coatings for long-term weather protection.

4.6 *Shielded Transportation*

SEG owns and operates one of the largest, safest, and most modern fleets of trailer-mounted shielded casks and vans in the United States. Because SEG maintains a variety of transportation equipment, each radwaste shipment can be optimized to provide the client with the lowest possible overall disposal costs.

Since the SEG facility became operational in early 1986, SEG has transported over 11,000 radioactive LSA shipments with no accidents and no NRC violations.

SEG provides vehicles, casks, and other equipment free of any condition that might impair the safe transport of the radioactive waste to the final disposal facility. The equipment satisfies the safety regulations referenced in 49 CFR 177.804 and presents an appearance consistent with maintaining the public's confidence in, and the industry's commitment to, the safe transportation of radioactive waste.

With a satellite tracking system on each tractor, SEG monitors the progress of each radioactive waste shipment, from the time it is shipped until it is delivered to the disposal facility. SEG acquires and maintains all licenses, permits, etc., required for the transportation of radioactive wastes.

Transport casks arrive complete, with all hardware and materials necessary to meet the requirements for its intended use as an authorized radioactive material transportation package. These include gaskets, pallets, inserts, and rigging.

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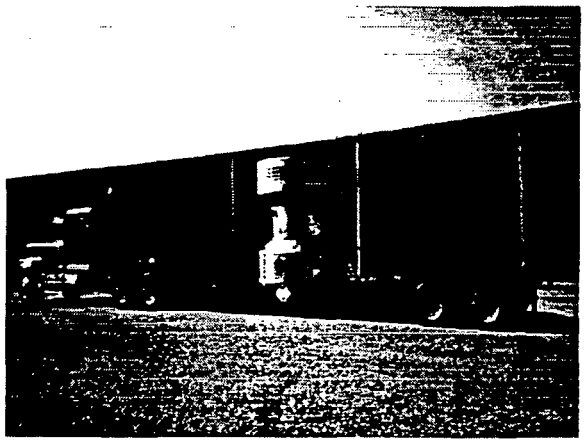
SEG provides radioactive material transportation services required to support radioactive waste disposal operations at the customer's site. These services include casks and other exclusive use transportation equipment. All casks provided by SEG are exclusively transported by our Transportation Service Company, Hittman Transport Services, Inc. Transportation service is available to licensed low-level waste burial sites and to the SEG Oak Ridge processing facility. All Type A and Type B shipping casks have an NRC-approved certificate of compliance.



SEG owns and operates one of the largest and most modern fleets of trailer-mounted shielded casks and vans in the nation.

SEG is in compliance with the ANI/MAELV Information Bulletin 88-2 and American Nuclear Standard ANSI N14.27. Drivers who pick up loads at SEG are briefed on the contents of the shipment, all documentation that accompanies the shipment, specific routes to be taken, required notification of the Highway Patrol and port-of-entry inspections points, and the call sequence to inform SEG of incidents.

SEG also provides its drivers with a "Driver Instruction Manual" that includes site-specific instructions regarding how to get to each site, customer requested shipment pick-up times and locations, customer and/or SEG shipping contact at each site and their telephone numbers, and any standing customer requirements associated with shipments of radioactive materials. These efforts ensure compliance with regulatory requirements and customer needs for professional, quality transportation services.

All SEG drivers have a minimum of five years of driving experience, have a good safety record, have a valid CDL license, and must pass DOT physical requirements. In addition, all drivers receive training in the proper packaging, labeling and transportation of radioactive materials including inspecting, receiving and documenting shipments of radioactive waste.

Each SEG driver is fully qualified in accordance with 49 CFR, and every driver carries on his person:

- Medical examination card (Per 391.3c of Motors Carrier Safety Regulations)
- Drivers certification card (391.3c certifies that the driver is fully qualified under 391 of the MCSR and certificate of road test)
- Radworker Driver Training Card. This card signifies that the driver has received sufficient training to meet DOT requirements to haul LSA materials.
- Brake Adjustment Card. This card certifies that the driver is qualified to inspect and adjust brakes.

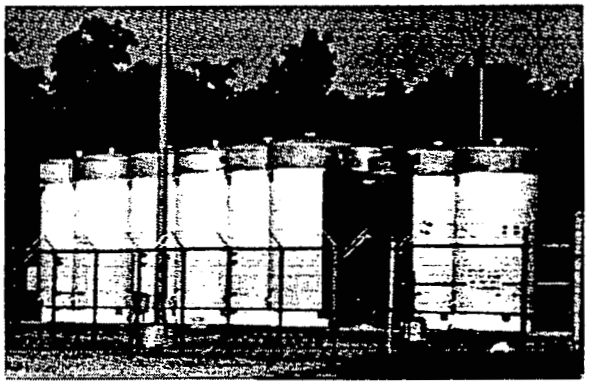
SEG employs strategically located emergency response teams in SEG service centers in Oak Ridge, Pittsburgh, PA, and Richland, WA. If necessary, SEG will use

chartered aircraft to fly teams to emergency sites. Each team is equipped with emergency response kits, which consist of survey instruments, signs, barrier ropes, and other safety-related equipment and materials.

SEG can provide, on an as-needed basis, qualified personnel to perform all brokerage services associated with radioactive material shipments.

4.7 *Spent Fuel Storage*

SEG offers several specialized casks for customer-site dry storage of spent fuel through its Independent Spent Fuel Storage Installation (ISFSI) service. This service includes shipment of the casks to the customer site, as well as auxiliary equipment such as lifting yoke, leak testing, vacuum drying, and a transporter for movement of the casks on site.



The MC-10 cask is a certified, proven alternative to concrete.

SEG can furnish procedures tailored to your plant operations, licensing support, and public information programs. SEG can also design and manage the construction of the storage facility, including concrete storage pads, lighting, and security system.

The SEG ISFSI service includes the Westinghouse-designed MC-10 cask which has been certified for use under a general license per Subpart K of 10 CFR 72 and is a viable, technically proven alternative to concrete systems. And they are easy to use. Once the fuel is loaded into the cask in the spent fuel pool or adjacent cask loading area, and the cask is decontaminated, it is simply transferred to the storage site where it remains for as long as needed. There are no other system-to-system transfers required.

SEG has also developed individual metal cask designs for dry storage of fuel from Russian-designed reactors, as well as cask systems for dry storage of other special fuels.

4.8 *Soil Washing Technology*

SEG offers on-site, comprehensive soil cleanup services for remediation of sites that have soils contaminated with radionuclides, heavy metals, organics, or mixed wastes. These services include soil evaluation and treatability testing, pilot-scale demonstrations, full-scale soil processing with our mobile systems, and a full range of disposal services for concentrated waste extracted from the soil.

A direct advantage of the SEG Soil Washing System is the minimization of the waste volume using chemical extraction. This minimization results in smaller quantities of waste for ultimate disposal, hence, lower total remediation costs. The system minimizes waste streams by treating and reusing the extraction solution, dewatering the solids, and recovering, or concentrating, the contaminants in a significantly reduced volume of soil.

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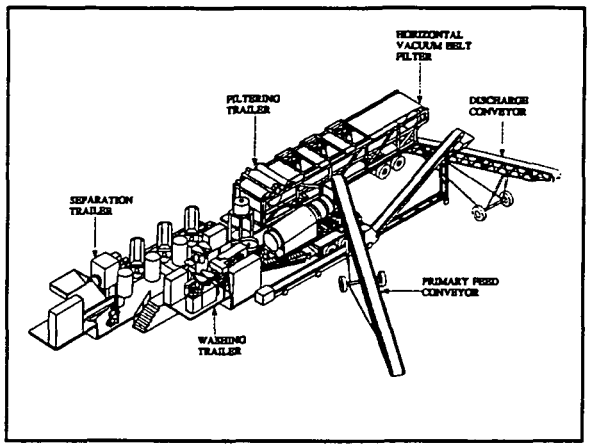


Isometric drawing of the mobile soil washing system.

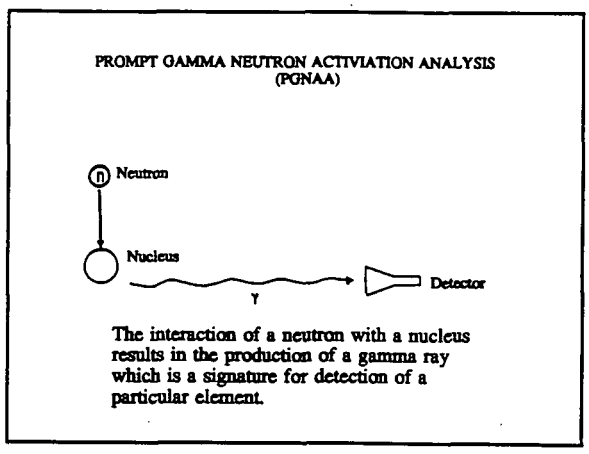
SEG soil remediation services offer many other important benefits.

- Free-release of treated soil
- Cleaned soil supports vegetation growth
- Quick site remediation with a capacity of 20 tons per hour
- In some cases, concentrated metals removed from soil can be sold as usable products
- Capable of separating certain mixed wastes into radioactive and hazardous compounds
- Four units ranging in size from one to 20 tons per hour which can be tailored to the client's needs

4.9 *In Situ Contaminant Analysis*

The SEG N-SCAN™ system is a non-intrusive assay tool capable of detecting pre-selected hazardous and radioactive target contaminants several feet below the surface of, or within, the object being assayed (depth is dependent upon the contaminant and the density of material being assayed).

The N-Scan process utilizes a technology called Prompt Gamma Neutron Activation Analysis (PGNAA). This technology has already been demonstrated on a limited scale. The SEG Nuclear Waste Technology Department (NWT), in conjunction with the Westinghouse Science and Technology Center, has developed methods of applying the PGNAA process to the long-standing market need for in-situ, real-time, identification and quantification of subsurface contaminants. In 1992, SEG/NWT demonstrated an application of PGNAA in-situ detection of uranium in soil in the laboratory and at a uranium mine site in Bruni, Texas.



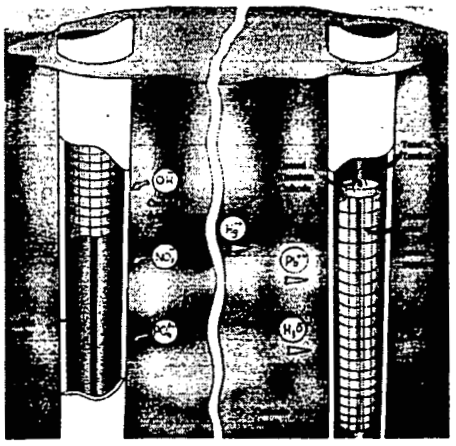
This demonstration revealed that the SEG N-Scan service provides several advantages over existing site survey techniques. These advantages include:

- Simultaneous, subsurface, multi-contaminant, on-site assay
- Analysis results available in minutes
- Per point costs lower than conventional laboratory analysis
- Reduced worker exposure to toxic and radioactive contamination
- No sample collection, shipping, or disposal costs

The list of contaminants which can be detected by the PGNAA process currently includes uranium, chlorine, mercury, chromium, and thorium, and is being expanded to include arsenic, barium, cadmium, lead, radium, cesium, plutonium, copper, technetium, neptunium, and americium.

4.10 *Electrokinetic Soil Remediation*

SEG has developed a patented technology called ELECTROSORB™ for removing unwanted environmental contamination from soil and water using either in situ or ex situ processing.



Electrode array and electrokinetic transport in soil.

This soil decontamination process involves the use of an electrode fence with an SEG proprietary sleeve around each electrode making up the fence. An electrical current is applied to the electrodes as a driving fluid (lixiviant) is injected into the soil to be decontaminated. The electrical charge causes contaminants to be ionized and to migrate to the cathode or anode where they are absorbed by the sleeves. Sleeves are periodically removed for UltraCompaction and disposal. This process is effective for the removal of a variety of radiological and hazardous species from soils.

Key elements of the SEG proprietary ELECTROSORB technology include the following.

- ELECTROSORB combines electrokinetic and electroosmotic phenomena to address charged metallic species, uncharged species, and hazardous organics that may be present.
- The electrokinetic fence ensures that all processing materials (lixiviants, purges, and carriers) are confined and that no release of materials can occur.
- The use of proprietary, biodegradable, charged extractants/carriers to mobilize contaminants bound to the soil ensures that added reagents are contained by the electrokinetic fence and that difficult-to-mobilize materials can be removed from the soils.
- The system Host-Receptor Matrix aids contaminant entrapment and extraction from the site while overcoming the cathodic precipitation phenomena that cripple most other electrochemical approaches.

The combination of mechanisms noted above allows ELECTROSORB to attack and remove both ionic and non-charged species. By modifying the ELECTROSORB operating conditions, SEG can selectively separate the hazardous and radioactive contaminants to minimize waste and prevent the formation of mixed waste fractions.

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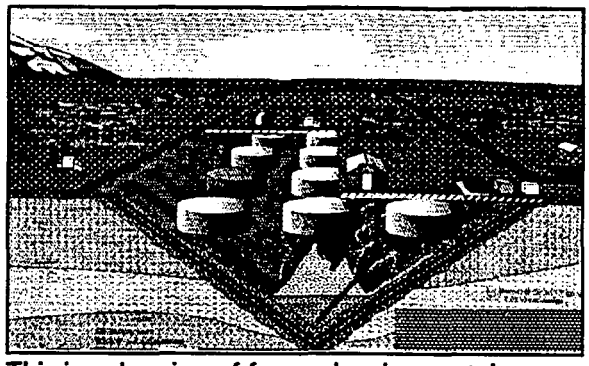
4.11 *Ground Water Containment*

Through a teaming agreement with RKK, Ltd., SEG provides a patented technology called CRYOCELL™ for containing radioactive and hazardous waste by means of subsurface cryogenic barriers. The use of frozen barriers in the earth is an established civil engineering application. In particular, ground freezing is used in coal mines to block water flow (where the water is contaminated with organics), shaft and tunnel construction, and in the Arctic to provide structural foundations.

Some cost-effective advantages to the frozen barrier process include:

- ✓ Effective containment of radioactive and hazardous wastes. The diffusion rate through the frozen barrier is below the detectable level for 10,000 years.
- ✓ Prevents leaching of contaminants into nearby streams, rivers, and aquifers. The barrier's integrity can be easily tested and measured.
- ✓ Meets RCRA Part B requirements for double containment.
- ✓ Cost-competitive with grout, slurry walls, etc., in the long term



This is a drawing of frozen barrier containment, characterization, and remediation at the Hanford site showing the vee-shaped barrier.

5. Rad. Engineering and Decommissioning Svcs.

SEG has established a group of highly qualified individuals dedicated solely to Radiological Engineering and Decommissioning Services (RE&DS). The RE&DS group is based in Oak Ridge and is currently involved with several decommissioning and remediation contracts, including the decontamination and decommissioning of the first large commercial nuclear power plant (Fort. St. Vrain Nuclear Generating Station) to undergo complete decommissioning.

Decontamination & Decommissioning

The SEG RE&DS group provides a strong combination of talent, knowledge and experience to identify needs and to develop efficient, effective project plans to address decontamination and decommissioning (D&D) issues with minimum impact on the customer's manpower and resources.

SEG has extensive experience and expertise in D&D of nuclear facilities encompassing a broad spectrum of specialties, such as site characterization, plan development, health physics, radiation monitoring, contamination control, shielding, hazardous materials handling, environmental impact, licensing, special equipment design, soil decontamination, special nuclear material (SNM) handling, and radioactive waste packaging, transportation, and disposal. SEG experience in nuclear decontamination ranges from design engineering and planning for decontamination, to actual decontamination, dismantling, and decommissioning activities for nuclear facilities.

Unique, multi-functional monitoring equipment, coupled with proprietary data management software, has been developed to minimize human error and improve efficiency in the performance of facility characterization surveys.

SEG full-scope decommissioning services include the following specialty areas.

Project management
Personnel
Licensing and other services
Waste management services
Radiation protection
Survey design and controls
Instrumentation
Final release surveys
Quality assurance

Radiological Engineering & Health Physics Support

SEG provides radiological engineering and health physics support services tailored to meet the special needs of each customer. A broad range of personnel gives SEG the flexibility to creatively and effectively respond to each challenge.

Quick mobilization, competitive pricing, stability, and quality have contributed to the SEG reputation for providing premier

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services. Even when the customer need is for only one professional, that professional is backed by the total resources of SEG.

Professional Certifications

As the largest radiological engineering group in the U.S., SEG RE&DS has more than 150 engineers, consultants, technicians, and others, many with advanced degrees. In addition, the staff holds many professional certifications and designations including:

- Certified Health Physicist (CHP),
- Certified Safety Professional (CSP),
- Professional Engineer (P.E.),
- National Registry of Radiation Protection Technologists (NRRPT)
- American National Standards Institute 3.1 (ANSI 3.1)
- OSHA Hazardous Material Handling (HAZMAT), and
- Quality Assurance Inspector.

SEG provides a full range of comprehensive radiological engineering and health physics services that include:

- Radiation protection program development and implementation, assessments and upgrades
- System engineering for radiological concerns
- Procedure analysis and preparation
- ALARA program review and preparation
- Staff augmentation
- Technical oversight
- Licensing support
- Operational readiness evaluations

These services can be used to evaluate, institute, develop, and improve existing radiological control programs or can be used to develop and implement entirely new radiological programs. SEG provides a flexible organization of staff members which can be deployed on an as-needed basis.

Technical Training

A professional staff with a diversity of radiological and non-radiological expertise provides the industry with the highest quality educational and application training programs. SEG will incorporate operational experience in all aspects of these programs, and make them relevant to the specific needs of the customer.

With extensive experience in the development, implementation, presentation, assessment, and management of training programs, SEG Training Services can even customize a training program. Professionals with a wide range of experience in such areas as internal and external dosimetry, ALARA, emergency planning, radiation protection, radiochemistry, HAZMAT, industrial hygiene, and decommissioning are guided by a staff of training professionals to create a program with a focus on application, and a format that is acceptable to current industry training protocols.

Standard Course Summary

SEG currently offers a selection of developed courses at pre-scheduled times throughout the year. These and other short courses are also available at customer sites.

Programs are available in the following areas:

- National Registry of Radiation Protection Technology (NRRPT) Exam Review, including optional review of fundamentals
- Internal dosimetry applications
- External dosimetry techniques
- Gamma spectroscopy fundamentals
- Advanced gamma spectroscopy applications
- Radiochemistry technician training
- Radiation protection fundamentals
- Industrial hygiene for health physicists
- Emergency planning
- OSHA emergency response to hazardous substance release (24- and 8-hour)
- OSHA hazardous waste operations (40-hour, 24-hour TSDF, 8-hour refresher and 8-hour supervisor courses)
- Environmental monitoring and assessment
- Reactor water chemistry
- 10 CFR 20 update for radiation protection and health physics technicians
- Radwaste minimization
- Radwaste shipping

Waste Management Consultation

The SEG mission has always been to provide the industry with low-level radioactive waste (LLRW) processing that minimizes customer costs for disposal, while improving final waste form stability. SEG has extensive experience in identifying, managing and solving industry's waste problems and has become a world leader in these relief efforts.

Identifying specifics and finding solutions to each individual waste element takes experienced professionals schooled in waste minimization, as well as disposal. SEG waste management consultation will assist in the programmatic development of a phased plan to address and implement each customer's unique set of problems. SEG has performed waste management consulting projects, which have not only been successful in alleviating waste problems, but have also exceeded customers' expectations.

SEG has directly participated in the development of many current technologies that have been implemented for treatment of radioactive waste and mixed waste. In addition, contributions in waste stream evaluation, characterization, minimization, and volume reduction through innovative processing techniques have led to unprecedented volume reduction factors. This has saved millions of dollars and valuable disposal space.

Programs for waste management available from SEG include, but are not limited to:

- Assessment of the radioactive waste program
- Recommendations for efficient use of resources
- Volume reduction programs and implementation
- Waste segregation programs and implementation
- Training for all programs

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Emergency Planning Consultation

SEG Emergency Planning is provided by a highly trained, professional staff organized and managed by personnel with experience in the Nuclear Regulatory Commission (NRC), Federal Emergency Management Agency (FEMA), and hazard planning.

SEG provides emergency planning activities that include:

- Hazard assessment
- Emergency action level assessment
- Site item reportability and issue management
- Emergency response training
- Emergency plan/procedure development
- Emergency training exercises (planning, instruction, and execution) and evaluations
- Mobilization of SEG Emergency Response Teams

In addition, SEG will provide overall project planning, project management, document control, accounting, and quality assurance as necessary for a comprehensive, total emergency preparedness program.

SEG has provided various emergency planning programs to nuclear-related and non-nuclear customers, municipal governments, regulatory agencies, DOE sites, and commercial nuclear facilities including the following selected recent sample projects.

Radiological Program Assessments

With a reputation for performing high quality program assessments, SEG provides root cause determinations, which are factual, to the point, and are readily understood and accepted by management and regulatory agencies.

Radiation Protection Program upgrades, including the revised 10 CFR 20 and readiness reviews for its implementation, are integral parts of SEG services.

Nuclear Regulatory Commission licensees are now required under the revised 10 CFR 20 to perform annual assessments of their Radiological Protection Program. In many cases, these assessments, and the performance improvements developed from them, have formed the basis for NRC permission for continued operation, or have provided an acceptable response to confirmatory action orders. In several cases, NRC power reactor licensees have improved performance from the lowest to the highest NRC Systematic Appraisal of License Performance rating within a two-year period.

Much of this success can be attributed to the special combination of talents and backgrounds of SEG staff. Many have held management or supervisory positions with the NRC, DOE, major nuclear utilities, or governmental agencies.

Assessment teams are, therefore, assembled with individual members who have a balance of regulatory, commercial, and government experience, as well as specialized technical training and certification including certified health physicists. This unique combination assures that the assessment team will objectively consider all aspects and viewpoints relating to the program being reviewed.

Process Methodology

SEG has developed a proven and effective basis for conducting program assessments. Based upon Management Oversight and Risk Tree (MORT) methodology and input from DOE, NRC and INPO, performance of a comprehensive analysis of the entire program is ensured.

Although originally developed to conduct accident/incident investigations, SEG has adapted the MORT methodology as an effective program assessment tool. SEG has used this methodology extensively to perform a variety of assessments including:

- Radiological protection
- Chemistry
- Radioactive waste management
- Emergency preparedness
- Special nuclear material control
- Occupational safety and health (OSH) programs
- Health physics

In addition to the mandatory elements of a program that ensure compliance with applicable codes and requirements, SEG assessment includes elements such as staffing, resources, budget, management support and commitment, and communication effectiveness.

Program improvement recommendations are included as necessary. If requested, a program improvement plan and assistance in implementation of recommendations can be provided.

Hazardous/Mixed Waste Facility Remediation

Extensive experience in licensing and permitting requirements, as well as in hazardous and mixed waste processing, makes SEG unique in the hazardous and mixed waste facilities remediation field. SEG has the personnel to provide technical expertise, total task management, and turn-key services for regulatory compliance, safety, testing, treatment, transport and disposal of mixed and hazardous wastes. In addition, SEG can determine the most cost-effective options for resolving a variety of hazardous or mixed waste problems.

SEG hazardous/mixed waste facility remediation includes the following.

- Fast response team experienced with hazardous and mixed waste problems
- Project management
- Technical oversight
- Regulatory reporting
- Safety and isolation recommendations
- Permit application and licensing assistance
- Site characterization
- Waste management planning
- Waste sampling with TCLP and radiological analyses
- Environmental impact evaluation
- Bench scale waste treatability testing
- Site remediation plan development
- Hazardous materials handling
- Specialty equipment and instrument design
- Waste processing including soil decontamination

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UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION

7590 Form 5 Panel 02

HAZARDOUS MATERIALS CERTIFICATE OF REGISTRATION

Registrant: Scientific Ecology Group Seg
Attn: H W Arrowsmith
PO Box 2530 1560 Bear Creek Rd.
Oak Ridge, TN 37830

This certifies that the registrant is registered with the U.S. Department of Transportation as required by 49 CFR Part 107, Subpart G.

This certificate is issued under the authority of Section 106(c)(1) of the Hazardous Materials Transportation Act, 49 App. U.S.C. 1801, et sec. It is unlawful to alter or falsify this document.

Reg. No: 090992 500 014 Issued: 09/10/92 Expires: 06/30/93

Recordkeeping Requirements for the Registration Program

The following must be maintained at the principal place of business for a period of three years from the date of issuance of this Certificate of Registration:

(1) A copy of the registration statement filed with RSPA;
(2) A copy of the check, money order, or credit card billing statement showing payment of the registration and processing fee; and
(3) This Certificate of Registration.

Each person subject to the registration requirement must furnish that person's Certificate of Registration (or a copy) and all other records and information pertaining to the information contained in the registration statement to an authorized representative or special agent of the U.S. Department of Transportation upon request.

Each motor carrier (private or for-hire) subject to the registration requirement must keep a copy of that carrier's current Certificate of Registration or another document bearing the registration number identified as the "U.S. DOT Hazmat Reg. No." in each truck and truck tractor (trailers and semi-trailers not included) used to transport hazardous materials subject to the registration requirement. The Certificate of Registration or document bearing the registration number must be made available, upon request, to enforcement personnel.

For information, contact the Hazardous Materials Registration Manager, DHM-60 Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street, SW, Washington, DC 20590, telephone (202)366-4109.

SCIENTIFIC ECOLOGY GROUP, INC.
Radworker Driver Training
Certification Card

Name: _____

S S# _____

[ ] Initial [ ] Requalification

Training Location:

[ ] Oak Ridge, TN

[ ] Madison, PA

[ ] Spartanburg, SC

Pix
Area

Training Date: _____ Exp. Date _____

Instructor: _____

This is to certify, the named driver has successfully completed training and has passed an examination for the transportation of Radioactive Materials.

Instructor's Address:

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830

DRIVER TRAINING SUMMARY

Much care is taken in selecting SEG drivers. The driver must have five (5) years driving experience, and a safe driving record with no chargeable accidents within the past three (3) years. During the interview, they must demonstrate a basic knowledge of hazardous materials per DOT Regulations, as well as a degree of personal maturity and responsibility. The minimum age required is 26.

Driver training at SEG includes initial training and an annual re-qualification training. Initial training covers the areas of radiation protection, DOT regulations, HRCQ paperwork and cask inspection, radiation basics, DOT radiation limits and emergency response procedures.

The initial training begins with an introduction to basic radiation protection, starting with a fundamental concept of atomic structure. Our drivers gain an understanding of the nature and design of an atom. They learn about the make-up of the nucleus and what it means to have an isotope that is unstable and radioactive. They are familiarized with the four (4) types of radiation and which represent an external and internal hazard. They learn which types of radiation has high penetrating capabilities and which ones do not. They learn and understand the difference between radiation and contamination. A Rem is not a foreign term to an SEG driver. He understands the biological effects of varying exposure levels and knows about dose versus effect relationships. He realizes that he is the one responsible for keeping his own exposure to a minimum and understands full-well the concept of ALARA and how to implement it. Our drivers are introduced to instrumentation, such that he is competent in reading a detector. The driver must pass an exam on radiation principles upon completion of this segment.

The SEG driver is capable of coping with an emergency situation because he is well trained in emergency response procedures. He is taught the "SWIMS" concept and how to protect himself and the public from possible harm in case of a spill. He is instructed in the use of his emergency response kit. He knows how to contact the appropriate personnel in the event of an accident. We differentiate between a major and a minor incident and teach the appropriate response to each. We stress where emergency procedures can always be found within the shipping paperwork.

Our drivers are trained to become familiar with the portions of CFR's that pertain to their job. Namely, Title 49 Hazardous Material Handling, 10 CFR 20 on administrative dose limits, and 10 CFR 19 on worker's rights and responsibilities.

Specifically, drivers are taught what the DOT vehicle and package radiation limits are. They are taught how to handle delicate situations where the dose limits at the customer's site may be excessive. They become familiar with when and how placards are displayed on the vehicle legally. They learn the difference between a label and a placard, and the difference between White I, Yellow II and Yellow III labels.

Select drivers receive and are qualified as HRCQ drivers. He is reviewed on 49 CFR 177.825, which covers policy governing the safe and proper shipment of HRCQ. He must understand what constitute a highway route control quantity and what this implies in terms of special

placarding, routing, timing of his travels through populated areas, interfacing with authorities, and reporting of deviations from the route plan to proper personnel. Another exam is administered upon completion of this section.

Each driver must become familiar with the various types of casks in use at SEG. He is taught how to inspect them before shipment, how to be alert to any potential problems associated with faulty components, improper tie-downs, proper labeling, etc. Specifically, he is taught to visually inspect the rain cover for tears, the security seals for breakage, the rachet binders for tightness, cables for fraying, proper position of pins, correct displaying of placards and labels, etc. He is also acquainted with the leak test equipment and how to check for calibration dates on the meter. He is taught to be alert to any potential problems associated with the flat, such as tire tread, damaged mud flaps, leaking wheel seal, etc.

Radiation work re-qualification, cask shipments, and emergency response are three subjects which are covered annually in a re-qualification program that each driver must attend. The day-long program is extremely thorough and concludes with a written exam which the drivers are required to pass.

Before an SEG driver begins driving, he must become familiar with the paperwork connected with his job. This involves learning how to keep logs properly, and how to fill out forms used at the burial sites and various power plants. He is instructed on how to interface with the customer. It is emphasized that he is a representative of SEG and should project a positive image of the company.

Last, but not certainly least, is the road test. The prospective driver is required to drive his vehicle with an SEG representative in the cab. He is asked to perform several maneuvers which would enable SEG to evaluate his truck handling capabilities.

A variety of controls have been instituted to facilitate timely service, while at the same time ensuring drivers do not compromise safety. One of these controls is the use of satellite communications and tracking devices. With these systems the exact location of units will always be known as well as the ability to have on line, communications with all drivers regardless of location. The SEG driver is well-versed in this systems operations.. SEG drivers receive training in a number of vital areas, critical to the safe transporting of radioactive waste. We take the education of our drivers very seriously. The goals and objectives of each session are designed to qualify our drivers to be among the most knowledgeable and hence, the most responsible and safest haulers of radioactive waste on the road today.

Next 66 Pages Redacted

Contains Proprietary Information

The commitment of SEG's subcontractors for the Plant 7 Steel Recycling Project is indicated by their submittals of price quotes. These price quotes served as the basis for our Volume 2 - Cost/Price Proposal. Documentation of those quotes will be provided to FERMCO upon request.

7590

FILE COPY

CITY OF
OAK RIDGE

POST OFFICE BOX 1 • OAK RIDGE, TENNESSEE 37831-0001

January 26, 1993

Mr. Walt Hipsher,
Vice President of
Regulatory Services & Transportation
SCIENTIFIC ECOLOGY GROUP (SEG)
1560 ~~1650~~ Bear Creek Road
Oak Ridge, TN 37830

Dear Walt:

We acknowledge receipt of your application for the Discharge Permit to the Oak Ridge Wastewater Collection System. We are currently in the process of re-establishing parameters as a result of an overall system wide study. The work is anticipated to be finished within the next few weeks and as a result we will be meeting with all potential radionuclide dischargers. Your current discharge permit will continue in force until April 1993.

If you have questions concerning this permit extension, please feel free to call me.

Respectfully yours,

Jack Robinson, Jr.
Wastewater Operations Superintendent

JR/pr

cc: Jim Goodpasture
Robert Keys

CITY OF
OAK RIDGE

POST OFFICE BOX 1 • OAK RIDGE, TENNESSEE 37831-0001

December 10, 1990

Jennifer L. Brown
Industrial Hygiene and
Safety Manager
Scientific Ecology Group, Inc.
P.O. Box 2530
Oak Ridge, Tennessee 37831-2530

RE: Modification To Permit #16-90

Dear Ms. Brown,

I appreciate receiving your pretreatment program information. The Industrial User Monitoring Form should be in appendix B, under tab #5 of the Industrial And Commercial Waste Water Discharge Permit Information Booklet we sent you.

S.E.G. is not required to monitor for pollutants in section 2.2, Table 2 unless the S.E.G. process changes to reflect a release of pollutants listed in this table.

Section 2.1.9 does read 6 to 9 ph, and I see no reason at this time for permit #16-90 to read 6 to 8 ph.

Please modify Table 1, page 16, of permit #16-90 to read as follows:

1. Under parameters:
   ph - Sample Frequency — Once per batch
   Sample Type — Keep a record of each release

2. Under Notes:
   Item #4 Water records will be verified by item #11 of the S.E.G. Pretreatment Program Guidelines.

If you have any questions concerning the Industrial Pretreatment Program please call me at 482-8342.

Respectfully Yours,

Jack Robinson, Jr.
Waste Water Operations
Superintendent

7590

SCIENTIFIC ECOLOGY GROUP, INC.

November 15, 1990

Jack Robinson
Pretreatment Coordinator
City of Oak Ridge Public Works
P.O. Box 1
Oak Ridge, TN 37830

Dear Mr. Robinson:

Attached is Scientific Ecology Group's POTW Pretreatment Program. In compliance with your requirements, a manhole has been made available for sampling.

Please send me a copy of the "Industrial User Monitoring Form" for quarterly reporting requirements.

If you have any comments or questions concerning SEG's Pretreatment Program, contact me or Robert Key at 481-0222.

Sincerely,

Jennifer L. Brown

Jennifer L. Brown
Industrial Hygiene and Safety Manager

cc: Jack Suggs

MEMO-90-124R

cc: Walt Hipsher
George Quinn
Robert Key

000199

P.O. Box 2530 1560 Bear Creek Rd. Oak Ridge, Tennessee 37831-2530 (615) 481-0222

SCIENTIFIC ECOLOGY GROUP'S PRETREATMENT PROGRAM

The guidelines for release of boiler blowdown waste water from the incinerator are detailed below.

1. Fill holding tank(s) to the top of sight glass (515 gallons at this level).

2. Sparge tank(s) with compressed air for a minimum of 30 minutes.

3. Pull sample and check pH.

4. Adjust pH level to between 6 and 8.

5. After completing steps 1 through 4 fill in Data Section on Boiler Water Holding Tank Discharge (BWHTD) Form. (See attached sample form)

6. Pull 500 ml sample to be analyzed by the lab for radionuclides and pH.

7. After the sample has been analyzed, and approval is given for free release, per HP Procedure 5.7, management will fill in the Approval Section of the BWHTD Form.

8. At this time, release of water can begin. Align valves and engage pump operation.

9. Water will pass through a 15 micron filter to keep total suspended solids (TSS) below 200 ppm.

10. Fill in the Release Started Section of the BWHTD Form.

11. Verify flow rate of water released. Take beginning gallons and subtract exiting gallons over a period of time (minimum of one hour). Adjust rate to sixty gallons per hour.

12. When release is complete fill in Release Complete Section of BWHTD Form.

All documentation, Boiler Water Holding Tank Discharge Forms, Free Release Approval Forms, and Lab Analysis is maintained by the Incinerator Manager, the Health Physics Department, or SEG's Lab.

SAMPLING REQUIREMENTS

Quarterly
Quarterly samples will consist of three samples collected in a two week period. TSS, D.O., and BOD will be sampled in November, December, and January and quarterly after January. D.O. will be sampled before release. A sample for TSS and BOD will be taken from the manhole at the outfall of the sewer.

Continuous
pH will be sampled before the waste water holding tank is released to the sewer system. The flow rate will be measured as stated in step 11. During the 8th through the 25th of October SEG released 6677 gallons of waste water at an average of rate of .8 gallons per minutes. SEG we like to use the method for determining flow rate as stated in step 11.

REPORTING REQUIREMENTS

If analysis indicated that the permit has been violated, SEG will:

- Within 24 hours inform the POTW of the violation; and
- Resample within 10 days and submit in writing the results of the new analysis within 30 days.

A summary of the monitoring results will be submitted quarterly starting January 10, 1990.

BOILER WATER HOLDING TANK DISCHARGE

DATA						APPROVAL			RELEASE STARTED				RELEASE COMPLETE			
TK. NO.	BARCODE	DATE FILL.	BEG pH	ADJ pH	TOT GAL	SAMPLE NO.	DATE APP.	MGR IN	TIME	DATE	OP IN	HP IN	TIME	DATE	OP IN	HP IN

0002020

Permit Number: 16-90
Permit Type: SN

Industrial and Commercial User
Waste Water Discharge Permit

In accordance with the provisions of the City of Oak Ridge Sewer Use Ordinance, City Ordinance Number 21-82 ;

Scientific Ecology Group
1650 Bear Creek Road
Oak Ridge, TN 37830

(name and address of IU)

herein referred to as the User, being an Industrial User, is hereby authorized to discharge waste water from a facility described as:

1650 Bear Creek Road

(name and address of facility)

in so far as such facility and waste water have been described in the incorporated Industrial User Survey and Waste Water Discharge Permit Application; subject to the conditions of this permit, the Sewer Use Ordinance and State and Federal Pretreatment Laws, Rules and Regulations.

Noncompliance with any term or condition of this permit shall constitute a violation of the Sewer Use Ordinance, and subject the User to enforcement actions as described therein.

This permit shall become effective: November 2, 1990*
and shall expire at midnight on : November 1, 1992

by: Jowell Stunk
Director of Public Works
City of Oak Ridge

Issued this 1 day of November, 1990

*See Special Condition - Page 15

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Table(s) 1: Allowable Concentrations and Sampling Requirements
Other Attachments:
Industrial User Survey and WW Discharge Permit Application
Additional Requirements (if any)
Sample Documents

1.0 Specific Permit Requirements

1.1 Discharge Points:

1.1.1 During the term of this permit, the user is authorized to discharge waste water to the City of Oak Ridge Sanitary Sewer System, herein referred to as the POTW, from the outfalls listed below:

Outfall	Type of Flow*1	Description of Outfall
1	Mixed Flow	4" Pipe into Manhole

*1-(Process, Sanitary, Mixed)

1.1.2 Discharge from any outfall not listed above from the named facility is specifically prohibited.

1.2 Waste Water Constituents:

1.2.1 The waste water discharged from the Outfalls as described above shall not exceed those listed in the table(s) 1 which follow. For constituents not listed, waste water concentrations shall not exceed the limits in section 2.2 of this document.

1.2.2 Discharges prohibited under section 2.1, Specific Prohibitions, are not allowed regardless of information listed in table(s) 1.

1.2.3 All discharges shall comply with all other applicable laws, regulations, standards, and requirements contained in the Sewer Use Ordinance (SUO) and any applicable State and federal pretreatment laws, regulations, standards, and requirements including any such laws, regulations, standards or requirements that may become effective during the term of this permit.

1.2.4 Discharges from processes or sources not described or containing pollutants (in above trace amounts) not listed in the User's Industrial User Survey and Waste Water Discharge Permit Application are specifically prohibited at the named source.

1.3 Monitoring Requirements:

1.3.1 Constituents listed in table(s) 1 attached must be monitored at the frequency indicated.

1.3.2 All handling and preservation of collected samples and laboratory analysis of samples shall be performed in accordance with 40 CFR Part 136 and amendments thereto unless specified otherwise in the monitoring conditions of this permit.

1.3.3 Standard notation has been used to specify frequency of monitoring. Note, however, the following:

a. **Quarterly Samples** shall be analyzed once every three (3) months and shall consist of three (3) samples collected in a two (2) week period.

b. **Continuous Samples** (or **Meter**) shall be continuously monitored. Unless otherwise noted, where "**Meter**" is indicated, maximum, minimum and average values shall be submitted for each day. Where "**Meter-Chart**" is indicated, a machine produced chart, or copy thereof must be submitted for each day.

c. **Composite Samples** shall be flow proportional unless specifically noted otherwise.

d. **One-Time Samples** shall be conducted to verify the presence or absence of a pollutant from the waste stream. Should pollutants be verified as present which were thought absent, immediate notification of the POTW is required.

1.4 Reporting Requirements

1.4.1 Monitoring results obtained shall be summarized and reported on an Industrial User Monitoring Form according to the following schedule:

Submit reports: Quarterly
The first report is due: January 10, 1991

Unless otherwise indicated reports are to be submitted by the 10th of the month following the close of the monitoring period.

1.4.2 The report shall indicate the nature and concentration of all pollutants in the effluent for which sampling and analyses were performed during the preceding reporting period.

1.4.3 If the permittee monitors any pollutant more

frequently than required by this permit, using test procedures prescribed in 40 CFR Part 136 of amendments thereto, or otherwise approved by the EPA or as specified in this permit, the results of such monitoring shall be included in any calculations of actual daily maximum or monthly average pollutant discharge and results shall be reported in the monthly report submitted to the POTW. Such increased monitoring frequency shall also be reported in the report as outlined above.

1.5 Automatic Re-sampling:

If the results of the user's waste water analysis indicated that a violation of this permit has occurred, the permittee must:

1. Inform the POTW of the violation within 24 hours; and,

2. Repeat the sampling and pollutant analysis within ten days of becoming aware of the first violation and submit, in writing, the results of this second analysis within 30 days of the second sampling date.

1.6 Construction Requirements:

The User is hereby instructed to construct improvements as described below:

____ No requirements this permit.

__X__ The following is to be constructed by November 15, 1990 (date):

__X__ Sampling Manhole*
__X__ Pretreatment Program
___ Other as described in attachment.

Plans for construction of improvements should be submitted to the POTW for review and approval.

1.7 Communications:

All official communications regarding this permit, or in response to the requirements it imposes shall be sent to:

Pre-Treatment Coordinator
Public Works Department
City of Oak Ridge
P.O. Box 1
Oak Ridge, Tennessee 37831

*(Make existing manhole accessable for use.)

2.0 Standard Discharge Limitations

2.1 Prohibitions on Waste Water Discharge

Regardless of permit status, no person shall discharge or cause to allow to be discharged into the POTW any waste which contains any of the following:

2.1.1 Oils and Grease
Fats, wax, grease or oils of more than one hundred (100) mg/l, whether emulsified or not, or containing substances which may solidify or become viscous at temperatures between 32 degrees and 150 degrees F (0 degrees and 65 degrees C) at the point of discharge into the system.

2.1.2 Explosive Mixtures
Liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient to cause hazard of fire or explosion or be injurious in any other way to the sewerage facilities or to the operation of the system. Prohibited materials included, but are not limited to gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides and sulfides.

2.1.3 Noxious Materials
Noxious or malodorous solids, liquids or gases, which, either singly or by interaction with other wastes, are capable of creating a public nuisance or hazard to life, or are or may be sufficient to prevent entry into a sewer for its maintenance and repair.

2.1.4 Improperly Shredded Garbage
Garbage that has not been ground or comminuted to such a degree that all particles are 1/2 inch or less in greatest dimension and will be carried freely in suspension under flow conditions normally prevailing in the public sewers.

2.1.5 Radioactive Wastes
Radioactive wastes or isotopes of such half-life or concentration that they are in noncompliance with permits or regulations issued by the appropriate authority having control over their use and which will or may cause damage or hazards to the sewerage facilities or personnel operating the system.

2.1.6 Solid or Viscous Wastes
Solid or viscous wastes which will or may cause obstruction to the flow in a sewer, or other interference with the proper operation of the sewerage facilities.

2.1.7 Excessive Discharge Rate

Waste waters at a flow rate which is excessive relative to the capacity of the treatment works or which could cause a treatment process upset and subsequent loss of treatment efficiency; or waste waters containing such concentrations or quantities of pollutants that their introduction into the treatment works over a relatively short time period (sometimes referred to as "slug" discharges) would cause a treatment process upset and subsequent loss of treatment efficiency.

2.1.8 Toxic Substances

Any toxic substances, chemical elements or compounds, phenols or other taste- or odor-producing substances, or any other substances in amounts which may interfere with the biological processes or efficiency of the treatment works, or that will pass through the treatment works in concentrations which would cause the POTW to exceed it's NPDES permit limits.

2.1.9 Corrosive Wastes

Any waste which will cause corrosion or deterioration of the sewerage facilities. All wastes discharged to the public sewer system must have a pH value in the range of six (6) to nine (9).

2.1.10 Thermal Discharge

Heat in amounts which will inhibit biological activity in the POTW or cause damage to the sewerage system resulting in interference, but in no case heat in such quantities that the temperature at the point treatment plant exceeds 40°C (104°F). Under no conditions may the temperature at the point of discharge exceed 120°F.

2.1.11 Human Hazard

Any waste water which caused hazard to human life or creates a public nuisance.

2.2 Standard Limitations on Discharges

Unless specifically stated in the table(s) 1 incorporated into this permit, the limits set forth in the following table (2) apply to all discharges into the POTW.

Table 2
Default Discharge Values for Pollutants
not Listed in Table 1

Parameter	Maximum Daily mg/L (1)	Maximum Instant mg/L (2)
Arsenic (As)	0.10	0.20
Benzene	0.87	1.74
Cadmium (Cd)	0.000024	0.000048
Chromium (Cr)		
-Hexavalent	0.002	0.004
-Trivalent	0.44	0.88
Copper (Cu)	0.04	0.08
Cyanide (CN)	0.007	0.014
Iron (Fe)	1.5	3.0
Lead (Pb)	0.0016	0.0032
Manganese (Mn)	1.0	2.0
Mercury (Hg)	0.0004	0.0008
Nickel (Ni)	0.10	0.20
Phenols	5.0	10.0
Silver (Ag)	0.0012	0.002
Toluene	5.35	10.7
Zinc (Zn)	0.094	0.188
Methylene Chloride	0.22	0.44
Trichloroethylene	0.045	0.09
Total Kjeldahl Nitrogen (TKN)	45.0	90.0
Oil and Grease	50.0	100.0
BOD	200.0	300.0
Suspended Solids	200.0	300.0

Notes: (1) From 24 hour flow proportional composite sample
(2) From Grab sample

3.0 GENERAL CONDITIONS

3.1 Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

3.2 Duty to Comply

The permittee must comply with all conditions of this permit. Failure to comply with the requirements of this permit may be grounds for administrative action, or enforcement proceedings

including civil or criminal penalties, injunctive relief, and summary abatements.

3.3 Duty to Mitigate

The permittee shall take all reasonable steps to minimize or correct any adverse impact to the public treatment plant or the environment resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

3.4 Permit Modification

This permit may be modified for good causes including, but not limited to, the following:

a. To incorporate any new or revised Federal, State, or local pretreatment standards or requirement;

b. Material or substantial alterations or additions to the discharger's operation processes, or discharge volume or character which were not considered in drafting the active permit;

c. A change in any condition in either the industrial user or the POTW that requires either a temporary or permanent reduction or elimination of the authorized discharge;

d. Information indicating that the permitted discharge poses a threat to the Control Authority's collection and treatment systems, POTW personnel or the receiving waters;

e. Violation of any terms or conditions of the permit;

f. Misrepresentation or failure to disclose fully all relevant facts in the permit application or in any required reporting;

g. Revision of Federal categorical standards;

h. To correct typographical or other errors in the permit;

i. To reflect changes in facility operation or effluent; or,

j. Upon request of the permittee, provided such request does not create a violation of any applicable requirements, standards, laws or rules and regulations.

The filing of a request by the permittee for a permit

modification, revocation and re-issuance, or termination, or a notification of planned changes or anticipated noncompliance, does not invalidate, waive or stay any permit condition.

3.5 Permit Termination

This permit may be terminated for the following reasons:

a. Falsifying self-monitoring reports;

b. Tampering with monitoring equipment;

c. Refusing to allow timely access to the facility premises and records;

d. Failure to meet effluent limitations;

e. Failure to pay fines;

f. Failure to pay sewer charges; or,

g. Failure to meet compliance schedules.

3.6 Permit Appeals

The permittee may petition to appeal the terms of this permit within thirty (30) days of the notice. This petition must be in writing; failure to submit a petition for review shall be deemed to be a waiver of the appeal. In its petition, the permittee must indicate the permit provisions objected to, the reasons for this objection, and the alternative condition, if any, it seeks to be placed in the permit.

3.7 Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any violation of Federal, State, or local laws or regulations.

3.8 Limitation on Permit Transfer

Permits may not be reassigned or transferred to a new owner and/or operator. New permits may, however, be issued based on previous data submitted for existing operations and facilities. Should a new owner of this facility operate without notifying the POTW, the facility and new owner are bound by the terms of this permit until a new permit is issued. Notwithstanding this, the facility is considered operating in violation until such notification is made.

3.9 Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must submit an application for a new permit a least 30 days before the expiration date of this permit.

3.10 Continuation of Expired Permits

An expired permit will continue to be effective and enforceable until the permit is reissued if:

a. The permittee has submitted a complete permit application at least thirty (30) days prior to the expiration date of the user's existing permit; and,

b. The failure to reissue the permit, prior to expiration of the previous permit, is not due to any act or failure to act on the part of the permittee.

3.11 Dilution

The permittee shall not increase the use of potable or process water or, in any way, attempt to dilute an effluent as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this permit.

3.12 Definitions

Definitions shall be as defined in the SUO and its referenced documents.

3.13 Compliance with Applicable Pretreatment Requirements

Compliance with this permit does not relieve the permittee from its obligations regarding compliance with any and all applicable local, State and Federal pretreatment standards and requirements including any such standards or requirements that may become effective during the term of this permit.

4.0 OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

4.1 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes but is not limited to: effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary

facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

4.2 Duty to Halt or Reduce Activity

Upon reduction of efficiency of operation, or loss or failure of all or part of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control its production or discharges (or both) until operation of the treatment facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4.3 Bypass of Treatment Facilities

4.3.1 Bypass is prohibited unless it is unavoidable to prevent loss of life, personal injury, or severe property damage or no feasible alternatives exist.

4.3.2 The permittee may allow bypass to occur which does not cause effluent limitations to be exceeded, but only if it is also for essential maintenance to assure efficient operation.

4.3.3 Notification of bypass:

A. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, at least ten days before the date of the bypass, to the Control Authority.

B. Unanticipated bypass. The permittee shall immediately notify the Control Authority and submit a written notice to the POTW within 5 days. This report shall specify:

i. A description of the bypass, and its cause, including its duration;

ii. Whether the bypass has been corrected; and

iii. The steps being taken or to be taken to reduce, eliminate and prevent a reoccurrence of the bypass.

4.4 Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of waste waters shall be

disposed of in accordance with State and Federal Law, particularly section 405 of the Clean Water Act and Subtitles C and D of the Resource Conservation and Recovery Act.

5.0 MONITORING AND RECORDS

5.1 Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water or substance. All equipment used for sampling and analysis must be routinely calibrated, inspected and maintained to ensure their accuracy. Monitoring points shall not be changed without notification to and the approval of the POTW.

5.2 Flow Measurements

If flow measurement is required by this permit, the appropriate flow measurement devices and methods consistent with approved scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less that 10 percent from true discharge rates throughout the range of expected discharge volumes.

5.3 Inspection and Entry

The permittee shall allow the Control Authority, or an authorized representative, upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit;

d. Sample or monitor, for the purposes of assuring permit compliance, any substances or parameters at any

location; and

e. Inspect any production, manufacturing, fabricating, or storage area where pollutants, regulated under the permit, could originate, be stored, or be discharged to the sewer system.

5.4 Retention of Records

5.4.1 The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Control Authority at any time.

5.4.2 All records that pertain to matters that are the subject of special orders or any other enforcement or litigation activities brought by the Control Authority shall be retained and preserved by the permittee until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.

5.5 Record Contents

Records of sampling and analyses shall include:

a. The date, exact place, time, and methods of sampling or measurements, and sample preservation techniques or procedures;

b. Who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. Who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

5.6 Falsifying Information

Knowingly making any false statement on any report or other document required by this permit or knowingly rendering any monitoring device or method inaccurate, is a crime and may result

in the imposition of criminal sanctions and/or civil penalties.

*SPECIAL CONDITION:

This permit is issued contingent on user supplying written evidence by February 15, 1991 of compliance with state radiological health permits.

Table 1: Allowable Concentrations (mg/L) and Sampling Requirements for Specific Pollutants, this Outfall

Outfall Number: 1
Maximum Daily Flow Allowed: 7200 gpd

___ Check if Only Domestic Sewage Is Permitted, This Outfall.

Parameter	L/C *1	Daily Maximum	Monthly Average	Sample Frequency	Sample Type	See Note
PH	L	*	*	Continuous	Meter Chart	1
TSS	L	300	200	Monthly	24 hr. Comp.	2
D.O.	L	*	*	Monthly	Grab	2,3
BOD	L	300	200	Monthly	24 hr. Comp.	2
Blow-Down Water Flow	L	1 gpm	1 gpm	Continuous	Meter	4

L/C refers to Local or Categorical limit
Sampling Location for this Outfall:

Discharge of neutralization basin in building for D.O. and pH; Manhole at outfall of sewer for others.

Notes:

1. PH minimum 6, maximum 8. Maintain charts on file for City inspection. Report maximum and minimum values only.

2. Frequency, monthly for 3 months, quarterly thereafter.

3. Minimum, dissolved oxygen = 6.

4. Verifty through use of water meter records. Submit statement of estimated used.

TENNESSEE AIR POLLUTION CONTROL BOARD
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-1531

OPERATING PERMIT Issued Pursuant to Tennessee Air Quality Act

Date Issued: FEB 11 1993

Date Expires: October 1, 1997

Permit Number: 0350095P

Issued To:

Scientific Ecology Group

Installation Address:

1560 Bear Creek Road
Oak Ridge

Installation Description:

FES C/RF-001
Low Level Radioactive Waste Reduction
with HEPA Filters

Emission Source Reference No:

[illegible]-0120-01
NESHAPS

The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations.

CONDITIONS:

1. The operating permit application that was utilized in the preparation of this permit is dated August 31, 1992 and signed by H. H. Arrowsmith, President of the permitted facility. If this person terminates his/her employment or is reassigned different duties such that he/she is no longer the responsible person to represent and bind the facility in environmental permitting affairs, the new person assuming these duties shall declare himself/herself in writing by name and title to the Technical Secretary within fifteen days of the above named person's separation or reassignment of duties within the facility. Said declaration shall contain a statement of concurrence by the new person that all applications and mutual letters of agreement that were signed by the person named above still represent and accurately describe the manner in which the facility is operated or to be operated. If such declaration cannot be made because of non-compliance with a specific value in the approved application and/or any agreement letters used in the preparation of this permit, the new person shall immediately notify the Technical Secretary in writing. The notification must detail the discovered non-compliance and provide a proposed schedule of corrective action to rectify the non-compliance. This permit does not cover any air contaminant source that does not conform to the conditions of this permit and the information given in the approved application. This includes compliance with the following operating parameters:

(continued on the next page)

TECHNICAL SECRETARY

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule or Regulation of the State of Tennessee or any of its Political Subdivisions.

NON TRANSFERABLE

POST OR FILE AT INSTALLATION ADDRESS

FEB 11 1993

0150955

Maximum input capacity for this source shall not exceed 10,000 pounds per hour of radioactive waste and 1,600 pounds per hour of asbestos-containing material.

2. Particulate matter emitted from this source shall not exceed 10.32 pounds per hour.

3. The issuance of this permit does not exempt you from any emission requirements of the Environmental Protection Agency pertaining to any hazardous material being emitted from this source.

4. There shall be no visible emissions (as defined in subparagraph 1200-3-11-.02(2)(jj).) from this source. Compliance with this standard shall be determined by the use of Tennessee Visible Evaluation Method 2 until such time as the Environmental Protection Agency promulgates a visible emission evaluation method for reading no visible emissions.

5. The permittee is placed on notice that Radionuclides and Asbestos have been listed in Section 112 of the Federal Clean Air Act. If the regulations developed pursuant to that Act should require additional control prior to the expiration of this permit, the Technical Secretary reserves the right to amend the permit to require such control.

6. The permittee shall apply for renewal of this permit not less than sixty (60) days prior to the permit's expiration date pursuant to Division Rule 1200-3-9-.02(1).

TENNESSEE AIR POLLUTION CONTROL BOARD
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-1531

OPERATING PERMIT Issued Pursuant to Tennessee Air Quality Act

Date Issued: FEB 1, 1993

Date Expires: October 1, 1997

Permit Number: 025077

Issued To:

Scientific Ecology Group

Installation Address:

1560 Bear Creek Road
Oak Ridge

Installation Description:

PES CVRF-002
Low Level Radioactive Waste Incinerator
Baghouse, HEPA Filters and Wet Scrubber Control

Emission Source Reference No:

77-0120-02
NESHAPS

The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations.

CONDITIONS:

1. The operating permit application that was utilized in the preparation of this permit is dated August 31, 1992 and signed by H. W. Arrowsmith, President of the permitted facility. If this person terminates his/her employment or is reassigned different duties such that he/she is no longer the responsible person to represent and bind the facility in environmental permitting affairs, the new person assuming these duties shall declare himself/herself in writing by name and title to the Technical Secretary within fifteen days of the above named person's separation or reassignment of duties within the facility. Said declaration shall contain a statement of concurrence by the new person that all applications and mutual letters of agreement that were signed by the person named above still represent and accurately describe the manner in which the facility is operated or to be operated. If such declaration cannot be made because of non-compliance with a specific value in the approved application and/or any agreement letters used in the preparation of this permit, the new person shall immediately notify the Technical Secretary in writing. The notification must detail the discovered non-compliance and provide a proposed schedule of corrective action to rectify the non-compliance. This permit does not cover any air contaminant source that does not conform to the conditions of this permit and the information given in the approved application. This includes compliance with the following operating parameters:

(continued on the next page)

TECHNICAL SECRETARY

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule or Regulation of the State of Tennessee or any of its Political Subdivisions.

NON TRANSFERABLE

POST OR FILE AT INSTALLATION ADDRESS

FEB 11 1993

035097I

The charge rate for this source shall not exceed 1,600 pounds per hour.

2. Particulate matter emitted from this source shall not exceed 0.2 percent of the charge rate (3.2 pounds per hour).

3. Sulfur dioxide emitted from this source shall not exceed 15.5 pounds per hour.

4. Visible emissions shall not exceed 20% opacity as specified in Rule 1200-3-5-.01 of the Tennessee Air Pollution Control Regulations (aggregate count). Visible emissions from stacks will be determined by Tennessee Visible Emission Evaluation Method 2 as adopted by the Tennessee Air Pollution Control Board on August 24, 1984.

5. All waste materials, raw materials, and finished products shall be stored in the enclosed building(s). There shall be no visible emissions from the storage facilities.

6. The issuance of this permit does not exempt you from any emission requirements of the Environmental Protection Agency pertaining to any hazardous material being emitted from this source.

7. The permittee is placed on notice that Radionuclides have been listed in Section 112 of the Federal Clean Air Act. If the regulations developed pursuant to that Act should require additional control prior to the expiration of this permit, the Technical Secretary reserves the right to amend the permit to require such control.

8. The permittee shall apply for renewal of this permit not less than sixty (60) days prior to the permit's expiration date pursuant to Division Rule 1200-3-9-.02(3).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

4APT-AES

JAN 25 1993

Mr. John E. Hess, Manager, A&TS
Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Rd.
Oak Ridge, Tennessee 37831-2530

RE: REQUEST FOR INCINERATOR STACK REPLACEMENT AND MONITORING SYSTEM UPGRADE

[National Emission Standards for Radionuclide Emissions from Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered by Subpart H - 40 CFR Part 61, Subpart I]

Dear Mr. Hess:

Your letter of October 30, 1992, with attachments, requested EPA approval for the replacement of the current SEG incinerator stack and an upgrade to the present stack monitoring system. After reviewing your request, we have the following comments:

Incinerator Replacement Stack

The letter indicated the current stack does not contain a protective lining and is undergoing corrosion and deterioration. The proposed replacement stack will be relocated approximately 50 feet northeast of the present stack and have larger dimensions in order to accommodate increased flow from a projected additional incinerator (*Note: Official construction approval must be obtained prior to fabrication of the second incinerator*). Approximate dimensions for the replacement stack are: 98' height (same as the old stack) and 8'10" diameter (old diameter was 1'9").

EPA has reviewed the COMPLY Code printout and agrees with your conclusion that relocation of the new stack will not change the effective dose equivalent (edel to any member of the public. Based upon these results, EPA approval for construction of the replacement stack will not be required. Please note that operation of the replacement stack must follow all conditions outlined in the original November 23, 1988, NESHAPs construction/operation approval letter (W.A. Smith to H.W. Arrowsmith) and any subsequent amendments.

Stack Monitoring System Upgrade

Proposed monitoring upgrades to be installed in the replacement stack include a Kürz IK-EVA 4200 Multi-point Isokinetic Sampling System. SEG will be permitted to use the continuous flow rate measuring device, subject to the following conditions:

1. A multiple point flow rate monitor must be used. The minimum number of points required for large circular ducts and stacks is found in ANSI N13.1-1969, Appendix A.3.2.

2. The continuous flow rate measuring device must be initially certified in accordance with the provisions of 40 CFR 52, Appendix E, within 90 days of startup.

3. An audit of the continuous flow rate measuring device must be conducted on a semi-annual basis to determine whether the relative accuracy of the flow rate monitor is within the applicable standard of 10 percent. The continuous flow rate measuring devices must be recalibrated anytime a semi-annual audit indicates the relative accuracy has exceeded 10 percent.

   Unless otherwise approved by our Agency, EPA Reference Method 2 (RM-2) must be used to determine the relative accuracy of the continuous flow rate measuring device.

   Relative accuracy should be calculated using equations contained in Section 8 of Performance Specification Test 2 in 40 CFR Part 60, Appendix B.

4. A relative accuracy and initial certification report must be submitted to EPA within 30 calendar days after testing. Recordkeeping of data from subsequent semi-annual audits must be retained as described in §61.105.

If you should have any questions, please contact Mr. Alan Drake of my staff at (404) 347-5014.

Sincerely yours,

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

TENNESSEE AIR POLLUTION CONTROL BOARD
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37247-3101

Permit to Operate and

Permit to Construct or Modify an Air Contaminant Source Issued Pursuant to Tennessee Air Quality Act

Date Issued: SEP 10 1992

Permit Number:

Date Expires:

October 1, 1994

Issued To:

Scientific Ecology Group

Installation Address:

1560 Bear Creek Road
Oak Ridge

Installation Description:

Low-Level Radioactive Metalelectric Induction Furnace and Natural Gas Powered Metal Melt Make-up Air Unit

Emission Source Reference No:

73-0130-05
NESHAPS

The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations.
This is not a permit to operate.
also

CONDITIONS:

1. This permit does not cover any air contaminant source that does not conform to the conditions of this permit and the information given in the approved application. This includes compliance with the following operating parameters:

   The maximum usage rate shall not exceed the amount given in the application dated June 26, 1992.

2. Particulate matter emitted from this source shall not exceed 0.5 pound per hour.

3. Visible emissions emitted from this source shall not exceed 20 percent or greater opacity as determined by EPA Method 9, as published in the Federal Register, Volume 39, No. 219 on November 12, 1974. (6 minute average)

4. Natural gas and propane only shall be used as fuel(s) for this source.

5. The issuance of this permit does not exempt the permittee from any requirements of the Environmental Protection Agency pertaining to the emissions from the operation of this new source.

(continued on the next page)

John W. Walton

TECHNICAL SECRETARY

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule or Regulation of the State of Tennessee or any of its Political Subdivisions.

NON TRANSFERABLE

POST AT INSTALLATION ADDRESS

SEP 1 0 1992

734578P

6. The issuance of this construction permit supersedes any previously issued construction and/or operating permit for this air contaminant source.

7. Sixty (60) days prior to the expiration of this permit, permittee shall apply for permit renewal.

8. If visible emissions exceed the limits specified in condition 3, a stack test for particulates will be required.

9. This permit is valid for melting ferrous metals, aluminum, copper and similar other metal materials. Materials containing noticeable amount of glass, paper, wood, plastic and materials unsuitable for melting shall not be charged to the pre-heater.

F2072240

TENNESSEE AIR POLLUTION CONTROL BOARD
NASHVILLE, TENNESSEE 37247-3101

OPERATING PERMIT Issued Pursuant to Tennessee Air Quality Act

Date Issued: MAY 2 6 1992

Permit Number:

Date Expires: October 1, 1993

034060P

Issued To:

Scientific Ecology Group, Inc.

Installation Address:

1560 Bear Creek Road
Oak Ridge

Installation Description:

Low-Level Waste Oil-Fired Boiler
Scrubber, Baghouse, and HEPA Filter Control

Emission Source Reference No:

73-0130-06

The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations.

CONDITIONS:

1. This permit does not cover any air contaminant source that does not conform to the conditions of this permit and the information given in the approved application. This includes compliance with the following operating parameters:

   The maximum waste oil used shall not exceed 15 gallons per hour.

2. Particulate matter emitted from this source shall not exceed 0.6 pounds/MMBtu (1.32 lbs/hr.).

3. Sulfur dioxide emitted from this source shall not exceed 5.0 pounds/MMBtu (11.0 lbs/hr.).

4. Visible emissions shall not exceed 20% opacity as specified in Rule 1200-3-5-.01 of the Tennessee Air Pollution Control Regulations (aggregate count). Visible emissions from stacks will be determined by Tennessee Visible Emission Evaluation Method 2 as adopted by the Tennessee Air Pollution Control Board on August 24, 1984.

5. The issuance of this permit does not exempt the permittee from any requirements of the Environmental Protection Agency pertaining to the emissions from the operation of this new source.

(continued on the next page)

John W. Nelson

TECHNICAL SECRETARY

F2182134

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule or Regulation of the State of Tennessee or any of its Political Subdivisions.

NON TRANSFERABLE

POST OR FILE AT INSTALLATION ADDRESS

MAY 2 6 1992

034060P

6. Routine maintenance, as required to maintain specified emission limits, shall be performed on the air pollution control devices. Maintenance records shall be recorded in a suitable permanent form and kept available for inspection by the Division. These records must be retained for a period of not less than two years.

7. Sixty (60) days prior to the expiration of this permit, permittee shall apply for permit renewal.

F2192134

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET N.E.
ATLANTA, GEORGIA 30365

OCT 2 8 1990

4APT-AEB

Mr. W. M. Hipsher, Vice President
Regulatory Services and Transportation
Scientific Ecology Group, Inc.
P.O. Box 2530
Oak Ridge, Tennessee 37831-2530

Subject: NESHAP Construction/Operation Approval for SEG Metal Melt Facility in Oak Ridge, Tennessee

[National Emission Standards for Radionuclide Emissions from Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered by Subpart H - 40 C.F.R. Part 61, Subpart I].

Dear Mr. Hipsher:

This is written in response to the application by Scientific Ecology Group, Inc. (SEG) for construction and operation of the proposed Metal Melt Facility (MMF). In accordance with the provisions of 40 C.F.R. Part 61, we have reviewed the information submitted on July 23, 1990, and September 12, 1990, to determine the ability of SEG's proposed MMF to comply with the NESHAP radionuclide emission standard promulgated in 40 C.F.R. Part 61, Subpart I. The data submitted indicates that the effective dose equivalent is within the 10 mrem/yr standard. Therefore, we are at this time granting approval under Subpart I for construction of the MMF in Oak Ridge, Tennessee.

In addition to the provisions of 40 C.F.R. Part 61, Subparts A and I, approval to construct and operate is contingent upon compliance with the following terms and conditions:

1. The MMF shall be designed, constructed, and operated as described in the NESHAP application dated July 23, 1990, and additional information dated September 12, 1990, (hereinafter referred to as the Application), unless superseded by a more stringent condition below.

2. All flue gas from the MMF shall pass through an air pollution control system consisting of a baghouse, prefilter, and HEPA filter bank.

3. The Applicant shall maintain a log of all radioactive receipts for the facility and shall include the following information in the log: (1) date of shipment; (2) date of receipt; (3) radionuclide inventory at the time of the

shipment; (4) verification results when conducted; (5) a comparison of the verification results with the reported inventory; and (6) date of treatment. A separate log shall be maintained and shall include a cumulative inventory for each radionuclide received and treated.

4. The exhaust stack shall be provided with testing facilities as follows:

   a. Sampling ports adequate for test methods applicable to such facility.

   b. Safe sampling platform(s).

   c. Safe access to sampling platform(s).

   d. Utilities for sampling and testing equipment.

5. At least sixty (60) days prior to startup, the Applicant shall submit a quality assurance plan to EPA in accordance with the requirements of 40 C.F.R. Part 61, Subpart B, Method 114.

6. Procedures in §61.107 shall be used for determining radionuclide emissions from the MMF. The Applicant shall maintain a record of all radionuclides emitted.

7. On or before March 31 of each year, the Applicant must submit an annual report to EPA covering emissions of the previous calendar year, as described in §61.104.

8. No condition presented herein precludes the Applicant from adherence to additional or more stringent conditions or requirements of any other Federal, State, or local approval or permit.

9. Failure to comply with the conditions of this approval may result in revocation of the approval and/or enforcement action by the Agency.

10. At all times, including periods of startup, shutdown, and malfunction, the MMF shall be maintained and operated in a manner consistent with good air pollution control practices for minimizing emissions.

11. All notifications, reports, and correspondence shall be submitted to the Chief, Air Enforcement Branch, Air, Pesticides and Toxics Management Division, U.S. EPA, Region IV, with copies to the Director, Tennessee Division of Air Pollution Control and to the Director, Tennessee Division of

Radiological Health.

This approval is granted solely under Section 112 of the Clean Air Act and implementing regulations under 40 C.F.R. Part 61, and in no way affects approvals under other Federal or State regulatory authorities.

If you have any questions concerning this approval, please contact Brian Beals or Jill Perry of my staff at (404) 347-2904.

Sincerely yours,

Bruce P Miller for

Winston A. Smith, Director
Air, Pesticides & Toxics
Management Division

John Walton

cc: Mr. Harold Hodges, P.E., Director
Division of Air Pollution Control
Tennessee Department of Health and Environment
Customs House, 4th Floor
701 Broadway
Nashville, Tennessee 37219-5403

Mr. Michael Mobley, Director
Division of Radiological Health
Tennessee Department of Health and Environment
150 9th Avenue, North
Nashville, Tennessee 37219-5404

RECEIVED NOV 28 1988

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

NOV 23 1988

4APT-AC

Mr. H. W. Arrowsmith, President
Scientific Ecology Group, Inc. (SEG)
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, Tennessee 37830

Dear Mr. Arrowsmith:

In accordance with the provisions of 40 C.F.R. 61, we have reviewed information submitted on May 20, 1988; August 5, 1988; August 8, 1988; August 29, 1988; and October 11, 1988, to determine the ability of SEG's planned low level radioactive waste incinerator and oil burning system to comply with the NESHAP-radionuclide emission standards promulgated at 40 C.F.R. 61, Subpart I. Based on this review, approval is hereby given for the construction/operation of the incinerator and oil burning system at SEG's Oak Ridge site. In addition to the provisions of 40 C.F.R. Part 61, Subparts A and I, the following additional terms and conditions apply:

1. The incinerator and oil burning system shall be designed, constructed and operated as described in the NESHAP application dated May 20, 1988, and additional information dated August 5, 1988; August 8, 1988; August 29, 1988; and October 11, 1988, (hereinafter referred to as the Application), unless superseded by a more stringent condition below.

2. All flue gas from the incinerator shall pass through an air pollution control system consisting of a baghouse, HEPA filter bank, and caustic scrubber. All flue gas from the burning of radioactive contaminated oil shall pass through an air pollution system consisting of a HEPA filter bank. All components of the two air pollution control systems shall be fully operational at all times during source operation.

3. The Applicant shall maintain a log of all radioactive receipts for the two sources and shall include the following information in the log: the date of shipment, the radionuclide inventory at the time of shipment, the date of receipt, verification results if conducted, comparison of the verification results with the reported inventory, and the date of treatment. A separate log shall be maintained and shall include a cumulative inventory for each radionuclide received and treated. In addition, the Applicant shall notify the Agency whenever the cumulative inventory treated for any radionuclide reaches a level that is equal to or greater than 75 percent of the annual quantities listed in Table 6-1 of the Application.

4. For any radionuclide not listed in Table 6-1 of the Application, the Applicant shall establish a Maximum Acceptable Quantity (MAQ) of the radionuclide to be treated each year if that quantity is likely to

exceed a minimum amount. The minimum amount is based on the quantity of the radionuclide that would result in a calculated effective dose equivalent of 1/100 of the NESHAP standards. Upon receiving a request for disposal of a radionuclide for which a MAQ has not been established and which is greater than the minimum amount, the Applicant shall perform a dose equivalent assessment for the radionuclide prior to establishing a MAQ. The dose equivalent assessment shall be conducted using the same techniques and data bases as outlined in the Application, with the exception that assessment must be performed only at the previously established point of maximum impact. Concurrent with the notification to the generator of waste acceptance, and prior to receiving the first shipment for a new radionuclide, which exceeds the minimum amount, the Applicant shall notify the Agency in writing of its intent to receive a waste containing a radionuclide not originally analyzed in the Application. The notification shall include the MAQ established for the new radionuclide, the composition of the waste, the expected quantity of waste to be received annually, and the estimated dose resulting from treating the waste in combination with all other doses associated with activities at the SEG's Oak Ridge site.

5. The Applicant shall not incinerate hospital waste or waste containing high concentrations of tritium or carbon-14.

6. Oil contaminated with tritium, carbon-14, or radioactive iodine shall not be fired in the oil burning system unless the Applicant uses EPA approved procedures to account for the release of the radionuclide emissions generated.

7. The incinerator and oil burner exhaust stacks shall be provided with testing facilities as follows:

   a. Sampling ports adequate for test methods applicable to such facility.

   b. Safe sampling platform(s).

   c. Safe access to sampling platform(s).

   d. Utilities for sampling and testing equipment.

8. Continuous monitoring of incinerator and oil burning off-gas shall be conducted during all periods of normal or emergency operation. Sampling of the incinerator off-gas shall be conducted in accordance with the procedures described in SEG's August 5, 1988, response to EPA questions regarding the initial NESHAP application for the incinerator, and sampling of the off-gas from oil burning shall be conducted with an isokinetic sampler designed to collect filterable radionuclide emissions. Samples shall be recovered and analyzed weekly, or more frequently if necessary. Filters recovered from the oil burning sampler shall be analyzed to determine release rates of uranium, technicium-99, gross alpha and gross beta. In addition to undergoing analysis for the same

radionuclides as the oil burning samples, the samples collected from the incinerator stack shall be analyzed for iodine-125, 129 and 131; carbon-14; and tritium. Filters from both monitors shall also be analyzed by gamma spectroscopy and the Applicant shall report any radionuclide which is released but which is not listed in the Application. The Applicant shall maintain a cumulative record of all results obtained and shall notify the Agency when the cumulative release of any radionuclide reaches a level that is equal to or greater than 75 percent of the annual estimated release rate from the incinerator, as stated in the Application.

9. At least thirty (30) days prior to incinerator startup the Applicant shall provide EPA with a sampling and analytical protocol for determining the quantity of radionuclides discharged in the incinerator ash and scrubber effluent.

10. Thirty (30) days after the end of each calendar quarter the Applicant shall report the following information:

    a. The quantity of each radionuclide in the material treated with the incinerator or oil burning system each month during the quarter.

    b. The quantity of each radionuclide emitted in the incinerator or oil burner flue gas each month during the quarter.

    c. The quantity of each radionuclide contained in the incinerator ash or discharged in the scrubber effluent each month during the quarter.

    All radionuclide quantities shall be expressed as curies per month, and EPA will consider the data reported to be an indicator of the Applicant's waste acceptance plan effectiveness.

11. No condition presented herein precludes the Applicant from adherence to additional or more stringent conditions or requirements of any other Federal, State, or local approval or permit.

12. Failure to comply with the conditions of this approval may result in revocation of the approval and/or enforcement action by the Agency.

13. At all times, including periods of startup, shutdown, and malfunction, the incinerator and oil burning system shall be maintained and operated in a manner consistent with good air pollution control practices for minimizing emissions.

14. All notifications, reports, and correspondence shall be submitted to the Chief, Air Compliance Branch, Air, Pesticides and Toxics Management Division, U.S. EPA, 345 Courtland Street, Atlanta, Georgia 30365 with copies to the Director, Tennessee Division of Radiological Health; and Director, Tennessee Division of Air Pollution Control.

This approval is granted solely under Section 112 of the Clean Air Act and implementing regulations at 40 C.F.R. 61 and in no way affects approvals under other Federal or State regulatory authorities.

If you have questions concerning this approval, please contact me at 404/347-3043.

Sincerely yours,

Winston A. Smith

Winston A. Smith, Director
Air, Pesticides and Toxics
Management Division

cc: Mr. Harold Hodges, Director
Division of Air Pollution Control
Tennessee Department of Public Health
Custom House, 4th Floor
701 Broadway
Nashville, Tennessee 37219-5403

Mr. Michael Mobley, Director
Division of Radiological Health
Tennessee Department of Public Health
Custom House, 4th Floor
701 Broadway
Nashville, Tennessee 37219-5403

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STATE OF TENNESSEE
DEPARTMENT OF HEALTH AND ENVIRONMENT
CORDELL HULL BUILDING
NASHVILLE, TENNESSEE 37247

NED McWHERTER
GOVERNOR

J. W. LUNA
COMMISSIONER

June 4, 1991

Scientific Ecology Group, Inc.
Clinch River Industrial Park
1560 Bear Creek Road
Oak Ridge, TN 37830

Attention: H. W. Arrowsmith, President

Gentlemen:

Attached to this letter is your Tennessee Radioactive Material License numbered R-73016-F96 and issued to expire on June 30, 1996.

A copy of "State Regulations for Protection Against Radiation" referred to in Condition 12 of the license conditions is being sent to you by separate mailing. Your attention is directed to State Regulations and to specific license Conditions 11 through 26 which are to be followed in the use of this license.

Also attached to this letter are several copies of Form RHS 8-3 for posting as noted on that form.

If we can be of further assistance to you, please contact us.

Sincerely,

Johnny C. Graves

Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

Attachments

RHX/26

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Authorization No. 343861. Number of Copies: 2,000
This public document was promulgated at a cost of .05 per copy.

RHS 8-3
7/81

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

NOTICE TO EMPLOYEES

In "STATE REGULATIONS FOR PROTECTION AGAINST RADIATION", the Tennessee Department of Health an Environment has established standards for your protection against radiation hazards and certain provisions fc the option of workers engaged in work under licenses or registrations issued by the Department.

YOUR EMPLOYER'S RESPONSIBILITY

Your employer is required to—

1. Apply these Regulations to work under the license or registration. Licenses and Certified Registrations contain special conditions which shall be considered in addition to these Regulations.

2. Post or otherwise make available to you a copy of the Regulations, licenses, registrations, and operating procedures which apply to work in which you are engaged, and explain their provisions to you.

   Post any written notice from the Department that the Regulations have been violated and response to such notice.

YOUR RESPONSIBILITY AS A WORKER

You should familiarize yourself with those provisions of the Regulations, and the operating procedures which apply to the work in which you are engaged. You should observe their provisions for your own protection and protection of your co-workers.

AREAS COVERED BY THESE REGULATIONS

1. Limits on exposure to radiation and radioactive material in restricted and unrestricted areas;
2. Measures to be taken after accidental exposure;
3. Personnel monitoring, surveys and equipment;
4. Caution signs, labels and safety interlock equipment;
5. Exposure records and reports;
6. Option for workers regarding the Department's inspection; and
7. Related matters.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY

1. The Department's Regulations require that your employer give you a written report if you receive an exposure in excess of any applicable limit as set for in the Regulations or in the license. The basic limi for exposure to employees are set forth in Rule 1200-2-5-.03, 1200-2-5-.05 and 1200-2-5-.06 of th Regulations. These Rules specify limits on exposu to radiation and exposure to concentrations c radioactive material in air and water.

2. If you work where personnel monitoring is require and if you request information on your radiation e posures;

   a. your employer must advise you annually of your e posure to radiation, and

   b. your employer must give you a written repor following termination of your employment, of you radiation exposures.

INSPECTIONS

All licensed or registered activities are subject to in spection by representatives of the Department. In addi tion, any worker or representative of workers whc believes that there is a violation of the Regulations o the terms of the employer's license or registration witt regard to radiological working conditions in which the worker is engaged, may request an inspection by send ing a notice of the alleged violation to the Tennessee Department of Health and Environment, Division o Radiological Health, TERRA Building, 150 9th Avenue North, Nashville, Tennessee 37219-5404. The request must set forth the specific grounds for the notice, and must be signed by the worker or the representative of the workers. During inspections, Department inspectors may confer privately with workers, and any worker may bring to the attention of the inspectors any past or present condition which he believes contributed to or caused any violation as described above.

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POSTING REQUIREMENT

Copies of this notice must be posted in a sufficient number of places in every establishment where employees are employed in activities registered or licensed pursuant to Chapter 1200-2-10 to permit employees working in or frequenting any portion of a restricted area to observe a copy on the way to or from their place of employment.

FORM RHS 8-7
(8-83)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

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RADIOACTIVE MATERIAL LICENSE

Pursuant to Tennessee Department of Health and Environment Regulations, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, aquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) desigated below. This license is subject to all applicable rules and regulations of the Tennessee Department of Health and Environment and orders of the Division of Radiological Health, now or hereafter in effect and to any conditions specified below.

LICENSEE		3. License number
1. Name	Scientific Ecology Group, Inc.	R-73016-F96
2. Address	Clinch River Industrial Park 1560 Bear Creek Road Oak Ridge, TN 37830	4. Expiration date June 30, 1996
		5. File no. R-73016

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or physical form	9. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.
SEE SUPPLEMENTARY SHEETS		

10. Authorized Use

SEE SUPPLEMENTARY SHEETS

CONDITIONS

11. Unless otherwise specified, the authorized place of use is the licensee's address stated in item 2. above.

SEE SUPPLEMENTARY SHEETS

Date of Issuance June 4, 1991

For the Commissioner
Tennessee Department of Health and Environment

By: Johnny C. Graves

DIVISION OF RADIOLOGICAL HEALTH
Johnny C. Graves
Licensing and Registration Manager

PH-0382 Rev 8/83

000238

Form RHS 8-7A
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number R-73016-F96

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or Physical Form	9. Maximum Radioactivity and/or Quantity of Material which Licensee may Possess at Any One Time
A. Mixed activation and fission products with atomic numbers 3-83 inclusive (not C-14)	A. Any form as suitable for transport under U.S. DOT Regulations	A. 200 Curies
B. Hydrogen 3	B. Same as A	B. 330 Curies
C. Carbon 14	C. Same as A	C. 110 Curies
D. Radium 226	D. Same as A	D. 11 Curies
E. Thorium 232	E. Same as A	E. 11 Curies
F. Uranium, depleted and natural	F. Same as A	F. 110 Curies
G. Uranium 233	G. Same as A	G. Combined possession limit for all SEG licenses authorized at the address in Condition 14 of this license: 200 grams *
H. Uranium 235	H. Same as A	H. Combined possession limit for all SEG licenses authorized at the address in Condition 14 of this license: 350 grams *

*For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified here for the same kind of special nuclear material. The sums of such ratios for all kinds of special nuclear material in combination shall not exceed "1" (i.e., unity).

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number R-73016-F96

I. Plutonium	I. Same as A	I. Combined possession limit for all SEG licenses authorized at the address in Condition 14 of this license: 200 grams *
J. Americium 241	J. Same as A	J. 250 Curies
K. Transuranics (not Pu or Am-241)	K. Same as A	K. 1.1 Curies
L. Radioactive materials with atomic numbers 84-91 inclusive (not Po-210, Ra-226, or Th-232)	L. Same as A	L. 1.1 Curies
M. Polonium 210	M. Same as A	M. 11 Curies
N. Uranium (not U-233, U-235, or U-238)	N. Same as A	N. 1.1 Curies

10. Authorized Use:

A. through N. The licensee is authorized to receive, possess, and perform metal melting operations as specifically outlined in application dated December 13, 1990, with attachments, and in documents referenced in Condition 26 of this license. This authorization does not include operations or activities not identified and described in the documents referenced in Condition 26 of this license.

CONDITIONS, Continued:

12. This license does not authorize the disposal of liquid waste to the sanitary

*For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified here for the same kind of special nuclear material. The sums of such ratios for all kinds of special nuclear material in combination shall not exceed "1" (i.e., unity).

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

sewerage system. The handling of liquid waste shall be in accordance with the procedures described in documents referenced in Condition 26 of this license.

13. A. The licensee is authorized to release materials for unrestricted use in accordance with documents referenced in Condition 26 of this license and in accordance with specific responses in letters dated December 11, 1990, with attachments, and March 21, 1991, with attachments, provided that only surface contamination is present on the materials and that these materials meet the criteria set forth in Regulatory Guide 1.86.

    B. The licensee is not authorized to release for unrestricted use materials which have been formed, generated, or produced as a result of (metal) melting. Such materials shall only be transferred to persons specifically licensed by the Department, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State to receive such material, or to an Agency of the Federal Government that has been exempted from licensing regulation by Federal law.

    C. Prior to transfer of any product in accordance with Item B of this Condition, the licensee shall submit to the Department for its approval a specific description of the label, etching, etc., including method of production, colors or absence of colors, which he plans to place on each product item transferred to a licensed recipient.

14. Radioactive material authorized by this license shall be used only at the licensee's facility in the Clinch River Industrial Park, 1560 Bear Creek Road, Oak Ridge, TN 37830.

15. The licensee shall comply with applicable provisions of 1200-2-4, 1200-2-5, 1200-2-10, and 1200-2-11 of "State Regulations for Protection Against Radiation."

16. A. Radioactive material authorized by this license shall be used by, or under the supervision of, H. W. Arrowsmith, J. T. Pride, W. M. Hipsher, S. T. Norris, J. E. Hess, Marsha Wilson, Laura Ayers, James R. Odell, Stephen L. Sugarman, Kirk Papa, Terry Schubert, Kim Everett Smith, Donald S. Brackett, or Angela M. McIntosh.

    B. The Radiation Safety Officer for this license is Walt M. Hipsher.

17. The following evaluations shall be performed for all process ventilation systems:

    A. Air balance within the RCA at least semi-annually and following any

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

ventilation system or process changes which could potentially alter the effectiveness of the system.

B. Particulate removal efficiency of the main filtration system HEPA filters by DOP or comparable testing in accordance with pertinent ANSI standards immediately following installation of new HEPA filters or at least semi-annually.

18. The licensee is authorized to receive, possess, and use any radioactive material distributed under a general license, issued by the U.S. Nuclear Regulatory Commission or another Agreement State, without this material being specifically referenced in Items 6, 8, 9, and 10 of this license. Notwithstanding any other conditions of this license, the general licensee may possess and use radioactive material received under the provisions of "State Regulations for Protection Against Radiation," 1200-2-10, in accordance with the regulations and requirements provided at the time of the transfer of the radioactive material under the terms of the general license.

19. The licensee shall maintain complete and accurate records of the receipt and disposal of radioactive material. The licensee shall, for radioactive material no longer useful for any purpose and for any equipment or supplies contaminated with such material for which further use and decontamination is not planned, define those materials as radioactive waste and treat them as such in accordance with the following provisions:

A. Radioactive waste material shall not be stored with non-radioactive waste.

B. A written record of all radioactive waste material shall be maintained until it has been determined by a suitable survey or radioassay that it has decayed to background levels or until it has been shipped to an authorized recipient in accordance with all applicable regulations. Accountability of radioactive waste material prepared for shipment but not yet shipped from the licensee's premises shall be maintained by the licensee by an internal record system such that the licensee is constantly aware of the material's location and the proposed time of shipment. Individuals who are involved in the shipping of such material and/or the storage of such material prior to shipment, shall be trained in the precautions necessary for such handling and storage.

C. For material which has decayed to background levels as determined by radioassay or external level as measured with appropriately calibrated instruments, records shall indicate that the material was determined to be no longer radioactive and will indicate the methods and results of the survey or

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

analysis.

D. Shipment records of radioactive waste material shall be maintained and the licensee shall require written confirmation from the authorized recipient of such material that this material has been received.

E. Transfer of radioactive waste to a land disposal facility or a licensed waste handler shall be done in accordance with 1200-2-5-.17 of "State Regulations for Protection Against Radiation."

F. All records and written confirmations required by this Condition shall be maintained for inspection by the Department.

The requirements of this Condition are in addition to any other requirements for the handling and/or disposal of radioactive material contained in this license and "State Regulations for Protection Against Radiation."

20. Except for plutonium contained in a medical device designed for individual human application, no plutonium, regardless of form, shall be delivered to a carrier for shipment by air transport or transported in an aircraft by the licensee except in packages the design of which the NRC has specifically approved for transport of plutonium by air.

21. The licensee shall not receive for storage or processing any radioactive material that originated from a facility in a state which has been denied access to the operating low-level radioactive waste disposal facilities pursuant to the 1985 Low-Level Radioactive Waste Policy Amendments Act.

The licensee must ascertain the status of the state in which each facility is located in order to show compliance with this amendment. Radioactive material in the licensee's possession at the time that access is denied may be processed and stored in accordance with the time limitations contained in Condition 23 of this license. Prior to exceeding this time limit the licensee shall return the radioactive material to the prior licensed possessor. If the state's access has been restored prior to the expiration of the time limits, material may be transferred to the disposal facility.

This Condition is waived if written assurances are furnished by the facility shipping the radioactive material indicating that the facility may accept return of the material, processed or unprocessed. Such assurances shall be obtained from the appropriate state governor's office, the state radiation control program, and the appropriate compact official, if any.

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

 License Number R-73016-F96

22. The licensee shall establish in every contractual obligation relating to radioactive materials the ability to return radioactive materials, processed or unprocessed, to the prior licensed possessor.

23. A. No radioactive material (excluding calibration and standardization sources) may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than 180 days. Exceptions to this rule are as follows:

    1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

       Materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater then 100 nCi/gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261).

       The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

    2. Radioactive wastes as soil or liquid, which are consumed in the disposal process, may be possessed on-site for a period not to exceed 365 days.

    B. No radioactive material may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Containers	1 high

24. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels authorized for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in 49 CFR 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements, the following criteria and restrictions must be

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

adhered to whenever radioactive materials are stored outside of the process and storage buildings:

A. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

B. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

C. Soil samples must be collected and analyzed at least quarterly along the edge of the asphalt or concrete pad where radioactive materials are stored to ensure that there is no buildup of radioactive contamination. Data from these samples shall be maintained for inspection by the Department.

The authorizations for processing and storage granted by this license shall not exceed a total of 42,595 square feet.

25. No provision of this license relieves the licensee from compliance with other Federal, State, and local laws, ordinances, and regulations applicable to the licensee's activities.

26. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated (but unsigned) March 30, 1990, with attachments, and signed application dated December 13, 1990; letters dated January 29, 1988, October 11, 1988, September 20, 1990, with attachments, including revised drawings, December 11, 1990, with attachments, December 14, 1990, with attachments, March 4, 1991, with attachments, April 10, 1991; cover sheet (to application) dated April 2, 1990; zone descriptions received April 29, 1991; and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 1

 License Number R-73016-F96

Scientific Ecology Group, Inc.
Clinch River Industrial Park
1560 Bear Creek Road
Oak Ridge, TN 37830

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by H.W. Arrowsmith and in accordance with his letter dated August 19, 1992, your Tennessee Radioactive Material License number R-73016-F96 is amended as follows:

To change Item 9A. and Condition 26. This Item and this Condition will now read as follows:

9A. 400 Curies

26. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated (but unsigned) March 30, 1990, with attachments, and signed application dated December 30, 1990, January 29, 1988, October, 11, 1988, September 20, 1990, with attachments including revised drawings, December 11, 1990, with attachments, December 14, 1990, with attachments, March 4, 1991, with attachments, April 10, 1991:cover sheet (to application) dated April 2, 1990; zone descriptions received April 29, 1991, and telephone conservation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988), and letter dated August 19, 1992.

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 1

 License Number R-73016-F96

All other parts of this license remain unchanged.

Date August 20, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form dHS E-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 2

License Number R-73016-F96

Scientific Ecology Group, Inc.
Clinch River Industrial Park
1560 Bear Creek Road
Oak Ridge, TN 37830

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by H.W. Arrowsmith and in accordance with his letter dated August 21, 1992, and as requested by W. M. Hipsher and in accordance with his letter dated September 11, 1992, your Tennessee Radioactive Material License number R-73016-F96 is amended as follows:

To add Conditions 27 and 28. These Conditions will read as follows:

27. Notwithstanding the requirements of Condition 23 of this license, the licensee may possess radioactive material received for processing at the Metal Melt Facility prior to its start-up date for a period of time not to exceed two (2) years from the Metal Melt Facility start-up date. All other radioactive material received for processing at the Metal Melt Facility shall comply with the requirements of Condition 23 of this license.

28. Notwithstanding any statements made in documents referenced in Condition 26 of this license, the licensee may perform as necessary the sorting operations required to process radioactive contaminated waste described in letter dated September 11, 1992. The licensee shall apply appropriate radiation surveys and radiation protection techniques described in documents referenced in Condition 26 to the extent necessary to minimize radiation exposure to workers involved in this operation.

To change Conditions 23 and 26. These Conditions will now read as follows:

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 2

 License Number R-73016-F96

23. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than one hundred eighty (180) days. Exceptions to this rule are as follows:

1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

   Radioactive materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater than 100 nCi\gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261).

   The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

2. Radioactive wastes as soil or liquid, which are consumed in the disposal process, may be possessed on site for a period not to exceed 365 days.

3. The small quantities of radioactively contaminated freon bottom stills generated at the CVRF only may be stored until such time as a permitted treatment or disposal option is available for these materials.

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high

Form RH-1574 (10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 2

 License Number R-73016-F96

C. This condition also includes "waste radioactive material" generated under the authority of this license.

D. This clarification of the nomenclature of Condition 23 is effective with the date of this amendment and allows the licensee ninety (90) days from the date of this amendment to comply with the provisions of this condition, including those concerning definition of materials and the length of storage times.

26. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated (but unsigned) March 30, 1990, with attachments, and signed application dated December 30, 1990, January 29, 1988, October, 11, 1988, September 20, 1990, with attachments including revised drawings, December 11, 1990, with attachments, December 14, 1990, with attachments, March 4, 1991, with attachments, April 10, 1991;cover sheet (to application) dated April 2, 1990; zone descriptions received April 29, 1991, and telephone conservation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988), and letters dated August 19, 1992, August 21, 1992, and September 11, 1992.

All other parts of this license remain unchanged.

Date September 11, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 3

Page 1 of 1 Pages

License Number R-73016-F96

Scientific Ecology Group, Inc.
Clinch River Industrial Park
1560 Bear Creek Road
Oak Ridge, TN 37830

Attention: H.W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73016-F96 is amended as follows:

To add Condition 29. This Condition will read as follows:

29. Effective January 1, 1993, the licensee shall not accept either radioactive waste and / or items contaminated or potentially contaminated with licensable quantities of radioactive material or radioactive materials or items from licensable activities for repackaging, processing, refurbishing, storage pending disposal or disposal unless the shipper of such waste possesses a valid license for delivery issued pursuant to 1200-2-10-.32 of "State Regulations for Protection Against Radiation".

All other parts of this license remain unchanged.
Date November 10, 1992

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 4

Page 1 of 1 Pages

License Number R-73016-F96

Scientific Ecology Group, Inc.
Clinch River Industrial Park
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

In accordance with our letter dated November 19, 1992, your Tennesse Radioactive Material License Number R-73016-F96 is amended as follows:

To change Conditions 21 and 22. These conditions will now read as follows:

21. Written assurances must be furnished by the facility shipping th radioactive material indicating that the facility may accept return of th material processed or unprocessed. In addition, for states outside th Southeast Compact the state or appropriate Compact must be a signatory t the Interregional Access Agreement for Waste Management or assurances shal be obtained from the appropriate state governor's office, the stat radiation control program, and the appropriate Compact official, if any

22. The licensee shall establish in every contractual obligation relating t radiaoctive materials the ability to return radioactive materials processed or unprocessed, to the prior licensed or exempt possessor.

All other parts of this license remain unchanged.

Date January 13, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By Michael A. Page
Michael A. Page
Environmental Specialist
Division of Radiological Health

(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 5

License Number R-73016-F96

Scientific Ecology Group, Inc.
Clinch River Industrial Park
1560 Bear Creek Road
Oak Ridge, TN 37830

DATE OF ISSUE

SEP 9 ..3

CONTROL NO.
1115

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by Walt Hipsher and in accordance with his letters dated February 10, 1993 and April 16, 1993, with attachments, and as requested by H. W. Arrowsmith and in accordance with his letter dated July 29, 1993, with attachments, your Tennessee Radioactive Material License number R-73016-F96, this license is amended as follows:

To change Condition 16., 23., and 26. These Conditions will now read as follows:

16. Radioactive material authorized by this license shall be used by, or under the supervision of, H. W. Arrowsmith, S.T. Norris, J.T. Pride, W.M. Hipsher, Marsha Wilson, J.E. Hess, Steve Sugarman, Angela McIntosh, B.S. Mays, Chris Jones, Jeffery Underwood, Kieth Jeter, Kirk Papa, D.B Jamieson, Bradley Moore, Pat Walsh, Donald Brackett, O. Meeuwis, E.A. Lloyd, Mitch Parker, R.L. Brackett, Don Neely, or Sam Clark.

    The Radiation Safety Officer for this license is Steve T. Norris.

23. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than three hundred sixty five (365) days. Exceptions to this rule are as follows:

    1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

       Radioactive materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater than 100 nCi\gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 5

C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261).

The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

2. The small quantities of radioactively contaminated freon bottom stills generated at the CVRF only may be stored until such time as a permitted treatment or disposal option is available for these materials.

3. Equipment, specifically licensed or otherwise authorized, and stored on-site for future use: (1) at a location authorized by a Scientific Ecology Group, Inc. Tennessee Radioactive Material License or (2) at a location where such equipment is authorized by the agency having jurisdiction.

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high
5. Any other strong tight container.	10 feet nominal

C. This condition also includes "waste radioactive material" generated under the authority of this license.

26. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated (but unsigned) March 30, 1990, with attachments, and signed application dated December 30, 1990, January 29, 1988, October, 11, 1988, September 20, 1990, with attachments including revised drawings, December 11, 1990, with attachments, December 14, 1990, with attachments, March 4, 1991, with attachments, April 10, 1991;cover

(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 5

 License Number R-73016-F96

sheet (to application) dated April 2, 1990; zone descriptions received April 29, 1991, and telephone conservation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988), and letters dated August 19, 1992, August 21, 1992, September 11, 1992 February 10, 1993, April 16, 1993, with attachments, and July 29, 1993, with attachments.

All other parts of this license remain unchanged.
Date August 9, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 1 CORRECTED COPY

Page 1 of 1 Pages License Number R-73013-A91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-01052-A91 is amended as follows:

To change Items 3. and 5. These Items will now read as follows:

3. R-73013-A91

5. R-73013

All other parts of this license remain unchanged.
Date July 17, 1989

For the Commissioner
Tennessee Department of Health
and Environment

By FOR EAS

Elisabeth A. Stetar
Health Physicist
Division of Radiological Health

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Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 2 CORRECTED COPY

 License Number R-73013-A91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by W. M. Hipsher and in accordance with his letters dated January 5, 1990, and January 19, 1990 your Tennessee Radioactive Material License number R-73013-A91 is amended as follows:

To add:

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or Physical Form	9. Maximum Radioactive Material Which Licensee May Possess at Any One Time
O. Any Radioactive Material (except special nuclear material)	O. Sealed Source	O. No single source to exceed 5 millicuries. Total not to exceed 10 millicuries.

10. Authorized use

O. For use as calibration and/or standardization sources in Sealed Sources (Manufactured, labeled, packaged, and distributed in accordance with a license issued by the Department, U.S. Nuclear Regulatory Commission, an agreement state or licensing state, as appropriate, in accordance with applicable provisions for the manufacture and distribution of such radioactive material).

To add Conditions 21 and 22. These Conditions will read as follows:

21. A. Sealed sources authorized by this license in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six (6) months. In the absence of a certificate from a transferor indicating that a test has been made within six (6) months prior to transfer, the sealed source shall not be put into use until tested.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 2 CORRECTED COPY

B. The tests shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample, or in the case of radium, the escape of radon at the rate of 0.001 microcurie per 24 hours. The test sample shall be taken from the sealed source or from the surface of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak tests shall be kept in units of microcuries and maintained for inspection by the Department.

C. If the test reveals the presence of 0.005 microcurie or more of removable contamination, or in the case of radium, the escape of radon at the rate of 0.001 microcurie or more per 24 hours, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Department regulations. A report shall be filed within five (5) days of the test with the Division of Radiological Health, Tennessee Department of Health and Environment, 150 9th Avenue North, Nashville, Tennessee 37219-5404, describing the equipment involved, the test results, and the corrective action taken.

D. Tests for leakage and/or contamination shall be performed in accordance with the statements, representations, and procedures referenced in Condition 22 of Tennessee Radioactive Material License number R-73008-E94 or by persons specifically authorized by this Department, the U. S. Nuclear Regulatory Commission, or another Agreement State to perform such services.

22. Notwithstanding the periodic leak test required by Condition 21, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting material or 10 microcuries or less of alpha emitting material.

To change Condition 20. This Condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988, (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 2 CORRECTED COPY

 License Number R-73013-A91

3, 1988, with attachments, August 6, 1988 (Answers to EPA Questions), August 13, 1988, with attachments, August 20, 1988, with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988, (Letter of Credit #S72244 signed by Charles Lamb), January 5, 1990, and January 19, 1990.

This amendment is considered to have been effective on January 18, 1990.

All other parts of this license remain unchanged.

Date January 24, 1990

For the Commissioner
Tennessee Department of Health
and Environment

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 3

Page 1 of 1 Pages

License Number R-73013-D91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73013-A91 is amended to show a change in expiration date. Items 3 and 4 will now read as follow

3. R-73013-D91

4. April 30, 1991

---

other parts of this license remain unchanged.

Date November 9, 1990

For the Commissioner
Tennessee Department of Health
and Environment

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 4

Page 1 of 1 Pages

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73013-D91 is amended to show a change in expiration date. Items 3 and 4 will now read as follo

3. R-73013-F91

4. June 30, 1991

.l other parts of this license remain unchanged.

Date April 30, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By Charles Arnott

Charles Arnott
Health Physicist
Division of Radiological Health

Form RHS 3-7-
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 5

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letters dated December 20, 1990 with attachments, May 17, 1991 with attachments, June 18, 1991 with attachments, and letter by Steve Norris dated June 21, 1991 with attachments, your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 23. This condition shall read as follows:

23. The licensee is authorized to start-up, operate, and shutdown the LUWA Evaporator and associated auxiliary subsystems as necessary to maintain water purity of the Incinerator Off-Gas Scrubbing system during normal incinerator operations. Pursuant to 1200-2-5-.08 of "State Regulations for Protection Against Radiation", the licensee shall monitor all discharges and effluents from the evaporator and auxiliary subsystems.

To change Condition 20. This condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988 (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988 with attachments, August 6, 1988 (answers to EPA questions), August 13, 1988 with attachments, August 20, 1988 with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988 (Letter of Credit #S72244 signed by Charles Lamb), January 5, 1990, January 19, 1990, December

Form RHS S-7A
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 5

License Number R-73013-F91

20, 1990 with attachments, May 17, 1991 with attachments, June 18, 1991 with attachments, and June 21, 1991 with attachments.

All other parts of this license remain unchanged.

Date: June 26, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By: John Hoffelt
John Hoffelt
Environmental Specialist
Division of Radiological Health

Form RHB 8-74
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 6

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73013-F91 is amended to allow for decommissioning of the Oxford Tennelec/Nucleus building at 761 Emory Valley Road as follows:

To add Condition 24. This condition shall read as follows:

24. The licensee is authorized to decommission the Oxford Tennelec/Nucleus building at 761 Emory Valley Road as described and in accordance with statements, representations, and procedures contained in letter dated July 10, 1991.

To change Condition 20. This condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988 (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988 with attachments, August 6, 1988 (answers to EPA questions), August 13, 1988 with attachments, August 20, 1988 with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988 (Letter of Credit #572244 signed by Charles Lamb), January 5, 1990, January 19, 1990, December 20, 1990 with attachments, May 17, 1991 with attachments, June 18, 1991 with attachments, June 21, 1991 with attachments, and July 10, 1991.

All other parts of this license remain unchanged.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 6

License Number R-73013-F91

Date: July 11, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By: John Hoffelt
John Hoffelt
Environmental Specialist
Division of Radiological Health

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GROUP INC.

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 7

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with letters dated June 14, 1991 with attachments, telefax dated August 12, 1991 (7 pages), October 8, 1991, and October 11, 1991, your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 25. This condition shall read as follows:

25. The licensee is authorized to discharge radioactive wastes to the sanitary sewerage system as described and in accordance with statements, representations, and procedures contained in letters dated June 14, 1991 with attachments, telefax dated August 12, 1991 (7 pages), October 8, 1991, and October 11, 1991. The licensee, in making disposal of radioactive wastes to the sanitary sewerage system, shall do so in conformity with 1200-2-5-.18 of "State Regulations for Protection Against Radiation", except however, that all references to Schedule RHS 8-1, Table I, Column 2, shall now read Schedule RHS 8-1, Table II, Column 2. Also, any information concerning disposals under 1200-2-4-.18, as contained in correspondence listed in Condition 20 of this license, shall be deemed to reference the criteria of this Condition 25.

To change Condition 20. This condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988 (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 7

License Number R-73013-F91

dated June 3, 1988 with attachments, August 6, 1988 (answers to EPA questions), August 13, 1988 with attachments, August 20, 1988 with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988 (Letter of Credit #S72244 signed by Charles Lamb), January 5, 1990, January 19, 1990, December 20, 1990 with attachments, May 17, 1991 with attachments, June 18, 1991 with attachments, June 21, 1991 with attachments, July 10, 1991, June 14, 1991 with attachments, telefax dated August 12, 1991 (7 pages), October 8, 1991, and October 11, 1991.

All other parts of this license remain unchanged.

Date: October 14, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By: John Hoffelt
John Hoffelt
Environmental Specialist
Division of Radiological Health

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 8

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with letters dated May 30, 1991, June 20, 1991 with attachment, July 2, 1991, and October 9, 1991, your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 26. This condition shall read as follows:

26. The licensee is authorized to install and operate a HVAC air handling unit and associated equipment as described and in accordance with statements, representations, and procedures contained in letters dated May 30, 1991, June 20, 1991 with attachment, July 2, 1991, and October 9, 1991.

To change Condition 20. This condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988 (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988 with attachments, August 6, 1988 (answers to EPA questions), August 13, 1988 with attachments, August 20, 1988 with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988 (Letter of Credit #S72244 signed by Charles Lamb), January 5, 1990, January 19, 1990, December 20, 1990 with attachments, May 17, 1991 with attachments, June 18, 1991 with attachments, June 21, 1991 with attachments, July 10, 1991, June 14, 1991 with attachments, telefax dated August 12, 1991 (7 pages), October 8, 1991, October 11, 1991, May 30, 1991, June 20, 1991 with

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 8

License Number R-73013-F91

attachment, July 2, 1991, and October 9, 1991.

All other parts of this license remain unchanged.

Date: October 15, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By: John Hoffelt
John Hoffelt
Environmental Specialist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 9

 License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letters dated May 20, 1991, with attachments, November 12, 1991, with attachments, (including drawings and blueprints), and November 19, 1991 your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 27. This Condition will read as follows:

27. The licensee is authorized to install and operate an oil burning system in accordance with statements, representations and procedures contained in letters dated May 20, 1991, with attachments, November 12, 1991, with attachments, (including drawings and blueprints), and letter dated November 19, 1991.

    This Condition also recognizes the verbal permission granted on November 19, 1991 to begin operation of this system on a limited scale.

To change Condition 20. This Condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988, (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988, with attachments, August 6, 1988 (Answers to EPA Questions), August 13, 1988, with attachments, August 20, 1988, with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988, (Letter of Credit #S72244 signed by Charles Lamb), January 5, 1990, January 19, 1990, December 20, 1990, with attachments, May 17, 1991, with attachments, May 20, 1991, with attachments, May 30, 1991, June 14, 1991, with attachments, June 18, 1991, with attachments, June 20, 1991, with attachments, June 21, 1991, with attachments, July 2, 1991, July 10, 1991, with attachments, telefax

Form RHS 8-7A
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 9

 License Number R-73013-F91

dated August 12, 1991, with attachments, letters dated October 8, 1991, October 9, 1991, October 11, 1991 November 12, 1991, with attachments, (including drawings and blueprints), and November 19, 1991.

All other parts of this license remain unchanged.
Date November 19, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By

Robert N. Young
Health Physicist
Division of Radiological Health

(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 10

 License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letter dated April 20, 1992, and as requested by W. M. Hipsher and in accordance with his letter dated June 20, 1992, with attachment, (facility diagram), your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 28. This Condition will read as follows:

28. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

    1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

    2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

    3. Soil samples must be collected and analyzed at least quarterly along the edges of asphalt or concrete pads where radioactive materials are stored and along the perimeter fence to ensure that there is no buildup of radioactive contamination. Data from these

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 10

samples must be maintained for inspection by the Department.

4. The combined authorizations for processing and storage granted by this license shall not exceed a total of 19,761 square feet.

5. The combined authorizations for additional "out side" storage, not included in part 4 above, in accordance with statements and representations contained in letters dated April 20, 1992, and June 20, 1992, with attachment, granted by this license and Tennessee Radioactive Material License R-73008 shall not exceed a total of 25,000 square feet.

To change Condition 20. This Condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988, (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988, with attachments, August 6, 1988 (Answers to EPA Questions), August 13, 1988, with attachments, August 20, 1988, with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988, (Letter of Credit #S72244 signed by Charles Lamb), January 5, 1990. January 19, 1990, December 20, 1990, with attachments, May 17, 1991, with attachments, May 20, 1991, with attachments, May 30, 1991, June 14, 1991, with attachments, June 18, 1991, with attachments, June 20, 1991, with attachments. June 21, 1991, with attachments, July 2, 1991, July 10, 1991, with attachments, telefax dated August 12, 1991, with attachments, letters dated October 8, 1991, October 9, 1991, October 11, 1991 November 12. 1991, with attachments, (including drawings and blueprints), November 19, 1991, April 20, 1992, and June 20, 1992, with attachment.

Form RHS 6-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 10

 License Number R-73013-F91

All other parts of this license remain unchanged.
Date July 10, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-2A (10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 11

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

To clarify the parameters of radioactive material storage, your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 29. This Condition will read as follows:

29. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than one hundred eighty (180) days. Exceptions to this rule are as follows:

B. This condition includes "waste radioactive material" generated under the authority of this license.

C. This clarification of the nomenclature of Condition 29 is effective with the date of this amendment and allows the licensee ninety (90) days from the date of this amendment to comply with the provisions of this condition, including those concerning definition of materials and the length of storage times.

All other parts of this license remain unchanged.
Date August 20, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 12

Page 1 of 1 Pages **License Number R-73013-F91**

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 30. This Condition will read as follows:

30. Effective January 1, 1993, the licensee shall not accept either radioactive waste and / or items contaminated or potentially contaminated with licensable quantities of radioactive material or radioactive materials or items from licensable activities for repackaging, processing, refurbishing, storage pending disposal or disposal unless the shipper of such waste possesses a valid license for delivery issued pursuant to 1200-2-10-.32 of "State Regulations for Protection Against Radiation".

All other parts of this license remain unchanged.
Date November 10, 1992

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 13

Page 1 of 1 Pages

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

In accordance with our letter dated November 19, 1992, your Tennessee Radioactive Material License Number R-73013-F91 is amended as follows:

To add Conditions 31 and 32. These conditions will now read as follows:

31. Written assurances must be furnished by the facility shipping the radioactive material indicating that the facility may accept return of the material processed or unprocessed. In addition, for states outside the Southeast Compact the state or appropriate Compact must be a signatory to the Interregional Access Agreement for Waste Management or assurances shall be obtained from the appropriate state governor's office, the state radiation control program, and the appropriate Compact official, if any.

32. The licensee shall establish in every contractual obligation relating to radiaoctive materials the ability to return radioactive materials, processed or unprocessed, to the prior licensed or exempt possessor.

All other parts of this license remain unchanged.

Date January 12, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By Michael A. Page
Michael A. Page
Environmental Specialist
Division of Radiological Health

(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 14

 License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73013-F91 is amended to add a reference which includes your response to our letter of July 31, 1989:

Condition 20. is changed to add this reference. This Condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988, (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988, with attachments, August 6, 1988 (Answers to EPA Questions), August 13, 1988, with attachments, August 20, 1988, with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988, (Letter of Credit #S72244 signed by Charles Lamb), August 20, 1989, with attachment, January 5, 1990, January 19, 1990, December 20, 1990, with attachments, May 17, 1991, with attachments, May 20, 1991, with attachments, May 30, 1991, June 14, 1991, with attachments, June 18, 1991, with attachments, June 20, 1991, with attachments, June 21, 1991, with attachments, July 2, 1991, July 10, 1991, with attachments, telefax dated August 12, 1991, with attachments, letters dated October 8, 1991, October 9, 1991, October 11, 1991 November 12, 1991, with attachments, (including drawings and blueprints), November 19, 1991, April 20, 1992, and June 20, 1992, with attachment.

The addition of this reference is considered effective September 1, 1989.

(9-92)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 14

License Number R-73013-F91

All other parts of this license remain unchanged.
Date March 1, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 15

 License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letters dated January 22, 1993, with attachments, and June 2, 1993, and as requested by W. M. Hipsher and in accordance with his letter dated April 25, 1993, (received May 3, 1993), with attachments, your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 33. This Condition will read as follows:

33. Notwithstanding the authorization of Condition 27, the license is authorized to disassemble and temporarily store the oil burning system in an area located inside of the "Incinerator Building". The licensee shall not install and/or operate the oil burning system until such time as another area is authorized for its operation.

To change Items 10 A - N, and Conditions 20 and 27. These Items and these Conditions will now read as follows:

10 A - N. Incineration of radioactive wastes in accordance with statements, representations, and procedures contained in application dated May 20, 1988, and letters dated August 13, 1988, August 20, 1988, January 22, 1993, with attachments, April 25, 1993, (received May 3, 1993), with attachments and other correspondence referenced in Condition 20 of this license.

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988, (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988, with attachments, August 6, 1988 (Answers to EPA Questions), August 13, 1988, with attachments, August 20, 1988, with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988, (Letter of Credit #S72244 signed by Charles Lamb), August 20, 1989, with

(9-92)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 15

 License Number R-73013-F91

attachment, January 5, 1990, January 19, 1990, December 20, 1990, with attachments, May 17, 1991, with attachments, May 20, 1991, with attachments, May 30, 1991, June 14, 1991, with attachments, June 18, 1991, with attachments, June 20, 1991, with attachments, June 21, 1991, with attachments, July 2, 1991, July 10, 1991, with attachments, telefax dated August 12, 1991, with attachments, letters dated October 8, 1991, October 9, 1991, October 11, 1991 November 12, 1991, with attachments, (including drawings and blueprints), November 19, 1991, April 20, 1992, June 20, 1992, with attachment, January 22, 1993, with attachments, April 25, 1993, (received May 3, 1993), with attachments, and June 2, 1993.

All other parts of this license remain unchanged.
Date June 29, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 17

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by Steven T, Norris and in accordance with his letters dated September 8, 1993, with attachments, and September 15, 1993, with attachments, your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To add Condition 34. This Condition will read as follows:

34. The licensee is authorized to install and operate, on a temporary basis only, a "Submerged Combustion Evaporator (SCE)" in accordance with statements, representations, and procedures contained in letter dated September 8, 1993, with attachments, with the following provisions:

    a. Areas between the building door edge and the Sea-Land container housing the SCE shall be sealed and secured so as to restrict the flow of ambient air into the facility;

    b. At no time shall the unit be operated in such a fashion that the exhaust gases are expelled directly into the incinerator building, rather, exhaust gases shall be discharged via conduit to the facility's ventilation system; and,

    c. The area used for the SCE's cooling tower shall be bermed sufficiently to contain the total volume of liquid in the SCE's cooling system.

    This authorization will expire six (6) months from the date of this Amendment.

To change Condition 20. This Condition will now read as follows:

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988, (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988, with attachments, August 6, 1988 (Answers

(9-92)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 17

 License Number R-73013-F91

to EPA Questions), August 13, 1988, with attachments, August 20, 1988, with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988, (Letter of Credit #S72244 signed by Charles Lamb), August 20, 1989, with attachment, January 5, 1990, January 19, 1990, December 20, 1990, with attachments, May 17, 1991, with attachments, May 20, 1991, with attachments, May 30, 1991, June 14, 1991, with attachments, June 18, 1991, with attachments, June 20, 1991, with attachments, June 21, 1991, with attachments, July 2, 1991, July 10, 1991, with attachments, telefax dated August 12, 1991, with attachments, letters dated October 8, 1991, October 9, 1991, October 11, 1991 November 12, 1991, with attachments, (including drawings and blueprints), November 19, 1991, April 20, 1992, June 20, 1992, with attachment, January 22, 1993, with attachments, April 25, 1993, (received May 3, 1993), with attachments, June 2, 1993, February 10, 1993, April 16, 1993, with attachments, June 17, 1993, with attachments, (LOC# SB/3143), July 29, 1993, with attachments, and September 8, 1993, with attachments.

All other parts of this license remain unchanged.
Date September 27, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

(9-92)

AUG 1 6 1993

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 16

Page 1 of 3 Pages

License Number R-73013-F91

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by Walt Hipsher and in accordance with his letters dated February 10, 1993 and April 16, 1993, with attachments, and as requested by Samuel T. Pelchar and in accordance with his letter dated June 17, 1993, with attachments, (LOC# SB/3143), and as requested by H. W. Arrowsmith and in accordance with his letter dated July 29, 1993, with attachments, your Tennessee Radioactive Material License number R-73013-F91 is amended as follows:

To change Conditions 14., 20., 28., and 29.. These Conditions will now read as follows:

14. Radioactive material authorized by this license shall be used by, or under the supervision of, H. W. Arrowsmith, S.T. Norris, J.T. Pride, W.M. Hipsher, Marsha Wilson, J.E. Hess, Steve Sugarman, Angela McIntosh, B.S. Mays, Chris Jones, Jeffery Underwood, Kieth Jeter, Kirk Papa, D.B Jamieson, Bradley Moore, Pat Walsh, Donald Brackett, O. Meeuwis, E.A. Lloyd, Mitch Parker, R.L. Brackett, Don Neely, or Sam Clark.

    The Radiation Safety Officer for this license is Steve T. Norris.

20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated May 20, 1988, (including Radioactive Material License Application, NESHAPS Permit Application, and Air Pollution Control Permit Application), and letters dated June 3, 1988, with attachments, August 6, 1988 (Answers to EPA Questions), August 13, 1988, with attachments, August 20, 1988, with attachments, November 23, 1988 (EPA NESHAPS approval signed by Winston A. Smith), December 6, 1988, December 15, 1988, (Letter of Credit #S72244 signed by Charles Lamb), August 20, 1989, with attachment, January 5, 1990, January 19, 1990, December 20, 1990, with attachments, May 17, 1991, with attachments, May 20, 1991, with attachments, May 30, 1991, June 14, 1991, with attachments, June 18, 1991, with attachments, June 20, 1991, with attachments, June 21, 1991, with attachments, July 2, 1991, July 10, 1991, with attachments, telefax dated August 12, 1991, with attachments, letters dated October 8, 1991, October 9, 1991, October 11, 1991 November 12, 1991, with attachments, (including drawings and blueprints), November 19, 1991,

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 16

April 20, 1992, June 20, 1992, with attachment, January 22, 1993, with attachments, April 25, 1993, (received May 3, 1993), with attachments, June 2, 1993, February 10, 1993, April 16, 1993, with attachments, June 17, 1993, with attachments, (LOC# SB/3143), and July 29, 1993, with attachments.

28. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

    1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

    2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

    3. Soil samples must be collected and analyzed at least quarterly along the edges of asphalt or concrete pads where radioactive materials are stored and along the perimeter fence to ensure that there is no buildup of radioactive contamination. Data from these samples must be maintained for inspection by the Department.

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 16

License Number R-73013-F91

29. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than three hundred sixty five (365) days.

B. This condition includes "waste radioactive material" generated under the authority of this license.

All other parts of this license remain unchanged.
Date August 16, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

FORM RHS 6-7

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

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AMENDMENT 34

RADIOACTIVE MATERIAL LICENSE

Pursuant to Tennessee Department of Health and Environment Regulations, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, aquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules and regulations of the Tennessee Department of Health and Environment and orders of the Division of Radiological Health, now or hereafter in effect and to any conditions specified below.

LICENSEE	
1. Name: Scientific Ecology Group, Inc.	3. License number: R-73008-E94 Amended in its entirety
2. Address: P.O. Box 2530 1560 Bear Creek Rd. Oak Ridge, TN 37830	4. Expiration date: May 31, 1994 5. File no.: R-73008

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or physical form	9. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.
	SEE SUPPLEMENTARY SHEETS	

10. Authorized Use

SEE SUPPLEMENTARY SHEETS

CONDITIONS

11. Unless otherwise specified, the authorized place of use is the licensee's address stated in item 2. above.

SEE SUPPLEMENTARY SHEETS

Date of Issuance May 15, 1989

For the Commissioner
Tennessee Department of Health and Environment

By: Elisabeth Stetas
DIVISION OF RADIOLOGICAL HEALTH

000287

TDPH-ORH
PH-0382 Rev 6/93

Form RHS 6-7A
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

 License Number R-73008-E94

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or Physical Form	9. Maximum Radioactivity and/or Quantity of Material Which Licensee May Possess at Any One Time
A. Mixed activation and fission products with atomic numbers 3-83 inclusive, (not C-14).	A. Any form as suitable for transport under U.S. DOT Regulations.	A. 200 Curies
B. Hydrogen 3	B. Same as A	B. 330 Curies
C. Carbon 14	C. Same as A	C. 110 Curies
D. Radium 226	D. Same as A	D. 11 Curies
E. Thorium 232	E. Same as A	E. 11 Curies
F. Uranium-depleted and natural	F. Same as A	F. 110 Curies
G. Uranium 233	G. Same as A	G. Combined possession limit for SEG licenses #R-73013-A91 and #R-73008-E94 200 grams*
H. Uranium 235	H. Same as A	H. Combined possession limit for SEG licenses #R-73013-A91 and #R-73008-E94 350 grams*

*For each kind of special nuclear material determine the ratio between the quantity of that special nuclear material and the quantity specified here for the same kind of special nuclear material. The sums of such ratios for all kinds of special nuclear material in combination shall not exceed "1" (i.e., unity).

Form RHS 8-76
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

 License Number R-73008-E94

I. Plutonium	I. Same as A	I. Combined possession limit for SEG licenses #R-73013-A91 and #R-73008-E94 200 grams*
J. Americium 241	J. Same as A	J. 250 Curies
K. Transuranics, (not Pu or Am-241)	K. Same as A	K. 1.1 Curies
L. Radioactive materials with atomic numbers 84 through 91 inclusive, (not Po-210, Ra-226, or Th-232).	L. Same as A	L. 1.1 Curies
M. Polonium 210	M. Same as A	M. 11 Curies
N. Uranium (not U-233, U-235, or U-238)	N. Same as A	N. 1.1 Curies
O. Cobalt 60	O. Sealed Source	O. One (1) source of 155 microcuries
P. Cobalt 60	P. Sealed Source	P. One (1) source of 1.76 Curies
Q. Cobalt 60	Q. Sealed Source	Q. One (1) source of 10 microcuries

*For each kind of special nuclear material determine the ratio between the quantity of that special nuclear material and the quantity specified here for the same kind of special nuclear material. The sums of such ratios for all kinds of special nuclear material in combination shall not exceed "1" (i.e., unity).

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

 License Number R-73008-E94

R. Americium 241	R. Sealed Source	R. One (1) source of 80 nanocuries
S. Cesium 137	S. Sealed Source	S. One (1) source of 2.95 Curies
T. Cesium 137	T. Sealed Source	S. One (1) source of 1.2 Curies

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10. Authorized Use

A. through N. Receipt, possession, storage, unpackaging, processing, repackaging, and loading for transport in accordance with application dated January 4, 1989 and specific authorizing conditions of this license.

See authorizing conditions for specifically authorized processes.

O. through T. Instrument standardization and calibration.

12. The licensee is authorized to sort and blend contaminated materials in accordance with statements, representations, and procedures contained in application dated January 4, 1989.

13. The licensee is authorized to shear and shred materials in accordance with application dated January 4, 1989, and letters dated November 5, 1986, with attachments, November 11, 1986, with attachments, December 31, 1986, and January 21, 1987, with attachments.

14. The licensee is authorized to cut, section and join materials in accordance with statements, representations and procedures contained in application dated January 4, 1989.

15. The licensee is authorized to perform precompaction and compaction in accordance with statements, representations and procedures contained in application dated January 4, 1989, and letters dated August 29, 1988, with attachments, and October 3, 1988.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

 License Number R-73008-E94

16. The licensee is authorized to perform limited decontamination in accordance with statements, representations and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachment, November 11, 1986, and August 12, 1988, with attachments, and September 23, 1988.

17. The licensee is authorized to perform liquid and granular processing in accordance with statements, representations and procedures contained in application dated January 4, 1989.

18. The licensee is authorized to perform metal smelting for the purposes of research and development only. R&D smelting shall be performed in accordance with statements, representations and procedures contained in application dated January 4, 1989, and letters dated November 26, 1988, with attachments, and November 30, 1988.

19. The licensee is authorized to perform aluminum smelting in accordance with statements, representations and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, October 28, 1986, with attachments, November 11, 1986, January 14, 1987, January 21, 1987, with attachment.

20. The licensee is authorized to release materials for unrestricted use in accordance with application dated January 4, 1989 provided that only surface contamination is present on the materials and that these materials meet the criteria set forth in Regulatory Guide 1.86.

21. The licensee is authorized to burn waste oils in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated November 4, 1987, with attachment, December 3, 1987, December 14, 1987, December 29, 1987, April 8, 1988, July 7, 1988, August 25, 1988, with attachment, and October 3, 1988.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34
Page Revised 7/10/89

SUPPLEMENTARY SHEET

22. The licensee is authorized to perform instrument calibrations, leak testing of sealed sources, and analytical services in accordance with application dated January 4, 1989, and letters dated November 11, 1986, and October 5, 1988, with attachments (pp. 24-26).

    The tests for leakage shall be capable of detecting 0.005 microcurie of contamination on the test sample, or in the case of radium, the escape of radon at the rate of 0.001 microcurie per 24 hours. The customer shall be furnished a report of leak test results in units of microcuries.

    If the test reveals the presence of removable contamination equivalent to or greater than 0.005 microcurie, or in the case of radium the escape of radon at the rate of 0.001 microcurie or more per 24 hours, the customer of the licensee shall be informed of the Department's requiremnts as follows: "The licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Department regulations.

    A report shall be filed within five days of the test with the Division of Radiological Health, Department of Health and Environment, 150 Ninth Avenue, North, Nashville, Tennessee 37219-5404, describing the equipment involved, the test results, and the corrective action taken."

23. Radioactive material authorized by this license shall be used only at Lot 5, Clinch River Industrial Park, 1560 Bear Creek Road, Oak Ridge, TN 37830.

24. The licensee shall comply with applicable provisions of 1200-2-4, 1200-2-5, 1200-2-10, and 1200-2-11, of "State Regulations for Protection Against Radiation".

25. A. Radioactive material authorized by this license shall be used by, or under the supervision of H.W. Arrowsmith, S.T. Norris, J.T. Pride, R.P. Williams, W.M. Hipsher, J.R. Odell, Terry Schubert, Kim Everett, or Marsha Wilson.

    B. The Radiation Safety Officer for this license is Walt M. Hipsher.

26. A. The combined concentrations in gaseous effluents from the Central Volume Reduction Facility authorized by this license and the incinerator facility authorized under license R-73013-A91 shall not exceed the limits specified for air in Schedule RHS 8-1, Table II, Column 1 of "State Regulations for Protection Against Radiation".

FORM RHS 5-7
7-83

7590

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 16

Pursuant to Tennessee Department of Health and Environment Regulations, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, aquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules and regulations of the Tennessee Department of Health and Environment and orders of the Division of Radiological Health, now or hereafter in effect and to any conditions specified below.

LICENSEE	
1. Name	Scientific Ecology Group
2. Address	Building 3, Route 3 Kingston, TN 37763

3. License number	R-73006-G94
4. Expiration date	July 31, 1994
5. File no.	R-73006

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or physical form	9. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.
	SEE SUPPLEMENTARY SHEETS	

10. Authorized Use

SEE SUPPLEMENTARY SHEETS

CONDITIONS

11. Unless otherwise specified, the authorized place of use is the licensee's address stated in item 2. above.

SEE SUPPLEMENTARY SHEETS

Date of Issuance July 31, 1989

For the Commissioner
Tennessee Department of Health and Environment

By: Elisabeth Stetas
DIVISION OF RADIOLOGICAL HEALTH

TDPH-DRH
PH-0382 Rev 6/83

Form RHS 8-7A
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 16

SUPPLEMENTARY SHEET

 License Number R-73006-G94

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or Physical Form	9. Maximum Radioactivity and/or Quantity of Material Which Licensee May Possess at Any One Time
A. Mixed activation and fission products with atomic numbers 3-83 inclusive, (not C-14).	A. Any form as suitable for transport under U.S. DOT Regulations.	A. 200 Curies
B. Hydrogen 3	B. Same as A	B. 330 Curies
C. Carbon 14	C. Same as A	C. 110 Curies
D. Radium 226	D. Same as A	D. 11 Curies
E. Thorium 232	E. Same as A	E. 11 Curies
F. Uranium-depleted and natural	F. Same as A	F. 110 Curies
G. Uranium 233	G. Same as A	G. 200 grams*
H. Uranium 235	H. Same as A	H. 350 grams*
I. Plutonium	I. Same as A	I. 200 grams*
J. Americium 241	J. Same as A	J. 250 Curies

*For each kind of special nuclear material determine the ratio between the quantity of that special nuclear material and the quantity specified here for the same kind of special nuclear material. The sums of such ratios for all kinds of special nuclear material in combination shall not exceed "1" (i.e., unity).

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 16

SUPPLEMENTARY SHEET

 License Number R-73006-G94

K. Transuranics, (not Pu or Am-241)	K. Same as A	K. 1.1 Curies
L. Radioactive materials with atomic numbers 84 through 91 inclusive, (not Po-210, Ra-226, or Th-232).	L. Same as A	L. 1.1 Curies
M. Polonium 210	M. Same as A	M. 11 Curies
N. Uranium (not U-233, U-235, or U-238)	N. Same as A	N. 1.1 Curies

10. Authorized Use

A. through N. Receipt, possession, storage, and transfer of radioactive waste when packaged in accordance with U.S. Department of Transportation requirements for interstate commerce in accordance with application dated September 14, 1987. In addition, the storage of contaminated equipment within the fenced area inside of Building #3 is authorized provided such equipment is packaged in wooden or metal containers or wrapped in plastic in accordance with letter dated July 26, 1989.

12. The licensee shall comply with applicable provisions of 1200-2-4, 1200-2-5, 1200-2-10, and 1200-2-11, of "State Regulations for Protection Against Radiation".

13. A. Radioactive material authorized by this license shall be used by, or under the supervision of H.W. Arrowsmith, S.T. Norris, J.T. Pride, R.P. Williams, W.M. Hipsher, J.R. Odell, Terry Schubert, Kim Everett, or Marsha Wilson.

B. The Radiation Safety Officer for this license is Walt M. Hipsher.

14. A. No radioactive material may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater that 180 days. Exceptions to this rule are as follows:

1. Liquids may not be stored at the Building 3 facility for for a period of time greater than 30 days.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 16

SUPPLEMENTARY SHEET

2. Radioactive wastes as soil or other granular materials, which are consumed in the disposal processes at the CVRF, may be possessed on site for a period not to exceed 365 days.

B. No radioactive material may be stored so as to exceed the following package stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high

15. Radioactive material may be stored outside of Building 3 within the perimeter fence provided that radiation levels authorized for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in 49 CFR 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of Building 3:

1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed 15 days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

3. Soil samples must be collected and analyzed at least quarterly along the edge of the concrete or asphalt pad where radioactive materials are stored to ensure that there is no build up of radioactive contamination. Data from these samples shall be maintained for inspection by the Department.

In addition radioactive material may be stored inside Building #3 provided it is stored in Sea-land containers in accordance with letter dated November 1, 1988.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 16

SUPPLEMENTARY SHEET

The combined space authorized for outside storage and storage within Building #3 under licenses R-73006-G94 and R-73008-E94 shall not exceed 50,000 square feet.

16. The licensee is authorized to store empty containers in areas not covered by financial assurance in accordance with statements, representations, and procedures contained in letters dated May 29, 1987, and November 1, 1988. Average radiation levels from these boxes shall not exceed 0.6 mR/hr, and hot spot activity shall not exceed 2 mR/hr. Such containers in storage shall meet any other more restrictive criteria for shipment required by the United States Department of Transportation regulations.

    These empty containers must be stored in a location that is easily identifiable.

17. The licensee shall maintain complete and accurate records of the receipt and disposal of radioactive material. The licensee shall, for radioactive material no longer useful for any purpose and for any equipment or supplies contaminated with such material for which further use and decontamination are not planned, define those materials as radioactive waste and treat them as such in accordance with the following provisions:

    A. Radioactive waste material shall not be stored with non-radioactive waste.

    B. A written record of all radioactive waste material shall be maintained until it has been determined by a suitable survey or radioassay that it has decayed to background levels or until it has been shipped to an authorized recipient in accordance with applicable regulations. Accountability of radioactive waste material prepared for shipment but not yet shipped from the licensee's premises shall be maintained by the licensee by an internal record system such that the licensee is constantly aware of the material's location and the proposed time of shipment. Individuals who are involved in the shipping of such material and/or the storage of such material prior to shipment, shall be trained in the precautions necessary for such handling and storage.

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RADIOACTIVE MATERIAL LICENSE

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SUPPLEMENTARY SHEET

C. For material which has decayed to background levels as determined by radioassay or external level as measured with appropriately calibrated instruments, records shall indicate that the material was determined to be no longer radioactive and will indicate the methods and results of the survey or analysis.

D. Shipment records of radioactive waste material shall be maintained and the licensee shall require written confirmation from the authorized recipient of such material that this material has been received.

E. Transfer of radioactive waste to a land disposal facility or a licensed waste handler shall be done in accordance with 1200-5-.17 of "State Regulations for Protection Against Radiation."

F. All records and written confirmations required by this condition shall be maintained for inspection by the Department.

The requirements of this condition are in addition to any other requirements for the handling and/or disposal of radioactive material contained in this license and "State Regulations for Protection Against Radiation".

18. Except for plutonium contained in a medical device designed for individual human application, no plutonium, regardless of form, shall be delivered to a carrier for shipment by air transport or transported in an aircraft by the licensee except in packages the design of which the NRC has specifically approved for transport of plutonium by air.

19. The licensee shall not receive for storage or processing any radioactive material that originated from a facility in a State which has been denied access to the operating low level radioactive waste disposal facilities pursuant to the 1985 Low-Level Radioactive Waste Policy Amendments Act.

The licensee must ascertain the status of the State in which each facility is located in order to show compliance with this amendment. Radioactive material in the licensee's possession at the time that access is denied

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may be processed and stored in accordance with the time limitations contained in Condition 29 of this license. Prior to exceeding this time limit the licensee shall return the radioactive material to the prior licensed possessor. If the State's access has been restored prior to the expiration of the time limits, material may be transferred to the disposal facility.

20. The licensee shall establish in every contractual obligation relating to radioactive materials the ability to return radioactive materials, processed or unprocessed, to the prior licensed possessor.

21. No provision of this license relieves the licensee from compliance with other Federal, State, and local laws, ordinances, and regulations applicable to the licensee's activities.

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, drawings and procedures contained in application dated September 14, 1987, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments (pp. 27-32), October 10, 1988, November 1, 1988, and June 7, 1989, and July 26, 1989.

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 17

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H.W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License #R-73006-G94 is amended as follows:

To add Condition 23. This condition will read as follows:

23. Radioactive material authorized by this license shall be stored at the SEG Building #3, Route 3, Kingston, TN 37763 in accordance with statements, representations and procedures contained in letters and documents referenced in Condition 22 of this license.

To change Item 2. This item will now read as follows.

2. P.O. Box 2530
Oak Ridge, TN 37830-2530

To change Condition 19. This condition will now read as follows:

19. The licensee shall not receive for storage or processing any radioactive material that originated from a facility in a State which has been denied access to the operating low level radioactive waste disposal facilities pursuant to the 1985 Low-Level Radioactive Waste Policy Amendments Act.

The licensee must ascertain the status of the State in which each facility is located in order to show compliance with this amendment. Radioactive

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

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AMENDMENT 17

material in the licensee's possession at the time that access is denied may be processed and stored in accordance with the time limitations contained in Condition 14 of this license. Prior to exceeding this time limit the licensee shall return the radioactive material to the prior licensed possessor. If the State's access has been restored prior to the expiration of the time limits, material may be transferred to the disposal facility.

This condition is waived if written assurances are furnished by the facility shipping the radioactive material indicating that the facility may accept return of the material, processed or unprocessed. Such assurances shall be obtained from the appropriate state governor's office, the state radiation control program; and the appropriate Compact official, if any.

All other parts of this license remain unchanged.

Date October 16, 1989

For the Commissioner
Tennessee Department of Health
and Environment

By Michael H. Mobley
Michael H. Mobley
Director
Division of Radiological Health

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(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 18

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by H.W. Arrowsmith and in accordance with his letters dated January 11, 1990, with attachments, February 24, 1990, with attachments, and April 25, 1990, with attachment, (Letter of Credit) and as requested by Steve Norris and in accordance with his letter dated May 23, 1990, with attachments and as requested by W.M. Hipsher and in accordance with his letter dated July 20, 1990, (as amended), with attachment, your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To add Condition 24. This Condition will read as follows:

24. The licensee is authorized to store contaminated equipment and empty radioactive waste boxes at the "Building 3/4/5" facility in accordance with statements representations, and procedures contained in letters dated January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, and July 20, 1990, (as amended), with attachment, provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the criteria and restrictions referenced in Condition 15 of this license must be adhered to whenever radioactive materials are stored at the "Building 3/4/5" facility.

To change Conditions 15 and 22. These Conditions will now read as follows:

15. Radioactive material may be stored outside of Building #3 within the perimeter fence provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of Building #3:

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 18

 License Number R-73006-G94

1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

3. Soil samples must be collected and analyzed at least quarterly along the edges of asphalt or concrete pads where radioactive materials are stored and along the perimeter fence as shown in drawing attached to letter dated May 23, 1990 to ensure that there is no buildup of radioactive contamination. Data from these samples must be maintained for inspection by the Department.

In addition, radioactive material may be stored inside of Building #3 provided it is stored in Sea-land containers or shipping casks and associated equipment in accordance with letters dated November 1, 1988 and July 20, 1990.

The combined authorizations for storage granted by this license shall not exceed a total of 71,428 square feet.

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements representations, and procedures contained in application dated September 14, 1987, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, and July 20, 1990, (as amended), with attachment.

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DIVISION OF RADIOLOGICAL HEALTH

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RADIOACTIVE MATERIAL LICENSE

Amendment 18

Page 3 of 3 Pages License Number R-73006-G94

All other parts of this license remain unchanged.

Date August 22, 1990

For the Commissioner
Tennessee Department of Health
and Environment

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 19

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letters dated December 14, 1990, and January 11, 1991, with attachment, your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To add Condition 25. This Condition will read as follows:

25. The licensee is authorized to open empty radioactive material transpor containers and perform radiological surveys and monitoring, quality assurance inspections, and minor container refurbishment (as defined in letter dated December 14, 1990) in accordance with statements, representations, and procedures contained in letters dated December 14, 1990, and January 11, 1991, with attachment.

To change Condition 22. This condition will now read as follows:

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated September 14, 1987, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, December 14, 1990, and January 11, 1991, with attachment.

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 19

Page 2 of 2 Pages License Number R-73006-G94

All other parts of this license remain unchanged.

Date February 1, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves

Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

000306

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 20

License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with application dated August 15, 1990, with attachments, and his letters dated August 15, 1990, October 15, 1990, with attachment, and December 14, 1990, with attachment, and in accordance with letters from Walt Hipsher dated February 26, 1991, and April 5, 1991, your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To add Conditions 26 and 27. These conditions will read as follows:

26. The licensee is authorized to open radioactive material transport containers in Building 3 and perform the types of activities specified in application dated August 15, 1990, with attachments. These activities shall be performed in accordance with statements, representations, and procedures contained in application dated August 15, 1990, with attachments, and letters dated February 26, 1991, and April 5, 1991.

27. The licensee is authorized to receive process equipment and perform in Building 3 the types of activities specified in application dated August 15, 1990, with attachments. These activities shall be performed in accordance with statements, representations, and procedures contained in application dated August 15, 1990, with attachments, and letter dated February 26, 1991.

To delete Condition 25. This condition is hereby deleted.

To change Items 10. A through N and Conditions 13 and 22. These items and these conditions will now read as follows:

10. A through N. Receipt, possession, storage, and transfer of radioactive waste when packaged in accordance with U. S. Department of Transportation requirements for interstate commerce in accordance with application dated September 14, 1987. Receipt, possession, storage, and transfer of radioactive material associated with transport container opening and process equipment activities in accordance with application dated August 15, 1990, with attachments, and letters dated February 26, 1991, and April 5, 1991. In addition, the storage of contaminated equipment within the fenced area inside of Building 3 is authorized provided such equipment is packaged in wooden or metal containers or wrapped in plastic in accordance with letter dated July 26, 1989.

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 20

 License Number R-73006-G94

13. A. Radioactive material authorized by this license shall be used by, or under the supervision of, H. W. Arrowsmith, S. T. Norris, J. T. Pride, R. P. Williams, W. M. Hipsher, J. R. Odell, Terry Schubert, Kim Everett, Marsha Wilson, J. E. Hess, Donald S. Brackett, Laura Ayers, Stephen L. Sugarman, Kirk Papa, or Gary L. Fausett.

    B. The Radiation Safety Officer for this license is Walt M. Hipsher.

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in applications dated September 14, 1987, and August 15, 1990, with attachments, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, August 15, 1990, October 15, 1990, with attachment, December 14, 1990, (two letters, one with attachment), January 11, 1991, with attachment, February 26, 1991, and April 5, 1991.

All other parts of this license remain unchanged.

Date April 10, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By Charles Arnott

Charles Arnott
Health Physicist
Division of Radiological Health

000308

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 21

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by W. M. Hipsher and in accordance with his letter dated July 30, 1991, with attachments, your Tennessee Radioactive Material License Number R-73006-G94 is amended as follows:

To add Condition 28. This condition will read as follows:

28. The licensee is authorized to inspect, operationally test with non-radioactive waste, clean, and maintain the Mobile Dry Active Waste Handling/Compactor referred to as "SAVEPAK" inside Building 3 until the containment enclosures previously approved by Amendment 20 of this license are constructed. These activities shall be performed in accordance with statements, representations, and procedures contained in application dated August 15, 1990, with attachments, and letters dated February 26, 1991, and July 30, 1991, with attachments.

To change Items 10. A through N and Condition 22. These items and this condition will now read as follows:

10. A through N. Receipt, possession, storage, and transfer of radioactive waste when packaged in accordance with U. S. Department of Transportation requirements for interstate commerce in accordance with application dated September 14, 1987. Receipt, possession, storage, and transfer of radioactive material associated with transport container opening, process equipment activities, and SAVEPAK system activities in accordance with application dated August 15, 1990, with attachments, and letters dated February 26, 1991, April 5, 1991, and July 30, 1991, with attachments. In addition, the storage of contaminated equipment within the fenced area inside of Building 3 is authorized provided such equipment is packaged in wooden or metal containers or wrapped in plastic in accordance with letter dated July 26, 1989.

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 21

 License Number R-73006-G94

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in applications dated September 14, 1987, and August 15, 1990, with attachments, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, August 15, 1990, October 15, 1990, with attachment, December 14, 1990, (two letters, one with attachment), January 11, 1991, with attachment, February 26, 1991, April 5, 1991, and July 30, 1991, with attachments.

All other parts of this license remain unchanged.

Date August 5, 1991

For the Commissioner
Tennessee Department of
Environment and Conservation

By Charles Arnott

Charles Arnott
Health Physicist
Division of Radiological Health

FORM RHS E-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 22

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by W.M. Hipsher and in accordance with his letters dated May 1, 1992, and May 26, 1992, your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To change Items 10. A through N and Condition 22. These items and this condition will now read as follows:

10. A through N. Receipt, possession, storage, and transfer of radioactive waste when packaged in accordance with U. S. Department of Transportation requirements for interstate commerce in accordance with application dated September 14, 1987. Receipt, possession, storage, and transfer of radioactive material associated with transport container opening, process equipment activities, and SAVEPAK system activities in accordance with application dated August 15, 1990, with attachments, and letters dated February 26, 1991, April 5, 1991, and July 30, 1991, with attachments. In addition, the storage of contaminated equipment within the fenced area inside of Building 3 or Building 4 is authorized provided such equipment is packaged in wooden or metal containers, wrapped in plastic, sealed to prevent the spread of contamination, or fixed in such a way as to prevent the spread of contamination from external surfaces in accordance with letters dated May 1, 1992 and May 26, 1992.

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in applications dated September 14, 1987, and August 15, 1990, with attachments, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, August 15, 1990, October 15, 1990, with attachment, December 14, 1990, (two letters, one with attachment), January 11, 1991, with attachment, February 26, 1991, April 5, 1991, July 30, 1991, with attachments, May 1, 1992, and May 26, 1992.

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 22

 License Number R-73006-G94

All other parts of this license remain unchanged.

Date June 22, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 6-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 23 CORRECTED COPY

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by H.W. Arrowsmith, and in accordance with his letter dated April 27, 1992, with attachments and as requested by W.M. Hipsher, and in accordance with his letters dated June 2, 1992, with attachments, August 4, 1992, with attachments, (including drawings), your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To add Condition 29. This Condition will read as follows:

29. The licensee is authorized to process wet radioactive waste material by either solidification or dewatering in accordance with statements, representations, and procedures contained in letters dated April 27, 1992, with attachments, June 2, 1992, with attachments, August 4, 1992, with attachments, (including drawings).

To change Item 9A. and Condition 22. This Item and this Condition will now read as follows:

9A. 400 Curies

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in applications dated September 14, 1987, and August 15, 1990, with attachments, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, August 15, 1990, October 15, 1990, with attachment, December 14, 1990, (two letters, one with attachment), January 11, 1991, with attachment, February 26, 1991, April 5, 1991, July 30, 1991, with attachments, May 1, 1992, May 26, 1992, April 27, 1992, with attachments, June 2, 1992, with attachments, August 4, 1992, with attachments, (including drawings).

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 23 CORRECTED COPY

 License Number R-73006-G94

All other parts of this license remain unchanged.

Date August 10, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By

Robert N. Young
Health Physicist
Division of Radiological Health

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(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 24

License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

To clarify the parameters of radioactive material storage addressed in Condition 14 of your Tennessee Radioactive Material License number R-73006-G94, this license is amended as follows:

To change Condition 14. This condition will now read as follows:

14. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than one hundred eighty (180) days. Exceptions to this rule are as follows:

1. Liquids may not be stored at the "Building 3/4/5" facility for a period of time greater than 30 days.

2. Radioactive wastes as soil or other granular materials or liquids which are consumed in the disposal process, may be possessed on site for a period not to exceed 365 days.

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high

C. This condition also includes "waste radioactive material" generated under the authority of this license.

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 24

 License Number R-73006-G94

D. This clarification of the nomenclature of Condition 29 is effective with the date of this amendment and allows the licensee ninety (90) days from the date of this amendment to comply with the provisions of this condition, including those concerning definition of materials and the length of storage times.

All other parts of this license remain unchanged.
Date August 20, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 25

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License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To add Condition 30. This Condition will read as follows:

30. Effective January 1, 1993, the licensee shall not accept either radioactive waste and / or items contaminated or potentially contaminated with licensable quantities of radioactive material or radioactive materials or items from licensable activities for repackaging, processing, refurbishing, storage pending disposal or disposal unless the shipper of such waste possesses a valid license for delivery issued pursuant to 1200-2-10-.32 of "State Regulations for Protection Against Radiation".

All other parts of this license remain unchanged.

Date November 10, 1992

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 26

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by H.W. Arrowsmith and in accordance with his letter dated April 26, 1993, your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To change Conditions 14. and 22. These Conditions will now read as follows:

14. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than one hundred eighty (180) days. Exceptions to this rule are as follows:

1. Liquids may not be stored at the "Building 3/4/5" facility for a period of time greater than 30 days.

2. Radioactive wastes as soil or other granular materials or liquids which are consumed in the disposal process, may be possessed on site for a period not to exceed 365 days.

3. Equipment, specifically licensed or otherwise authorized, and stored on-site for future use: (1) at a location authorized by a Scientific Ecology Group, Inc. Tennessee Radioactive Material License or (2) at a location where such equipment is authorized by the agency having jurisdiction.

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Type	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high
5. Any other strong tight container.	10 feet nominal

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(10-85)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 26

 License Number R-73006-G94

C. This condition also includes "waste radioactive material" generated under the authority of this license.

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in applications dated September 14, 1987, and August 15, 1990, with attachments, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, August 15, 1990, October 15, 1990, with attachment, December 14, 1990, (two letters, one with attachment), January 11, 1991, with attachment, February 26, 1991, April 5, 1991, July 30, 1991, with attachments, May 1, 1992, May 26, 1992, April 27, 1992, with attachments, June 2, 1992, with attachments, August 4, 1992, with attachments, (including drawings), and April 26, 1993.

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ll other parts of this license remain unchanged.

ıte July 19, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 27

License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by Walt Hipsher and in accordance with his letter dated April 16, 1993, with attachments, and as requested by H.W. Arrowsmith and in accordance with his letter dated July 29, 1993, with attachments, your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To change Conditions 14., 20., and 22. These Conditions will now read as follows:

14. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than three hundred sixty five (365) days. Exceptions to this rule are as follows:

1. Liquids may not be stored at the "Building 3/4/5" facility for a period of time greater than 30 days.

2. Equipment, specifically licensed or otherwise authorized, and stored on-site for future use: (1) at a location authorized by a Scientific Ecology Group, Inc. Tennessee Radioactive Material License or (2) at a location where such equipment is authorized by the agency having jurisdiction.

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 27

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Type	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high
5. Any other strong tight container.	10 feet nominal

C. This condition also includes "waste radioactive material" generated under the authority of this license.

20. Radioactive material authorized by this license shall be used by, or under the supervision of, H. W. Arrowsmith, S.T. Norris, J.T. Pride, W.M. Hipsher, Marsha Wilson, J.E. Hess, Steve Sugarman, Angela McIntosh, B.S. Mays, Chris Jones, Jeffery Underwood, Kieth Jeter, Kirk Papa, D.B Jamieson, Bradley Moore, Pat Walsh, Donald Brackett, O. Meeuwis, E.A. Lloyd, Mitch Parker, R.L. Brackett, Don Neely, or Sam Clark.

The Radiation Safety Officer for this license is Steve T. Norris.

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in applications dated September 14, 1987, and August 15, 1990, with attachments, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, August 15, 1990, October 15, 1990, with attachment, December 14, 1990, (two letters, one with attachment), January 11, 1991, with attachment, February 26, 1991, April 5, 1991, July 30, 1991, with attachments, May 1, 1992, May 26, 1992, April 27, 1992, with attachments, June 2, 1992, with attachments, August 4, 1992, with attachments, (including drawings), April 16, 1993, with attachments, April 26, 1993, and July 29, 1993, with attachments.

(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 27

Page 3 of 3 Pages License Number R-73006-G94

All other parts of this license remain unchanged.

Date August 16, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 28

 License Number R-73006-G94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2560

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by W.M. Hipsher, and in accordance with his letter dated November 2, 1993, with attachments, March 16, 1993, with attachments, and August 4, 1993, with attachments, and as requested by Steve Norris and in accordance with his letter dated September 20, 1993, with attachments, your Tennessee Radioactive Material License number R-73006-G94 is amended as follows:

To add Condition 31. This Condition will read as follows:

31. The licensee is authorized to install and operate the Low Level Waste Assay (LLWA) system for the purposes of survey and unrestricted release of Dry Active Waste (DAW) which has been received from customers who have classified the waste in accordance with a Waste Characterization plan in accordance with "Title 10, Code of Federal Regulations, Part 61". The licensee shall be provided with this characterization and shall make appropriate reviews to determine its acceptability. All records of characterization, survey, and release of DAW shall be maintained for inspection by the Department.

    The LLWA system shall be operated in accordance with statements, representations, and procedures contained in letters dated November 2, 1993, with attachments, March 16, 1993, with attachments, August 4, 1993, with attachments, and September 20, 1993, with attachments. As stated in the letters referenced above this reference material is considered by the licensee to be proprietary in nature and will be maintained by the Department in accordance with 'State Regulations for Protection Against Radiation (SRPAR)' 1200-2-4-.10.

(10-85)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 28

 License Number R-73006-G94

To change Condition 22. This Condition will now read as follows:

22. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in applications dated September 14, 1987, and August 15, 1990, with attachments, and letters dated May 29, 1987, January 29, 1988, March 8, 1988, October 5, 1988, with attachments, (pp. 27-32), October 10, 1988, November 1, 1988, June 7, 1989, July 26, 1989, January 11, 1990, with attachments, February 24, 1990, with attachments, April 25, 1990, with attachment, (Letter of Credit), May 23, 1990, with attachments, July 20, 1990, (as amended), with attachment, August 15, 1990, October 15, 1990, with attachment, December 14, 1990, (two letters, one with attachment), January 11, 1991, with attachment, February 26, 1991, April 5, 1991, July 30, 1991, with attachments, May 1, 1992, May 26, 1992, April 27, 1992, with attachments, June 2, 1992, with attachments, August 4, 1992, with attachments, (including drawings), April 16, 1993, with attachments, April 26, 1993, July 29, 1993, with attachments, November 2, 1993, with attachments, March 16, 1993, with attachments, August 4, 1993, with attachments, and September 20, 1993, with attachments.

1 other parts of this license remain unchanged.

te September 30, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

DUPLICATE ORIGINAL

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

B. Continuous monitoring and sampling of gaseous effluents from the Central Volume Reduction Facility shall be conducted in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 5, 1988, with attachments, and December 11, 1988.

27. The follwing evaluations shall be performed for all process ventilation systems:

1) Air balance within the RCA at least semi-annually, and following any ventilation system or process changes which could potentially alter the effectiveness of the system,

2) Particulate removal efficiency of the main filtration system HEPA filters by DOP or comparable testing in accordance with pertinent ANSI standards immediately following installation of new HEPA filterrs or at least semi-annually.

28. The licensee in making disposal of radioactive wastes to the sanitary sewerage system shall do so in conformity with 1200-2-5-.18 of "State Regulations for Protection Against Radiation", except however, that all references to Schedule RHS 8-1, Table I, Column 2, shall now read Schedule RHS 8-1, Table II, Column 2. Also any information concerning disposals under 1200-2-5.18, as contained in application dated January 4, 1989 and correspondence listed in Condition 38 of this license, shall be deemed to reference the criteria of this Condition 28.

29. A. No radioactive material (excluding calibration and standardization sources) may be possessed under this license, from its time of receipt, until its transfer from the facility, for a period of time greater that 180 days. Exceptions to this rule are as follows:

1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

Materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater than 100 nCi/gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261).

The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

2. Radioactive wastes as soil or liquid, which are consumed in the disposal process, may be possessed on site for a period not to exceed 365 days.

3. The small quantities of radioactively contaminated freon bottom stills generated at the CVRF only may be stored until such time as a permitted treatment or disposal option is available for these materials.

B. No radioactive material may be stored at heights which exceed the following:

Container Size	Stacking Limit	Height
1. Drums	3 high	9 feet
2. B-25 Boxes	3 high	12 feet
3. B-12 Boxes	5 high	10 feet
4. Sea-Land Cont.	1 high	8 feet

30. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels authorized for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in 49 CFR 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed 15 days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

3. Soil samples must be collected and analyzed at least quarterly along the edge of the concrete or asphalt pad where radioactive materials are stored to ensure that there is no build up of radioactive contamination. Data from these samples shall be maintained for inspection by the Department.

In addition radioactive material may be stored inside the storage building (Building #3, License #R-73006-E94) provided it is stored in Sea-land containers in accordance with letter dated November 1, 1988.

The combined space, authorized for outside storage (including storage within Building #3) under licenses R-73006-E94 and R-73008-E94 shall not exceed an average of 15,000 square feet and a maximum of 22,000 square feet.

Financial assurance for outside storage of radioactive materials under License #R-73008-E94 and storage of materials outside and in Building 3 under License #R-73006-E94 is provided in accordance with letters dated September 6, 1988 (two letters with this date) September 7, 1988, (Letter of Credit, Amendment #3 signed by Charles Lamb), September 8, 1988, with attachment (signed by Thomas W. Powell).

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

31. The licensee is authorized to store empty containers in areas not covered by financial assurance in accordance with statements, representations, and procedures contained in letters dated May 29, 1987, and November 1, 1988. Average radiation levels from these boxes shall not exceed 0.6 mR/hr, and hot spot activity shall not exceed 2 mR/hr. Such containers in storage shall meet any other more restrictive criteria for shipment required by the United States Department of Transportation regulations.

    These empty containers must be stored in a location that is easily identifiable.

32. The licensee is authorized to receive, possess and use any radioactive material distributed under a general license, issued by the U.S. Nuclear Regulatory Commission, or another Agreement State, without this material being specifically referenced in Items 6, 8, 9, and 10 of this license. Notwithstanding any other conditions of this license, the general licensee may possess and use radioactive material received under the provisions of "State Regulations for Protection Against Radiation", 1200-2-10 in accordance with the regulations and requirements provided at the time of the transfer of the radioactive material under the terms of the general license.

33. The licensee shall maintain complete and accurate records of the receipt and disposal of radioactive material. The licensee shall, for radioactive material no longer useful for any purpose and for any equipment or supplies contaminated with such material for which further use and decontamination are not planned, define those materials as radioactive waste and treat them as such in accordance with the following provisions:

    A. Radioactive waste material shall not be stored with non-radioactive waste.

    B. A written record of all radioactive waste material shall be maintained until it has been determined by a suitable survey or radioassay that it has decayed to background levels or until it has been shipped to an authorized recipient in accordance with applicable regulations. Accountability of radioactive waste material prepared for shipment but not yet shipped from the licensee's premises shall be maintained by the licensee by an internal record system such that the licensee is constantly

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34
Page Revised 7/10/89

SUPPLEMENTARY SHEET

aware of the material's location and the proposed time of shipment. Individuals who are involved in the shipping of such material and/or the storage of such material prior to shipment, shall be trained in the precautions necessary for such handling and storage.

C. For material which has decayed to background levels as determined by radioassay or external level as measured with appropriately calibrated instruments, records shall indicate that the material was determined to be no longer radioactive and will indicate the methods and results of the survey or analysis.

D. Shipment records of radioactive waste material shall be maintained and the licensee shall require written confirmation from the authorized recipient of such material that this material has been received.

E. Transfer of radioactive waste to a land disposal facility or a licensed waste handler shall be done in accordance with 1200-5-.17 of "State Regulations for Protection Against Radiation."

F. All records and written confirmations required by this condition shall be maintained for inspection by the Department.

The requirements of this condition are in addition to any other requirements for the handling and/or disposal of radioactive material contained in this license and "State Regulations for Protection Against Radiation".

34. Except for plutonium contained in a medical device designed for individual human application, no plutonium, regardless of form, shall be delivered to a carrier for shipment by air transport or transported in an aircraft by the licensee except in packages the design of which the NRC has specifically approved for transport of plutonium by air.

35. The licensee shall not receive for storage or processing any radioactive material that originated from a facility in a State which has been denied access to the operating low level radioactive waste disposal facilities pursuant to the 1985 Low-Level Radioactive Waste Policy Amendments Act.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 34

SUPPLEMENTARY SHEET

The licensee must ascertain the status of the State in which each facility is located in order to show compliance with this amendment. Radioactive material in the licensee's possession at the time that access is denied may be processed and stored in accordance with the time limitations contained in Condition 29 of this license. Prior to exceeding this time limit the licensee shall return the radioactive material to the prior licensed possessor. If the State's access has been restored prior to the expiration of the time limits, material may be transferred to the disposal facility.

36. The licensee shall establish in every contractual obligation relating to radioactive materials the ability to return radioactive materials, processed or unprocessed, to the prior licensed possessor.

37. No provision of this license relieves the licensee from compliance with other Federal, State, and local laws, ordinances, and regulations applicable to the licensee's activities.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, drawings and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachment, November 5, 1986, with attachments, November 11, 1986, with attachments, (three letters with this date) December 31, 1986, January 14, 1987, January 21, 1987, with attachment, November 4, 1987, with attachment, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August 12, 1988, with attachments, August 29, 1988, with attachment, September 6, 1988 (two letters with this date), September 7, 1988, (Letter of Credit, Amendment #3 signed by Charles Lamb), September 8, 1988, with attachment (signed by Thomas W. Powell), September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, and December 11, 1988, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

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Form RMS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 35

 License Number R-73008-E94

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H.W. Arrowsmith, President

Gentlemen:

In accordance with the attached letter dated June 7, 1989, your Tennessee Radioactive Material License #R-73008-E94 is amended as follows:

To change Conditions 30 and 38. These conditions will now read as follows:

30. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels authorized for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in 49 CFR 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

    1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed 15 days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

    2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

    3. Soil samples must be collected and analyzed at least quarterly along the edge of the concrete or asphalt pad where radioactive materials are stored to ensure that there is no build up of radioactive contamination. Data from these samples shall be maintained for inspection by the Department.

Form RHS 8-7A
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 35

 License Number R-73008-E94

In addition radioactive material may be stored inside the storage building (Building #3, License #R-73006-E94) provided it is stored in Sea-land containers in accordance with letter dated November 1, 1988.

The combined space, authorized for outside storage (including storage within Building #3) under licenses R-73006-E94 and R-73008-E94 shall not exceed 50,000 square feet.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, drawings and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachment, November 5, 1986, with attachments, November 11, 1986, with attachments, (three letters with this date) December 31, 1986, January 14, 1987, January 21, 1987, with attachment, November 4, 1987, with attachment, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August 12, 1988, with attachments, August 29, 1988, with attachment, September 6, 1988 (two letters with this date), September 7, 1988, (Letter of Credit, Amendment #3 signed by Charles Lamb), September 8, 1988, with attachment (signed by Thomas W. Powell), September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, and June 7, 1989, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

All other parts of this license remain unchanged.

Date July 10, 1989

For the Commissioner
Tennessee Department of Health
and Environment

By Elisabeth A. Stetar
Elisabeth A. Stetar
Health Physicist
Division of Radiological Health

Form RHS 5-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 36

 License Number R-73008-E94

Scientific Ecology Group, Inc.
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by Mr. Walt M. Hipsher and in accordance with his letter dated July 27, 1989, your Tennessee Radioactive Material License #R-73008-E94 is amended as follows:

To change Conditions 29, 30, and 38. These conditions will now read as follows:

29. A. No radioactive material (excluding calibration and standardization sources) may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater that 180 days. Exceptions to this rule are as follows:

1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

   Materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater than 100 nCi/gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261).

   The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

2. Radioactive wastes as soil or liquid, which are consumed in the disposal process, may be possessed on site for a period not to exceed 365 days.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 36

3. The small quantities of radioactively contaminated freon bottom stills generated at the CVRF only may be stored until such time as a permitted treatment or disposal option is available for these materials.

B. No radioactive material may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high

30. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels authorized for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in 49 CFR 101-3.61 or DOT approved strong tight containers as described in letter date January 29, 1989. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed 15 days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

3. Soil samples must be collected and analyzed at least quarterly along the edge of the concrete or asphalt pad where radioactive materials are stored to ensure that there is no build up of radioactive contamination. Data from these samples shall be maintained for inspection by the Department.

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 36

 License Number R-73008-E94

In addition radioactive material may be stored inside the storage building (Building #3, License #R-73006-E94) provided it is stored in Sea-land containers in accordance with letter dated November 1, 1988.

The combined space, authorized for outside storage (including storage within Building #3) under licenses R-73006-G94 and R-73008-E94 shall not exceed 50,000 square feet.

(This Condition is amended to correct the Building #3 License number R-73006-E94 to R-73006-G94.)

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, drawings and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachment, November 5, 1986, with attachments, November 11, 1986, with attachments, (three letters with this date) December 31, 1986, January 14, 1987, January 21, 1987, with attachment, November 4, 1987, with attachment, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August 12, 1988, with attachments, August 29, 1988, with attachment, September 6, 1988 (two letters with this date), September 7, 1988, (Letter of Credit, Amendment #3 signed by Charles Lamb), September 8, 1988, with attachment (signed by Thomas W. Powell), September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, and July 27, 1989, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

All other parts of this license remain unchanged.

Date July 31, 1989

For the Commissioner
Tennessee Department of Health
and Environment

By Elisabeth A. Stetar
Elisabeth A. Stetar
Health Physicist
Division of Radiological Health

Form RHI 6-72
(10-68)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 37

Page 1 of 2 Pages License Number R-73008-E94

Scientific Ecology Group, Inc
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H.W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License #R-73008-E94 is amended as follows:

To change Condition 35. This condition will now read as follows:

35. The licensee shall not receive for storage or processing any radioactive material that originated from a facility in a State which has been denied access to the operating low level radioactive waste disposal facilities pursuant to the 1985 Low-Level Radioactive Waste Policy Amendments Act.

The licensee must ascertain the status of the State in which each facility is located in order to show compliance with this amendment. Radioactive material in the licensee's possession at the time that access is denied may be processed and stored in accordance with the time limitations contained in Condition 29 of this license. Prior to exceeding this time limit the licensee shall return the radioactive material to the prior licensed possessor. If the State's access has been restored prior to the expiration of the time limits, material may be transferred to the disposal facility.

This condition is waived if written assurances are furnished by the facility shipping the radioactive material indicating that the facility may accept return of the material, processed or unprocessed. Such assurances shall be obtained from the appropriate State governor's office, the state radiation control program, and the appropriate Compact Official, if any.

Form RHI 1-74
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 37

 License Number R-73008-E94

All other parts of this license remain unchanged.

Date October 16, 1989

For the Commissioner
Tennessee Department of Health
and Environment

By Michael H. Mobley
Michael H. Mobley
Director
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 38

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H.W. Arrowsmith, President

Gentlemen:

As requested by H.W. Arrowsmith and in accordance with his letters dated November 1, 1989, with attachments, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To change Conditions 12., 14., and 38. These Conditions will now read as follows:

12. The licensee is authorized to sort and blend contaminated materials in accordance with statements representations, and procedures contained in application dated January 4, 1989, and letter dated November 1, 1989, with attachments.

14. The licensee is authorized to cut, section, and join materials in accordance with statements representations, and procedures contained in application dated January 4, 1989, and letter dated November 1, 1989, with attachments.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements representations, and procedures contained in application dated January 4, 1989 and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments, (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987,, July 7, 1988, August 12, 1988, with attachments, August 29, 1988, with attachment, September 6, 1988, (two letters with this date), September 7, 1988, (Letter of Credit Amendment #3 signed by Charles Lamb), September 8, 1988, with attachment, (signed by Thomas W. Powell), September 23, 1988, October 3, 1988, October 5, 1988, , with attachments, October 11, 1988,

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 38

 License Number R-73008-E94

November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, and November 1, 1989, with attachments and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
Date January 5, 1990

For the Commissioner
Tennessee Department of Health
and Environment

By _____
Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 39

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by W. M. Hipsher and in accordance with his letters dated January 5, 1990, and January 19, 1990 your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add:

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or Physical Form	9. Maximum Radioactive Material Which Licensee May Possess at Any One Time
U. Any Radioactive Material (except special nuclear material)	U. Sealed Source	U. No single source to exceed 5 millicuries Total not to exceed 10 millicuries.

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10. Authorized use

U. For use as calibration and/or standardization sources in Sealed Sources (Manufactured, labeled, packaged, and distributed in accordance with a license issued by the Department, U.S. Nuclear Regulatory Commission, an agreement state or licensing state, as appropriate, in accordance with applicable provisions for the manufacture and distribution of such radioactive material).

To add Conditions 39. and 40. These Conditions will read as follows:

39. A. Sealed sources authorized by this license in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six (6) months. In the absence of a certificate from a transferor indicating that a test has been made within six (6) months prior to transfer, the sealed source shall not be put into use until tested.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 39

B. The tests shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample, or in the case of radium, the escape of radon at the rate of 0.001 microcurie per 24 hours. The test sample shall be taken from the sealed source or from the surface of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak tests shall be kept in units of microcuries and maintained for inspection by the Department.

C. If the test reveals the presence of 0.005 microcurie or more of removable contamination, or in the case of radium, the escape of radon at the rate of 0.001 microcurie or more per 24 hours, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Department regulations. A report shall be filed within five (5) days of the test with the Division of Radiological Health, Tennessee Department of Health and Environment, 150 9th Avenue North, Nashville, Tennessee 37219-5404, describing the equipment involved, the test results, and the corrective action taken.

D. Tests for leakage and/or contamination shall be performed in accordance with statements, representations, and procedures contained in Condition 22 of this license or by persons authorized by this Department, the U. S. Nuclear Regulatory Commission, or another Agreement State to perform such services.

40. Notwithstanding the periodic leak test required by Condition 39, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting material or 10 microcuries or less of alpha emitting material.

To change Condition 38. This Condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7,

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 39

 License Number R-73008-E94

1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, and January 19, 1990, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

This amendment is considered to have been effective on January 18, 1990.

All other parts of this license remain unchanged.

e January 24, 1990

For the Commissioner
Tennessee Department of Health
and Environment

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

R 7590

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 40

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letter dated April 26, 1990, with attachment, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To change Conditions 30 and 38. These Conditions will now read as follows:

30. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

    1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

    2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

    3. Soil samples must be collected and analyzed at least quarterly along the edges of asphalt or concrete pads where radioactive materials are stored and along the perimeter fence to ensure that there is no buildup of radioactive contamination. Data from these samples must be maintained for inspection by the Department.

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 40

 License Number R-73008-E94

The combined authorizations for processing and storage granted by this license shall not exceed a total of 95,714 square feet.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, and April 26, 1990, with attachment, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
Date August 22, 1990

For the Commissioner
Tennessee Department of Health
and Environment

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 41

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by James L. Harvey and in accordance with his letter dated September 27, 1991, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 40. This condition will read as follows:

40. The licensee is authorized to remove, decontaminate, process, and dispose of radioactive material contained in a railway car at the Florida Steel plant in Knoxville. After decontamination in accordance with established procedures for employee health and safety and established standards for free-release, the rail car may be released for return to service.

To change Condition 38. This condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1983, and letters dated October 2, 1986 with attachments, October 28, 1986 with attachments, November 5, 1986 with attachments, November 11, 1986 with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987 with attachments, November 4, 1987 with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August 12, 1988 with attachments, August 29, 1988 with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988 with attachments (signed by Thomas

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 41

License Number R-73205-E24

W. Powell), September 23, 1988, October 3, 1988, October 5, 1988 with attachments, October 11, 1988, November 1, 1988, November 26, 1988 with attachments, November 30, 1988 with attachments, December 11, 1988, July 27, 1989, November 1, 1989 with attachments, January 5, 1990, January 19, 1990, April 26, 1990 with attachment, September 27, 1991, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.

Date: September 27, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By: John Hoffelt
John Hoffelt
Environmental Specialist
Division of Radiological Health

Form RHS B-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 42

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by Walt M. Hipsher and in accordance with letters dated July 26, 1991 with attachments, August 6, 1991 with attachments (signed by Steve Norris), October 3, 1991 with attachment (signed by H.W. Arrowsmith), October 8, 1991 with attachments (from H.W. Arrowsmith to Dan Fisher), and October 10, 1991, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 41. This condition will read as follows:

41. The licensee is authorized to operate the Resin Drying System as described and in accordance with statements, representations, and procedures contained in letters dated July 26, 1991 with attachments, August 6, 1991 with attachments, October 3, 1991 with attachment, October 8, 1991 with attachments (from H.W. Arrowsmith to Dan Fisher), and October 10, 1991. The licensee shall provide dryer clean-out procedures in the event such procedures become necessary. Such activity shall be authorized by approved SEG radiological work permit. Procedures and associated radiological work permit shall be maintained for inspection by the Department. The licensee shall confirm through measurements the designed ventilation flow rate and shall perform appropriate air balance evaluations to determine compliance with Condition 27 of this license.

To change Condition 38. This condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 42

License Number R-73008-E94

October 2, 1986 with attachments, October 28, 1986 with attachments, November 5, 1986 with attachments, November 11, 1986 with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987 with attachments, November 4, 1987 with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August 12, 1988 with attachments, August 29, 1988 with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988 with attachments (signed by Thomas W. Powell), September 23, 1988, October 3, 1988, October 5, 1988 with attachments, October 11, 1988, November 1, 1988, November 26, 1988 with attachments, November 30, 1988 with attachments, December 11, 1988, July 27, 1989, November 1, 1989 with attachments, January 5, 1990, January 19, 1990, April 26, 1990 with attachment, September 27, 1991, July 26, 1991 with attachments, August 6, 1991 with attachments, October 3, 1991 with attachment, October 8, 1991 with attachments (from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.

Date: October 11, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By: John Hoffelt

John Hoffelt
Environmental Specialist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 43

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letters dated June 12, 1990, (revised April 10, 1991), with attachments, April 15, 1991 and October 16, 1991, and as requested by W. M. Hipsher and in accordance with his letter dated August 2, 1991, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 42. This Condition will read as follows:

42. The licensee is authorized to operate an additional compactor for the processing of TRU waste in accordance with statements, representations, and procedures contained in letters dated June 12, 1990, (revised April 10, 1991), with attachments, April 15, 1991, August 2, 1991, and October 16, 1991. (Note: The October 16, 1991 letter represents the licensee's statement of special conditions which apply to this process. The five (5) numbered items which appear in this letter more precisely define the scope and limits of the project.)

To change Condition 38. This Condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 43

 License Number R-73008-E94

date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, April 15, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
Date October 20, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 44 CORRECTED COPY

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letter dated October 8, 1991, with attachments, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To change Conditions 17 and 38. These Conditions will now read as follows:

17. The licensee is authorized to perform liquid and granular processing in accordance with statements, representations, and procedures contained in application dated January 4, 1989. The licensee is also authorized to deviate from the processing methods described in the January 4, 1989, application and process liquid waste in accordance with statements, representations, and procedures contained in letter dated October 8, 1991, with attachments.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 44 CORRECTED COPY

 License Number R-73008-E94

date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, April 15, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
D- - October 24, 1991

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 45

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by W. M. Hipsher and in accordance with his letter dated April 25, 1991, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To change Item 9A. and Condition 38. This Item and this Condition will now read as follows:

9A. Total not to exceed 400 curies.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 45

 License Number R-73008-E94

date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

A' other parts of this license remain unchanged.
I February 20, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By _____
Robert N. Young
Health Physicist
Division of Radiological Health

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 46

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by W. M. Hipsher and in accordance with his letter dated April 27, 1992, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 43. This Condition will read as follows:

43. The licensee is authorized to assist scrapmetal/metal recycling facilities in the surveying for and location of sources of radioactive material, the identification of these sources as to isotope and radiological hazard, the segregation of such radioactive material present, the proper packaging of such radioactive material, and the transport and transfer of such radioactive material to the licensee's facility, all in accordance with statements, representations, and procedures contained in letter dated April 27, 1992. The licensee shall notify the Department by telephone of his intention to begin a project authorized by this Condition, the anticipated manner in which he will provide assistance, the extent of the hazard anticipated to be found at the project site based upon information known about the situation, and the method(s) he will use to survey and remediate the hazard. During the project if additional contamination or hazard not previously identified is found the licensee shall immediately cease operations, secure the area to prevent unnecessary radiation exposure and/or spread of contamination and notify the Department. At the conclusion of the project the licensee shall provide the Department a complete report detailing his activities with respect to the project.

To change Condition 38. This Condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 46

 License Number R-73008-E94

28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12, 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991 with attachments, October 8, 1991, with attachments, (two letters wit the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, and April 27, 1992, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
Date June 22, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

FORM RHS 8-72
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 47

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letter dated April 20, 1992, and as requested by W. M. Hipsher and in accordance with his letter dated June 30, 1992, with attachment, (facility diagram), your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To change Conditions 30 and 38. These Conditions will now read as follows:

30. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

    1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

    2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

    3. Soil samples must be collected and analyzed at least quarterly along the edges of asphalt or concrete pads where radioactive materials are stored and along the perimeter fence to ensure that there is no buildup of radioactive contamination. Data from these samples must be maintained for inspection by the Department.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 47

4. The combined authorizations for processing and storage granted by this license shall not exceed a total of 95,714 square feet.

5. The combined authorizations for additional "out side" storage, not included in part 4 above, in accordance with statements and representations contained in letter dated April 20, 1992, and June 20, 1992, with attachment, granted by this license and Tennessee Radioactive Material License R-73013 shall not exceed a total of 25,000 square feet.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, and June 20, 1992, with attachment, (facility diagram), and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 47

License Number R-73008-E94

All other parts of this license remain unchanged.
Date June 30, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By _____
Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 48

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

To clarify the parameters of radioactive material storage addressed in Condition 29 of your Tennessee Radioactive Material License number R-73008-E94, this license is amended as follows:

To change Condition 29. This condition will now read as follows:

29. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than one hundred eighty (180) days. Exceptions to this rule are as follows:

1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

   Radioactive materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater than 100 nCi\gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261).

   The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

FORM RHS 8-7A
(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 48

 License Number R-73008-E94

2. Radioactive wastes as soil or liquid, which are consumed in the disposal process, may be possessed on site for a period not to exceed 365 days.

3. The small quantities of radioactively contaminated freon bottom stills generated at the CVRF only may be stored until such time as as permitted treatment or disposal option is available for these materials.

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high

C. This condition also includes "waste radioactive material" generated under the authority of this license.

D. This clarification of the nomenclature of Condition 29 is effective with the date of this amendment and allows the licensee ninety (90) days from the date of this amendment to comply with the provisions of this condition, including those concerning definition of materials and the length of storage times.

All other parts of this license remain unchanged.
Date August 20, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By Johnny C. Graves
Johnny C. Graves
Licensing and Registration Manager
Division of Radiological Health

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TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 49

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by Steve T. Norris and in accordance with his letter dated October 2, 1990, with attachments, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 44. This Condition will read as follows:

44. The licensee is authorized to install and operate an "Epoxy Solidification System" in accordance with statements, representations, and procedures contained in letter dated October 2, 1990, with attachments.

To change Condition 38. This Condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, October 2, 1990, with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments,

(10-85)

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 49

 License Number R-73008-E94

September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, and June 20, 1992, with attachment, (facility diagram), and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

In light of the fact that this amendment has been in process for a lengthy time, the Department considers this amendment effective January 1, 1991. Please accept our apology for this delay.

All other parts of this license remain unchanged.
Date September 21, 1992

For the Commissioner
Tennessee Department of Health
and Environment

By

Robert N. Young
Health Physicist
Division of Radiological Health

FORM RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 50

Page 1 of 1 Pages

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

Your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 45. This Condition will read as follows:

45. Effective January 1, 1993, the licensee shall not accept either radioactive waste and / or items contaminated or potentially contaminated with licensable quantities of radioactive material or radioactive materials or items from licensable activities for repackaging, processing, refurbishing, storage pending disposal or disposal unless the shipper of such waste possesses a valid license for delivery issued pursuant to 1200-2-10-.32 of "State Regulations for Protection Against Radiation".

All other parts of this license remain unchanged.
Date November 10, 1992

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(10-85)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 51

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by W. M. Hipsher and in accordance with his letters dated October 5, 1992, and November 17, 1992, with attachments, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To Add:

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or Physical Form	9. Maximum Radioactivity and/or Quantity Material Which Licensee May Possess at Any One Time
V. Cesium 137	V. Sealed source (Industrial Reactor Lab Series 2, Isotope Products Lab Model 225, 3M Company Model 4F6E, or Amersham Corporation Model CDC.800 Series.)	V. One (1) source not to 25 millicuries.

10. Authorized use

V. For use in J.L. Shepherd and Associates model 423 dosimeter calibrator.

To change Condition 38. This Condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date),

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 51

 License Number R-73008-E94

December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, October 2, 1990, with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, June 20, 1992, with attachment, (facility diagram), October 5, 1992, and November 17, 1992, with attachments, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
Date December 4, 1992

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

Form RHS 8-7A
(9-92)

► 7590

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 52

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by W. M. Hipsher and in accordance with his letters dated October 7, 1992, with attachments, November 2, 1992, with attachments, November 18, 1992, with attachments, and December 28, 1992, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 46. This Condition will read as follows:

46. The licensee is authorized to install, and operate a small shredder for the purposes of performing treatability studies of the nature described in letter dated December 28, 1992.

To change Condition 38. This Condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, October 2, 1990, with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments,

(9-92)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 52

 License Number R-73008-E94

September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, June 20, 1992, with attachment, (facility diagram), October 5, 1992, October 7, 1992, with attachments, November 2, 1992, with attachments, November 18, 1992, with attachments, and December 28, 1992 and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

This Amendment also recognizes the construction of a "tool shed" located adjacent to the Central Volume Reduction Facility (CVRF).

All other parts of this license remain unchanged.
Date January 8, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

FORM RLB 8-7A
(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 53

Page 1 of 1 Pages

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

In accordance with our letter dated November 19, 1992, your Tennes: Radioactive Material License Number R-73008-E94 is amended as follows:

To change Conditions 35 and 36. These conditions will now read as follows:

35. Written assurances must be furnished by the facility shipping t radioactive material indicating that the facility may accept return of t material processed or unprocessed. In addition, for states outside t Southeast Compact the state or appropriate Compact must be a signatory the Interregional Access Agreement for Waste Management or assurances sha be obtained from the appropriate state governor's office, the sta radiation control program, and the appropriate Compact official, if an

36. The licensee shall establish in every contractual obligation relating radiaoctive materials the ability to return radioactive material processed or unprocessed, to the prior licensed or exempt possessor.

All other parts of this license remain unchanged.

Date January 12, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By Michael A. Page
Michael A. Page
Environmental Specialist
Division of Radiological Health

(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 54

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letter dated March 4, 1993, with attachments, (including photographs), your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To add Condition 47. This Condition will read as follows:

47. The licensee is authorized to operate a "porcupine dryer" on a temporary pilot project basis to perform research and development testing of radioactive waste drying technology using radioactive scrubber salts and aqueous sludges in accordance with statements, representations, and procedures contained in letter dated March 4, 1993, with attachments, (including photographs). The radiation safety officer or his designate shall be present during the initial operation of this pilot project to verify that all safety precautions have been properly instituted. He shall also conduct a complete inspection of this project within 72 hours of its initial startup. Records of these audits shall be maintained for inspection by the Department. This authorization shall expire April 2, 1993.

To change Condition 38. This Condition will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988,

(9-92)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 54

 License Number R-73008-E94

with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, October 2, 1990, with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, June 20, 1992, with attachment, (facility diagram), October 5, 1992, October 7, 1992, with attachments, November 2, 1992, with attachments, November 18, 1992, with attachments, December 28, 1992, and March 4, 1993, with attachments, (including photographs), and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
Date March 4, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

RDLS 6-7A
(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 55

Page 1 of 2 Pages

License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

DATE OF ISSUE
APR 15 1993

Attention: H. W. Arrowsmith, President

CONTROL NO.
115

Gentlemen:

As requested by H. W. Arrowsmith and in accordance with his letter dated March 26, 1993, your Tennessee Radioactive Material License number R-73008-E94 is amended as follows:

To change Conditions 38 and 47. These Conditions will now read as follows:

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988 May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August 29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, October 2, 1990, with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, June 20, 1992, with attachment, (facility diagram), October 5, 1992, October 7, 1992, with attachments, November 2, 1992, with attachments, November 18, 1992, with attachments, December 28, 1992, March 4, 1993, with attachments,

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(9-92)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 55

 License Number R-73008-E94

(including photographs), March 26, 1993, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

47. The licensee is authorized to operate a "porcupine dryer" on a temporary pilot project basis to perform research and development testing of radioactive waste drying technology using radioactive scrubber salts and aqueous sludges in accordance with statements, representations, and procedures contained in letters dated March 4, 1993, with attachments, (including photographs) and March 26, 1993. The radiation safety officer or his designate shall be present during the initial operation of this pilot project to verify that all safety precautions have been properly instituted. He shall also conduct a complete inspection of this project within 72 hours of its initial startup. Records of these audits shall be maintained for inspection by the Department. This authorization shall expire April 30, 1993.

All other parts of this license remain unchanged.
Date April 1, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

DATE OF ISSUE
APR 15 1993

CONTROL NO.
1115

(9-92)

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TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by Walt Hipsher and in accordance with his letters dated February 10, 1993 and April 16, 1993, with attachments, and as requested by Samuel T. Pelchar and in accordance with his letter dated June 17, 1993, with attachments, (LOC# SB/3143), and as requested by H. W. Arrowsmith and in accordance with his letter dated July 29, 1993, with attachments, and to clarify the parameters of radioactive material storage addressed in Condition 29 of your Tennessee Radioactive Material License number R-73008-E94, this license is amended as follows:

To change Condition 25., 29., 30., and 38. These Conditions will now read as follows:

25. Radioactive material authorized by this license shall be used by, or under the supervision of, H. W. Arrowsmith, S.T. Norris, J.T. Pride, W.M. Hipsher, Marsha Wilson, J.E. Hess, Steve Sugarman, Angela McIntosh, B.S. Mays, Chris Jones, Jeffery Underwood, Kieth Jeter, Kirk Papa, D.B Jamieson, Bradley Moore, Pat Walsh, Donald Brackett, O. Meeuwis, E.A. Lloyd, Mitch Parker, R.L. Brackett, Don Neely, or Sam Clark.

    The Radiation Safety Officer for this license is Steve T. Norris.

29. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than three hundred sixty five (365) days. Exceptions to this rule are as follows:

    1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

Radioactive materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater than 100 nCi\gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261). The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

3. The small quantities of radioactively contaminated freon bottom stills generated at the CVRF only may be stored until such time as as permitted treatment or disposal option is available for these materials.

4. Equipment, specifically licensed or otherwise authorized, and stored on-site for future use: (1) at a location authorized by a Scientific Ecology Group, Inc. Tennessee Radioactive Material License or (2) at a location where such equipment is authorized by the agency having jurisdiction.

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high
5. Any other strong tight container.	10 feet nominal

C. This condition also includes "waste radioactive material" generated under the authority of this license.

30. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

3. Soil samples must be collected and analyzed at least quarterly along the edges of asphalt or concrete pads where radioactive materials are stored and along the perimeter fence to ensure that there is no buildup of radioactive contamination. Data from these samples must be maintained for inspection by the Department.

4. The combined authorizations for processing and storage granted by this license shall not exceed a total of 95,714 square feet.

5. The combined authorizations for additional "out side" storage, not included in part 4 above, in accordance with statements and representations contained in letters dated April 20, 1992, June 20, 1992, with attachment, and June 17, 1993, with attachments, granted by this license and Tennessee Radioactive Material License R-73013 shall not exceed a total of 48,000 square feet.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August

(9-92)

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

 License Number R-73008-E94

29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, October 2, 1990, with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, June 20, 1992, with attachment, (facility diagram), October 5, 1992, October 7, 1992, with attachments, November 2, 1992, with attachments, November 18, 1992, with attachments, December 28, 1992, March 4, 1993, with attachments, (including photographs), March 26, 1993, February 10, 1993 April 16, 1993, with attachments, June 17, 1993, with attachments, (LOC# SB/3143), and July 29, 1993, with attachments, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

All other parts of this license remain unchanged.
Date August 9, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By _____

Robert N. Young
Health Physicist
Division of Radiological Health

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

 License Number R-73008-E94

Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, TN 37830-2530

Attention: H. W. Arrowsmith, President

Gentlemen:

As requested by Walt Hipsher and in accordance with his letters dated February 10, 1993 and April 16, 1993, with attachments, and as requested by Samuel T. Pelchar and in accordance with his letter dated June 17, 1993, with attachments, (LOC# SB/3143), and as requested by H. W. Arrowsmith and in accordance with his letter dated July 29, 1993, with attachments, and to clarify the parameters of radioactive material storage addressed in Condition 29 of your Tennessee Radioactive Material License number R-73008-E94, this license is amended as follows:

To change Condition 25., 29., 30., and 38. These Conditions will now read as follows:

25. Radioactive material authorized by this license shall be used by, or under the supervision of, H. W. Arrowsmith, S.T. Norris, J.T. Pride, W.M. Hipsher, Marsha Wilson, J.E. Hess, Steve Sugarman, Angela McIntosh, B.S. Mays, Chris Jones, Jeffery Underwood, Kieth Jeter, Kirk Papa, D.B Jamieson, Bradley Moore, Pat Walsh, Donald Brackett, O. Meeuwis, E.A. Lloyd, Mitch Parker, R.L. Brackett, Don Neely, or Sam Clark.

    The Radiation Safety Officer for this license is Steve T. Norris.

29. A. No radioactive material (excluding calibration and standardization sources) or radioactive waste may be possessed under this license, from its time of receipt until its transfer from the facility, for a period of time greater than three hundred sixty five (365) days. Exceptions to this rule are as follows:

    1. Up to 20,000 cubic feet of the radioactive waste received may be stored for an unlimited period in accordance with letter dated October 11, 1988, and telephone conversation with H. W. Arrowsmith on November 23, 1988 (documented in memo dated November 29, 1988).

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

Radioactive materials stored under this provision shall not include TRU wastes (wastes containing concentrations greater than 100 nCi\gm of transuranics) or mixed wastes (radioactive wastes which exhibit the characteristics outlined in Subpart C of 40 CFR Part 261 or radioactive wastes which contain hazardous wastes listed in Subpart D of 40 CFR Part 261). The licensee shall maintain records of the receipt and storage of this material such that its volume and location are readily identifiable.

3. The small quantities of radioactively contaminated freon bottom stills generated at the CVRF only may be stored until such time as as permitted treatment or disposal option is available for these materials.

4. Equipment, specifically licensed or otherwise authorized, and stored on-site for future use: (1) at a location authorized by a Scientific Ecology Group, Inc. Tennessee Radioactive Material License or (2) at a location where such equipment is authorized by the agency having jurisdiction.

B. No radioactive material or radioactive waste may be stored so as to exceed the following stacking limits:

Container Size	Stacking Limit
1. Drums	3 high
2. B-25 Boxes	3 high
3. B-12 Boxes	5 high
4. Sea-Land Cont.	1 high
5. Any other strong tight container.	10 feet nominal

C. This condition also includes "waste radioactive material" generated under the authority of this license.

30. Radioactive material may be stored outside of the process and storage buildings within the perimeter fence provided that radiation levels for unrestricted areas are not exceeded. This material must be stored in either locked DOT intermodal containers as described in Title 49 Code of Federal Regulations (CFR), Part 101-3.61 or DOT approved

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

strong tight containers as described in letter dated January 29, 1988. In addition to these requirements the following criteria and restrictions must be adhered to whenever radioactive materials are stored outside of the process and storage buildings:

1. Containers used for outside storage of radioactive materials must be capable of withstanding environmental conditions. Wooden containers are not considered suitable for outside storage. Materials received in wooden containers may remain outside for a period not to exceed fifteen (15) days, provided the containers are covered with a plastic tarp so as to prevent the infiltration of rainwater. After 15 days the material must be moved inside or repackaged in a container suitable for outside storage.

2. Outside storage of radioactive materials is only permitted in paved (asphalt or concrete) areas. Storage on grass, dirt, or gravel is specifically prohibited.

3. Soil samples must be collected and analyzed at least quarterly along the edges of asphalt or concrete pads where radioactive materials are stored and along the perimeter fence to ensure that there is no buildup of radioactive contamination. Data from these samples must be maintained for inspection by the Department.

4. The combined authorizations for processing and storage granted by this license shall not exceed a total of 95,714 square feet.

5. The combined authorizations for additional "out side" storage, not included in part 4 above, in accordance with statements and representations contained in letters dated April 20, 1992, June 20, 1992, with attachment, and June 17, 1993, with attachments, granted by this license and Tennessee Radioactive Material License R-73013 shall not exceed a total of 48,000 square feet.

38. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 8, and 9 of this license in accordance with statements, representations, and procedures contained in application dated January 4, 1989, and letters dated October 2, 1986, with attachments, October 28, 1986, with attachments, November 5, 1986, with attachments, November 11, 1986, with attachments (three letters with this date), December 31, 1986, January 14, 1987, January 21, 1987, with attachments, November 4, 1987, with attachments, December 3, 1987, December 14, 1987, December 29, 1987, January 29, 1988, April 8, 1988, May 29, 1987, July 7, 1988, August, 12. 1988, with attachments, August

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 56 CORRECTED COPY

 License Number R-73008-E94

29, 1988, with attachments, September 6, 1988 (two letters with this date), September 7, 1988 (Letter of Credit, Amendment #3, signed by Charles Lamb), September 8, 1988, with attachments (signed by Thomas W. Powell) September 23, 1988, October 3, 1988, October 5, 1988, with attachments, October 11, 1988, November 1, 1988, November 26, 1988, with attachments, November 30, 1988, with attachments, December 11, 1988, July 27, 1989, November 1, 1989, with attachments, January 5, 1990, January 19, 1990, April 26, 1990, with attachment, June 10, 1990, (Revised April 10, 1991), with attachments, October 2, 1990, with attachments, April 15, 1991, April 25, 1991, July 26, 1991, with attachments, August 2, 1991, August 6, 1991, with attachments, September 27, 1991, October 3, 1991, with attachments, October 8, 1991, with attachments, (two letters with the same date, one from H.W. Arrowsmith to Dan Fisher), October 10, 1991, and October 16, 1991, April 20, 1992, April 27, 1992, June 20, 1992, with attachment, (facility diagram), October 5, 1992, October 7, 1992, with attachments, November 2, 1992, with attachments, November 18, 1992, with attachments, December 28, 1992, March 4, 1993, with attachments, (including photographs), March 26, 1993, February 10, 1993 April 16, 1993, with attachments, June 17, 1993, with attachments, (LOC# SB/3143), and July 29, 1993, with attachments, and telephone conversation with H.W. Arrowsmith on November 23, 1988 (documented in memo dated November 23, 1988).

ll other parts of this license remain unchanged.
ate August 9, 1993

For the Commissioner
Tennessee Department of
Environment and Conservation

By

Robert N. Young
Health Physicist
Division of Radiological Health

WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CRESNICE, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Tot.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32312	3.9544	26756	----

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2590

WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary																Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary																Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Rat.Vol to Bury/ Return
791-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
791-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
791-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
791-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
791-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
791-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
791-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
791-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
791-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
791-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
791-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000385

7590

WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary																Summary Status	
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794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1402.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
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794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02100	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1402.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000386

7590

WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

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Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sol Weight	Dec/Sol Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	368.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
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Customer Summary Report
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Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

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794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26758	----

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ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
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Date: 04/16/93

Scientific Ecology Group
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Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Rat.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02100	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
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Date: 04/16/93

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Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incln Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incln.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIE RAY

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Date: 04/16/93

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794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76100	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	368.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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CHESWICK, PA 15024
Contact: HARVIE RAY

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from 01/01/92 to 03/31/93

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Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CRESSICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary																	Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	368.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	368.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIE RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Rat.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000399

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000400

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary																Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23108	1553	10.60	11408	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000401

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000402

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: MARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Rat.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000403

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Retn'd	Incin Vol Buried/ Retn'd	Activity Received	Activity Buried/ Retn'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Est.Vol to Bury/ Return
794-92-1	03/18/92	465.0	231.80	0.00	27.93910	27.93910	16909	0	0.00	16909	231.8	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

000404

7590

WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

Shipments Received		Received and Buried Summary					Processing Summary															Summary Status	
Manifest Number	Date Received	Volume Recd	Volume Buried/ Beta'd	Incin Vol Buried/ Beta'd	Activity Received	Activity Buried/ Beta'd	Waste Weight	Weight Incin.	Ash Volume	Weight Capted	Capted Volume	Grit Weight	Grit Volume	Liq/Oil Volume Burned	Liq/Oil Weight Burned	Liq/Oil Activity Burned	Dec/Sal Weight	Dec/Sal Activity	Metal Weight	Metal Activity	Wt.to Process	Rat.Vol to Bury/ Return
794-92-1	03/10/92	465.0	231.00	0.00	27.93910	27.93910	16909	0	0.00	16909	231.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38563	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-7	10/21/92	536.0	0.00	0.00	0.08980	0.00000	7014	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	7014	0.08880	0	0.00
794-92-8	10/22/92	366.0	364.00	0.00	44.57630	44.57630	12851	0	0.00	12851	364.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
794-93-1	03/24/93	10.5	0.00	0.00	0.02400	0.00000	704	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	704	----
794-93-2	03/29/93	1442.0	0.00	0.00	2.07570	0.00000	25570	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	25570	----
TOTAL: 11		6791.0	1166.70	35.10	169.08003	147.9757	129094	9290	35.10	60706	1131.6	0	0.0	0.0	0	0.00000	0	0.00000	32342	3.9544	26756	----

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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CRESWICK, PA 15024
Contact: HARVIN RAY

Customer Summary Report
from 01/01/92 to 03/31/93

Date: 04/16/93

Scientific Ecology Group
PO Box 2530
Oak Ridge, TN 37830

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794-92-2	04/03/92	1372.0	218.20	0.00	10.19320	7.03280	17200	0	0.00	10600	218.2	0	0.0	0.0	0	0.00000	0	0.00000	6600	3.16040	0	0.00
794-92-3	08/11/92	1442.0	112.70	24.50	44.63030	44.60910	19910	7737	24.50	5320	88.2	0	0.0	0.0	0	0.00000	0	0.00000	6853	0.02120	0	0.00
794-92-4	08/11/92	909.0	167.90	10.60	39.38583	23.76400	23106	1553	10.60	11406	157.3	0	0.0	0.0	0	0.00000	0	0.00000	9665	0.57260	482	----
794-92-5	09/22/92	125.0	0.00	0.00	0.00100	0.00000	1304	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	1304	0.00100	0	0.00
794-92-6	10/01/92	116.0	72.10	0.00	0.05440	0.05440	3620	0	0.00	3620	72.1	0	0.0	0.0	0	0.00000	0	0.00000	0	0.00000	0	0.00
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ELECTRO-MECHANICAL DIV.
CHESWICK, PA 15024
Contact: HARVIN RAY

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794-92-10	11/19/92	7.5	0.00	0.00	0.11040	0.00000	906	0	0.00	0	0.0	0	0.0	0.0	0	0.00000	0	0.00000	906	0.11040	0	0.00
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WESTINGHOUSE ELECTRO-MECHANICAL
ELECTRO-MECHANICAL DIV.
CRESWICK, PA 15024
Contact: HARVIN RAY

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Next 8 Pages Redacted

Contains Proprietary Information

OFFSITE PROCESSING WORKPLAN
FOR THE
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
PLANT 7 STEEL RECYCLING PROJECT

Revision 0, Draft 6/1/94

Prepared by
Scientific Ecology Group, Inc.
P.O. Box 2530
1560 Bear Creek Road
Oak Ridge, Tennessee 37831-2530

Submitted to
Fernald Environmental Restoration and Management Company
Environmental Restoration Management Contractor for the
Department of Energy
Fernald Environmental Management Project

FERMCO RFP JC-97686/SEG Proposal No. FR-9404-111

OFFSITE PROCESSING WORKPLAN
FOR THE
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
PLANT 7 STEEL RECYCLING PROJECT

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1.0 INTRODUCTION

1.1 BACKGROUND

On September 20, 1991, the U. S. Department of Energy (DOE) and the U. S. Environmental Protection Agency (EPA) jointly signed an Amended Consent Agreement establishing milestones for the implementation of Comprehensive Environmental Response, compensation, and Liability Act (CERCLA) response actions at the Fernald Environmental Management Project (FEMP). The Fernald Environmental Restoration Management Corporation (FERMCO) is the Environmental Restoration Management Contractor at the FEMP and is responsible for managing CERCLA implementation. CERCLA initiatives at the site include, but are not limited to, waste characterization, segregation, processing, minimization, and shipment for recycling/beneficial reuse or final disposition at DOE approved disposal sites.

1.2 OBJECTIVE AND SCOPE OF WORK

1.2.1 Objective

The objective of this project is to identify and execute a method for processing 700 tons of scrap steel from Plant 7 for recycling/beneficial reuse. Such a processing method will serve as a demonstration of technology that can be implemented on a larger scale as remediation of the FEMP progresses under CERCLA. The objective includes providing containers for packaging of low level radioactive waste (LLRW) to FERMCO for use at the FEMP. This offsite processing workplan describes activities that Scientific Ecology Group (SEG) will perform in support of FERMCO to meet the objectives for this project.

1.2.2 Scope of Work

A multi-step approach has been developed for performing this project in a cost-effective manner that complies with all environmental, safety, and health regulatory requirements and DOE Orders. A process flow diagram for processing and dispositioning the FERMCO steel

is provided in Figure 1. The approach is summarized below and discussed in detail in Section 2.0.

SEG will process FEMP scrap metal for beneficial reuse/recycling and provide large and/or small bulk containers as designated by FERMCO by implementing the following approach.

1. Transport radioactively contaminated scrap steel packaged in FERMCO containers from the FEMP to our Decontamination and Container Refurbishment Facility in Oak Ridge, Tennessee
2. Process the steel by decontamination for free release or by packaging and transporting to NTS for disposal. Approximately 90% of the scrap steel inventory will be suitable for decontamination and free release
3. Disposition the processed steel by selling the decontaminated portion to an experienced scrap steel broker
4. Purchase and arrange for delivery of large bulk and/or small box containers made of virgin carbon steel, giving FERMCO credit for sale of the scrap
5. Process secondary waste as either DOE waste to meet DOE Nevada Test Site (NTS) waste acceptance criteria or as SEG waste
6. Document and evaluate the results of the project in a final report for use in the FERMCO CRU3 Treatability Studies

All SEG facilities are permitted and licensed to transport, accept, and process FERMCO's radioactively contaminated materials. SEG holds a *State of Tennessee Radioactive Material License* and transportation permits, certifications, and licenses. The SEG *Waste Acceptance Procedure* implements our Radioactive Material License.

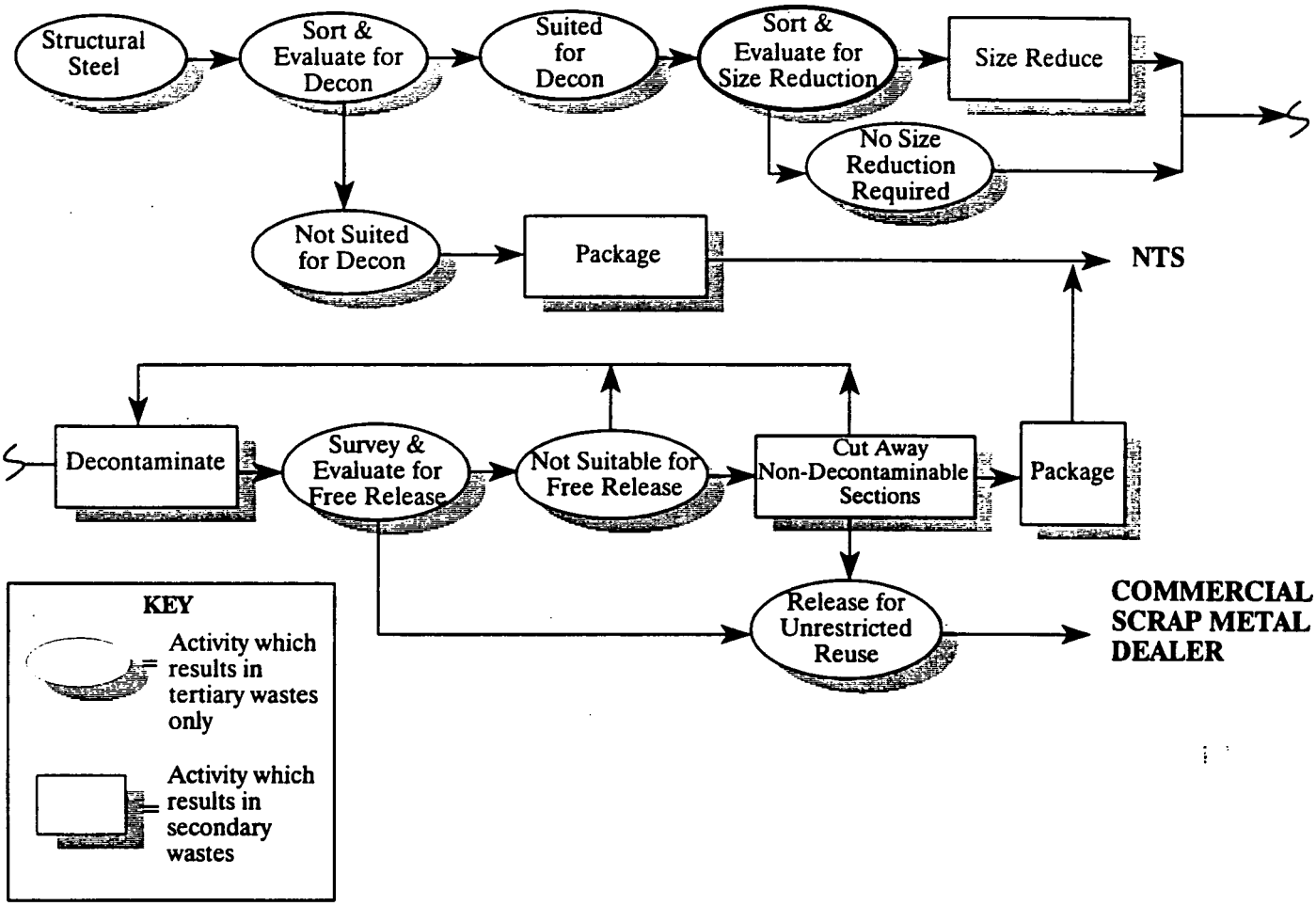


Figure 1. Process Flow Diagram

2.0 IMPLEMENTATION ACTIVITIES

2.1 RECEIPT

2.1.1 Receipt of Materials

SEG will transport FERMCO's structural steel to our facility in Oak Ridge. Each container or load of scrap steel will have been barcoded at FEMP with a unique identifier that will be used to track the steel throughout the project; from transportation and receipt, through processing, to end product and disposal or return.

SEG will accept waste that meets our licenses and waste acceptance criteria and can be safely processed. Packages must be described, identified, marked, and labeled in compliance with applicable federal, state, and local regulations, including the Department of Transportation shipping manifest. To verify that the packages were properly loaded for safe transport, the package must be accompanied by either a visual inspection record prepared by an SEG transportation specialist, or FERMCO supplied photographs or videotapes of the internal contents. Completed and signed shipping manifests and bills of lading will accompany the packages. FERMCO will be notified when each shipments reaches SEG.

To monitor the progress of waste from our clients' sites through our facilities, we use the Advance Notification Form (Figure 2) and the Waste Inventory Tracking System (WITS).

In addition to the DOW/NRC Form 741 and radioactive shipment manifest, SEG requires a completed Advance Notification Form (Figure 2) from FERMCO prior to receipt of scrap steel at SEG to ensure the proper and efficient processing. This form assists SEG in scheduling container usage, tracking materials, and maintaining our site's limits for specific isotopes. It also allows SEG to better prepare for special shipping and handling requirements. The SEG Site Lead will complete this form either through direct verbal contact with our Transportation Department or by faxing the form to our Transportation Department. The Site Lead will receive a response from the Transportation Department that acknowledges receipt.

SEG SCIENTIFIC ECOLOGY GROUP, INC.

ADVANCE NOTIFICATION FORM

SHIPMENT INFORMATION

Client: _____

Client Contact/Phone: _____

Client manifest #: _____

TN License #: _____

Burial Site Permit/Generator #: _____

Contract/Purchase Order #: _____

Scheduled ETA: _____

Carrier: _____

SEG SHIPMENT #: _____

FLATBED VAN RAGTOP DROPDECK
OTHER _____

☐ TO BE STORED AT BUILDING 3

DIST: - ORIGINAL: MANIFEST DATA SYSTEMS
O. Anderson D. Hartje T. Richards
D. Benson S. Norris R. Sackett
R.L. Brackett K. Jeter S. Sugarman
S. Cross D. King M. Wilson
D. Grafton D. Matheny
DIST. ONLY IF CIRCLED:
R. Betow M. McCauley D. Jamieson
B. Reynolds P. Walsh

THIS BLOCK COMPLETED BY SEG

PACKAGE(S) & QUANTITY INFORMATION

QTY/CONTAINER TYPE	SEG CONTAINER #(S) (S/L, OIL BINS, REC...ETC.)
____ 30 gallon drums	
____ 55 gallon drums	
____ metal bins (__ft3)	
____ wood boxes (__ft3)	
____ 20' sealands	
____ 40' sealands	
____ fuel rack	
____ resin liner/HIC	

AVIEST CONTAINER WT. (LBS) _____

RADIOLOGICAL/ISOTOPE INFORMATION

U-233	____	grams
U-235	____	grams
U-238	____	mCi
PU	____	mCi
Am-241	____	mCi
Ra	____	mCi
Sr90	____	mCi
C14	____	mCi
H3	____	mCi

Maximum On-Contact Radiation Levels (mR/hr):
External _____
Internal _____

TOTAL ACTIVITY (mCi) _____

WASTE MATERIAL DESCRIPTION INFORMATION

Drums and/or boxes inside sealands? Yes____ No ____
If yes, # of each? Box____ Drum____
If yes, are separate isotopics enclosed? Yes ____ No ____
Is waste incinerable? Yes ____ No ____ Mixed____
Mix with other compact generators? Yes ____ No ____

Date to be shipped/buried: _____

*____ Asbestos _____ ft.³ ____ Rubber ____ Ash ____ Paper
*____ Glass ____ Soil ____ Blasting Grit ____ Cloth
*____ Hot Particles ____ Vermiculite ____ Bldg. Rubble ____ Plastic
*____ Lead ___lbs___ ft³ ____ Concrete ____ HEPA Filters ____ Wood
*____ Wet/Oily ____ Metal
*____ Irradiated Metal
*____ Liquid Filters: Are filters segregated Yes _____ No _____
Are separate isotopics enclosed Yes _____ No _____
*____Resin: Bead____ Powdex____ Mixed powdex/bead____; % anion____ %cation____
Manufacturer: _____

** ADDITIONAL INFORMATION MAY BE REQUESTED BY SEG*

BURIAL SITE:

SC WA NTS HR P/R

WASTE CLASS:

A B C

_____NOTIFICATION MADE AFTER SHIPMENT DEPARTED CLIENT.

ANY SPECIAL OR ADDITIONAL INSTRUCTIONS NOTED ON REVERSE SIDE

PREPARED BY: _____ DATE: __/__/__ TIME: _____

Figure 2. Advance Notification Form

MANIFEST PROCESSING INSTRUCTIONS

CLIENT: _____

CLIENT MANIFEST #: _____ SEG SHIPMENT #: _____

CLIENT SPECIAL/ADDITIONAL INSTRUCTIONS:

_____

_____

_____

_____

_____

MANIFEST PROCESSING INSTRUCTIONS (to be completed by SEG):

_____

_____

_____

_____

_____

_____

_____

_____

SEG VISION

To be the safest, highest performing, innovative waste management company in the world, accomplished by combining teamwork, exceptional customer service, the application of advanced technologies, and a commitment to excellence.

Figure 2. Advance Notification Form (continued)

As the steel arrives at our site, we will review the shipping manifests to verify the contents of each shipment and stage the material at our Metal Decontamination and Container Refurbishment facility for further processing. Prior to processing, the barcode, waste amounts, and other information on the shipping manifest will be entered into the WITS. This system will be used to prohibit the flow of any non-FEMP materials into the process area. As an additional protection, all FERMCO scrap steel will be stored separately from other waste on the SEG site. Thus, the FEMP metals will not become cross-contaminated with metals from other clients.

SEG will provide FERMCO with monthly status reports that provide information on number and dates of shipments received; volumes received, processed and returned; and the characteristics of the waste, such as levels of activity. Information for this report is drawn in part from WITS.

2.1.2 Container Receipt Inspection

Receipt inspection of FERMCO containers will be performed when the loaded container arrives in Oak Ridge. Technicians will examine the container for holes, door integrity, seals, and general condition. If adverse conditions are found, the container will be tagged and a nonconformance report completed. The nonconformance report will be routed to the FERMCO Point of Contact and SEG Health Physics, Transportation, and Container Managers.

Containers that have been emptied of scrap steel from the FEMP will be stored in or near the Decontamination and Container Refurbishment Building at the SEG Gallaher Road facility for efficient return to FERMCO. When a sufficient number of empty containers exist for a full return load, they will be transported to FEMP.

To certify that each empty container meets strong-tight requirements, SEG technicians will perform a receipt inspection and complete an Empty Container Pre-Shipment Inspection Checklist (Figure 3), as identified in SEG procedure OP-4.8Q, *Use/Control/Inspection of Sea/Land Containers*.

TITLE: USE/CONTROL/INSPECTION OF SEA/LAND CONTAINERS

NUMBER: OP-4.8Q
REVISION: 3

ENCLOSURE 3.2

EMPTY CONTAINER PRE-SHIPMENT INSPECTION CHECKLIST

CONTAINER NO._____ DATE:_____

CONTAINER NO._____ INSPECTOR:_____

SHIPMENT NO. _____ H.P.TECH:_____

A. CONTAMINATION

1. Removable Contamination (Internal):

Sealand containers will be decontaminated to levels meeting the reuse criteria of <5000 dpm/100 cm^2 Beta-Gamma and <200 dpm/100 cm^2 alpha. (Note: Does not release Sealand for Unrestricted Use.) Exterior removable contamination will be below SEG site limits of <1000 dpm/100 cm^2 Beta-gamma and <20 dpm/100 cm^2 alpha.

S/L EXT._____ /INT._____ _____
Maximum Removable Contamination dpm/100cm^2 H.P. Tech

S/L EXT._____ /INT._____ _____
Maximum Removable Contamination dpm/100cm^2 H.P. Tech

2. Fixed Contamination:

External and internal fixed contamination shall not exceed 0.5 mR/hr and 5.0 mR/hr respectively.

S/L EXT._____ /INT._____ _____
Fixed Contamination mR/hr H.P. Tech

S/L EXT._____ /INT._____ _____
Fixed Contamination mR/hr H.P. Tech

Instr. Used: _____ RAD

_____ CON. (Beta-Gamma)

_____ CON. (Alpha)

RSO/Designee Waiver: _____
Signature Date

Figure 3. Empty Container Pre-Shipment Inspection Checklist

TITLE: USE/CONTROL/INSPECTION OF SEA/LAND CONTAINERS

NUMBER: OP-4.8Q
REVISION: 3

ENCLOSURE 3.2 (CONT.)

CONTAINER NO._____ REVIEWED:_____ DATE:_____

B. GASKETS AND CONTAINER CONDITION

1. Gaskets will be inspected to assure that they are not cracked, missing or painted on the seating surface. Gaskets shall be replaced or cleaned as necessary.

   Gaskets cleaned ( ) yes ( ) no
   Gaskets replaced ( ) yes ( ) no

   _____ Inspector

2. The adequacy of the gaskets shall be checked by closing the doors and inspecting for light leaks from within the package.

   _____ Inspector

3. The interior and exterior of the container shall be inspected for rusted through areas or rotted decking. Deficient areas must be repaired as necessary.

   _____ Inspector

4. The container ISO corners will be inspected for cracked welds.

   _____ Inspector

5. The container outside shall be in excellent condition, painted with SEG green and have the SEG Logo on the side.

   _____ Inspector

6. The roof on the outside of the container shall have a coating of Cool Seal applied (or equivalent material to prevent water leaks).

   Coating applied ( ) yes ( ) no
   Water Leak Tested ( ) yes ( ) no

   _____ Inspector

7. The floor of the container shall be checked for the condition of the wood or metal.

   Wood replaced ( ) yes ( ) no
   Metal replaced ( ) yes ( ) no
   Light leak test ( ) yes ( ) no
   Load tested ( ) yes ( ) no
   (i.e. forktruck)

   _____ Date _____ Inspector

8. All barcodes shall be removed.

   _____ Inspector

C. CONTAINER MARKINGS AND LABELING

1. Verify that the container has a legible S/L number visible from each side of the sea-land. Additionally verify the legibility of the tare weight next to the containers S/L number.

   _____ Inspector

2. The container shall be marked "RADIOACTIVE LSA" in at least one inch capital letters on two sides of the sea-land container. The letters shall be in a contrasting color to the container color.

   _____ Inspector

Figure 3. Empty Container Pre-Shipment Inspection Checklist (continued)

TITL USE/CONTROL/INSPECTION OF SEA/LAND CONTAINERS

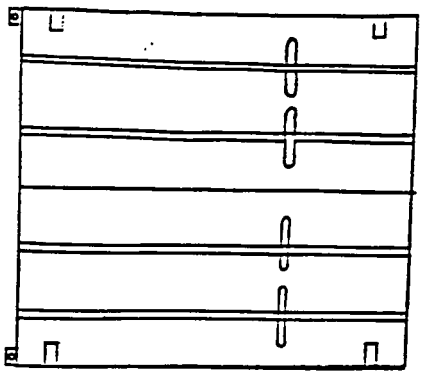
NUMBER: OP-4.8Q
REVISION

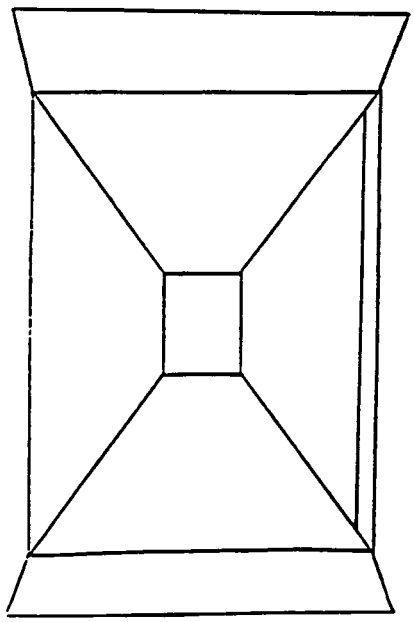
ENCLOSURE 3.3

TYPICAL SEA/LAND CONTAINER SURVEY FORM

HIGHEST DOSE RATE: INTERNAL _____ (mR/hr)
HIGHEST DOSE RATE: EXTERNAL _____ (mR/hr)
INTERNAL SWIPE # USED _____
EXTERNAL SWIPE # USED _____

SEA/LAND # _____
20' _____
40' _____





DATE: _____ TIME: _____ TYPE OF SURVEY: _____ REASON FOR SURVEY: _____

RAD INST: _____ SER #: _____ COM INST: _____ (B,Y) SERF: _____ (d) SER #: _____

REMARKS: _____

IS THIS FOR AN EXEMPT OR LIMITED QUANTITY SHIPMENT? YES NO

TECHNICIAN: _____ NUMBER OF NETS _____ REVIEWED BY: _____

OP SECTION 4A

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Figure 3. Empty Container Pre-Shipment Inspection Checklist (continued)

After the container is emptied of its contents, a thorough radiological survey and container inspection are performed and the Empty Container Pre-Shipment Inspection Checklist is completed. Internal and external surveys are conducted to ensure that radiation levels do not exceed those allowable under DOT regulations. The container will also be inspected for any obvious damage that would jeopardize the strong-tight integrity of the container. An inspection for holes, breaches, and faulty seals will be conducted, and a water spray test will be performed.

If nonconformances are identified during the receipt or empty container inspections, SEG will disposition nonconforming containers as directed by FERMCO. Depending on its condition and FERMCO direction, we will either mend the container at our Container Refurbishment Facility or include the container in the inventory of scrap steel to be decontaminated.

2.2 SORTING AND EVALUATION

After receipt and inventory, the FERMCO steel will be moved to the sorting, cutting, and sizing area where it will be sorted based first on need for and ease of decontamination, then on size; size reduced as appropriate using non-thermal techniques; decontaminated; re-evaluated for free release; and released or reprocessed as needed.

2.2.1 Pre-decontamination Evaluation

A pre-decontamination evaluation will be made to assess suitability for decontamination in our system. Materials that are less than 0.25-in. thick, activated materials, materials with deep contaminated fissures, or materials contaminated to greater than 25 mR/hr will be packaged and sent directly to NTS for disposal. The balance of the steel (approximately 90%) will be accepted for decontamination for free-release in our abrasive blasting decontamination system. This evaluation will avoid the expense associated with sorting and decontaminating materials that need not be decontaminated or could not be decontaminated to existing criteria for free release; i.e. to segregate non-decontaminable materials before processing begins.

2.2.2 Size Reduction

Any structural members too large to be decontaminated in our abrasive blasting decontamination system cabinet will be sectioned into smaller pieces. Materials as large as 36-in. wide by 96-in. high can be decontaminated in the cabinet. Sectioning operations will be accomplished by sawing, as thermal cutting processes often fix contaminated particles into the cut portions, potentially creating areas that cannot be decontaminated to free release levels and must, therefore, be processed as radioactive materials.

Secondary wastes from this operation include fines that will be dispositioned as described in Section (a)2.9.

2.3 DECONTAMINATION

The FERMCO steel will be decontaminated in the abrasive blasting decontamination system booth. The decontamination booth is specifically designed to accommodate steel plate, ingots, and structural members up to 36-inch wide by 96-inch high. The system comprises a blast cabinet, a grit recovery and handling system, a load and unload conveyor, and a dust collector.

In the cabinet, a high-pressure abrasive grit is sprayed over the steel surface to remove an approximately 1/32-inch thick layer from the steel surface. In this way, the lead-based paint and radioactive contaminants on the surface of the steel will be removed. Most contaminants will be removed in one pass through the booth; however, the steel can be passed through the system as necessary until it is established and verified that it has been decontaminated to the extent possible.

The secondary waste from this operation will be spent grit, which contains the lead-based paint and radioisotopic contaminants removed from the steel. This grit is recycled through a recovery and handling system, which segregates intact abrasive particles from pulverized grit, paint particles, and radioisotopic constituents. The spent grit and radioisotopic constituents will be dispositioned as discussed in Section 2.9 and the reusable abrasive will be recycled

through the abrasive blasting system until it breaks down. After the grit is pulverized, it will be disposed as described in Section 2.9.

2.4 SURVEY AND EVALUATION FOR FREE RELEASE

The post-decontamination evaluation will include a survey to quantify the amount of volumetrically contaminated material to be designated for direct disposal at NTS. The cut ends of the steel pieces that were sectioned during Building 7 dismantlement will have been volumetrically contaminated as the melting action of the torches will imbed contaminants within the metal matrix. These contaminated cutting ends will be packaged and sent directly to NTS for disposal. The balance of the metal will be resurveyed and depending upon the survey results, will be re-decontaminated or free-released.

2.5 RELEASE FOR UNRESTRICTED REUSE

All decontaminated steel will undergo rigorous survey and testing to verify that all SEG license criteria found in *Unconditional Release of Materials* and the criteria of NUREG 1.86 have been met. Each steel component will be surveyed using two methods.

1. Standard swipe method, whereby a dry filter or soft absorbent paper is wiped over the metal surface to determine the amount of removable radioactive material

2. Sodium iodide detector, which is passed over the surface of the metal by hand to detect fixed contaminants

Any steel that does not meet release criteria will undergo additional decontamination efforts, be re-surveyed, and released, or packaged and sent to NTS. Steel that meets or is less than the regulatory limit for free release will be sold to a commercial scrap metal dealer for recycle and will not be tracked further by SEG.

2.6 CONTAINER SPECIFICATIONS

SEG will specify, procure, and deliver strong-tight bulk and/or small box containers for storage or transportation of LLRW as specified by FERMCO. These containers will be made of virgin carbon steel.
Container suppliers will be subject to SEG's quality assurance requirements and will undergo a quality assurance audit.

2.7 MATERIAL DISPOSITION

Processed materials will be dispositioned in one of two ways:

1. Free-released to Southern Alloys, Inc. for unrestricted reuse (with appropriate local, state, FERMCO, and DOE approvals)

2. Packaged and transported to NTS

2.8 WASTE DISPOSITION

2.8.1 DOE Waste

All secondary or process wastes that can be effectively segregated will be designated as FERMCO waste, processed to meet NTS acceptance criteria, and disposed at NTS as described in Table 1.

Table 1. Most secondary wastes will be tracked as DOE wastes.

Waste Category	Description	Method of Segregation	Treatment/ Disposition
Transport residues and floor sweepings	Oxides, residues, or other debris that may be in or on the GFM when packaged at the FEMP and may come loose during transport or unloading, or generated during size reduction or cutting activities.	This waste will be collected from the transport containers prior to container refurbishment and from the process area at intervals throughout and at completion of the FERMCO steel decontamination campaign.	Transport residues and floor sweepings will be containerized in SEG innerpack boxes, sampled, analyzed for radiological constituents and TCLP, barcoded and tracked as FERMCO waste, compacted, overpacked in a strong-tight package, and disposed at NTS in accordance with NVO-325, FERMCO's Application to Ship Waste to the NTS and the addendum to FERMCO's Waste Certification Program Plan.
Radioactively-contaminated, lead- based paint chips	Characteristic, mixed waste comprising lead-based paint chips and radioactive contaminants (primarily normal & depleted uranium) recovered from the decon process.	Paint chips will be collected during operations of the abrasive blasting cabinet dedicated to FERMCO wastes.	This waste will be collected, containerized, barcoded and tracked as FERMCO waste, grouted, analyzed for TCLP constituents, overpacked, transported and buried at NTS in accordance with NVO-325, FERMCO's Application to Ship Waste to the NTS and the addendum to FERMCO's Waste Certification Program Plan.
Decontamination grit	Characteristic, mixed waste comprising an abrasive blasting media with residual radioactive and lead-based paint constituents.	Grit will be collected during operations of the abrasive blasting cabinet dedicated to FERMCO wastes.	This waste will be collected, containerized, barcoded and tracked as FERMCO waste, grouted, analyzed for TCLP constituents, overpacked, transported and buried at NTS in accordance with NVO-325, FERMCO's Application to Ship Waste to the NTS and the addendum to FERMCO's Waste Certification Program Plan.
Steel scrap	Scrap, trimmings, and cuttings from size reduction and fabrication activities.	FERMCO steel will be segregated from other client waste from receipt through processing, allowing the collection of FERMCO-only secondary waste scraps.	Steel scrap will be packaged in SEG containers, barcoded and tracked as FERMCO material, disposed of at NTS as FERMCO waste.

SEG understands that FERMCO and DOE-Nevada auditing teams will perform oversight of the generation, characterization, and packaging of secondary wastes that are destined for disposal at NTS. These audits will verify compliance of the secondary waste packages with NVO-325, Rev. 1, *Nevada Test Site Defense Waste Acceptance Criteria, Certifications, and Transfer Requirements*.

2.8.2 SEG Waste

Secondary wastes that cannot be effectively segregated from other wastes or that can be beneficially reused in other DOE applications will be designated as SEG wastes and dispositioned as described in Table 2.

Table 2. Some secondary waste will be tracked as SEG wastes.

Waste Category	Description	Treatment/Disposition Method
Tertiary wastes	Protective clothing, sampling supplies, air filtration products, and disposable items used in the size reduction process at SEG	Tertiary wastes will be collected, containerized in SEG innerpack boxes, barcoded and tracked as SEG waste and treated either by compaction or incineration. Compacted or incinerated SEG waste will be characterized, overpacked, transported, and buried at a radioactive landfill at SEG's expense.

3.0 SCHEDULE

SEG will perform in the most safe and expedient manner possible. Schedules for key activities are as follows. A summary schedule is included as Figure 4.

3.1 WASTE PICKUP AND TRANSPORTATION

The SEG Site Lead will notify the SEG Transportation Department ten working days in advance of the desired date for arrival of a trailer. After notification is received, SEG will schedule a dedicated trailer for arrival at the agreed-upon time and place. After the material has been loaded on the truck for transport to Oak Ridge, SEG personnel will complete an Advanced Notification Form. The Advanced Notification Form must be completed and submitted to the SEG Transportation Department at least 24 hours in advance of the expected time of departure from FEMP. Shipments from FEMP will require 2 to 4 days loading and transport time.

3.2 PROCESSING OF SCRAP STEEL

Decontamination of incoming shipments of scrap steel can begin immediately upon arrival at SEG. We estimate that 630 tons of steel can be decontaminated to meet the free release criteria of NUREG 1.86. Assuming that each shipment contains 12.6 tons of steel that can be decontaminated to free release, and that two shipments arrive each working day, we estimate that decontamination can be completed within 150 onsite working days after arrival of the first shipment at SEG.

3.3 DISPOSITION OF PROCESSED STEEL

Decontaminated material will be sold to Southern Alloys as truckload-sized lots are collected. Nondecontaminable steel will be packaged for disposal at NTS.

3.4 PURCHASE AND DELIVERY OF CONTAINERS

Credit for the sale of decontaminated scrap steel will be applied toward the purchase of new carbon steel containers for FERMCO. Because this activity is not dependent on completion of steel processing, SEG can order the sizes and quantities of containers requested by FERMCO immediately after being given approval to proceed with this contract and a container delivery order.

3.5 SECONDARY WASTE PROCESSING

As much as possible, secondary waste streams resulting from processing of FERMCO material will be segregated from that of other customers. Sufficient quantities will be collected for efficient preparation of the final waste forms within the limitations of our site licenses. SEG estimates that a campaign to solidify the mixed waste that results from abrasive blasting operations (radioactively lead-based paint chips and decontamination grit) will be conducted every 90 days.

SEG will be responsible for processing of secondary wastes and shipment to burial at NTS.

3.6 PREPARATION AND SUBMITTAL OF FINAL REPORT

Data for inclusion in the final report will be collected and analyzed throughout the performance of this project. The final report will be delivered to FERMCO prior to completion of the project, which is estimated to be 180 working days after arrival at SEG of the first shipment of steel.

Other data reporting requirements will be submitted to FERMCO in accordance with the schedule depicted in Table 3.

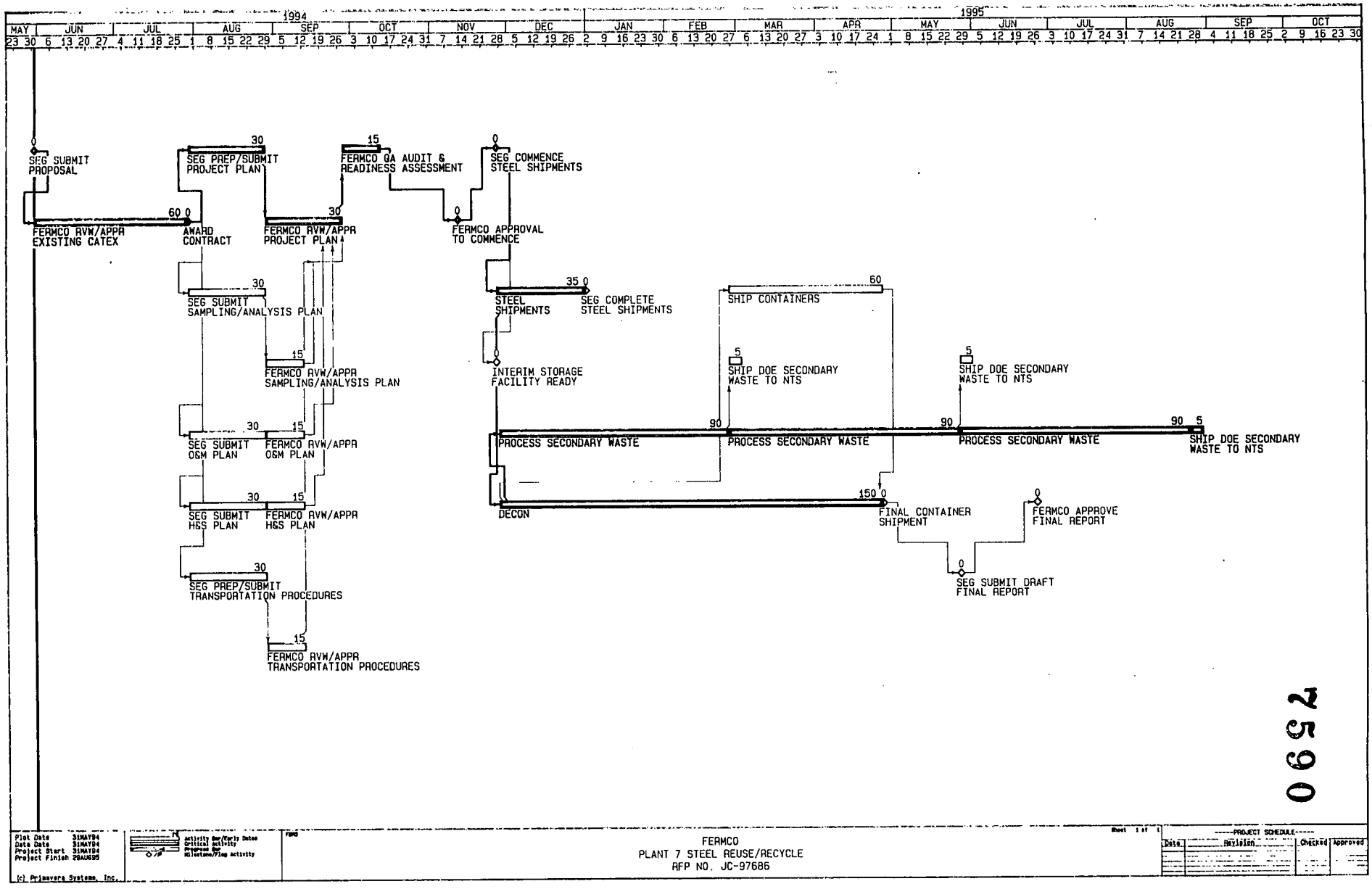

Figure 4. Key Activities Summary

000502

7590

Table 3. Schedule for Submittal of RFP Section J Data Reporting Requirements

Data Number	Title	Schedule
A001	Meeting Minutes/Travel Report	5 days after event
A002	Transportation Procedures	30 days prior to commencing shipments
A003	Offsite Processing Workplan	With Technical/Management Proposal
A004	Operation and Maintenance Plan	30 days after contract award
A005	Health and Safety Plan	30 days after contract award
A006	Quality Assurance Project Plan	With Technical/Management Proposal
A007	Monthly Progress Report	5 days after post award site visit/5 days after month-end
A008	Final Project Report	30 days after completion of project

4.0 PERSONNEL AND EQUIPMENT REQUIREMENTS

4.1 PERSONNEL

Figure 5 shows the key personnel and organization for this project. This organization was designed to ensure direct lines of communication and support between the project manager and the technical specialists who will be involved in each aspect of the steel recycling demonstration. Additionally, project personnel will be dedicated to following key indicators of project progress, including cost and schedule and contract administration. The project staff includes quality assurance and transportation specialists as well. All project personnel will be in frequent contact with the project manager, providing the information necessary for smooth operation of the work.

Table 4 lists the responsibilities and authorities of each person in the project organization.

4.2 EQUIPMENT

SEG will provide all equipment necessary for operations at the Oak Ridge facility. These operations include unloading of containers of FERMCO scrap steel, steel processing, secondary waste disposition, and return of empty FERMCO containers to the FEMP.

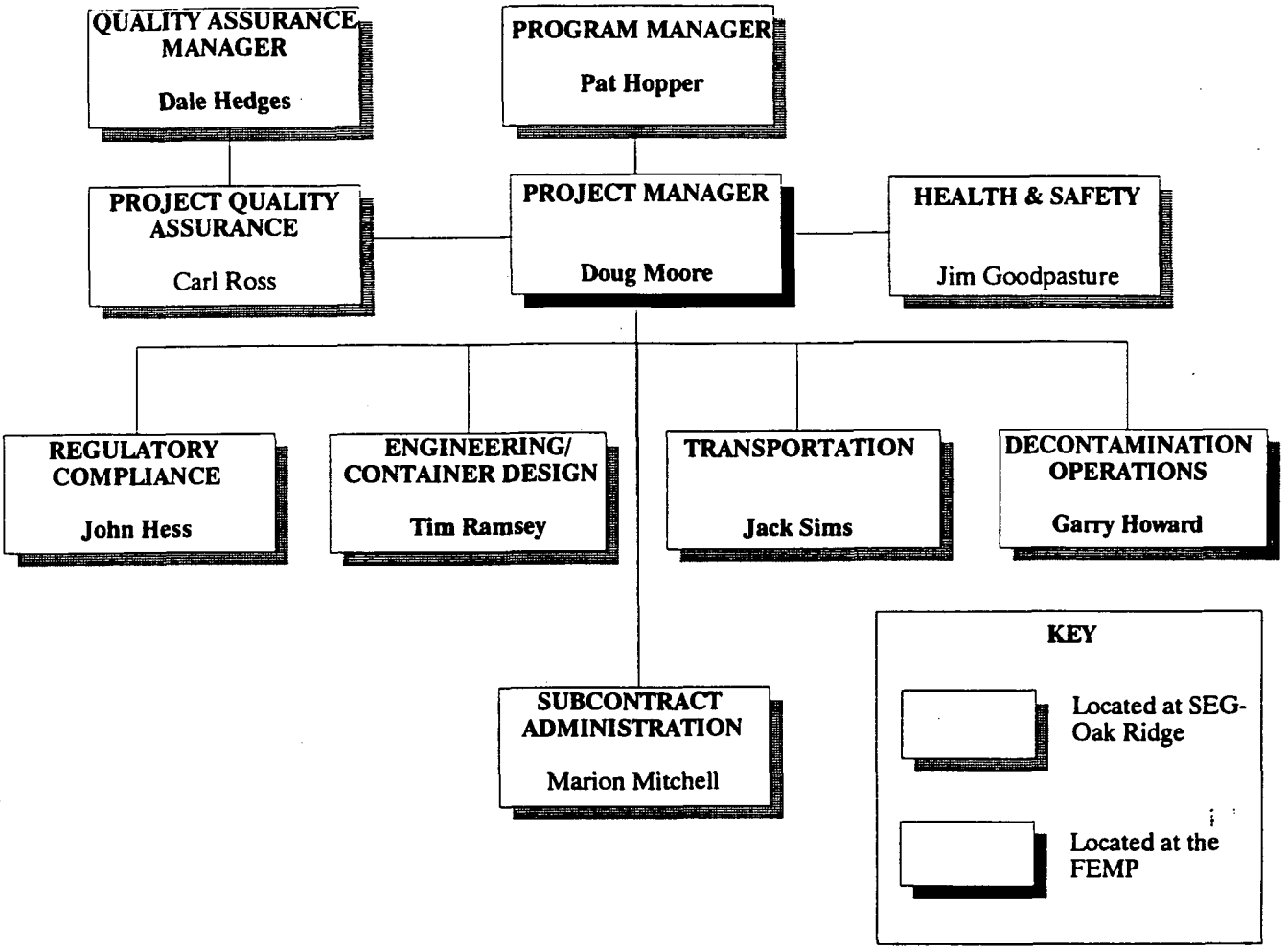

Figure 5. Key Personnel and Organization

Table 4. Responsibilities and Authorities Matrix for the Plant 7 Steel Recycling Project

Key Position	Responsibilities	Authorities
Program Manager **Pat Hopper**	• Overall project leadership and direction • Review and approve all data required by Section J of the RFP	• Approve/control budget expenditures • Allocate resources for all project activities • Oversee project execution
Project Manger **Doug Moore**	• Compliance with project scope, schedule, and budget • Primary client contact • Provision of containers • Submittal of all data required by Section J of the RFP • Client liaison for project • Direct packaging of steel and loading of containers on trailers	• Direct project execution • Review, approve and submit all data required by Section J of the RFP • Review shipping documentation prepared at FEMP
Decon Operations **Garry Howard**	• Operate the Decontamination Facility in a safe and efficient manner • Collect survey data • Maintain inventory control	• Approve free release of decontaminated materials • Dedicate operations staff • Recommend improvements to decontamination processes
Subcontracts Administra-tion **Marion Mitchell**	• Monitor subcontractor operations for adherence to specifications • Negotiate contractual and financial issues with subcontractors • Monitor cost and schedule performance of subcontractors • Track purchase orders • Coordinate preparation of data required under Section J of the RFP	• Recommend placement of subcontracts • Recommend corrective actions and process improvements to subcontractors • Review and approve data to be submitted in accordance with Section J of the RFP
Engineering/ Container Design **Tim Ramsey**	• Coordinate design and fabrication of containers to meet specifications • Determine container requirements • Coordinate testing of containers • Coordinate with subcontractor personnel during specification, design, and fabrication as necessary	• Review and approve design and fabrication modifications • Initiate container testing and review and approve container test report

Key Position	Responsibilities	Authorities
Transportation Specialist **Jack Sims**	• Schedule and route steel to and from destinations • Monitor daily transportation activities • Coordinate preparation of data required by Section J of the RFP • Identify licensed and competent transporters • Verify compliance with transportation regulations • Coordinate transportation activities with FERMCO transportation specialists, regulators	• Accept scrap shipments • Review and approve data to be submitted in accordance with Section J of the RFP • Recommend contracts with transporters • Approve plans for complying with regulations • Evaluate transporters performance
Regulatory Compliance **John Hess**	• Assess regulatory requirements and compliance for SEG site and client site activities • Maintain licensing and permitting documentation • Maintain documentation of regulatory compliance • Coordinate regulatory compliance activities with FERMCO regulatory specialists, regulators	• Review work plans for regulatory compliance • Dedicate regulatory compliance staff
Quality Assurance Manager **Dale Hedges**	• Maintain corporate quality assurance policies and procedures • Contribute to preparation of project quality assurance plans • Oversee conduct of quality assurance activities	• Review and approve project quality assurance plan • Monitor conduct of project quality assurance activities
Project Quality Assurance **Carl Ross**	• Develop and maintain project quality assurance plan • Coordinate training of personnel to the quality assurance plan • Document and track nonconformances • Perform quality assurance surveillance of processes to ensure compliance/conformance • Audit subcontractors	• Approve/disapprove of selected corrective actions • Accept or reject procured services or goods based on quality
Safety and Health Manager **Jim Goodpasture**	• Develop project-specific health and safety plan for SEG activities at the FEMP • Perform oversight of health and safety activities at SEG	• Submit project-specific health and safety plan for SEG activities at the FEMP

5.0 SAMPLING AND ANALYSIS PLAN

5.1 DECONTAMINATION FOR FREE RELEASE

Surveying of materials for unconditional release is performed in accordance with SEG procedure HP-5.6Q, *Unconditional Release of Materials*. SEG ascribes to the free release criteria contained in NUREG 1.86.

Prior to releasing any item (equipment, parts, materials, etc.) for unconditional release, the item is first surveyed for loose surface and fixed alpha and beta-gamma contamination. Each steel component will be surveyed using two methods.

1. Standard swipe method, whereby a dry filter or soft absorbent paper is wiped over the metal surface to determine the amount of removable radioactive material.

2. Sodium iodide detector, which is passed over the surface of the metal by hand to detect fixed contaminants.

Surveys should be performed in locations where background radiation levels are as low as possible; when surveying an item with a frisker, background must be less than 300 cpm.

If no activity is detected, it is assumed that accessible areas have neither fixed or loose surface contamination. Inaccessible areas must also be surveyed for internal contamination prior to release for unconditional use. Smears taken on access points to inaccessible internal surfaces must provide a representative analysis of the inaccessible surface; otherwise, the surface contamination shall be assumed to exceed the criteria of NUREG 1.86.

Results from the surveys are documented on the SEG Blank Survey Form (Figure 5).

TITLE: UNCONDITIONAL RELEASE OF MATERIALS

NUMBER: HP-5.6Q
REVISION: 4

ENCLOSURE 3.2

SEG BLANK SURVEY FORM

Location: _____
Swipes #s Used: _____

Date: _____ Time: _____ Type of Survey: _____ Reason for Survey: _____

RAD Inst.: _____ Ser#: _____ CON Inst.: _____ ( ) Ser#: _____ ( ) Ser#: _____

Remarks: _____

Technician: _____ Reviewed By: _____

Figure 6. SEG Blank Survey Form

5.2 METAL MELTING

Sampling of the furnace bath is performed during processing to track the bath chemistry while charging. This is necessary because of the inconsistent composition of the metal processed. Due to the stirring action present in the induction furnace, the samples are considered homogeneous. The bath is sampled with immersion samplers (Electro-Nite Quik-Spec 4000 Dual Thickness Steel Sampler), in which molten metal from the furnace is pulled into a small mold in the end of a heavy cardboard tube.

When a sample is taken, the immersion sampler is pushed through the slag layer into the molten metal in the furnace. After a few seconds, when the metal has had time to fill in the mold, the sampler is removed from the furnace. The mold is opened, and the sample is allowed to cool. After cooling, the sample is ground flat on a Leco metallographic grinder and passed through the air lock into the Metallurgy Laboratory. A laboratory technician then analyzes the sample on the Leco Glow Discharge Spectrometer to determine the chemistry of the bath. Levels of thirteen elements are determined: Fe, Mn, Si, P, C, S, Ni, Mo, Cu, Co, Nb, Al, and Cr. A copy of the analytical results are then given to the control room operator, who makes any necessary alloy additions to the bath. Additional samples may be taken during charging of the furnace as necessary.

Just prior to pouring, three samples are pulled from the bath to determine the final block chemistry. One of the three final samples is ground and analyzed on the spectrometer. The thin part of the sample is removed and sent to the main laboratory for radiological characterization. The main laboratory analyzes the sample on a gamma spectrometer with a high purity Ge detector to determine the isotopic breakdown of the bath. The other two samples pulled from the heat are archived.

5.3 SECONDARY WASTE

SEG Procedure OP-6.8, *Process Residue Sampling Procedure*, provides guidelines for sampling of process residues generated at the Decontamination and Refurbishment Facility and the Metal Processing Facility. Secondary wastes are sampled to determine the content of hazardous constituents. Also, secondary wastes that have been treated for disposal are

sampled to verify that they have been rendered nonhazardous. Standard, repeatable sampling techniques are employed to ensure that homogeneous representations of each process residue are obtained for analysis.

Types of samples that will be taken for this project include scoop samples (floor sweepings, metal melt slag, lead sludge, hazardous/mixed waste solidified in concrete) and core samples (Pangborn dust, Pangborn airwash fines). Each method involves use of a specialized tool to withdraw and transfer residue samples from their original containers to sample containers. Scoop samples are taken by using a scoop to remove the sample; core sampling involves inserting and withdrawing a 48-in. long x 3/4 in.-diameter core sampling tool. Specimen size may be reduced by grinding to facilitate transfer of the material into the sample container. When grinding, the grinder is cleaned between samples.

Sample containers are delivered to the laboratory for analysis and the laboratory sample log-in sheet is completed in accordance with established laboratory practices. If chain-of-custody is being used for the sample, SEG Procedure OP-6.9, *Chain of Custody*, is followed.

REFERENCES

NVO-325, Nevada Test *Site Defense Waste Acceptance Criteria, Certifications, and Transfer Requirements*, Revision 1, June 1992

SEG Procedure HP-5.6Q, *Unconditional Release of Materials,* Revision 4, February 21, 1992

SEG Procedure OP-4.8Q, *Use/Control/Inspection of Sea/Land Containers*

SEG Procedure OP-4.35, *Waste Acceptance Procedure*, Revision 0, May 12, 1993

Tennessee Radioactive Material License, R-73016-F96

7590

SCIENTIFIC ECOLOGY GROUP, INC.

Our Vision

To be the safest, highest performing, innovative waste management company in the world, accomplished by combining teamwork, exceptional customer service, the application of advanced technologies, and a commitment to excellence.

QUALITY ASSURANCE PLANNING
FOR THE
PROCESSING AND BENEFICIAL REUSE OR RECYCLING OF 700 TONS OF RADIOACTIVELY CONTAMINATED STEEL

FERMCO RFP JC-97686

PREPARED BY: _____
C. H. Ross, Project QA Engineer Date

APPROVED BY: _____
Doug Moore, Project Manager Date

APPROVED BY: _____
Dale Hedges, Vice President, SEG QA Date

000513

SPECIFIC FERMCO PROJECT QUALITY PLAN REQUIREMENTS
PLANT 7 STRUCTURAL STEEL

The following addresses each of the Criterion specified in Section J.6.1 "SPECIFIC PROJECT QUALITY PLAN REQUIREMENTS - PLANT 7 STRUCTURAL STEEL" of FERMCO RFP JC-97686.

SEG, with respect to the scope of work, shall implement a project-specific quality assurance plan that implements the following requirements defined by FERMCO RFP JC-97686, Processing and Beneficial Reuse or Recycling of 700 Tons of Radioactively Contaminated Steel.

CRITERION 1 - PROGRAM

Figure 1 shows our proposed project organization. This organization was designed to ensure direct lines of communication and support between the SEG Project Manager and the technical specialists who will be involved in each aspect of the Plant 7 Steel Recycling Project. All project personnel will be in frequent contact with the Project Manager, providing the information necessary for smooth operation of the work.

Key personnel include the following:

Pat Hopper, Program Manager
Doug Moore, Project Manager
Garry Howard, Decontamination Operations
Tim Ramsey, Engineering/Container Design
Marion Mitchell, Subcontract Administration
Jack Simms, Transportation
John Hess, Regulatory Compliance
Carl Ross, Project Quality Assurance
Dale Hedges, Quality Assurance Manager
Jim Goodpasture, Health and Safety

Resumes for key personnel are included as Appendix A

A Responsibility Assignment Matrix (RAM) is provided in Table 1. This matrix lists the responsibilities of each key person assigned to this project.

CRITERION 2 - PERSONNEL TRAINING AND QUALIFICATION

Project team personnel shall receive documented indoctrination training to the requirements of the project-specific Quality Assurance Plan.

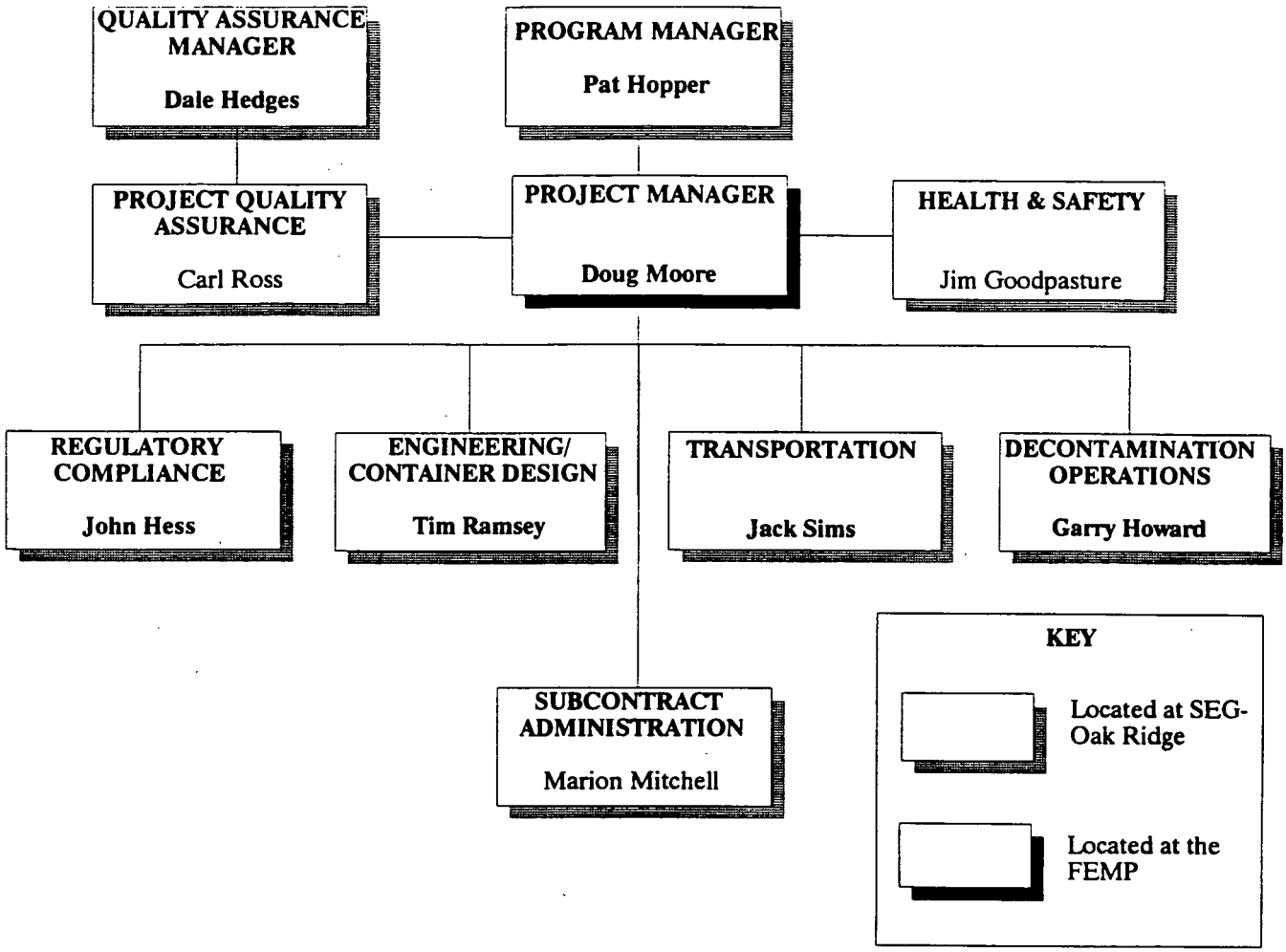

Figure 1 Project Organization

Table 1
Responsibilities and Authorities Matrix for the Plant 7 Steel Recycling Project

Key Position	Responsibilities	Authorities
Program Manager **Pat Hopper**	• Overall project leadership and direction • Review and approve all data required by Section J of the RFP	• Approve/control budget expenditures • Allocate resources for all project activities • Oversee project execution
Project Manger **Doug Moore**	• Compliance with project scope, schedule, and budget • Primary client contact • Provision of containers • Submittal of all data required by Section J of the RFP • Client liaison for project • Direct packaging of steel and loading of containers on trailers	• Direct project execution • Review, approve and submit all data required by Section J of the RFP • Review shipping documentation prepared at FEMP
Decon Operations **Garry Howard**	• Operate the Decontamination Facility in a safe and efficient manner • Collect survey data • Maintain inventory control	• Approve free release of decontaminated materials • Dedicate operations staff • Recommend improvements to decontamination processes
Subcontracts Administra-tion **Marion Mitchell**	• Monitor subcontractor operations for adherence to specifications • Negotiate contractual and financial issues with subcontractors • Monitor cost and schedule performance of subcontractors • Track purchase orders • Coordinate preparation of data required under Section J of the RFP	• Recommend placement of subcontracts • Recommend corrective actions and process improvements to subcontractors • Review and approve data to be submitted in accordance with Section J of the RFP
Engineering/ Container Design **Tim Ramsey**	• Coordinate design and fabrication of containers to meet specifications • Determine container requirements • Coordinate testing of containers • Coordinate with subcontractor personnel during specification, design, and fabrication as necessary	• Review and approve design and fabrication modifications • Initiate container testing and review and approve container test report

Key Position	Responsibilities	Authorities
Transportation Specialist Jack Sims	• Schedule and route steel to and from destinations • Monitor daily transportation activities • Coordinate preparation of data required by Section J of the RFP • Identify licensed and competent transporters • Verify compliance with transportation regulations • Coordinate transportation activities with FERMCO transportation specialists, regulators	• Accept scrap shipments • Review and approve data to be submitted in accordance with Section J of the RFP • Recommend contracts with transporters • Approve plans for complying with regulations • Evaluate transporters performance
Regulatory Compliance John Hess	• Assess regulatory requirements and compliance for SEG site and client site activities • Maintain licensing and permitting documentation • Maintain documentation of regulatory compliance • Coordinate regulatory compliance activities with FERMCO regulatory specialists, regulators	• Review work plans for regulatory compliance • Dedicate regulatory compliance staff
Quality Assurance Manager Dale Hedges	• Maintain corporate quality assurance policies and procedures • Contribute to preparation of project quality assurance plans • Oversee conduct of quality assurance activities	• Review and approve project quality assurance plan • Monitor conduct of project quality assurance activities
Project Quality Assurance Carl Ross	• Develop and maintain project quality assurance plan • Coordinate training of personnel to the quality assurance plan • Document and track nonconformances • Perform quality assurance surveillance of processes to ensure compliance/conformance • Audit subcontractors	• Approve/disapprove of selected corrective actions • Accept or reject procured services or goods based on quality

Key Position	Responsibilities	Authorities
Safety and Health Manager Jim Goodpasture	• Develop project-specific health and safety plan for SEG activities at the FEMP • Perform oversight of health and safety activities at SEG	• Submit project-specific health and safety plan for SEG activities at the FEMP

SEG personnel shall receive training and qualification in accordance with SEG procedure SEG/QA-2.1.

SEG personnel shall receive documented General Employee Training which includes general safety, radiation protection, and Quality Assurance Program indoctrination.

SEG personnel classified as Radiation Workers shall receive documented training, qualification, and annual re-qualification in accordance with the SEG Radworker Training Program.

SEG Health Physics department personnel shall receive documented training and qualification in accordance with the departmental HP Training Program.

SEG Quality Assurance personnel performing inspections and tests shall be trained and certified in accordance with procedure SEG/QA-10.3.

SEG Quality Assurance personnel or others performing nondestructive examinations shall be trained and certified in accordance with procedure SEG/QA-2.4.

SEG Quality Assurance Personnel or others qualified as SEG Lead Auditors shall be trained and certified in accordance with procedure SEG/QA-2.2.

CRITERION 3 - QUALITY IMPROVEMENTS

SEG shall cooperate to resolve nonconforming condition reported by FERMCO independent assessments (Criterion 10), Management Assessments (Criterion 9), and Inspection and Test Acceptance (Criterion 8). Project-related nonconforming conditions affecting materials, processes, and containers shall be reported to the FERMCO project engineer for evaluation and disposition in accordance with FERMCO construction division procedures.

SEG shall document nonconforming condition in accordance with SEG/QA-100, Section 15 and procedure SEG/QA-15.1, Nonconformance Reporting provides the requirements for personnel assigned to the project to detect, identify, report and follow-up deficiencies to assure that nonconforming items or activities are corrected.

SEG Nonconformance reports and Open Item Status Reports shall be maintained as quality assurance records available for FERMCO review upon request.

CRITERION 4 - DOCUMENTS AND RECORDS

Project procedures shall be issued, used, revised, controlled, and stored in accordance

with SEG/QA-100 Section 6 and procedure SEG/QA-6.1. A distribution list will designate individuals and/or organizations who will receive controlled copies.

Personnel files shall be maintained by the Human Resources Department in accordance with the SEG Policies Manual. Personnel records attesting to training, qualifications, and certifications shall be maintained by SEG Document Control in accordance with procedures SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

Waste shipping documentation shall be maintained in accordance with procedure SEG/OP-4.3.

Monthly Progress Reports to FERMCO shall be issued by the Project Manager in accordance with the Project Management Plan and maintained by Project Manager as Project Records for submittal to Document Control upon project completion in accordance with procedures SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

Draft and Final project reports shall be issued to FERMCO by the Project Manager upon review and approval of cognizant SEG project personnel in accordance with the Project Management Plan. Final project reports issued upon resolution of FERMCO review comments and revisions of draft reports are maintained as Project Records for submittal to Document Control upon project completion in accordance with procedures SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

SEG Waste Transportation procedures shall be developed, issued, used, revised, and controlled, and stored in accordance with SEG/QA-100 Section 6 and procedure SEG/QA-6.1.

FERMCO Drawings and Specifications for the contracted containers shall be controlled by Project Manager for internal issue for information and fabrication within SEG. Purchase orders for third party fabrication shall specify and include submittal of the appropriate drawings and specifications. Any revisions transmitted to and accepted by the Project Manager from FERMCO shall receipt documented and exchanged with existing specifications and drawings. A purchase order amendment and submittal of the current revision shall be made should third party fabrication be underway. FERMCO drawings and specifications shall be maintained as Project Records for submittal to Document Control upon project completion in accordance with procedures SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

SEG drawings and specifications shall be developed in accordance with Engineering Design Control procedure SEG/QA-3.1 and issued, used, revised, and controlled in

accordance with Engineering Design Document Control procedure DP-002 and Document Control procedure SEG/QA-6.1.

Project Plans shall be developed, issued, used, revised, and controlled in accordance with Document Control procedure SEG/QA-6.1. Copies shall also be maintained as Project Records for submittal to Document Control upon project completion in accordance with procedures SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

Container test procedures shall be developed and used in accordance with SEG/QA-100, Section II and Procedure 11.1, Test Control. They shall be issued, revised, and controlled in accordance with Document Control procedure SEG/QA-6.1.

Container test data and test certification records shall be obtained in accordance with test procedures and maintained as Project Records for copy submittal to FERMCO as defined by the contract and the Management Plan. Project Records shall be submittal to Document Control upon project completion in accordance with procedure SEG/QA-17.1. Container inspection and test records shall also be maintained as quality assurance records in accordance with procedures SEG/QA 17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

SEG Welder Qualifications shall be maintained by shop managers within department files and by the SEG Certified Welding Inspector within quality assurance records files. Welder certification records applicable to this project shall be obtained as Project Records for copy submittal to FERMCO as defined by the contract and the Management Plan. Project Records shall be submittal to Document Control upon project completion in accordance with procedures SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

Subcontractor Welder Qualifications applicable to this project shall be obtained as Project Records for copy submittal to FERMCO as defined by the contract and the Management Plan. Project Records shall be submittal to Document Control upon project completion in accordance with procedure SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

Procurement documentation and receiving reports shall be issued, used, controlled, and revised in accordance with procedure SEG/QA 4.1, Procurement Control.

All project-related quality assurance records shall be generated, issued, used, maintained, and revised/corrected (if necessary) in accordance with Section 17 of SEG/QA-100, SEG/QA-17.1, Quality Records Management, and SEG/QA-17.2, Records Submittal.

CRITERION 5 - WORK PROCESSES

SEG shall develop a project-specific Process Procedure to address all work processes from handling, loading, release, and transport from the FEMP to the receipt, handling, control, processing, and disposition of the contaminated steel at SEG. It shall address the work processes by which the releasable and non-releasable steel is further controlled and processed for recycle or reuse and it will address the control of secondary radioactive wastes generated for disposal. It will also address each step of the fabrication and quality processes for the bulk container production under FERMCO specifications. This project-specific Process Procedure shall provide detained procedures or reference existing procedures with integrated project-specific quality assurance and quality control requirements from the project-specific Quality Assurance Plan. SEG inspection, verification, and test hold points shall be identified as well as SEG QA surveillance requirements. FERMCO inspection, test, and surveillance hold points will also be identified.

Existing SEG procedures sufficient for the project will be referenced within the project-specific Quality Assurance Plan and the project-specific Process Procedure. Work process procedures will be developed, approved, and controlled where necessary to control each work processes of the project-specific Quality Assurance Plan and the Process Procedure.

CRITERION 6 - DESIGN CONTROL

FERMCO Drawings and Specifications for the contracted containers shall be controlled by Project Manager for internal issue for information and fabrication within SEG. Purchase orders for third party fabrication shall specify and include submittal of the appropriate drawings and specifications. Any revisions transmitted to and accepted by the Project Manager from FERMCO shall receipt documented and exchanged with existing specifications and drawings. A purchase order amendment and submittal of the current revision shall be made should third party fabrication be underway. FERMCO drawings and specifications shall be maintained as Project Records for submittal to Document Control upon project completion in accordance with procedures SEG/QA-17.1, Quality Records Management and SEG/QA-17.2, Records Submittal.

SEG drawings and specifications shall be developed in accordance with Engineering Design Control procedure SEG/QA-3.1 and issued, used, revised, and controlled in accordance with Engineering Design Document Control procedure DP-002 and Document Control procedure SEG/QA-6.1.

CRITERION 7 - PROCUREMENT

Potential SEG suppliers are evaluated and selected based on objective evidence of their ability to meet the project specifications in accordance with SEG/QA-7.2, Approved Supplier List.

SEG shall conduct procurement activities in accordance with Section 4 of SEG/QA-100 and procedure SEG/QA-4.1. Procurement documents shall be reviewed by technically knowledgeable personnel to assure appropriate technical, quality assurance and documentation requirements are incorporated.

Procurement documents identify SEG's responsibility for ensuring that suppliers comply with quality requirements. Hold Points shall be clearly identified when appropriate. Procurement activities shall be specified, reviewed, and controlled for any requirements unique to the project such as FERMCO inspection, verification, test, and surveillance needs. Although subcontractors are required to have quality programs consistent with SEG requirements, no portion of the transportation or decontamination activities shall be subcontracted.

SEG inspection activities for this Project shall be controlled in accordance with SEG/QA-100, Section 10, Procedure SEG/QA-10.1, Inspection. Surveillance activities are controlled by procedure SEG/QA-10.2, Surveillance Practice. The receipt inspection provisions of SEG\QA-10.1 and the surveillance provisions of SEG/QA-10.2 shall be implemented for containers fabricated by subcontracted organizations.

SEG testing shall be conducted in accordance with SEG/QA-100, Section 11 and Procedure 11.1 Test Control. At a minimum SEG QA shall review test plans and procedures. Tests performed by SEG or subcontractors shall be controlled to assure adequacy and accuracy.

SEG shall control the identification of materials, parts and components in accordance with Section 8 of SEG/QA 100.

Items or services purchased for the project shall be controlled in accordance with SEG/QA-100, Section 7 and Procedure SEG/QA-7.1.

In all cases, the documentation generation and documentation collection requirements of the above referenced SEG procedures, the project-specific Quality Assurance Plan, and the project-specific Process Procedure shall be met including the required reviews and approvals to ensure their adequacy, accuracy, and acceptability.

CRITERION 8 - INSPECTION AND TEST ACCEPTANCE

SEG shall cooperate fully with FERMCO quality personnel with the scheduling and their

conduct of required acceptance inspections and tests.

CRITERION 9 - MANAGEMENT ASSESSMENT

SEG shall cooperate fully with FERMCO for their required assessments of SEG's operations.

CRITERION 10 - INDEPENDENT ASSESSMENT

SEG shall cooperate fully with FERMCO Quality Assurance Division for their required independent assessments of SEG's operations.

APPENDIX A - KEY PERSONNEL RESUMES

SCIENTIFIC ECOLOGY GROUP, INC.

QUALITY ASSURANCE PROGRAM

Revision 3

March 1990

Submitted: James L. Mosley
Quality Assurance Manager

Approved: H.W. Arnowsmith 3/26/90
President

FOR INFORMATION ONLY

P.O. Box 2530

1560 Bear Creek Road
(615) 481-0222 Office (615) 482-7206 Fax

Oak Ridge, Tennessee 37831-2530

SCIENTIFIC ECOLOGY GROUP, INC.

LOCATION:	1560 Bear Creek Road Oak Ridge, Tennessee
MAILING ADDRESS:	1560 Bear Creek Road P.O. Box 2530 Oak Ridge, TN 37831-2530
TELEPHONE:	(615) 481-0222 Office (615) 482-7206 Fax
OFFICE HOURS:	8:00 a.m. to 5 p.m. Monday through Friday
FACILITY DESCRIPTION:	The facility consists of six buildings (250,000 ft^2 Total), located on lots 5A and 5B in the Clinch River Industrial Park, and Building 2, 3, and 4 on Gallaher Road, Kingston, Tennessee.

P.O. Box 2530 1560 Bear Creek Road Oak Ridge, Tennessee 37831-2530
(615) 481-0222 Office (615) 482-7206 Fax

000527

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 13 1990

SGTB:LLG

71-0024	71-9086	71-9159	71-9203
71-0496	71-9089	71-9177	71-9208
71-6574	71-9145	71-9178	71-9222
71-9073	71-9151	71-9179	71-9224

Scientific Ecology Group, Inc.
ATTN: Mr. James Mooney, QA Manager
1560 Bear Creek Road
Oak Ridge, TN 37831

Gentlemen:

Enclosed is Quality Assurance (QA) Program Approval for Radioactive Material Packages No. 0496, Revision No. 5. This supercedes LN Technologies Inc. QA Program Approval No. 0496, Revision No. 4 and Westinghouse Radiological Services QA Program Approval No. 0024, Revision No. 9.

Please note the conditions in the approval.

Also as requested, we have registered you in accordance with Section 71.12 of 10 CFR Part 71 as a user of Certificate of Compliance Nos. 6574, 9073, 9086, 9089, 9145, 9151, 9159, 9177, 9178, 9179, 9203, 9208, 9222 and 9224.

Sincerely,

Charles E. MacDonald, Chief
Transportation Branch
Division of Safeguards
and Transportation, NMSS

Enclosure:
As stated

NRC FORM 311
(9-87)

U. S. NUCLEAR REGULATORY COMMISSION

QUALITY ASSURANCE PROGRAM APPROVAL
FOR RADIOACTIVE MATERIAL PACKAGES

1. APPROVAL NUMBER: 0496
REVISION NUMBER: 5

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and Title 10, Code of Federal Regulations, Chapter 1, Part 71, and in reliance on statements and representations heretofore made in Item 5 by the person named in Item 2, the Quality Assurance Program identified in Item 5 is hereby approved. This approval is issued to satisfy the requirements of Section 71.101 of 10 CFR Part 71. This approval is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

2. NAME: Scientific Ecology Group, Inc.
STREET ADDRESS: 1560 Bear Creek Road
CITY: Oak Ridge | STATE: TN | ZIP CODE: 37831

3. EXPIRATION DATE: August 31, 1993

4. DOCKET NUMBER: 71-0496

5. QUALITY ASSURANCE PROGRAM APPLICATION DATE(S): March 27, 1990

6. CONDITIONS

Activities conducted under applicable criteria of Subpart H of 10 CFR Part 71 to be executed with regard to transportation packages.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald

CHIEF, TRANSPORTATION BRANCH
DIVISION OF SAFEGUARDS AND TRANSPORTATION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

APR 13 1990
DATE

000529

Number: SEG/QA-100
Revision: 3
Date: 03-20-92

SCIENTIFIC ECOLOGY GROUP, INC. QUALITY ASSURANCE PLAN

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Section	Title
	Introduction DCN 92-065 Rev. 3/4 DCN 92-086 Rev. 3/4
1	Organization DCN 92-087 Rev. 3/4
2	Quality Assurance Program
3	Design Control
4	Procurement Document Control
5	Instructions, Procedures and Drawings
6	Document Control
7	Control of Purchased Material, Equipment and Services
8	Identification and Control of Materials, Parts, and Components
9	Control of Special Processes
10	Inspection
11	Test Control
12	Control of Measuring and Test Equipment
13	Handling, Storage and Shipping
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15	Nonconforming Material, Parts and Components

Number: SEG/QA-100
Revision: 3
Date: 03-20-92

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Section	Title
16	Corrective Action
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18	Audits

DOCUMENT CHANGE NOTICE

DCN NO. 92-065 | Sht 1 of 2

Doc. Title QUALITY ASSURANCE PROGRAM

Work Order No. | Doc. No. QA-100 | Old/New Rev. 3/4

#	Change Description	Change Justification	Known Impacts
1.	Delete DCN 91-032	Q-List, Level 1 and 2 no longer to be addressed in the QA Program. The QA Program shall apply to SEG quality related activities without a level designation.	None.
2.	Introduction-Page 2 of 2, delete the paragraph: "For simplification... state and local regulations."		
3.	Section 3, page 4 of 4 last sentence change to: *Not mandatory except NRC related activities.		
4.	Section 7, page 5 of 5 last sentence change to: *Not mandatory except NRC related activities.		
5.	Section 11, page 2 of 2 last sentence change to: *Not mandatory except NRC related activities.		
6.	Section 15 page 2 of 3 paragraph 15.2.7, remove asterisk.		
7.	Section 15 page 2 of 3 delete last sentence: *Not mandatory...		
8.	Section 16, page 2 of 2 Para. 16.2.8, remove asterisk. Delete last sentence: *Not Mandatory...		

Originator (print name):

This is a:

☐ Pending DCN (no sig. rq'd)

☒ Open DCN - when signed at the right, use this DCN as an interim Rev. ___ of this document until Rev. ___ is issued.

Sign and date (only for Open DCNs)

Preparer Patricia Hodges 2-12-92

Checker Karol K Dexter 2-14-92

Mgr H.W. Arnsmeil 2/18/92

QA (if rq'd) [illegible] 2-12-92

H&S (if rq'd) N/A 2-18-92

DOCUMENT CHANGE NOTICE	DCN NO. 92-065	Sht 2 of 2
Doc. Title QAULITY ASSURANCE PROGRAM		
Work Order No.	Doc. No. QA-100	Old/New Rev. 3/4

#	Change Description	Change Justification	Known Impacts
9.	Section 14, page 2 of 2 change last sentence to: *Not mandatory except NRC related activities.		

Originator (print name):

This is a:

☐ Pending DCN (no sig. rq'd)

☐ Open DCN - when signed at the right, use this DCN as an interim Rev. ___ of this document until Rev. ___ is issued.

Sign and date (only for Open DCNs)

Preparer _____ _____

Checker _____ _____

Mgr _____ _____

QA (if rq'd) _____ _____

H&S (if rq'd) _____ _____

DOCUMENT CHANGE NOTICE

QAP Introduction

DCN 92-086 Sht 1 of 2

Ref. EWR No.	Doc. No. SEG/QA-100	Old/New Rev. 3/4

#	Change Description	Change Justification	Known Impacts
1	In "Scope" Section Change "NQA-1;" To "NQA-1-1989" And Add d) DOE 5700.6C	To Specify Current Regulatory Requirements	DOE 5700.6C will Add Additional Requirements To the QA Program.
2	Remove "Policy" Section And Replace with "Discussion" Section which is Documented on Page 2.	Update To Restate Responsibilities	None
			Open DCN

* Signature required here only if DCN is an open DCN, otherwise, "NR"

Change Prepared by/Date	Change Checked by/Date	Engr. Mgmt/Date
J. Durham 2-27-92	Patricia Hodges 2-28-92	N/A
...S/Date	QA (if req'd)/Date	Approved by/Date
N/A	Vicki Kelly 2-28-92	3-12-92 H.W. Arnsmeier

DISCUSSION

SEG shall implement a Quality Assurance Program that will be implemented by all functional organizations involved in quality-related activities. The program will be maintained by the QA Organization. The QA Organization has the authority and freedom to: identify quality problems; verify that activities affecting quality are correctly performed; initiate, recommend, or provide corrective actions; control the further use of nonconforming items until their evaluation and disposition has been accomplished; and verify satisfactory implementation of corrective actions. The QA Organization has "Stop Work" authority.

The Director, Quality Assurance has the overall responsibility for implementing and maintaining a QA Program for quality-related items and services. Implementation includes keeping management informed of the status and adequacy of the QA Program and providing quality improvement recommendations. He is also responsible for the Quality Assurance interface with customers, the Nuclear Regulatory Commission and state agencies.

All levels of SEG personnel are required to comply with the applicable requirements of the SEG QA Program when accomplishing their assigned duties.

INTRODUCTION

TITLE: QUALITY ASSURANCE PROGRAM INTRODUCTION

Number: SEG/QA-100
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INTRODUCTION

POLICY

It is the policy of the Scientific Ecology Group, Inc., (SEG Inc.) to provide exemplary services and products to licensed nuclear facilities in accordance with this Quality Assurance Program (QAP) which assures that the products and services comply with applicable regulations, codes, standards, and contracts.

SEG shall apply the applicable provisions of this program into implementing procedures and practices that could have an effect on licensed packages for shipments of greater than Type A quantities of radioactive material and services thereto.

The Quality Assurance Manager has the overall responsibility for maintaining and directing the QAP. He shall ensure compliance with the QAP. He shall also be responsible for the Quality Assurance interface with customers, the Nuclear Regulatory Commission, and state agencies. The Quality Assurance Manager and his designees have stop-work authority when work practices conflict with this plan.

Deviations from the QAP shall not be permitted except as specifically authorized by the President, SEG or the Quality Assurance Manager.

SCOPE

This QAP describes the program which is written to ensure that products and services meet customer, regulatory and internal requirements for quality, safety and reliability. The QAP complies with the following Quality Assurance criteria as they apply to supplied products and services:

a) 10CFR71, Subpart H

b) 10CFR50, Appendix B;

c) NQA-1;

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APPLICABILITY

This QAP applies to SEG activities and supplier or subcontractor activities related to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspecting, testing, operating, maintenance, repair, modification, and use of licensed packages for shipment of radioactive materials.

This SEG Quality Assurance Program is applicable to all company activities which require handling or processing radioactive material. The requirements of this program represent the Quality Assurance requirements of Title 10 Code of Federal Regulations Part 71, subpart H. These requirements shall be mandatory for activities or services performed in accordance with the Quality Assurance requirements of 10CFR71 Subpart H, 10CFR50 Appendix B, 10CFR21, or NQA-1.

Activities which require compliance to the Quality Assurance Requirements of USNRC Regulatory Guide 1.143 or other similar guides shall be performed in accordance with the applicable requirements of this program.

For simplification and ease of reference in the QA Manual and implementing procedures, the SEG scope of activities and associated quality requirements have been classified as Level 1 and Level 2

Level 1: Level 1 activities include these routine SEG activities governed by 10CFR71, Subpart H, and these activities contractually identified as being governed by 10CFR50, Appendix B, ANSI N45.2 and/or ANSI/ASME NQA-1.

Level 2: Level 2 activities include these routine SEG activities associated with chemical decontamination, radioactive waste processing, and other radioactive waste volume reduction methods. These activities are governed by the applicable provisions of Regulatory Guide 1.143, as well as state and local regulations.

QA PROGRAM CONTROL

The control and distribution of the QAP shall be the responsibility of the Quality Assurance Manager, or his designee, and shall include a system for controlled issue of the latest revision.

DOCUMENT CHANGE NOTICE

QUALITY ASSURANCE PROGRAM ORGANIZATION

DCN 92-087

Sht 1 of 3

Ref. EWR No.	Doc. No. SEG/QA-100 SECTION 1	Old/New Rev. 3/4

#	Change Description	Change Justification	Known Impacts
	REPLACE FIGURES 1.1 & 1.2 WITH ATTACHED CHARTS	TO PROVIDE CHARTS THAT DEPICT THE CURRENT SEG AND QA ORGANIZATIONS TO FULFILL COMMITMENT TO PP&L TO PROVIDE CURRENT ORG. CHARTS. REF. PP&L AUDIT 91-047, RECOMMENDATION NO 14.	NONE Open DCN

* Signature required here only if DCN is an open DCN, otherwise, "NR"

Change Prepared by/Date	Change Checked by/Date	Engr. Mgmt/Date
L. Nuhse 2-27-92	Patricia Hodges 2-27-92	N/A
...S/Date N/A	QA (if req'd)/Date 2-25-92	Approved by/Date 3-12-92 H.W. Crosmont

SEG ANIZATION

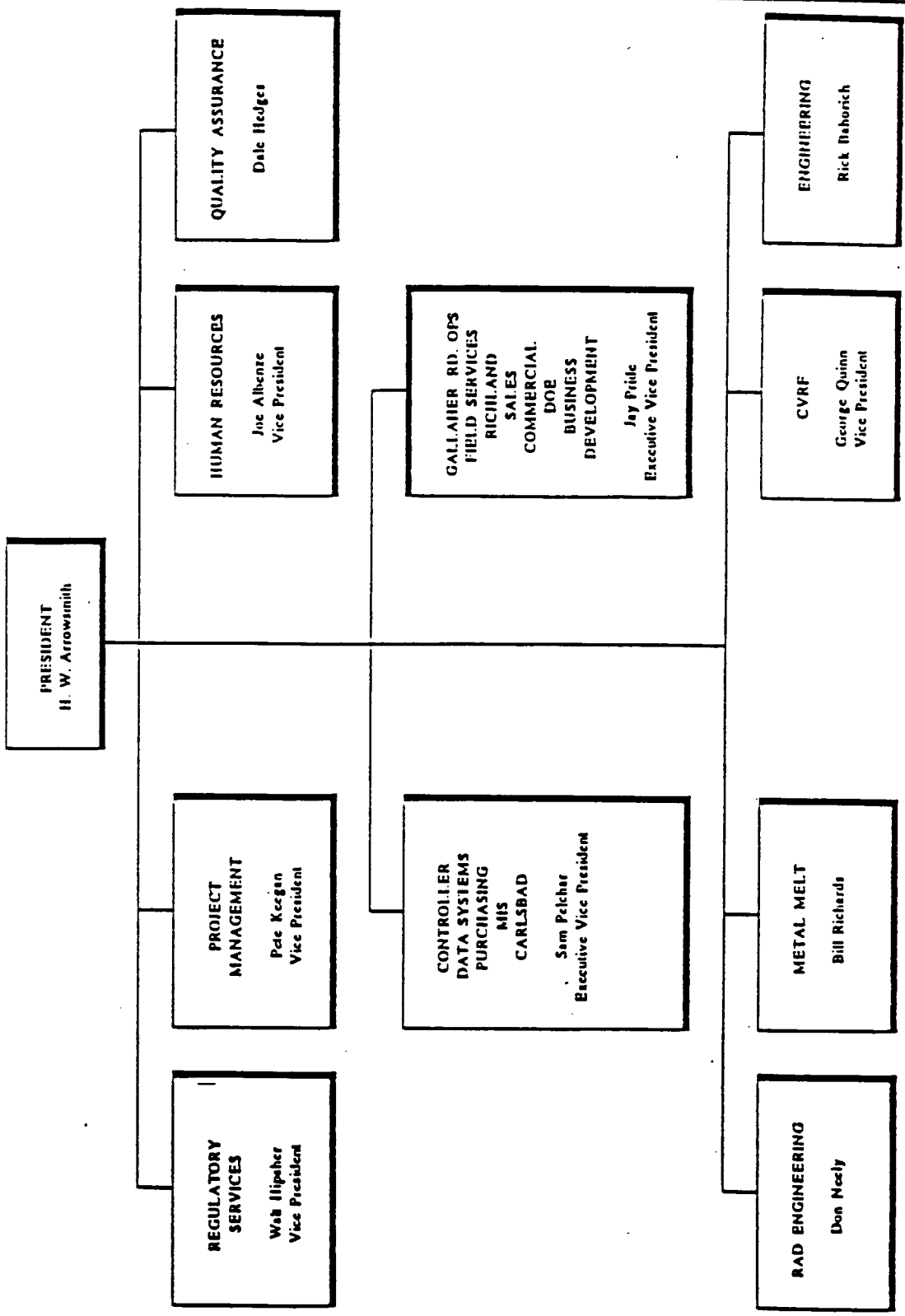
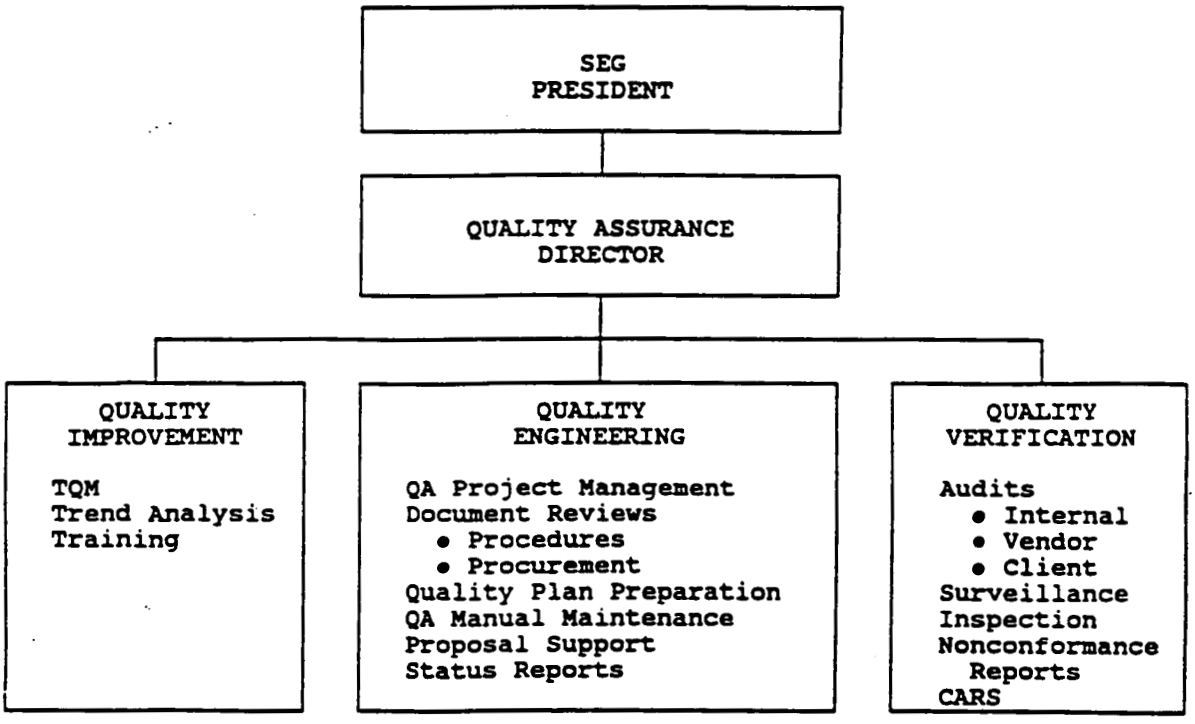


FIGURE 1.1

SEG Quality Assurance Organization

Figure 1.2



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CRITERIA 1

TITLE: QUALITY ASSURANCE PROGRAM ORGANIZATION
Number: SEG/QA-100 SECTION 1
Revision: 3
Page: 1 of 8

1.0 SCOPE

This section describes the SEG organization for the management, direction, and execution of this QA Program. Quality Assurance is not the responsibility of one individual or group; Quality Assurance encompasses all safety-related functions and activities.

1.1 GENERAL REQUIREMENTS

1.1.1 The authority and duties of persons and organizations performing activities affecting quality shall be clearly established and delineated in writing.

1.1.2 The persons and organizations performing Quality Assurance functions shall have direct access to the highest management level which ensures the required access to work areas, authority and organizational freedom, and shall include sufficient independence from cost and schedule to accomplish their duties and tasks.

1.1.3 The persons and organizations performing quality assurance functions shall have sufficient authority and organizational freedom to identify quality problems; to initiate, recommend or provide solutions; and to verify implementation of solutions.

1.1.4 Control of activities affecting quality includes verification of the functions associated with attaining quality objectives. The Quality Assurance functions to control activities affecting quality are:

(A) ensuring that an appropriate quality assurance program is established and effectively executed,

(A) verifying, through methods such as checking, auditing, and inspection, that activities affecting quality have been correctly performed, and

(C) initiating stop work or other controls for conditions adverse to quality when immediate corrective action is required.

1.1.5 The work of establishing and executing the Quality Assurance Program or any part of the program may be delegated to others, such as contractors, agents, or consultants, but SEG shall retain responsibility for the program.

1.1.6 The organizational structure of SEG is described in FIGURE 1.1. Assignments are such that:

(A) Quality is achieved by those assigned responsibility.

(B) Quality is verified by persons or organizations not directly responsible for performing the work.

(C) All internal and external interfaces are identified, responsibilities defined, and documented.

(D) Responsibility for identification and control of nonconforming items/services has been identified.

1.2 SEG ORGANIZATION

The relationship of the Quality Assurance Manager to the SEG organization is shown in Figure 1.2. All personnel involved function in accordance with the SEG Program as it applies to design, fabricate, procurement, use, maintenance, repair, or modification of items and services, and other quality-affecting activities.

It is SEG policy to perform work in accordance with the requirements of the applicable regulatory requirements, codes, and standards specified in contractual documents and as prescribed and implemented through the SEG QA Program.

1.2.1 The QAM is responsible for and has authority to maintain and direct the QAP. He assures timely and effective correction of conditions adverse to quality. To be qualified for the position of QAM, the individual's abilities

shall be evaluated, approved and documented by the SEG President. The positive factors to be considered in evaluating the QAM as demonstration of his abilities include the following:

(A) Bachelors degree in a technical field or equivalent professional experience.

(B) Five years experience in the field of quality assurance, or in a manufacturing or engineering supervisory position, or a combination of the two. At least two years of the five years experience shall be nuclear related experience involving the implementation of a quality assurance program.

(C) Demonstrated ability to communicate clearly (orally and written).

(D) Thorough knowledge of applicable quality related codes and standards, regulatory, and licensing requirements.

1.2.2 SEG personnel assigned to perform quality assurance, quality control, inspection, or testing functions shall have experience and training in the performance, organization, evaluation, and review of results of inspection and tests. They shall be capable of supervising or maintaining surveillance over inspections and tests performed by others, and of calibration or establishing the validity of calibration of inspection and measuring and test equipment. They shall have demonstrated proficiency in planning and setting up tests and shall be capable of determining the validity of test result.

1.2.3 Each manager or supervisor may delegate the performance of any of his duties to those who report directly to him and are qualified to perform such duties. However, the responsibility for those duties shall not be delegated. When managerial responsibilities change, an internal appointment letter will be initiated by the appropriate level of management commensurate with the level of

appointment. If qualified, managers and supervisors may perform work of their subordinates.

1.3 ORGANIZATIONAL RESPONSIBILITIES

The organizational structure and assignment of functional responsibility within SEG are based on recognition of quality-affecting activities being performed by many individuals from top-level management down to individual contributors and hands-on craftsmen. The functional responsibilities are such that:

(A) Attainment of quality objectives is accomplished by individuals assigned responsibility for performing work to specifications.

(B) Verification of conformance to established quality requirements is accomplished by those who do not have direct responsibility for the work.

(C) Personnel in quality assurance functions have direct access to top-level management.

1.3.1 The President:

(A) Has overall responsibility for work performance of work and quality of work performed.

(B) Provides management, support, and organizational freedom to the quality assurance organization.

(C) Ensures that personnel responsible for quality verification activities are independent of those directly responsible for performing the work.

1.3.2 The Quality Assurance Manager (QAM):

(A) Plans, develops, and with the concurrence of the President, establishes general policies and procedures for quality assurance.

(B) Develops, issues, and maintains the SEG Quality Assurance Program and Implementing Procedures.

(C) Reviews Quality Plans, Project Plans, technical procurement documents, etc. to ensure that appropriate provisions are identified for meeting quality requirements.

(D) Provides for vendor surveillance or audit and maintains a list of approved suppliers.

(E) Performs audits to evaluate the status, adequacy, and effectiveness of the quality assurance program.

(F) Ensures that personnel involved in quality verification activities are appropriately trained in accordance with approved training plans and that proper documentation, certification, or qualifications are maintained.

(G) Directs quality control activities to ensure that all specifications, client, or SEG quality requirements are met.

(H) Establishes and maintains the quality assurance records program.

(I) Controls nonconformance reports and approves the resolution of nonconforming items.

(J) Reports periodically to the President on the effectiveness of the QA Program and assures that an annual audit is performed to evaluate the overall adequacy of the QA Program.

1.3.3 Engineering:

(A) Prepares the plans or specifications which control the design, fabrication and testing of equipment used in SEG's service operations and activities related to certified packages for shipment of licensed materials.

(B) Designs, fabricates, and tests equipment used in SEG's service operation in accordance with approved plans or specifications.

(C) Maintains the design control system.

(D) Provides safety analyses, including safety evaluation of system equipment and design and safety performance criteria.

1.3.4 Regulatory and Technical Services:

(A) Has primary responsibility for Radiation Safety and coordinates with the Radiation Safety Officer (RSO) to assure radiological controls are implemented.

(B) Maintains and assures compliance with the Radioactive Material Licenses issued to SEG.

(C) Provides technical support for waste processing programs for both development and field applications.

(D) Maintains radiation dose records in accordance with federal and state laws and regulations. Responsible for control of analytical support services to SEG operation.

(E) Ensures that personnel involved in transportation of radioactive materials are properly trained and perform duties in accordance with SEG, client, and all applicable regulatory requirements.

1.3.5 Waste Processing

(A) Provides services in accordance with customer purchase order requirements and the requirements specified in SEG Plans and procedures.

(B) Provides technical support for the chemical decon, chemical cleaning, and volume reduction programs in the field.

(C) Trains individual technicians in the operation and maintenance of SEG equipment, radiation protection practices, and performance of field analysis at field locations.

(D) Develops, reviews, and approves procedures which provide specific instructions for equipment operation, maintenance, data recording, emergency response, and administrative controls.

(E) Monitors the progress of each field job through inspections or log reviews to ensure that the requirements of the job are completed satisfactorily.

(F) Initiates corrective action when necessary in response to internal and external QA audits.

(G) Prepares project plans which describe the organization and conduct of each job to ensure compliance with the customer purchase order requirements and with the requirements specified in this QA Program.

1.3.6 Production

(A) Responsible for receipt, Waste Tracking identification, and storage of client radwaste in accordance with approved SEG procedures.

(B) Directs activities associated with radwaste sorting to establish preferred waste reduction method, or as specified in the client's contractual documents.

(C) Responsible for Supercompaction and on-site solidification and decontamination activities.

(D) Maintains traceability of radwaste through various processing stages including final loading for shipment to burial sites.

(E) Ensures that personnel performing Radworker tasks are properly trained in radiological controls and Quality Assurance requirements commensurate to their assigned tasks.

(F) Directs Health Physics activities to assure radiological controls are implemented in accordance with SEG, State, EPA, and other appropriate regulatory requirements.

1.3.7 Purchasing:

(A) Purchases the materials and supplies used by SEG.

(B) Maintains and controls the inventory of materials and supplies required to support SEG administrative and service work.

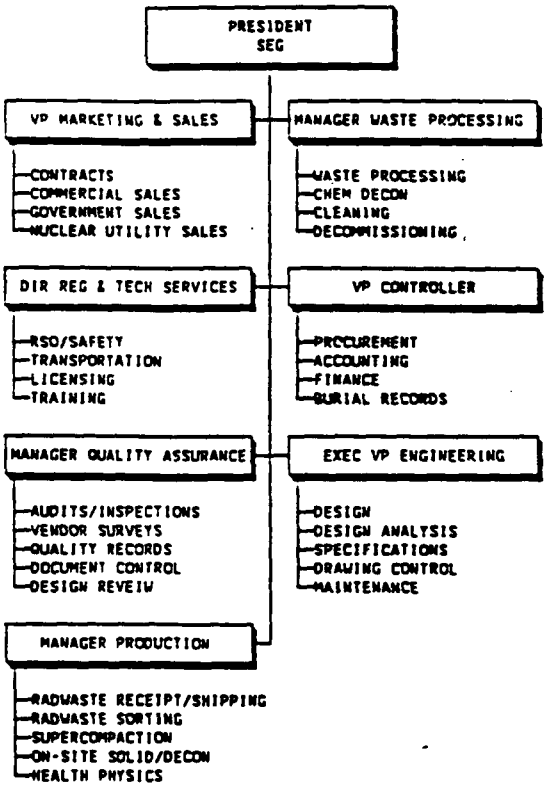
1.3.8 Principal Contractor and Consultants:

The activities of principal contractors shall be controlled in accordance with SEG procurement documents and conducted in accordance with an approved QA program, or the SEG program.

Consultants may be retained as an additional resource to provide optimum assurance that appropriate levels of quality are maintained. These personnel may be used for independent quality audits, studies of processes and systems, or other functions that are deemed necessary. SEG shall be responsible for the actions of all consultants and will use reasonable judgement in evaluating their recommendations.

SEG ORGANIZATION

FIGURE 1.1



NOTE: ORGANIZATION CHART IS TYPICAL AND WILL NOT BE REVISED UNLESS THE REPORTING STRUCTURE OF THE QUALITY ASSURANCE MANAGER CHANGES

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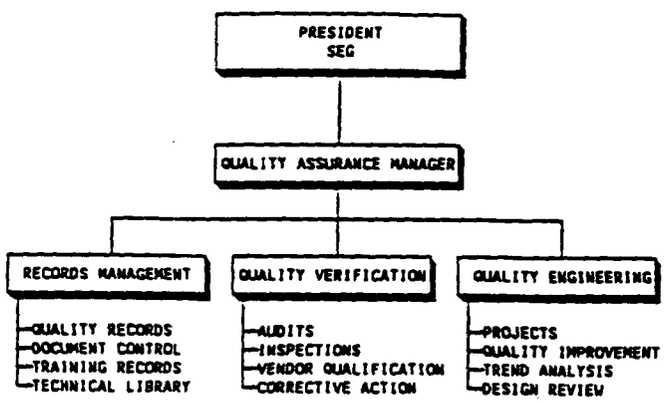
SEG QUALITY ASSURANCE ORGANIZATION

FIGURE 1.2



CRITERIA 2

TITLE: QUALITY ASSURANCE PROGRAM Number: SEG/QA-100 SECTION 2
Revision: 3
Page: 1 of 8

2.0 SCOPE

This Quality Assurance Program (QAP) describes the policies and practices for a planned and disciplined approach to achieve the standards for quality, safety and reliability of products and services supplied by SEG. It is structured to ensure that contractual, quality and regulatory requirements are met.

This document describes the Quality Assurance Program (QAP) of SEG which is applicable to the activities affecting the quality of transportation package basic components (as defined in 10CFR21). SEG operations which are responsible for design, fabrication, testing and servicing of licensed packages for shipment of radioactive material are conducted in accordance with this program.

2.1 REQUIREMENTS

2.1.1 The quality assurance program shall be planned and documented by written policies, procedures, or instructions and shall be implemented throughout the life of the activities to which it applies.

2.1.2 Methods shall be established for identifying the components, structures, and systems to be covered by the QA program. The SEG QA Program provides controls consistent with the technical aspects and their importance to safety.

2.1.3 The quality assurance program provides control over the activities affecting the quality and safety of the identified structures, systems, components, and services to the extent necessary to ensure that the items will perform satisfactorily in service. Quality controls will be established at the earliest practical time in the schedule for performing of Quality related activities.

2.1.4 Activities affecting quality shall have suitably controlled conditions established to ensure that appropriate equipment, environmental conditions, and prerequisites for the given activity have been satisfied.

2.1.5 The quality assurance program takes into account the need for special controls, processes, test equipment, tools, and skills to attain the required quality standards, and the need for verification of quality by inspection and testing.

2.1.6 The quality assurance program provides for indoctrination and training of personnel performing activities affecting quality, as necessary, to ensure that suitable proficiency is achieved and maintained.

2.1.7 The status and adequacy of the quality assurance program shall be regularly reviewed and evaluated by SEG management.

2.2 DESCRIPTION

SEG has established a quality assurance program to provide controls over the activities of SEG employees, each of whom has specific responsibilities for meeting the required quality objectives. The program consists of several component parts which collectively provide for conducting activities affecting quality under suitably controlled conditions, the use and maintenance of appropriate equipment, the implementation of environmental and special process controls the conduct of inspections and tests, and the training and qualification of personnel performing quality-affecting activities.

2.2.1 Program Structure

The program has been structured to address the common requirements of regulatory requirements and industry codes and standards as they may be applicable to specific SEG activities.

2.3 SEG PROGRAM

The SEG QA Program establishes overall policy and identifies the quality requirements for accomplishing the various types of services provided by the Corporation. The program manual contains eighteen sections which address each of the eighteen criteria quality related activities. The program addresses Level 1 and Level 2 activities, and clearly identifies the required extent of compliance for the level involved.

2.4 IMPLEMENTING PROCEDURES

The SEG Quality Assurance objectives are achieved through documented methods for planning, reviewing, implementing, and controlling activities affecting quality. Procedures are established and controls identified early in the schedule for accomplishing quality-related tasks.

SEG's procedures are structured to address major work elements as follows:

2.4.1 Quality Procedures Manual

Provides overall policy and methods to control quality-related activities. Implementing procedures describe compliance with:

(A) 10CFR50 Appendix B;

(B) ANSI/ASME NQA-1;

(C) 10CFR61;

(D) 10CFR71, Subpart H;

(E) and Reg. Guide 1.143.

The procedures are numbered to correspond with the appropriate Criteria/Section Number of the SEG QA Program.

2.4.2 Central Volume Reduction Facility (CVRF) Operations Manual

The Operations procedures further enhance and implement the requirements of the Quality Assurance Program and licensing documents into the specific low-level radioactive waste processing activities at the CVRF. CVRF Operations procedures are developed to describe the safe operation of plant equipment and systems, safety practices, approved methods for performing routine CVRF operating tasks, responsibilities, and reporting requirements.

2.4.3 Field Operations Manual

Field Operations procedures further define those activities associated with transportation and processing of radioactive materials at client sites. These procedures provide guidance to ensure compliance with regulatory and client requirements.

2.4.4 Cask Services Manual

Describes the operations associated with receipt, use, maintenance, and documentation for SEG licensed packages and related services and equipment. These procedures implement 49CFR; DOT; 10CFR, Part 21; and other applicable state and regulatory requirements.

2.4.5 Health Physics Manual

Health Physics procedures further describe and implement the requirements of the Quality Assurance Program, SEG licenses, and the Radiation Safety Guide. Health Physics procedures will be developed to describe the use of radiation monitoring equipment, calibration techniques, SEG laboratory and bioassay activities and equipment, radiation safety practices, and other routine tasks performed by Health Physics personnel to assure an effective radiation/contamination control program and safe performance of low-level radioactive waste processing activities.

2.5 QUALITY PLANS

The third major component of the SEG QA program is the Quality Plan. Written specifically for the control of a special project, or scope of work, the Quality Plan becomes the primary guidance document for special project activities; it provides the plan participants with a clear and concise definition of the scope of work and the applicable administrative, technical, and quality assurance requirements unique to the project.

The Quality Plan will be developed by the Project Manager and the QA Manager. Quality Plans are not required where the full SEG QA program is to be implemented.

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2.6 PERSONNEL TRAINING AND QUALIFICATIONS

SEG procedures provide measures for ensuring that personnel performing quality-affecting activities receive indoctrination and training commensurate with the skill levels needed and that only qualified personnel within SEG are assigned to quality related tasks.

SEG Management is responsible for assessing their areas of responsibility to develop and plan appropriate training and indoctrination. All training is formally documented.

2.6.1 Indoctrination

All SEG employees are indoctrinated in the technical objectives of their assigned tasks. Indoctrination includes familiarization with the appropriate codes and standards and the QA elements commensurate with their scope of work.

2.6.2 Training

SEG will establish training activities to maintain continuing proficiency of its personnel in performing assigned tasks. Specific task training is either "on-the-job" or formal. Formal training is provided through classroom sessions, seminars, or certification courses or programs. On-the-job training is provided by actual performance of specific tasks under the direct supervision of a qualified person.

2.7 QUALIFICATION OF INSPECTION AND TEST PERSONNEL

Each SEG organization will identify those activities that require qualified inspection or test personnel. Minimum requirements are established for the selection of personnel based on the scope of work and complexity of the activity. Personnel are selected based on a combination of education and previous experience.

2.7.1 Initial determination of a candidate's qualifications is based on an evaluation of education, experience, training test results, or demonstration of capability. Any combination may be used to assess the candidate's level of qualifications.

2.7.2 Levels of Qualification

The following are minimum requirements for personnel performing inspection and testing:

Trainee - A trainee is allowed to perform activities only under direct supervision by a qualified individual.

Level I - A Level I person may independently perform operations, tests or inspections in accordance with documented procedures or industry practice. The individual will be familiar and have demonstrated proficiency with the tools and equipment to be used, calibration status of M&TE, and use of approved inspection, test,or operating procedures. The individual shall have completed QA indoctrination, and task training which included instruction in the principles and techniques of the assigned activities. Inspection and test results must be reviewed and approved by a Level II person as a minimum. All technical training is to be developed, performed, and documented by the appropriate staff manager.

Level II - A Level II person shall have all the capabilities of a Level I person. In addition, a Level II shall have demonstrated capabilities in planning inspections, test or operations; in setting up operations, as well as the preparation and setup of support equipment; in supervising or monitoring Level I and trainee personnel; in reporting results of the operation, and in evaluating validity and acceptability of the test results.

Level III - A Level III person shall have all of the capabilities of a Level II person, plus be capable of evaluating the adequacy of specific programs used to train and test personnel to Levels I and II.

2.7.3 Evaluation of Performance

Inspection and Test Personnel will periodically be re-evaluated to assess that their performance has been satisfactory or to retrain or redetermine their levels of

capability. Re-evaluation shall be annually. When capabilities are not in accordance with requirements, the person will be removed from the assignment until such time as he has demonstrated satisfactory retraining. When an individual has not performed the test or inspection for which he is qualified in greater than one year, he will be re-evaluated in the principals and techniques of the test or inspection.

2.8 CERTIFICATION

A file of Personnel Certifications will be established and maintained. The file will contain evidence of the basis for qualification, a certificate of qualification, and documentation related to successful test results, including physical capabilities (eye exams, physical and mental health, drug tests, etc.) as appropriate.

2.9 AUDITOR QUALIFICATIONS

SEG Audit personnel shall have training and experience commensurate with the scope, complexity, or special nature of activities to be audited. Auditors are given training and orientation on the requirements of 10CFR50, Appendix B and NQA-1 licensing fundamentals, and specialized guidance on the specific audit items. Auditors are directly supervised by a Lead Auditor during audit planning, performance, reporting, and follow-up.

2.9.1 Qualifications of Lead Auditor

Lead Auditors are qualified in accordance with NQA-1, Supplement 2S-3. Lead Auditors have participated in a minimum of five audits in a three year period, and passed a written exam covering audit techniques and nuclear facility regulatory standards.

2.9.2 Maintenance of Qualifications

Lead Auditors maintain proficiency through regular participation in audit processes and are re-evaluated annually. Lead Auditors who do not maintain proficiency for a period greater than two years will be re-examined and will participate in at least one nuclear related audit prior to recertification.

2.9.3 Administration

The Quality Assurance Department selects personnel who are independent of the audited organization to participate in audits. The Lead Auditor is responsible for ensuring that audit team members are appropriately trained and knowledgeable in audit techniques.

Lead Auditor examinations are executed by the QA Manager. The exam questions are maintained in confidential files to assure the integrity of the Auditor Training Program.

Certifications of Lead Auditor Qualifications are maintained in the QA Department Training files and are re-evaluated annually.

CRITERIA 3

TITLE: QUALITY ASSURANCE PROGRAM DESIGN CONTROL
Number: SEG/QA-100 SECTION 3
Revision: 3
Page: 1 of 4

3.0 SCOPE

Where design activities apply to safety related components or services, measures are established to correctly translate applicable regulatory requirements and design bases into design, procurement and procedural documents. A specific design control program applies to design activities for licensed packages. Design documents, as applicable, shall include appropriate Qualitative and Quantitative standards.

3.1 REQUIREMENT

Measures shall be established and implemented to ensure that applicable design bases and regulatory requirements are correctly translated into specifications, drawings, procedures, or instructions.

3.2 DESCRIPTION

3.2.1 Changes or deviations from identified quality standards, including the reason or justification for the changes, shall be identified, approved, documented, and controlled in accordance with approved procedures.

3.2.2 Design documents will be adequate to support the design, fabrication, and use of the components or equipment.

3.2.3 Design methods, materials, parts, components, systems, or processes are selected and reviewed for the suitability of their intended application. Appropriate review results are made available to cognizant design personnel.

3.2.4 Final design documents are traceable to design input data in sufficient detail to facilitate design verification. Final design documents identify assemblies and components that are commercial grade items upgraded or modified, and provides traceability to product difference.

3.2.5 Interfaces between participating design organizations shall be identified, coordinated, and controlled.

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3.2.6 Design analysis is planned, controlled, and documented in a legible, reproducible manner. Design documents are to be sufficiently detailed to permit other technically competent personnel to review and understand the analysis and verify its adequacy without interface with the originator.

3.2.7 Calculations are traceable to the subject, component, system, originator, date, reviewers, and other data deemed appropriate. Computer programs are verified to produce valid data within defined parameters.

3.2.8 Documentation of design analysis includes:

(A) definition of the objective of the analysis

(B) design input and its source

(C) research, studies, and background data

(D) assumptions and indication of those that must be verified

(E) identification of computer calculations, computer program used, and other supporting data

(F) reviews and approvals.

3.2.9 Procedures or instructions are established among participating design organizations for the review, approval, release, distribution, and revision of design documents involving design interfaces.

3.2.10 The design documents shall be verified to ensure the adequacy of design by design review, alternate or simplified calculational methods, or a suitable test program developed in accordance with SEG procedures. Verification activities are performed in a timely manner, and prior to placing the component or equipment in use.

3.2.11 The design shall be verified or checked by competent individuals or groups other than those who performed the original design.

3.2.12 The immediate supervisor of the individual who originated the design document may perform the verification of design, provided that:

(A) The supervisor is the only one technically capable of performing the verification.

(B) QA audits are performed to prevent abuse of this practice.

3.2.13 When a test program is used to verify or check the adequacy of a specific design feature in lieu of other verifying or checking processes, it shall include suitable qualification testing of a prototype or sample under the most adverse conditions.

3.2.14 Design parameters, such as criticality physics, radiation shielding, stress, cooling, thermal, hydraulic, decontamination, maintenance, repair, inservice inspection, handling, storage, shipping, cleaning, accident analysis, and delineation of acceptance criteria for inspections and tests, as applicable, shall be properly considered, reviewed, and approved by the responsible design organization.

3.2.15 Design changes, including field changes, shall be subject to the same controls applied to the original design in accordance with approved SEG Procedures. Changes in design that could result in conditions differing from those identified on the licensed packages Certificate of Compliance shall be approved by the NRC prior to implementation.

3.2.16 For design activities performed by others, procurement documents shall require that the design be accomplished under the control of an NRC-approved QA program or the SEG program which is approved by the NRC.

TITLE: QUALITY ASSURANCE PROGRAM
DESIGN CONTROL

Number: SEG/QA-100 SECTION 3
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3.3 DRAWING CONTROL

Procedures will be established for preparation and control of drawings and specifications using normal business standards and practices such as:

(A) standard symbols/format

(B) identification

(C) status identification

(D) checking methods

(E) issue and distribution

(F) storage and control of original or master copies

(G) revision control

(H) as-built drawings

- Not mandatory for Level 2.

CRITERIA 4

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TITLE: QUALITY ASSURANCE PROGRAM
PROCUREMENT DOCUMENT CONTROL

Number: SEG/QA-100 SECTION 4
Revision: 3
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4.0 SCOPE

This section identifies the requirements and assigns responsibility for the control of procurement documents for purchased items and services used by SEG.

4.1 REQUIREMENT

Measures shall be established and implemented to ensure that applicable regulatory requirements, design bases, technical and quality requirements are included or referenced in procurement documents for materials, equipment, or services.

4.2 DESCRIPTION

4.2.1 Procurement documents, including those for spare and replacement parts, and any changes thereto shall be reviewed, prior to release, by Quality Assurance and other appropriate technical disciplines to ensure that sufficient technical and quality assurance requirements are included, and that approved supplier item procurements are placed with qualified suppliers.

4.2.2 Procurement documents issued at all tiers of procurement shall contain the following, as applicable.

(A) Scope of work/item description.

(B) Technical and regulatory requirements.

(C) Quality Assurance Program requirements for suppliers and subtier suppliers.

(D) Documentation requirements.

(E) Records to be retained, controlled, and maintained by the supplier and those to be turned over to SEG prior to installation or use.

(F) Records required to be submitted to SEG will be specified or those records to be retained by the supplier will be identified and retention/disposition requirements prescribed.

(G) Requirements for reporting and approving disposition of supplier generated nonconformances.

(H) Spare and replacement parts required.

(I) Material and component identification requirements.

(J) Testing and inspection requirements.

(K) Special process instructions or requirements.

(L) 10CFR21 requirements;

Note: The provisions of 10CFR21 are implemented through SEG procedures, as appropriate.

(M) Certificates of compliance attesting that licensed packages have been manufactured under the control of an NRC-approved QA program or a program which has been approved in accordance with this program.

4.2.3 Procurement documents shall be reviewed and approved prior to contract award.

4.2.4 Changes to procurement documents are reviewed at the same degree as the original.

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CRITERIA 5

TITLE: QUALITY ASSURANCE PROGRAM INSTRUCTIONS, PROCEDURES, AND DRAWINGS

Number: SEG/QA-100 SECTION 5
Revisions: 3
Page: 1 of 2

5.0 SCOPE

This section identifies the provisions for the establishment of documented procedures and instructions for the performance of quality-related activities.

5.1 REQUIREMENTS

Measures are established and implemented to ensure that all quality-affecting activities are performed in accordance with appropriate documented instructions, procedures, or drawings.

5.2 SPECIFIC REQUIREMENTS

Quality-affecting activities shall be performed in accordance with documented instructions, procedures, or drawings which are prepared and approved prior to commencing activities.

5.2.1 The specific methods for complying with each of the eighteen (18) criteria, shall be specified in SEG procedures.

5.2.2 Instructions, procedures, and drawings include appropriate quantitative and qualitative acceptance criteria to verify that the activity has been satisfactorily accomplished.

5.2.3 Instructions and procedures shall be prepared, reviewed, issued, and controlled in accordance with SEG procedures.

5.2.4 Quality assurance shall review and concur with inspection plans, testing, calibration, and special processes, operating procedures, instructions, specifications, project plans, and any changes thereto. Plans for inspection, including maintenance and repair, shall be reviewed by with quality assurance personnel to ensure that appropriate inspection and hold points are included, as necessary, to verify that the activities have been satisfactorily completed.

5.2.5 Changes to instructions, procedures, or drawings shall have the same review as the original document.

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5.3 PROCEDURE ELEMENTS

Applicable elements to be included in procedures are:

(A) Objectives or Scope

(B) Prerequisites

(C) Interface Requirements

(D) Responsibilities

(E) Safety Precautions

(F) Descriptive Methods for performing activities.

(G) Reporting Results

(H) Records

Safety-related procedures shall be approved by the manager responsible for the activity and concurred with by Quality Assurance. The procedures shall be reviewed by two technically knowledgeable persons and a QA representative, as a minimum.

CRITERIA 6

TITLE: QUALITY ASSURANCE PROGRAM DOCUMENT CONTROL

Number: SEG/QA-100 SECTION 6
Revisions: 3
Page: 1 of 2

6.0 SCOPE

This section provides the requirements for the control of documents used in activities affecting quality.

6.1 REQUIREMENTS

Measures shall be established and implemented to control the issuance and revision of quality-related documents.

6.2 DESCRIPTION

6.2.1 Documents which prescribe or affect quality shall be controlled. The control system shall ensure that all documents are properly identified, distributed, and retained as specified in this program contract, purchase order, project plan, or other governing document. Documents shall be reviewed for adequacy and approved for release by authorized personnel prior to issuance. Documents shall be issued to and used at the location where the activity is being performed. Document changes other than typographical errors and editorial corrections, or minor changes, shall be reviewed and approved in the same manner as the original document.

6.2.2 The control system is documented in SEG procedures, and provides for:

(A) Identification of the documents to be controlled

(B) Distribution of the controlled document

(C) Assignment of responsibility for preparing, reviewing, approving and issuing documents

(D) Review for adequacy, completeness and correctness prior to issue

(E) Identification of authorized persons who are permitted to make correction and minor changes that do not require a review cycle to the same extent as the original document.

CRITERIA 7

TITLE: QUALITY ASSURANCE PROGRAM CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES

Number: SEG/QA-100 SECTION 7
Revision: 3
Page: 1 of 5

7.0 SCOPE

This section drescribes methods for conducting source evaluation and selection for safety-related items or services, the measures established to evaluate the quality of material, equipment, or services by audit/survey, or inspection of supplier products prior to acceptance based upon the potential suppliers quality assurance program.

7.1 REQUIREMENT

Measures shall be established and implemented to ensure that material, equipment, and services purchased either directly or through contractors and subcontractors conform to the procurement documents.

7.2 DESCRIPTION

• 7.2.1 Procurement planning methods are described in SEG procedures as appropriate. Planning shall determine what is to be accomplished, who is responsible, how the activities are to be performed, and the schedule for key events. Planning is accomplished as early as possible to assure interface compatibility and a uniform approach to the procurement process.

Procurement plans for safety-related items will address:

(A) Procurement document preparation, review, and control of revisions.

(B) Selection of the vendors.

(C) Evaluation of bids and contract award.

(D) Supplier performance.

(E) Verification of supplier activities (audit, survey, inspection).

(F) Nonconformance control.

(G) Corrective action.

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(H) Acceptance of product/services.

(I) Quality records.

7.2.2 Selection of procurement sources shall be based on an evaluation of their capabilities in accordance with procurement document requirements. The following attributes may be considered:

(A) The supplier's capability to comply with quality-specifying codes or standards.

(B) Results of the survey of the supplier's facility, technical capabilities, and/or program implementation.

(C) Review of the supplier's previous records and performance for similar products or services.

7.2.3 Bid evaluation is performed to determine the extent of conformance to procurement documents. Additional considerations such as supplier's personnel, production capability, and other alternatives may be reviewed.

7.2.4 Supplier performance evaluation are established in accordance with SEG procedures. The results of each services procurement shall be reviewed for acceptability by the appropriate manager. The terms and conditions specified in the individual procurement documents shall serve as criteria for the evaluation.

7.2.5 Surveillance planning for complex equipment is performed by Quality Assurance and special emphasis is placed on aspects of manufacture and inspection that could affect equipment performance and reliability. The frequency and scope of surveillance varies with the importance to safety and complexity of an item or service and supplier performance. This determination is made by Quality Assurance in conjunction with input from the responsible engineering organization.

7.2.6 The QA/QC verification activities to be performed during fabrication, inspection, testing, shipment, and receipt, including methods of acceptance, shall be established as a function of the importance, complexity, or degree of quality-related activities associated with the product. Qualified personnel shall inspect, audit, or witness specific attributes.

7.2.7 Documentary evidence that material and equipment conform to the procurement requirements shall be available at the supplier's facility prior to use of materials and equipment by SEG.

Purchased materials parts and components shall be inspected in accordance with approved SEG procedures.

7.2.8 Certain critical procurements may necessitate in-process surveillance at specified hold points. Such in-process surveillance activities will be identified in the purchase order, the Quality Plans or other appropriate documents. Conduct of the surveillance will be in accordance with approved SEG Procedures.

7.2.9 The methods of controlling nonconformances of procured material, equipment, and services shall be established in accordance with SEG procedures and/or identified in the procurement documents.

7.2.10 Records which identify the items and codes, standards, specifications, drawings, regulations, or other acceptance criteria met by the items, including nonconformances, and corrective actions, shall be maintained in accordance with SEG procurement requirements.

7.2.11 Delivered products shall be accompanied by appropriate documentation as identified in the purchase order prior to use. These documents shall be referenced in the Certificate of Compliance, shall be related to the use and maintenance of the product, and shall identify necessary actions to be taken prior to

transport or use any licensed containers. Documented inspection and test data are evaluated against the acceptance criteria prior to final acceptance and use of the product. Nonconformances and disposition activities shall be reviewed for acceptability.

7.2.12 For supplier certificates of conformance, the purchase document shall state the requirements of the certification and the sellers responsibilities relative to the quality requirements. The certification of conformance shall identify the requirements met by the items and means must be provided to verify the validity of such certifications.

7.2.13 Measures, such as source surveillance and audits, shall be taken to ensure that the design and fabrication of licensed containers are performed under the control of and NRC-approved quality assurance program.

7.3 RECEIVING INSPECTION

Purchased items are inspected, as required, to verify key attributes such as proper configuration, identification, dimensions, cleanliness, and that no shipping damage was sustained.

7.4 COMMERCIAL GRADE ITEMS

7.4.1 When a commercial grade item identified in a design document is substituted with an alternate commercial grade item, the design organization shall verify that the substitute item will perform the intended function satisfactorily. The purchase order shall specify the commercial grade item as identified in the supplier's catalog.

7.4.2 Source evaluation and selection will be performed as deemed necessary in accordance with Paragraph 7.2.2.

7.4.3 Receipt inspection is performed in accordance with Paragraph 7.3.

- Not mandatory for Level 2.

CRITERIA 8

TITLE:	QUALITY ASSURANCE PROGRAM IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENETS	Number: SEG/QA-100 SECTION 8 Revision: 3 Page: 1 of 2

8.0 SCOPE

This section applies to SEG controls related to materials parts, and components for licensed containers, as well as identification and traceability of client radioactive materials processed by SEG. Suppliers of safety related materials, parts, or components are required to maintain a system of identification and control in accordance with requirements of the purchase order.

8.1 REQUIREMENTS

Measures shall be established to ensure that only acceptable items are used or installed. These measures shall provide for the identification and control of materials, parts, and components.

8.2 DESCRIPTION

Physical identification shall be used to the maximum extent possible in accordance with approved SEG procedures. Where physical identification is impossible or impractical, physical separation, procedural control, or other appropriate measures shall be established.

8.2.1 Markings, when used, shall be applied using materials and methods which provide a clear and legible identification and do not detrimentally affect the function or use of the item. When appropriate, markings shall be transferred to each part of an identified item when subdivided, and shall not be obliterated or hidden by surface treatment, processing ,or coatings unless other means are substituted.

8.2.2 Identification and traceability of items such as traceability of an item to a particular contract, or specification and grade of material, or to heat, batch, lot, part, or serial number, specified tests, inspections, or other activities shall be performed in accordance with appropriate SEG procedures.

8.2.3 Maintenance of identification on stored items shall be in accordance with the specific handling, storage, or shipping procedures, or project plans. These measures shall include

provisions for replacement of markings due to damage or mishandling, protection from deterioration due to environmental exposure, or updating existing records as necessary.

8.2.4 Items having limited calendar shelf life or operating life shall be controlled to prevent their inadvertent use in accordance with the specific handling, storage, or shipping procedures, or project plans, as appropriate.

CRITERIA 9

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TITLE: QUALITY ASSURANCE PROGRAM
CONTROL OF SPECIAL PROCESSES

Number: SEG/QA-100 SECTION 9
Revision: 3
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9.0 SCOPE

This section establishes the method to control special processes that verify quality, such as nondestructive examination or quality control, and delineates the requirements for qualified personnel and procedures.

9.1 REQUIREMENTS

Measures shall be established and implemented to ensure that quality-affecting special processes, including welding, heat treating, nondestructive testing, and other quality controls, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other specified requirements.

9.2 DESCRIPTION

9.2.1 As required, each special process shall be performed in accordance with an approved instruction or procedure which identifies qualification requirements for equipment and personnel.

9.2.2 Special processes, such as welding, heat treating, and nondestructive testing, shall be qualified, performed, and documented in accordance with the applicable codes, standards, and specifications.

9.2.3 The organization performing the special process shall ensure welding procedures, personnel, and equipment are qualified and documented in accordance with the applicable codes, standards, and specifications, and in accordance with the approved SEG procedures.

9.2.4 Special processes are performed and/or verified by qualified personnel. Recorded evidence of this verification is maintained in accordance with SEG procedures.

9.2.5 The acceptance criteria of the applicable codes, standards, and specifications, shall be included in or referenced in the procedures or instructions for special processes, along with

any other conditions necessary to perform the processes. The procedures or instructions shall delineate equipment requirements, calibration requirements, or environmental conditions, and control parameters of the process.

9.2.6 Procedures or instructions shall identify special requirements not covered by existing codes or standards, and the necessary requirements for qualification of personnel or equipment.

9.2.7 Records of qualification for personnel, procedures, and equipment shall be established and maintained.

CRITERIA 10

TITLE: QUALITY ASSURANCE PROGRAM INSPECTION CONTROL
Number: SEG/QA-100 SECTION 10
Revision: 3
Page: 1 of 3

10.0 SCOPE

This section describes the requirements for planning and controlling inspection activities for quality related activities associated with licensed containers, radioactive material processing, or other critical items and services.

10.1 REQUIREMENTS

Inspections required to verify conformance of an item or activity to specified requirements will be planned and executed; methods and results will be documented.

10.2 DESCRIPTION

10.2.1 Inspection personnel shall not directly report to immediate supervisors who are responsible for performing the work being inspected.

10.2.2 Personnel who verify conformance of work for acceptance shall be qualified to perform the inspection. Persons training for inspection qualification on-the-job are directly supervised by a qualified person who verifies the inspection results until qualification is achieved.

10.2.3 Inspection Hold Points may be provided in approved SEG procedures or by QA notification. Work may not proceed beyond the Hold Point without documented consent from QA or the designated representative.

10.2.4 Inspection planning shall be accomplished to ensure that inspection procedures, instructions, or checklists identify the characteristics and activities to be inspected; acceptance and rejection criteria; responsible organization for performing inspection; and recording of objective evidence of inspection results. Planning also includes identification of hold or witness points; approval of data by supervisor to

ensure that all inspection prerequisites and requirements have been satisfied, including operator and equipment qualifications, and establishment of sampling methods, if applicable, in accordance with approved SEG procedures or project plans.

10.2.5 In-process inspections in process shall be performed as necessary to verify quality. Indirect control by monitoring may be utilized when direct inspection is disadvantageous. Both inspection and monitoring are provided when control is inadequate without both. The combination inspection and process monitoring are performed in a systematic manner to assure quality is achieved throughout the duration of the process.

10.2.6 Final inspection shall include a records review of the results of inspection and resolution of nonconformances identified in previous inspections. Checklists are established for final inspection prior to release to verify that the following inspection requirements have been complied with, as a minimum, for Radioactive Material Containers:

(A) Package is properly assembled and leak tight in accordance with SEG procedures.

(B) Moderators/neutron absorbers are present, or shielding materials as appropriate

(C) Valves are protected against tampering and are set to specifications. Loading is accomplished in accordance with appropriate SEG procedures.

(D) Shipping papers are properly completed.

(E) Containers are durably marked as required by the DOT regulations.

(F) A designated individual performed final inspection of shipping documentation prior to authorization for shipment.

10.2.7 Items are inspected for completeness, markings, calibration, adjustments, protection from damage.

10.2.8 Quality records generated in support of an inspection shall be reviewed for adequacy and completeness prior to acceptance.

10.2.9 Inspection records shall contain, at a minimum, the item inspected, date of inspection, inspector, type of observation, results or acceptability, and reference to information on action taken in connection with nonconformances.

10.2.10 The acceptance of the item will be documented and approved by authorized personnel. Modification, repair or replacement requires re-inspection or retest as appropriate to verify acceptability.

10.2.11 Project plans or procedures shall establish an inspection program for packaging to ensure adequate maintenance of packaging. The program shall identify the items to be monitored, the criteria for replacement or acceptability, and the frequencies of inspection assigned to each item.

10.2.12 In-service inspection methods will be established to verify that characteristics of an item continue to stay within the specified limits. Inspection methods will include routine evaluation of emergency and safety systems, verification of calibration or integrity of instruments or systems and their maintenance, as appropriate.

10.2.13 Records of in-service activities conform to SEG procedures and are documented per paragraph 10.2.9, as a minimum.

CRITERIA 11

TITLE: QUALITY ASSURANCE PROGRAM TEST CONTROL

Number: SEG/QA-100 SECTION 11
Revision: 3
Page: 1 of 2

11.0 SCOPE

This section describes the requirements for test control to demonstrate that new, modified, or in-service components, parts, or licensed containers, or other items function satisfactorily.

11.1 REQUIREMENTS

Methods shall be established and implemented to ensure that all testing required to demonstrate that structures, systems, components, and licensed containers will perform satisfactorily in service is identified and performed in accordance with written test procedures. The test procedures shall incorporate the requirements and acceptance limits contained in the applicable design documents, governing regulations, certificates of compliance or other specifying documents. The testing shall include, as appropriate, proof test, preoperational tests, maintenance, repair, modification, replacement, and operational and developmental tests.

11.2 DESCRIPTION

Required testing of specific components, parts, items, or licensed containers are described in either the project plans or SEG procedures. The following items should be included in typical testing performed prior to delivery or transport of licensed packaging by a carrier: Structural integrity; leak-tightness; component performance of valves, gaskets, and fluid transport devices; shielding integrity; and thermal integrity.

11.2.1 Tests will include, as appropriate, prototype qualification tests, production tests, proof tests, preoperational tests, and operational tests.

11.2.2 Tests will be controlled through written test procedures prepared in accordance with design requirements. Test requirements and acceptance criteria shall be based upon specified requirements contained in applicable design documents, certificates of compliance, maintenance or operating manuals, or other pertinent technical documents.

TITLE: QUALITY ASSURANCE PROGRAM TEST CONTROL

Number: SEG/QA-100 SECTION 11
Revision: 3
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11.2.3 Test procedures will include or reference test objectives, and address prerequisites, instrumentation, personnel training, environmental conditions, and documentation requirements.

11.2.4 Prerequisites are considered, such as, calibrated instrumentation, appropriate equipment, condition of equipment, and the item to be tested, and provisions for data acquisition.

11.2.5 Test records content shall, at a minimum, identify the item tested, date of test, tester or data recorder, type of observation, results and acceptability, deviations noted and actions taken thereto, and person evaluating test results.

11.2.6 Test results shall be documented and evaluated by qualified individuals or groups in accordance with approved procedures.

11.2.7 Special training or qualification of personnel who perform the testing shall be accomplished, as necessary, prior to performing the test.

11.2.8 Data-recording by qualified individuals or groups shall be as specified in the particular test procedure. Quality monitoring shall be by individuals qualified in accordance with approved SEG procedures.

* 11.2.9 Maintenance test programs as defined in project plans or procedures shall be established to ensure that licensed packages or other items remain usable and free of excessive radiation and contamination.

* Not Mandatory for Level 2.

CRITERIA 12

000595

TITLE: QUALITY ASSURANCE PROGRAM CONTROL OF MEASURING AND TEST EQUIPMENT
Number: SEG/QA-100 SECTION 12
Revision: 3
Page: 1 of 2

12.0 SCOPE

This section describes the controls of measuring and test equipment (M&TE) that may affect the quality of safety related or designated items.

12.1 REQUIREMENTS

SEG personnel who use M&TE are responsible to verify that the instrument has not exceeded the calibration due date and to remove the calibrated item from service if the calibration date has expired, or the instrument is suspected to need repair or be out of calibration due to damage.

12.2 DESCRIPTION

SEG personnel will select instruments that fit the required range, tolerance, type, and accuracy as specified in pertinent documents (such as operating procedures) to verify conformance to the specified criteria. The Quality Assurance Manager is responsible for verifying the implementation of a M&TE Control Program.

12.3 M&TE shall be calibrated, adjusted, and maintained at scheduled intervals against certified equipment or standards having known valid relationships to nationally recognized standards. If no national standard exists, the basis of calibration shall be documented. Calibration standards should be accurate to within 1/10th of the accuracy of the device being calibrated.

The method and interval of calibration for each item shall be based on the type of device, stability, characteristics, required accuracy, purpose, frequency of usage and environment where used.

12.4 Calibration procedures for control and issuance of tools, gauges and test equipment will be developed as a quality related procedure. Calibration methods shall be documented, and performed by competent personnel in an environment that will not adversely affect the calibration. Special controls shall be documented and applied when they are required for environmental conditions such as temperature, humidity, cleanliness, or radiation to maintain the accuracy or operating characteristic of the device or standard.

12.5 When a controlled device is found to be out of calibration, it shall be determined how long the condition existed or when the calibration of the device was last verified, whichever is the most recent. Items inspected, tested or processed with the M&TE during the periods of uncertain calibration shall be controlled as nonconforming until their acceptability is verified.

Out of calibration M&TE will be tagged and/or segregated to prevent inadvertent use and shall not be used until it has been recalibrated. If M&TE is found to be consistently out of calibration, it shall be repaired or replaced.

12.6 Special calibration will be performed whenever equipment is suspect.

12.7 M&TE shall be verified to have a calibration sticker affixed to the instrument prior to use. M&TE must be traceable to their calibration and servicing history.

CRITERIA 13

TITLE: QUALITY ASSURANCE PROGRAM HANDLING, STORAGE, AND SHIPPING
Number: SEG/QA-100 SECTION 13
Revision: 3
Page: 1 of 3

13.0 SCOPE

This section describes the control to prevent damage or loss and to minimize deterioration in safety-related or designated items during handling, storage, preservation and shipping of the items.

13.1 REQUIREMENTS

Special documents (such as instructions, procedures, drawings, etc.) shall be used to describe the methods for handling, storage, packaging, shipping and preservation of items. These instructions shall be in accordance with design requirements and applicable codes, standards and regulations. Qualified personnel shall be assigned to perform as needed to minimize deterioration of the item.

General marking and labeling for packaging, shipping, handling and storage of items shall be adequate to identify, maintain and preserve shipment. Special environments or special controls will be identified.

13.2 DESCRIPTION

13.2.1 A final prerelease review of system, components, or certified or licensed packages prior to delivery shall be performed in accordance with SEG procedures or the appropriate project plans. This review shall ensure that equipment has been prepared for delivery to SEG in accordance with approved drawings, specifications, government regulations, certificates of compliance, or other specifying documents; that all required inspections and tests have been completed; that the items are properly identified; that the necessary shipping papers have been prepared; and, as applicable, that the item contains operating manuals, maintenance manuals, and generic procedures relating to the item's use, as appropriate.

13.2.2 Packaging which is being prepared by SEG for delivery to a carrier shall be reviewed to ensure that all conditions, including specified operations, inspections, tests, NRC

and DOT requirements, necessary shipping papers, and as applicable, draining and/or drying of package containments gave been accomplished.

13.2.3 Receipt and initial storage of materials, parts and components shall be in accordance with approved SEG procedures.

Withdrawal of materials, parts, and components from initial storage shall be in accordance with SEG procedures.

Materials with identified shelf lives shall be handled in accordance with the manufacturer's instructions or specific procedures.

13.2.4 Handling equipment selected and used shall be adequate for protection of the item and shall be operated by competent personnel. Special tools or equipment shall be used, if required, to prevent damage for items that are:

(A) Heavy or bulky

(B) critical or of high value

(C) Sensitive to physical forces

(D) Periodically inspected and tested.

13.2.5 Prior to packaging, cleaning may be performed if necessary. Measures shall be employed to minimize contamination (e.g., oil, sealing, coating, inert atmosphere, etc.). If special cleaning is not required, standard industry cleaning practices may be utilized. Competent personnel shall perform special cleaning operations.

13.2.6 Crates or special containers shall be provided as required to protect the item or minimize deterioration. Shipping instructions shall denote special packaging or handling instructions.

13.2.7 Identification shall be provided on packaged items or the container.

CRITERIA 14

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TITLE:	QUALITY ASSURANCE PROGRAM INSPECTION, TEST, AND OPERATING STATUS	Number: SEG/QA-100 SECTION 14 Revision: 3 Page: 1 of 2

14.0 SCOPE

This section describes the requirements for use of status indicators for safety related or designated items to prevent inadvertent use of nonconforming or defective items. Status indicators are also necessary to show that items have passed specific tests, and to preclude bypassing of required tests. Status indicators are required to prevent operation on items removed from service for test, calibration, maintenance or repair.

14.1 REQUIREMENTS

Measures shall be established and implemented to ensure that the required inspection and test activities, including maintenance, are performed and to ensure that items which have not passed the required inspections or tests are not inadvertently installed, used, or operated. Status of the required inspections or tests shall be maintained in either on the item or in documents traceable to the item. Status indicators shall also provide for indicating the operating status, such as tagging, to prevent their inadvertent operation.

14.2 DESCRIPTION

The required inspections, tests, or maintenance activities are described in the particular project plans or inspection and test plans.

The status of inspection, tests, maintenance, and other activities performed on items shall be maintained to the extent possible on the item or on documents traceable to the item. The status will be identified by the use of tags, markings, stamps, or travelers to ensure that required inspections are not inadvertently bypassed. The status indicator used for SEG activities shall be in accordance with SEG approved procedures or the individual project plans.

14.2.1 Status indicators will be used to identify nonconforming items which have not passed the required inspections or tests to assure the items are not inadvertently installed, used, or operated.

14.2.2 The authority for application and removal of status indicators is identified in SEG procedures. QA/QC personnel routinely monitor the quality related activities to assure status indicators are used and removed, as appropriate, in accordance with SEG approved procedures.

14.2.3 The operating status of systems and components are controlled through use of lock out tags secured to appropriate valves and switches.

- 14.2.4 Licensed containers are marked and/or tagged to provide the current level of inspection that has been successfully completed. A final inspection shall be performed by Qualified Inspectors and affix a security seal prior to release for use.

- Not mandatory for Level 2 work.

CRITERIA 15

TITLE:	QUALITY ASSURANCE PROGRAM NONCONFORMING MATERIALS, PARTS, COMPONENTS, OR SERVICES	Number: SEG/QA-100 SECTION 15 Revision: 3 Page: 1 of 3

15.0 SCOPE

This section establishes controls and requirements for nonconforming materials, services, components, parts or activities that affect the quality of safety related or other designated items. Nonconforming items shall be controlled to prevent inadvertent use or installation.

15.1 REQUIREMENTS

Measures shall be established and implemented to control materials, parts, components, chemicals, and services which do not conform to applicable codes, standards, specifications, or other documented requirements in order to prevent their inadvertent or continued use, further processing, delivery, or installation.

15.2 DESCRIPTION

Reporting, identification, and documentation requirements of nonconformances are provided in approved SEG procedures to ensure proper management attention, notification of nonconforming condition, and proper documenting of the condition, which includes the corrective action and cause.

15.2.1 Identification of a nonconforming item shall be legible and conspicuously displayed by use of marking, tagging, or other means which does not adversely affect the end use of the item.

15.2.2 Segregation of nonconforming materials, parts, and components shall be accomplished, as feasible, to ensure that they will not be inadvertently used. The segregated storage area for nonconforming items shall be clearly designated and marked, roped, or otherwise distinctly contained.

15.2.3 Disposition of nonconformances shall be prepared and approved by responsible individuals or groups in accordance with documented SEG procedures. The nonconforming item shall be controlled pending evaluation and approved disposition by authorized personnel. The justification of final

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disposition of reject, repair, rework or use-as-is shall be documented on the nonconformance form.

15.2.4 Notification of affected organizations shall be in accordance with documented SEG procedures. The responsibility and authority for evaluation and disposition of nonconformances are defined in SEG procedures.

15.2.5 Reinspection or retesting of nonconforming items following rework shall be performed using the original acceptance criteria, and are subject to design control measures commensurate to those applied to the original design.

15.2.6 Nonconformances shall be closed and documented by Quality Assurance in accordance with SEG procedures.

• 15.2.7 Trending of nonconformances to determine quality trends for management review and assessment will be accomplished in accordance with approved SEG procedures.

15.2.8 Nonconformances shall be evaluated to determine 10CFR21 reportability, and as applicable, shall be reported, dispositioned, followed up, and closed in accordance with approved SEG procedures.

15.3 NONCONFORMANCE REPORTING

Nonconformance reports shall include the following information as a minimum:

a. Identity of the item, service, or activity.

b. Description of the nonconformance with adequate detail to facilitate evaluation and disposition.

c. Identification of tests or reinspection required prior to acceptance, and determination of 10CFR21 reportability is documented.

• Not Mandatory for Level 2.

TITLE:	QUALITY ASSURANCE PROGRAM NONCONFORMING MATERIALS, PARTS, COMPONENTS, OR SERVICES	Number: SEG/QA-100 SECTION 15 Revision: 3 Page: 3 of 3

d. Identity and approval of responsible managers.

e. Evidence that the disposition was performed as authorized.

f. Record of results of retest, reinspection, training, etc.

Nonconformances are retained as a Quality Record. Nonconformances are logged, the status reviewed periodically, corrective action implementation verified, and closed by Quality Assurance.

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CRITERIA 16

TITLE: QUALITY ASSURANCE PROGRAM CORRECTIVE ACTION

Number: SEG/QA-100 SECTION 16
Revision: 3
Page: 1 of 2

16.0 SCOPE

This section describes the controls to ensure correction of conditions adverse to quality. Adverse conditions will be identified; reported; Stop Work initiated, as appropriate; reported in accordance with 10CFR21, as appropriate; and corrected in a timely manner.

16.1 REQUIREMENTS

Measures shall be established and implemented to ensure that conditions adverse to quality such as deficiencies, deviations, defective material and equipment, or conditions concerning the use, maintenance, or repair of equipment, are promptly identified and corrected. In the case of significant conditions adverse to quality, the cause of the conditions shall be determined and corrective action taken to preclude recurrence. The identification of the significant conditions, the cause of the condition, and the corrective action taken shall be documented and reported to the President.

16.2 DESCRIPTION

16.2.1 Significant or repetitive conditions adverse to quality shall be reported in accordance with approved SEG procedures. The conditions shall be identified promptly and corrected as soon as practical. Appropriate management will be apprised of the condition.

16.2.2 In cases where corrective action is unable to be accomplished immediately, the appropriate manager or vendor provide a written response. The response shall describe the cause of the deficiency and the proposed corrective action to be completed within a specified time.

16.2.3 Corrective action shall be sufficient to preclude reoccurrence.

16.2.4 If corrective action is not taken for significant or repetitive conditions adverse to quality, Quality Assurance shall issue a Stop-Work Order followed by immediate verbal notification to the President

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of SEG, and complete by a formal report. Work may commence after satisfactory resolution of the nonconforming condition as verified by the QA Manager.

16.2.5 Corrective action follow-up to ensure that corrective actions were effectively implemented shall be performed by SEG Quality Assurance in accordance with SEG procedural requirements.

16.2.6 The QA Manager shall be responsible for verifying the effectiveness and closure of corrective actions.

16.2.7 Corrective actions under the purview of 10CFR21 shall be reported, dispositioned, followed up, and closed in accordance with SEG procedure requirements.

• 16.2.8 Trending of adverse conditions to determine quality trends for management review will be accomplished in accordance with SEG procedures.

16.2.9 Documentation of Corrective Actions may include logs, formal reports, and objective evidence of satisfactory implementation. Documentation will be maintained by Quality Assurance as a Quality Record.

• Not Mandatory for Level 2.

CRITERIA 17

000611

TITLE: QUALITY ASSURANCE PROGRAM Number: SEG/QA-100 SECTION 17
QUALITY RECORDS Revision: 3
Page: 1 of 6

17 SCOPE

This section describes the controls for Quality Records that furnish documentary evidence of the quality of safety related parts, components, licensed containers, services or activities provided by SEG.

17.1 REQUIREMENTS

Measures shall be established and implemented to ensure that sufficient records that furnish documentary evidence of quality are specified, prepared, and maintained. Quality assurance records shall be complete, legible, identifiable, and retrievable. Quality assurance records shall be identified in design, procurement, project control documents, and SEG procedures.

17.2 DESCRIPTION

Quality assurance records shall be identified in project control documents or procedures as specified in SEG procedures.

17.2.1 RECORD ADMINISTRATION

Quality Records include, but are not limited to: contract documents, specifications, procedures, documents that implement customer, federal, and state requirements, or records that document compliance with codes, standards, licensing or other regulatory requirements.

17.2.2 The Quality Records Program shall be described in Quality Assurance procedures which provide system definition, implementation and enforcement. Appropriate SEG and project procedures, specifications, procurement documents, or other documents will define the Quality Records to be generated or supplied.

17.2.3 Each SEG manager is responsible for the identification of Quality Records for his area of responsibility. Department managers are responsible for the maintenance and control of department files until the appropriate time for submittal to the Quality Records Center.

17.2.4 Quality Records requirements shall be determined for special projects. The Quality Records Plan shall be documented in SEG Project Plans or procedures. This planning documentation will include:

a. QA Records required by the contract or applicable codes, standards or regulations.

b. QA Records to be transmitted to the client and the turnover schedule.

c. QA Records to be maintained by SEG during the project.

d. QA Records to be maintained by SEG after completion of the project.

17.2.5 Each SEG Department will identify retention periods for maintaining working files, and turnover periods for submitting Quality Records to the client or Quality Records Center.

17.2.6 SEG will identify in procurement documents the types of Quality Records to be provided to SEG, retention responsibility, and the method of final disposal.

17.3 VALIDATION AND DISTRIBUTION

17.3.1 The SEG department managers and the QA Engineer shall assure that active project files are established and maintained. These records shall be identified, indexed, maintained and controlled to ensure readability, retrievability, and to prevent loss and damage.

17.3.2 Records will be distributed and controlled in accordance with SEG procedures.

17.3.3 For site projects, a site file should be established with a backup home office copy maintained. QA records required to be transmitted to client, shall be transmitted by means of a transmittal form, letter or other suitable means.

17.3.4 Quality Records will be validated upon completion by stamp, initial, or signature and date of an authorized individual.

17.4 INDEX AND IDENTIFICATION

An indexing system will be established in accordance with QA procedures. The index will be defined in sufficient detail to permit identification between the item or activity and the record that applies to that item or activity.

17.4.1 Quality Records shall be classified as either "Lifetime Records" or "Nonpermanent Records". The QA Procedure shall list typical records and their retention times. Nonpermanent Records have a retention period of either the duration of the project or a specified number of years.

17.4.2 Nonpermanent Quality Records

Nonpermanent Records are those required to show evidence that an activity was performed in accordance with the applicable requirements but need not be retained for the life of the item. Specific retention periods may be specified.

17.4.3 Lifetime Quality Record

Lifetime Quality Records are those which shall be maintained for the life of the item, or the operating life of SEG (no less than forty years).

17.5 STORAGE, PRESERVATION, AND SAFEKEEPING

The Quality Assurance Manager or an assigned person, is responsible for receiving Quality Records and controlling their safety. A receipt control system is delineated in SEG QA procedures.

QA shall ensure that records are maintained in duplicate files in separate buildings or in one-hour rated fireproof cabinets. Quality Records received from SEG, subcontractors, vendors, or the clients will be:

(A) verified to be legible and complete and in agreement with the transmittal

(B) indexed and assigned a file number

(C) maintained, controlled and accounted for if removed from the file

(D) controlled for filing of supplemental information or correction of superseded records

(E) processed for final storage and maintained in appropriated facilities

A Quality Records Receipt Log may be used to reflect current status of records.

17.5.1 The records will be stored in accordance with approved procedures. These procedures should designate:

(a) the storage location(s)

(b) description of storage facility

(c) filing index

(d) receipt control

(e) authorization for access to and control of the files

(f) method for maintaining control of and accountability for records removed

(g) method to file supplementary records and disposition of outdated records.

17.5.2 Preservation requirements on storage locations include:

(a) provision to prevent damage from environmental conditions

(b) placement of records in binders or folders for storage on shelves or in file cabinets

(c) storage of special process records (films, negatives) to prevent damage from light, temperature, etc.

17.5.3 Safekeeping requirements shall be established to preclude unauthorized access to files. Lost or damaged files should be replaced, restored, or substituted. Facilities requirements for QA Records to be maintained in dual facilities separated by enough distance to preclude a simultaneous hazard. In lieu of dual storage, selected records may be stored in a fireproof rated cabinet, that meets applicable codes, standards, and requirements.

QA shall establish and maintain records applicable to the QA program, including transmittals, distribution lists, corrective action reports, internal audits, auditor qualification, documentation and disposition of Quality Records, nonconformance reports, divisional audits, divisional QA indoctrination, and personnel certifications records. In addition, during the course of special projects, the Quality Assurance is responsible for assuring maintenance of the home office copy of project files.

17.5.4 RETRIEVAL

Storage systems (site, home office or corporate) shall have a documented list of personnel who have access to the quality files. Records retained by subcontractors (or SEG) shall be accessible to SEG (or the client). An index or other retrieval system will be maintained to assure traceability and timely retrieval of Quality Records.

17.6 DISPOSITION

Records accumulated by SEG's subcontractor prior to transfer to SEG shall be available for SEG's inspection. Records submission to SEG will be identified on procurement documents.

The most stringent requirements shall be used to determine final disposition of records. Nonpermanent Records will not be disposed of until; as appropriate:

(A) items are released for shipment

(B) regulatory requirements are satisfied

(C) Operational status warrants disposal

(D) warranty conditions are satisfied

(E) Purchaser requirements are satisfied.

SEG shall maintain documentation indicating disposition of Quality Records.

CRITERIA 18

TITLE: QUALITY ASSURANCE PROGRAM Number: SEG/QA-100 SECTION 18
QUALITY AUDITING Revision: 3
Page: 1 of 5

18 SCOPE

This section establishes a comprehensive system of planned and periodic audits to verify contract or specification compliance, proper procedure implementation, and the determination of the effectiveness of the Quality Assurance Program. The Audit Program consists of internal program audits, external audits of SEG's subcontractors, internal audits of SEG projects, and may include performance of audits with SEG clients. The program includes the following:

18.0.1 Audits of quality related activities to ensure proper implementation of applicable elements of the SEG Quality Assurance Program, SEG procedures, contract specifications, and appropriate codes and standards.

18.0.2 Audits of certain suppliers to ensure compliance with procurement documents as required.

18.0.3 Annual Management Review and evaluation of the effectiveness and thoroughness of implementation of the SEG Quality Assurance Program.

Audits will be performed:

18.0.4 To provide an objective evaluation of implementation of established requirements, methods, and procedures.

18.0.5 To determine adequacy of Quality Assurance Program performance.

18.0.6 To verify implementation of corrective action.

18.1 REQUIREMENTS

Measures shall be established and implemented to ensure that a system of planned and periodic audits is performed to verify the compliance and effectiveness of all aspects of a the quality assurance program.

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18.2 DESCRIPTION

18.2.1 Quality Assurance shall develop an Annual Audit Schedule and shall periodically update the schedule. Audits may be schedule in accordance with key milestones:

(A) Prior to initiation of the activity to examine planning activities

(B) During the activity to verify conformance to plans, or

(C) Near the end or after the activity to verify requirements have been met.

18.2.2 A written audit plan and checklist(s) will be prepared for each audit by the Audit Team. The plan should shall identify the following:

(A) Scope and the requirements documents related to the audited activities

(B) Audit team members

(C) Organization and specific activities to be audited

(D) Audit schedule

(E) Audit checklists to be used.

The audits are to be performed in accordance with the written audit plan and checklist by appropriately trained technical personnel not having direct responsibilities in the areas being audited.

18.2.3 The Audit Team Leader (Lead Auditor) shall ensure the audit team is prepared by:

(A) Selection of personnel with the collective skills to perform the audit.

(B) Provide orientation to the scope of the audit.

(C) Coordinate audit team activities, pace of audit and communications between the team and the audited organization.

(D) Provide indoctrination of auditors to include as a minimum:

1. This Policy

2. Applicable portions of 10CFR 50, Appendix B and NQA-1

3. Applicable QA Program procedures

4. Other applicable procedures or specifications

18.3 PERSONNEL

Auditing personnel will be selected and assigned who are independent of any direct responsibility for the activity to be audited. Audit personnel selected for Quality Assurance auditing assignments should have experience and/or training commensurate with the scope, complexity or special nature of the activity to be audited.

A qualified Lead Auditor will be assigned to each audit team to organize and direct the audit, report audit findings, and evaluate corrective action. An audit team of one person will require the auditor to be a qualified Lead Auditor. The Lead Auditor shall be qualified in accordance with SEG's Auditor Certification Program and shall have participated in a minimum of five (5) quality audits within the previous three (3) years, one of those audits being a Nuclear Quality Assurance audit.

18.4 The auditors will document the audit results, and management having responsibility in the area audited shall review the documented audit results. Responsible

management (department manager or equal) will take necessary action to review and correct the deficiencies revealed by the audit. Deficient areas may be re-audited when corrections have been accomplished or during a subsequent audit.

Audits will include an evaluation of quality assurance practices, procedures and instructions, the effectiveness of implement and conformance with SEG management directives and the SEG QA Program. During the performance of these evaluations, the audits should include evaluation of work activities, processes, products, personnel training and qualifications, and review of documents and records.

18.5 AUDIT SYSTEM

Audits will be conducted on a scheduled and timely basis. The total scope of the SEG Internal Quality Assurance Program will be audited annually.

Suppliers or vendors audits for Level 1 related materials or services will be conducted initially upon contract award, and then every three years as a minimum.

A Pre-Audit Meeting (Entrance interview) will be held by the Lead Auditor to make introductions as appropriate, confirm the scope and plan of the audit, establish a tentative schedule, and lines of communication.

Objective evidence will be evaluated for conformance to the Quality Assurance Program requirements.

A Post-Audit Meeting (Exit interview) will be held at the conclusion of the audit to review all findings for clarity, correctness and for suitable corrective action. All conditions requiring immediate corrective action shall be identified to the appropriate SEG manager or supervisor, or the appropriate external organization management.

18.6 AUDIT REPORTS

The Lead Auditor shall document the audit activities and sign the audit report. The audit report should contain sufficient information to be a stand-alone document and

include what was examine, what was found to be acceptable, and what was inadequate. The report will describe the following:

a. The audit scope

b. Auditors names, organizations audited, and audit dates

c. Names of personnel interviewed during the audit, and those attending Pre/Post Audit meetings

d. Summary of audit results, including any program deficiencies

e. Details of deficiencies and recommendations for corrective action

f. Team Members signatures

The Quality Assurance Manager shall concur and issue the audit report. All reports must be transmitted to the audited organization within two weeks after completion of the audit. All audit findings must be answered within thirty (30) days from the date of the audit report.

The Lead Auditor will evaluate the audit response, verify its implementation when appropriate, and accept or request further corrective action if the response or implementation is inadequate to prevent recurrence of the deviation.

All audit finding responses will be reviewed and accepted by the Lead Auditor. Once corrective action has been completed, a Quality Assurance Representative will verify acceptable implementation and completion of corrective action. A memo describing the corrective actions and announcing the closure of the audit will be sent to appropriate management. The audit file will be retained as a Quality Record in accordance with Section 17, Quality Records.

SCIENTIFIC ECOLOGY GROUP, INC.

J. PAT HOPPER

VICE PRESIDENT PROJECT MANAGEMENT

EDUCATION AND ASSOCIATED TRAINING

1972 BSChE, West Virginia Institute of Technology
1979 MSChE, Ohio University

Completed numerous technical, managerial, and environmental courses including 24-hour RCRA and 40-hour 29 CFR 1910.120 training.

U.S. citizen, Active Security Clearance (DOE-Q)

SUMMARY OF EXPERIENCE

21 years

- 7 years - Environmental Management
- 7 years - Technical and Project Management
- 5 years - Process and Technical Engineering
- 2 years - R&D and Start-Up

EXPERIENCE

1992 - Present Scientific Ecology Group, Inc., Oak Ridge, TN

Vice President Project Management

Responsible for managing and implementing environmental projects to meet client requirements and state and federal regulations including:

- $45-million-dollar project to manufacture and supply casks for DOD Chemical Stockpile Disposal Program.
- $10-million-dollar project to manufacture and supply unique plastic overpack containers to Martin Marietta Energy Systems/DOE.
- $12 million dollar project for DOE Fernald site to dispose of 50,000 drums of process residues and 2210 tons of radioactively contaminated scrap metal.
- DOE R&D projects for decontamination and beneficial reuse.
- Long-range planning for future projects and business development.

1989 - 1992 Environmental Remedial Action, Westinghouse Environmental Management Co. of Ohio, Cincinnati, OH

Program Manager

Responsible for the formulation and management of a $5-billion program to perform environmental cleanup under CERCLA, RCRA, DOE and EPA.

- Program Director for $150 MM per year environmental budget
- Implementing, planning, scheduling, coordination and tracking of RI/FS and remedial actions based on Records of Decision
- Staff of 102 professionals with matrix support from plant services groups

J. PAT HOPPER

- Company liaison with DOE and EPA on environmental restoration
- Managed large architect-engineer firm (up to 400 personnel) to perform remedial design
- Technical Program Manager responsible for technology development, demonstrations, technology transfer and educational programs
- Participated in public meetings on cleanup progress
- Corporate liaison for environmental restoration and technology transfer
- Experienced in CERCLA, NEPA, RCRA, safety analysis, plant start-up, waste management

1986 - 1989 Environmental Project Engineering, Westinghouse Environmental Management Co. of Ohio, Cincinnati, OH

Manager

Managed a $350-million environmental, health and safety improvements program consisting of over 100 subprojects. Built staff of 35 professionals with matrix support from approximately 100 plant support personnel. Managed capital budget of $50 million per year and improved CPAF rating from satisfactory to excellent. Met all capital expenditure commitments and successfully achieved all annual funding requests. Developed a validatable CSCSC management control system. Designed, installed and started up state-of-art biodenitrification fluidized bed waste treatment system. Managed design by A-E firm of approximately 150 personnel

1983 - 1985 Goodyear Atomic Corporation, Piketon, OH

Superintendent Engineered Services

Managed and administered three departments charged with providing start-up, engineering support, data management, and training programs for an operations division of 600 personnel. Managed annual budget of $10 million. Supervised 60 employees - 45 technical and engineering, 15 wage. Managed outside contracts with engineering services and training firms. Also performed as company-appointed liaison with A-Es, construction contractors and DOEnergy on plant start-up. Start-up Manager for $750 MM of high tech process equipment

1980 - 1983 Goodyear Atomic Corporation, Piketon, OH

Supervisor Engineering and Start-Up

Initiated and established a new engineering services department which provided operations design criteria and performed design reviews with major A-E firms (Fluor, Bechtel, Catalytic). Prepared operating procedures and functional checkout tests for start-up of a new facility.

Served as Start-Up Team Leader and formulated the logistics, philosophies, schedules and coordination programs for start-up of a new technology. Developed and implemented a facility readiness review program that resulted in the successful start-up of $750 million of process equipment

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J. PAT HOPPER

1977 - 1980 Martin Marietta Energy Systems, Oak Ridge, TN

Technical Support Section Leader

On special assignment to Martin Marietta (formerly Union Carbide) providing technical support to the design, check-out, start-up, and operation of pilot plant and demonstration facilities. This included developing operating and check-out procedures and operating philosophies, troubleshooting and coordinating facility and process modifications.

1971 - 1977 Goodyear Atomic Corporation, Piketon, OH

Process Engineer

Group Leader of chemical engineering discipline. Responsibilities included developing computer model of open and closed loop heat transfer network, appointed heat transfer specialist, designed adsorption trapping system for contaminant removal, and specified cooling towers. Successfully tested and operated two pilot plants: a ion-exchange system for recovery of hexavalent chromium, and a spray tower for scrubbing fluorine from gaseous effluent streams

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DOUGLAS C. MOORE

EDUCATION AND ASSOCIATED TRAINING

1984 AS, Photography, Clover Park Vocational Technical Institute, IT Corporation Project Management Associate Program

29 CFR 1910.120 40-hour Hazardous Waste Operation and Emergency Response Course (OSHA training).

29 CFR 1910.120 8-hour Hazardous Waste Operation and Emergency Response Course Refresher (OSHA training).

29 CFR 1910.120 8-hour Supervisory Course

EXPERIENCE

1992 - Present Scientific Ecology Group, Inc.

Project Manager

Fernald Scrap Metal Beneficial Reuse Project (2,200 tons scrap metal). Responsible for the supervision of all on-site activities for the sorting, sectioning, loading, and transportation of 2,200 tons of scrap metal to the SEG facility in Oak Ridge, Tennessee.

Project Manager

Process and Dispose of 50,000 Drums of Non-RCRA Low Level Radioactive Waste. Responsible for the supervision of all on-site activities for the assay, loading, and transportation of 50,000 drums of low-level radioactive waste from Fernald Environmental Management Project .

1990- 1992 International Technology Corporation

Technical Writer

Provided technical writing and support on various radioactive decontamination and decommissioning (D&D) proposals. Participated directly in bid/no-bid decisions on multi-million dollar proposals.

Site Manager

Responsible for Ft. Flagler State Park, Marrowstone Island, WA. Responsible for all on-site activities required to identify and dispose of Unexploded Ordinance (UXO) at the former Ft. Flagler Army Post. The World War II-vintage live ordinance was detonated in place by the Explosive Ordinance Detachment (EOD) from Ft. Lewis Army Post. Direct responsibilities included site-specific cost tracking, procurement and coordination of all site activities with U. S. Army Corp of Engineers (client), U.S. Army, state and park representatives.

DOUGLAS C. MOORE

Operations Superintendent

Responsible for the re-sampling of the K-65 silos at DOE's Fernald site. Twenty-two-foot vertical core samples were taken through the manways atop the concrete silos. The sampling of the radium bearing material is to be included in the Remedial Investigation and Feasibility Study (RI/FS) being conducted at the Feed Materials Production Center.

Other responsibilities included writing detailed work procedures, task-specific addenda to the RI/FS sampling plan, working directly with the client to coordinate field activities with other contractors and performing as acting Project Manager when the Project Manager is out of town.

1989 - 1990 Hilbert & Associates, Inc.

Supervisor

Supervised sectioning and pilot decontamination processes of Acrylonitrile 1 Reactors and associated components. These decontamination processes consisted of physical abrasive techniques, grinding and Co_2 abrasive blasting. Participated in other aspects of the overall site assessment, including surface and subsurface soil sampling, soil grid surveys, building surveys and sample preparation.

1985 - 1988 International Technology Corporation

Operations Superintendent

Field Office, Fernald, Ohio, Thorium Removal and Remediation Project. Responsible for the removal of approximately 1,800 drums of Thorium 232 from two bins and a silo at the Feed Materials Production Center. Once the material was removed from the vessels, they were decontaminated using a vacuum blast system and flame cut to the ground.

Health Physics Technician

Vallecitos Nuclear Center. Radiologically surveyed internals of three cooling towers to determine contamination levels for decommissioning.

Health Physics Supervisor

Supervised health physics technicians at approximately 25 sites contaminated with Polonium 210. Personnel performed radiological assessment surveys and decontamination processes as required to unconditionally release facilities within Nuclear Regulatory Commission standards. Additional responsibilities included oversight for waste packaging and shipping documentation.

Senior Decon Technician, Health Physics Technician

Smith Kline, and French. Decontaminated 20 laboratories and removed the ventilation system contaminated with Carbon 14 and Tritium.

DOUGLAS C. MOORE

Senior Decon Technician

Transuranic Waste Repackaging Project (unnamed client). Repackaged and shipped 130 drums and boxes of high-level Americium 241 and Plutonium 238 hot cell waste.

Senior Decon Technician

Radioactive asbestos size reduction project at Scientific Ecology Group. Repackaged boxes and operated pre-compactor and prepared boxes for the main compactor.

Senior Decon Technician, Health Physics Technician

Decontaminated two off-shore oil barges for Chevron Oil, contaminated with Uranium 238.

Foreman

Oversaw decontamination and decommissioning crew at the Shippingport Station Decommissioning Project. Removed radioactive and non-radioactive asbestos throughout the plant and built scaffolding to access these areas.

SCIENTIFIC ECOLOGY GROUP, INC.

GARRY L. HOWARD

PROJECT MANAGER

EDUCATION AND ASSOCIATED TRAINING

1978 BSME, University of Florida, Gainesville, FL
Two semesters of business management
Sutton & Associates Employment Management
Tech Math and Blueprint, Anderson County Vocational

TRAINING

- Principles and practices of radiation protection
- Radioactivity measurements standardization and monitoring techniques and instruments
- Mathematics and calculations basic to the use and measurements of radioactivity
- Biological effects of radiation
- Handling and disposal of asbestos
- US Ecology nuclear packaging and transportation of radioactive waste material
- Sutton & Associates Mid Management
- Equal Employment Opportunity Seminar
- Training at various utilities
- Q clearance in 1978

EXPERIENCE HIGHLIGHTS

- Thirteen years experience in electrochemical plating and cleaning
- Six years experience in electropolishing
- Thirteen years experience in chemical processing
- Ten years nuclear experience
- Three years road work nuclear experience
- Five years experience in management
- Eight years experience in management
- Various decommissioning, decontamination, quality assurance and quality control experience
- Five years experience in radwaste packaging, transportation and burial requirements

EXPERIENCE

1986 - 1993 **Decontamination Manager**

Responsible for continuing and new decontamination projects, technologies, operations and scheduling. Responsible for metals handling, processing, free release and associated operations. Responsible for radwaste activities, radwaste activities process scheduling and manpower, radwaste packaging and preparation for burial, radwaste transportation to burial sites (Richland, WA, Beatty, NV, Barnwell, SC), state, federal, and site license criteria for transport and burial of radioactive waste, and employee training of radioactive waste and packaging including asbestos handling. Responsible for production scheduling of materials for day-to-day activities, cost tracking activities, and client relations as per

GARRY L. HOWARD

material schedule. Responsible for transportation activities including client relations for scheduling transportation, radioactive material transport to burial facilities, radioactive and non-radioactive transport to utilities, and cost tracking for transportation requirements, DOT, state, federal, and utility requirements.

1985 - 1986 **Production Manager**

Responsible for day-to-day production activities including the execution of the production schedule, manpower assignments, cost tracking, radioactive waste tracking, liquid waste processing and radiological health and safety.

1983 - 1985 **Water Treatment**

Responsible for chemical disposal, material and equipment engineering and process control.

Various Field Experience

Decon of crane for Savannah River, SC; electropolishing fuel pool, Phoenix, AZ; decommissioning, Saxton, PA; decontamination of lab, Erwin, TN; scaffolding project, Nine Mile Point, NH; scaffolding project, St. Lucie Plant, FL; and electropolishing, Monticello, MN.

1974 - 1982 **Electronics Metal Finishing**

Oak Ridge, TN, electroplating, electropolishing and electrocleaning. Subcontractor for DOE, Boeing.

VARIOUS PROJECTS

- Waste management project, Donald C. Cook, MI
- Computer program for Quadrex Recycle Center Materials Tracking System
- Quadrex Recycle Center Scaffolding Management Program

SCIENTIFIC ECOLOGY GROUP, INC.

JACK R. SIMS, JR.

EDUCATION AND ASSOCIATED TRAINING

MS, Candidate, Radiological Engineering
BS, Biology/Marine Biology, Troy State University, Troy, AL, 1975
Graduate courses, Business Management, Troy State University, Dothan AL, 1977
Economics/Computer Programming, Maricopa County Community College, Phoenix, AZ
Alabama Power Health Physics Technician Training Course, 1981
Planning for Nuclear Emergencies, Harvard University, 1984
Advanced Planning for Nuclear Emergencies, Harvard University, 1986
Certified Instructor Training Course, STPEGS, October 1987
CNSI Radioactive Waste Packaging and Transportation Workshop, 1989

CERTIFICATIONS

Emergency Medical Technician I & II license, Wallace Community College, Dothan, AL 1977
OSHA 40-Hour HAZMAT Training Course, 1992
OSHA 8-Hour Supervisory HAZMAT Training Course, 1992

EXPERIENCE

1993 - Present Scientific Ecology Group, Inc., Oak Ridge, TN

Supervisor - Radwaste Shipping and Receiving

Direct activities of radwaste shipping and receiving department concerning the coordination, acceptability, transportation, receipt and shipment of radioactive material to and from SEG facilities. Interface with customers on a day-to-day basis to ensure smooth and timely flow of waste into the facility for processing and outgoing shipments for disposal.

1992 - 1993 **Senior Radiological/Environmental Engineer**

Technical support of the Fort St. Vrain (Platteville, CO) and Army Material Technology Laboratory (Watertown, MA) decommissioning projects including developing procedures and material and equipment specifications. Supervised radiation protection technicians assigned to the Army Material Technology Laboratories (AMTL) project. Supervised and conducted shipments of radioactive material from AMTL and supervised the characterization and turnover of radioactive waste and mixed waste packages to AMTL personnel for disposal. Supervised all administrative functions for onsite SEG personnel. Assigned to the Richland, WA, office to assist DOE in the remediation of the Hanford Reservation.

JACK R. SIMS, JR.

01/93 - 04/93 South Texas Project Electric Generating Station, Houston Lighting and Power Company

Radiation Protection Supervisor - Operations

Served as the on-shift Health Physics Shift Supervisor for two 1270 mW PWR Westinghouse reactors. Provided guidance and instructions for a health physics shift crew of four and interfaced with plant operations, maintenance and management on a daily basis.

1989 - 1993 **Radiation Protection Supervisor - Radwaste**

Responsible for the receipt and shipment of all radioactive material and disposal of all radioactive waste. Directed the daily activities of technicians assigned to the Operations Support Section of the Health Physics Division. Solely responsible for the proper packaging, documenting and shipping of all radioactive material and radioactive waste in accordance with USDOT and USNRC regulations. Trained and familiar with Impell WASTRAK and WMG, Inc., RADMAN/RAMSHIP software used at STOEGS. Dealt on a direct basis with plant management and federal, state and local governmental officials. Responsible for the section budget nominally in excess of 1.5 million/year. On the initial design/engineering team for the site low-level waste storage facility. Participated in numerous QA, NRC and independent audits with no deficiencies received.

1985 - 1989 **Senior Emergency Preparedness Specialist**

Emergency Preparedness Specialist responsible for on-site emergency preparedness activities. Assisted with the initial draft of the emergency plan and procedures and was responsible for all revisions thereafter. Responsible for the development and implementation of the emergency response facilities. Wrote and assisted with the scenario development program and served as controller in numerous drills. Served as the Primary Emergency Preparedness Specialist, a member of the site emergency response organization. Interfaced on a continuing basis with local governmental officials and with the USNRC and FEMA. Served as the systems engineer for the local prompt notification system. Wrote and approved equipment specifications for tone alert radios, emergency standby diesel generators, radiation survey instruments, etc.

1983 - 1985 Palo Verde Nuclear Generating Station Arizona Nuclear Power Project

Emergency Preparedness Engineer III

Emergency Preparedness Engineer providing administrative, logistical and technical support to PVNGS in the field of emergency preparedness. Ensured accurate, workable procedures and equipment were available for the safe operation of PVNGS in the event of an emergency in order to provide maximum protection to PVNGS employees and to the general public.

JACK R. SIMS, JR.

1980 - 1982 Joseph M. Farley Nuclear Plant, Alabama Power Company

Senior Health Physics Technician/Senior Radwaste Technician

Provided health physics support to plant operations and also in charge of radwaste packaging, shipping, and documentation. Provided radiological coverage for initial fuel load, refueling, full power operations and extended outages. Supervised decontamination personnel in daily decon activities. Interfaced with radwaste burial ground personnel for each shipment.

1975 - 1980 Great Southern Paper Company, Northern Nekoosa/Edwards

Lead Environmental Control-Technician

Environmental Control Technician performing environmental quality tests on air and water emissions using chemical and statistical analysis to ensure compliance with regulatory agencies.

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JOHN E. HESS

MANAGER, ANALYTICAL AND TECHNICAL SERVICES

EDUCATION

1974 High School Diploma, Franklin High School, Franklin, WV
1974 1 Semester, Potomac State College, Keyser, WV
U.S. Army NPPOC, 1976/1977

CERTIFICATES

U.S. Army Certificate, Health Physics - Plant Chemistry

EXPERIENCE

1989 - Present Scientific Ecology Group, Inc.

Manager, Analytical and Technical Services

Manages all phases of SEG analytical laboratory in support of facility operations. Determines acceptability of wastes for SEG processes, including incinerator and oil burner. Coordinates reporting to regulatory agencies as required by SEG licenses and permits, including State of Tennessee and EPA. Provides technical and project management support for hazardous waste permitting, licensing, processing and remediation. Responsible for effluent release calculations, dose equivalent assessments, and characterization of SEG wastes in accordance with all applicable regulatory requirements. Additional responsibilities include providing regulatory technical support for to customers and SEG personnel for hazardous and radioactive waste shipment, transportation, manifesting, classification, and processing.

1987 - 1989 GPU Nuclear Corp.

Supervisor, Waste Disposal, TMI

Responsible for supervision of all activities relating to the classification, shipment, transportation and disposal of radioactive waste from TMI including, but not limited to, the following: Developing and controlling schedules for disposal of waste, analyzing volume reduction/reprocessing methods and setting up contracts for same, controlling spending of a waste disposal budget in excess of a million dollars, preparing shipment portfolios for the transfer of TMI-2's damaged fuel to DOE, writing computer programs, coordinating transportation and cask leasing, maintenance of GPU-owned shipping casks, procedure development, operational supervision and support, controlling packaging, processing and solidification of waste, shipment and receipt of radioactive samples and sources, evaluation of potential mixed wastes, etc. Additionally responsible for technical guidance to TMI-2 support organizations, TMI-1 and Saxton Experimental Station in matters relating to the processing, packaging and eventual disposition of radioactive waste.

JOHN E. HESS

1987 **Waste Management Supervisor, TMI**

Responsible for the direct supervision of various operational and technical functions associated with waste management at TMI. Duties included operational control of waste storage facilities, preparation and loading of vehicles, mobile crane operational supervision and support, on-site transfers of radioactive waste containers and preparation for shipment, accountability of waste packages generated, performing curie calculations for waste packages, supervision of critical lifts, maintenance of transportation packages and technical guidance in the determination of shipping, transportation and waste classification requirements.

1985 - 1987 **Radioactive Material Coordinator**

Responsible for various activities associated with waste generation at TMI. Duties included determination of packaging requirements, accountability of all waste packages generated, operation and maintenance of on-site waste storage facilities, determination of shipping and transportation requirements, completion of shipment records, transportation coordination, performing curie estimates, procedure writing, and procedure review. Also, responsible for the coordination and supervision of personnel in support of these activities. Involved in solidification methods, resin dewatering techniques, waste volume reduction methods, etc.

1980 - 1985 Nuclear Support Services, Inc.

Radioactive Material Coordinator

Responsible for activities associated with waste generation at TMI. Duties were the same as those outlined above while employed by GPU Nuclear Corp.

1979 - 1980 **Senior Health Physics Technician/Acting Foreman**

Duties included performing radiation and contamination surveys, RWP preparation, counting lab operation, control point watch, air sampling, job coverage, personnel/equipment decon, dose rate/shielding calculations, survey reviews, coordination of job coverage support, and supervision of junior HPs.

1977 - 1979 U.S. Army

Uniformed Services, University of the Health Sciences, Armed Forces Radiobiology Research Institute

Health Physics/Plant Chemistry Specialist

Responsible for the radiological control of labs, storage areas and special work areas performing radiological research work. Duties included establishing radiological work areas, performing radiation and contamination surveys, decontamination, personnel monitoring, instrument calibration, instrument procurement, collection and sampling of solid and liquid rad waste, preparation of waste for shipment, etc. Additionally

JOHN E. HESS

responsible for control of personnel dosimetry, TLD reading and record keeping of personnel exposures.

1976 - 1977 Successfully completed Nuclear Power Plant Operators Course (NPPOC), Health Physics-Plant Chemistry Specialty. Training included Nuclear Engineering, Electrical Engineering, Mechanical Engineering, Diesel Generator operation, control room simulator training, etc. In addition, completed specific health physics - plant chemistry related training including personnel monitoring, use of film badges, TLDs and dosimeters, radiation and contamination surveys, liquid, solid and gaseous sampling and analysis, use and calibration of survey instruments, operation of multi-channel analyzers, chemical sampling and analysis of water systems, etc.

TIMOTHY B. RAMSEY

SENIOR ENGINEER

EDUCATION AND ASSOCIATED TRAINING

1985 MS, Civil Engineering, University of Tennessee, Knoxville, TN
1979 BS, Civil Engineering, Tennessee Technological University, Cookeville, TN

ACCREDITATION

Registered Engineer, State of Tennessee

SUMMARY OF EXPERIENCE

Mr. Ramsey has over 13 years experience in the design of steel and concrete structures in the nuclear industry. He has extensive experience in stress evaluations and material testing.

EXPERIENCE

1990 - Present Scientific Ecology Group, Inc.

Senior Engineer

Responsible for the design and product development of shielded transportation casks. This effort includes the preparation of procedures and specifications for the design and maintenance of the cask fleet. Also have responsibility for preparing submittals to the NRC for maintaining the certificates of conformance for the casks. Have performed numerous design evaluations for the improvements to closure/sealing systems and cask-to-trailer tie down arrangements. Responsible for the design and product development of containers for shipment, process, storage and burial of low-level radioactive waste. These designs include dewatering/solidification units, and temporary site storage containers manufactured from polyethylene, carbon and stainless steel and concrete materials. This effort includes the preparation of calculations, drawings, specifications and licensing documents to support container designs.

1980 - 1990 Tennessee Valley Authority, Knoxville, TN

Technical Supervisor

Technical supervisor in a seven-member structural engineering section with responsibility for preparing calculations and drawings for steel and concrete structures including schedule development and cost estimates. Directed several programs which reduced required calculations and eliminated expensive modifications.

SCIENTIFIC ECOLOGY GROUP, INC.

TIMOTHY B. RAMSEY

Design Engineer

Performed design and analysis on structural steel and concrete for hydro, fossil and nuclear electric generating facilities. Performed inspections at numerous facilities to determine adequacy of various structural features and develop cost-effective modifications for those found inadequate. Some of these efforts were performed under critical schedules and received letters of commendation for performance.

Research

Responsible for the development and implementation of research and test programs to provide qualification of structural components including writing technical specifications, supervising lab personnel and preparing reports on the test results. Several programs resulted in significant cost savings by qualifying components already installed. Other programs were essential in the development of critical design information.

1979 - 1980 Sverdrup and Parcel & Associates, Nashville, TN

Design Engineer

Designed water and wastewater treatment facilities and prepared plans, specifications and bid documents. These efforts also encompassed site evaluation and selection, coordination with city management and the development of possible revenue plans. Prepared plans and specifications for highways, bridges and aircraft facilities. Performed field inspection of secondary bridges and generated reports regarding the integrity of the structures.

SCIENTIFIC ECOLOGY GROUP, INC.

MARION J. MITCHELL

PRINCIPAL PROJECT PLANNER

EDUCATION AND ASSOCIATED TRAINING

1977 Engineering Traffic, Greenville Tech, Greenville, SC
1983 Business courses, Idaho State University, Idaho Falls, ID

SUMMARY OF EXPERIENCE

Extensive management and administration of subcontracts and procurement of complex subcontracts for government and private sector construction and nuclear materials programs. In-depth knowledge of federal and DOE procurement regulations (including Standard Form 1332), cost or pricing data requirements, weighted guideline analysis profit, fee objectives, setting negotiation objectives, and conducting negotiations.

EXPERIENCE

1993 - Present Scientific Ecology Group, Inc.

Principal Project Planning Engineer

Responsible for the solicitation, negotiation and award of subcontracts. Administrative project support role in two Martin Marietta Energy Systems PRDAs to decontaminate and recycle carbon and stainless steel. Also involved in the DOE Fernald scrap metal and drum projects.

1991 - 1993 Westinghouse Savannah River Company

Principal Procurement Specialist

Responsible for administration of CPFF A-E subcontracts valued at approximately $200M. Responsible for negotiation of changes/claims/ schedule impact, contract interpretation, administration of cost accounting standards, cost analysis, evaluation/approval of progress payment requests. Conducted training seminars for technical and procurement personnel.

1989 - 1991 Chas. T. Main, Inc.

Purchasing Manager

Supervisory responsibility for staff of 10. Department was responsible for solicitation and award of approximately $15M in annual purchases for Savannah River. Department had total procurement responsibility (i.e., purchasing, expediting, supplier submittal and records retention). Developed departmental day-to-day operations procedure and procurement tracking system. Provided support and input to Manager of Purchasing relative to prime contract interpretation and administration. Participated in proposal preparation with emphasis on DOE projects.

1986 - 1989 Westinghouse Fernald

Senior Contract Administrator

Responsible for administration of CPFF A-E subcontracts valued at approximately $40M. Responsible for negotiation of changes/claims/ schedule impact, contract interpretation, administration of socio-economic program/goals, evaluation/approval of progress payment requests. Used DOE Standard Form 1332 as a checklist to ensure compliance with DOE regulations. Chairman of three source evaluation and selection boards two architect engineers using Brooks Bill selection process and one for site-wide telecommunications system.

1984 - 1986 Stearns Catalytic

Procurement Specialist I

Responsible for mechanical/structural piping buying. Assisted in preparation for CPSR audit. Responsible for coordination and interface for DuPont AES-DOE projects. Tracking and maintaining status of procurement requirements, reporting of project status, developed project procedures and implementation/training of same, liaison between client and SCC.

1980 - 1984 Catalytic, Inc.

Senior Subcontract Administrator

Responsible for DOE FAST Project HVAC, architectural, mechanical and piping contracts administration valued at approximately $30M. Responsibilities included contract interpretation, negotiation of change notices, correspondence, claim evaluations and settlements.

1974 - 1980 Celanese Plastics Company

Buyer and Traffic Manager

Maintenance buyer, research and development of required items. Transferred to expansion group purchasing major equipment, field construction materials, and construction subcontracts. Expedited and scheduled same items. Negotiated blanket orders for building materials, expendable construction materials, misc. electrical materials and service contracts. Promoted to traffic management with responsibility for purchasing packaging materials. Responsibilities included rate negotiations, import and export, scheduling and expediting shipments. Negotiated and implemented outside warehousing. Resolution of all transportation claims.

1973 - 1974 Catalytic, Inc.

Buyer II

Responsible for same as previous Catalytic employment. Additionally, worked on AGNS

contract as buyer of major equipment and instrumentation. Minimal negotiation of pricing agreements.

1972 - 1973 Miller Building Supply Company

Purchasing Agent

Coordinated warehouse deliveries with customers, inventory control, negotiation of contracts with various suppliers.

1968 - 1972 Catalytic, Inc.

Began as file clerk while in college. Promoted in 1969 to purchasing department as clerk responsible for all purchasing records, requisitions and purchase order logs, equipment order schedules and ledgers. June 1969, promoted to Assistant Buyer, Instrumentation Department, responsible for inquiring and purchasing of instruments for textile industries, expediting of orders, maintaining master instrument index, coordinating of engineering, purchasing and client efforts, status report, preparation of bid tabulations and soliciting of new vendors. August 1969, changed from buying instrumentation to major equipment items. Additionally, trained all purchasing clerks that came into the department. In October 1971, assumed additional responsibility for instrumentation buying.

CARL H. ROSS

EDUCATION AND ASSOCIATED TRAINING

Bachelor Work - Engineering - Shoreline Community College, Seattle, Washington, 1970-1972.
Technical Work - Metallurgy and Weld Inspection, Aiken Technical College, Aiken, South Carolina and various company sponsored training courses and seminars, 1970 - Present.

CERTIFICATIONS:

Certified Welding Inspector, American Welding Society (13 Years)
Qualified Lead Auditor (16 Years)
Inspection and NDE Qualifications

SUMMARY OF EXPERIENCE

Over 22 years Quality Assurance and Quality Control experience with over 17 years of that experience in the nuclear industry. Past responsibilities have included QA/QC supervision and management, auditing, inspection, and QA Program development. Routinely recognized for writing administrative and technical procedures. Authored a variety of QA programs and plans. Duties have also involved the overall management and responsibility for corporate audit systems.

Audit-related experience is coupled with essential technical competence and assessment skill obtained from over 16 years of comprehensive assignments. Among those most often performed were:

- audits of internal quality system practices and procedures;
- field audits of waste processing and radiological control projects (includes audits at over 25 commercial reactor facilities);
- audits of radioactive waste transportation systems;
- audits of the Barnwell Low-Level Radioactive Waste Disposal Facility;
- and external quality system survey and audits of suppliers.

Additionally, audit-related experience includes the development and administration of the company's audit program. Among the types of organizations audited were:

- code fabricators and machine shops;
- instrument manufacturers and calibration labs;
- testing laboratories;
- material suppliers;
- hazardous waste management sites;
- environmental chemistry analytical laboratories;
- radiochemistry laboratories;
- transportation companies;
- radwaste brokering service companies;
- and multi-disciplinary engineering services firms providing design; geotechnical, structural, and transportation engineering; environmental and waste management services; hydrological and hydraulic engineering; and materials testing services.

Experienced in the quality audit methodology, as well as the environmental audit approach encompassing risk assessment elements. Direct participation of an estimated 200 customer and regulator audits of company, Quality Assurance Program, and operational facilities and activities.

EXPERIENCE

1992 - Present Scientific Ecology Group, Inc., Oak Ridge, TN

Senior Quality Assurance Engineer/Project QA Manager

Responsible for quality planning, project interface, and adequate and effective implementation of quality assurance processes. Oversight of projects in a variety of applications including proposal preparation and review, project planning, quality audits, surveillances, and assessments.

1977 - 1991 Chem-Nuclear Systems, Inc.

6/90 - 10/91 **Manager of Audit Systems**

Responsible for the internal and external audit programs which have increased in scope from business expansion and development of new low-level radioactive waste disposal sites.

1987 - 6/90 **Director Quality Assurance**

Responsible for ensuring compliance with federal and state regulations; review of operating procedures and engineering drawings for compliance with specifications; performance of internal and external audit and surveillance programs; interface with customer and regulator organizations; management and training of quality assurance and quality control personnel

1984 - 1987 **Quality Assurance Audit Supervisor**

Responsible for developing, implementing, and executing the company's internal and external audit programs. Also responsible for key projects under the direction of the Director, Quality Assurance.

1978 - 1984 **Quality Assurance Inspector/Auditor**

Participated in the initial development of the company's Quality Assurance Program and implementing procedures. Also responsible for corporate inspection and audit functions. Experience included 1-1/2 years Quality Assurance and Quality Control activities at the company's Barnwell Low-Level Radioactive Waste Disposal Facility. Experience also included environmental audit and surveillance work at the company's Arlington, OR, hazardous waste facility (currently Chem-Security Systems, a Chem-Waste Management, Inc., facility).

1977 - 1978 **Radwaste System Operator**

Experience in the operation of the company's radioactive waste processing and transportation systems. Included was radiological control and protection training and experience.

1975 - 1977 Owens Corning Fiberglass

Quality Control Crewleader

Responsible for shift production quality and supervision of inspectors for the fabrication of sheetmetal, fiberglass and foam components for the Alaska Pipeline Project.

1973 - 1975 Pro-Con, Inc.

Quality Assurance Manager

Responsible for the production quality of remote valve actuator systems. Experience included precision machine part inspections.

1970 - 1973 Physio Control Corporation

Quality Control Inspector

Responsible for Receiving Inspection of components for electronic medical instruments.

DALE HEDGES

CORPORATE DIRECTOR, QUALITY ASSURANCE AND RELIABILITY

EDUCATION AND ASSOCIATED TRAINING

1950 BS, Industrial Education, Southern Illinois University
1955 MS, Industrial Education, University of Illinois
Post graduate courses in engineering statistics, accounting, time and methods study, and conflict management.

EXPERIENCE

1992 - Present Scientific Ecology Group, Oak Ridge, TN

Corporate Director, Quality Assurance and Reliability

As Corporate Director, Quality Assurance and Reliability, responsible for developing and implementing management systems to ensure that SEG products and services meet customer needs and expectations. Responsible for leading the SEG management effort to implement Total Quality Management principles and to attain the state of excellence necessary to win the George Westinghouse Total Quality Award. Serves on an EPA/DOE/ DOD committee to harmonize existing consensus quality assurance standards for use on waste management projects. Also serves on ASME committees for development and improvement of quality assurance standards.

1990 - 1992 Roy F. Weston, Inc.

Corporate Vice President and Corporate Quality Assurance Officer

Responsible for formulating corporate policies and procedures and coordinating the implementation of the corporate quality assurance process. Participated directly in the company's significant projects and provided training and consultation to other project management teams. Served as a corporate resource to the Chairman of the Board of Directors and regional and division managers in the implementation of the Total Quality Management concept throughout Weston.

Provided training and consultation services to states preparing to site and construct low-level radioactive waste facilities. Also was a consultant to the director of the Nuclear Regulatory Commission's Division of Low-Level Radioactive Waste Management and Decommissioning where he assisted in the preparation of quality assurance guidance documents and staff review plans. Co-authored NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal Facility" and NUREG-1383, "Guidance on the Application of Quality Assurance for Characterizing a Low-Level Radioactive Waste Disposal Site."

DALE HEDGES

1989 - 1990 Science Applications International Corporation

Department Manager

Managed a department responsible for scheduling and conducting surveillance and audits of the Department of Energy's Project Office (civilian radioactive waste management) and its major contractors. Provided reports assessing the adequacy of implementation of the department's quality assurance program were provided to the DOE.

1986 - 1989 CER Corporation

Geotechnical and Engineering Consulting Firm

As Corporate Director of Quality Assurance, managed all of CER's government and commercial quality assurance work. Maintained management overview of the CER quality assurance support provided to DOE to develop and implement a quality assurance program at DOE headquarters to meet industry standards and NRC licensing requirements for a high-level radioactive waste repository. Prepared the initial QA requirements and QA program description for the DOE Office of New Production Reactor. Prepared the initial QA program description and implementing procedures for the DOE Division of Waste Transportation Management. Provided QA support to the New York State Low-Level Radioactive Waste Commission's prime contractor.

1985 - 1986 Nuclear Regulatory Commission, Washington, D.C.

Senior Staff Engineer

Had oversight responsibility of DOE activities related to preparation for characterization of candidate sites for the nation's first high-level nuclear waste repository. Evaluated DOE quality assurance plans, procedures, and implementation for the salt, basalt, crystalline, and tuff projects. Prepared status reports and recommendations for the Nuclear Regulatory Commission.

1976 - 1985 Clinch River Breeder Reactor Project

A DOE Project to License and Operate a Breeder Reactor

Directed the quality assurance program for the Clinch River Breeder Reactor Project Office (CRBRP) and its prime contractors throughout the design, developmental testing, fabrication, and construction readiness of the nation's first on-line breeder reactor demonstration plant. Responsible for devising, directing and ensuring effective execution of the project's quality assurance program to meet federal laws and industry codes and standards. Directed the development and implementation of readiness review, audit, and surveillance techniques. Assisted in the licensing process, ensured that licensing requirements were addressed, and that licensing commitments were met. Represented the CRBRP Office and its contractors on quality assurance matters to the NRC and served as an expert witness during NRC hearings for a construction permit. Supervised a staff of 20 professional and clerical personnel.

DALE HEDGES

1966 - 1976 EG&G, Inc.

DOE Nevada Test Site Support Contractor

Initial assignment was to establish a quality assurance program to meet NASA requirements. Later promoted to Director of Technical Support with responsibility for quality assurance, environmental measurements, electronics and mechanical fabrication, health physics, plant maintenance, radiation detector fabrication, program management, and technical management training. Directed five departments comprised of more than 130 professional and supervisory staff. Later served as Director of Safety and Manager of Administration. In the capacity of Director of Safety, directed the development of a safety program to meet OSHA standards.

1962 - 1966 Honeywell, Inc.

Design and Fabrication of Guidance Systems

Supervised quality assurance and reliability program managers who interpreted and implemented reliability and quality assurance requirements to meet contractual and corporate requirements. Analyzed overall quality and reliability assurance effectiveness and recommended needed changes. Interfaced with approximately 20 customer representatives stationed in the manufacturing and test facilities.

1960 - 1962 Lockheed Space and Missile Company, Sunnyvale, CA

Fabrication and Testing of Space Vehicles

As Supervisor of Statistical Quality Control, established and maintained process controls and control charts in electronic fabrication, machine shops, welding, electro-mechanical fabrication, and final missile assembly. Analyzed process and assembly problems and recommended corrective measures. Made weekly presentations to the manufacturing division directors and their staffs to provide the status of quality and to alert them of potential problems.

1957 - 1960 Magnavox, Urban, IL

R&D - Timing and Arming Devices for Classified Weapons

As Supervisor of Industrial Engineering, responsible for tooling, assembly planning, inspection methods, cost estimating and pilot line operation on production engineering contracts. Designed and documented mass production tooling, machinery and plant layouts for weapons and arming devices. Supervised technicians and inspectors during pilot-line operations.

1956 - 1957 Resolved tooling and methods problems during production engineering pilot runs and determined production tooling equipment, methods and layout for mass production of weapons and arming devices. Prepared and made oral presentations of program status to clients.

DALE HEDGES

1951 - 1956 Chanute Air Force Base, Rantoul, IL

Flight Engineer Instructor

Taught courses in flight engineering, flight simulator operation and repair, and instructor training. Students were U.S. and foreign officers.

MEMBERSHIPS

- American Society of Mechanical Engineers; Member-Decommissioning Working Group and Waste Management Working Group
- American Nuclear Society member
- American Society of Quality Control
- 1985, Technical Chairman, 12th Annual ASQC National Energy Division Conference
- 1986, Vice Chairman, 13th Annual ASQC National Energy Division Conference
- 1986/1987, Technical Chairman, 1st & 2nd ASQC Waste Management Conference
- 1987, Conference Chairman, 14th Annual ASQC National Energy Division Conference
- 1988, Executive Committee Member, 15th Annual ASQC National Energy Division Conference
- 1989, Conference Chairman, 3rd Annual ASCQ International Waste Management Conference
- 1991, Conference Chairman, 4th Annual ASQC International Waste Management Conference
- 1992, Conference Chairman, 5th Annual ASQC International Waste Management Conference
- Member ASME Working Group for Decommissioning of Nuclear Facilities
- Member ASME Working Group for Low-Level Radioactive Waste Management
- Member EPA Committee to Revise QA Requirements for Environmental Restoration Projects (Combining NQA-1 and QAMS 005/80)

PUBLICATIONS

"How Does One Develop the 'Right' Quality Assurance Program for Waste Management Projects?" proceedings of the 1988 DOE Model Conference, October 1988

"How Does One Determine if the QA Program Design for a Low- or High-Level Radioactive Waste Program will be Acceptable to the NRC?" proceedings of the Waste Management '88 Conference, March 1988

"What is the Role of a Project or Program Manager in Implementing and Maintaining and Quality Assurance Program?" proceedings of the Waste Management '89 Conference, March 1989

"Lessons Learned in the Application of Quality Assurance Principles to Radioactive Waste Management Practices," accepted for presentation at the First International Mixed Waste Symposium in Baltimore, MD, August 26-29, 1991

JAMES D. GOODPASTURE, CIH

INDUSTRIAL HYGIENE AND SAFETY MANAGER

EDUCATION

1985 M.P.H., Occupational Health and Safety, University of Tennessee
1978 BS, Biology, David Lipscomb College

SUMMARY OF EXPERIENCE

Mr. Goodpasture has more than 14 years of experience in the health and safety field including managing and implementing safety policies and programs, developing solutions to safety concerns, interfacing with regulatory agencies, and coordinating site regulatory compliance with regard to safety. He also has experience ensuring compliance with regulations regarding air pollution and hazardous waste.

EXPERIENCE

1992 - Present Scientific Ecology Group, Inc.

Industrial Hygiene and Safety Manager

Manages and implements corporate safety policies, develops and implements health and safety programs, and develops plans and procedures for solutions to accident and loss producing conditions. Other responsibilities include evaluating job safety analysis, employee exposure monitoring, maintaining regulatory compliance and interfacing with regulatory agencies, evaluating safety and health training, reviewing accident reports and investigations, and acting as site emergency coordinator. Coordinates regulatory compliance with federal, state, and local water discharge and waste water standards and permit requirements. Assists in maintaining company compliance with air pollution, hazardous waste, and radiological safety standards.

1987 - 1992 Law Engineering, Inc.

Hazardous Materials Department Manager/Health and Safety Officer

Provided industrial hygiene consulting services for recognition, evaluation and control of environmental factors impacting worker health and welfare. Performed employee exposure sampling for airborne contaminants, noise surveys, dosimetry testing and physical and health hazard evaluations. Developed assistance programs, such as operations and maintenance plans, hazard communication, respiratory protection, and safety programs. Assisted in providing indoor air quality evaluation for commercial building owners, schools and institutions. Evaluations involved risk assessments for airborne hazards and building mechanical systems examination. Broad experience in addressing building survey and evaluation, as well as sampling of various building materials for asbestos and lead content. Served as Project Manager on several asbestos and lead abatement projects and managed abatement projects of various durations.

JAMES D. GOODPASTURE

Performed air monitoring inside and outside of abatement work areas to determine respiratory protection compliance, the possible escape of hazardous materials from the enclosed work area, and final clearance/reoccupancy testing.

1979 - 1987 State of Tennessee, Department of Health and Environment

Environmental Specialist

Responsibilities involved inspection of air contaminant sources and enforcement of state air pollution control rules and regulations. Also performed air source permitting, stack testing, visible emission evaluations, and complaint investigations. Operated and maintained continuous air monitoring instruments for several types of air pollutants including sulfur dioxide, ozone, nitrogen oxides, and particulates. Performed residential air sampling for asbestos, formaldehyde, and chlordane and projects including joint participation with personnel from the State Solid Waste Management and Water divisions and the Occupational Safety and Health Administration.

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Westinghouse

Annual Report 1992

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Westinghouse Electric Corporation is a world leader in the development of advanced products and services for governmental, industrial and commercial applications. The Corporation's activities are centered on three technology-driven businesses—power systems, electronic systems and environmental services—as well as on its historically successful businesses in transport temperature control and broadcasting. Here are their main components:

Power Systems

Fossil and nuclear power systems and plants, nuclear fuel, process control systems, superconducting magnets, alternative energy systems and naval nuclear power systems.

Electronic Systems

Military and commercial electronic systems, including airborne and ground-surveillance radar, as well as systems for electronic warfare, anti-submarine warfare, space sensors, information services, logistics and support, home security and postal applications.

Environmental Services

Handling and treatment of hazardous waste, emissions monitoring and control, management of government-owned facilities and waste-to-energy plants.

Transport Temperature Control

Refrigeration for trailers, trucks, railcars and seagoing containers; bus and railcar air conditioning; and vehicle and cargo heating. (These operations of the subsidiary Thermo King Corporation are grouped with Industry Products and Services in the redefined "Industries" segment in the financial section of this annual report.)

Broadcasting

Sixteen radio and five television stations, television production and syndication, cable programming and distribution, and satellite and telecommunications services.

Financial Highlights

(in millions except per share amounts)

	1992	1991	1990	1989	1988
Sales and operating revenues from Continuing Operations	$ 8,447	$ 8,490	$ 8,646	$ 8,921	$ 9,057
Operating profit	747	598	1,073	652	832
Other income and expenses, net	(22)	(12)	152	510	91
Income from Continuing Operations	348	265	746	706	480
Net income (loss)	(1,291)	(1,086)	268	922	823
Common Share Data:					
Earnings per share from Continuing Operations	$ 0.93	$ 0.84	$ 2.54	$ 2.41	$ 1.65
Earnings (loss) per share	(3.81)	(3.46)	0.91	3.15	2.83
Dividends	0.72	1.40	1.35	1.15	0.96
Book value at end of year	6.77	11.07	13.44	15.13	13.19
Market price at end of year	13⅜	18	28½	37	26⅝
Shares outstanding at end of year	346	339	290	290	288
Other Financial Information:					
Capital expenditures	$ 229	$ 293	$ 328	$ 353	$ 359
Depreciation and amortization	270	284	284	307	294

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Westinghouse is also engaged in non-strategic businesses that have been earmarked for divestiture. These businesses are financial services, office furniture, community land development, electrical distribution and control equipment, and wholesale distribution of electrical products.

Results from Continuing Operations

Sales and Operating Revenues

(in millions)

	1992	1991	1990
Power Systems	**$ 2,849**	$ 2,651	$ 2,443
Electronic Systems	**2,874**	3,245	3,200
Environmental	**643**	600	657
Industries	**1,327**	1,282	1,342
Broadcasting	**853**	832	858
Divested and Other	**77**	70	331
Intersegment Sales	**(176)**	(190)	(185)
Sales and Operating Revenues	**$ 8,447**	$ 8,490	$ 8,646

Operating Profit

(in millions)

	1992	1991	1990
Power Systems	**$ 280**	$ 258	$ 329
Electronic Systems	**221**	207	337
Environmental	**71**	(4)	81
Industries	**87**	90	168
Broadcasting	**160**	133	187
Divested and Other	**(72)**	(86)	(29)
Operating Profit	**$ 747**	$ 598	$ 1,073

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GARY M. CLARK
President
Acting Chief Executive Officer

RICHARD M. MORROW
Chairman of the Board

Fellow Shareholders:

NINETEEN NINETY-TWO was a turbulent year for Westinghouse.

The impact of the continuing problems in the real estate and overall financial services markets forced us to take large write-offs, eliminate some 5,000 jobs and cut the dividend.

These actions followed a painstaking re-evaluation of the Corporation's financial structure, its business portfolio and its competitive position in all its markets around the world. That assessment convinced your Directors that only a new comprehensive plan would finally extricate us from the financial services situation and put us on a course designed to increase value to shareholders.

On the pages that follow, we'll review the steps we've taken to change our course and strengthen our base of businesses. We'll introduce a new Westinghouse—its structure and its capabilities—on the path to better performance, growth and enhanced value for its owners.

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Significant Changes

Our 1992 financial results will be more meaningful after a brief summary of the changes that were made in our financial structure, our management organization and our governance and the reasons for them.

The modifications to our financial structure were most significant. They centered on a decision to exit the financial services business, to divest certain other businesses and to refocus the Corporation on five key areas: power systems, electronic systems, environmental services, transport temperature control and broadcasting.

These are all areas where we are strong competitors and where we have the capabilities to achieve sustainable success in world markets.

Reluctantly, we identified the Distribution and Control Business Unit, Westinghouse Electric Supply Company, The Knoll Group and Westinghouse Communities for divestiture. The sale of these businesses, which we have determined are not essential to our long-term strategy, will help to strengthen the Corporation's financial position. We are seeking buyers who recognize the strengths of these businesses and who will serve the best interests of their employees and customers.

Another element of our financial restructuring was the segregation of financial results of Westinghouse Financial Services, Inc. (WFSI), and the businesses to be divested from those of the continuing businesses through the application of Accounting Principles Board Opinion 30 (APB 30). This will make it easier for investors to track the financial performance of our continuing businesses.

As part of the formal plan adopted by management and the Board of Directors to sell the assets of WFSI over a three-year period, a pre-tax charge of $2.65 billion was recorded against fourth-quarter 1992 earnings.

All of the actions we are taking should provide enough funds to retire more than $6 billion of debt.

Management and Board Changes

In January 1993, Paul E. Lego, the thirteenth chairman of Westinghouse, retired. His distinguished career with the Corporation spanned three decades and his dedication to Westinghouse, especially during the critical past two and a half years, was unfailing. The undersigned—Richard Morrow and Gary Clark—will serve as Chairman of the Board and as President and Acting Chief Executive Officer, respectively. Gary Clark was also elected to the Board.

Dr. Paula Stern, president of The Stern Group of Washington and former Chairwoman of the International Trade Commission, joined the Board in 1992. Her extensive trade and government experience provides Westinghouse with an important resource.

Also during the year, Theodore Stern retired and Barbara Franklin resigned when she was appointed U.S. Secretary of Commerce under the Bush Administration. Both provided exemplary service to the Corporation.

In a set of important corporate governance reforms, the Westinghouse Board of Directors eliminated the Corporation's Shareholder Rights Plan, commonly referred to as a "poison pill" defense

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against a takeover, and adopted a series of bylaw changes. In redeeming the "rights" previously issued under the Plan, Westinghouse was obligated to make payments to shareholders of one-half cent per share.

The changes to the bylaws center on the way your Board operates. A new nominating and governance committee consisting only of outside directors is responsible for nominating new Board members. In addition, the new bylaws require that all directors be elected annually (after their current terms expire) and that all voting on proxy resolutions be kept confidential. The new provisions reaffirm that the majority of the Board will continue to be independent outside directors and that members of the Board's compensation committee will continue to be outside directors.

Financial Results

With this explanation of our changes as background, we will review our 1992 financial results.

Westinghouse recorded a net loss for the year due to the actions associated with exiting the financial services business and the adoption of two new accounting standards in the first quarter.

Net income from continuing operations—the "new" Westinghouse—in 1992 was $348 million or 93 cents per share on revenues of $8.447 billion. This compares with 1991 net income of $265 million or 84 cents per share on revenues of $8.490 billion. For the year, operating profit was $747 million with an operating profit margin of 8.8 percent. This compares to operating profit in 1991 of $598 million with an operating profit margin of 7.0 percent.

For 1992 the net operating loss from discontinued operations was $21 million or a loss of six cents per share. The estimated net loss for disposal of discontinued operations was $1.280 billion for a combined net loss of $1.301 billion or a loss of $3.76 per share. This compares with a net loss for 1991 of $1.351 billion or a loss of $4.30 per share.

Two new accounting standards adopted in the first quarter of 1992—SFAS 106 "Employers' Accounting for Postretirement Benefits Other Than Pensions" and SFAS 109 "Accounting for Income Taxes"—resulted in a net charge of $338 million or 98 cents per share. Including the results of both continuing and discontinued businesses, the Corporation's net loss for 1992 was $1.291 billion or a loss of $3.81 per share, compared with a net loss in 1991 of $1.086 billion or a loss of $3.46 per share.

Growth Opportunities

Looking to the future, what are Westinghouse's prospects?

With our restructuring, we've taken decisive action to concentrate our resources on businesses that over the longer term will provide the maximum value to shareholders. These are markets we understand, serving customers we know, involving technologies where we are strong.

We are already established competitors in these markets, domestically and internationally. Each of these businesses offers opportunities for sustained long-term growth.

Let's look at each of these businesses.

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Power Systems

Exciting opportunities exist in Westinghouse's power systems business, in which we build, equip, and service power plants. With sales in 1992 of $2.85 billion, 39 percent of which were international, and a backlog of nearly $4.5 billion, this business has grown 44 percent in just three years.

Our key markets in Power Systems are driven by demand for electricity. In the U.S., this demand is forecast to increase by more than 2 percent a year, which means utilities will require that much more capacity. We expect industry orders of up to 120,000 megawatts of new capacity over the next ten years.

The power generation segment has demonstrated exceptional strength—sales for our power projects and generation equipment and services have grown in five years from $700 million to $1.7 billion. Even in the sluggish 1992 economy, our power generation unit sold 3,600 megawatts of new power generation capacity — an improvement over 1991 performance.

The international market, in which we are well-placed, is four times the size of the U.S. market. We made significant inroads into the world market in 1992 in both the power generation and energy systems segments.

During the year, 45 percent of our power generation orders were international. Our strategic alliances with Mitsubishi, FiatAvio and 12 other companies contribute to our strong international position. Westinghouse strengthened its global alliance network in 1992 when we established a multi-faceted technical and commercial agreement with Rolls-Royce, plc.

Today, 38 global alliances substantially expand our market access and technology base.

Our energy systems unit made good progress in Central Europe by winning competitions to supply $350 million of fuel and control systems for the Temelin nuclear power plants under construction in the Czech Republic. Negotiations for these contracts are continuing.

The unit also won the majority of $150 million in funding from major utilities and the Department of Energy for the completion of first-of-a-kind engineering on advanced nuclear plants. This accomplishment demonstrates support by U.S. and international utilities for maintaining the nuclear option and shows their enthusiasm for the advanced passive technology of Westinghouse's AP600 design.

Both the power generation and energy systems units are number one or two in every market they serve; both are at the leading edge of the technologies, products and services offered industry-wide; and both are well-positioned for continued success.

Electronic Systems

With 1992 sales of over $2.87 billion and a backlog of nearly $4 billion, our electronic systems business remains a world leader in airborne and ground-based surveillance radar and other high-technology defense systems.

The group continued to adjust its portfolio of businesses during 1992, divesting the Electrical Systems and Copper Laminates divisions and acquiring three excellent small businesses for key non-defense growth areas. These divestitures contributed to lower 1992 sales compared to 1991.

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The electronic systems business continued its strategy to strengthen its commercial electronics operations while maintaining its defense market share. Key awards in mobile satellite communications, transportation management systems, and international air traffic control help to position the group for the key infrastructure projects of the 1990s.

In the defense arena, Electronic Systems won several major contracts during the year, including the AN/SQQ-89 Antisubmarine Warfare System for surface ships, weather radars for the Lockheed C-130, and several major classified development programs. The business plans to continue its diversification strategy to reach a 50 percent non-Department of Defense business mix in the mid-1990s.

Electronic Systems' expertise is directly applicable to a wide spectrum of non-defense needs in the commercial and civil markets. Currently, we're channeling this expertise into related electronic markets: aircraft systems, airspace management, law enforcement, security systems, transportation management, and information systems. An additional focus is on emerging systems, which includes such diverse and exciting pursuits as developing power and control systems for pollution-free electric vehicles.

In conjunction with these diversification initiatives, Electronic Systems is also increasing its global penetration and international presence by establishing strategic positions and joint ventures throughout the world. With several such positions already established, these alliances serve as platforms from which to grow both commercial and defense electronics businesses. This strategy will enable Electronic Systems to respond more quickly to international opportunities and to become a global enterprise in the 1990s.

Environmental Services

Westinghouse also has excellent potential in the growing $21 billion world environmental services market. With 1992 sales of $643 million in this business, we're becoming a leading competitor in the high-value, high-growth segments of the environmental market.

Already a leader in remediation and hazardous-waste treatment, Westinghouse achieved important milestones in its environmental business in 1992, including the start-up of a 70,000 ton-per-year hazardous waste incinerator near Salt Lake City. This new facility, combined with our existing 30,000 ton-per-year plant in Coffeyville, Kansas, gives us the capacity to process almost 15 percent of the contaminated bulk solids and soils which must be incinerated every year in the U.S.

We also took action to further expand our participation in this profitable, fast-growing industry. In July, Westinghouse acquired Florida First Processing, Inc., which plans to build and operate a 40,000 ton-per-year incinerator in Polk County, Florida, and we announced plans in December to seek permits for an additional 70,000 ton-per-year incinerator at our existing site in Kansas.

We're also a leader in the nuclear waste services business. Westinghouse owns and operates the only incinerator in the U.S. permitted to burn low-level radioactive waste.

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The government-owned sites we operate for the U.S. Department of Energy are another important part of our environmental business. These include the Savannah River Company, Westinghouse Hanford and three other operations. In managing these sites, we gain significant research and development opportunities—which may be used commercially—with minimal investment.

But global participation is key to our success in the environmental business. We took an important step in this direction in 1992 by winning a contract for the design and start-up of Eastern Europe's first low-level radioactive waste processing facility at a power plant near Sofia, Bulgaria.

Because every country has different environmental regulations and enforcement efforts, further moves into the global marketplace will require special attention to each customer's particular needs. Westinghouse offers the kind of dedication to the customer that will win our environmental business—and the rest of the Corporation—tremendous opportunities for growth.

Transport Temperature Control

Thermo King Corporation produces equipment used to control the temperature inside trucks, trailers, seagoing containers, buses and trains during transit. It is the world leader in transport temperature control.

With 14 plants in eight countries—including the newest ones in the People's Republic of China and the Czech Republic—and international sales representing about one-half of its business, Thermo King is a model of a global corporation.

To achieve this success in the international markets, Thermo King has focused on strategic alliances that expand its distribution and service, enhance its manufacturing or technology, or give it a local presence in a new or difficult market. In creating 18 such alliances in less than a decade, Thermo King has been able to build on these partnerships and use them to achieve competitive advantage.

The company's alliance with Frigicoll of Spain offers a good example of the effectiveness of this strategy. The initial agreement in 1984 resulted in Thermo King obtaining a broad range of small truck refrigeration products and, more significantly, an important distribution and service network in Spain. By using that network and building on its presence in that country, Thermo King has achieved a competitive edge.

This same strategy is facilitating the company's expansion into the emerging markets of the Far East and Eastern Europe. Through an alliance with two Chinese companies, Thermo King has established a distribution network and has begun construction of a manufacturing facility to be completed in 1993.

By obtaining a majority stake in an alliance with Frigera of the Czech Republic, the largest supplier of transport refrigeration products in the region, Thermo King has gained access to an existing factory, low-cost manufacturing capability, a highly skilled work force, a strong research center and a historical trade relationship with the republics of the former Soviet Union.

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Broadcasting

In broadcasting, Westinghouse is a highly profitable communications and entertainment company with strong market positions.

Our five Group W television stations reach 10 percent of all U.S. viewers. In 1992, those stations grew operating profit more than 22 percent over the prior year. Our 16 radio stations—eight of them in top ten markets—make Westinghouse the largest non-network radio broadcaster in the U.S.

The recent action by the Federal Communications Commission to increase the number of radio stations one firm can own gives us even more growth opportunities.

Group W Satellite Communications, our cable programming, marketing and satellite transmission business, has established strong franchises in country music and regional cable sports, and is the recognized industry leader in providing technical services to the cable and broadcast industries.

Our syndicated programming entity, Group W Productions, distributes several new, creative programs including "Vicki!" starring Vicki Lawrence. We also hold an equity position in Castle Rock Entertainment, producers of the popular television show "Seinfeld" and the hit movie "A Few Good Men."

Westinghouse Communications, the company's telecommunications service business, provides local area networks, data networks, and long-distance telephone services to Westinghouse and other businesses. It grew dramatically during the year, nearly doubling its non-Westinghouse client base.

Smaller But Stronger

It's difficult in this quick overview to do more than highlight the strengths of the businesses that will make up the new Westinghouse. The decision to divest four solid businesses was difficult to make, but we are convinced it reflects the best option available.

What will remain after the exit from financial services and the divestiture of the discontinued businesses will be a smaller but stronger corporation with the financial, technological and human resources needed to excel in all its markets.

During the pivotal year of 1992, we laid the groundwork for a better Westinghouse. But there's much work still to be done.

On the long road ahead, we will be guided and motivated by three ideals: to maintain the loyalty of our customers with quality goods and services; to renew the confidence of shareholders through improved financial performance; and to build on the commitment of the talented men and women of Westinghouse, who remain our most valuable asset.

Richard M. Morrow

Richard M. Morrow
Chairman of the Board

Gary M. Clark

Gary M. Clark
President and Acting Chief Executive Officer

February 25, 1993

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Management's Discussion and Analysis

Overview

In November 1992, the Board of Directors of the Corporation adopted a financial and strategic plan to refocus the Corporation on five key businesses. These key businesses, which are reflected in the financial statements as Continuing Operations, are Broadcasting, Electronic Systems, Environmental, Transport Temperature Control and Power Systems.

As part of this strategy, the Corporation will exit the financial services business through the disposition of assets of its financial services unit. In addition to exiting financial services, the Corporation will divest the following other non-strategic operations: Distribution and Control Business Unit, Westinghouse Electric Supply Company, The Knoll Group and Westinghouse Communities, Inc. The Corporation expects to use the net proceeds of these sales primarily to reduce debt.

The Corporation reported a net loss of $1,291 million for 1992 or a loss of $3.81 per share. The net loss in 1991 was $1,086 million or a loss of $3.46 per share, and net income in 1990 was $268 million or $0.91 per share. Included in 1992 results was an after-tax charge of $1,280 million to record the estimated loss on the disposal of the discontinued businesses. This charge was the result of the Corporation's announced plan to exit the financial services business and divest the non-strategic business units. The components of this charge, including a $2,350 million pre-tax valuation provision at the financial services unit, are discussed below. Until these businesses are sold, they will be accounted for as discontinued operations under the provisions of Accounting Principles Board Opinion No. 30 (APB 30).

Income from Continuing Operations was $348 million or $0.93 per share for 1992, $265 million or $0.84 per share for 1991, and $746 million or $2.54 per share for 1990. The loss from Discontinued Operations was $1,301 million or $3.76 per share for 1992, $1,351 million or $4.30 per share in 1991, and $478 million or $1.63 per share in 1990. See note 2 to the financial statements.

Also included in 1992 results is the adoption in the first quarter of 1992 of Statement of Financial Accounting Standards (SFAS) No. 106, "Employers' Accounting for Postretirement Benefits Other Than Pensions," concurrently with the adoption of SFAS No. 109, "Accounting for Income Taxes." The adoption of these standards resulted in a net charge of $338 million or $0.98 per share. See notes 1 and 4 to the financial statements for a discussion of SFAS No. 106 and notes 1 and 5 for a discussion of SFAS No. 109.

Valuation provisions at the financial services unit of $1,680 million and $975 million, before provisions for taxes, were recorded in 1991 and 1990, respectively. See Discontinued Operations below for a discussion of these valuation provisions. Also included in 1991 results was a $160 million pre-tax charge for a corporate-wide workforce reduction, $22 million of which relates to discontinued businesses. See note 21 to the financial statements.

Sales and operating revenues from Continuing Operations were $8,447 million in 1992, $8,490 million in 1991, and $8,646 million in 1990. Sales and operating revenues in 1992 remained relatively level compared to 1991 as some of the Corporation's businesses continued to experience weak markets, while others experienced strengthening in their markets. Because of lower-than-expected order rates, the results for the first quarter of 1993 may be below those for the same period in 1992. The Corporation's objective for Continuing Operations is to have improved operating results for the full year of 1993 compared to the operating results of 1992, with improvement occurring in the second half of 1993.

The Corporation's Board of Directors reduced the quarterly dividend on Westinghouse common stock from $0.18 per share to $0.10 per share at a November 1992 meeting.

Discontinued Operations

Discontinued Operations consists of Financial Services and Other Operations. Financial Services is comprised primarily of Westinghouse Credit Corporation (WCC) and Westinghouse Savings Corporation (WSAV), each subsidiaries of Westinghouse Financial Services, Inc. (WFSI), and the Corporation's leasing portfolio. WSAV sold Westinghouse Federal Bank, whose assets represented the substantial majority of WSAV's assets, in January 1993. Other Operations includes the Distribution and Control Business Unit, Westinghouse Electric Supply Company, The Knoll Group and Westinghouse Communities, Inc.

In November 1992, the Board of Directors adopted a strategy that entails, over a three year period, exiting the financial services business through disposition of assets, the divestiture of other non-strategic businesses and the use of the net proceeds primarily to reduce debt. These operations will be accounted for in accordance with APB 30.

As a result of this action, the Corporation recorded, during the fourth quarter of 1992, a pre-tax charge of $1,914 million. This pre-tax charge consists of $2,350 million for an addition to the valuation allowance for Financial Services portfolios, $300 million for estimated losses from operations for Financial Services during the phase-out period, and $180 million for restructuring charges related to the change in corporate strategy. These charges were partially offset by an estimated $400 million gain from the disposition of other non-strategic businesses and an estimated $516 million of earnings from those operations during the phase-out period. Income tax benefits totalling $634 million were recorded in connection with this plan. The after-tax estimated loss on disposal of Discontinued Operations was $1,280 million.

The addition to the valuation allowance for Financial Services portfolio investments reduced the carrying value of those investments to reflect valuations consistent with the asset disposition strategy. Under the Corporation's previous strategy of downsizing Financial Services over a period of up to five years and holding certain assets for the long term, the methods used to value assets resulted in higher asset values net of valuation allowances.

Since the estimated loss on disposal of Discontinued Operations consists of the addition to the valuation allowance, estimated future results of operations and sales proceeds to be obtained from the discontinued businesses, as well as estimates as to the timing of the divestitures and assumptions regarding other relevant factors, this estimated loss may require adjustment to reflect changes in any of the constituent elements, which may be affected by adverse economic, market or other factors beyond what is anticipated at this time.

The Board of Directors November 1992 decision, based on management's recommendations, was the culmination of management's comprehensive review and evaluation of alternatives to the then current strategy of downsizing Financial Services over a period of up to five years and holding certain assets for the long term, undertaken concurrently with its review of all of the Corporation's businesses to determine how best to position the Corporation for the future. The review and evaluation of Financial Services was undertaken due to the continuing adverse conditions in the economy, declining margins and yields in Financial Services portfolios, the lack of liquidity in markets in which Financial Services customers operate and Financial Services experience in disposing assets pursuant to its then current strategy.

The strategy to downsize Financial Services commenced in February 1991. At that time, the Board of Directors adopted a strategy which entailed downsizing the financial services business and reducing its exposure to underperforming and higher risk assets. That decision was based on continuing deterioration in the U.S. economy and weakness in several of the markets in which Financial Services customers operate. As a result of that decision, assets totalling $3,381 million were classified as held for sale or restructuring. To reflect the decline in the then estimated net realizable value of those assets, a pre-tax valuation provision of $975 million was recognized in the fourth quarter of 1990.

Through September 1991, Financial Services made significant progress in disposing high-yield marketable securities, however, experienced only limited progress in liquidating or restructuring real estate and corporate financing assets. The real estate and highly leveraged corporate financing markets continued to weaken and suffered from a lack of liquidity for refinancing. This lack of liquidity, coupled with a national oversupply of commercial real estate properties and the prolonged recession, contributed to increased loan defaults and further depressed property and asset values. Financial Services portfolio investments were similarly adversely affected.

In response to these conditions, management identified $3,140 million of additional assets for classification as held for sale or restructuring at September 30, 1991. To reflect the worsened markets and credit liquidity problems and management's experience in liquidating or restructuring assets held for sale or restructuring, a $1,680 million pre-tax valuation provision was recorded primarily to reduce the carrying values of assets held for sale or restructuring. This valuation provision assumed an orderly liquidation of the identified assets over a reasonable marketing period, which in some cases could be as long as five years.

Results of Operations

Continuing Operations

1992 Versus 1991

The Corporation has realigned its Continuing Operations into five segments for reporting purposes. The Broadcasting, Electronic Systems and Power Systems segments remain essentially unchanged. The Industries segment is now comprised of the transport temperature control business and industry products and services, which includes motors and engineering and repair services. The Environmental segment includes toxic, hazardous and radioactive waste services, waste-to-energy plants and management and operation of several government-owned facilities. Segment information for 1991 and 1990 has been restated to reflect these changes. See note 21 to the financial statements for a discussion of the business activities of each segment.

The 1991 results for Continuing Operations included a pre-tax charge of $138 million for the corporate-wide workforce reduction. Each segment was impacted by this charge in 1991.

Revenues for Broadcasting increased 3% in 1992 compared to 1991 primarily due to increased revenues in Group W Satellite Communications and Westinghouse Communications. Operating profit for the year increased 20% compared to 1991 primarily due to cost reductions in television and radio and volume increases in Group W Satellite Communications and Westinghouse Communications. Included in 1991 operating profit was $8 million of workforce reduction costs. Excluding that amount, operating profit increased 13% in 1992 compared to 1991.

Revenues for Electronic Systems decreased 11% in 1992 compared to 1991 due to to the termination settlement received in 1991 for the A-12 program cancellation, the 1992 divestitures of Electrical Systems and Copper Laminates divisions and lower Department of Defense (DoD) volume. Operating profit increased 7% in 1992 compared to 1991 due to lower workforce reduction charges and other cost improvements in 1992. In October 1992, Electronic Systems announced a workforce reduction to adjust for the DoD budget decline. Operating profit for 1992 reflects a $35 million

charge for that workforce reduction, compared to a $69 million charge included in 1991 for the Electronic Systems portion of the corporate workforce reduction. Excluding the workforce reduction charges in both years, operating profit decreased 7% in 1992 compared to 1991.

Electronic Systems business is influenced by changes in the budgetary plans and procurement policies, including the effects the change in administration may have on any such policies, of the U.S. government. Until budget measures are actually executed, it is difficult to predict the effect on the segment. However, the proposed reduction in the DoD's 1993 fiscal year budget is not expected to have a material adverse effect on this segment's business. In 1992, non-DoD revenues were 27% of total revenues of Electronic Systems.

Environmental revenues increased 7% in 1992 compared to 1991 due to increased volume in the incineration business. The $71 million operating profit for 1992, compared to a $4 million operating loss in 1991, was due to the absence of cost overruns in the waste-to-energy business, increased revenues in the incineration business and higher operating results at the government-owned facilities. Included in the 1991 operating loss was $9 million of workforce reduction costs.

Revenues for Industries increased 4% in 1992 compared to 1991 as higher revenues from a stronger domestic truck and trailer market were partially offset by lower revenues in industry products and services, which continues to be impacted by weak markets. Operating profit decreased 3% in 1992. Included in 1991 operating profit was $15 million of workforce reduction costs. Excluding that amount, operating profit decreased 17% in 1992 compared to 1991 as continued weak performance in industry products and services offset improvements in transport refrigeration.

Power Systems revenues increased 7% in 1992 compared to 1991 as power generation projects sales increased. These increases were partially offset by lower licensee income and reduced shipments of manufactured products. Operating profit increased 9% in 1992 compared to 1991. Included in 1991 operating profit was $22 million of workforce reduction costs. Excluding that amount, operating profit was flat for 1992 compared to 1991 due to an unfavorable mix of products sold.

1991 Versus 1990

Broadcasting revenues for 1991 decreased 3% compared to 1990. This decline was due primarily to a drop in television advertising revenue caused by the Persian Gulf War and the recession. The decrease in television advertising revenues was partially offset by increased revenues at Group W Productions and Group W Satellite Communications. Operating profit for 1991 declined 29% compared to the 1990 level due primarily to the reduced levels of television advertising. Included in 1991 operating profit was $8 million of workforce reduction costs. Excluding that amount, operating profit decreased 25% in 1991 compared to 1990.

Electronic Systems revenues increased 1% in 1991 compared to 1990 due principally to the termination settlement on the A-12 aircraft program in 1991. Operating profit declined 39% from 1990 due to lower margins, resulting from an unfavorable sales mix in government production and development contracts and higher strategic costs incurred to expand the non-DoD business. Also included in 1991 operating profit was $69 million of workforce reduction costs. Excluding that amount, operating profit decreased 18% in 1991 compared to 1990.

Environmental revenues decreased 9% in 1991 compared to 1990 due to depressed economic conditions. The $4 million operating loss in 1991, compared to an operating profit of $81 million in 1990, was due to reduced sales and construction delays and cost overruns in the waste-to-energy business. Included in the 1991 operating loss was $9 million of workforce reduction costs.

Industries revenues decreased 4% in 1991 compared to 1990 due to depressed U.S. economic conditions partially offset by increased European revenues in transport refrigeration. Operating profit decreased 46% due principally to reduced volume in industry products and services and an unfavorable mix of sales in transport refrigeration. Included in 1991 operating profit was $15 million of workforce reduction costs. Excluding that amount, operating profit decreased 38% in 1991 compared to 1990.

Power Systems revenues for 1991 increased 9% over 1990 due principally to increased demand for power generation equipment. Operating profit for 1991 decreased 22% compared to 1990 due to the recognition of revenue from significant levels of licensing and plant completions in 1990, partially offset by increased profits from the higher volume in the power generation businesses in 1991. Included in 1991 operating profit was $22 million of workforce reduction costs. Excluding that amount, operating profit decreased 15% in 1991 compared to 1990.

Discontinued Operations — Other Operations

The following table presents the results of operations for Other Operations for each of the three years in the period ended December 31, 1992.

Results of Operations – Other Operations

(in millions)

Year Ended December 31	1992	1991	1990
Sales and operating revenues:			
Distribution and Control Business Unit and Westinghouse Electric Supply Company	$2,428	$2,438	$2,643
The Knoll Group	578	673	422
Westinghouse Communities, Inc.	235	258	141
Total	$3,241	$3,369	$3,206
Operating profit (loss):			
Distribution and Control Business Unit and Westinghouse Electric Supply Company	$ 104	$ 47	$ 169
The Knoll Group	(14)	26	27
Westinghouse Communities, Inc.	97	122	78
Total	$ 187	$ 195	$ 274

Included in 1992 are $315 million of revenues from Other Operations and $44 million of operating profit realized after the Board of Directors adopted the strategic plan in November 1992. See note 2 to the financial statements for additional information about results of Discontinued Operations.

1992 Versus 1991

Distribution and Control Business Unit (DCBU) and Westinghouse Electric Supply Company (WESCO) revenues were flat in 1992 compared to 1991. Increased revenues resulting from the consolidation of a joint venture previously accounted for by the equity method for which the Corporation gained control in 1992, were offset by lower revenues due to weak U.S. and Canadian markets and price competition. Operating profit increased in 1992 compared to 1991 primarily due to cost reductions. Included in 1991 operating profit was $22 million of workforce reduction costs. Excluding that amount, operating profit increased 51% in 1992 compared to 1991.

The Knoll Group (Knoll) revenues decreased 14% in 1992 compared to 1991 due to continued weak European markets and weak domestic demand for Knoll products. The $14 million operating loss in 1992, compared to a $26 million operating profit in 1991, was due to reduced volume.

Westinghouse Communities, Inc. (WCI) revenues decreased 9% in 1992 compared to 1991 due to lower levels of commercial and residential land sales. Operating profit decreased 20% in 1992 compared to 1991 due to lower volume and the shift from land to building sales.

1991 Versus 1990

DCBU and WESCO revenues decreased 8% in 1991 compared to 1990 due to weak economic conditions and aggressive competitive pricing. Operating profit decreased 72% in 1991 compared to 1990 on reduced volume. Included in 1991 operating profit was $22 million of workforce reduction costs. Excluding that amount, operating profit decreased 59% in 1991 compared to 1990.

Knoll revenues increased 59% in 1991 compared to 1990 reflecting a full year of operations of Knoll International, Inc., which was acquired in August 1990. Operating profit for 1991 decreased 4% from 1990 due primarily to the impact of deep discount levels caused by competitive pressures in the weakened economy.

Revenues for WCI increased 83% in 1991 compared to 1990 due primarily to higher levels of commercial and residential land sales. Operating profit for WCI in 1991 increased 56% due principally to higher volume.

Discontinued Operations — Financial Services

During 1992, the Corporation continued to downsize Financial Services, resulting in a reduction in assets and debt. Financial Services revenues for the twelve months ended December 31, 1992 decreased 30% compared to the same period in 1991 reflecting a reduction of portfolio investments through asset dispositions and reduced volume, lower income on interest-rate-sensitive assets and higher levels of underperforming assets. Revenues for 1991 decreased 12% compared to 1990 due primarily to a decrease in portfolio investments through asset dispositions and reduced volume, an increase in underperforming assets and a reduction in equity gains. Pretax losses of $2,831 million and $1,660 million in 1992 and 1991, respectively, are due primarily to the valuation provisions recorded in each year.

Margin as a percent of average portfolio investments had been declining in recent years; however, margin in 1992 was 2.7% compared to 2.2% for 1991. The apparent margin improvement in 1992 compared to 1991 is not indicative of performance improvement, but occurred because substantially more portfolio investments, of the type that are included in the margin calculation, were written off during 1992.

Financial Services portfolio investments totalled $8,967 million and $10,587 million at December 31, 1992 and 1991, respectively. The investments consist of receivables, real estate properties, investments in partnerships and other entities, nonmarketable and marketable securities, equipment on operating leases and other investments. The investments are segregated into the real estate, corporate and leasing portfolios.

Financial Services real estate portfolio is valued using the Derived Investment Value (DIV) method. DIV is the process developed by the Resolution Trust Corporation for use in measuring the values of real estate owned and loans secured by income-producing assets and land. Financial Services corporate and leasing portfolios are valued using various techniques which consider a number of factors, including trading desk values with respect to the corporate portfolio and information provided by independent consultants. Trading desk values arise from actual or proposed current trades of identical or similar assets. See note 2 to the financial statements.

During 1992, Financial Services disposed of corporate, leasing and real estate assets for $1,404 million in cash. Of this amount, dispositions with proceeds of $1,023 million resulted in chargeoffs of $363 million and the remainder resulted in gains of $74 million.

Also during 1992, WSAV executed a definitive agreement with First Financial Bank, F.S.B., to sell its Illinois-based thrift, Westinghouse Federal Bank. The sale was completed on January 4, 1993. At December 31, 1992, included in Financial Services real estate and corporate receivables were $326 million and $30 million, respectively, of receivables of WSAV. Of these amounts, $292 million of real estate receivables and all of the corporate receivables were included in the January 1993 sale. At December 31, 1991, included in real estate and corporate receivables were $317 million and $38 million, respectively, of receivables of WSAV.

At December 31, 1992 and 1991, receivables totalled $6,728 million and $8,412 million, respectively, of which $3,442 million and $3,769 million, respectively, were real estate receivables, and $2,140 million and $3,456 million, respectively, were corporate receivables. The remaining receivables related to leasing transactions.

Real estate receivables consist of loans for commercial and residential real estate properties. At December 31, 1992, first mortgages on real estate properties, the majority of which were income-producing, composed 84% of real estate receivables. Hotels and motels secured 29% of the receivables at December 31, 1992, apartments secured 18%, shopping centers and land each secured 8% and office buildings secured 7%. Of these properties, 18% were located in California, 12% in Illinois, 9% in Pennsylvania and 8% in Florida. No other significant geographic concentrations existed. The largest borrower exposure in the real estate portfolio totalled $299 million at December 31, 1992; average borrower exposure, excluding small-balance borrowers, was $20 million.

At December 31, 1991, first mortgages on real estate properties, the majority of which were income-producing, composed 86% of real estate receivables. Hotels and motels secured 28% of the receivables at December 31, 1991, apartments secured 16%, office buildings secured 13%, shopping centers secured 10% and land secured 7%. Of these properties, 16% were located in California, 13% in Illinois and 8% in both Florida and Pennsylvania. No other significant geographic concentrations existed. The largest borrower exposure in the real estate portfolio totalled $296 million at December 31, 1991; average borrower exposure, excluding small-balance borrowers, was $18 million.

Financial Services has entered into participation agreements with lending institutions which provide for the recourse sale of a senior interest in certain real estate loans. No loans were sold in 1992 or 1991. The receivables previously sold under participation agreements had remaining outstanding balances of $57 million and $142 million at December 31, 1992 and 1991. During 1992 and 1991, Financial Services repurchased $82 million and $92 million, respectively, of receivables previously sold under these agreements.

Corporate receivables are generally considered highly leveraged financing transactions. A transaction is highly leveraged if the related financing involves a buyout, acquisition, or recapitalization of an existing business, and involves a high debt-to-equity ratio.

At December 31, 1992, 58% of corporate receivables were senior obligations of the borrowers and 42% were subordinated. Variable-amount commercial line-of-credit loans secured by the borrowers' inventory or receivables represented 25% of the corporate receivables. An additional 33% of corporate receivables represented fixed-amount loans secured by specified assets, general assets, stock or other tangible assets of the borrower. The remaining corporate receivables were unsecured.

Borrowers in the corporate portfolio, generally middle market companies, are located primarily throughout the U.S. Manufacturing, retail trade, media and financial services represent the significant industry concentrations in this portfolio. Exposure to the largest borrower totalled $165 million at December 31, 1992; average borrower exposure was $15 million.

At December 31, 1991, 53% of corporate receivables were senior obligations of the borrowers and 47% were subordinated. Variable-amount commercial line-of-credit loans secured by the borrowers' inventory or receivables represented 20% of corporate receivables. An additional 33% of corporate receivables represented secured, fixed-amount loans. The remaining corporate receivables were unsecured. Exposure to the largest borrower totalled $182 million at December 31, 1991; average borrower exposure was $19 million.

The leasing portfolio consists of direct financing and leveraged leases. At December 31, 1992 and 1991, 66% and 64%, respectively, of these leases related to aircraft. The portfolio also includes leases for cogeneration facilities, railcars, marine vessels and trucking equipment.

Nonearning receivables at December 31, 1992 totalled $1,923 million, an increase of $411 million from year-end 1991.

Reduced earning receivables totalled $881 million at December 31, 1992, a decrease of $184 million from year-end 1991. Reduced earning receivables consist generally of real estate loans which have been modified and earned less than the original contractual rate during the last month of the reporting period and for which the borrowers are in financial difficulty, as determined by management. The income from these receivables will fluctuate depending on the performance of the properties.

Income earned during 1992 on nonearning and reduced earning receivables at December 31, 1992 represented yields of 3.0% and 4.7%, respectively, versus an average interest cost of 6.7%. The reduction in income for 1992 resulting from nonearning and reduced earning receivables at December 31, 1992 was $170 million.

Receivables past due 60 days or more, not otherwise included in nonearning or reduced earning receivables, totalled $139 million at December 31, 1992, compared to $230 million at December 31, 1991.

Real estate receivables totalling $892 million, which exclude $326 million of WSAV real estate receivables, at December 31, 1992, and not otherwise classified as nonearning, reduced earning or past due 60 days or more are considered by management to be potential problem receivables. However, the characterization as potential problem receivables is mitigated by the valuation allowance attributed to such receivables at December 31, 1992.

In addition, certain corporate receivables classified as performing, totalling $271 million at December 31, 1992, have been identified as having credit characteristics that cause management to have serious doubts as to the ability of the borrowers to continue to meet contractual terms and could result in impairment to the receivables' carrying values.

Actual performance of all receivables will likely vary due to factors influencing the borrowers and the markets in which they operate. In establishing the valuation allowance, the Corporation contemplates losses on receivables which are not currently nonearning, reduced earning or past due 60 days or more.

At December 31, 1992, real estate properties totalled

$663 million compared to $730 million at December 31, 1991. Real estate properties were acquired through foreclosure proceedings or represent "in-substance" foreclosures. The acquired properties are being operated by Financial Services or contracted professional management until their sale.

Investments in partnerships and other entities totalled $895 million at December 31, 1992, compared to $643 million at year-end 1991. Of the $895 million of investments at December 31, 1992, $457 million were corporate financing investments, primarily in limited partnerships engaged in subordinated investing to highly leveraged borrowers, $402 million were investments in real estate partnerships and $36 million were leasing partnerships.

Investments in nonmarketable equity securities related to corporate financing transactions totalled $332 million at December 31, 1992, compared to $173 million at year-end 1991.

Originally, investments in partnerships and other entities and investments in nonmarketable equity securities were acquired with the intent to realize appreciation upon disposition, reflecting an increase in the value of the underlying entity. However, many of these investments are now the result of debtor account restructurings.

Marketable securities totalled $241 million at December 31, 1992, all of which were assets of WSAV, and consisted of U.S. and other government obligations, mortgage-backed securities and a small amount of corporate debt securities. At December 31, 1991, marketable securities totalled $498 million, of which $452 million related to WSAV. Financial Services marketable securities other than those owned by WSAV were completely liquidated through sales or write-offs during 1992 and 1991. During 1992, proceeds from sales of investments in debt securities totalled $367 million. Gross gains of $7 million and gross losses of $19 million were realized on those sales. During 1991, proceeds from sales of investments in debt securities totalled $626 million. Gross gains of $24 million and gross losses of $103 million were realized on those sales.

Financial Services had issued various loan or investment commitments, guarantees, standby letters of credit and standby commitments. Those commitments impacted and will continue to impact the Corporation's efforts to reduce assets and debt. In addition, in order to preserve or strengthen existing portfolios, Financial Services may provide certain financing services on a limited basis. Further discussion of outstanding financing commitments appears in note 17 to the financial statements. Depending on market conditions, although it is difficult to predict, management estimates that funding of approximately $315 million of these outstanding commitments, excluding commercial line-of-credit commitments of $86 million, may be required in 1993. Of these amounts, approximately 81% are expected to become reduced earning or nonearning receivables, real estate owned or investments that do not produce a current return. A provision has been included in the estimated loss on disposal of Discontinued Operations for the estimated losses related to such fundings.

Management believes that under current economic conditions, the valuation allowance at Financial Services at December 31, 1992, should be adequate to cover losses that are inherent in the various portfolios. However, no assurance can be given that a further lack of liquidity in the markets in which Financial Services customers operate, a further downturn in the economy, or other adverse conditions will not have a negative effect on the ability of borrowers to repay and on asset values generally. This could result in increased credit losses and additional provisions to reflect asset revaluations, and could have a negative impact on Financial Services ability to sell assets.

Other Income and Expenses — Continuing Operations

Other income and expenses increased from a net expense of $12 million in 1991 to a net expense of $22 million in 1992 due to lower interest income on securities, partially offset by improved operating results from affiliates.

Other income and expenses decreased from a net income of $152 million in 1990 to a net expense of $12 million in 1991 primarily due to reduced gains recognized from the sale of assets and losses incurred from the disposition of marketable securities. Additionally, lower operating results from affiliates contributed to the increase in the net expense.

Interest expense decreased $9 million in 1992 compared to 1991 due to lower effective interest rates on average outstanding debt, partially offset by fees associated with the revolving credit facility. In 1991, interest expense decreased by $2 million compared to 1990 due to lower effective interest rates on average outstanding debt.

Income Taxes

The Corporation's 1992 benefit for income taxes was 51.3% of the net losses from all sources. The 1992 benefit totalled $1,338 million and was comprised of $182 million tax expense on income from Continuing Operations, a benefit of $685 million on losses from Discontinued Operations, and a benefit of $835 million on the cumulative effect of changes in accounting principles for postretirement benefits other than pensions and for the adoption of SFAS No. 109. The consolidated net loss before taxes, minority interest in income of consolidated subsidiaries and provision for postretirement benefits other than pensions totalled $2,609 million and was comprised of income from Continuing Operations of $536 million, the loss from Discontinued Operations of $1,972 million and the pretax charge for the adoption of SFAS No. 106 of $1,173 million. In 1991, the Corporation had a 2.3% tax benefit on the loss before income taxes and minority interest in income of consolidated subsidiaries. In 1990, there was a 33.6% tax expense on income before income taxes and minority interest in income of consolidated subsidiaries.

In January 1992, the Corporation adopted SFAS No. 109. This statement replaced SFAS No. 96 which the Corporation had used to account for income taxes since 1988. The effect of adopting SFAS No. 109 on the Corporation's income taxes is to permit the recognition of certain deferred tax benefits not recognized under SFAS No. 96. The recognition of such benefits reduces income tax expense in the year the benefits are recognized.

There are three significant components of the deferred tax asset balance: (i) the tax effect of cumulative net temporary differences of $3,580 million that represents future income tax deductions which management believes will be substantially claimed for tax purposes during 1993 through 1995, resulting in the generation of tax net operating losses for those years which will expire within 15 years from their origination, (ii) the tax effect of net operating loss carryforwards of $850 million which will expire by the year 2007, and (iii) alternative minimum tax credit carryforwards of $255 million which have no expiration date.

Management believes that the Corporation will have sufficient future taxable income to make it more likely than not that the net deferred tax asset will be realized. In making this assessment, management considered the actual historic operating performance and taxable income generated by the Continuing Operations as well as the adoption of the financial and strategic plan to refocus the Corporation on five key businesses. Management believes that through implementation of this plan, the Corporation will produce sufficient future taxable income to utilize the tax attributes discussed above.

The following table shows a reconciliation of income from Continuing Operations before income taxes to taxable income or loss from Continuing Operations for 1992 and the two preceding years detailing the permanent and temporary tax attributes.

Reconciliation of Income from Continuing Operations Before Income Taxes to Taxable Income (Loss)

(in millions)

	1992	1991	1990
Income from Continuing Operations before income taxes	**$536**	$ 388	$1,025
Permanent increases (decreases):			
Income earned in foreign entities and Puerto Rico	**(173)**	(167)	(235)
State income taxes	**(35)**	(11)	(16)
Goodwill amortization	**17**	16	18
Other	**(15)**	23	41
Net permanent decrease	**(206)**	(139)	(192)
Temporary increases (decreases):			
Pension expense greater (less) than amount deducted for tax purposes	**71**	(306)	(295)
Long-term contract adjustment	**29**	20	76
Depreciation	**24**	(6)	(54)
Other	**75**	31	(82)
Net temporary increase (decrease)	**199**	(261)	(355)
Taxable income (loss)	**$529**	$ (12)	$ 478

Included in income from Continuing Operations before income taxes for 1991 was a provision for workforce reduction costs totalling $138 million.

Liquidity and Capital Resources

Overview

The Corporation's liquidity and capital resources have been negatively impacted by Financial Services over the last two years, and will continue to be so impacted until the plan announced in November 1992 is substantially executed. Additionally, a significant portion of the Corporation's debt matures over the next two years. Management believes, however, that the Corporation has adequate liquidity and capital resources to accomplish the plan, including the repayment of maturing debt. These resources include net proceeds from the liquidation of assets of Discontinued Operations, significant existing levels of cash and cash equivalents, borrowing capacity under the Corporation's revolving credit facility, cash flow from the operations of Continuing Operations and, until sold, cash flow from the operations of Other Operations. In addition, the Corporation may also access capital markets.

Significant progress was made during 1992 in reducing debt. The Corporation's net debt (total debt less cash and cash equivalents) was $8,379 million at December 31, 1992, a reduction of $1,533 million from $9,912 million at December 31, 1991. The principal sources of cash in 1992 for this reduction, other than operations, were an equity offering of preferred stock resulting in net cash proceeds of $543 million, business divestitures resulting in net proceeds of $238 million and disposals of Financial Services assets for $1,404 million, partially offset by funding commitments of $1,170 million. Funding of Financial Services commitments has slowed the Corporation's efforts to reduce debt. However, the level of remaining unfunded commitments declined significantly in 1992. Unfunded commitments were $1,418 million at December 31, 1992 compared to $2,782 million at December 31, 1991, a decrease of $1,364 million. Management expects that approximately $401 million of these commitments will be funded in 1993. See note 17 to the financial statements.

In December 1991, the Corporation entered into a $6 billion revolving credit facility agreement (revolver) with a syndicate of domestic and international banks. This facility expires in December 1994. At December 31, 1992, borrowings under the revolver totalled $5,495 million. The revolver is available for use by Westinghouse and WCC subject to the maintenance of certain ratios and compliance with other covenants and subject to there being no material adverse change with respect to the Corporation taken as a whole. Among other things, the covenants place restrictions on the incurrence of liens, the amount of debt on a consolidated basis and at the subsidiary level, and the amount of contingent liabilities. The covenants also require the maintenance of a maximum leverage ratio, a minimum interest coverage ratio, and minimum consolidated net

worth. Certain of the covenants become more restrictive over the term of the revolver. At December 31, 1992, the Corporation was in full compliance with these covenants.

During 1992, Moody's Investors Service, Inc. (Moody's) and Standard and Poor's Corporation (S&P) lowered their ratings on the securities of both Westinghouse and WCC. Fitch Investor's Service, Inc. (Fitch) ratings of the securities remained unchanged. The following table summarizes the ratings of the securities of Westinghouse and WCC at the beginning and end of 1992.

Securities Ratings

	Moody's	S&P	Fitch
At January 1, 1992			
Commercial paper	Prime-2	A-1	F-1
Senior long-term debt	A3	A	A
Subordinated debt – Westinghouse	Baa1	A–	Not rated
Preferred stock – WCC	a3	A–	Not rated
At December 31, 1992			
Commercial paper	Prime-3	A-2	F-1
Senior long-term debt	Baa3	A–	A
Subordinated debt – Westinghouse	Ba1	BBB+	Not rated
Depositary shares – Westinghouse	ba1	BBB+	Not rated
Preferred stock – WCC	ba1	BBB+	Not rated

Reasons for the downgrades cited by the agencies were deterioration in the investment portfolios at Financial Services, including the continuing stress of the nonperforming loan portfolios and the funding of off-balance-sheet commitments. Weak operating performance at Westinghouse was also cited.

As a result of these rating agency actions and management's assessment of the capital markets, in October 1992, the Corporation discontinued the sale of commercial paper and replaced this debt with borrowings under the revolver.

Operating Activities

Cash flow from operating activities of Continuing Operations was $564 million for 1992, an increase from $360 million for 1991. The principal source of the $204 million increase from 1991 was an improvement in income.

Cash flow from operating activities of Discontinued Operations was $435 million for 1992, an increase from $344 million in 1991.

Investing Activities

Excluding cash flows to and from Discontinued Operations, investing activities of Continuing Operations used $39 million of cash in 1992, compared to $211 million of cash used in 1991, an improvement of $172 million. The principal source of this improvement was the divestitures of the Copper Laminates and Electrical Systems divisions in 1992. See note 20 to the financial statements.

Investing activities included a number of cash flow transactions between Continuing Operations and Discontinued Operations. In 1992, Financial Services repaid a 1991 advance from Westinghouse of $312 million and received $73 million of capital contributions from Westinghouse under a support agreement. In 1991, Continuing Operations invested $1,704 million in Discontinued Operations: $1,405 million represented capital contributions to Financial Services under a support agreement and $299 million represented advances to Financial Services.

Capital expenditures of Continuing Operations were $229 million in 1992 compared to $293 million in 1991. Management expects that capital expenditures for Continuing Operations in 1993 will approximate the 1991 level. Capital expenditures of Discontinued Operations were $75 million in 1992 compared to $74 million in 1991. Management expects capital expenditures of Discontinued Operations for 1993 to approximate those of 1992.

Financing Activities

Total debt of the Corporation was $9,933 million at December 31, 1992, a decrease of $1,223 million from $11,156 million at December 31, 1991. Cash and cash equivalents of the Corporation was $1,554 million at December 31, 1992, an increase of $310 million from $1,244 million at December 31, 1991.

Short-term debt, including current maturities of long-term debt, of the Corporation totalled $6,990 million at December 31, 1992, a $432 million decrease from December 31, 1991. See notes 11 and 13 to the financial statements.

Short-term debt, including current maturities of long-term debt, of Continuing Operations was $1,526 million at December 31, 1992 compared to $2,559 million at December 31, 1991. Commercial paper of Continuing Operations decreased from $1,442 million at December 31, 1991 to $78 million at December 31, 1992 reflecting the Corporation's withdrawal from the commercial paper market. At December 31, 1992, the outstanding commercial paper had an average maturity of 29 days and an average annual interest rate of 4.5%.

Short-term debt, including current maturities of long-term debt, of Discontinued Operations totalled $5,464 million at December 31, 1992 compared to $4,863 million at December 31, 1991, an increase of $601 million. At December 31, 1992, commercial paper of Discontinued Operations totalled $131 million, a $2,071 million decrease from year-end 1991, also, reflecting the Corporation's withdrawal from the commercial paper market. At December 31, 1992, the outstanding commercial paper had an average maturity of 25 days and an average annual interest rate of 4.2%.

Total borrowings outstanding under the revolver were $5,495 million at December 31, 1992, of which $1,100 million was attributable to Continuing Operations and $4,395 million to Discontinued Operations. These borrowings carried a weighted average annual interest rate

of 5.0% for Continuing Operations and 4.5% for Discontinued Operations. The current interest rate for borrowings under the revolver is based on the London Interbank Offer Rate (LIBOR) and an interest rate spread based upon the Corporation's debt ratings. An increase in LIBOR will result in higher interest expense to the Corporation. Borrowings under the revolver are also subject to facility and utilization fees.

Long-term debt of the Corporation totalled $2,943 million at December 31, 1992, a $791 million decrease from December 31, 1991. See note 13 to the financial statements.

Long-term debt of Continuing Operations increased $72 million, from $1,251 million at December 31, 1991 to $1,323 million at December 31, 1992. This increase is primarily due to the combined issuance of $625 million of 10-year notes and 20-year debentures during 1992. Partially offsetting this increase was $250 million of 8.60% notes due 1993 which were reclassified to current maturities of long-term debt. Additionally, through December 31, 1992, the holders of $217 million of variable-rate notes due 2007 exercised their prepayment option.

On June 25, 1992, Westinghouse completed the sale of $350 million 8⅜% notes due June 15, 2002. On August 10, 1992, Westinghouse completed the sale of $275 million 8⅝% debentures due August 1, 2012. The notes and debentures were offered at a discount and the net proceeds, totalling $345 million and $270 million, respectively, were used to reduce short-term debt. The all-in yield including commissions was 8.6% for the notes and 8.8% for the debentures.

Long-term debt of Discontinued Operations decreased $863 million from $2,483 million at December 31, 1991 to $1,620 million at December 31, 1992. The decrease is primarily due to maturing medium-term notes.

In June 1992, Westinghouse sold through an underwritten public offering 32,890,000 Depositary Shares, representing 8,222,500 shares of Series B Conversion Preferred Stock (B Preferred). The B Preferred shares will automatically convert into common stock on September 1, 1995, unless called earlier by Westinghouse. An annual dividend of $1.53 per Depositary Share, $6.12 per B Preferred share, is payable on the same quarterly schedule as the Corporation's dividend on Westinghouse common stock. Dividends on the B Preferred shares are cumulative and must be declared by the Board of Directors to be payable. Net proceeds from the offering, totalling $543 million, were used to reduce short-term debt of Continuing Operations. See note 15 to the financial statements.

On August 26, 1992, Westinghouse filed a registration statement on Form S-3 for the issuance of up to $1 billion of Westinghouse debt securities. At December 31, 1992, this shelf registration was unused. Also, at December 31, 1992, $2,144 million was available for the future issuance of WCC debt securities under a 1990 shelf registration which became effective in 1991. WCC does not anticipate issuing securities under this shelf registration.

In November 1992, the Board of Directors reduced the quarterly dividend on Westinghouse common stock to $0.10 per common share from $0.18 per common share.

The Corporation's net debt-to-capital ratio for Continuing Operations was 47% at December 31, 1992, unchanged from year-end 1991. For this ratio, the reduction of net debt during 1992 was offset by non-cash charges to shareholders' equity including the recognition of unfunded pension obligations and the adoption of new accounting principles for postretirement benefits other than pensions and income taxes. See notes 1, 4 and 5 to the financial statements.

Other Actions

A support agreement exists between Westinghouse and WCC. Under this agreement, Westinghouse, among other things, provides the financial support necessary to maintain WCC's total debt-to-equity ratio at not more than 6.5 to 1 and maintain WCC's equity at a minimum of $1 billion. Westinghouse also guarantees WCC's commercial paper and may also guarantee fundings provided by others. Payments of $73 million and $1,405 million were made under the support agreement in 1992 and 1991, respectively.

On December 31, 1992, Westinghouse assumed $1,800 million of WCC's revolver debt in exchange for increased investment in Financial Services. As a result, at December 31, 1992, the equity of WCC exceeded $1 billion and its total debt-to-equity ratio was less than 6.5 to 1. Therefore, no payment will be required under the support agreement for the first quarter of 1993. An additional $345 million of WCC's revolver debt was assumed by Westinghouse as partial payment to WCC for the purchase of certain leasing assets on December 31, 1992.

On January 27, 1993, the Corporation announced its intention to merge WFSI and WCC into Westinghouse. Such a merger will give management greater flexibility to execute its liquidation of the assets of Financial Services. The merger is contingent upon certain conditions, including the consent of commercial banks participating in the revolver. As a consequence of the merger, WFSI and WCC will cease to exist as separate legal entities, and their debt will be assumed by Westinghouse.

Other Matters

With regard to environmental matters, particularly remedial actions under federal and state superfund laws, the Corporation has been named as a potentially responsible party at numerous sites located throughout the country. In many instances, however, the Corporation is either not a responsible party or its site involvement is very limited. Depending upon the development of further information, the Corporation may have varying degrees of clean-up responsibilities at 52 of these sites. With regard to clean-up costs, in many cases the Corporation will share these costs with other responsible parties and the Corporation believes that any liability incurred with respect to clean-up costs will

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be satisfied over a number of years. In addition, the Corporation continues to implement a 1985 Consent Decree relating to the remediation of six sites in Bloomington, Indiana. Applications for permits to build an incinerator required by this Consent Decree are pending. There is continuing community opposition to the incinerator which has resulted in delays in the issuance of necessary construction and operating permits. Revenues from the operation of the incinerator are expected to partially offset the Corporation's clean-up costs. It should also be noted that in 1987, Westinghouse filed an action in New Jersey against over 100 insurance companies seeking recovery for these and other environmental liabilities. The first trial, regarding an environmental site in New Jersey, was scheduled to begin in the fourth quarter of 1992, but has been delayed. Management continues to believe that the ultimate aggregate cost of environmental remediation by the Corporation will not result in a material adverse effect on its future financial condition or results of operations.

At present, there are 10 pending actions brought by utilities claiming a substantial amount of damages in connection with alleged tube degradation in steam generators sold by the Corporation as components for nuclear steam supply systems. One of the actions, which was pending in 1991 and was resolved in 1992 after a full arbitration hearing before the International Chamber of Commerce, found that no damages were warranted on any of the steam generator claims against the Corporation. Westinghouse is also a party to eight agreements with utilities or utility plant owners' groups which toll the statute of limitations regarding their steam generator tube degradation claims and permit the parties time to engage in discussions. The parties have agreed that no litigation will be initiated for an agreed upon period of time as set forth in the respective tolling agreements. The term of each tolling agreement varies. Westinghouse has notified over 150 of its insurance carriers of the pending steam generator actions and claims. All of the carriers, except for four which have denied coverage, have reserved their rights with respect to the proceedings.

The Corporation continues to work with its customers and to respond to requests from the Nuclear Regulatory Commission regarding various steam generator issues involving detection of steam generator tube anomalies, plugging of tubes or other remedial responses to steam generator tubes displaying anomalies.

The Corporation is defending class action, derivative and individual lawsuits brought against the Corporation, WFSI, WCC, and/or certain present and former directors and officers of the Corporation, as well as other unrelated parties. Together, these actions allege various federal securities law and common law violations arising out of (i) alleged misstatements or omissions contained in the Corporation's public filings concerning the financial condition of the Corporation, WFSI and WCC in connection with a $975 million charge to earnings announced on February 27, 1991, a public offering of Westinghouse common stock in May 1991, a $1,680 million charge to earnings announced on October 7, 1991, and alleged misrepresentations regarding the adequacy of internal controls at the Corporation and WCC, and (ii) the Corporation's acquisition of substantially all the assets of Knoll International, Inc. and Knoll Nevada, Inc. in exchange for Westinghouse common stock in August 1990 which claims are asserted only by the seller of these assets.

Based on its understanding and evaluation of the relevant facts and circumstances and discussions with counsel, management believes that the Corporation has meritorious defenses to the litigation described above, as well as the pending litigation described in note 17 to the financial statements. While substantial damages are sought in each of the foregoing cases and the outcome of litigation is always difficult to predict, management believes that the litigation should not have a material adverse impact on the future financial condition or the results of operations of the Corporation. As discussed in note 17, the Corporation is a party to other lawsuits.

At December 31, 1992, in accordance with SFAS No. 87, "Employers' Accounting for Pensions," a minimum pension liability of $1,099 million was recognized for the sum of the underfunded amount of $303 million plus the prepaid pension contribution of $796 million. An intangible asset of $348 million and a charge to shareholders' equity of $751 million, which was reduced to $496 million due to tax deferrals of $255 million, offset the minimum pension liability.

In November 1992, the Financial Accounting Standards Board issued SFAS No. 112, "Employers' Accounting for Postemployment Benefits," which requires employers to adopt accrual accounting for workers compensation, salary continuation, medical and life insurance continuation, severance benefits and disability benefits provided former or inactive employees after employment but before retirement. The statement is effective beginning in 1994. The Corporation is currently studying SFAS No. 112 and has not yet determined its impact on the Corporation's financial position.

Report of Management

The Corporation has prepared the consolidated financial statements and related financial information included in this Annual Report. Management has the primary responsibility for the financial statements and other financial information and for ascertaining that the data fairly reflect the financial position, results of operations and cash flows of the Corporation. The financial statements were prepared in accordance with generally accepted accounting principles appropriate in the circumstances, and necessarily include amounts that are based on best estimates and judgments with appropriate consideration given to materiality. Financial information included elsewhere in this Annual Report is presented on a basis consistent with the financial statements.

The Corporation maintains a system of internal accounting controls, supported by adequate documentation, to provide reasonable assurance that assets are safeguarded and that the books and records reflect the authorized transactions of the Corporation. Limitations exist in any system of internal accounting controls based upon the recognition that the cost of the system should not exceed the benefits derived. Westinghouse believes its system of internal accounting controls, augmented by its corporate auditing function, appropriately balances the cost/benefit relationship.

The independent accountants provide an objective assessment of the degree to which management meets its responsibility for fair financial reporting. They regularly evaluate the system of internal accounting controls and perform such tests and procedures they deem necessary to express an opinion on the fairness of the financial statements.

The Board of Directors pursues its responsibility for the Corporation's financial statements through its Audit Review Committee composed of directors who are not officers or employees of the Corporation. The Audit Review Committee meets regularly with the independent accountants, management and the corporate auditors. The independent accountants and the corporate auditors have direct access to the Audit Review Committee, with and without the presence of management representatives, to discuss the scope and results of their audit work and their comments on the adequacy of internal accounting controls and the quality of financial reporting.

We believe that the Corporation's policies and procedures, including its system of internal accounting controls, provide reasonable assurance that the financial statements are prepared in accordance with the applicable securities laws and with a corresponding standard of business conduct.

Report of Independent Accountants

To the Board of Directors
and Shareholders of
Westinghouse Electric Corporation

In our opinion, the accompanying consolidated financial statements appearing on pages 21 through 45 of this Annual Report present fairly, in all material respects, the financial position of Westinghouse Electric Corporation and its subsidiaries at December 31, 1992 and 1991, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 1992, in conformity with generally accepted accounting principles. These financial statements are the responsibility of the Corporation's management; our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with generally accepted auditing standards which require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for the opinion expressed above.

As discussed in Note 1 to these financial statements, the Corporation adopted Statement of Financial Accounting Standards (SFAS) No. 106, "Employers' Accounting for Postretirement Benefits Other Than Pensions," and SFAS No. 109, "Accounting for Income Taxes," in 1992. As discussed in Note 2 to these financial statements, the Corporation adopted a comprehensive plan in November 1992 that entails exiting the financial services business and certain other non-strategic businesses. These businesses have been accounted for as discontinued operations.

Price Waterhouse

600 Grant Street
Pittsburgh, Pennsylvania 15219-9954
January 26, 1993

Consolidated Statement of Income

(in millions except per share amounts)

Year Ended December 31	1992	1991(a)	1990(a)
Product sales	$ 5,435	$ 5,369	$ 5,664
Service sales	3,012	3,121	2,982
Sales and operating revenues	8,447	8,490	8,646
Cost of products sold	(4,072)	(4,304)	(4,022)
Cost of services sold	(2,171)	(2,075)	(2,168)
Cost of sales and revenues	(6,243)	(6,379)	(6,190)
Marketing, administration and general expenses	(1,187)	(1,229)	(1,099)
Depreciation and amortization	(270)	(284)	(284)
Other income and expenses, net (note 19)	(22)	(12)	152
Interest expense	(189)	(198)	(200)
Income from Continuing Operations before income taxes and minority interest in income of consolidated subsidiaries	536	388	1,025
Income taxes (notes 1 and 5)	(182)	(121)	(276)
Minority interest in income of consolidated subsidiaries	(6)	(2)	(3)
Income from Continuing Operations	348	265	746
Discontinued Operations, net of income taxes (note 2):			
Loss from operations	(21)	(1,351)	(478)
Estimated loss on disposal of Discontinued Operations	(1,280)	—	—
Loss from Discontinued Operations	(1,301)	(1,351)	(478)
Income (loss) before cumulative effect of changes in accounting principles	(953)	(1,086)	268
Cumulative effect of changes in accounting principles:			
Postretirement benefits other than pensions (notes 1 and 4)	(742)	—	—
Income taxes (notes 1 and 5)	404	—	—
Net income (loss)	$ (1,291)	$ (1,086)	$ 268
Earnings (loss) per common share (note 15):			
From Continuing Operations	$ .93	$ .84	$ 2.54
From Discontinued Operations	(3.76)	(4.30)	(1.63)
From cumulative effect of changes in accounting principles	(.98)	—	—
Earnings (loss) per common share	$ (3.81)	$ (3.46)	$ 0.91
Cash dividends per common share (note 15)	$ .72	$ 1.40	$ 1.35

The information on pages 24 through 45 is an integral part of these financial statements.
(a) Certain amounts have been reclassified for comparative purposes. See notes 1 and 2.

Consolidated Balance Sheet

(in millions)

At December 31,	1992	1991(a)
Assets		
Cash and cash equivalents	$ 739	$ 545
Customer receivables (note 6)	1,216	1,143
Inventories (note 7)	1,054	921
Uncompleted contracts costs over related billings (note 7)	331	397
Prepaid and other current assets (note 8)	625	251
Total current assets	3,965	3,257
Plant and equipment, net (note 9)	1,804	1,922
Intangible and other noncurrent assets (note 10)	3,506	2,638
Net assets of Discontinued Operations (note 2)	1,123	2,517
Total assets	$10,398	$10,334
Liabilities and Shareholders' Equity		
Short-term debt (note 11)	$ 1,239	$ 2,516
Current maturities of long-term debt (note 13)	287	43
Accounts payable	555	585
Uncompleted contracts billings over related costs (note 7)	656	575
Other current liabilities (note 12)	1,220	1,310
Total current liabilities	3,957	5,029
Long-term debt (note 13)	1,323	1,251
Other noncurrent liabilities (note 14)	2,741	281
Total liabilities	8,021	6,561
Contingent liabilities and commitments (note 17)		
Minority interest in equity of consolidated subsidiaries	33	19
Shareholders' equity (note 15):		
Preferred stock, $1.00 par value (25 million shares authorized):		
Series A preferred (no shares issued)	—	—
Series B conversion preferred (8 million shares issued)	8	—
Common stock, $1.00 par value (480 million shares authorized, 393 million shares issued)	393	393
Capital in excess of par value	1,523	1,039
Common stock held in treasury	(1,102)	(1,264)
Other	(498)	4
Retained earnings	2,020	3,582
Total shareholders' equity	2,344	3,754
Total liabilities and shareholders' equity	$10,398	$10,334

The information on pages 24 through 45 is an integral part of these financial statements.
(a) Certain amounts have been reclassified for comparative purposes. See notes 1 and 2.

Consolidated Statement of Cash Flows

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(in millions)

Year Ended December 31,	1992	1991(a)	1990(a)
Continuing Operations:			
Cash Flows from Operating Activities			
Income	$ 348	$ 265	$ 746
Adjustments to reconcile income to cash:			
Depreciation and amortization	270	284	284
Deferred income taxes	(429)	110	57
Change in assets and liabilities, net of effects of acquisitions/divestitures of businesses:			
Customer receivables	(109)	224	239
Inventories	2	(171)	(280)
Deferred taxes	442	(219)	43
Income taxes currently payable	(2)	(105)	19
Restructuring programs	(13)	(44)	(191)
Other working capital	(13)	182	(249)
Other assets and liabilities	68	(166)	(139)
Cash provided by operating activities	564	360	529
Cash Flows from Investing Activities			
Business divestitures	238	52	166
Marketable securities	(48)	90	16
Capital expenditures	(229)	(293)	(328)
Cash from (to) Discontinued Operations	239	(1,704)	(217)
Other	—	(60)	9
Cash provided (used) by investing activities	200	(1,915)	(354)
Cash Flows from Financing Activities			
Change in short-term debt	(1,499)	607	91
Long-term borrowings	620	406	267
Payments of long-term debt	(82)	(71)	(182)
Sale of equity securities	543	551	—
Treasury stock	111	72	(165)
Dividends	(271)	(433)	(392)
Other	8	28	52
Cash provided (used) by financing activities	(570)	1,160	(329)
Cash provided (used) by Continuing Operations	194	(395)	(154)
Discontinued Operations:			
Loss from operations, net of income taxes	(21)	(1,351)	(478)
Estimated loss on disposal	(1,280)	—	—
Change in net operating assets	1,736	1,695	979
Operating activities	435	344	501
Investing activities	235	417	(2,098)
Financing activities	(554)	(298)	1,533
Cash provided (used) by Discontinued Operations	116	463	(64)
Increase (decrease) in cash and cash equivalents	310	68	(218)
Cash and cash equivalents at beginning of period (note 1)	1,244	1,176	1,394
Cash and cash equivalents at end of period (note 1)	$ 1,554	$ 1,244	$ 1,176
Supplemental Disclosure of Cash Flow Information			
Interest paid — Continuing Operations	$ 228	$ 245	$ 216
Interest paid — Discontinued Operations	542	861	790
Income taxes paid	53	111	191

The information on pages 24 through 45 is an integral part of these financial statements.
(a) Certain amounts have been reclassified for comparative purposes. See notes 1 and 2.
For a description of noncash transactions, see notes 1, 3, 4, 5 and 7.

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Note 1: Summary of Significant Accounting Policies

Consolidation

The consolidated financial statements include the accounts of Westinghouse Electric Corporation (Westinghouse) and its subsidiary companies (together, the Corporation) after elimination of intercompany accounts and transactions. Investments in joint ventures and in other companies in which the Corporation does not have control, but has the ability to exercise significant management influence over operating and financial policies, are accounted for by the equity method.

Certain previously reported amounts have been reclassified to conform to the 1992 presentation.

Discontinued Operations

In November 1992, the Board of Directors adopted a comprehensive plan that includes exiting the financial services and other non-strategic businesses. The Corporation has accounted for the businesses to be divested as discontinued operations in accordance with Accounting Principles Board Opinion No. 30, "Reporting the Results of Operations — Reporting the Effects of Disposal of a Segment of a Business, and Extraordinary, Unusual and Infrequently Occurring Events and Transactions" (APB 30). Discontinued Operations consists of Financial Services and Other Operations. Financial Services is comprised primarily of Westinghouse Credit Corporation (WCC) and Westinghouse Savings Corporation (WSAV), each subsidiaries of Westinghouse Financial Services, Inc. (WFSI), and the Corporation's leasing portfolio. WSAV sold Westinghouse Federal Bank, whose assets represented a substantial majority of WSAV's assets, in January 1993. Other Operations includes Distribution and Control Business Unit, Westinghouse Electric Supply Company, The Knoll Group and Westinghouse Communities, Inc. (WCI). See note 2 to the financial statements.

Revenue Recognition

Sales are recorded primarily as products are shipped and services are rendered. The percentage-of-completion method of accounting is used for nuclear steam supply system and related equipment orders with delivery schedules generally in excess of five years, major power generation systems with a cycle time in excess of one year, and certain construction projects where this method of accounting is consistent with industry practice. For certain long-term contracts in which development and production are combined, revenue is recognized as development milestones are completed or units are delivered.

Amortization of Intangible Assets

Goodwill and other acquired intangible assets are amortized under the straight-line method over their estimated lives, but not in excess of 40 years.

Cash and Cash Equivalents

The Corporation considers all investment securities with a maturity of three months or less when acquired to be cash equivalents. All cash and temporary investments are placed with high credit-quality financial institutions and the amount of credit exposure to any one financial institution is limited.

Cash and cash equivalents in the Consolidated Statement of Cash Flows includes those items from Continuing Operations, Financial Services and Other Operations. See note 2 to the financial statements.

Inventories

Inventories are stated at the lower of standard cost, which approximates actual cost on a first-in, first-out (FIFO) basis, or market. The elements of cost included in inventories are direct labor, direct material and certain overheads. Prior to 1992, a portion of the value of the Corporation's domestic inventories were determined using the last-in, first-out (LIFO) method of inventory valuation. See note 7 to the financial statements. Long-term contracts in process include costs incurred plus estimated profits on contracts accounted for according to the percentage of completion method.

Plant and Equipment

Plant and equipment assets are recorded at cost and depreciated generally under the straight-line method over their estimated useful lives. Expenditures for additions and improvements are capitalized, and costs for repairs and maintenance are charged to operations as incurred. The Corporation limits capitalization of newly acquired assets to those assets with cost in excess of $1,000.

New Accounting Principles

Effective January 1, 1992, the Corporation adopted Statement of Financial Accounting Standards (SFAS) No. 106, "Employers' Accounting for Postretirement Benefits Other Than Pensions," on the immediate recognition basis. This statement requires that the cost of certain medical, dental and life insurance benefits for eligible retirees and dependents be recognized in the financial statements during the employees' service with the Corporation. The Corporation's previous practice was to expense these costs as incurred. See note 4 to the financial statements.

In the first quarter of 1992, the Corporation also adopted SFAS No. 109, "Accounting for Income Taxes." This statement replaced SFAS No. 96, which the Corporation previously used to account for income taxes, and permitted the Corporation to recognize

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certain deferred tax benefits not recognized under SFAS No. 96. See note 5 to the financial statements.

In December 1992, the Corporation adopted SFAS No. 107, "Disclosures about Fair Value of Financial Instruments." This statement is an extension of SFAS No. 105, "Disclosure of Information about Financial Instruments with Off-Balance-Sheet Risk and Financial Instruments with Concentrations of Credit Risk," adopted in a prior year, and requires the disclosure of the fair value of certain financial instruments. See note 22 to the financial statements.

Note 2: Discontinued Operations

In November 1992, the Board of Directors adopted a strategy that entails exiting the financial services business, over a three year-period, through the disposition of assets, the divestiture of other non-strategic businesses and the use of the net proceeds primarily to reduce debt. These businesses will be accounted for in accordance with APB 30.

As a result of this action, the Corporation recorded during the fourth quarter a pre-tax charge of $1,914 million. This pre-tax charge consists of $2,350 million for an addition to the valuation allowance for Financial Services portfolios, $300 million for estimated losses from operations for Financial Services during the phase-out period and $180 million for restructuring charges related to the change in corporate strategy. These charges were partially offset by an estimated $400 million gain from the disposition of other non-strategic businesses and an estimated $516 million of earnings from those operations during the phase-out period. Income tax benefits totalling $634 million were recorded in connection with this plan. The after-tax estimated loss on disposal of Discontinued Operations was $1,280 million.

In determining the valuation provision for Financial Services real estate portfolio, management used the Derived Investment Value (DIV) method. DIV is the process developed by the Resolution Trust Corporation for use in measuring the values of real estate owned and loans secured by income-producing assets and land. In developing the provision for Financial Services corporate and leasing portfolios, management used various techniques which considered a number of factors, including trading desk values with respect to the corporate portfolio, and information provided by independent consultants. Trading desk values arise from actual or proposed current trades of identical or similar assets. These valuation processes provided portfolio valuations that reflect the strategy of exiting the financial services business. Under the Corporation's previous strategy of downsizing Financial Services over a period of up to five years and holding certain assets for the long term, the methods used to value assets resulted in higher asset values net of valuation allowances.

The estimated gain from the disposition of Other Operations was determined by management using various techniques and assumptions which considered, among other factors, index multiples derived for comparable businesses as appropriately adjusted to reflect the characteristics of the businesses within Other Operations.

Variances from estimates which may occur will be considered in determining if an adjustment of the estimated loss on disposal of Discontinued Operations is necessary.

Prior to December 1992, the Corporation maintained an allowance for credit losses and a valuation allowance for assets held for sale or restructuring at levels considered adequate by management to provide for potential losses, based on an evaluation of risks inherent in the respective portfolios.

At December 31, 1992, the valuation allowance established by the $2,350 million 1992 pre-tax provision, the allowance for credit losses and the valuation allowance for assets held for sale or restructuring have been combined into a single valuation allowance for portfolio investments since, in accordance with the plan, all Financial Services portfolio investments are subject to disposition.

Systematically applied methodologies were utilized to develop the amounts of the allowance for credit losses and the valuation allowance for assets held for sale or restructuring.

Management conducted quarterly loss reserve meetings for the purpose of determining the adequacy of the allowance for credit losses and, during 1992 and 1991, the adequacy of the valuation allowance.

In determining the adequacy of the allowance for credit losses and the valuation allowance for assets held for sale or restructuring, management considered, among other factors, current delinquencies, the characteristics of the accounts, the value of the underlying collateral and past chargeoff experience. Management also assessed general economic conditions and trends and its strategy with respect to underperforming assets.

For receivables held for investment, the quarterly systematic reviews included all nonearning and reduced earning receivables, plus any other receivables where known information about possible credit problems caused management to have concern as to the ultimate collectibility of the borrower's account. When appropriate, management determined specific reserve amounts for those accounts. A general allowance for credit losses was maintained for those accounts for which specific reserves were not assigned.

For assets held for sale or restructuring, all assets were subject to review each quarter. Consideration was given to the likelihood of collection, the quality of collateral, estimated net cash flows, the appropriate discount and capitalization rates and costs to hold the assets until disposed. The result of this process was an estimate of the net realizable value of each asset. The valuation allowance for assets held for sale or restructuring was maintained at a level that was intended to reduce the carrying value of such assets to the estimated net realizable value.

From time to time, management reclassified certain assets held for investment to assets held for sale or restructuring, or certain assets held for sale or restructuring to assets held for investment, based upon developments in the liquidity in the markets for Financial Services assets, management's evaluation of the value of

the asset, as well as the progress management had made in reducing portfolio exposure. At such times, appropriate adjustments to the allowance for credit losses and the valuation allowance were made.

In accordance with APB 30, the consolidated financial statements reflect the operating results of Discontinued Operations separately from Continuing Operations. Prior periods have been restated. In segregating the income statement components, corporate interest expense of $28 million for the eleven months ended November 30, 1992, and $26 million and $15 million for the years ended December 31, 1991 and 1990, respectively, has been allocated to WCI. The assets and activities of this operation, like WFSI, are atypical of the other non-strategic operations to be sold. The allocation of interest expense to WCI reflects the higher degree of leverage typically associated with the real estate development business. Summarized operating results of Discontinued Operations follow.

Operating Results of Discontinued Operations
(in millions)

Eleven Months ended November 30, 1992	Financial Services	Other Operations	Total
Sales and operating revenues	$ 699	$2,926	$3,625
Income (loss) before income taxes	(181)	123	(58)
Income taxes (benefit)	(71)	20	(51)
Minority interest in income	10	4	14
Income (loss) from operations	(120)	99	(21)
1991			
Sales and operating revenues	$1,064	$3,369	$4,433
Income (loss) before income taxes	(1,660)	176	(1,484)
Income taxes (benefit)	(172)	26	(146)
Minority interest in income	13	—	13
Income (loss) from operations	(1,501)	150	(1,351)
1990			
Sales and operating revenues	$1,209	$3,206	$4,415
Income (loss) before income taxes	(844)	247	(597)
Income taxes (benefit)	(167)	35	(132)
Minority interest in income	13	—	13
Income (loss) from operations	(690)	212	(478)

The composition of the estimated loss on disposal of Discontinued Operations recorded in the fourth quarter of 1992 follows.

Estimated Loss on Disposal of Discontinued Operations
(in millions)

	Financial Services	Other Operations	Total
Provision for losses on portfolio investments	$2,350	$ —	$2,350
Estimated operating expenses (income) during phase-out period	300	(516)	(216)
Provision for restructuring	—	180	180
Estimated gain on sale of Discontinued Operations	—	(400)	(400)
Net loss (gain) from Discontinued Operations	2,650	(736)	1,914
Income taxes (benefit)	(901)	267	(634)
Estimated loss (gain) on Discontinued Operations, net of taxes	$1,749	$ (469)	$1,280

The assets and liabilities of Discontinued Operations have been separately classified on the balance sheet as net assets of Discontinued Operations. A summary of these net assets and additional information pertaining to Financial Services follows.

Net Assets of Discontinued Operations
(in millions)

At December 31	1992	1991
Assets:		
Financial Services:		
Cash and cash equivalents	$ 752	$ 678
Portfolio investments, net	5,329	8,257
Deferred income taxes	634	—
Other assets	105	126
Total assets — Financial Services	6,820	9,061
Other Operations:		
Cash and cash equivalents	63	21
Customer receivables	453	469
Inventories	733	636
Other current assets	29	117
Plant and equipment, net	599	611
Accrued estimated gain on sale of Discontinued Operations	400	—
Accrued operating income, net	308	—
Other noncurrent assets	814	747
Total assets — Other Operations	3,399	2,601
Total assets — Discontinued Operations	10,219	11,662
Liabilities and Minority Interest:		
Financial Services:		
Thrift deposits	693	672
Other liabilities	151	94
Deferred income taxes	—	304
Accrued operating expenses	287	—
Minority interest	102	152
Total liabilities and minority interest excluding debt — Financial Services	1,233	1,222
Other Operations:		
Accounts payable	244	254
Other current liabilities	211	283
Deferred income taxes	294	7
Other noncurrent liabilities	30	33
Total liabilities excluding debt — Other Operations	779	577
Short-term debt (note 11)	4,579	3,305
Current maturities of long-term debt (note 13)	885	1,558
Long-term debt (note 13)	1,620	2,483
Total liabilities — Discontinued Operations	9,096	9,145
Net assets of Discontinued Operations	$ 1,123	$ 2,517

Financial Services

Revenue Recognition

Financial Services revenues are recognized generally on the accrual method, except that revenues for real estate accounts identified as held for sale are being recognized only as payments are received.

When accrual method accounts become delinquent for more than two payment periods, usually 60 days, income is recognized only as payments are received. Such

delinquent accounts and real estate accounts held for sale for which no payments are received in the current month, and other accounts on which income is not being recognized because the receipt of either principal or interest is questionable, are classified as nonearning receivables.

Investment Tax Credit

The investment tax credit earned prior to its repeal on property leased to others has been deferred and is recognized as income over the contractual terms of the respective leases.

Portfolio Investments

Portfolio investments are summarized in the table below.

Portfolio Investments
(in millions)

At December 31	1992	1991
Marketable securities	$ 241	$ 498
Receivables	6,728	8,412
Real estate properties	663	730
Investments in partnerships and other entities	895	643
Nonmarketable equity securities	332	173
Equipment on operating leases	101	113
Other	7	18
Portfolio investments	8,967	10,587
Valuation allowance	(3,638)	(2,330)
Portfolio investments, net	$ 5,329	$ 8,257

Marketable securities are summarized in the table below.

Marketable Securities
(in millions)

	Carrying Value	Unrealized Gains (Losses)	Market Value
At December 31, 1992			
U.S. and other government obligations	$111	$ 6	$117
Mortgage-backed securities	113	2	115
Corporate debt securities	17	—	17
Marketable securities	$241	$ 8	$249
At December 31, 1991			
U.S. and other government obligations	$ 95	$ 9	$104
Mortgage-backed securities	357	11	368
Corporate debt securities	46	(28)	18
Marketable securities	$498	$ (8)	$490

At December 31, 1992, all marketable securities were assets of WSAV. At December 31, 1991, $452 million of marketable securities were assets of WSAV.

At December 31, 1992 and 1991, there were no unrealized losses on U.S. and other government obligations or mortgage-backed securities. At December 31, 1992 and 1991, there were no unrealized gains on corporate debt securities. On January 4, 1993, WSAV's marketable securities were sold.

During 1992 and 1991, proceeds from sales of investments in debt securities totalled $367 million and $626 million, respectively. Gross gains on such sales during 1992 and 1991 were $7 million and $24 million, respectively. Gross losses were $19 million and $103 million.

Receivables are summarized in the following table.

Receivables
(in millions)

At December 31	1992	1991
Category of Financing		
Real estate	$3,442	$3,769
Corporate	2,140	3,456
Leasing	1,146	1,187
Receivables	$6,728	$8,412

Real estate receivables consist of loans for commercial and residential real estate properties. At December 31, 1992, first mortgages on real estate properties, the majority of which were income-producing, composed 84% of real estate receivables. Hotels and motels secured 29% of the receivables at December 31, 1992, apartments secured 18%, shopping centers and land each secured 8% and office buildings secured 7%. Of these properties, 18% were located in California, 12% in Illinois, 9% in Pennsylvania and 8% in Florida. No other significant geographic concentrations existed. The largest borrower exposure in the real estate portfolio totalled $299 million at December 31, 1992; average borrower exposure, excluding small-balance borrowers, was $20 million.

At December 31, 1991, first mortgages on real estate properties, the majority of which were income-producing, composed 86% of real estate receivables. Hotels and motels secured 28% of the receivables at December 31, 1991, apartments secured 16%, office buildings secured 13%, shopping centers secured 10% and land secured 7%. Of these properties, 16% were located in California, 13% in Illinois and 8% in both Florida and Pennsylvania. No other significant geographic concentrations existed. The largest borrower exposure in the real estate portfolio totalled $296 million at December 31, 1991; average borrower exposure, excluding small-balance borrowers, was $18 million.

Financial Services has entered into participation agreements with lending institutions which provide for the recourse sale of a senior interest in certain real estate loans. No loans were sold in 1992 or 1991. The receivables previously sold under participation agreements had remaining outstanding balances of $57 million and $142 million at December 31, 1992 and 1991. During 1992 and 1991, Financial Services repurchased $82 million and $92 million, respectively, of receivables previously sold under these agreements.

Corporate receivables are generally considered highly leveraged financing transactions. A transaction is highly leveraged if the related financing involves a buyout, acquisition, or recapitalization of an existing business, and involves a high debt-to-equity ratio.

At December 31, 1992, 58% of corporate receivables were senior obligations of the borrowers and 42% were subordinated. Variable-amount commercial line-of-credit loans secured by the borrowers' inventory or receivables represented 25% of the corporate receivables. An additional 33% of corporate receivables represented fixed-amount loans secured by specified assets, general assets, stock or other tangible assets of the borrower. The remaining corporate receivables were unsecured.

Borrowers in the corporate portfolio, generally middle market companies, are located primarily throughout the U.S. Manufacturing, retail trade, media and financial services represent the significant industry concentrations in this portfolio. Exposure to the largest borrower totalled $165 million at December 31, 1992; average borrower exposure was $15 million.

At December 31, 1991, 53% of corporate receivables were senior obligations of the borrowers and 47% were subordinated. Variable-amount commercial line-of-credit loans secured by the borrowers' inventory or receivables represented 20% of corporate receivables. An additional 33% of corporate receivables represented fixed-amount loans secured by specified assets, general assets, stock or other tangible assets of the borrower. The remaining corporate receivables were unsecured. Exposure to the largest borrower totalled $182 million at December 31, 1991; average borrower exposure was $19 million.

At December 31, 1992, included in real estate and corporate financing receivables were $326 million and $30 million, respectively, of receivables of WSAV. Of these amounts $292 million of real estate receivables and all of the corporate receivables were sold on January 4, 1993. At December 31, 1991, included in real estate and corporate receivables were $317 million and $38 million, respectively, of receivables of WSAV.

The leasing portfolio consists of direct financing and leveraged leases. At December 31, 1992 and 1991, 66% and 64% respectively, of these leases related to aircraft. The portfolio also includes leases for cogeneration facilities, railcars, marine vessels and trucking equipment. The net investment in leases is summarized below.

Net Investment in Leases
(in millions)

At December 31	1992	1991
Rentals receivable (net of principal and interest on nonrecourse loans)	$1,232	$1,303
Estimated residual value of leased assets	478	503
Unearned and deferred income	(544)	(614)
Investment in leases	1,166	1,192
Deferred taxes and deferred investment tax credits arising from leases	(657)	(620)
Net investment in leases	$ 509	$ 572

Nonearning and reduced earning receivables are summarized below.

Nonearning and Reduced Earning Receivables
(in millions)

At December 31	1992	1991
Category of Financing		
Nonearning receivables:		
Real estate	$1,253	$ 931
Corporate	670	562
Leasing	—	19
Nonearning receivables	$1,923	$1,512
Reduced earning receivables:		
Real estate	$ 862	$1,036
Corporate	19	29
Reduced earning receivables	$ 881	$1,065

Under original contractual terms, the income that would have been earned on nonearning receivables at December 31, 1992 and 1991 totalled $203 million and $186 million. Income actually earned on nonearning receivables at December 31, 1992 and 1991 totalled $57 million and $56 million, respectively. Financial Services has issued commitments to fund $234 million related to accounts at December 31, 1992 included in the table above. Included in nonearning receivables at December 31, 1992 were $263 million of receivables from borrowers who were in bankruptcy at year-end 1992.

Reduced earning receivables consist generally of real estate loans which have been modified and earned less than the original contractual rate during the last month of the reporting period and for which the borrowers are in financial difficulty, as determined by management. Repayment terms on restructured real estate receivables often provide for payments based on the performance of the underlying property as well as a residual interest in that property. Under original contractual terms, the income that would have been earned on reduced earning receivables at December 31, 1992 and 1991 totalled $65 million and $101 million. Income actually earned on reduced earning receivables at December 31, 1992 and 1991 totalled $41 million and $62 million, respectively.

Maturities for receivables are presented in the table below.

Receivables and Related Contractual Maturities
(in millions)

	At December 31, 1992							At December 31, 1991
		Year of Maturity						
Category of Financing	Total	1993	1994	1995	1996	1997	After 1997	Total
Real estate	$3,442	$1,374	$650	$364	$366	$281	$ 407	$3,769
Corporate	2,140	341	299	333	232	292	643	3,456
Leasing	1,146	14	26	33	44	52	977	1,187
Receivables	$6,728	$1,729	$975	$730	$642	$625	$2,027	$8,412

For receivables at December 31, 1992, management expects actual contractual cash collections to be significantly different than their scheduled maturities during 1993 due to the planned disposition of assets as well as the expected inability of real estate customers to repay their borrowings. Accordingly, the maturities shown in the table above should not be regarded as a forecast of future cash collections.

During 1992 and 1991, receivables liquidations totalled $5,119 million and $4,888 million, respectively, of which $1,197 million and $801 million represented sales of receivables. The remainder were principally repayments under commercial line-of-credit loans.

Real estate properties were acquired through foreclosure proceedings or represent "in-substance" foreclosures. The acquired properties are being operated by either Financial Services or contracted professional management.

Investments in partnerships and other entities at December 31, 1992 included $457 million of corporate financing investments, $402 million of real estate partnerships and $36 million of leasing partnerships. At December 31, 1991, investments in partnerships and other entities included $306 million of corporate financing investments, $297 million of real estate partnerships and $40 million of leasing partnerships. The corporate financing investments consisted primarily of investments in limited partnerships engaged in subordinated investing to highly leveraged borrowers. Nonmarketable equity securities related to corporate financing transactions. Originally, investments in partnerships, other entities and nonmarketable securities generally were acquired with the intent to realize appreciation upon disposition, reflecting an increase in the value of the underlying entity. However, many of these investments are now the result of debtor account restructurings.

Investments in partnerships or other entities are accounted for by either the equity or cost methods in those cases where the Corporation gains majority ownership of entities of a temporary nature or in those cases where the Corporation is legally prevented from exercising control even though it has majority ownership. Ownership is considered of a temporary nature if the entity is acquired through foreclosure and the Corporation expects to maximize its investment through near-term disposal or liquidation. At December 31, 1992 and 1991, the total carrying value of such non-consolidated entities related to Financial Services was $147 million and $23 million, respectively. In addition, at December 31, 1991, the total carrying value of a non-consolidated entity related to Other Operations was $16 million.

The following table is a reconciliation of the valuation allowance for portfolio investments for the years ended December 31, 1992, 1991 and 1990.

Valuation Allowance for Portfolio Investments
(in millions)

Year Ended December 31						
Category of Investment	Beginning Balance	Portfolio Investments Written Off	Transfers	Provision Added During Year	Ending Balance	Percent of Investments
1992						
Marketable securities	$ 28	$ 22	$ (2)	$ (4)	$ —	—%
Receivables:						
Real estate	1,279	417	(307)	1,494	2,049	59.5
Corporate	465	210	(58)	337	534	25.0
Leasing	17	9	(11)	60	57	5.0
Total receivables	1,761	636	(376)	1,891	2,640	39.2
Real estate properties	392	514	241	280	399	60.2
Investments in partnerships and other entities	129	42	36	195	318	35.5
Nonmarketable equity securities	20	32	92	201	281	84.6
1992	$ 2,330	$ 1,246	$ (9)	$ 2,563	$ 3,638	40.6%
1991						
Marketable securities	$ 178	$ 110	$ (40)	$ —	$ 28	5.6%
Receivables:						
Real estate	550	355	(52)	1,136	1,279	33.9
Corporate	436	197	(70)	296	465	13.5
Leasing	34	25	(22)	30	17	1.4
Total receivables	1,020	577	(144)	1,462	1,761	20.9
Real estate properties	124	39	78	229	392	53.7
Investments in partnerships and other entities	11	5	25	98	129	20.1
Nonmarketable equity securities	—	101	96	25	20	11.6
1991	$ 1,333	$ 832	$ 15	$ 1,814	$ 2,330	22.0%
1990	$ 231	$ 68	$ 31	$ 1,139	$ 1,333	11.1%

During 1992, portfolio investments written off represented 12.7% of average outstanding portfolio investments. The comparable percentages for 1991 and 1990 were 7.1% and 0.7%, respectively. Portfolio investments written off during 1992 and 1991 reflect management's strategy to liquidate or downsize portfolios.

Marketable and nonmarketable securities written off usually resulted from the disposition of the securities for cash. Receivables and real estate properties written off generally resulted from management's determination of the recoverability of the receivable balance or property value in accordance with management's disposition strategy.

Transfers among categories of investment are primarily a result of the movement of receivables, and the related reserves, to other categories of investment due to foreclosures and other restructurings.

The increase in the provision in 1992 compared to 1991 reflects management's current strategy to exit the financial services business, compared to management's prior strategy to downsize portfolios over a period of up to five years. The increase in the provision in 1991 compared to 1990 reflected the continued weakening in the real estate and highly leveraged corporate financing markets, which affected the property and asset values of Financial Services portfolio investments.

At December 31, 1992, the valuation allowances of $2,049 million for real estate receivables and $534 million for corporate receivables included $174 million and $3 million, respectively, related to estimated losses on guarantees and commitments. At December 31, 1991, the valuation allowance of $1,279 million for real estate receivables included $289 million related to estimated losses on guarantees and commitments. There were no reserves for estimated losses on guarantees and commitments at December 31, 1990.

The valuation allowance at December 31, 1992, adjusted by adding back amounts written off since January 1, 1991 totalling $988 million related to investments remaining in the portfolio at year-end 1992, represented 46.4% of the value of portfolio investments, with such investments similarly adjusted. The valuation allowance at December 31, 1991, comparably adjusted for amounts written off since January 1, 1991 totalling $375 million, represented 24.7% of the value of portfolio investments.

Excluding the portfolio investments of Westinghouse Federal Bank at December 31, 1992, which were sold by WSAV in January 1993, the valuation allowances for real estate receivables and real estate properties as a percent of those categories of investment were 64.9% and 60.3%, respectively, at year-end 1992.

Thrift deposits, which were the obligations of WSAV and were assumed on January 4, 1993 by the purchaser of the thrift, are summarized below.

Thrift Deposits
(in millions)

At December 31	1992		1991	
Type of Account	Balance	Avg. Rate	Balance	Avg. Rate
Term accounts:				
Due in 3 months	$ 90	5.0%	$123	6.5%
Due in 3 to 6 months	104	5.3%	80	6.4%
Due in 6 to 12 months	123	5.8%	115	6.6%
Due in 12 months or more	200	6.3%	182	7.4%
Passbook accounts	81	3.1%	72	4.7%
Money market accounts	19	3.2%	37	4.3%
NOW accounts	62	2.5%	38	4.5%
Other, noninterest and escrow	14	—	25	—
Thrift deposits	$693		$672	

Note 3: Pensions

The Corporation has various pension arrangements covering substantially all employees. Most plan benefits are based on either years of service and compensation levels at the time of retirement or a formula based on career earnings. Pension benefits are paid from trusts funded by contributions from employees and the Corporation. The pension funding policy is consistent with the funding requirements of U.S. federal and other government laws and regulations. Plan assets consist primarily of listed stocks, fixed income securities and real estate investments.

The projected benefit obligation is the actuarial present value of that portion of the projected benefits attributable to employee service rendered to date. Service cost is the actuarial present value of that portion of the projected benefits attributable to employee service rendered during the year.

Net Periodic Pension Costs
(in millions)

	1992	1991	1990
Service cost	$ 68	$ 65	$ 65
Interest cost on projected benefit obligation	432	436	438
Amortization of unrecognized net obligation	44	48	44
Amortization of unrecognized prior service cost	5	8	11
Amortization of unrecognized net loss	20	3	—
	569	560	558
Return on plan assets:			
Actual return on plan assets	(107)	(699)	53
Unrecognized return on plan assets	(376)	216	(525)
Recognized return on plan assets	(483)	(483)	(472)
Net periodic pension cost	$ 86	$ 77	$ 86

For the principal plans for each of the three years, a 9% discount rate and a 6% rate of increase in future compensation levels was used in determining the actuarial present value of the projected benefit obligation. The expected long-term rate of return on plan assets was 11%.

For financial reporting purposes, a pension plan is considered underfunded when the fair value of plan assets is less than the accumulated benefit obligation. When that is the case, a minimum pension liability must be recognized for the sum of the underfunded amount plus any prepaid pension contributions. In recognizing such a liability, an intangible asset is usually recorded. However, the amount of the intangible asset may not be greater than the sum of the prior service cost not yet recognized and the unrecognized transition obligation as shown in the Funding Status table. When the liability to be recognized is greater than the intangible asset limit, a charge must be made to shareholders' equity for the difference, net of any tax effects which could be recognized in the future.

At December 31, 1992, a minimum pension liability of $1,099 million was recognized for the sum of the underfunded amount of $303 million plus the prepaid pension contribution of $796 million. An intangible asset of $348 million and a charge to shareholders' equity of $751 million, which was reduced to $496 million due to tax deferrals of $255 million, offset the pension liability.

At December 31, 1991, no pension liability was provided since the fair value of plan assets was in excess of the accumulated benefit obligation. See notes 10, 14 and 15 to the financial statements.

Funding Status – Pensions
(in millions)

At December 31	1992	1991
Actuarial present value of benefit obligation:		
Vested	$(4,192)	$(4,365)
Nonvested	(376)	(409)
Accumulated benefit obligation	(4,568)	(4,774)
Effect of projected future compensation levels	(389)	(324)
Projected benefit obligation for service rendered to date	(4,957)	(5,098)
Plan assets at fair value	4,265	4,856
Projected benefit obligation in excess of plan assets	(692)	(242)
Unrecognized net loss	1,140	643
Prior service cost not yet recognized in net periodic pension cost	7	13
Unrecognized transition obligation at January 1, net of amortization	341	450
Prepaid pension contribution	$ 796	$ 864

As a result of the plan announced in November 1992, see note 2 to the financial statements, in accordance with the provisions of SFAS No. 88, "Employers' Accounting for Settlements and Curtailments of Defined Benefit Pension Plans and for Termination Benefits," a curtailment charge totalling $66 million was included in the estimated loss on disposal of Discontinued Operations. This curtailment charge reduced the unrecognized transition obligation and prior service costs not yet recognized in periodic pension costs.

Note 4: Postretirement Benefits Other Than Pensions

The Corporation has defined benefit postretirement plans that provide medical, dental and life insurance for eligible retirees and dependents.

The adoption of SFAS No. 106 on the immediate recognition basis, concurrent with the adoption of SFAS No. 109, as of January 1, 1992, resulted in a charge to first quarter 1992 earnings of $742 million, or $2.14 per share, net of $431 million of deferred income tax effects.

Summary information on the Corporation's plans follows.

Funding Status – Postretirement Benefits
(in millions)

At December 31	1992
Accumulated postretirement benefit obligation:	
Retirees	$ 778
Fully eligible, active plan participants	75
Other active plan participants	335
Accumulated postretirement benefit obligation	$1,188

The components of net periodic postretirement benefit cost follow.

Net Periodic Postretirement Benefit Cost
(in millions)

	1992
Immediate recognition of transition obligation	$1,173
Service cost, benefits attributed to employee service during the year	15
Interest cost on accumulated postretirement benefit obligation	95
Actual return on plan assets	—
Net periodic postretirement benefit cost	$1,283

The accumulated postretirement benefit obligation was calculated using the terms of medical, dental and life insurance plans, including the effects of established maximums on covered costs, together with relevant actuarial assumptions and health-care cost trend rates projected at annual rates ranging from 13% in 1992, declining 1/2% each year thereafter, to 7% in the year 2004 and beyond. The effect of a 1% annual increase in these assumed cost trend rates would increase the accumulated postretirement benefit obligation by approximately $67 million; the annual service and interest cost components in the aggregate would not be materially affected. A 9% discount rate and a 6% rate of increase in future compensation levels was used in determining the actuarial present value of the accumulated postretirement benefit obligation.

Certain of the Corporation's non-U.S. subsidiaries have private and government-sponsored plans for retirees. The cost of these plans is not significant to the Corporation.

Note 5: Income Taxes

Income Taxes from Continuing Operations
(in millions)

	1992	1991	1990
Current:			
Federal	$125	$ 32	$174
State	35	(4)	16
Foreign	46	39	44
Total income taxes current	206	67	234
Deferred:			
Federal	(15)	45	37
State	—	16	—
Foreign	(9)	(7)	5
Total income taxes deferred	(24)	54	42
Income taxes	$182	$121	$276

Consolidated Income Taxes
(in millions)

	1992	1991	1990
Current:			
Federal	$ (33)	$ (30)	$135
State	37	(2)	20
Foreign	62	43	64
Total income taxes current	66	11	219
Deferred:			
Federal	(1,041)	(77)	(70)
State	(118)	47	(4)
Foreign	45	(6)	(1)
Total income taxes deferred	(1,114)	(36)	(75)
Operating loss carryforward – Federal	(290)	—	—
Income taxes (benefit)	$(1,338)	$ (25)	$144

Income tax expense (benefit) included in the consolidated financial statements follows.

Components of Consolidated Income Taxes
(in millions)

	1992	1991	1990
Continuing Operations	$ 182	$121	$276
Discontinued Operations	(51)	(146)	(132)
Estimated loss on disposal of Discontinued Operations	(634)	—	—
Cumulative effect of change in accounting principle for postretirement benefits other than pensions	(431)	—	—
Cumulative effect of change in accounting principle for income taxes	(404)	—	—
Income taxes (benefit)	$(1,338)	$ (25)	$144

In addition to the amounts in the table above, during 1992, 1991 and 1990, $255 million of income tax benefit, $71 million of income tax expense and $74 million of income tax benefit, respectively, were recorded against shareholders' equity as a result of the pension liability adjustment. See note 3 to the financial statements.

In January 1992, the Corporation adopted SFAS No. 109. This statement replaced SFAS No. 96 which the Corporation had used to account for income taxes since 1988. The effect of adopting SFAS No. 109 on the Corporation was to permit the recognition of deferred tax benefits as shown in the following table.

Deferred Tax Benefits Recognized upon Adoption of SFAS No. 109
(in millions)

At January 1,	1992
Change related to application of financial basis net operating loss and credit carryforwards	$487
State income tax, net of federal effect	12
Valuation allowance	(95)
Deferred tax benefit	$404

The foreign portion of income before income taxes and minority interest in income of consolidated subsidiaries in the consolidated statement of income was $61 million in 1992, $32 million in 1991, and $120 million in 1990. Such income consists of profits and losses generated from foreign operations and can be subject to both U.S. and foreign income taxes.

Deferred federal income taxes have not been provided on cumulative undistributed earnings from foreign subsidiaries, totalling $474 million at December 31, 1992, in which the earnings have been reinvested for an indefinite time. It is not practicable to determine the income tax liability that would result had such earnings been repatriated. The amount of withholding taxes that would be payable upon such repatriation is estimated to be $30 million.

During 1992, federal income tax assessments were settled which reduced deferred income taxes by $70 million.

Income from Continuing Operations includes income of certain manufacturing operations in Puerto Rico which are exempt from U.S. federal income tax and partially exempt from Puerto Rican income tax under grants of industrial tax exemptions. These tax exemptions provided tax benefits of $20 million or $.06 per share in 1992, $20 million or $.06 per share in 1991, and $26 million or $.09 per share in 1990. The exemptions will expire at various dates from 2002 through 2007.

Deferred income taxes result from temporary differences in the financial bases and tax bases of assets and liabilities. The type of differences that give rise to significant portions of deferred income tax liabilities or assets are shown in the accompanying table.

Consolidated Deferred Income Tax Sources
(in millions)

At December 31,	1992	1991
Provisions for expenses and losses	$1,496	$1,255
Accumulated depreciation	(223)	(245)
Long-term contracts in process	112	111
Leasing activities	(670)	(674)
Minimum pension liabilities	(8)	(287)
Financial basis operating losses and credit carryforwards	—	(184)
Tax basis operating losses and credit carryforwards	544	—
Other postretirement benefits	431	—
Other deferred tax assets	89	116
Other deferred tax liabilities	(111)	(239)
Valuation allowance for deferred taxes	(79)	—
Deferred income taxes, net asset (liability)	$1,581	$ (147)

The valuation allowance for deferred taxes represents foreign tax credits not anticipated to be utilized. The net balance of deferred income taxes is intended to offset future taxable income expected to be earned by the Corporation's continuing businesses. See Management's Discussion and Analysis — Income Taxes.

At December 31, 1992 there were regular tax net operating loss carryforwards of $850 million which expire by the year 2007, alternative minimum tax operating loss carryforwards of $465 million which expire by the year 2007 and alternative minimum tax credit carryforwards of $255 million which have no expiration date.

Effective Tax Rate for Continuing Operations

	1992	1991	1990
Federal statutory income tax rate	34.0%	34.0%	34.0%
Increase (decrease) in the tax rate resulting from:			
Change related to application of financial basis net operating losses and credit carryforwards	—	—	(7.1)
State income tax, net of federal effect	4.3	2.1	1.1
Lower tax rate on income of foreign sales corporations	(.6)	(2.6)	(.9)
Lower tax rate on net income of Puerto Rican operations	(3.7)	(5.2)	(2.5)
Other	—	3.0	2.3
Effective tax rate for Continuing Operations	34.0%	31.3%	26.9%

Effective Tax (Benefit) Rate for Discontinued Operations

	1992	1991	1990
Federal statutory income tax (benefit) rate	(34.0)%	(34.0)%	(34.0)%
Decrease (increase) in the benefit rate resulting from:			
Lower tax rate on net income of Puerto Rican operations	(3.4)	(2.3)	(9.3)
State income tax net of federal effect	(3.3)	1.4	—
Change related to application of financial basis net operating losses and credit carryforwards	—	25.9	22.5
Additional liability of businesses to be disposed due to tax basis adjustments and distribution of foreign proceeds	7.4	—	—
Valuation allowance	(0.8)	—	—
Other	(0.7)	(0.8)	(1.4)
Effective tax (benefit) rate for Discontinued Operations	(34.8)%	(9.8)%	(22.2)%

Effective Tax (Benefit) Rate for Cumulative Effect of Change in Accounting Principle for Other Postretirement Benefits

	1992
Federal statutory income tax (benefit) rate	(34.0)%
Decrease (increase) in the benefit rate resulting from:	
State income tax, net of federal effect	(2.8)
Effective tax (benefit) rate for change in accounting principle for postretirement benefits other than pensions	(36.8)%

The federal income tax returns of the Corporation and its wholly-owned subsidiaries are settled through the year ended December 31, 1986. Management believes that adequate provisions for taxes have been made through December 31, 1992.

Note 6: Customer Receivables

Customer receivables at December 31, 1992 included $237 million which represented the sales value of material shipped under long-term contracts but not billed to the customer. Billing will occur upon shipment of major components of the contract, and collection of these receivables is expected to be substantially completed within one year.

Allowance for doubtful accounts of $44 million and $49 million at December 31, 1992 and 1991, respectively, were deducted from customer receivables.

At December 31, 1992 and 1991, approximately 20% of the Corporation's customer receivables were from sales on open account with various agencies of the U.S. government, which is the Corporation's largest single customer. The Corporation performs ongoing credit evaluations of its customers and generally does not require collateral.

Note 7: Inventories and Costs and Billings on Uncompleted Contracts

During the fourth quarter of 1992, the Corporation changed its method of determining the cost of a portion of its inventories from the LIFO method to the FIFO method.

The plan adopted by the Board of Directors in November 1992, which, as discussed in note 2 to the financial statements, was accounted for under the requirements of APB 30, resulted in a decrease in inventories of Continuing Operations that were valued using the LIFO method. The change to the FIFO method will conform all inventories of the Corporation to the same method of valuation. The Corporation believes that the FIFO method of inventory valuation provides a more meaningful presentation of the financial position of the Corporation since it reflects more recent inventory acquisition costs in the balance sheet. Under the current economic environment of low inflation, the Corporation believes that the FIFO method also results in a better matching of current costs with current revenues.

The change in the method of valuing inventories has not been applied retroactively to prior periods as the effect on the Corporation's financial position and its results of operations was not material.

Inventories
(in millions)

At December 31	1992	1991
Raw materials	$ 68	$ 83
Work in process	741	825
Finished goods	136	118
	945	1,026
Long-term contracts in process	657	923
Progress payments to subcontractors	168	201
Recoverable engineering and development costs	473	504
	2,243	2,654
Inventoried costs related to contracts with progress billing terms	(1,189)	(1,733)
Inventories	$1,054	$ 921

Costs and Billings on Uncompleted Contracts
(in millions)

At December 31	1992	1991
Costs included in inventories	$1,185	$1,262
Progress billings on contracts	(854)	(865)
Uncompleted contracts costs over related billings	$ 331	$ 397
Progress billings on contracts	$ 660	$1,046
Costs included in inventories	(4)	(471)
Uncompleted contracts billings over related costs	$ 656	$ 575

Raw materials, work in process and finished goods included contract-related costs of approximately $866 million at December 31, 1992 and $891 million at December 31, 1991. All costs in long-term contracts in process, progress payments to subcontractors, and recoverable engineering and development costs were contract related.

Inventories other than those related to long-term contracts are generally realized within one year. Inventoried costs do not exceed realizable values.

Note 8: Prepaid and Other Current Assets

Prepaid and Other Current Assets
(in millions)

At December 31	1992	1991
Deferred income taxes	$363	$ 71
Other	262	180
Prepaid and other current assets	$625	$251

Note 9: Plant and Equipment

Plant and Equipment
(in millions)

At December 31	1992	1991
Land and buildings	$ 666	$ 671
Machinery and equipment	3,057	3,160
Construction in progress	266	297
Plant and equipment, at cost	3,989	4,128
Accumulated depreciation	(2,185)	(2,206)
Plant and equipment, net	$1,804	$1,922

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Note 10: Intangible and Other Noncurrent Assets

Intangible and Other Noncurrent Assets
(in millions)

At December 31	1992	1991
Deferred income taxes	$ 877	$ 93
Goodwill and other acquired intangible assets	818	844
Prepaid pension contribution (note 3)	796	864
Unrecognized pension costs (note 3)	348	—
Joint ventures and other affiliates	190	195
Noncurrent receivables	106	102
Uranium settlement assets (note 17)	46	54
Other	325	486
Intangible and other noncurrent assets	$3,506	$2,638

Joint ventures and other affiliates include investments in companies where the Corporation does not have the ability to exercise control.

Uranium settlement assets relate to uranium inventory awaiting delivery and settlement items being produced under uranium supply contract settlement agreements. Inventory and other settlement items expected to be delivered within one year are included in other current assets.

Note 11: Short-Term Debt

In December 1991, the Corporation entered into a three-year $6 billion revolving credit facility agreement (revolver) with a syndicate of domestic and international banks. The largest commitment from any one bank is less than 5% of the total facility. The revolver is available for use by Westinghouse and WCC subject to the maintenance of certain ratios and compliance with other covenants and subject to there being no material adverse change with respect to the Corporation taken as a whole. Among other things, these covenants place restrictions on the incurrence of liens, the amount of debt on a consolidated basis and at the subsidiary level, and the amount of contingent liabilities. The covenants also require the maintenance of a maximum leverage ratio, a minimum interest coverage ratio, and minimum consolidated net worth. Certain of the covenants become more restrictive over the term of the revolver.

The interest rate for revolver borrowings is determined at the time of each borrowing and may be based on one of the following indices: London Interbank Offer Rate (LIBOR), certificate of deposit, prime, or federal funds. The interest rates for the borrowings under the revolver at December 31, 1992 and 1991, were based on LIBOR. At December 31, 1992, consolidated borrowings under the revolver totalled $5,495 million, of which $1,100 million was attributed to Continuing Operations and $4,395 million was attributed to Discontinued Operations.

There are no compensating balance requirements under the revolver. Origination fees of $91 million are being amortized and charged to Discontinued Operations over the term of the revolver. Facility fees during 1992 were .375% of the total facility and were charged to Continuing and Discontinued Operations on a pro-rata basis. Further downgrades could result in a facility fee of .5%. In addition, a utilization fee is charged if total revolver borrowings are $2,000 million or more. Based on borrowings outstanding at year-end 1992, this fee was .25% of the outstanding balance.

As a result of rating agency actions and management's assessment of the capital markets, in October 1992, the Corporation discontinued the sale of commercial paper and replaced this debt with borrowings under the revolver.

Short-Term Debt — Continuing Operations
(in millions)

	At December 31		During the Year		
	Balance	Composite Rate	Max. Outstanding	Avg. Outstanding	Wtd. Avg. Rate
1992					
Commercial paper	$ 78	3.6%	$1,890	$1,077	4.5%
Revolving credit facility	1,100	4.4%	1,100	646	5.0%
Short-term foreign bank loans	61	12.0%	158	122	12.1%
Short-term debt	$1,239				
1991					
Commercial paper	$1,442	5.9%	$2,435	$1,897	6.3%
Revolving credit facility	985	5.7%	985	22	6.4%
Short-term foreign bank loans	89	13.7%	171	104	13.7%
Short-term debt	$2,516				
1990					
Commercial paper	$1,786	8.0%	$2,014	$1,480	8.2%
Short-term foreign bank loans	83	14.9%	192	111	14.9%
Short-term debt	$1,869				

Average outstanding borrowings for Continuing Operations were determined based on daily amounts outstanding for commercial paper and the revolver, and on monthly balances outstanding for short-term foreign bank loans. The average rates for those bank loans compared to commercial paper reflect the impact of higher interest costs on local currency borrowings of subsidiaries.

Short-Term Debt — Discontinued Operations
(in millions)

	At December 31		During the Year		
	Balance	Composite Rate	Max. Outstanding	Avg. Outstanding	Wtd. Avg. Rate
1992					
Commercial paper	$ 131	3.6%	$3,178	$2,066	4.2%
Revolving credit facility	4,395	4.1%	4,395	1,747	4.5%
Other revolving credit facilities	—	—	50	1	3.8%
Other	53				
Short-term debt	$4,579				
1991					
Commercial paper	$2,202	5.3%	$4,384	$3,325	6.5%
Revolving credit facility	1,005	5.7%	1,005	25	6.4%
Other revolving credit facilities	—	—	1,470	282	5.8%
Sterling commercial paper	—	—	109	30	12.9%
Variable-rate trust master notes	—	—	207	39	6.3%
Other	98				
Short-term debt	$3,305				
1990					
Commercial paper	$3,725	7.9%	$6,012	$5,648	8.2%
Sterling commercial paper	109	14.1%	139	72	14.5%
Variable-rate trust master notes	164	7.2%	197	156	8.1%
Other	180				
Short-term debt	$4,178				

Average outstanding borrowings for Discontinued Operations were determined based on daily amounts outstanding for commercial paper and revolving credit facilities, and on monthly balances outstanding for variable-rate trust master notes.

Financial Services has entered into interest rate and currency exchange agreements with notional amounts which totalled $2,218 million and $3,133 million at December 31, 1992 and 1991, respectively. Financial Services exposure under the agreements is limited to the cost of replacing the exchange agreement in the event of nonperformance by the counter party. Certain of these agreements are associated with medium-term notes included in long-term debt of Discontinued Operations. See note 13 to the financial statements.

Note 12: Other Current Liabilities

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Other Current Liabilities
(in millions)

At December 31	1992	1991
Accrued employee compensation	$ 290	$ 233
Income taxes currently payable	160	162
Accrued product warranty	89	91
Other	681	824
Other current liabilities	$1,220	$1,310

Note 13: Long-Term Debt

Long-Term Debt — Continuing Operations
(in millions)

At December 31	1992	1991
8.60% notes due 1993	$ 250	$ 250
Medium-term notes due through 2001	124	124
7¼% notes due 1996	300	300
8⅞% notes due 2001	250	250
8⅜% notes due 2002	348	—
Variable-rate notes due 2007	2	219
8⅝% debentures due 2012	273	—
Other	63	151
	1,610	1,294
Current maturities	(287)	(43)
Long-term debt — Continuing Operations	$1,323	$1,251

Medium-term notes totalling $124 million were issued at various times during 1991. The notes range in maturity from two to ten years and carry interest rates ranging from 7.5% to 9.4%.

In June 1992, Westinghouse issued $350 million of 8⅜% notes due June 15, 2002. These notes were offered at a discount.

The variable-rate notes mature in December 2007 unless redeemed at the holders' option. As of January 7, 1993, all of these notes have been redeemed except for escrow notes of a nominal amount which will be released from escrow at the direction of Westinghouse. At December 31, 1992 and 1991, the effective interest rates on the notes of 3.2% and 5.4%, respectively, were based on the average of the London Interbank Bid Rate and LIBOR.

In August 1992, Westinghouse issued $275 million of 8⅝% debentures due August 1, 2012. These debentures were offered at a discount.

At December 31, 1992 and 1991, $25 million of the medium-term notes and all of the 8⅞% notes were subject to interest rate exchange agreements. These agreements have effectively changed the fixed interest rate for the first two years of the notes' terms to a variable rate based on the 30-day commercial paper rate. At December 31, 1992 and 1991, the effective interest rates on the medium-term notes were 7.8% and 8.6%, respectively, and the effective interest rates on the 8⅞% notes were 5.1% and 5.0%, respectively.

The 8.60% notes, the medium-term notes, the 7¼% notes, the 8⅞% notes, the 8⅜% notes, and the 8⅝% debentures may not be redeemed prior to maturity.

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The 8⅝% notes due 2002 and the 8⅝% debentures due 2012 were issued under a shelf registration statement filed in 1991. In August 1992, Westinghouse filed an additional shelf registration statement for $1 billion and, as of December 31, 1992, this shelf registration was unused.

At December 31, 1992, Continuing Operations long-term debt maturing in each of the following years is: 1993 – $287 million, 1994 – $2 million, 1995 – $3 million, 1996 – $317 million, and 1997 – $2 million.

Long-Term Debt — Discontinued Operations
(in millions)

At December 31	1992	1991
Medium-term notes due through 2001	$1,826	$3,084
Variable-rate bank loan due through 1993	65	96
Variable-rate senior notes due 1995	—	200
8⅞% senior notes due 1995	150	150
6.9% to 8.6% Federal Home Loan Bank advances due through 1996	61	94
8⅞% senior notes due 1996	100	100
8⅞% senior notes due 2014	150	150
Other	153	167
	2,505	4,041
Current maturities	(885)	(1,558)
Long-term debt — Discontinued Operations	$1,620	$2,483

During 1992, $1,313 million of medium-term notes were paid at maturity and $55 million of new notes were issued. At December 31, 1992, the average interest rate and average remaining maturity for medium-term notes were 7.3% and 1.65 years, compared to 7.4% and 1.72 years at year-end 1991.

The variable-rate bank loan due through 1993 consists of floating-rate construction mortgage notes. The effective interest rate was 5.4% at December 31, 1992, and 5.7% at December 31, 1991, and is based on a federal funds rate.

The variable-rate senior notes due 1995 were redeemed in February 1992. At December 31, 1991, the effective interest rate on the notes was 6.3%.

At December 31, 1992, $2,144 million was available for the future issuance of WCC debt securities under a 1990 shelf registration which became effective in 1991. WCC does not anticipate issuing securities under this shelf registration.

At December 31, 1992, Discontinued Operations long-term debt maturing in each of the following years is: 1993 – $885 million, 1994 – $791 million, 1995 – $239 million, 1996 – $390 million, and 1997 – $41 million.

Note 14: Other Noncurrent Liabilities

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Other Noncurrent Liabilities
(in millions)

At December 31	1992	1991
Postretirement benefits (note 4)	$1,188	$ —
Minimum pension liability (note 3)	1,099	—
Other	454	281
Other noncurrent liabilities	$2,741	$281

Note 15: Shareholders' Equity

Shareholders' Equity
(in millions)

At December 31	1992	1991	1990
Preferred Stock:			
Balance at January 1	$ —	$ —	$ —
Series B preferred shares issued	8	—	—
Balance at December 31	$ 8	$ —	$ —
Common Stock:			
Balance at January 1	$ 393	$ 370	$ 184
Two-for-one stock split	—	—	185
Shares issued	—	23	1
Balance at December 31	$ 393	$ 393	$ 370
Capital in Excess of Par Value:			
Balance at January 1	$ 1,039	$ 659	$ 795
Two-for-one stock split	—	—	(185)
Redemption of common share "rights"	(2)	—	—
Common shares issued	—	548	21
Series B preferred shares issued	535	—	—
Shares issued under various compensation and benefit plans	(42)	(169)	(2)
Shares issued under dividend reinvestment plan	(7)	(2)	—
Shares issued for acquisitions	—	—	25
Other	—	3	5
Balance at December 31	$ 1,523	$ 1,039	$ 659
Common Stock Held in Treasury:			
Balance at January 1	$(1,264)	$(1,887)	$(1,798)
Shares purchased by the Corporation	—	(15)	(261)
Shares issued under various compensation and benefit plans	136	631	96
Shares issued under dividend reinvestment plan	26	7	—
Shares issued for acquisitions	—	—	76
Balance at December 31	$(1,102)	$(1,264)	$(1,887)
Other:			
Balance at January 1	$ 4	$ (346)	$ (22)
Foreign currency translation adjustments	(6)	(2)	24
Unrealized gain on Financial Services marketable equity securities	—	—	4
Pension liability adjustment, net of deferred taxes	(496)	352	(352)
Balance at December 31	$ (498)	$ 4	$ (346)
Retained Earnings:			
Balance at January 1	$ 3,582	$ 5,101	$ 5,225
Net income (loss)	(1,291)	(1,086)	268
Cash dividends	(271)	(433)	(392)
Balance at December 31	$ 2,020	$ 3,582	$ 5,101
Shareholders' equity	$ 2,344	$ 3,754	$ 3,897

In June 1992, Westinghouse sold 32,890,000 Depositary Shares at $17 per share. Each of the Depositary Shares represents ownership of one-quarter of a share of Westinghouse's $1 par value Series B Conversion Preferred Stock (B Preferred) deposited with Mellon Bank, N.A., as Depositary, and entitles the owner to all of the proportionate rights, preferences and privileges of the B Preferred. A total of 8,222,500 B Preferred shares were deposited. The Depositary Shares are listed on the New York Stock Exchange (NYSE) under the symbol "WXPrP."

Since the Depositary Shares are claims against the Depositary who in turn holds all the shares of B Preferred in trust, only the B Preferred are shown as equity on the Corporation's balance sheet. Holders of Depositary Shares may redeem them for the B Preferred shares at the Depositary; however, only the Depositary Shares are listed for trading on the NYSE.

The net proceeds to the Corporation from the sale of the Depositary Shares, after commissions, fees, and out-of-pocket expenses, totalled $543 million which was used to reduce short-term debt of Continuing Operations. As a result of the transaction, par value of B Preferred was established for $8 million, and capital in excess of par value was increased by $535 million.

Annual dividends are $1.53 per Depositary Share (equivalent to $6.12 for each B Preferred) and are payable quarterly in arrears on the first day of March, June, September and December. Dividends are cumulative and must be declared by the Board of Directors to be payable. Payments commenced September 1, 1992.

On September 1, 1995 (the Mandatory Conversion Date), each of the outstanding Depositary Shares will automatically convert into (i) one share of common stock (equivalent to four shares for each B Preferred) subject to adjustment if certain events occur, and (ii) the right to receive on such date an amount in cash equal to all accrued and unpaid dividends thereon, or, in certain circumstances, a number of shares of common stock equal to 110 percent of such cash amount divided by the market value of the common stock. Conversion of the outstanding Depositary Shares (and the B Preferred) may also occur upon certain mergers, consolidations or similar extraordinary transactions involving the Corporation or in connection with certain other events, as described in the prospectus.

At any time and from time to time prior to the Mandatory Conversion Date, Westinghouse may call the outstanding B Preferred (and thereby the Depositary Shares), in whole or in part, for redemption. Upon any such redemption, each owner of Depositary Shares will receive, in exchange for each Depositary Share so called, shares of common stock having a market value initially equal to $26.23 (equivalent to $104.92 for each B Preferred), declining by $0.002095 (equivalent to $0.008380 for each B Preferred) on each day following the date of issue of the B Preferred to $23.93 (equivalent to $95.72 for each B Preferred) on July 1, 1995, and equal to $23.80 (equivalent to $95.20 for each B Preferred) thereafter (the Call Price), plus an amount in cash equal to all proportionate accrued and unpaid dividends thereon. On September 1, 1995, the outstanding B Preferred shares mandatorily convert to one share of common stock at the then existing market price.

The B Preferred shares are considered common stock equivalents, at a rate of four to one, for the calculation of primary and fully diluted earnings per share, unless such treatment would result in a lower net loss per share or higher net income per share. If common stock equivalency is not appropriate, the B Preferred shares are considered preferred stock for earnings per share purposes.

At December 31, 1991, 25,000,000 shares of preferred stock were authorized but none were issued or outstanding. At December 31, 1992, 8,222,500 shares of B preferred stock were issued and outstanding.

Series B Preferred Shares
(in thousands)

	Issued	In Treasury	Outstanding
Balance at January 1, 1992	—	—	—
Public stock offering	8,223	—	8,223
Balance at December 31, 1992	8,223	—	8,223

During May 1991, Westinghouse issued 21,500,000 shares of its common stock in a public offering, the net proceeds of which totalled $551 million. The proceeds of the offering were used to reduce the Corporation's short-term debt.

During the third quarter of 1991, the Corporation offered a Dividend Reinvestment and Common Stock Purchase Plan (Plan) whereby shareholders may elect to reinvest cash dividends, and may optionally invest additional cash, in shares of Westinghouse common stock without paying commissions or service charges. Proceeds received from Plan participants for shares which are newly-issued or treasury shares are used for general corporate purposes.

During October 1991, the Corporation contributed 22,645,000 shares of common stock held in treasury to the Westinghouse pension plan. The contribution at that time was valued at $375 million by the pension plan trustee. The current value of the shares is included as a component of the prepaid pension contribution. See notes 3 and 10 to the financial statements.

During 1990, the Board of Directors approved a two-for-one split of Westinghouse common stock effective May 5, 1990, and an increase in authorized common stock from 240,000,000 shares to 480,000,000 shares. At December 31, 1992, common shares outstanding totalled 346,442,281.

Common Shares
(shares in thousands)

	Issued	In Treasury	Outstanding
Balance at January 1, 1990	184,411	39,279	145,132
Two-for-one stock split	184,865	39,050	145,815
Shares purchased for treasury	—	7,743	(7,743)
Shares issued for employee plans	—	(2,740)	2,740
Shares issued for acquisitions	—	(3,224)	3,224
Shares issued on conversion of 9% convertible debentures	940	—	940
Balance at December 31, 1990	370,216	80,108	290,108
Public stock offering	21,500	—	21,500
Shares purchased for treasury	—	542	(542)
Shares issued for dividend reinvestment plan	—	(289)	289
Shares issued for employee plans	—	(26,616)	26,616
Shares issued on conversion of 9% convertible debentures	1,282	—	1,282
Other	—	17	(17)
Balance at December 31, 1991	392,998	53,762	339,236
Shares purchased for treasury	—	—	—
Shares issued for dividend reinvestment plan	—	(1,113)	1,113
Shares issued for employee plans	—	(6,046)	6,046
Shares issued on conversion of 9% convertible debentures	—	—	—
Other	—	(47)	47
Balance at December 31, 1992	392,998	46,556	346,442

Earnings (loss) per common share is computed by dividing income, after deducting the preferred dividend requirements, by the weighted average number of common shares outstanding during the year plus the weighted average common stock equivalents. Common stock equivalents consist of shares subject to stock options and shares potentially issuable under deferred compensation programs. For this computation, net income or loss was adjusted for the after-tax interest expense applicable to the deferred compensation programs. The B Preferred shares may be treated as common stock equivalents or preferred stock depending on the effect as previously discussed. When treated as preferred stock, the B Preferred dividends are deducted for computing earnings available to common shareholders. During 1992 the B Preferred shares for earnings per share calculations were treated as common stock equivalents in the first and second quarters, and as preferred stock for the third and fourth quarters and the total year. No preferred shares were outstanding in 1991 or 1990, therefore no preferred dividend requirements existed in those years. The weighted average number of common shares used for computing earnings or loss per share was 346,103,000 in 1992, 313,984,000 in 1991 and 293,592,000 in 1990.

In 1988, the Board of Directors adopted a shareholder rights plan pursuant to which one right was attached to each share of common stock outstanding on December 17, 1988, and to each share issued thereafter. In accordance with plan provisions, in December 1992, the Board of Directors elected to redeem the rights at a redemption price of $0.005 per share. The Corporation paid approximately $2 million to shareholders of record as of December 2, 1992, as the total redemption price for the rights.

Note 16: Stock Options and Other Long-Term Incentive Compensation Awards

The 1991 and 1984 Long-Term Incentive Plans provide for the granting of stock options and other performance awards to employees of the Corporation. The 1991 Plan is similar in all material respects to the 1984 Plan.

Four million shares have been authorized for awarding under the 1991 Plan. Unoptioned shares available under the 1991 Plan at December 31, 1992 and 1991 totalled 1,167,160 and 1,756,400, respectively. An aggregate of 12,000,000 shares has been authorized for awarding under the 1984 Plan. Unoptioned shares available under the 1984 Plan at December 31, 1992 and 1991 totalled 204,132 and 1,074,053, respectively.

During 1992, 1,671 employees of the Corporation were granted options and other performance awards under the 1991 Plan. Of these, 253 employees are eligible to receive long-term incentive grants. The remaining 1418 employees received one-time grants through an all-employee recognition program that supports ownership initiatives in the Corporation. In addition, 33 corporate officers and non-officer business unit managers were eligible and were granted options and other performance awards under the 1984 Plan. The option price under the Plans may not be less than the fair market value of the shares on the date the option is granted. The options were granted for terms of 10 years and become exercisable in whole or in part after the commencement of the second year of the term.

Stock options are also outstanding under the 1979 Stock Option and Long-Term Incentive Plan. No additional awards may be granted under that Plan.

At December 31, 1992, 1,672 employees held outstanding options under the 1991 Plan, 384 employees held outstanding options under the 1984 Plan, and 22 employees held outstanding options under the 1979 Plan. At December 31, 1992, the total number of options outstanding to employees represents 3% of the total common shares outstanding. All options outstanding under the 1979 Plan, and all options outstanding under the 1984 and 1991 Plans, except those granted during 1992, were exercisable at December 31, 1992. Outstanding options have expiration dates ranging from 1993 through 2002.

Stock Option Information
(shares in thousands)

	1992	1991	1990
Shares subject to option:			
Balance at January 1	10,227	3,737	3,177
Options granted	1,821	6,715	946
Options exercised	(262)	(178)	(340)
Options terminated	(111)	(47)	(46)
Balance at December 31	11,675	10,227	3,737
Weighted average option price in dollars:			
At January 1	$23.56	$28.67	$25.58
Options granted	17.45	20.62	36.53
Options exercised	14.94	17.18	21.43
Options terminated	22.59	34.08	30.23
At December 31	22.81	23.56	28.67

During 1992, Equity Plus dollar grants of $16,998,000 were granted to 285 employees. Equity Plus dollar grants have the potential to increase in value through both financial performance and stock price appreciation. Payment of these grants is approved by a committee of the Board of Directors and is contingent upon achieving performance targets over a three year period. If minimum levels of financial performance are not achieved, the grants under the program will not be paid. All payments are made in stock.

In 1992, 46,220 performance units totalling $4.6 million were paid to 104 employees based on performance units granted in 1989.

Note 17: Contingent Liabilities and Commitments

Uranium Settlements

The Corporation had previously provided for all estimated future costs associated with the resolution of all uranium supply contract suits and related litigation. The remaining balance at December 31, 1992 is deemed adequate considering all facts and circumstances known to management. The future obligations require providing specific quantities of uranium and products and services over a period extending beyond the year 2010. Variances from estimates which may occur will be considered in determining if an adjustment of the liability is necessary. See note 10 to the financial statements.

Litigation

Republic of the Philippines and National Power Corporation

In December 1988, the Republic of the Philippines and National Power Corporation of the Philippines (NPC) (collectively the Republic) filed a 15 count lawsuit against the Corporation in connection with the construction of a nuclear power plant in the Philippines. In May 1989, the U.S. District Court (USDC) for the District of New Jersey stayed substantially all of the complaint pending arbitration by the International Chamber of Commerce (ICC) in Geneva, Switzerland. The Court did not grant a stay with respect to the count in the complaint involving alleged intentional interference with a fiduciary relationship. In December 1991, the ICC arbitration panel issued an award finding that the NPC had failed to carry its burden of proving the alleged bribery by the Corporation. The panel thereby concluded that the arbitration clause and the contract were valid and the panel had jurisdiction over the disputes remaining before it regarding construction of the plant; the panel concluded that it did not have jurisdiction over the Republic. The NPC, in an attempt to attack the ICC decision regarding jurisdiction and contract validity, has filed an action for annulment with the Swiss Federal Supreme Court.

In March 1992, the parties agreed to settle both the New Jersey litigation and arbitration proceeding. Based upon the presentations of counsel and the submission of a settlement agreement (Settlement Agreement), which required the parties to take certain further action, the Court entered an order administratively discontinuing this lawsuit. The order provided that the action may be reopened "for good cause shown for the entry of any stipulation of order, or for any other purpose required to obtain a final determination of the litigation." As a result of the settlement, and upon request of the parties, the ICC agreed to suspend all arbitration proceedings.

In December 1992, the Republic informed the Corporation of its intention to terminate the Settlement Agreement. The Republic has asked the USDC and the ICC tribunal to reinstate the litigation and the arbitration, respectively. In view of the Settlement Agreement, the question of reinstatement of the litigation is now before the USDC. Trial in this litigation could occur in the first quarter of 1993.

Steam Generators

At present, there are 10 pending actions brought by utilities claiming a substantial amount of damages in connection with alleged tube degradation in steam generators sold by the Corporation as components for nuclear steam supply systems. One of the actions which was pending in 1991, and was resolved in 1992 after a full arbitration hearing before the ICC, found that no damages were warranted on any of the steam generator claims against the Corporation. Westinghouse is also a party to eight agreements with utilities or utility plant owners' groups which toll the statute of limitations regarding their steam generator tube degradation claims and permit the parties time to engage in discussions. The parties have agreed that no litigation will be initiated for an agreed upon period of time as set forth in the respective tolling agreements. The term of each tolling agreement varies. Westinghouse has notified over 150 of its insurance carriers of the pending steam generator actions and claims. All of the carriers, except for four which have denied coverage, have reserved their rights with respect to the proceedings.

Securities Class Actions

The Corporation is defending class action, derivative and certain individual lawsuits brought against the Corporation, WFSI, WCC, and/or certain present and former directors and officers of the Corporation, as well as other unrelated parties. Together, these actions allege various federal securities law and common law violations arising out of (i) alleged misstatements or omissions contained in the Corporation's public filings concerning the financial condition of the Corporation, WFSI and WCC in connection with a $975 million charge to earnings announced on February 27, 1991, a public offering of Westinghouse common stock in May 1991, a $1,680 million charge to earnings announced on October 7, 1991, and alleged misrepresentations regarding the adequacy of internal controls at the Corporation and WCC, and (ii) the Corporation's acquisition of substantially all of the assets of Knoll International, Inc. and Knoll

Nevada, Inc. in exchange for Westinghouse common stock in August 1990 (these claims are asserted only by the seller of these assets).

Based on its understanding and evaluation of the relevant facts and circumstances and discussions with counsel, management believes that the Corporation has meritorious defenses to the litigation described above. While substantial damages are sought in each of the foregoing cases and the outcome of litigation is always difficult to predict, management believes that the litigation should not have a material adverse impact on the future financial condition or the results of operations of the Corporation.

The Corporation's commitments for the purchase of plant and equipment and its contingent liabilities consisting of guarantees and other claims, except as described below, are not material.

Financing Commitments — Discontinued Operations

Commitments with Off-Balance-Sheet Credit Risk
(in millions)

At December 31	1992	1991
Guarantees and credit enhancements	$ 588	$1,082
Standby letters of credit and other standby agreements	31	427
Commitments to extend credit	575	913
Partnership calls and other investment commitments	224	360
Commitments with off-balance-sheet credit risk	$1,418	$2,782

Substantially all of the financing commitments pertain to Financial Services and represent commitments to provide funds, including loan or investment commitments, guarantees, standby letters of credit and standby commitments, generally in exchange for fees. Commitments have fixed expiration dates from 1993 through 2000 and may expire unexercised.

The primary reasons for the $1,364 million reduction in commitments during 1992 were that Financial Services funded $1,170 million of commitments and was released from $278 million of commitments through asset sales, restructurings and commitment expirations, as well as being released from $53 million of commitments by assuming the senior debt of third parties on assets foreclosed. These decreases were partially offset by $137 million of new commitments and other additions.

Of the $619 million of guarantees, credit enhancements, standby letters of credit and other standby agreements at December 31, 1992, $282 million are associated with real estate financing and the remainder are associated with corporate financing. They were issued to assist customers in obtaining construction project financing from third parties at a lower rate than otherwise would be available or to improve the salability of private or public bonds. Typically, the sole condition for funding under guarantees and credit enhancements is default by the borrower to the third party lender. Standby letters of credit and other standby agreements typically require the satisfaction of various conditions by the customer. These conditions may include completion of a specified percentage of construction or a minimum occupancy level. At December 31, 1991, of the $1,509 million of guarantees, credit enhancements, standby letters of credit and other standby agreements, $1,195 million were associated with real estate financing and the remainder was associated with corporate financing.

Approximately 71% and 58% of the commitments to extend credit at December 31, 1992 and 1991, respectively, represent amounts available to corporate customers under existing revolving credit agreements. Of the commitments to extend credit, 20% related to real estate financing at December 31, 1992. At December 31, 1991, 34% related to real estate financing.

Partnership calls and other investment commitments include agreements to fund, upon call, equity interests in partnerships, generally as a limited partner or in other entities.

These commitments have impacted and will continue to impact the Corporation's efforts to reduce assets and debt. Management estimates, although it is difficult to predict, that approximately $315 million of the outstanding commitments at December 31, 1992, excluding commercial line-of-credit commitments of $86 million, could be funded during 1993, depending on market conditions. Of the $315 million that management estimates could be funded in 1993, approximately 81% are expected to become reduced earning or nonearning receivables, real estate properties or investments that do not produce a current return. For 1993, commercial line-of-credit commitments are expected to decrease approximately $86 million as customers are expected to increase their borrowings. A provision for anticipated losses expected to be incurred from funding commitments is included in the estimated loss from Discontinued Operations.

Note 18: Leases

The Corporation has commitments under operating leases for certain machinery and equipment and facilities used in various operations. Rental expense for Continuing Operations in 1992, 1991, and 1990 was $210 million, $149 million, and $138 million, respectively. These amounts include immaterial amounts for contingent rentals and sublease income.

Minimum Rental Payments — Continuing Operations
(in millions)

At December 31	1992
1993	$ 125
1994	108
1995	95
1996	71
1997	64
Subsequent years	873
Minimum rental payments	$1,336

Note 19: Other Income and Expenses, Net

Other Income and Expenses, net
(in millions)

Interest on securities	$ 18	$ 41	$ 48
Miscellaneous interest income	10	15	14
Gain (loss) on disposition of fixed assets	(6)	(2)	8
Gain (loss) on sale of securities	—	(1)	26
Operating results — nonconsolidated affiliates	(2)	(20)	(5)
Foreign currency transaction and high-inflation translation effect	(7)	(7)	(5)
Gains on sales of businesses	—	—	98
Losses on sales of businesses	—	(17)	(24)
Other	(35)	(21)	(8)
Other income and expenses, net	$(22)	$(12)	$152

In 1990, gains on sales of businesses include $28 million for Group W Cable of Chicago, $26 million for two radio stations, $29 million for a foreign nuclear venture and $15 million for assets of Westinghouse Beverage Group. Losses on sales of businesses include a $17 million provision for the loss on investment in an affiliate in 1991 and $24 million for the sale of the combustion control business in 1990. All items in the other category are less than $10 million each.

Note 20: Mergers, Acquisitions and Divestitures

On January 27, 1993, the Corporation announced its intention to merge WFSI and WCC into Westinghouse. Such a merger will give management greater flexibility to execute its liquidation of the assets of Financial Services. The merger is contingent upon certain conditions, including the consent of the commercial banks participating in the revolver. As a consequence of the merger, WFSI and WCC will cease to exist as separate legal entities and their debt will be assumed by Westinghouse.

During 1992, WSAV executed a definitive agreement with First Financial Bank, F.S.B., to sell its Illinois-based thrift, Westinghouse Federal Bank. The sale was completed in January 1993.

In August 1992, the Corporation sold the Copper Laminates Division (formerly part of the Electronic Systems segment) for $97 million in cash.

In May 1992, the Corporation sold the Electrical Systems Division (formerly part of the Electronic Systems segment) for $125 million in cash.

During 1991, there were no significant acquisitions or divestitures; however, in 1990, the Corporation acquired and divested many businesses and entered into several joint ventures. All acquisitions were accounted for under the purchase method. Material transactions are discussed below.

In August 1990, the Corporation acquired substantially all of the assets and assumed certain of the liabilities of Knoll International, Inc. and Knoll Nevada, Inc., an office furniture company. The stock of subsidiary and related companies was also acquired. Consideration included cash and Westinghouse common stock valued at $112 million in total and the assumption of $111 million of existing Knoll debt. Purchase accounting adjustments relating to this acquisition were recorded in 1990 and 1991.

Also in August 1990, substantially all of the assets of Westinghouse Beverage Group were sold to a corporation organized by former managers of Beverage for total consideration of $209 million, including $166 million of cash. Westinghouse retained a 15% interest in the new venture.

In October 1990, WSAV, through its subsidiary Westinghouse Federal Bank, acquired United Federal Savings Bank (United), an Illinois thrift. In December 1990, United acquired all of the assets and certain of the liabilities of Enterprise Savings Bank (Enterprise), another Illinois thrift. To complete the acquisition of Enterprise, United received $55 million of government assistance. The assets of the thrifts at the last acquisition date totalled $876 million. WSAV contributed total cash of $41 million to the thrifts. This contribution was sufficient to permit the thrifts to meet the then current regulatory capital requirements.

Note 21: Segment Information

Westinghouse is a diversified, global, technology-based corporation operating in the principal business arenas of television and radio broadcasting, defense electronics, environmental services, transport refrigeration, and the electric utility markets. The Corporation's continuing businesses have been realigned for reporting purposes into five segments: Broadcasting, Electronic Systems, Environmental, Industries, and Power Systems. Results of international manufacturing entities, export sales, and foreign licensee income are included in the financial information of the segment that has operating responsibility.

Broadcasting provides a variety of communications services consisting primarily of commercial broadcasting, program production, and distribution. It sells advertising time to radio, television, and cable advertisers through national and local sales organizations. Within Broadcasting, Group W currently owns and operates five network affiliated television broadcasting stations and 16 radio stations. Group W also provides programming and distribution services to the cable television industry. The Longines-Wittnauer Watch Company, Group W Satellite Communications and Westinghouse Communications are also included in this segment.

The Electronic Systems segment is a world leader in the research, development, production, and support of advanced electronic systems for the Department of

Defense (DoD), Federal Aviation Administration, National Aeronautics and Space Administration, other government agencies, and U.S. allies. Products include surveillance and fire control radars, command and control systems, electronic countermeasures equipment, electro-optical systems, spaceborne sensors, missile launching and handling equipment, torpedoes, sonar, and communications equipment. The group also engages in technologically complementary non-DoD markets such as air traffic control, security systems, and drug traffic interdiction.

The Environmental segment combines the Corporation's environmental businesses: toxic, hazardous and radioactive waste services, waste-to-energy plants, and management and operation of several government-owned facilities primarily under contract with the Department of Energy.

The Industries segment is comprised of a leading supplier of mobile temperature control equipment for trucks, trailers, ships, fishing vessels, and railway cars. The segment also includes industry products and services, such as motors and engineering and repair services.

The Power Systems segment designs, develops, manufactures and services nuclear and fossil-fueled power generation systems and is a leading supplier of reload nuclear fuel to the global electric utility market.

Sales and Operating Revenues and Segment Operating Profit from Continuing Operations
(in millions)

	Sales and Operating Revenues			Segment Operating Profit (Loss)		
	1992	1991	1990	1992	1991	1990
Broadcasting	$ 853	$ 832	$ 858	$160	$133	$ 187
Electronic Systems	2,874	3,245	3,200	221	207	337
Environmental	643	600	657	71	(4)	81
Industries	1,327	1,282	1,342	87	90	168
Power Systems	2,849	2,651	2,443	280	258	329
Divested and Other	77	70	331	(72)	(86)	(29)
Intersegment sales	(176)	(190)	(185)	—	—	—
Total	$8,447	$8,490	$8,646	$747	$598	$1,073

Segment sales and operating revenues include products that are transferred between segments generally at inventory cost plus a margin. Segment operating profit or loss consists of sales and operating revenues less segment operating expenses that include cost of sales and revenue, marketing, administrative and general expenses, depreciation and amortization, and restructuring provisions.

A provision for costs associated with the Corporation's 1991 workforce reduction was recorded in the third quarter 1991 and totalled $138 million for Continuing Operations. Prior to that provision, operating profit totalled $141 million for Broadcasting, $276 million for Electronic Systems, $5 million for Environmental, $105 million for Industries, and $280 million for Power Systems.

Identifiable assets, depreciation and amortization, and capital expenditures are presented below. Assets not identified to segments principally include cash and marketable securities, deferred income taxes, prepaid pension contributions, and unrecognized pension costs.

Other Financial Information
(in millions)

	Identifiable Assets			Depreciation and Amortization			Capital Expenditures		
	1992	1991	1990	1992	1991	1990	1992	1991	1990
Broadcasting	$ 901	$ 933	$ 893	$ 34	$ 33	$ 34	$ 24	$ 31	$ 31
Electronic Systems	1,592	1,646	1,606	79	93	93	67	65	73
Environmental	551	520	425	18	19	16	34	50	48
Industries	563	566	601	29	27	28	22	39	53
Power Systems	1,630	1,476	1,420	85	81	80	74	99	104
Other	4,038	2,676	3,598	25	31	33	8	9	19
Continuing Operations	9,275	7,817	8,543	$270	$284	$284	$229	$293	$328
Discontinued Operations	10,219	11,662	11,152						
Total	$19,494	$19,479	$19,695						

Included in income from Continuing Operations is income of subsidiaries located outside the U.S. These subsidiaries contributed $51 million of income in 1992, $45 million in 1991 and $49 million in 1990. Subsidiaries located outside the U.S. comprised 4% of total assets of Continuing Operations in 1992 and 5% in 1991 and 1990. Subsidiaries located outside the U.S. comprised 2% of total liabilities of Continuing Operations in 1992, 3% in 1991 and 2% in 1990.

Financial Information by Geographic Area
(in millions)

	1992	1991	1990
Sales and operating revenues from Continuing Operations:			
U.S.	$ 7,554	$ 7,613	$ 7,862
Outside the U.S.	893	877	784
Sales and operating revenues	$ 8,447	$ 8,490	$ 8,646
Operating profit from Continuing Operations:			
U.S.	$ 663	$ 523	$ 1,001
Outside the U.S.	84	75	72
Operating profit	$ 747	$ 598	$ 1,073
Segment identifiable assets of Continuing Operations:			
U.S.	$ 8,900	$ 7,420	$ 8,115
Outside the U.S.	375	397	428
Segment identifiable assets	$ 9,275	$ 7,817	$ 8,543

The Corporation sells products manufactured domestically to customers throughout the world using domestic divisions and subsidiaries doing business primarily outside the U.S. Generally, products manufactured outside the U.S. are sold outside the U.S.

Sales From Products and Services Sold Outside the U.S. from Continuing Operations
(in millions)

	1992		1991		1990	
	Amount	% of Sales	Amount	% of Sales	Amount	% of Sales
Subsidiaries outside the U.S.:						
Europe, Africa, Middle East	$ 581	6.9%	$ 548	6.4%	$ 460	5.3%
Canada	245	2.9%	262	3.1%	257	3.0%
All other	67	0.8%	67	0.8%	67	0.8%
Total	$ 893	10.6%	$ 877	10.3%	$ 784	9.1%
U.S. exports:						
Europe, Africa, Middle East	$ 660	7.8%	$ 557	6.6%	$ 677	7.8%
Asia Pacific	525	6.2%	325	3.8%	298	3.5%
All other	175	2.1%	127	1.5%	104	1.2%
Total	$1,360	16.1%	$1,009	11.9%	$1,079	12.5%

The largest single customer of the Corporation is the U.S. government and its agencies, whose purchases accounted for 32% of sales and operating revenues from Continuing Operations in 1992 and 34% in 1991 and 1990. Of the 1992 purchases, 87% were from the Electronic Systems segment. No other customer made purchases totalling 10% or more of sales and operating revenues.

Research and Development from Continuing Operations
(in millions)

	1992	1991	1990
Westinghouse sponsored:			
Electronic Systems	$ 96	$ 90	$ 84
Power Systems	58	73	75
Other	8	12	9
Customer sponsored:			
Electronic Systems	501	524	698
Power Systems	70	77	83
Other	45	39	35
Total research and development expenditures	$778	$815	$984

Note 22: Fair Value of Financial Instruments

The estimated fair value of financial instruments has been determined by the Corporation using the best available market information and appropriate valuation methodologies. However, considerable judgment was necessary in interpreting market data to develop the estimates of fair value. Accordingly, the estimates presented are not necessarily indicative of the amounts that the Corporation could realize in a current market exchange or the value that ultimately will be realized by the Corporation upon maturity or disposition. Additionally, because of the variety of valuation techniques permitted under SFAS No. 107, comparability of fair values between entities may not be meaningful. The use of different market assumptions and/or estimation methodologies may have a material effect on the estimated fair value amounts.

Fair Value of Financial Instruments – Continuing Operations
(in millions)

At December 31, 1992	Carrying Amount	Estimated Fair Value
Assets:		
Cash and cash equivalents	$ 739	$ 739
Noncurrent receivables	106	92
Liabilities:		
Short-term debt	1,239	1,239
Current maturities of long-term debt	287	291
Long-term debt	1,323	1,268
Off-balance-sheet financial instruments:		
Interest rate and currency exchange agreements	—	11

Fair Value of Financial Instruments – Discontinued Operations

(in millions)

At December 31, 1992	Carrying Amount*	Estimated Fair Value
Assets:		
Cash and cash equivalents	$ 815	$ 815
Portfolio investments:		
Marketable securities	241	249
Real estate receivables	1,567	1,567
Corporate receivables	1,609	1,609
Investments in partnerships and other entities	577	577
Nonmarketable equity securities	51	51
Liabilities:		
Short-term debt	4,579	4,579
Current maturities of long term debt	885	878
Long-term debt	1,620	1,643
Thrift deposits	693	693
Off-balance-sheet financial instruments:		
Interest rate and currency exchange agreements	—	14
Financing commitments	—	—

*Carrying amount refers to the amount included in net assets of Discontinued Operations at December 31, 1992 after giving effect to the appropriate valuation allowances. See note 2 to the financial statements.

The following methods and assumptions were used to estimate the fair value of financial instruments for which it was practicable to estimate that value.

Cash and cash equivalents

The carrying amount for cash and cash equivalents approximates fair value.

Noncurrent receivables

The fair value of noncurrent receivables is estimated by discounting the expected future cash flows at interest rates commensurate with the creditworthiness of the related customers.

Portfolio investments

The carrying amount of financial instruments included in portfolio investments at Financial Services approximates their fair value.

The fair value for marketable securities is determined by quoted market prices, if available, or estimated using quoted market prices for similar securities.

The real estate portfolio, including receivables, real estate properties and real estate investments in partnerships and other entities, is valued using the Resolution Trust Corporation's DIV method.

The corporate portfolio, including receivables, investments in partnerships and other entities and nonmarketable equity securities, is valued using various valuation techniques, including trading desk values, which arise from actual or proposed current trades of identical or similar assets, plus other factors.

Short-term debt

The carrying amount of the Corporation's borrowings under the revolving credit facility and commercial paper approximate fair value.

Long-term debt

The fair value of long-term debt has been estimated using quoted market prices or discounted cash flow analyses based on the Corporation's incremental borrowing rates for similar types of borrowing arrangements with comparable terms and maturities.

Thrift deposits

The thrift deposits were assumed by the purchaser of Westinghouse Federal Bank on January 4, 1993 at their carrying amount.

Interest rate and currency exchange agreements

The fair value of interest rate and currency exchange agreements (used for hedging purposes) is the amount that the Corporation would receive or pay to terminate the exchange agreements, considering interest rates, currency exchange rates and remaining maturities.

Financing commitments

Most of the unfunded commitments relate to, and are inseparable from, specific portfolio investments. When establishing the fair value for those portfolio investments, consideration was given to the related financing commitments.

For certain other financing commitments at December 31, 1992, management estimates that undiscounted losses totalling $177 million will be incurred. This amount reflects management's best estimate of the obligation which would result from the satisfaction of those commitments. A provision for such anticipated losses is included in the estimated loss on disposal of Discontinued Operations.

Five-Year Summary

Selected Financial and Statistical Data *(unaudited)*

(dollars in millions except per share amounts)

	1992	1991	1990	1989	1988
Sales and operating revenues	$ 8,447	$ 8,490	$ 8,646	$ 8,921	$ 9,057
Other income and expenses, net	(22)	(12)	152	510	91
Interest expense	(189)	(198)	(200)	(201)	(200)
Income from Continuing Operations before income taxes	536	388	1,025	961	723
Income taxes	(182)	(121)	(276)	(244)	(243)
Income from Continuing Operations	348	265	746	706	480
Income (loss) from Discontinued Operations	(1,301)	(1,351)	(478)	216	343
Cumulative effect of changes in accounting principles (1)	(338)	—	—	—	—
Net income (loss)	(1,291)	(1,086)	268	922	823
Income from Continuing Operations as a percentage of sales	4.1%	3.1%	8.6%	7.9%	5.3%
Earnings (loss) per share:					
Continuing Operations	$ .93	$ 84	$ 2.54	$ 2.41	$ 1.65
Discontinued Operations	(3.76)	(4.30)	(1.63)	.74	1.18
Cumulative effect of changes in accounting principles	(.98)	—	—	—	—
Earnings (loss) per share	(3.81)	(3.46)	.91	3.15	2.83
Dividends per share	.72	1.40	1.35	1.15	0.96
Total assets — Continuing Operations	$ 9,275	$ 7,817	$ 8,543	$ 8,967	$ 8,062
Total assets — Discontinued Operations	10,219	11,662	11,152	8,957	7,030
Total assets	19,494	19,479	19,695	17,924	15,092
Long-term debt — Continuing Operations	1,323	1,251	916	741	831
Long-term debt — Discontinued Operations	1,620	2,483	5,116	3,621	2,691
Shareholders' equity	2,344	3,754	3,897	4,389	3,799
Average common and common equivalent shares outstanding	346,103,408	313,984,242	293,591,984	292,465,132	291,088,150
Market price range per share	$20⅞-9¼	$31-13¾	$39⅝-24¾	$38⅝-25⅝	$28¾-23⅜
Common shareholders at year end	127,559	120,833	101,157	106,770	112,774
Average number of employees	109,050	113,664	115,774	121,963	119,640

Previously reported amounts have been restated to segregate the results of Discontinued Operations from Continuing Operations.
(1) See notes 1, 4 and 5 to the financial statements.

Quarterly Financial Information *(unaudited)*

(in millions except per share amounts)

	1992 Quarters Ended				1991 Quarters Ended			
	Dec. 31	Sept. 30	June 30	March 31	Dec. 31	Sept. 30	June 30	March 31
Sales and operating revenues	$2,346	$2,068	$2,179	$1,854	$2,360	$2,330	$2,074	$1,726
Gross profit	193	197	209	148	260	42	197	99
Income (loss) from Continuing Operations	91	89	103	65	137	(4)	89	43
Income (loss) from Discontinued Operations	(1,272)	(75)	19	27	34	(1,478)	38	55
Cumulative effect of changes in accounting principles	—	—	—	(338)	—	—	—	—
Net income (loss)	(1,181)	14	122	(246)	171	(1,482)	127	98
Per share of common stock:								
Income (loss) from Continuing Operations	.22	.22	.30	.19	.41	(.01)	.29	.15
Income (loss) from Discontinued Operations	(3.66)	(.22)	.05	.08	.10	(4.85)	.12	.19
Cumulative effect of changes in accounting principles (1)	—	—	—	(.99)	—	—	—	—
Net income (loss)	(3.44)	-0-	.35	(.71)	.51	(4.86)	.41	.34
Dividends paid	.18	.18	.18	.18	.35	.35	.35	.35
New York Stock Exchange market price per share:								
High	16⅛	18¼	18⅞	20⅞	22½	28⅞	30½	31
Low	9¼	15⅞	16¼	18⅛	13¾	21⅛	26¼	22

Results of operations for all quarters prior to the fourth quarter 1992 have been restated to segregate the results of Discontinued Operations and accordingly amounts for sales and operating revenues and gross profit pertain only to Continuing Operations.

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Corporate Information

E. 7590

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Pittsburgh, PA 15222-1384
(412) 244-2000

Annual Meeting

April 28, 1993
10:30 A.M.
Hyatt Regency Minneapolis
1300 Nicollet Mall
Minneapolis, MN 55403

Stock Exchanges

New York
Philadelphia
Boston
Midwest
Pacific

Transfer Agents/Registrars

Harris Trust Company of New York
77 Water Street
4th Floor
New York, NY 10005
(212) 701-7609

Mellon Bank, N.A.
P.O. Box 444
Pittsburgh, PA 15230
(412) 236-8000

Stock Symbols

Common: WX
Preferred: WXPrP (PERCS)

CUSIP* Numbers

Common: 960402 10 5
Preferred: 960402 60 0

*Committee on Uniform Security Identification Procedures

Shareholder Services and Information

For information or assistance regarding individual stock records, transactions, dividends or stock certificates, write to:

Shareholder Services
Westinghouse Electric Corporation
P.O. Box 8815
Pittsburgh, PA 15221

To request a copy of Form 10-K or other information about Westinghouse, write to:

Shareholder Communications
Westinghouse Electric Corporation
11 Stanwix Street
Room 1069
Pittsburgh, PA 15222-1384

Or call the Westinghouse Shareholder Information Line:
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