

NOV 29 1974

John G. Davis, Deputy Director for Field Operations, Directorate of Regulatory Operations, Headquarters

SPECIAL INSPECTION - CHEM-NUCLEAR SYSTEMS, INC., BELLEVUE, WASHINGTON  
(BARKSWELL, SOUTH CAROLINA BURIAL SITE) LICENSE NO. 46-13536-01

As requested in your memorandum of November 29, 1974, enclosed in a report of an inspection conducted by Messrs. P. R. Guinn and G. L. Troup on November 26, 1974.

Our inspection revealed no evidence that radioactivity had migrated from the licensee's burial trenches into the environs. As a further evaluation of the licensee's environmental sampling program we have sent water, soil and vegetation samples to HSL for analysis.

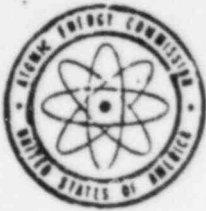
Our inspection revealed two apparent violations which we plan to cover in separate correspondence.

Original signed by  
H. C. Moseley

Norman C. Moseley  
Director

8508190009 850626  
PDR FOIA  
FLAHART85-298 PDR

OFFICE	RO:II	RO:II	RO:II		
SURNAME	PRGuinn:jag	JTSutherland	NCMoseley		10
DATE	11/29/74	11/ /74	11/ /74		



UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIRECTORATE OF REGULATORY OPERATIONS  
REGION II - SUITE 818  
230 PEACHTREE STREET, NORTHWEST  
ATLANTA, GEORGIA 30303

TELEPHONE: (404) 828-4808

John G. Davis, Deputy Director for Field Operations, Directorate of Regulatory Operations, Headquarters

SPECIAL INSPECTION - CHEM-NUCLEAR SYSTEMS, INC., BELLEVUE, WASHINGTON  
(BARNWELL, SOUTH CAROLINA BURIAL SITE) LICENSE NO. 46-13536-01

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A handwritten signature in cursive script, reading "Norman C. Moseley", is positioned above the typed name and title.

Norman C. Moseley  
Director

Transmitted Via Facsimile  
11/29/74 4:00 P.M. tlh



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TELEPHONE (404) 826-4501

John G. Davis, Deputy Director for Field Operations, Directorate of Regulatory Operations, Headquarters

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Norman C. Moseley  
Director

Transmitted Via Facsimile  
11/29/74 4:00 P.M. tlh

RO Rpt. No. 74-1

Inspection Report

Chem-Nuclear Systems, Inc.,  
P. O. Box 1866  
Bellevue, Washington 98009  
(Barnwell, South Carolina  
Burial Site)  
License No. 46-13536-01

Prepared By:

P. R. Guinn, Radiation Specialist Radiological and Environmental Protection Branch	Date
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G. L. Troup, Radiation Specialist Radiological and Environmental Protection Branch	Date
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Inspection Date: November 26, 1974

Reviewed By:

J. T. Sutherland, Chief Radiological and Environmental Protection Branch	Date
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Licensed Activities Authorized By The State and By The AEC

1. AEC License No. 46-13536-01 authorizes the licensee to receive and process packaged waste byproduct, source and special nuclear material in the amounts specified in the license, in any State in the United States, except Agreement States, and to dispose of by burial packages containing uranium-235 in accordance with the amounts, procedures, and at the designated location specified in the license.
2. State of South Carolina License No. 097 authorizes the licensee to receive process, store for disposal by burial byproduct and source material waste in accordance with the amounts, procedures and at the designated location specified in the license.

Licensee Activities

The licensee is receiving, possessing, transporting and storing byproduct, source and special nuclear material wastes in liquid and solid form. Most of the solid wastes are received and buried in packaged containers, although some internally contaminated pipes and other metal objects are received and buried without containers. Liquid wastes are transported in DOT authorized containers and are buried in metal drums after solidifying with cement. Spent resins are being transported in DOT authorized containers in semi-liquid form and are buried in special metal containers after de-watering. During the period of October 28, 1971, through November 12, 1974, a total of

61,586 curies of byproduct (mostly cobalt 60), 187,796 pounds of source material (mostly depleted uranium) and 258,326 grams of special nuclear (all uranium-235) material wastes have been received and disposed of by burial in nine burial trenches.

#### Burial Ground Operations

Most solid wastes are being received in wooden or cardboard packages and are taken directly to the trenches for burial. Some amounts of internally contaminated metal pipes and other metal objects are received and buried without containers. Liquid wastes are stored in a designated storage area and as time permits are mixed with cement in 55 gallon drums and after solidification are taken to the trenches and buried. Resins are screened to remove the liquids and placed in metal containers which are then placed in the trenches and buried.

#### Radiation Control Program

The licensee is requiring all employees to wear protective clothing, TLD badges and direct reading dosimeters. Radiation surveys, including instrument surveys and smear tests, are conducted on all incoming shipments. During operations where dusts are encountered, air samples are taken. Daily instrument surveys are conducted in all work areas, including the trenches in which burials are being made. After unloading of the trucks, instrument surveys and smear tests are conducted inside the trucks. Contamination surveys are made on each employee when exiting from the work area. Employees are given annual whole body counts and are required to submit quarterly urine samples for analysis. Whole body counts in 1974 for three employees indicated some uptake of uranium 235, but were only a fraction of lung burden limits. The only indication of an excessive exposure to any employee was that one employee's film badge result during the first calendar quarter of 1974 showed an exposure of 3.3 rem. This was attributed to an exposure to cobalt 60 and was reported to the State of South Carolina.

#### Control of Releases to the Environment

The licensee is controlling releases of radioactivity from the buried wastes by (1) the burying of solid wastes only and (2) by following burial methods which are designed to prevent the entrance of water into the burial trenches, thereby preventing migration of radioactivity from the trenches. Most of the wastes are buried in wooden or cardboard packages or metal drums. These are placed in the burial trenches which are excavated in a clay soil to a depth of 20 feet (about 20 feet above the water table) and are 500 feet in length. A layer of sand and rock, about three feet thick, is placed in the bottom of each trench for the purpose of collecting surface rainwater. The only other treatment for the trenches is that during excavation operations clay is placed on the sides of the trenches to a thickness of at least three feet. Waste

containers are stacked to a height of 12 feet but no higher than five feet from the top of the trench and then covered with soil. A layer of clay, at least six-feet-thick is placed over the top of the filled trench and then compacted and seeded. Each filled trench is marked with a permanent granite marker.

#### Environmental Monitoring Program

1. The AEC and State of South Carolina licenses specify that an environment monitoring program shall be conducted, consisting of the following:
  - (a) thirty-five well water samples on annual basis (gross alpha, gross beta) except all wells within 1500 feet of trench boundaries shall be samples on a semi-annual period
  - (b) trench well water samples prior to burial operations and on a quart. period.
  - (c) soil samples prior to burial operations
  - (d) animal and vegetable material sampled "periodically"
  - (e) Water samples from five municipal water supplies off-site on an annual basis
  - (f) "small number" of air samples to be obtained initially
  - (g) determination of water table configuration in March and September annually
  - (h) water level recorder installed in one well
2. The licensee is conducting an environmental monitoring program which was described by licensee representatives to consist of the following:
  - (a) nine well water: samples on annual basis (gross alpha, gross beta, gamma isotopic and tritium); one well water sample semi-annually
  - (b) trench well water samples quarterly (Note: records indicate this is being performed semi-annually; review of records revealed no trench well samples were collected prior to burial).
  - (c) soil samples from six locations annually (gross beta, gamma isotopic weekly samples from areas around site (no specific number) (gross be as check for spread of contamination)

- (d) vegetation samples from six locations annually (gross beta, gamma isotopic); no animal samples are collected
- (e) no municipal water supply samples are collected; the State of South Carolina collects and analyzes the municipal water supply samples and furnishes results to the licensee
- (f) one continuous air particulate monitor changed weekly and analyzed (gross beta)
- (g) water levels in wells logged semi-annually, but not necessarily in March and September.
- (h) continuous water level indicated with strip chart recorder installed in one well (installed October 1974)

All samples are collected by licensee personnel. Water, annual soil and annual vegetation samples are analyzed by Eberline Instrument Corporation. Weekly soil samples and air particulate samples are analyzed on site by the licensee.

3. A review of the environmental monitoring program records indicates a gap in the performance of the required samples between 1970 and 1973 for peripheral well samples and no data prior to 1973 for other samples (soil, vegetation, animal material, trench well water). The trench well water sample data indicates that samples are being collected and analyzed semi-annually, not quarterly as stated by the licensee. Also, the wells around the site boundary which are not on the licensee's property are not being sampled and analyzed nor are animal samples being collected. The licensee is not conducting an environmental monitoring program in accordance with the conditions of the license.
4. A review of the available sample results for peripheral well water, trench well water, soil and vegetation does not indicate any apparent migration of radioactivity from the burial trenches to the surrounding environs. Examples of data collected by the licensee to substantiate this are:



## Well B-18 (peripheral well)

gross beta : 12/70 1.25 E + 1 pCi/l  
 3/73 <2.25 ± 2.25 E-2 pCi/l  
 (reported as <1.00 E+01 d/m/200 ml ± 100%)

## Well B-14 (peripheral well)

gross beta : 3/73 <2.25 ± 2.25 E-2 pCi/l  
 5/74 01 ± 3.0 EO pCi/l  
 (reported as <1.00 E+1 d/m/200 ml ± 100%)

## Well 2-W-W (trench well)

gross beta : 8/73 0 ± 5.5 EO pCi/l  
 5/74 0 ± 3.6 EO pCi/l

## Well 1-E-W (trench well)

gross beta : 8/73 5.7 ± 5.7 EO pCi/l  
 5/74 0 ± 3.6 EO pCi/l

## Soil sample location #1: 11/74

9/73

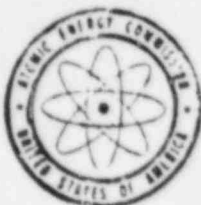
Cs-137	1.1 ± 0.9 E-01 pCi/g	3.39 ± 1.05 E-01
Co-60	6.2 ± 5.7 E-02	2.19 ± 0.85 E-01
Bi-214	5.4 ± 2.1 E-01	8.06 ± 2.53 E-01
Pb-212	7.8 ± 2.7E-01	1.01 ± 0.26 EO

## Vegetation sample location #4: 11/74

9/73

Cs-137	<1.4 EO pCi/g	8.19 ± 4.68 E-01
Ph-212	<4.0 EO	<1.23 EO
Co-60	4.2 ± 1.4 EO	9.14 ± 3.94 E-01





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REGION II - SUITE 818  
230 PEACHTREE STREET, NORTHWEST  
ATLANTA, GEORGIA 30303

TELEPHONE 14041528-4503

In Reply Refer To:  
RO:II:PRG  
74-01

Chem-Nuclear Systems, Inc.  
Attn: Mr. Bruce W. Johnson, President  
P. O. Box 1866  
Bellevue, Washington 98009

Gentlemen:

This refers to the inspection conducted by Messrs. P. R. Guinn and G. L. Troup of our Region II office on November 26, 1974, of activities authorized by AEC Byproduct, Source and Special Nuclear Material License No. 46-13536-01 at your Barnwell, South Carolina burial site, and to the discussions of our findings held by Messrs. Guinn and Troup with Thomas J. McCord at the conclusion of the inspection.

The inspection was an examination of the activities conducted under your license as they relate to radiation safety and to compliance with the Commission's rules and regulations and the conditions of your license. The inspection consisted of selective examination of procedures and representative records, interviews with personnel, and observations by the inspector.

During the inspection it was found that certain activities under your license appear to be in violation of AEC requirements. The violations and references to pertinent requirements are identified in the enclosure to this letter.

This notice is sent to you pursuant to the provisions of Section 2.201 of the AEC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations. Section 2.201 requires you to submit to this office, within 20 days of your receipt of this notice, a written statement or explanation in reply including: (1) corrective steps which have been taken by you, and the results achieved; (2) corrective steps which will be taken to avoid further violations; and (3) the date when full compliance will be achieved.

You should note that this letter and your reply to this letter will be disclosed to the public by being placed in an AEC Public Document Room.

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Very truly yours,

R. H. Engelken  
Director

cc: N. C. Moseley, Region II  
T. J. McCord, Chem-Nuclear

ENCLOSURE

License No. 46-13536-01

Certain activities under your license appear to be in violation of regulation requirements as indicated below:

Violations considered to be of Category II severity were as follows:

- A. Condition 1C of the license establishes the requirement that up to 850 grams of uranium 235 may be possessed at any one time provided that no single package contains more than 15 grams of uranium 235.

Contrary to the above, on numerous occasions since July 1, 1973, packages of wastes for burial have been received which contained more than 15 grams of uranium 235. Included in this total were 91 packages received during the period of October 18 through October 31, 1974, which contained from 15.1 to 49.0 grams each of uranium 235.

- B. Condition 2 of the license references the application dated November 18, 1971, and the amendment dated February 24, 1972, which establish the requirement in Appendix 6 that the environmental monitoring program shall include sampling and analysis of water, soil, vegetation and animal material at established frequencies and locations.

Contrary to the above, the environmental monitoring program being conducted is not of the prescribed scope in that the required number of wells and municipal water supplies are not being sampled and no animal material sampling has been conducted.

*Inspection 12/26/74*

File

ASSIST INSPECTION FOR REGION V CHEM-NUCLEAR SYSTEMS, INC., BELLEVUE, WASHINGTON  
(BARNWELL, S.C., BURIAL SITE) LICENSE NO. 46-13536-01 (THRU AMENDMENT NO. 5  
DATED MAY 20, 1973)

General Information

On November 26, 1974, an announced inspection was made by P. R. Guinn and G. L. Troup, Region II, of the licensee's activities at the Barnwell, South Carolina burial site. This inspection was made primarily for the purpose of determining if the buried materials had migrated into the cavity as requested by J. G. Davis, RO Headquarters, in his memorandum dated November 25, 1974. This part of the inspection was covered in the Region inspection report mailed to RO Headquarters on November 27, 1974. Also, a routine inspection was conducted which revealed two apparent violations. These were covered in the draft enforcement letter sent to Region V on December 4, 1974, for dispatch to the licensee.

Although the State of South Carolina was notified of the proposed inspection they did not have a representative present during the inspection.

Persons Contacted

Thomas J. McCord, Manager, Nuclear Operations (In charge of the Barnwell site)  
R. Posiek, Manager, Industrial and Nuclear Safety  
H. R. Oakley, Operations Manager

Activities Under The License

The licensee is continuing to collect radioactive wastes throughout the South Carolina area for burial at the Barnwell, South Carolina burial site. Most wastes are transported to the site in licensee trucks. Most solid wastes are being received in cardboard or wooden boxes which are taken to the trenches and buried. Some internally contaminated metal pipes are also being buried. Liquid wastes are being transported in DOT approved containers which are mixed with cement in 55 gallon drums and then buried. Spent resins are being transported in DOT approved containers and are buried in metal containers after the resin have been screened to remove the resin. *unten*

All burials of byproduct and source material wastes have been conducted under State of South Carolina License No. 097. Since July 1, 1973, burial of special nuclear materials have been conducted under the AEC license.

## Receipts of Receipts

As [redacted] records showed that since October 28, 1971, a [redacted] of byproduct material (mostly Cobalt 60), 187 [redacted] materials (mostly depleted uranium) and 258 [redacted] nuclear material (all uranium 235) wastes have been received and buried at the Barnwell, South Carolina site. (copies of licensee records are attached to the Region II inspection report). On the average, 30 to 35 truck loads of waste (all types) are being received each week. Questioning of licensee personnel and an examination of records pertaining to special nuclear material receipts showed that individual packages of wastes contained up to 49 grams of uranium 235 while the total amount contained in all packages in each shipment contained up to 350 grams. (Condition 1C of the license states that no single package may contain more than 15 grams of uranium 235). An audit of records for the period of October 18 through October 31, 1974, showed that a total of 427 packages of uranium 235 wastes (14 truck loads) had been received and of this total 91 packages contained from 15.1 to 49 grams of uranium 235. The total amount of uranium 235 contained in each of the 14 truck loads ranged from 292 to 350 grams.

## Burial Procedures

No apparent changes have been made in the burial operations noted during the last inspection. The burial methods are designed to contain the materials within the burial trenches thereby preventing migration of the materials into the environs. The trenches are about 500 feet long and 20 feet deep and are excavated in a clay soil. During the burial operations clay is placed over the top of the trenches, compacted and then seeded. (The attached copy of the inspection report, dated December 4, 1974, which was submitted to RO Headquarters gives further details of the burial operations)

## Radiation Surveys

Interviews with licensee personnel revealed that radiation <sup>surveys</sup> are being made as follows:

1. Surveys, including readings with radiation survey meter and random wipe tests are made on all incoming shipments <sup>and on</sup> trenches. [redacted] that only occasional low level contamination has been found on trenches and shipments. If [redacted] beta-gamma or 220 dpm alpha; decontamination is [redacted] readings on shipments must not exceed 200 mr/hr on the surface and 10 mr/hr at 3 feet. The reading in the cab of the trucks must not exceed 2 mr/hr.

2. ~~Readings~~ readings are taken in all areas of the burial site ~~at~~ site office.
3. ~~Readings~~ readings are taken around all filled trenches. (Daily surveys are made on the trenches which are being filled)
4. Licensee ~~trench~~ <sup>truck</sup> drivers make surveys of each package of waste as it is loaded into the truck. If readings exceed those shown in item #3 the packages are rejected.
5. Air samples are taken at random intervals in various work areas. (The records show no significant results to date)

#### Personnel Monitoring

The licensee's personnel monitoring program involves the following:

1. All workers in the burial trench area and truck drivers are required to wear TLD's and direct reading dosimeters. Eberline is providing the TLD's on a monthly service basis. A review of these results showed that six employees had received 3150 mrem to 7020 mrem doses to the whole body during 1973 but only one had exceeded 3 rem during any calendar quarter. Employee Boyles had received 3370 mrem during the 1st calendar quarter and a total of 7020 mrem for the year. This was reported to the State of South Carolina who conducted an investigation. Boyles had assisted in unloading and burying some irradiated reactor components. A Form AEC-4 had been established for all employees. Through October 31, 1974, no employee had received in excess of 3 rem during any calendar quarter although one employee, <sup>NOE,</sup> ~~Boyles~~ had received a total accumulated dose to the whole body of 4350 mrem.
2. Urine samples are collected from all burial site employees each calendar quarter and sent to Eberline for analysis. The highest results noted to date was up to 25 dpm/sample which is considered <sup>by the licensee</sup> to indicate little or no uptake of materials.
3. Each burial site employee is whole body counted by Helgeson once a year. The results for eight employees counted on March 2, 1973, was "zero". The results for 13 employees counted on May 23, 1974, revealed four employees with results indicating some low level uptake of uranium 235. These results were 60, 69, 70 and 78 micrograms or up to 30 percent on a permissible lung burden. (Approximately)
4. Personnel are required to monitor themselves for contamination each time exit is made from the burial site area. Only slight amounts of contamination have been detected on employees to date.

Environmental Monitoring

This program is discussed on pages 3 and 4 of the attached inspection report which was submitted to RO Headquarters on November 27, 1974. It was noted that the licensee has not been conducting an environmental sampling program of the required scope as established in Appendix 6 of the license.

Management Review

At the conclusion of the inspection the two apparent violations were discussed with McCord. He said they would be corrected.

P. R. Guinn  
Radiation Specialist

OFFICE	RO:II	RO:II	RO:II			
SURNAME	PRGuinn:pw	J. Sutherland	<del>NCM:Stacy</del>			
DATE	12/16/74	12/18/74	<del>12/17/74</del>			



Written procedures have also been established ~~for~~ covering all aspects of the licensed activities. The procedures cover all uses of licensed materials and also contain instructions to be followed during emergency conditions. Schultze has several years experience in the use of radioactive material including experience with the Union Carbide Corporation and as State of South Carolina Coordinator of Atomic Energy and Industrial Development Programs. He has a Ph. D. in Chemistry from the University of North Carolina. ~~He~~ also has several years experience in the handling of radioactive material including experience in Hanford, Washington, the General Electric Company's Vallecitos Atomic Laboratory and with Nuclear Engineering Company at the Morehead, Kentucky burial site.

8. Schultze stated that Chem-Nuclear, Inc., holds the following Agreement State licenses which authorize the pickup and storage of radioactive waste:

Oregon - License No. ORE-0219-1  
South Carolina - License No. 097  
Washington - License No. WN-1051-1  
(The South Carolina license authorizes possession of waste containing up to 5,000 curies of byproduct material, 60,000 pounds of source material and 350 grams of SNM material)

III. Receipts and Transfers

9. The licensee's records of receipts and transfers were reviewed to determine the kinds and amounts of licensed materials that had been possessed under the license. The licensee's records showed that the following quantities of cobalt 60 resins had been picked up at the Norfolk Naval Base in Norfolk, Virginia, and transferred to the Tennessee Nuclear Specialists storage site in Jonesboro, Tennessee.

9/29/70 - 100 mc cobalt 60 resins  
9/24/70 - 19.5 mc cobalt 60 resins  
9/22/70 - 32.7 mc cobalt 60 resins  
10/23/70 - 18.6 curies cobalt 60 resins  
9/4/70 - 105 mc cobalt 60 resins  
10/1/70 - 57.7 mc cobalt 60 resins  
10/6/70 - 411 mc cobalt 60 resins  
10/8/70 - 72.8 mc cobalt 60 resins  
10/13/70 - 3.0 mc cobalt 60 resins  
10/15/70 - 31.1 curies cobalt 60 resins

10/20/70 - 4.6 curies cobalt 60 resins  
 10/27/70 - 78.5 curies cobalt 60 resins

Chem-Nuclear, Inc. took possession of these resins at the Norfolk Naval Shipyard and then shipped them by commercial carrier to Jonesboro, Tennessee, for storage. The times that the licensee possessed the cobalt 60 resins at the Norfolk Naval Shipyard were subject to AEC jurisdiction.

10. The licensee's records show that approximately 30,457 pounds of waste materials containing approximately 4.2 curies total of byproduct materials had been picked up from various customers throughout the southeastern United States. This material is being held in storage at the Chem-Nuclear storage site in Barnwell, South Carolina. About 1500 millicuries of this byproduct material waste material were picked up at the Union Carbide facility in Charleston, West Virginia. During the time that this material from Union Carbide was in the possession of Chem-Nuclear in West Virginia, a non-Agreement State, this was subject to AEC jurisdiction.
11. The licensee's records of receipts and transfers of special nuclear material showed that the following quantities of special nuclear material had been received to date and consisted entirely of unrecoverable uranium oxide containing U-235:

<u>Facility &amp; Address</u>	<u>Description</u>	<u>Amount (grams)</u>	<u>Date Received</u>
Southern Space, Inc. N. Charleston, S.C. (laundry facility)	two 55-gallon drums	220	11/2/70
Interstate Industrial Uniform N. Charleston, S.C. (laundry facility)	two 55-gallon drums	174	6/15/70
Westinghouse Electric Corp. Columbia, S.C.	baled waste	348	5/20/70
"	"	343	5/27/70
"	"	347.6	6/2/70
"	"	349.1	6/4/70
"	"	164.7	6/16/70
"	"	154	10/20/70

Facility & Address	Description	Amount <sup>/175</sup> (grams)	Date Received
Westinghouse Electric Corp. Columbia, S. C.	52 bales	193	10/20/70
Westinghouse Electric Corp. Columbia, S. C.	7 bales	<del>54</del>	10/21/70
Westinghouse Electric Corp. Columbia, S. C.	74 bales	294	10/27/70
Westinghouse Electric Corp. Columbia, S. C.	8 bales	80 <del>grams</del>	11/3/70
Westinghouse Electric Corp. Columbia, S. C.	5 bales	49 <del>grams</del>	11/3/70

Schultze stated that SNM wastes are transported from the customer facilities to Barnwell, South Carolina for temporary storage. He stated that these wastes are then transported in a Chem-Nuclear truck with a Chem-Nuclear employee as the driver of the truck, to the Nuclear Fuel <sup>service</sup> location in West Valley, New York for burial. He stated that every effort had been made to see that the 350 gram limit established for SNM waste materials in the South Carolina license had not been exceeded. He stated that at no time had the amount of SNM waste materials exceeded the 350 grams. Schultze stated that in his opinion possession of the SNM waste materials at the Barnwell site and during transportation of the materials to West Valley, New York, ~~the material~~ was under the provisions of the South Carolina license. (As will be shown in the following paragraph the shipments of SNM waste materials from Barnwell, South Carolina to West Valley, New York, are subject to AEC jurisdiction while it was being transported in the Chem-Nuclear truck with a Chem-Nuclear employee as the driver while the material was en route through the non-Agreement States of Virginia, West Virginia, Maryland, and Pennsylvania).

12. A review of the licensee's records showed that during the times that the licensee possessed licensed materials under AEC jurisdiction, the possession limits under the license for byproduct materials had not been exceeded. However, the licensee's records showed that on seven separate occasions in 1970 more than 200 grams of SNM waste materials had been possessed by the licensee in non-Agreement States and thereby subject to the possession limits of the AEC license of 200 grams. It was determined that the following shipments had been possessed by the licensee in a Chem-Nuclear truck with a Chem-Nuclear employee as the driver while SNM waste material containing unrecoverable U-235 was being transported through the non-Agreement States of Virginia, West Virginia, Maryland, and Pennsylvania.

5/20/70 - 348 grams U-235  
5/27/70 - 343 grams U-235  
6/2/70 - 347.6 grams U-235  
6/4/70 - 349.1 grams U-235  
6/16/70 - 164.7 grams U-235  
10/20/70 - 347 grams U-235  
10/27/70 - 348 grams U-235  
11/3/70 - 349 grams U-235  
6/15/70 - 174 grams U-235

Seven of the above shipments exceed the possession limit of the license as established in paragraph 1 which states that the licensee shall not possess at any one time more than 200 grams of SNM.

#### IV. Facilities and Equipment

13. Schultze and Powers were questioned regarding the Chem-Nuclear facilities. Schultze said that Chem-Nuclear has office facilities located in Prosser, Washington, and in Columbia, South Carolina, while they have storage facilities located in Arlington, Oregon, and Barnwell, South Carolina. Administrative offices are located in Portland, Oregon, but according to Schultze, are expected to be moved to Wenatchee, Washington, in the near future. The Barnwell, South Carolina, storage area is located in the County of Barnwell, South Carolina, approximately one mile NW of the town of Snelling and occupies the southern corner of a track of land referred to as the Laura Moore track. Chem-Nuclear also has the adjacent tract of

land referred to as the W. W. Moore property. Approximately 250 acres of land are available for use by Chem-Nuclear Services, Inc. The Barnwell storage site is surrounded by a chain-link fence topped with three strands of barbed wire. Inside this area are two separate fenced-in areas which also are surrounded by a six-foot high chain link fence topped with barbed wire. These two areas inside the larger areas are referred to as storage compounds No. 1 and No. 2. The storage compound No. 1 is used for storage of SNM radioactive waste. Locked entrance gates are used to secure the area and the keys to the entrance are controlled by Powers. Schultze and Powers stated that appropriate warning signs are posted around the fenced-in area.

14. Ample supplies of coveralls, shoecovers, gloves, etc. are available for use by personnel. Several radiation detection instruments are on hand including beta-gamma and alpha detection equipment. Most of this equipment has been procured from Eberline. Schultze stated that three CT-69 shipping casks are available for use. He stated that each of these casks weighs approximately 46,000 pounds while empty. He stated that to date, these casks have been used only for shipping the cobalt 60 resins from the Norfolk Naval Shipyard to the storage site at Jonesboro, Tennessee.

#### V. Personnel Monitoring and Radiation Surveys

15. A personnel monitoring program is being conducted by means of direct reading dosimeters with ranges from 0 to 200 mr and film badges. The dosimeters are being read daily while the film badges are changed at monthly intervals. Film badge services are supplied by the U. S. Testing Company. In response to questions regarding personnel exposures, Schultze and Powers stated that personnel exposure records are being maintained by Farmer but Powers also keeps a record of these results at the Barnwell, South Carolina Site. These records were not available for review at the time of the inspection but both Schultze and Powers stated that to the best of their knowledge none of the exposures have ever exceeded a total exposure of 500 mrem during any one month period (Powers said this exposure occurred at the Barnwell storage site during the last quarter) and that no "off scale" dosimeter readings have been noted to date. Schultze stated that none of the personnel exposure totals have ever exceeded the limits in 10 CFR 20.

16. Radiation surveys are being conducted and records of results are being maintained. Powers is conducting most of these radiation surveys and has recorded results in a logbook and on the appropriate shipping papers for each shipment of radioactive waste material. The records were reviewed and it was noted that radiation measurements had been made on each shipping container at a distance of one meter and on the surface. It was noted, for example, that on the shipments of cobalt 60 resins to the Jonesboro storage site that a maximum radiation level of 17 mr/hr had been noted on the surface of the shipping cask and that the maximum radiation level noted at a distance of one meter was 6 mr/hr. Powers stated that he wipe tests the trucks prior to release of the trucks to transport materials to storage sites or burial grounds and he also took smears and did instrument surveys on empty containers and trucks when returned to the Barnwell site. In response to a question regarding the radiation surveys on the shipping cask for the cobalt 60 resins, Powers stated that these radiation surveys have been made by U. S. Navy personnel at the Norfolk Naval Shipyard but that he had checked results on several occasions and that Navy personnel are making good radiation surveys on these shipping casks. Powers stated that also he had conducted numerous radiation surveys at the storage site at Barnwell, S.C., and the radiation levels outside the fence around the storage site in unrestricted areas had not exceeded 0.2 mr/hr. Schultze stated that no shipments of radioactive waste will be made if the radiation levels from the shipping containers exceed 10 mr/hr at one meter or 200 mr/hr on the surface of the shipping container.

#### VI. Posting and Labeling

17. In response to questions regarding posting and labeling of storage areas, storage containers, and shipping containers, Schultze and Powers stated that efforts had been made to comply with all AEC requirements and all ICC requirements. Powers stated that all shipping containers contain labels with the conventional radiation caution symbol, with "Caution Radioactive Materials," and information showing the kinds and quantities of radioactive materials. The various ICC labeling requirements were discussed with Schultze and Powers.



Each specific requirement was pointed out and both Schultze and Powers indicated that they had fully complied with the requirements.

VII. Review with Licensee Management

18. At 9:00 a.m. on December 3, 1970, the inspection results were reviewed with licensee management. Persons present during this review were as follows:

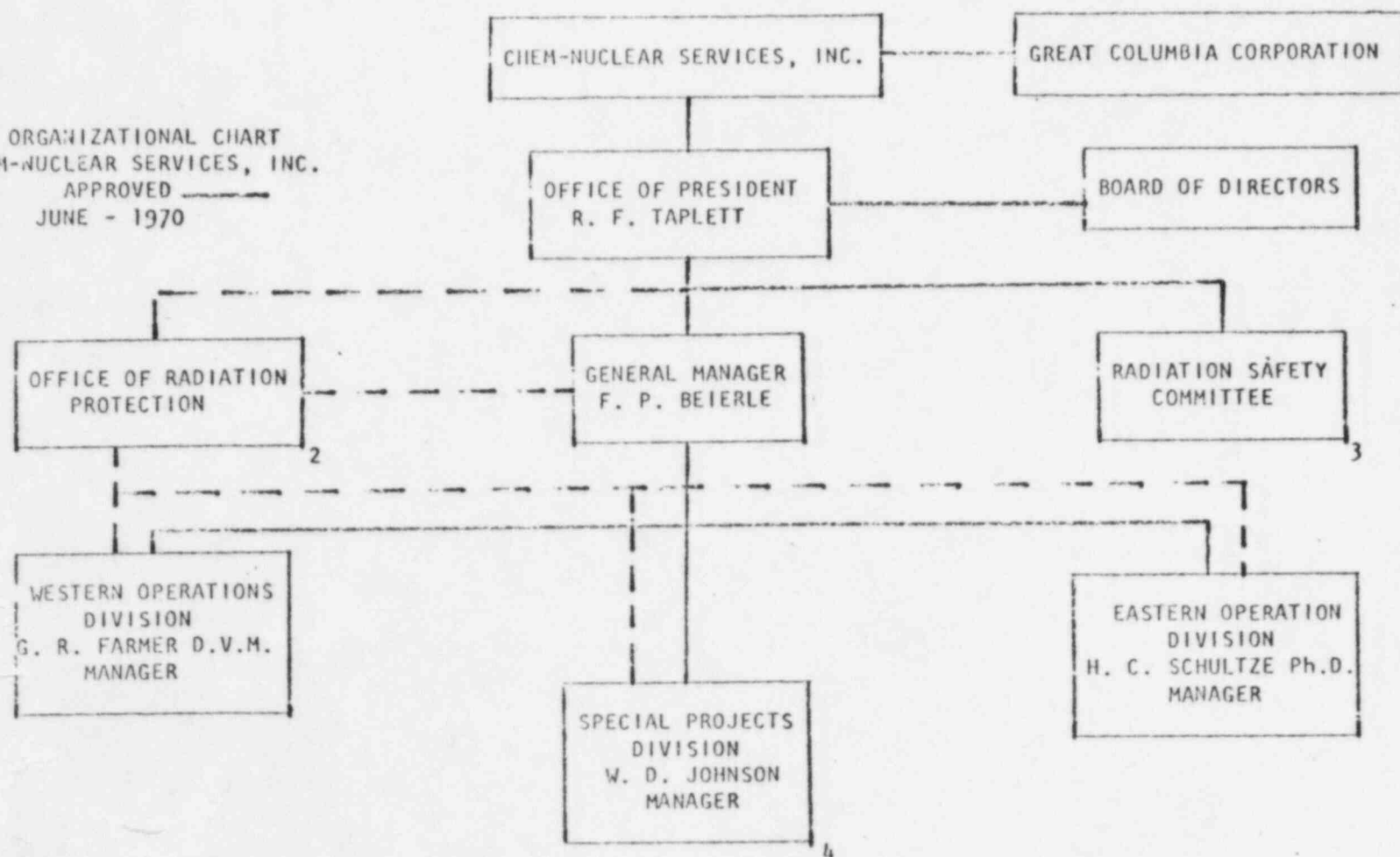
Frederick P. Beierle, General Manager, Chem-Nuclear, Inc.  
William D. Johnson, Manager, Special Projects, Chem-Nuclear, Inc.  
Henry C. Schultze, Vice President, and Manager, Eastern Operations, Chem-Nuclear, Inc.  
Clifford F. Powers, Manager, Barnwell Site, Chem-Nuclear, Inc.  
Heyward G. Shealy, Director, Radiological Health, State of South Carolina  
Paul R. Guinn, Region II, Division of Compliance

Guinn opened the meeting by stating that the inspection on November 19, 1970 had been limited to the activities conducted under AEC jurisdiction. Activities which had been conducted under AEC jurisdiction included the activities involving waste pickup at the Union Carbide Corporation, Charleston, West Virginia, which is a non-Agreement State, the period of time in which the cobalt 60 resins were in possession of Chem-Nuclear, Inc., and at the Norfolk Naval Shipyard, and the period of time during which the SNM waste materials were in the Chem-Nuclear, Inc., truck with the Chem-Nuclear, Inc., driver during transport through non-Agreement States to burial sites at West Valley, New York. At this point Schultze stated that it had been his opinion that the shipments of SNM waste materials to West Valley, New York had been conducted under the South Carolina license. He was informed that since the SNM materials had been possessed in a Chem-Nuclear, Inc., truck with a Chem-Nuclear employee as the driver and since the truck had been driven through the non-Agreement States of Virginia, West Virginia, Maryland, and Pennsylvania, that the time these materials were possessed in these non-Agreement States ~~case~~ the AEC had jurisdiction and all the requirements of the AEC license would apply. The group was then informed that the only item of



noncompliance noted during the inspection concerned License Condition No. 1 which states that no more than 200 grams of SNM may be possessed at any one time whereas the Chem-Nuclear transfer records showed that on seven separate occasions more than 200 grams of SNM have been possessed in waste material while being transported through the non-Agreement States of Virginia, West Virginia, Maryland, and Pennsylvania, in a Chem-Nuclear, Inc. truck and with a Chem-Nuclear, Inc. employee as the driver. It was explained that if the shipments had been made by commercial carrier or if the shipments had been limited to 200 grams or less, that the item of noncompliance could have been avoided. Schultze again stated that it had been his impression that the shipments were being made under the South Carolina license under terms of the reciprocity agreements of the AEC and Agreement States. After further discussion, both Schultze and Beierle acknowledged the item of noncompliance and stated that a request would be submitted to DML immediately for an amendment to the license to increase the possession limit to 350 grams for SNM. They also stated that no further shipments above the 200 gram limit would be made until such time as the increased possession limit is authorized. In closing, Schultze stated that he and Beierle would be at AEC Headquarters on Wednesday, December 9, 1970, and that this matter pertaining to the item of noncompliance would be discussed further with DML at this time. Beierle stated that his new mailing address is Box 918, Wenatchee, Washington 98801.

ORGANIZATIONAL CHART  
CHEM-NUCLEAR SERVICES, INC.  
APPROVED \_\_\_\_\_  
JUNE - 1970



1. Chem-Nuclear Services, Inc., is a wholly owned subsidiary of the Great Columbia Corporation.
2. Chief Radiation Protection Officer, Dr. G. R. Farmer; Assistant RPO, W. D. Johnson; Assistant RPO, Clifford F. Powers.
3. Radiation Safety Committee composed of President, General Manager, Eastern Division Manager, Western Division Manager, and Chief Radiation Protection Officer.
4. Special Projects Division operates as assigned in either Division. (Presently assigned to Western Operations Division)