

AMCCOM PAMPHLET 385-1

Safety

HANDBOOK FOR DISPOSAL OF UNWANTED RADIOACTIVE MATERIAL

DEPARTMENT OF THE ARMY
HEADQUARTERS,
U.S. ARMY ARMAMENT,
MUNITIONS AND CHEMICAL COMMAND
ROCK ISLAND, IL 61299-6000

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FOREWORD

The U.S. Army Armament, Munitions and Chemical Command (AMCCOM) is responsible for the ultimate disposal of unwanted radioactive material within the U.S. Army. The goal of AMCCOM is to ensure the safe packaging, transport, and handling of unwanted radioactive material from the generator to the disposal site.

This handbook discusses the procedures for preparing shipments of unwanted radioactive material in full compliance with Federal, state, and burial site regulations. Special emphasis is placed on the audit and certification procedures developed by the HQ, AMCCOM, Safety Office to insure the most cost effective and safe methods of disposal are employed.

Disposal and transport of unwanted radioactive material is an extremely sensitive issue and must be conducted in the manner prescribed by the relevant regulations. Even minor infractions of these regulations cannot be ignored and will result in suspension of use of the commercial burial sites. This has happened in the past to the Army. Generators of unwanted radioactive material are urged to follow explicitly the guidelines set forth in this handbook and to contact the AMCCOM Safety Office if any further assistance is required.

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 (In Accordance with U.S. Army Guidelines)

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*This pamphlet supersedes AMCCOMP 385-1, 2 April 1985.

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CHAPTER 1
INTRODUCTION

1-1. Purpose and Scope.

This handbook is for those who generate unwanted radioactive material for disposal within the U.S. Army. It provides information and instructions for the ultimate disposal of unwanted radioactive material as radioactive waste in accordance with U.S. Army, State, and Federal regulations.

1-2. General.

a. Headquarters, U.S. Army Armament, Munitions and Chemical Command (HQ, AMCCOM), has been designated by AR 385-11 as the responsible agency for the safe disposal of all unwanted low-level radioactive material in the U.S. Army. In the past, numerous problems and violations have occurred with the packaging and shipment of radioactive waste. HQ, AMCCOM, is responsible to provide information and guidance to all generators of unwanted radioactive material to prevent violations of Federal and state regulations, thereby insuring safe and legal transport and burial of the material.

b. In past years, more than 250 different shippers have requested information and assistance from HQ, AMCCOM, covering some area of handling, packaging, or transporting radioactive material. Due to the large turnover of personnel in the Army and National Guard units, training alone has not been the answer to providing this assistance to the field. It is hopeful that this handbook and personal assistance from this headquarters will fulfill the requirement.

c. HQ, AMCCOM, has negotiated contracts with commercial firms operating the burial sites at Richland, WA, Beatty, NV, and Barnwell, SC. All unwanted low-level radioactive material generated within the US Army must be disposed of via one of these contracts if funding is to be provided by HQ, AMCCOM, in accordance with (IAW) AR 385-11. Additionally, broker contracts have been negotiated to provide pickup service and consolidation points. Use of the broker will be directed by this headquarters only. Shipments to the broker for consolidation will be only by authorization from HQ, AMCCOM.

CHAPTER 2
INSTRUCTIONS TO GENERATORS

2-1. General Instructions.

a. Radioactive waste should be stored by the generator in accordance with TM 3-261 and/or Nuclear Regulatory Commission (NRC) license requirements. The generator is to maintain the following information about the radioactive items, where available:

- (1) National Stock Number (NSN).
- (2) Radionuclide Involved (60 Co, 226 Ra, etc.).
- (3) Item Name (Compass, Watch, Trash, etc.).
- (4) Quantity of Each Item.
- (5) Activity per Item (in microcuries, millicuries, or curies).

b. The generator must request disposal instructions, by letter, to Commander, AMCCOM, ATTN: AMSMC-PCW-HA, Rock Island, IL 61299-6000. The generator is not to pack waste for shipment prior to receiving instructions unless shipment is to be made under the generator's permit or permission has been granted by HQ, AMCCOM. The letter requesting disposition instructions should contain at least the information listed in a above.

c. Burial costs will be paid by HQ, AMCCOM. Packaging costs will be paid by the generator. Waste shipped directly to a burial site under the HQ, AMCCOM, permit must be certified by a HQ, AMCCOM, Health Physicist.

d. On-site support for packaging, labeling, marking, and shipping is available from AMCCOM Health Physicists, if required and requested. This support will be at the discretion of HQ, AMCCOM.

e. Disposal of radioactive waste by any other method is prohibited by Army regulation.

2-2. HQ, AMCCOM, Specific Instructions.

a. Upon receipt of a written request from a generator for disposal of unwanted radioactive material, HQ, AMCCOM, will:

- (1) Assign a HQ, AMCCOM, control number; all future correspondence must reference this control number.
- (2) Evaluate the request for disposal and determine whether the shipment will be sent to a consolidation facility, direct to a commercial burial site, or picked up by an AMCCOM broker at the generator's facility.
- (3) Establish the most economical method for packaging, consistent with state, Federal, and burial site regulations.
- (4) For shipments to a consolidation facility, HQ, AMCCOM, will provide the generator, by letter, the exact packaging, labeling, and marking requirements for the material and/or provide on-site assistance, if deemed necessary. The assistance may be either from HQ, AMCCOM, or an AMCCOM broker.

b. An HQ, AMCCOM, Health Physicist, will complete an onsite audit and certification for all shipments direct to the burial site (not required for shipment to the AMCCOM broker). This audit will include an inspection of the loaded truck used for transport. This audit is not required for generators shipping under their own permit or outside of AMCCOM jurisdiction.

2-3. Assistance Pertaining to Specific Questions.

To obtain assistance pertaining to specific questions on packaging, labeling, NRC, Department of Transportation (DOT), and disposal site criteria, call HQ, AMCCOM, Health Physicist, AV 793-2964/2969, or Com1 (309) 782-2964/2969. For administrative problems, call the Radioactive Waste Disposal Administrator, AV 793-4947, or Com1 (309) 782-4947.

2-4. HQ, AMCCOM, Unwanted Radioactive Material Brokers.

a. The current AMCCOM brokers are Chem-Nuclear Systems, Inc. (CNSI), Columbia, SC, and U.S. Ecology Inc., Louisville, KY. U.S. Ecology, Inc., maintains a warehouse on the west

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coast at Pleasanton, CA. CNSI maintains a consolidation facility at Snelling, SC. Shipments to these locations are to be made only with specific authorization and disposal instructions from HQ, AMCCOM. Shipments not specifically authorized will be returned at the generators' expense.

b. Shipments made to the consolidation facilities will be consolidated, audited, and certified by an AMCCOM Health Physicist at least biannual. General instructions for shipments are found in chapter 3, and will be specifically detailed for each shipment.

2-5. Explanation of Terms.

a. The definitions below include a summary of the latest revisions of the DDT and NRC rules. More information can be found in chapter 4 of this handbook.

"A₁" - Maximum activity of special form radioactive material permitted in a type A package. (See 49CFR 173.435.)

"A₂" - Maximum activity of radioactive material, other than special form or low specific activity radioactive material, permitted in a type A package. (See 49CFR 173.435, 173.433.)

"Class A, B, or C" - A classification of waste determined by the use of Title 10, part 61, paragraph 61.55.

"Closed Transport Vehicle" - Transport vehicle equipped with a securely attached exterior enclosure that during normal transportation restricts the access of unauthorized persons to the cargo space containing the radioactive material. The enclosure may be either temporary or permanent and, in the case of packaged materials, may be of the "see through" type and must limit access from top, sides, and ends.

"Fissile Material" - Fissile Radionuclides are Plutonium-238, Plutonium-239, Plutonium-241, Uranium-233, Uranium-235, or any material containing any of these isotopes. Neither natural nor depleted uranium are fissile material.

"Highway Route Controlled Quantity" - This is a new term as of 1 July 1983, formerly called "large quantity." This means a quantity within a single package which exceeds:

- (1) 3,000 times the A₁ value of the radionuclides as specified in 49CFR 173.433 for special form radioactive material;
- (2) 3,000 times the A₂ value of the radionuclides as specified in 49CFR 173.433 for normal form radioactive material; or
- (3) 30,000 curies, whichever is least.

"Low Specific Activity Material" (LSA) - Means any of the following:

- (1) Uranium or thorium ores and physical or chemical concentrates of these ores.
- (2) Unirradiated natural or depleted uranium or unirradiated natural thorium.
- (3) Tritium oxide in aqueous solutions provided the concentration does not exceed 5.0 millicuries per milliliter.
- (4) Material in which the radioactivity is essentially uniformly distributed and in which the estimated average concentration of contents does not exceed:
 - (i) 0.0001 millicurie per gram of radionuclides for which the A₂ quantity is not more than .05 curie.
 - (ii) 0.005 millicurie per gram of radionuclides for which the A₂ quantity is more than .05 curie but not more than 1 curie; or
 - (iii) 0.3 millicurie per gram of radionuclides for which the A₂ quantity is more than 1 curie.
- (5) Objects of nonradioactive material externally contaminated with radioactive material, provided that the radioactive material is not readily dispersible and the surface contamination, when averaged over an area of 1 square meter, does not exceed 0.0001 millicurie/cm² of radionuclides for which the A₂ quantity is not more than .05 curie or 0.001 millicurie/cm² for other radionuclides.

"Normal Form Radioactive Material" - Means radioactive material which has not been demonstrated to qualify as "special form radioactive material."

"Special Form Radioactive Material" - Means radioactive material which satisfies the following conditions:

- (1) It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;
- (2) The piece or capsule has at least one dimension not less than 5 millimeters; and
- (3) It satisfies the test requirements of 173.469.

"Type A Packaging" - Means a packaging designed to retain the integrity of containment and shielding required by this part under normal conditions of transport as demonstrated by tests set forth in 173.465 or 173.466, as appropriate. Examples of type A packages are found in chapter 3 of this handbook.

"Type B Packaging" - Means a packaging designed to retain the integrity of containment and shielding required by this part when subjected to the normal conditions of transport and hypothetical accident test conditions set forth in 10 CFR Part 71.

- b. The following definitions, though not derived from the Code of Federal Regulations, Title 49, are held as generally accepted meanings of the terms listed.

"Alpha Particles" - One of the three primary forms of radioactive emissions from radioactive atoms. Alpha particles are positively charged particles emitted from the nucleus of a radioactive atom and have a mass and charge equal to the nucleus of a helium atom (2 protons plus 2 neutrons). Alpha particles have very little penetrating ability and, therefore, are chiefly internal radiation hazards. They travel very short distances in air and are shielded very easily.

"Beta Particles" - One of three primary forms of radioactive emissions from radioactive atoms. Beta particles are negatively or positively charged particles emitted from the nucleus of a radioactive atom and have a mass and charge equal to that of an electron. They usually travel greater distances in air than alpha particles, have an intermediate penetrating ability, but still can be easily shielded with common materials.

"Gamma Rays" - One of three primary forms of radioactive emissions from radioactive atoms. Gamma rays are not particulate (as opposed to alpha and beta particles), but are short wave length electromagnetic radiations from the nucleus of radioactive atoms. Except for their origin (the nucleus of the atom rather than the outer shell), they are identical in characteristics to X-rays. Gamma rays are the most penetrating form of radiation and travel great distances in air before absorption. They require heavy shielding materials, such as lead, to attenuate the radiation.

"Curie" - An expression of the quantity of radioactive material in terms of the number of atoms which disintegrate (decay) per second. A curie (Ci) is that quantity of radioactive material which decays such that 37 billion atoms disintegrate per second with each disintegration resulting in the emission of alpha or beta particles and/or gamma ray(s). One thousandth of a curie is a millicurie (mCi); one millionth of a curie is a microcurie (uCi). Be careful when using these abbreviations to not confuse microcurie and millicurie.

"Radiation Level" - A term sometimes used instead of radiation "dose rate" or "exposure rate." It generally refers to the effect of radiation on matter; that is, the energy imparted to and absorbed by matter due to emitted radiation per unit of time.

"Millirem" - (One Thousandth of a Rem) - The rem is a unit sometimes used to express radiation level or dose rate (millirem per hour). Technically speaking, the rem is an expression of radiation dose which considers the biological effect of the absorbed radiation. Do not confuse millirem with curie.

"Encapsulation" - A term used to denote an additional fabrication technique often used in preparation of radiation sources, wherein the basic material is physically placed within sealed, high physical integrity capsules or envelopes to provide further assurance that in the event a package breaks and the capsule escapes, there would be little possibility of a spread of radioactive contamination.

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"Nuclear Criticality" - This term denotes the occurrence of a chain reaction with fissile radioactive materials. The purpose of the Fissile Classes is to prevent the occurrence of nuclear criticality during the transport of Fissile Materials. (Controlled nuclear criticality is the objective within a nuclear power reactor.)

"Radioisotope and Radionuclide" - For the purpose of transportation, these terms are synonymous with "Radioactive Materials" and identify specific isotopes of chemical elements that have radioactive properties.

"Radiotoxicity" - A term used to denote the relative hazards of the various radionuclides; that is, their internal radioactive effect within the body.

"Swipe Sample" - A test for loose or removable radioactive contamination on surfaces (also sometimes referred to as a "smear" test).

CHAPTER 3
PACKAGING INSTRUCTIONS

3-1. General Instructions. Do not package the material for shipment prior to receiving specific instructions or permission from HQ, AMCCOM. To facilitate handling and storage of unwanted radioactive material prior to requesting/receiving specific guidance from HQ, AMCCOM, see instructions for packaging, labeling, and transportation in paragraph 3-3.

3-2. Types of Packages Authorized.

a. Radioactive waste is packaged and shipped under the direction of HQ, AMCCOM. In response to a request for shipping radioactive waste, a letter of specific instructions is provided to the generator as to packaging and shipping criteria.

b. When Type A containers are not specifically specified by HQ, AMCCOM the smallest steel container that will hold the Type A waste should be selected from table 3-1. Other containers may also be authorized for Type A shipments by prior approval of HQ, AMCCOM, AV 793-2964/2969. Containers may not be packaged such that large amounts of air space are present.

c. Metal drums used for any shipment of radioactive waste cannot have rust, perforations, or weak spots. These do not meet the site requirements for a strong-tight-container. All drums must have a heavy duty retainer ring and gasket fastened with a bolt and lock nut. Fifty-five gallon drums and larger must be fitted with a 5/8-inch bolt, and others with at least a 3/8-inch bolt. Threads should be staked after final closure. Drums classified as 17H can easily be identified by the presence of three rolling hoops and markings and can be procured from GSA or numerous commercial sources. These drums have been tested to conform to DOT-7A standards.

d. Wooden boxes are acceptable for burial at the Barnwell SC site if they are constructed of Grade A, 1/2-inch or 3/4-inch plywood with all corners reinforced. Wooden boxes are allowed at the Hanford, WA, site only by special permission. All wooden boxes must be banded both vertically and horizontally and all seams caulked on the interior of the box. Boxes used for "Type A" shipments must be tested to meet DOT-7A specifications. Request you check with this headquarters prior to use of wooden boxes. Fiberboard boxes are not acceptable for shipments direct to the burial sites even though they meet DOT specifications as a strong-tight-container. Prefabricated metal containers are available from several commercial sources and are usually less costly than the wooden boxes.

TABLE 3-1.
TYPE A STEEL CONTAINERS APPROVED FOR SHIPPING AND BURIAL OF RADIOACTIVE WASTE*

Container Description	Capacity (gal)	Spec No	Wt Limit (lb)	Inside Hgt (in)	Inside Dia (in)
Steel drum NSN 8110-00-254-5719	0.7	7A	25	8-1/2	5
Steel drum NSN 8110-00-254-5722	4	7A	69	13-1/2	10-1/2
Steel drum NSN 8110-00-254-5715	5	6C	80	12-3/4	11-1/4
Steel pail NSN 8110-00-570-9641	5	17C	100	12-1/2	11-1/4
Steel drum	10	6C	160	16-1/2	13-7/8
Steel drum	30	6B	600	27-1/2	18-1/4
Steel drum NSN 8110-00-030-7779	30	17H	500	28	18
Steel drum	55	6J	880	33	22-1/2
Steel drum	55	17C	840	33-1/4	22-1/2
Steel drum NSN 8110-00-823-8121	55	17H	840	33-1/4	22-1/2

*MLM - 2228 "Certification of ERDA Contractors' Packaging to Compliance with DOT Specification 7A Performance Requirements, Phase II: Summary Report." MLM - 3245 "DOT 7A Type A Certification Document."

3-3. Handling and Storage Instructions.

a. Generator Responsibility.

(1) You, and only you, as generator of the materials have firsthand knowledge of what goes into a package. Therefore, it is imperative that you keep accurate records of

the physical contents, each radioisotope, and the activity. For example, is the package filled only with counting vials, animal carcasses, or dry solid wastes? (For the burial sites most waste types must be separated.) Have there been any bottles of liquids placed in any containers? If there have been, this is not allowed. No free liquids are acceptable.

(2) You must also bear in mind the various rules and regulations that must be complied with. These include your own licensing conditions, the licensing conditions of any broker utilized, DOT regulations, and any other conditions that have been placed on the burial sites by the applicable regulatory agency. Consequently, packaging to one set of standards, such as the DOT regulations, may not be adequate to meet the standards at a burial site. We will inform you of all conditions that you are required to meet and changes as they occur.

b. Types of Containers That May Be Used.

(1) Steel drums of various sizes (5-gallon, 30-gallon, 55-gallon, etc.) may be used provided they are in excellent shape and they will, without question, conform to the conditions of a strong-tight-container and, when required, meet DOT-7A specification tests.

(2) Wooden boxes are allowed at the Barnwell SC site, but should only be used in those instances when large, bulky objects are involved that do not lend themselves to a standard steel drum. Wooden boxes are allowed at the Hanford WA site only by special permission. When wooden boxes are used, extreme care should be taken to be absolutely certain that all cracks are sealed with a material such as caulking compound to assure that no leakage can occur. In addition, all objects that are placed in a wooden box should be securely wrapped in plastic and sealed with tape or some equivalent method. Boxes must also be adequately banded with steel bands in two directions. Boxes containing type A quantities must be constructed and tested to meet DOT-7A specification.

(3) Metal boxes prefabricated by various manufacturers may be purchased and used for shipments. Again, when a type A quantity is packaged, the container must be certified to DOT-7A specifications.

(4) For each package, whether it be a steel box or drum or wooden box, the smallest outside dimension must be 4 inches or greater. Each package must be of such integrity either for shielding efficiency or leak tightness, so that, under conditions normally incident to transportation, there will be no release of radioactive material. This means that all packages of radioactive materials must be so designed and packaged to withstand a trip of hundreds of miles enroute to a burial site.

(5) What this means to you as the generator/packager is that you have the responsibility for each of your packages.

c. Marking and Labeling.

(1) LSA radioactive materials which are transported as exclusive use are exempt from specification packaging, marking, and labeling. The words "Radioactive LSA" must be stenciled or otherwise marked on each package.

(2) Each package not shipped "exclusive use" shall have the name and address of the generator/packager clearly and legibly written or printed on the package.

(3) The AMCCOM coded number will be written or printed on the Radioactive Shipment Manifest (RSM).

(4) All packages that are not specifically excepted must have a Radioactive White I, Radioactive Yellow II, or Radioactive Yellow III label attached as described below:

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Radioactive White I



(a) A Radioactive White I label must be affixed to each package measuring 0.5 millirem per hour or less at any point on the external surface of the package, provided the package is not a Fissile Class II or III or does not contain a "highway route controlled quantity" of radioactive material as defined in paragraph 173.403 of the Hazardous Materials Regulations of the Department of Transportation.

Radioactive Yellow II



(b) A Radioactive Yellow II label must be affixed to each package measuring more than 0.5 but less than 50 millirem per hour at any point on the external surface, and not exceeding 1.0 millirem per hour at 1 meter from each point on the external surface of the package, and on a Fissile Class II package having a transport index of 1.0 or less.

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Radioactive Yellow III



(c) A Radioactive Yellow III label must be affixed to each package which measures more than 50 millirem per hour at any point on the external surface, or exceeds 1.0 millirem per hour at 1 meter from any point on the external surface, or a Fissile Class III or contains a "highway route controlled quantity" or radioactive material as defined in paragraph 173.403 of the Hazardous Materials Regulations of the Department of Transportation.

(d) Each package requiring the above Radioactive labels must have these labels affixed to two opposite sides (not top and bottom) of the package.

(e) These labels may be ordered from Defense General Supply Center, Richmond, VA.

d. Transportation of Radioactive Materials (Broker Pickup Only).

When the AMCCOM broker arrives at your facility for a pickup, their personnel will perform the following procedures. This is a double check of the information provided by the customer on the RSM.

(1) Packages will be examined visually for integrity. Only superficial scratches and very minor dents will be accepted on a package. Severe rusting or any damage that would indicate that the package may fail during transport is reason to reject a package or require an overpack.

(2) Closure devices will be carefully checked. In the case of open head drums, the bolt ring must be securely in place around the lid. There must be a gasket on each drum and the bolt ring must be pulled down as tightly as possible using an adequate tool of enough strength to render the bolt ring immovable and to reasonably assure that the lid would not "pop off" if the drum were dropped from a height of four (4) feet or more. NOTE: Only heavy gauge, bolted rings with drop forged lugs and 5/8-inch bolt and nut are authorized for 55-gallon and 83-gallon drums.

(3) A radiation survey will be made at all points on the external surface of the container and at 1 meter from the external surface (highest reading) of the container using a AN/PDR-27 survey meter or equivalent.

(4) Contamination surveys will be taken by wiping the external surface of the container with an absorbent material, using moderate pressure and covering the container surface.

(5) Labeling and marking will be checked for compliance with DOT regulations, NRC requirements, and contents. Any containers that are not properly labeled or marked will be rejected.

(6) Shipping documents will be prepared, RSMS checked against labels, and all required certifications will be signed and completed as required.

e. Transportation of Radioactive Materials (AMCCOM Directed).

(1) Unwanted radioactive material disposition instructions may require the generator to package, mark, label, and ship the material without on-site assistance from HQ, AMCCOM.

(a) All requests for disposition will be carefully examined by HQ, AMCCOM, to determine the best method of packaging for the material.

(b) A letter with specific and detailed instructions will be forwarded to the generator. The instructions will specify the type of container(s) to be used and will include the necessary marking, labels, and shipping papers to preclude any shipping violations.

(c) These instructions must be followed explicitly.

(2) Unwanted radioactive material disposition requests may require on-site assistance from HQ, AMCCOM, Health Physicists to package and ship the material in a safe and cost-effective manner. In these cases, direct communication will be made with the generator by AMCCOM.

f. Leak Test for Steel Drums.

(1) Liquids.

(a) The only liquids that may be packaged in an unabsorbed state are liquids contained in scintillation vials. Liquids in bottles or any other container, regardless of volume, cannot be placed in a container filled with dry solid waste. Scintillation vials with activity specified by NRC 10 CFR 20.306 for disposal without regard to radioactivity are not acceptable at the burial site. These vials must be separated and will be disposed of via other methods by HQ, AMCCOM.

(b) Even though you may have instructed your personnel to package according to the foregoing paragraph, all drums of radioactive materials to be picked up by the AMCCOM broker should be leak tested by placing each drum in a horizontal position for at least fifteen (15) minutes. The drum can then be returned to the vertical position for storage or continued to be stored in the horizontal position until pickup is accomplished.

(c) If leakage is observed from any container, it means that liquid has been improperly placed into the package. If leakage is observed in either of the foregoing instances, the drum must be repackaged to meet burial site criteria.

(2) Animal Carcass Drums.

If leakage is observed from an animal carcass drum, improper packaging procedures may have been used. Determine why the leakage occurred and then repackage according to burial site procedures and the graphic illustrations in this pamphlet. Repeat the leak test after repackaging.

(3) Dry Solid Drums.

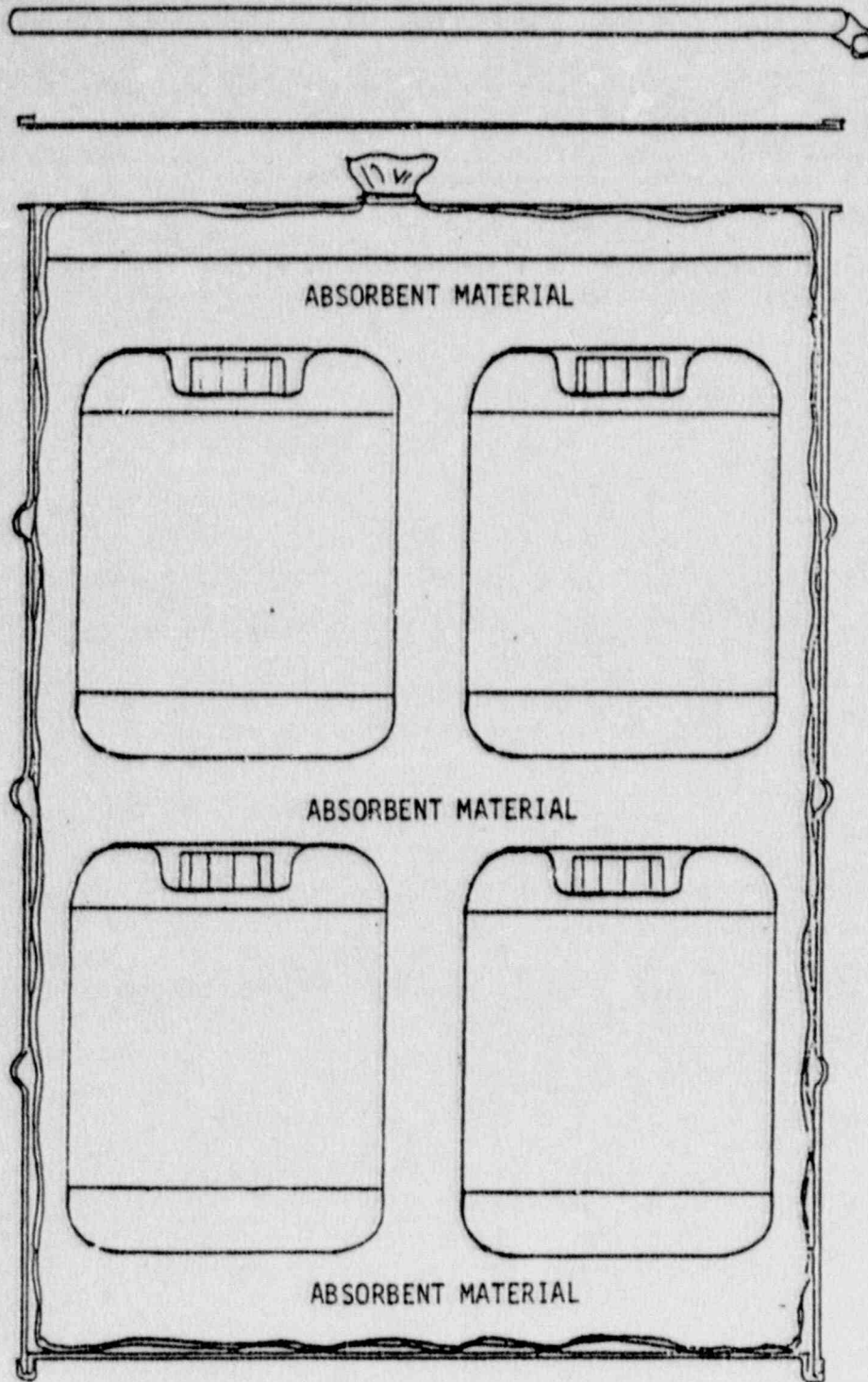
(a) If leakage is observed from a drum of dry solid waste, a serious violation of packaging procedures has occurred. There should not be, and must not be, any liquid whatsoever placed into a drum of dry solid waste.

(b) The drum must be repackaged and returned to a dry solid state. There can be absolutely no liquid, regardless of amount, left in the container. If the contents of the drum have absorbed liquid and are still wet, then that container cannot be buried. This leaves the alternative of complete dryness or adding sufficient approved absorbent.

g. Packaging Absorbed Liquids (Recommended).

- (1) Outer container must be a DOT approved drum, 55-gallon size, which meets DOT-7A specifications.
- (2) Outer container must be lined with a 4-mil plastic liner and sealed at the top when container is packed.
- (3) Inner containers must be nonbreakable and capable of a leak tight closure (screw cap).
- (4) Liquid in inner containers must be absorbed with at least a two-to-one ratio of absorbent to liquid with no freestanding liquid.
- (5) Inner containers are packaged in the 55-gallon drum filling all voids with absorbent. Total maximum capacity of inner containers cannot exceed 20 gallons.
- (6) Only sorbents approved by the State of Washington, Department of Social and Health Services may be used. For approved sorbents see paragraph L.
- (7) Installation must maintain a quality control program which verifies that the above conditions are met.

ABSORBED LIQUIDS PACKAGING



h. Packaging Absorbed Liquids (Alternative).

(1) Container must be a DOT approved drum, either 30-gallon or 55-gallon size, which meets DOT-7A specifications.

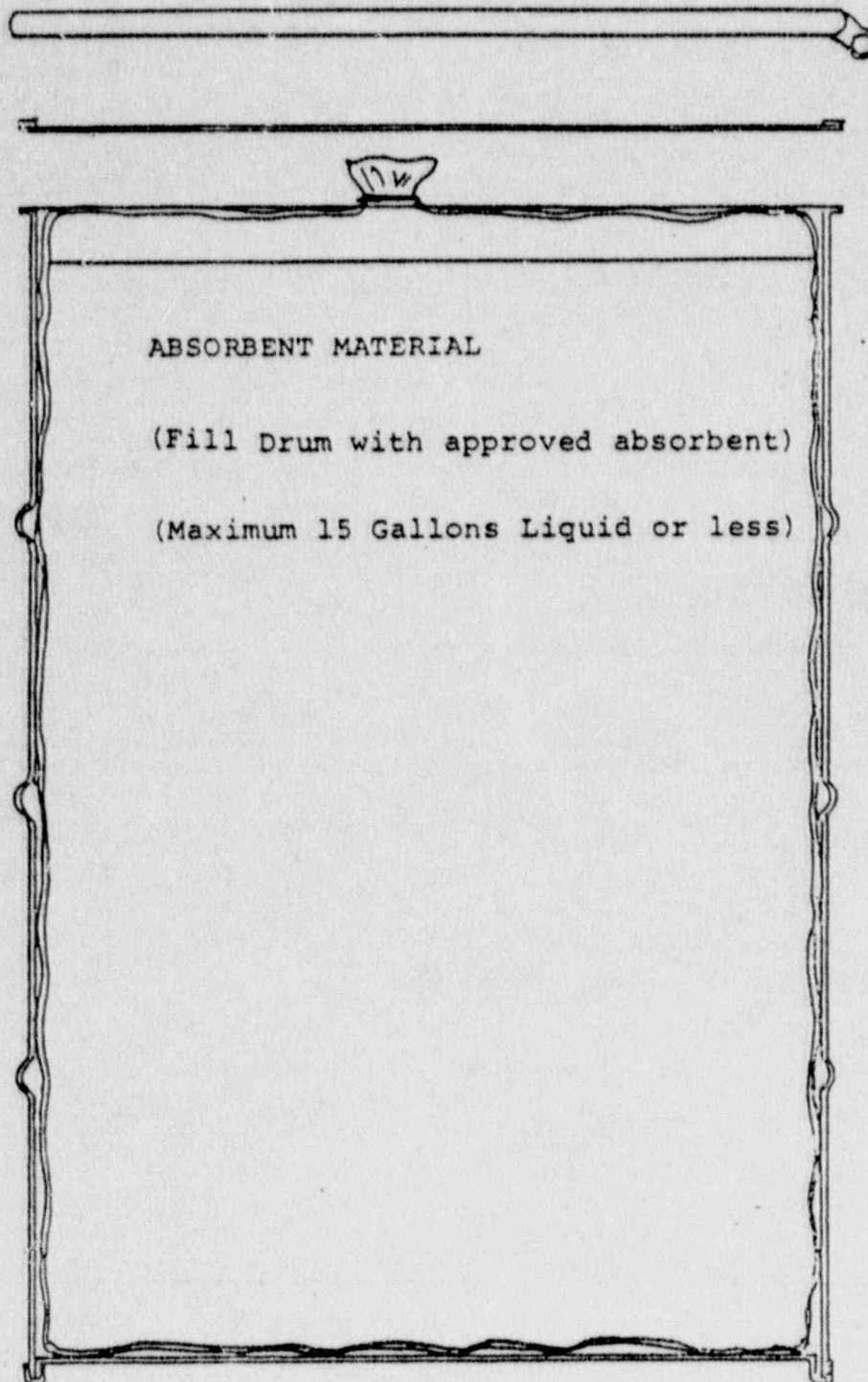
(2) Container must be lined with a 4-mil plastic liner and sealed at the top when container is packed.

(3) Container must be filled with a two-to-one ratio of absorbent to liquid layered in approximately 1-foot layers to ensure even dispersion.

(4) For approved sorbents see paragraph L.

(5) Installation must maintain a quality control program which verifies that the above conditions are met.

ABSORBED LIQUIDS PACKAGING



1. Packaging Scintillation Vials.

(1) Currently the Army disposes of scintillation vials by contract with Chem-Nuclear Systems, Inc..

(2) Container must be a metal drum in good condition. A DOT 7A type drum is preferred.

(3) Container must be lined with a 4-mil (min) plastic liner and sealed at the top when container is packed.

(4) Place approximately 5 inches of vermiculite at the bottom of the container.

(5) Place another 4 mil (min) liner inside the first liner.

(6) Make sure the vial tops are secure. Place the vials in the inner liner. Fill the liner with the vials leaving room to tie or seal the inner liner. Seal the inner liner.

(7) Place 5 inches of vermiculite on top of the inner liner.

(8) Seal the outer liner.

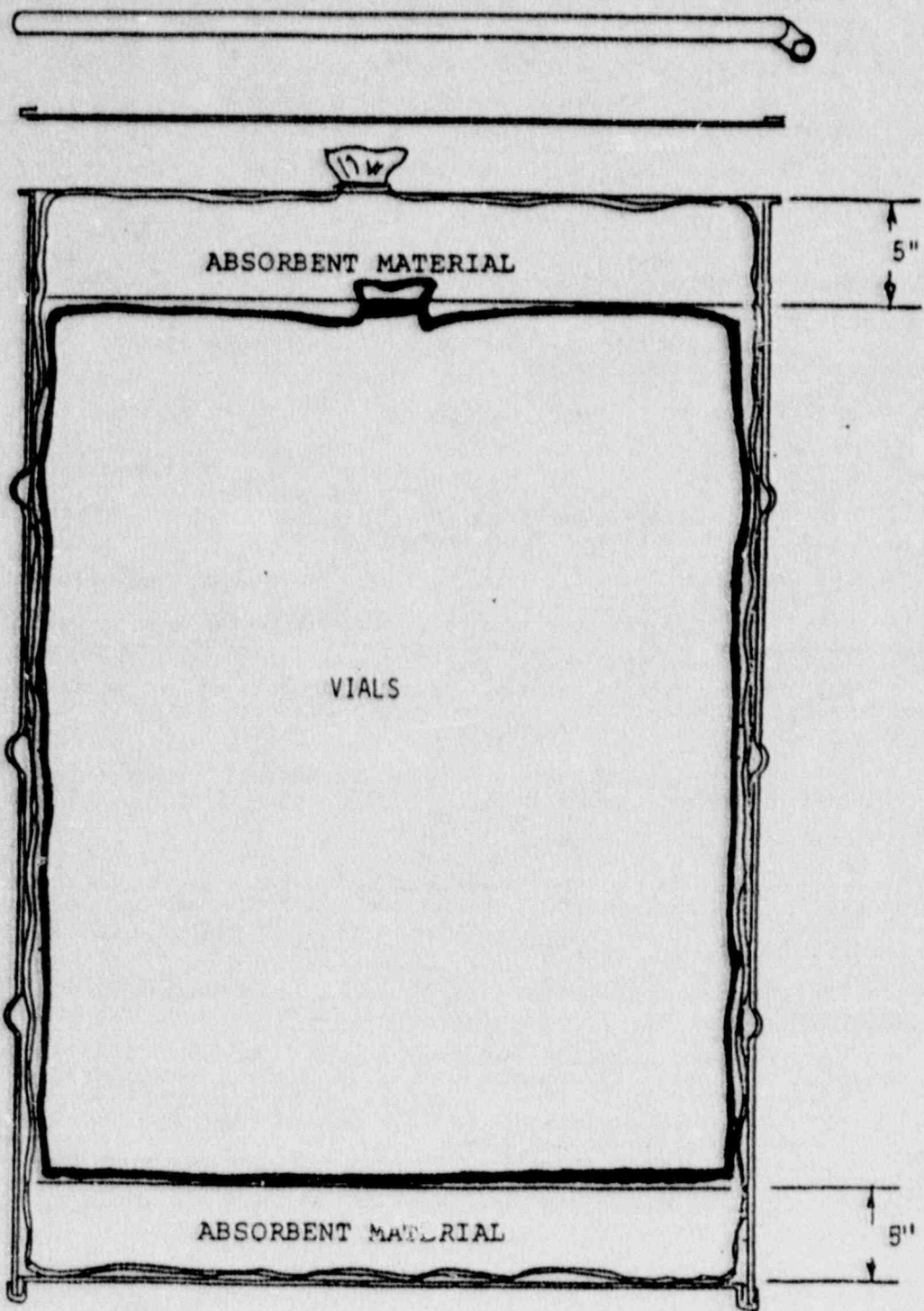
(9) Assure that the drum lid closure device is firmly in place and secure.

(10) Biological waste, lab trash, needles, and other foreign waste shall not be placed in the packages. Regulatory sanctions will occur if inappropriate materials are found in the package. Scintillation fluid containing more than .05 uCi/ml of H3 or C14 are unacceptable.

(11) All liquid scintillation fluids shall be classified as a hazardous waste, as defined by the U.S. Environmental Protection Agency (EPA), and as such shall be packaged, marked, labeled, and manifested as required by the U.S. DOT, EPA, and state (originating and receiving) laws, rules, regulations, and licenses.

(12) Shipments from generators or small quantity generators (as defined by the U.S. EPA), a U.S. EPA or Agreement State Identification Number must be supplied to Chem-Nuclear at the time of shipment or in the case of conditional exempt small quantity generators (CESQG), a letter (original on letterhead stationary) must be provided to Chem-Nuclear stating that the generator is a CESQB and is exempt from compliance with the manifest systems and recordkeeping required by Code of Federal Regulation, Title 40.

SCINTILLATION VIALS PACKAGING



j. Packaging Animal Carcasses.

(1) Hanford WA site - Waste containing biological (excluding animal carcasses) or infectious material or equipment (e.g., syringes, test tubes, capillary tubes) used to handle such material, shall be treated to reduce, to the maximum extent practicable, the potential hazard from the nonradiological materials.

(a) The inner waste container shall be a metal container meeting DOT-7A specifications or manufactured to DOT-17H specifications.

(b) The inner container shall be lined with a 4 mil (min) plastic liner.

(c) Place waste into inner container and seal plastic liner.

(d) The inner waste container shall be placed in an outer metal container meeting DOT-7A specifications and shall have a capacity at least 40 percent greater than the inner container.

(e) Completely fill the void between the inner and outer container with approved sorbent as listed in paragraph L.

(f) Seal outer container.

(2) Hanford WA site - Animal carcasses containing, or contained in, radioactive materials shall be packaged in accordance with the following requirements.

(a) The inner waste container shall be a metal container meeting DOT-7A specifications or manufactured to DOT-17H specifications.

(b) The inner container shall be lined with a 4 mil (min) plastic liner.

(c) The biological material shall be placed in the inner container and layered with absorbent and lime.

(d) The inner container shall be sealed and placed in a metal outer container meeting DOT-7A specifications. The outer container will have a capacity at least 40 percent greater than the inner container.

(e) Completely fill the void between the inner and outer container with approved sorbent as listed in paragraph L.

(f) Seal outer container.

(3) Barnwell SC site - Plants, animals, and by-products thereof are considered biological material. Glassware, etc., that at one time contained these materials are also considered biological. All biological waste shipped to the Barnwell SC site must be packaged as follows:

(a) The inner container having a capacity of 55-gallons or less shall be in good condition and must comply with DOT specifications for a strong tight container.

(b) The inner container shall have a watertight liner (i.e., polyethylene or equivalent) of a least 4 mils thickness.

(c) The biological material shall be placed in the inner container and thoroughly layered with absorbent and slaked lime. The lime used shall be commercially available slaked lime. The absorbent used should be agricultural grade four vermiculite or medium grade diatomaceous earth. The lime and absorbent to biological material should be in a ratio of one part lime to 10 parts absorbent, to 30 parts biological material. Formaldehyde is strictly prohibited.

(d) The watertight liner shall be hermetically (airtight) sealed by taping, tying, or heat sealing.

(e) The inner container shall be sealed and placed upright in the outer container.

(f) The outer container shall be a new or properly recertified steel DOT-17H specification container or equivalent.

(g) The bottom of the outer container shall be covered with a minimum of 4 inches of absorbent material.

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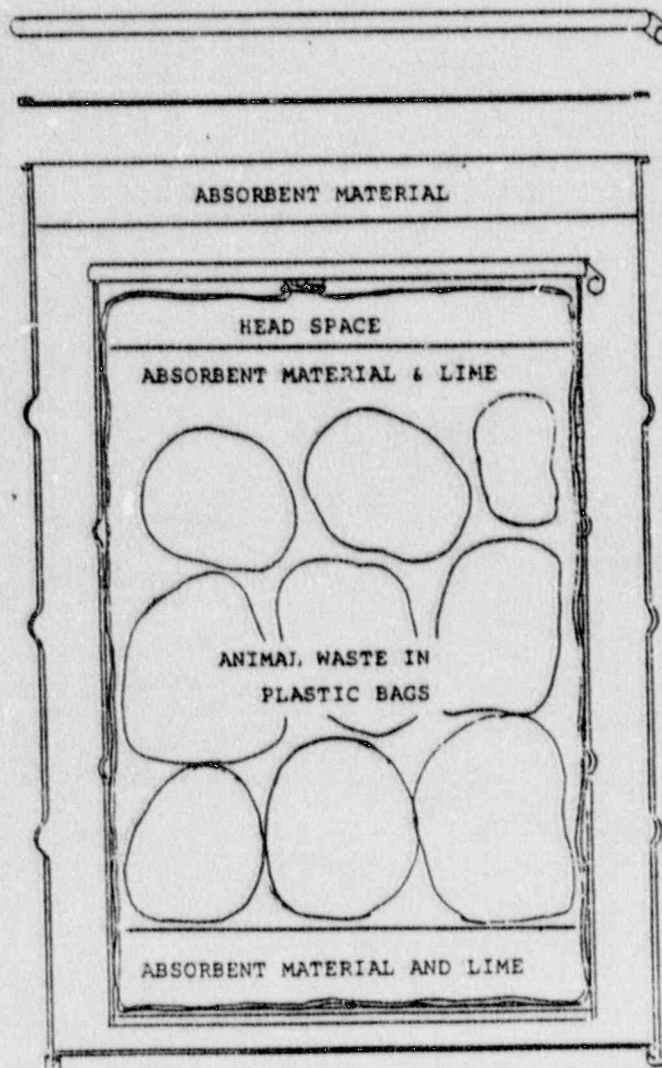
(h) After the inner container(s) is/are placed in the outer container, (two 5-gallon containers may be placed in a 30-gallon container; one 30-gallon container placed in an 55-gallon container; or one 55-gallon container placed in an 83-gallon container); it shall be completely surrounded to the top of the outer container with additional absorbent material and sealed.

(i) Containers of small capacity may be used provided that the volume of the outer container is at least 1.5 times the volume of the inner container.

(j) The outer container shall be equipped with a tamper-proof seal.

(k) A refrigerated van shall be used to ship biological waste between 1 April and 1 October, if transit time will exceed 48 hours from the time the biological waste is first removed from cold storage until arrival at the site.

ANIMAL WASTE PACKAGING



k. Packaging Dry, Compacted, and Noncompacted Waste.

(1) Container must be a DOT approved drum, either 30-gallon or 55-gallon.

(Note: Type A shipments require a drum which meets DOT-7A specifications.)

(2) A 4-mil plastic liner, sealed at the top is recommended for each container.

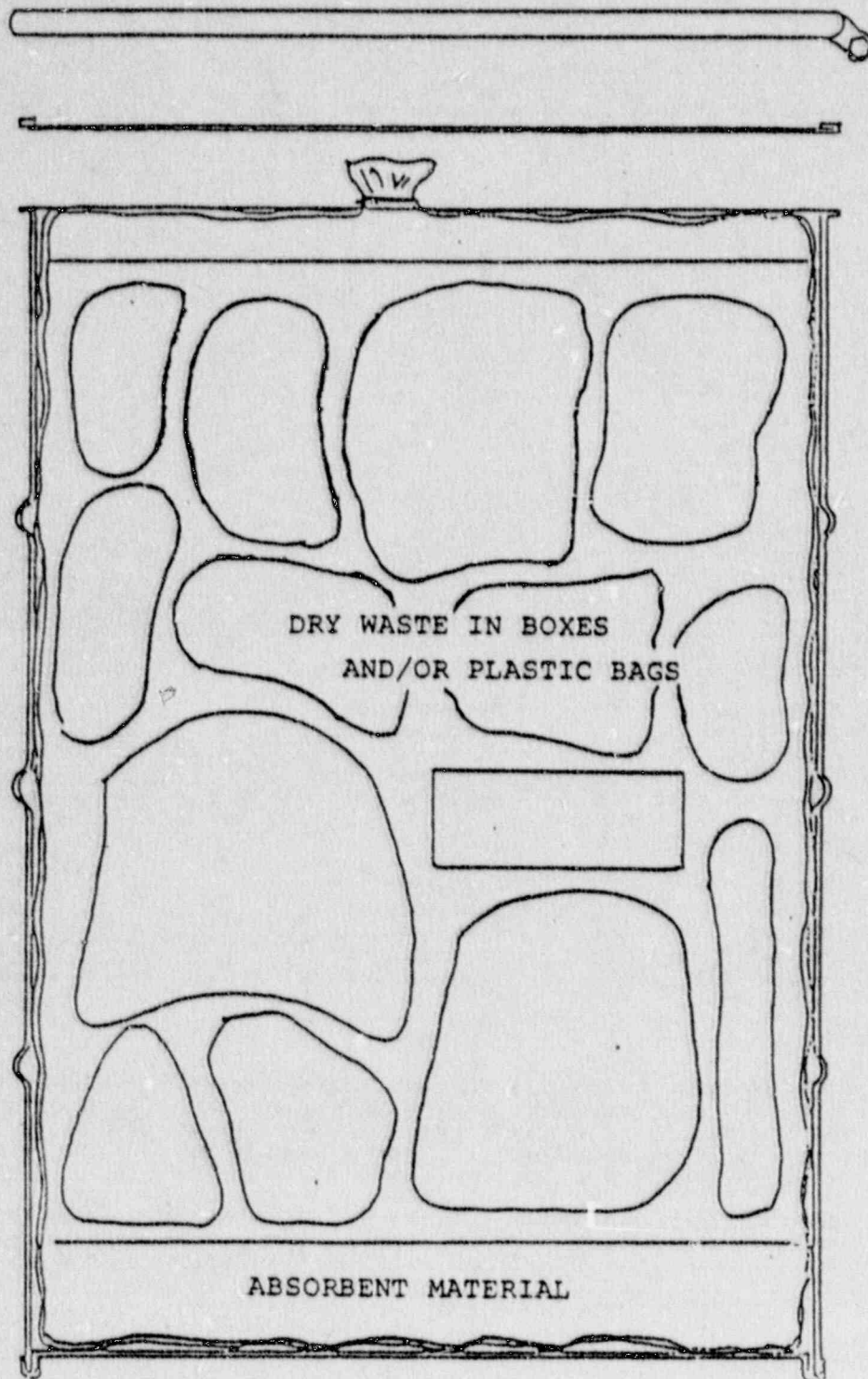
(3) A minimum of 1 inch of absorbent at bottom of container is recommended.

(4) Seal drum.

(5) For approved sorbents see paragraph L.

NOTE: Absolutely no liquids of any kind can be placed in drum.

DRY WASTE PACKAGING



l. Approved Sorbents/Hanford Site

Only those absorbents listed below have been approved by the State of Washington, Department of Social and Health Services, Office of Radiation Protection (Department) for general use in packaging and/or processing radioactive liquids or with materials that may contain a quantity of liquid that requires absorbing.

Absorbency efficiencies and quantity of absorbent required vary. In all cases, it is the responsibility of the waste generator and/or packager to determine the efficiency and proper proportions of absorbent for liquids being absorbed. Note: Enough absorbent materials must be provided to absorb at least twice the volume of radioactive liquid contents.

<u>Media</u>	<u>Oil</u>	<u>Water</u>
(1) <u>Clay Materials</u>		
1. Speedi Dri	Approved	Approved
2. Hi Dri	Not Approved	Approved
3. Florco	Approved	Approved
4. Florco X	Not Approved	Approved
5. Instant Dri	Not Approved	Approved
6. Safe T Sorb	Not Approved	Approved
7. Opalex	Approved	Approved
(2) <u>Diatomaceous Earths</u>		
1. Superfine	Approved	Approved
2. Floor Dry	Approved	Approved
3. Celetom	Approved	Approved
4. Safe N Dri	Approved	Approved
5. Solid-A-Sorb	Approved	Approved
(3) <u>Perlite</u>		
1. Chemsil 30	Not Approved	Approved
2. Chemsil 50	Approved	Approved
3. Chemsil 3030	Approved	Approved
4. Dicaperl HP200	Approved	Approved
5. Dicaperl HP500	Approved	Not Approved
(4) <u>Others</u>		
1. Dicalite Dicasorb	Approved	Not Approved
2. Petroset**	Approved***	Approved***
3. Petroset II**	Approved	Not Approved
4. Aquaset**	Not Approved	Approved
5. Aquaset II**	Not Approved	Approved*
6. Safe T Set	Not Approved	Approved

*Not for use with pure water

**Note: The products Aquaset, Aquaset II, Petroset, and Petroset II are exempt from 4 mil plastic liner requirement. These products shall only be used without an inner 4 mil plastic liner. Additionally, these products when used in accordance with the manufacturer's procedures incorporate the requirement of enough absorbent material to absorb at least twice the volume of radioactive liquid content.

***Note: The product Petroset is primarily used in conjunction with Petroset II or Aquaset II when a mixture of water and oils are present and the oils are in excess of 5 percent of the waste volume. Use of Petroset requires power mixing equipment.

m. Approved Solidification Media/Hanford Site

Only approved solidification media can be used. Approved solidification media are:

- (1) Aztech (General Electric)
- (2) Aquaset I and II
- (3) Bitumen* (Waste Chem and ATI)
- (4) Chem-Nuclear Cement

- (5) Concrete (Structural)
- (6) Delaware Custom Media
- (7) Dow Media
- (8) Envirostone
- (9) Hittman Grout
- (10) Petroset I and II
- (11) Safe T Set
- (12) Other solidification media and processes which have been approved by U.S. NRC and/or the Department.

*Note: For waste types that require solidification, both oxidized bitumen and straight distilled are acceptable.

Solidification means a resultant waste form which is a free standing solid and primarily relies upon a chemical reaction or encapsulation to contain the liquid. Approved stabilization media may also be used as solidification agents without conducting tests necessary to verify stability provided the resulting waste form is a free standing solid.

It is the responsibility of the person processing the waste into a solid form to adhere to a quality control program to verify the waste form is appropriate. If a material can also be used as a sorbent, the restrictions noted for its use in paragraph L shall apply to its use as a solidification agent.

n. Approved Stabilization Media/Hanford Site.

Only those stabilization media which have been evaluated or are in the process of being evaluated and are used with the stability guidance requirements of the U.S. NRC's Low-Level Licensing Branch, Technical Position on Waste Form or are specifically approved by the Department are considered acceptable stabilization media. Approved stabilization media are:

- (1) Aztech (General Electric)
- (2) Bitumen* (ATI and Waste Chem)
- (3) Chem-Nuclear Cement
- (4) Concrete**
- (5) Dow Media (Vinyl Ester Styrene)
- (6) Envirostone (U.S. Gypsum Cement)
- (7) LN Technologies Cement
- (8) Stock Equipment Cement
- (9) Westinghouse - Hittman Cement
- (10) Other stabilization media and processes which have been reviewed and approved by U.S. NRC and/or the Department as meeting waste form stability criteria.

*Note: Oxidized Bitumen only.

**Concrete, when used as an encapsulation medium around a small volume of radioactive material; e.g., a sealed source centered in a 55-gallon drum containing concrete, shall have a formulated compressive strength greater than or equal to 2500 psi.

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CHAPTER 4
SHIPPING FORMS

4-1. Shipping Forms.

The generator will fill out shipping forms as specifically instructed by HQ, AMCCOM. The following listed forms are provided solely to illustrate the type of information required to accompany a radioactive waste shipment to a commercial burial site or broker.

- a. Radioactive Waste Shipment and Disposal Form, U.S. Ecology, Inc.
- b. Barnwell Waste Management Facility, Chem-Nuclear Systems, Inc.
- c. Radioactive Shipment Manifest Form, DOD consolidation facility.
- d. Low-level Radioactive Waste Shipment Certification, State of Washington.
- e. Letter of Instruction to Driver - State of Washington.

In most cases the forms listed above will be filled out by HQ, AMCCOM, for the generators. Exceptions are shipments or pickups handled exclusively by the generator under his own permit or funds. On-site assistance will include preparation of the required paperwork.

4-2. U.S. Ecology's Radioactive Waste Shipment and Disposal Form

Each shipment of low-level radioactive waste to U.S. Ecology's disposal sites must be accompanied by a fully completed Radioactive Waste Shipment and Disposal Form (RWSD). The instructions contained hereih are to assist in completing the RWSD form.

A shipment may be refused if the RWSD Form is incomplete or unintelligible.

Please note that the use of abbreviations is limited to the extent authorized by the appropriate regulatory agency.

INSTRUCTIONS for completing the Washington State Department of Ecology's Pre-notification Form (A-1) for generators of low-level radioactive waste.

1. All generators must complete an A-1 Form for any waste that is being shipped from their facilities, unless the waste is being shipped directly to a commercial low-level radioactive waste disposal facility other than the facility located near Richland, WA.
 - a. All generators shipping directly to the Richland disposal facility must complete the entire form. The completed form, accompanied by the required surcharge payment should be sent to:

"Pre-notification"
Cashier
Fiscal Office
Department of Ecology
St. Martin's Campus
Mail Stop PV-11
Olympia, WA 98504

Payment can be made by cashier's check, certified check or electronic transfer. Checks should be made payable to the State of Washington. The site use permit number and manifest number must be recorded on the check.

Surcharge payments which are made by electronic transfer must be sent to the State of Washington and credited to:

Robert S. O'Brien, State Treasurer
Concentration Account
Rainier National Bank
Olympia Branch
Account #0041399260

The telegraphic abbreviation that must be used is: RAINIER SEA (all in upper case). In order to identify your payment, you must include your site use permit number and the manifest number, followed by the name of your facility (name is limited to 35 characters). All of this information is essential. Your payment cannot be accepted unless it is included in the transaction.

The completed A-1 form and payment must be received by the Department at least three (3) working days prior to the anticipated shipping date.

- b. All generators shipping their waste to a broker must complete sections (1), (2), (4) and (5). The completed form must accompany the waste when it is shipped to a broker. Surcharge payment is not required.
2. The forms may be reproduced for future shipments.

Section

(1) Generator Number: Enter the number issued to you by EPA or US Ecology.

Generator Name: Enter the name used on site use permit.

Address: Enter the address of the facility at which the waste has been generated.

Compact Region: If generator is located in a non-compact member state, write "none." Otherwise, list designated region.

Contact: Enter name and phone number of person who can be contacted concerning information contained in this form.

User Permit #: Enter your Washington State site use permit number.

Shipment #: Enter the number that you assign to the shipment.

Manifest #: Enter the number printed on the US Ecology manifest that will accompany the shipment (applies only to generators shipping directly to the site).

- (2) Record total volume of this shipment in cubic feet.
- (3) Only generators shipping directly to the disposal facility must complete this section.

Enter the date on which you expect to ship the waste to the disposal facility, and the date on which you expect it to arrive at the disposal facility.

- (4) Indicate whether any commercial nuclear power reactor waste is contained in this shipment. If such waste is present, enter the total volume in cubic feet and proceed to question (5). If there is no reactor waste, go directly to question (5).
- (5) Only generators shipping directly to the disposal facility must complete this section and enclose or wire surcharge payment.

Indicate whether the waste in this shipment was generated outside the Northwest Compact Region. The Northwest Compact Region is composed of Alaska, Hawaii, Idaho, Montana, Oregon, Utah, and Washington. Surcharges are due on waste generated outside of the Northwest Compact Region only. Complete the table if you checked "yes." If you checked "no," go to question (6).

Enter total volume of shipment in the first column (in cubic feet).

Enter applicable surcharge, which is currently \$10.00 per cubic foot, in the second column.

Multiply volume of waste times \$10.00 to arrive at "Total Amount Due" in the third column.

In the fourth column, list "Total Payment Enclosed." The remaining three columns in the table are for the Department of Ecology's use only.

- (6) If the generator has been granted emergency access by the U.S. Nuclear Regulatory Commission pursuant to Section 6 of the Low-Level Radioactive Waste Policy Amendments Act of 1985, PL 99-240, documentation should accompany the completed Pre-notification Form. Documentation that the waste has been reduced in volume to the maximum extent possible must also be included.

Please remember to sign and date the form.

Shipment Prenotification Form for Brokers (B-1)

March 10, 1986

AMCCOMP 385-1

"Prenotification"
 Cashier
 Fiscal Office
 Department of Ecology
 St. Martin's Campus
 Mail Stop PV-11
 Olympia, WA 98504
 (206) 459-6228

(1) Broker Number _____ Compact Region _____
 Broker Name _____ Contact _____
 Address _____ Phone _____
 _____ User Permit # _____
 City _____ Shipment # (if used) _____
 State _____ Zip Code _____ Manifest # _____

(2) Total Volume of shipment: _____ cu. ft.
 (3) Estimated date of shipment: _____
 Estimated date of arrival: _____

(4) In the following table, list all waste contained in this shipment (by generator) and compute surcharge due. Continue on other side, if necessary.

4-4

COMPUTATION OF SURCHARGE DUE					
Name of Generator	Location of Generator		Volume of Waste (cu. ft.)	Applicable Surcharge Including Penalty Surcharge (per cu. ft.)	Surcharge Due (Volume X per cu. ft. surcharge)
	State	Compact Region			
Subtotal from this side _____					
Subtotal from other side _____					
Subtotal from additional forms _____					
TOTAL AMOUNT DUE _____					
TOTAL PAYMENT ENCLOSED _____ *					

For WDOE Use Only		
Milestones Met?	Penalty Surcharge Due	Access Denied

I certify that the information contained in this form is true and correct, to the best of my knowledge.

Authorized Signature _____

Title _____

Date _____

* Checks should be made payable to the State of Washington.

LISTED BELOW ARE THE ITEMS OF INFORMATION NEEDED FOR COMPLETION OF THE US ECOLOGY RADIOACTIVE WASTE SHIPMENT AND DISPOSAL MANIFEST (REV 1/84). AN EXPLANATION FOR EACH ITEM IS INCLUDED TO ASSIST YOU IN PROPERLY COMPLETING THE FORM. PLEASE CALL US ECOLOGY (502-426-7160) SHOULD YOU NEED CLARIFICATION OF ANY OF THE ITEMS.

- (1) Generator Number and Name - In the boxes provided, enter the number assigned to your facility by US Ecology. Indicate the company or facility name, address, contact person and telephone number. The User Permit Number is that number assigned to your facility by either the State of Washington or Nevada, and should be consistent with the consigned disposal facility (Item #4). The shipment number should agree with the "Radiation Shipment Record Number" indicated on the Washington State form RHF-31 for loads consigned to Richland, WA. This number is assigned by you the generator for your own records.
- (2) Billing Information - The shipper should indicate in this section the exact name, address and purchase order number which should be used by US Ecology for invoicing. Shippers should carefully check their records to ensure that a current purchase order number is listed for each shipment. If disposal charges are to be billed to a broker, simply write the word "BROKER" in this section. If you are using US Ecology as your broker, however, all of the information in this section must be completed.
- (3) Agent/Broker - If an agent or broker is utilized, complete this section listing the Agent or Broker, address, contact, telephone number, and the User Permit Number assigned to the Agent/Broker by the States of Washington or Nevada. The broker may sign in this area to acknowledge receipt of your waste.
- (4) Consigned to - Check the box for the appropriate US Ecology site to which the shipment is destined. The "OTHER" category is for US Ecology use only.
- (5) Carrier - Indicate the originating carrier name, address and phone number, (or name and EPA hazardous waste identification number). Also include the shipping date. Indicate the type of cask used (if any) and the highest cask surface exposure rate.
- (6) Proper Shipping Name - Indicate the total number of packages and total weight in pounds of all packages in each of the proper shipping name categories. The total weight in this section should equal the total of the weights recorded in column 12 on the continuation sheets.
- (7) Shipment Totals - Indicate the total volume (cubic feet) and number of packages for the entire shipment. Also indicate the total quantity of source material (kilograms) and special nuclear material (grams). Ensure that the totals in grams for U-233, U-235 and Plutonium equals the grand total for SNM. 10CFR20.311 has been amended to require separate shipment totals for tritium (H-3), C-14, Tc-99, and I-129. The total activity for all isotopes in the shipment is to be indicated in the "ALL ISOTOPES" column and the proper units of activity must be indicated.
- (8) Signature - The certification on each Page Number 1 of the manifest must be signed and dated by the person responsible for the packaging and labeling operations and who is authorized to sign on behalf of the Company.

DO NOT WRITE IN THE AREA BELOW THE LINE MARKED "FOR US ECOLOGY'S USE ONLY."

CONTINUATION SHEET

- A. Complete the generator number, generator name, and agent/broker name (if used) in the upper left corner of the Continuation Sheet.
- B. Transfer the manifest number from PAGE 1 of the Manifest to the block in the upper right corner on the Continuation Sheet. In the same block, be sure to number each page, and include the total number of pages for that shipment.

- (9) Item Number - Each package must be listed individually, even if each is exactly alike in all respects. The number entered is the identification number used by the generator for the package in question. Both numbers and letters may be used.
- (10) Container Type - Indicate the type of container used, e.g., 55-gallon drum, wood box, etc.
- (11) Container Volume - Indicate the cubic footage of the outside dimensions of each container to the nearest hundredth of a cubic foot. Some commonly used containers are:

55-gallon drum - 7.50 cu.ft.
 30-gallon drum - 4.01 cu.ft.
 5-gallon drum - 0.67 cu.ft.
 83-gallon drum - 11.5 cu.ft.

- (12) Container Weight - List the combined weight of the container plus contents to the nearest pound.
- (13) Physical Form - Describe the physical form of the contents in the container. "Solid", or "Liquid", or "Gas" are the only acceptable descriptions. If supplementary descriptions are needed, you have an opportunity to provide additional information in columns 14, 15 and 16.
- (14) Waste Description - Using the codes found in NOTE #1 at the bottom of the CONTINUATION SHEET, indicate the single code which most specifically describes the type of waste in the package. If "OTHER" is used, a written explanation must be attached to the manifest.
- (15) Solidification or Absorbent Media - Using the codes found in NOTE #2 at the bottom of the CONTINUATION SHEET, indicate the single code which identifies the name of the material used to solidify or absorb the waste material. Use of any other material or brand name must be specifically approved by the government authority regulating disposal of the material in the package. Use of "OTHER" in this column requires a written explanation attached to the manifest which will include a copy of the letter of approval from the appropriate government authority.
- (16) Chemical Form - As accurately as possible, list the most prevalent chemical form, e.g., cellulose, Na, cement, metallic oxides, toluene, xylene, etc. If animal carcasses were coded in Column 14, the chemical form should include the word "LIME" in addition to any other significant chemicals.
- Also, indicate the name and percentage of chelating agents which are present in amounts greater than 0.1% by weight of waste or greater than 1.0% by package volume. Specify whether your percentage is by weight or volume. If chelating agents are not present or if they represent less than 0.1% by weight, then check the column provided.
- (17) Radionuclide - List all radionuclides present in each package. Enter each nuclide on a separate line and use as many lines as required for each package. Listing only the most abundant radionuclides or the category "mixed fission products" is not acceptable. Use the official abbreviations only (see 49CFR173.435).
- (18) Activity - List the activity for each radionuclide. You may check either Curies or Millicuries; however, you must be consistent.
- (19) D.O.T. Sub-Type: Indicate the Department of Transportation category which you have used to determine the maximum activity allowable in the package. Such categories include "A1," "A2," "LSA," "Limited Quantity (LQ)," "Instruments and Articles (I/A)," etc. Do not indicate the numerical value of the D.O.T. limit.
- (20) Special Nuclear Material - List any special nuclear material in grams. The term special nuclear material refers to plutonium, U-233, uranium containing more than the natural abundance of U-235, or any material artificially enriched in any of these substances.
- (21) Source Material - Indicate the kilograms of Source Material. This refers to a class of materials consisting of natural or depleted uranium, natural thorium, or uranium or thorium ores. Do not confuse this with the weight of the package (Item #12), they are not the same.
- (22) Waste Form Class - Indicate the classification (A, B, or C) of your waste form as described in the radioactive material license applicable at the disposal site to which your waste is consigned.
- (23) Stability Class - Indicate the structural stability of your waste as defined by the appropriate licensing agency. Stability may be characterized by the code "S" for stable and "U" for unstable. See Note #3.
- (24) Radiation Level - Disposal Container Surface - Indicate the highest radiation level (in mR/hr) on contact with the disposable container. Do not enter values for the exposure levels on the cask (if any).
- (25) Do not use this column.
- (26) Radiation Level - Disposal Container at 1 meter - List the highest radiation level measured at one meter from the disposable container. Do not enter values for exposure levels one meter from the cask (if any).
- (27) Transport Index - The value obtained by measuring the surface exposure in mR/hr at 1 meter or by using the other criteria described in 49CFR173.403(bb).
- (28) Fissile Class - Indicate the Fissile Class I, II, or III as applicable. Refer to 49CFR173.455.
- (29) D.O.T. Label - Indicate the type of label which appears on the package (or the proper shipping name if no label is required) e.g., "WHITE-1," "LSA," "LIMITED QUANTITY," etc.
- 0) Totals - Enter the page totals on each continuation sheet for columns 9 (total items per page), 11, 12, 18, 20, and 21.

15 June 1987

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4-3. Shipping Forms for Chem-Nuclear, Inc., Barnwell, SC. Barnwell waste management facility and DOD consolidation facility

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Radioactive Waste Shipment Prior Notification and Manifest Form

[Failure to Complete All Entries Will Result in Return of Form and Constitute Noncompliance.]

See Reverse Side for Instructions		
1. Name and Address of Shipper/Generator:	2. Person Responsible for Waste Shipment: a) Name: b) Title: c) Telephone: ()	
3. Radioactive Waste Transport Permit No.	4. Shipment Identification No.:	
5. Location from which waste will be shipped:	6. Name and Address of Consignee:	
7. Scheduled Date of Departure of Shipment:	8. Estimated Date of Arrival of Shipment:	
9. Carrier:	10. Trailer No. & Owner: (if available)	11. Type Transport Vehicle:
12. Routes shipment will follow in State of South Carolina (Be Specific):		
13. Type Package or Cask Model No.:	14. Type Container in Cask:	15. Package or Cask Spec.:
16. Complete Waste Description (Be Specific):		
17. Physical & Chemical Form:	18. Total No. of Packages:	19. Prominent Radionuclides:
20. Total Curies:	21. Waste Class. & Stability:	22. Total Cubic Feet:
23. DOT Sub Type:	24. DOT Class. & Hazard Class UN No.:	25. Hwy. Route Controlled: (Large Quantity) <input type="checkbox"/> Yes <input type="checkbox"/> No

CERTIFICATION

I hereby certify on behalf of the above-named shipper/generator to the South Carolina Department of Health and Environmental Control that the information provided herein is complete and correct to the best of my knowledge; and that the shipper/generator has complied with all the provisions as required by Act No. 429 of 1980, the South Carolina Radioactive Waste Transportation and Disposal Act, and Department Regulation 61-83.

Date _____

Typed Name

Signature of Consignee's Authorized
Representative

~~CONFIDENTIAL - RADIOACTIVE WASTE~~

This acknowledges to the South Carolina Department of Health and Environmental Control that the above-described radioactive waste shipment was received.

Date of Delivery _____

Signature of Consignee's Authorized
Representative

Typed or Printed Name and Title

DEHC 802 (Rev. 10/84)

(Copies of this form may be reproduced locally as needed)

General Instructions and Information

1. This form is to be used to provide the Department with prior notification of radioactive waste shipments transported into or within the State of South Carolina. This notification is to be made 72 hours before the expected date of arrival in the State. All written notices shall be mailed to:

Bureau of Radiological Health
Radioactive Waste Management Section
S.C. Dept. of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201
2. A separate form shall be submitted for each radioactive waste shipment. If a shipment is changed, a new notification is required.
3. All entries are required to be completed. Incomplete forms will be returned as well as notifications received more than 30 days in advance of shipments. The shipper shall immediately notify the Department at (803) 758-7806 of any cancellations or significant changes in the prior notification or manifest summary which occur prior to the shipment departing his facility.
4. The "Manifest Summary" portion of this form will satisfy requirements of providing the Department with a shipping manifest. However, it does not satisfy the requirements of shipping documents which shall accompany the shipments as required by DOT Regulations and the disposal facility's license and criteria.
5. A copy of this completed form shall be provided to the carrier and all drivers of the radioactive waste shipment.
6. Upon delivery of the shipment to the consignee, acknowledgement of receipt shall be obtained, and a copy of this form and the shipper/carrier's certification form shall be returned to the Department.

Specific Instructions

1 & 2. Self Explanatory

3. Enter Radioactive Waste Transport Permit No. issued by DHEC.
4. Each shipment of radioactive waste shall be identified in some manner by the shipper. This number can be a radioactive shipment record number, bill of lading number, allocation number, etc. The identification number shall only be used once to identify the one shipment for which notification is being made.
5. Self Explanatory
6. Indicate in this item the disposal facility, company, organization, etc., to which this shipment has been consigned.
7. Self Explanatory.
8. For through shipments, indicate in this item estimated date shipment will pass through the State.
9. Self Explanatory
- 10 & 11. Applies only to explosive use, sole use, and full load shipments.
12. All routing information must be specific. You should check with carrier to insure routes you prescribe are appropriate. The carrier is responsible to inform the Department of any changes of routes in South Carolina after departure.
13. Enter type transport package, i.e. wooden box, 55-gallon drum, cask 14-195-6.
14. Enter type container within cask, i.e. 55-gallon drum, IIC.
15. Enter package or cask specification, i.e. STY, Type-A, Type-B.
- 16-22. Self Explanatory
23. Enter DOT Sub Type, i.e. A1, A2, LSA.
24. Enter DOT Radioactive Material Classification and Hazard Class No., i.e. Radioactive Material, LSA, n.o.s., UN 2912.
25. Indicate if shipment is "Highway Route Controlled" (Large Quantity) as defined by DOT Regulation 49 CFR.

Certification: To be signed only by an authorized representative of the shipper/generator.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Radioactive Waste Shipment Certification Form

General Instructions and Information: This is a two part form to be used by shippers and carriers of radioactive waste. The certifications contained herein satisfy the requirements of Section 13-7-150, of Act No. 499 of 1980, the South Carolina Radioactive Waste Transportation and Disposal Act. This certification along with a copy of the prior notification form shall accompany each shipment of radioactive waste into and within the State of South Carolina. The shipper is to complete his portion of the form and present it to the carrier as part of the shipping documents. Upon receipt, the carrier shall complete his portion of the form. Upon delivery of the shipment to the consignee, a copy of this certification form, and a copy of the Prior Notification and Manifest form with the consignee acknowledgement, shall be returned to the Department.

Part I: Shipper's Certificate of Compliance

1. Name of Shipper and Address: Telephone No. ()	2. Shipment Identification No. 3. Transport Permit No.
--	---

In compliance with Act No. 499 of 1980, the South Carolina Radioactive Waste Transportation and Disposal Act, I hereby certify on behalf of the above-named shipper to the South Carolina Department of Health and Environmental Control that the above-named shipper has complied with all provisions of Act No. 499 of 1980, and all applicable laws and administrative rules and regulations, both State and Federal, regarding the packaging, transportation, storage, disposal and delivery of such wastes. I further certify that this shipment of radioactive waste has been inspected within 48 hours of the time of departure and that no items of non-compliance with applicable laws, rules or regulations were found.

Date _____

Typed Name and Title of Agent of Shipper _____

Signature _____

Part II: Carrier's Certification

1. Name of Carrier and Address: Telephone No. ()	2. Shipment Identification No. 3. Transport Trailer No.
4. Scheduled Date of Departure of Shipment:	5. Estimated Date of Arrival of Shipment:

Certification is hereby made to the South Carolina Department of Health and Environmental Control that: (a) the shipper has provided the carrier with a copy of the shipment manifest, the certificate of compliance, and the routing instructions; (b) the shipment of radioactive waste has been properly placarded for transport according to applicable U.S. Department of Transportation Regulations; (c) all shipping papers originated or reproduced by the carrier have been properly executed; (d) the transport vehicle has been inspected according to applicable State and Federal regulations within the prescribed intervals and that all safety and operational components are in good working order and meet the requirements of regulations; (e) all drivers who will operate the vehicle within the State of South Carolina are qualified to transport hazardous materials as specified by applicable U.S. Department of Transportation regulations; (f) the Department shall be immediately notified of any variance, occurring after departure, from the shipper's notification of primary routes in South Carolina and estimated date of arrival; (g) all applicable laws and administrative rules and regulations, both State and Federal, regarding the transportation of radioactive wastes will be complied with.

Date _____

Typed or Printed Name and Title _____

Signature _____

BARNWELL WASTE MANAGEMENT FACILITY

Operated by CHEM-NUCLEAR SYSTEMS, INC.
P. O. Box 726, Barnwell, South Carolina 29812
(803) 259-1781

RADIOACTIVE SHIPMENT MANIFEST FORM

(1) GENERATOR NAME _____ ADDRESS _____ CITY _____ STATE _____

(2) CONTACT _____ PHONE _____
 CHEM-NUCLEAR SYSTEMS, INC.
 P.O. BOX 726, OSBORN ROAD
 BARNWELL, S.C. 29812

(3) USE THIS MARKER ON ALL CONTINUATION PAGES
 SHIPMENT ID NUMBER _____ PAGE _____ OF _____

CARRIER _____ ADDRESS _____
 TELEPHONE _____ SHIPPING DATE _____
 SHIPMENT TYPE _____ SHIPMENT SURFACE EXPOSURE _____
 CASK IDENTIFICATION NO. U.S.A. / _____
 SHIPMENT NO. _____ LINER SERIAL NO. _____
 DRIVER SIGNATURE _____ DATE _____

SHIPMENT TOTALS			
(5) DISPOSAL VOLUME (GAL) (Feet)	TOTAL NO OF PACKAGES	ACTIVITY (RCR20311) MILICURIES	(7) TOTAL SHM ISOTOPE GRAMS
		ALL ISOTOPE	U-233
		TITANIUM C-14	U-235
			TOTAL

(6) TOTAL PALLET VOLUME (CU FT)	(8) CHEMICAL FORM AND NAME AND % OF CHELATING AGENT(S)	(9) MINIMUM % FILL FOR STABILIZATION PROCESS	(10) WASTE FORM CLASS
			<input type="checkbox"/> AU <input type="checkbox"/> AS <input type="checkbox"/> B <input type="checkbox"/> C

(10) WASTE DESCRIPTION _____
 (11) THIS VEHICLE IS COMING FROM _____
 (12) THIS VEHICLE IS COMING FROM _____
 (13) THIS VEHICLE IS COMING FROM _____
 (14) THIS VEHICLE IS COMING FROM _____
 (15) THIS VEHICLE IS COMING FROM _____

(16) CERTIFICATION IS HEREBY MADE TO THE SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL THAT THIS SHIPMENT OF LOW-LEVEL RADIOACTIVE WASTE HAS BEEN INSPECTED IN ACCORDANCE WITH THE REQUIREMENTS OF SOUTH CAROLINA RADIOACTIVE MATERIAL LICENSE NO. 097 AS AMENDED, AND THE NUCLEAR REGULATORY COMMISSION'S LICENSE NO. 12-15536-01 AS AMENDED, AND THE EFFECTIVE BARNWELL SITE DISPOSAL CRITERIA WITHIN 48 HOURS PRIOR TO SHIPMENT, AND FURTHER CERTIFICATION IS MADE THAT THE INSPECTION REVEALED NO ITEMS OF NON-COMPLIANCE WITH ALL APPLICABLE LAWS, RULES AND REGULATIONS.

Date _____ By _____
 Title and Organization _____
 Telephone No. () _____

CNSI USE ONLY

This material meets all license requirements.
 This material was disposed of in accordance with license.
 Discrepancy _____

Signature _____ Title _____
 Company _____

Arrival Date _____ Arrival Survey No. _____
 Date/Time Buried _____ H.P. Initial _____
 Trench No. _____ Location Code _____
 Waste Class Code _____
 Trench No. _____ Location Code _____
 Waste Class Code _____
 Personnel Exposure _____ (m Rem)

Form No. CMS-201 (6-86)
 SEE INSTRUCTIONS ON REVERSE SIDE FOR FILLING OUT THIS FORM

CHEM NUCLEAR SYSTEMS, INC.

INSTRUCTIONS FOR COMPLETING RADIOACTIVE SHIPMENT FORM

NOTE SHIPMENT MAY BE REFUSED IF CONTENTS, SUPPORTING DOCUMENTATION AND PACKAGING REQUIREMENTS ARE NOT IN COMPLIANCE WITH CHEM NUCLEAR SYSTEMS, INC. STATE AND FEDERAL LICENSES, THE BARNWELL SITE CRITERIA AND APPLICABLE DOT AND NRC SHIPPING REGULATIONS.

GENERATOR OR SHIPPER MUST PROVIDE (PRINTED OR TYPED) INFORMATION IN ALL NUMBERED COLUMNS ON THE RSM FORM. USE OF N/A FOR "NOT APPLICABLE" IS AUTHORIZED.

- | ITEM | DESCRIPTION OF ITEMS |
|------|---|
| 1 | Indicate generator name (consignor), address, contact person and phone number on page 1 of this form. |
| 2 | Consignor: If shipment is being made to some other facility and this form is being used by the consignee, the consignee's name and address must be stated. |
| 3 | Each shipment is assigned a Shipment I.D. Number by the Barnwell Office. Write the Shipment I.D. Number in block 3 on all continuation pages used for each shipment. Number all pages in this block. |
| 4 | If the carrier address, enter the number, shipping date, shipment type and state on page 1 of this form. If the carrier is responsible for the exterior of the van, truck and tank identification, the carrier must provide a description of the vehicle, driver signature and date. |
| 5 | Indicate the total number of containers and the total weight in pounds. |
| 6 | Record the cumulative total of all hazard classes in these blocks. Use the appropriate hazard class code and hazard class name listed in the four (4) columns and do not place a check mark in the appropriate column if the material is not present. The minimum detectable amount (MDA) of the material which is source material must be recorded in section 6. |
| 7 | List weight in grams of special nuclear material. |
| 8 | Record volume in cu. ft. of all disposable pallets. |
| 9 | Enter the minimum level of combined waste and stabilization medium. A minimum level of stabilization medium for Classes A, B or C must have a minimum level of stabilization medium. |
| 10 | SEE ITEM NO. 23 |
| 11 | SEE ITEM NO. 21 |
| 12 | SEE ITEM NO. 22 |
| 13 | SEE ITEM NO. 24 |
| 14 | Indicate if shipment is transported as exclusive use or not applicable. If "yes", a checkmark, instructions for maintenance of exclusive use vehicles must be provided by the shipper to the carrier. |
| 15 | A company representative of the generator must sign the DOT certification. All signatures must be legible. |
| 16 | A company representative of the generator must sign the S.C. DHEC certification. The signatory's name and phone number must be indicated. The date must be within 48 hours of the shipping date as specified in block 4. Under no circumstances should the shipping date be prior to the certification date of block 16. All signatures must be legible. |
| 17 | List each container separately. Item number is on the disposal container must be identical with the number shown on the RSM form. |
| 18 | List the prominent radionuclides in each container. Use of TRP or MCR is not sufficient. The name of the radionuclide must be in the contents of the container. NOTE: Listing of radionuclides is required for the first container only. Subsequent containers must be labeled with appropriate information on each. Use of the words "See attached" is not acceptable. |
| 19 | Record the percent abundance of each radionuclide in the activity of each container. Use the appropriate decay constant. |
| 20 | Record the cumulative total of all isotopes in each container in mCi. |
| 21 | Record the physical form of the waste material. Liquid is not authorized. |
| 22 | Record the chemical form of the waste material. NOTE: If material contains unknowns, the name of the unknown and weight percentage must be listed. |
| 23 | Describe briefly what the waste is. If the material is a solid, describe what solid waste is present. If the material is a liquid, describe the liquid in detail. Describe the reason for the presence of the waste. Describe the type of container used. Describe the type of contamination (if any) present (paper, plastic, metal, etc.). |
| 24 | List the size and shape of the waste package. (Example: 45 B, 11 H, 11 W, 11 D). |
| 25 | Weight in grams of the container. (1200 or 1200) empty and material set of. |
| 26 | Weight in pounds of the isotopes. (1200) The total weight of the isotopes in the container. |
| 27 | Weight in pounds of each disposable container, including its contents. |
| 28 | Record the volume in cu. ft. of the disposal container. Boxes with enhanced seals are not acceptable. Boxes with enhanced seals inside tanks are not acceptable as hazardous waste. |
| 29 | List each type of disposal container used. (Example: 45 B, 11 H, 11 W, 11 D). |
| 30 | Record the highest gaseous radionuclide level for each disposal container surface. If the container is not used, the container must be marked as follows: (Example: 45 B, 11 H, 11 W, 11 D). |
| 31 | Record the results of container surface surveys performed on the disposal container. If the container is not used, the container must be marked as follows: (Example: 45 B, 11 H, 11 W, 11 D). |
| 32 | If acute radioactive material is being shipped, see the applicable class of the material. |
| 33 | Write the weights of D.C.S. bands or shipping tags on each container. (Example: 45 B, 11 H, 11 W, 11 D). |

CHEM-NUCLEAR SYSTEMS, INC.

INSTRUCTIONS FOR COMPLETING RADIOACTIVE SHIPMENT MANIFEST FORM

NOTE: SHIPMENT MAY BE REFUSED IF CONTENTS, SUPPORTING DOCUMENTATION AND PACKAGING REQUIREMENTS ARE NOT IN COMPLIANCE WITH CHEM-NUCLEAR SYSTEMS, STATE AND FEDERAL LICENSES, THE CONSOLIDATION FACILITY ACCEPTANCE CRITERIA, AND APPLICABLE DOT AND NRC SHIPPING REGULATIONS.

SHIPPER MUST PROVIDE (PRINTED OR TYPED) INFORMATION IN ALL NUMBERED AREAS ON THE RSM FORM. USE OF N/A FOR "NOT APPLICABLE" IS AUTHORIZED.

ITEM	DESCRIPTION OF ITEMS
1	Indicate authorizing command, complete originating command (command/consignor), by checking appropriate boxes and completing Originating Command and Location.
2	Consignee.
3	Each shipment is assigned a shipment control number via the commanding officer at AMCCDM or SA-ALC. Write the number in this space and use this same number on all continuation pages used for each shipment. Number all pages in chronological order.
4	List the carrier, address, telephone number, shipping date.
5	Record total activity of shipment and total activities of this. C-14, Tc-99, and I-129.
6	Indicate the total number of containers and the total weight, in lbs, of each hazard class.
7	Indicate if shipment is transported as exclusive use or not applicable. If "yes" is checked, the driver must sign and date the manifest in the space provided.
8	A representative of the shipper must sign the DOT certification. All signatures must be legible.
9	A representative of the shipper must sign the S.C. DHEC certification. Title, rank, organization and phone number must be indicated. The date must be within 48 hours of the shipping date as specified in block 4. Under no circumstances should the shipping date be prior to the certification date of block 5. All signatures must be legible.
10	List each container separately. Item number(s) on the disposal container(s) must correspond with item number(s) listed on the RSM form.
11	List the prominent radionuclides in each container. Use of MFP or MCP are not authorized. Use as many lines as necessary to describe the contents of the container.
12	Record the activity for each radionuclide in mCi.
13	Record the physical form of the waste material. (solid or gas) "Liquid" is not authorized.
14	Record the chemical form of the waste material. NOTE: If material contains chelating agents in quantities greater than 0.1%, the name and weight percentage must be listed.
15	Describe briefly what the waste is. If the material is solidified, indicate what solidification media is used.
16	Indicate the waste class for each container.
17	Weight, in grams, of the isotopes U-233, U-235, Pu-238, Pu-239.
18	Weight, in pounds, of the isotopes U-238 (Diposited Uranium) and Thorium.
19	Weight, in pounds, of each container including its contents.
20	Record the volume, in ft ³ , of the container.
21	List each type of container used. (Example: wooden box, steel box, drum, cardboard box, etc.)
22	Record the highest measured radioactivity level for each container as Case Terminated (TT) equal mR/hr at 6 in (1) distance from the container, rounded up to the nearest count.
23	Record the results of contamination surveys performed on the containers. Do not use "ERK" for background levels unless the test ground level is indicated in the column.
24	Write in what kind of D.O.T. labels or markings are used on each container. Such as: Radioactive, W-1, Y-11, Y-111, L-11, or N/A.

NOTE: STANDARD DISPOSAL VOLUMES:

65 Gallon Recovery Drum	11.0 ft ³
55 Gallon Drum	7.5 ft ³
30 Gallon Drum	4.0 ft ³
1 Gallon Drum	1.0 ft ³
STD B-25 Box with Skids	66 ft ³

4-4. Low-Level Radioactive Waste Shipment Certification, State of Washington.

LOW-LEVEL RADIOACTIVE WASTE SHIPMENT
CERTIFICATION FOR THE FEDERAL GOVERNMENT AS A
GENERATOR/PACKAGER, AND ITS BROKERS AND CARRIERS

SAMPLE
CERTIFICATION
FOR
RICHLAND

The following certification, completed as applicable, is made to the State of Washington:

Certification is hereby made to the State of Washington that Radiation Shipment Record No. 54070 of low-level radioactive waste has been inspected in accordance with requirements of the Governor of Washington's Executive Order dated November 19, 1979, prior to its shipment. Further certification is made that the inspection has revealed no items of non-compliance with all applicable laws, rules and regulations.

As determined under the provisions of the Federal Tort Claims Act (28 USC § 2671-2680), the undersigned shall be liable for and hold harmless the State of Washington from any and all claims, suits, losses, damages or expenses on account of injuries to any and all persons whomsoever, and any and all property damage, arising or growing out of or in any manner connected with any activities performed under this order.

Except for any violation of applicable existing state or federal statute or regulation respecting packaging and shipment, inspection and acceptance of any item or container or material covered by this certification by the State of Washington or a duly authorized contractor shall release the party who executed this certificate from any and all requirement of indemnification from injury or loss.

SECTION A:
FOR THE GENERATOR/PACKAGER: US ARMY ARMAMENT MUNITIONS & CHEMICAL COMMAND
(Company Name)

PERMIT NUMBER: -2550

VOLUME OF WASTE IN THIS SHIPMENT: 1470.94 FT³

DATE: 12/14/84 BY: Byron E Morris

TITLE: HEALTH PHYSICIST

Certification is hereby made to the State of Washington that Radiation Shipment Record No. 54070 of low-level radioactive waste has been acted in accordance with requirements of the Governor of Washington's Executive Order dated November 19, 1979, prior to its shipment. Further certification is made that the inspection have revealed no items of non-compliance with all applicable laws, rules and regulations.

The undersigned shall indemnify and hold harmless the State of Washington, in an amount not to exceed \$1,000,000.00 per individual who may be injured, provided that indemnification shall not exceed \$5,000,000.00 in total, for each occurrence, from any and all claims, suits, losses, damage, injury and expenses to any person whomsoever or to property arising or growing out of or in any manner connected with the activities performed under this order.

Except for any violation of applicable existing state or federal statute or regulation respecting packaging and shipment, inspection and acceptance of any item, or container or material covered by this certification by the State of Washington or a duly authorized contractor shall release the party who executed this certificate from any and all requirement of indemnification from injury or loss.

SECTION B:
FOR THE BROKER: NA
(Company Name)

PERMIT NUMBER: _____

VOLUME OF WASTE IN THIS SHIPMENT: _____

DATE: _____ BY: _____

TITLE: _____

SECTION C:
FOR THE CARRIER: TRI-STATE MOTOR TRANSIT
(Company Name)

VOLUME OF WASTE IN THIS SHIPMENT: _____

12/14/84 BY: Legis Ball

TITLE: DRIVER / OPERATOR



15 June 1987

AMCCOMP 385-1

4-5. Letter of Instruction to Driver, State of Washington.

DRIVER'S INSTRUCTIONS FOR

EXCLUSIVE USE VEHICLES

(Hanford)

THE CODE OF FEDERAL REGULATION 49 CFR 173.425 (b)(9) REQUIRES THAT SPECIFIC INSTRUCTIONS FOR MAINTENANCE OF EXCLUSIVE USE SHIPMENT CONTROLS BE PROVIDED BY THE SHIPPER TO THE CARRIER. THESE INSTRUCTIONS MUST BE INCLUDED WITH THE RADIOACTIVE WASTE SHIPMENT DOCUMENT.

THE FOLLOWING INSTRUCTIONS MUST BE COMPLIED WITH FOR ALL EXCLUSIVE USE VEHICLES:

HAZARDOUS MATERIAL DRIVER: THE MATERIAL YOU ARE CARRYING IS TO BE TRANSPORTED TO U. S. ECOLOGY, INC., RICHLAND, WASHINGTON FOR BURIAL. YOU MUST ENTER THE STATE OF WASHINGTON AT ONE OF THE TWO ENTRY POINTS LISTED BELOW AND STOP FOR AN INSPECTION OF YOUR VEHICLE TO INSURE COMPLIANCE WITH STATE OF WASHINGTON AND DEPARTMENT OF TRANSPORTATION REQUIREMENTS FOR VEHICLES CARRYING HAZARDOUS MATERIALS. YOU WILL NOT BE ALLOWED ENTRY INTO THE STATE UNTIL YOUR VEHICLE PASSES THIS INSPECTION. YOU WILL NOT BE ALLOWED TO UNLOAD YOUR VEHICLE AT THE DISPOSAL SITE WITHOUT A CERTIFICATION OF INSPECTION FROM ONE OF THESE CHECKPOINTS:

A) WEIGH STATION AT PLYMOUTH (I-8~~4~~)
PHONE: (509) 783-4014

B) I-90 NEAR SPOKANE
PHONE: (509) 226-3366

YOU MUST NOTIFY ONE OF THE ABOVE CHECKPOINTS BY PHONE AT LEAST 4 HOURS PRIOR TO ENTERING THE STATE. A PERSONAL MONETARY FINE OF \$100.00 WILL BE LEVIED BY THE STATE OF WASHINGTON FOR FAILURE TO STOP AT ONE OF THE ABOVE CHECKPOINTS. A LENGTHY DELAY MAY ALSO BE EXPECTED IN ADDITION TO THE \$100.00 FINE.

DO NOT CHANGE OUT TRACTOR BEFORE ARRIVAL AT THE RADIOACTIVE BURIAL SITE WITHOUT NOTIFYING SHIPPER.

DO NOT CHANGE THE FIFTH WHEEL ADJUSTMENT ON THE TRACTOR WITHOUT NOTIFYING SHIPPER.

DO NOT MOVE OR TRANSFER PACKAGES WITHIN THE VAN OR BETWEEN VANS WHILE ENROUTE TO BURIAL SITE WITHOUT NOTIFYING SHIPPER.

NOTIFY THE RICHLAND, WASHINGTON (HANFORD) BURIAL SITE WITHIN 24 HOURS OF ARRIVAL:
(509) 377-2411.

THE SHIPMENT MUST BE LOADED BY CONSIGNOR AND UNLOADED BY CONSIGNEE FROM THE TRANSPORT VEHICLE IN WHICH ORIGINALLY LOADED.

SHIPMENTS MUST BE BRACED SO AS TO PREVENT LEAKAGE OR SHIFTING OF LOAD UNDER CONDITIONS NORMALLY INCIDENT TO TRANSPORTATION.

THE VEHICLE MUST BE PLACARDED "RADIOACTIVE" ON ALL FOUR SIDES OF THE VEHICLE UNTIL SHIPMENT IS UNLOADED.

IF THE VEHICLE IS INVOLVED IN AN ACCIDENT OR IS REQUIRED TO MAKE EMERGENCY BRAKING WHICH COULD SHIFT THE LOAD AND CHANGE RADIATION LEVELS, NOTIFY THE SHIPPER IMMEDIATELY.

STATEMENT OF CERTIFICATION

I HAVE READ AND UNDERSTAND THE ABOVE STATEMENTS CONCERNING THE PROPER DELIVERY OF RADIOACTIVE MATERIALS.

SIGNATURE OF DRIVER

DATE: _____

SHIPMENT NO.: _____

CHAPTER 5
HQ, AMCCOM AUDITS AND CERTIFICATIONS

5-1. Summary.

The audit and certification program at HQ, AMCCOM, provides for on-site inspections of radioactive waste being shipped direct from a generator to burial site or consolidation facilities via the HQ, AMCCOM, permit or direction. On-site audits are conducted by a health physicist assigned to the HQ, AMCCOM, Safety Office. These audits are required by the permit issued to the U.S. Army by one of the commercial burial site. Any deficiency in a shipment of radioactive waste will usually result in a ban on shipments of the entire Army. Request that you provide assistance, manpower, and any needed materials for these audits to insure a quality shipment for your installation.

5-2. HQ, AMCCOM AUDIT PROGRAM

a. Introduction. The procedures set forth herein have been instituted by HQ, AMCCOM, to establish uniform guidance and training for personnel packaging and transporting radioactive waste under the Army permit issued to AMCCOM. These actions have resulted in a positive, improved program throughout the Army in assuring proper packaging and shipments of low-level radioactive waste for disposal. The program is coordinated by AMCCOM Health Physicists with the shipping organizations in the field.

b. Purpose. Audits of the radioactive waste shippers are conducted to:

- (1) Assure compliance with all Federal, state, and Army regulations.
- (2) Assure the adequacy of instructions to the shipper and the shipper's documentation for the radioactive waste packages.
- (3) Provide on-site direct assistance and training by experienced health physicists to shippers as required.

(4) Establish a better line of communication between the U.S. Army, the burial site contractors, and state authorities.

c. Applicability. To all shippers of radioactive waste under the Army program managed by HQ, AMCCOM, at Rock Island, IL 61299-6000. The audit program does not apply to generators making shipments under their own permit.

d. Auditor. The auditors are trained health physicists with sufficient experience to perform all operations and checks required to certify the package as safe and in compliance with Federal, state, and Army regulations.

e. Frequency of Audits. Audits are made on all direct radioactive waste shipments to a commercial burial site or as deemed necessary by HQ, AMCCOM.

f. Place of Audit. At the shipper's facilities where packaging and shipping activities are conducted or at a designated Army consolidation facility.

g. Checklist. A checklist (appendix A) has been prepared to serve as a guide for the shipper and the auditor. The list is not intended to be restrictive and the auditor will utilize his experience and knowledge in addition to the checklist.

h. Specific Program Requirements.

(1) Potential Army shippers of radioactive waste shall advise the Army (HQ, AMCCOM) of their requirement by written directive. Instructions will be forwarded to the shipper who will then complete the forms required for a shipment to a consolidation facility. All forms will be completed by the health physicist at HQ, AMCCOM or AMCCOM broker for shipments direct to a burial site. On-site audits are not required for shipments to a consolidation point.

(2) On-site audits of shipments to a consolidation site may be performed on a random selection of shipments. Direct shipments to a burial site will be audited 100 percent of the time. Shipments from overseas will usually be directed to the AMCCOM broker warehouse and audited at this location.

(3) The audit procedures will generally follow the checklist; however, the auditor will examine each package to whatever extent he feels necessary to guarantee full compliance with existing regulations. This may include a certain amount of unpackaging to

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verify contents, although this will be held to a minimum to reduce risk of exposure and contamination of personnel and property. If the material is unpackaged, the auditor will assist in the packaging, audit all packages and paperwork, and certify the shipment for burial.

(4) The auditor will always be a health physicist and thoroughly familiar with the requirements set forth in existing regulations. Training will be made available to the auditor staff annually to insure they are kept abreast of new concepts and improved technology.

(5) The auditor shall prepare a trip report which will provide full details of the audit. The trip report will certify the proper packaging and compliance with pertinent regulations. Audit reports will be kept on file at HQ, AMCCOM, and available for review at any time.

i. Audit Followup.

(1) The AMCCOM Health Physicist will prepare an audit report containing a description of the audit, persons contacted during the audit, a summary of the audit and results, and a detailed description of each deficiency. Audited shipments will not be authorized for transport until all deficiencies are corrected.

(2) The AMCCOM Commanding General may forward descriptions of any deficiencies to higher headquarters for appropriate action to be taken to prevent reoccurrences.

CHAPTER 6
INDICATORS OF HAZARDOUS MATERIALS SHIPMENT VIOLATIONS AND PROBLEM AREAS.

6-1. 1) A current area causing problems is recognition of the amount and type of radionuclide present in lenstatic compasses. These compasses may contain (1) tritium (H-3) with activities ranging from 50 to 190 millicuries or (2) radium-226 with activities ranging from 1 to 15 microcuries. One sure way to separate those containing radium-226 from the tritium compasses is to measure the field at the surface of the compass with a gamma survey meter; i.e., AN/PDR-27 or equivalent. The radium dial compasses will emit a gamma field from 1 to 20 millirem/hour. The tritium dial compasses will not be measurable with a beta-gamma survey meter due to the low energy of the emitted beta particle. Additionally, the tritium compasses are embossed with the NSN and/or the radionuclide and activity; i.e., H-3, 50mci, 75mci, 120mci, or 190mci. All of the radium dial compasses we have seen to date have no information of this kind embossed on the case. Request you use care in identifying these items and correctly record the radionuclide and activity when requesting disposal instructions.

2) There is a difference between the marking and labeling of containers with radioactive material. A label consists of a Radioactive White-I, Yellow-II, or Yellow-III and is to be applied on two sides of type A or higher level containers IAW DOT Title 49 Criteria. Marking is applied in contrasting color, in letters at least 1/2-inch high, and must only be on one side of each container.

3) The type of package required for radioactive material is determined by the radionuclide, activity, dose rate, and description of the material. Type A and B packages always require labels. Limited quantity, instruments and articles, and LSA (if shipped "Exclusive Use") packages never require a label. Some marking may be required. Instruments and limited quantity packages cannot exceed 0.5 mrem/hour on the outer surface. Instruments shipped "Exclusive Use" have a limit of 2 mrem/hour per package. See DOT Title 49 (173.401 through 173.478) for detailed requirements or contact this headquarters for specific instructions. Point of contact is Byron Morris, AV 793-2964/2969, commercial (309) 782-2964/2969.

APPENDIX A
UNWANTED RADIOACTIVE MATERIAL DISPOSAL CHECKLIST

A-1. Purpose.

This checklist will serve as a guide to avoid frequently found errors associated with the packaging, marking, labeling, and shipping of radioactive waste material. The list will be changed from time to time to insure full compliance with current procedures.

A-2. General Packaging Requirements.

a. Check to ensure proper absorbents are utilized when shipping liquids and biological wastes.

b. Metal containers (4-gal, 5-gal, 30-gal, 55-gal, etc.) must meet a DOT specification which meets the requirement for 7A IAW CFR Title 49 (178.118 and 178.350). Metal containers must be used unless otherwise directed by HQ, AMCCOM. Metal containers not meeting DOT-7A specifications may be used as strong-tight-containers if approved by HQ, AMCCOM.

c. Wooden boxes, when authorized, must meet DOT Specification 19A IAW CFR Title 49 (178.190). All boxes must be banded in two directions and cracks and seams caulked.

d. No package shall have surface contamination (173.443(f)).

e. Labels must be displayed on two sides or two ends (excluding top and bottom of package) (172.403(f), Placement of Labels).

f. An inspection shall be conducted to insure that the package is sealed tight and to determine the worthiness of the package to undergo transport without incident.

g. Radioactive labels require specific information to be displayed on them:

(1) WHITE I: Radionuclide contents and activity.

(2) YELLOW II and III: Radionuclide contents, activity, and transport index (172.403(g)).

h. Radioactive packages will be properly loaded onto the transport vehicle; heaviest packages on the bottom, boxes on top of barrels. All shipments will be blocked and braced to meet Title 49 criteria.

i. Shipment by Parcel Post is not authorized.

j. Shipment by rail is not authorized.

A-3. Labeling.

Each outer container requiring a radioactive label must have one of the following labels affixed to two sides of the container.

a. Radioactive White I.

(1) Radioactive material in greater than limited quantity (i.e., Type A or B).

(2) Not to exceed 0.5 millirem/hour on contact, nor exceed background at 1 meter.

(3) Not Fissile Class II or III (172.403).

b. Radioactive Yellow II.

(1) Measured more than 0.5 millirem/hour but less than 50 millirem/hour on any surface and not exceeding one (1.0) millirem/hour at 1 meter from any external surface.

(2) Fissile Class II (172.403(c)).

c. Radioactive Yellow III.

(1) Measuring more than 50 millirem/hour on any surface or exceeds one (1.0) millirem/hour at 1 meter from any external surface.

(2) Fissile Class III.

(3) Contains "highway route controlled quantity" of radioactive material.

A-4. Marking.

Each outer container will be marked on one side in contrasting color and letters at least 1/2-inch high as required by 49 CFR. (See following checklists for packages.)

A-5. Radioactive Shipment Manifest (RSM).

- a. The RSM will be legible and completely filled out in accordance with the contractor's instructions attached thereto.
- b. Commercial telephone numbers, name, and address of the shipping activity will be completely typed out or printed. No abbreviations or acronyms permitted.
- c. Certification signatures at the bottom (two places) will be affixed.
- d. If more than one copy of RSM is needed, local reproduction is authorized. However, all copies including the original must accompany shipment and be accounted for.
- e. See checklist for manifest.

A-6. Distribution of Documents and Advance Notice. (See checklist for final checks)

A-7. Final Inspection by the Generating Activity and AMCCOM.

A final inspection by a health physicist, accompanied by a local radiation safety officer and transportation specialist, will be made to assure that all provisions are met.

- a. Each package to be used for shipment of radioactive waste is in compliance with DOT and NRC rules and regulations and that the container is authorized for shipment of that type and quantity waste.
- b. Radiation levels are in compliance with DOT and NRC regulations.
- c. Each container is properly marked and labeled in accordance with DOT, NRC, and burial site regulations.
- d. The GBL, RSM, and any required State Compliance Certificates have been completed in detail, signed, dated, and accompany the shipment.
- e. The transport vehicle is placarded (if required) in accordance with DOT regulations.
- f. The transport vehicle is roadworthy and can pass a DOT safety inspection (DD Form 626).

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HQ, AMCCOM CHECKLIST FOR SHIPMENT OF
RADIOACTIVE WASTE HANFORD/BARNWELL

- I. PACKAGES
- II. MANIFEST
- III. TRANSPORT VEHICLE
- IV. FINAL CHECKS

HQ, AMCCOM CHECKLIST FOR SHIPMENT OF
RADIOACTIVE WASTE HANFORD/BARNWELL

I. PACKAGESA. RADIOACTIVE MATERIAL, INSTRUMENTS AND ARTICLES
UN2911.

- CERTIFICATION STATEMENT (49 CFR 173.421-1)
- STRONG-TIGHT CONTAINER
- INSTRUMENT ACTIVITY DOES NOT EXCEED TABLE 7 LIMITS
- PACKAGE ACTIVITY DOES NOT EXCEED A2 LIMIT
- RAD LEVEL AT 4 INCHES FROM DEVICE, NOT OVER 10MR/HR
- RAD LEVEL ON PKG NOT OVER 0.5 MR/HR (2MR/HR FOR EXCLUSIVE USE SHIPMENTS)
- NO CONTAMINATION ON PKG SURFACE
- MARKING AND LABELLING
 1. NO LABELS
 2. WEIGHT = _____ LBS
 3. PKG NO. _____
 4. CLASS _____ WASTE • HANFORD - SIDE
 5. (UN)STABLE • BARNWELL - TOP
- RING ON DRUM TIGHT

*NOTE: NOT REQUIRED FOR SHIPMENTS TO THE CONSOLIDATION FACILITIES.

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HANFORD/BARNWELL
B. - RADIOACTIVE MATERIAL, LIMITED QUANTITY, n.o.s
UN2910.

- CERTIFICATION STATEMENT (49 CFR 173.421-1)
- STRONG-TIGHT CONTAINER
- ACTIVITY DOES NOT EXCEED LIMITS OF TABLE 7.
- RAD LEVEL ON PKG NOT OVER 0.5 MR/HR
- NO CONTAMINATION ON PKG. SURFACE.
- MARKING AND LABELLING
 1. NO LABELS
 2. WEIGHT = _____ LBS
 3. PKG NO.
 4. "Radioactive"
 5. CLASS _____ WASTE • HANFORD - SIDE
 6. (UN)STABLE • BARNWELL - TOP
- RING ON DRUM TIGHT

*NOTE: NOT REQUIRED FOR SHIPMENTS TO THE CONSOLIDATION FACILITIES.

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HANFORD/BARNWELLC. RADIOACTIVE MATERIAL, LSA, n.o.s
UN2912.

- STRONG-TIGHT CONTAINER (EXCLUSIVE USE SHIPMENT)*
- MEETS DEFINITION OF LSA (173.403(n))
- NO CONTAMINATION ON PKG SURFACE.
- RAD LEVEL ON PKG DOES NOT EXCEED 200 MR/HR;
TRANSPORT INDEX DOES NOT EXCEED 10.
- SHIPMENT LOADED BY CONSIGNOR AND UNLOADED BY CONSIGNEE
- NO LOOSE RAD MATERIAL IN SHIPMENT
- PLACARDS REQUIRED
- MARKING AND LABELLING
 1. NO LABELS
 2. WEIGHT = _____ LBS
 3. PKG NO.
 4. "RADIOACTIVE - LSA"
 5. CLASS WASTE HANFORD - SIDE
 6. (UN)STABLE BARNWELL - TOP
- RING ON DRUM TIGHT

* NOTE: TYPE A CONTAINER REQUIRED FOR NONEXCLUSIVE USE SHIPMENT

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HANFORD/BARNWELL

D. RADIOACTIVE MATERIAL, n.o.s
UN2982.

- CONTAINER MUST MEET DOT-7A SPECIFICATIONS
- ACTIVITY DOES NOT EXCEED LIMITS (A2) in 173.435.
- NO CONTAMINATION ON PKG SURFACE
- SECURITY SEAL ON PKG
- RADIATION LEVEL MEASUREMENTS AT SURFACE AND 1 METER
- MARKING & LABELLING

1. RADIOACTIVE LABEL - TWO OPPOSITE SIDES (NOT TOP AND BOTTOM)
2. RADIOACTIVE LABELS PROPERLY FILLED OUT
3. "USA DOT-7A TYPE A RADIOACTIVE MATERIAL, NOS"
4. WEIGHT = _____ LBS
5. PKG NO _____
6. "UN2982"
7. CLASS _____ WASTE (HANFORD - TWO SIDES)
(BARNWELL - TOP)
8. (UN)STABLE (HANFORD - TWO SIDES)
(BARNWELL - TOP)
9. CONSIGNOR NAME/ADDRESS, OR/AND
10. CONSIGNEE NAME/ADDRESS*

- NO BUNGS, NO RUST, 5/8" BOLT WITH HEAVY DUTY CLOSURE RING
- CLOSURE RING TIGHT.

*IF NONEXCLUSIVE USE SHIPMENT

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HQ, AMCCOM CHECKLIST FOR SHIPMENT OF
RADIOACTIVE WASTE HANFORD/BARNWELL

II. MANIFEST

A. ALL OTHER SHIPMENTS REQUIRE THE FOLLOWING INFORMATION
ON MANIFEST:

- LIMITED QUANTITY/INSTRUMENTS AND ARTICLES CERTIFICATION STATEMENT (IF REQUIRED 49 CFR 173.421-2)
- PROPER SHIPPING NAME
- ID NUMBER
- QUANTITY OF MATERIAL BY WEIGHT
- QUANTITY OF MATERIAL BY VOLUME
- RADIONUCLIDES COMPRISING 1 PERCENT OR MORE OF PKG
- WASTE AND STABILITY CLASS
- PHYSICAL AND CHEMICAL FORM OR "SPECIAL FORM"
- TOTAL ACTIVITY IN CURIES (Ci), MILLICURIES (mCi), OR MICROCURIES (uCi).
- "HIGHWAY ROUTE CONTROLLED QUANTITY" IF SHIPMENT CONTAINS THIS AMOUNT
- CATEGORY OF LABELS APPLIED TO PACKAGES
- TOTAL TRANSPORT INDEX IF ANY LABEL ARE YELLOW II or YELLOW III
- ID MARKINGS OF CONTAINER IF CERTIFIED BY DOT, NRC, OR OTHER COMPETENT AUTHORITY
- OTHER INFO AS REQUIRED BY SHIPPER.
- PLACARDS FURNISHED (IF APPLICABLE)
- SPECIAL INSTRUCTIONS TO DRIVER (ATTACHED AND SIGNED)
- EXCLUSIVE USE STATEMENT (IF APPLICABLE)
- CERTIFICATION STATEMENT SIGNED
- PERMIT NO. ON RSM (2550) - HANFORD ONLY
- GENERATOR NO. ON RSM (ILR-99-001-2833) - HANFORD ONLY
- CONTRACT NO. ON RSM - HANFORD ONLY
- ALLOCATION NO. ON RSM - BARNWELL ONLY

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HQ, AMCCOM CHECKLIST FOR SHIPMENT OF
RADIOACTIVE WASTE HANFORD/BARNWELL

III. TRANSPORT VEHICLE

- A. WILL PASS STATE SAFETY INSPECTION (DD Form 626)
- B. PROPERLY BLOCKED AND BRACED
- C. NOT OVERLOADED PER AXLE (WEIGHT)
- D. DRIVER INSTRUCTED
- E. PLACARDED (4-SIDES) IF REQUIRED
- F. TRAILER SEALED (IF REQUIRED)
- G. DOSE RATE DOES NOT EXCEED LIMITS
- H. LOOSE MATERIAL IN TRUCK CHECKED FOR CONTAMINATION
- I. DRIVER TRAINING
- J. MANIFEST TO DRIVER (ORIGINALS FOR BURIAL SITE)
- L. MANIFEST TO DRIVER (FOR COMPANY)
- M. MANIFEST TO DRIVER (DRIVER COPY)

HQ, AMCCOM CHECKLIST FOR SHIPMENT OF
RADIOACTIVE WASTEHANFORDIV. FINAL CHECKS

- A. TRUCK BLOCKED AND BRACED
- B. DOOR CLOSED AND SEALED (IF REQ'D)
- C. TRUCK PLACARDED (IF REQ'D)
- D. MANIFEST (8 COPIES)
 - BILL OF LADING WITH CERTIFICATION SIGNED (1103)
 - RSM DATED WITHIN 48 HRS OF SHIPMENT
 - VEHICLE INSPECTION FORM (DD FORM 626)
 - CERTIFICATION FORM (DSMS)
 - INSTRUCTIONS TO DRIVER (FORM DD 836)
 - INSTRUCTIONS TO DRIVER FOR EXCLUSIVE USE VEHICLES (AMCCOM INFORMATION)
 - DOE/NRC FORM 741 (IF REQ'D FOR MATERIAL TRANSFER)
- E. MANIFEST DISTRIBUTION
 - DRIVER (DRIVER/COPY)
 - DRIVER (MTR. VEHICLE COPY)
 - DRIVER (US ECOLOGY - ORIGINALS REQ'D)
 - INSIDE TRUCK (ATTACHED TO CONTAINER)
 - INSTALLATION
 - HQ, AMCCOM
 - COPY MAILED TO US ECOLOGY
 - BROKER (IF REQ'D)
- F. PRIOR SHIPMENT NOTICE TO SITE (509) 377-2411

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HQ, AMCCOM CHECKLIST FOR SHIPMENT OF
RADIOACTIVE WASTE

BARNWELL

IV. FINAL CHECKS

- A. TRUCK BLOCKED AND BRACED
- B. PRIOR NOTIFICATION FORM SENT (DHEC 802) TO CNSI AND TO STATE AT LEAST 72 HOURS PRIOR TO ARRIVAL IN STATE.
- C. SITE CALLED TO VERIFY ARRIVAL DATE (803) 259-1781 BURIAL SITE/DOD CONSOLIDATION SITE
- D. TRUCK PLACARDED (IF REQ'D)
- E. DRUMS EXCEEDING 1000 POUNDS PALLETIZED OR OPEN VAN
- F. DRUMS EXCEEDING 1000 POUNDS PALLETIZED
- G. DIFFERENT CLASS WASTE NOT MIXED ON PALLET.
- H. MANIFEST (8 COPIES)
 - BILL OF LADING WITH CERTIFICATION STATEMENT SIGNED
 - EDM DATED WITHIN 48 HRS OF SHIPMENT
 - PRIOR NOTIFICATION FORM (DHEC-802/RHA-PNC)
 - CERTIFICATION FORM (DHEC-803)
 - WRITTEN STATEMENTS - UNUSUAL HAZARDS OR PRECAUTIONS
 - VEHICLES INSPECTION FORM (DD FORM 626)
 - DRIVER INSTRUCTIONS (DD FORM 836)
 - DOE/NRC FORM 741 (IF REQ'D TO TRANSFER MATERIAL)
 - EXCLUSIVE USE VEHICLE INSTRUCTIONS TO DRIVER
- I. MANIFEST DISTRIBUTION
 - DRIVER (DRIVER COPY)
 - DRIVER (MTR VEHICLE COPY)
 - DRIVER (CHEM-NUCLEAR AT SITE - ORIGINALS REQ'D)
 - INSIDE TRUCK (ATTACHED TO CONTAINER)
 - INSTALLATION
 - HQ, AMCCOM
 - MAIL COPY TO CHEM-NUCLEAR (SITE)
 - BROKER (IF REQ'D)
- J. CALL SITE WHEN SHIPMENT DEPARTS (803) 259-1781

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APPENDIX B
REFERENCES

The following references constitute additional current Army guidance related to radioactive waste:

- a. Title 10, Code of Federal Regulations, Energy Parts 0 to 199.
- b. Title 49, Code of Federal Regulations, Transportation, Parts 100 to 177.
- c. AR 385-11, Ionizing Radiation Protection (Licensing, Control, Transportation, Disposal, and Radiation Safety).
- d. TM 55-315, Transportability Guidance for Safe Transport of Radioactive Materials.
- e. TM 3-261, Handling and Disposal of Unwanted Radioactive Material.
- f. MLM-2228, MLM-2228 (Suppl 1), Certification of ERDA Contractor's Packaging with Respect to Compliance with DOT Specification 7A Performance Requirements, Phase II: Summary Report.
- g. A review of the Department of Transportation Regulations for Transportation of Radioactive Materials, U.S. Department of Transportation.
- h. MLM-3245 DOT-7A Type A certification document.

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This handbook was prepared and distributed by the HQ, AMCCOM, Safety Office, Rock Island, IL 61299-6000, as part of the objective to improve the overall radioactive waste program within the Army. Recommendations or suggestions for the modification or improvement of the handbook are invited and should be submitted to Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-SFS, Rock Island, IL 61299-6000. Telephonic suggestions may be made to (309) 782-2964/2969, AV 793-2964/2969.

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