GEORGIA POWER COMPANY

HATCH NUCLEAR PLANT

PROCEDURE

Shipment Of Radioactive Material
PROCEDURE TITLE

HNP-8016
PROCEDURE NUMBER

Lab
RESPONSIBLE SECTION

SAFETY RELATED (X)   NON-SAFETY RELATED (   )

REV.	DESCRIPTION	APPROVED DEPT. HEAD	APPROVED PLANT MANAGER	DATE
12	Page 15,16 & 18	W.H. Rogers	[signature]	3/1/82

SHIPMENT OF RADIOACTIVE MATERIAL

A. PURPOSE

To assure that all shipments of radioactive material meet the Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) requirements.

B. SAFETY

Observe Radiation Protection Procedures.

C. REFERENCES

1. 49 CFR 100-199
2. 10 CFR 71
3. A review of the Department of Transportation (DOT) Regulations for Transportation of Radioactive Materials, August 1976.
4. Control and Accountability of Radioactive Material, HNP-8017
5. Health Physics Journal, Vol 31, No. 5, November 1976.
6. Barnwell site Disposal Criteria, HNP-8401.

D. SPECIAL EQUIPMENT

1. Appropriate survey instruments.
2. Appropriate DOT labels and placards.
3. Radioactive Shipment Record (RSR) form.

CAUTION

The technician is to visually inspect each package for integrity, dents, loose caps, or ruptures. All packages MUST BE approved by a Laboratory Foreman, Laboratory Supervisor, or Health Physics Superintendent. These persons must be knowledgeable in NRC, DOT regulations, Chem Nuclear requirements, and Georgia Power Company procedures for radioactive shipments.

E. MATERIAL CLASSIFICATION AND TYPE OF PACKAGE DETERMINATION

NOTE

This procedure specifies steps to consider when preparing any radioactive material for shipment. Shipment of fissile material requires special consideration to ensure against nuclear criticality due to the fissile nature of the materials.

1. Determine what isotope(s) is to be shipped and whether fissile or non-fissile.

2. Determine what quantity of each isotope is to be shipped and the total aggregate quantity. If a counting room quantitative analysis is impractical, estimate the aggregate quantity using radiation surveys and Section N.

3. Determine what is the form of the isotope, i.e., NORMAL FORM or SPECIAL FORM. See Figure 1 and Section R, Definition.

   a. If normal form, determine which transport group the radioactive material is classified by referring to 49 CFR 173.390 or the Table 1 below.

TABLE 1 *

RADIONUCLIDE	TRANSPORT GROUP
Cesium 137	III
Cobalt 58	IV
Cobalt 60	III
Chromium 51	IV
Iodine 131	III
Mixed Fission Products (MFP)	II
Manganese 54	IV
Plutonium 239	I
Strontium 90	II
Uranium 235	III
Zinc 65	IV
Zirconium 95	III

* For mixtures of radionuclides see 49 CFR 173.390 (c).

   b. Special form material is not classified by transport group.

4. Determine the package type as follows:

   a. Determine if the material is a small or exempt quantity, low specific activity material, or radioactive device by Table 2 below. If the material does not exceed the limits in Table 2, proceed to Sections F, G, or H.

TABLE 2
ACTIVITY LIMITS FOR SMALL QUANTITIES,
DEVICES AND LOW SPECIFIC ACTIVITY MATERIALS

Transport Group	Small or Exempt Quantities	Manft Articles and Radioactive Devices Maximum Quantities		Low Specific Activity Materials
		Per Device	Per Package	
I	0.01 mCi	0.0001 Ci	0.001 Ci	0.0001 mCi/gm
II	0.1 mCi	0.001 Ci	0.05 Ci	0.005 mCi/gm
III	1 mCi	0.01 Ci	3 Ci	0.3 mCi/gm
IV	1 mCi	0.05 Ci	3 Ci	0.3 mCi/gm
V	1 mCi	1 Ci	1 Ci	
VI	1 mCi	1 Ci	1 Ci	
VII	25 Ci	25 Ci	200 Ci	
Tritium Oxide (2)	0.5 mCi/ml (2)			(See also Note (1) below)
Special Form	1 mCi	0.05 Ci	20 Ci	
U.235	15 gms		15 gms (fissile material)	

NOTE

(1) Also objects of non-radioactive material externally contaminated with radioactive material, if the radioactive material is not readily dispersible and the surface contamination does not exceed 0.0001 mCi/cm^2 Group I or 0.001 mCi/cm^2 all other groups. Such objects must be suitably wrapped when shipped in a closed vehicle (except aircraft; see Section P)

(2) Aqueous solution. Total activity per package not more than 3 curies.

b. If the radioactive material does exceed the limits in Table 2 determine the package requirement from Table 3 below, then proceed to Section I.

TABLE 3
TYPE A AND TYPE B PACKAGE QUANTITY LIMITS

TRANSPORT GROUP	TYPE A PACKAGE QUANTITY (CURIES)	TYPE B PACKAGE Quantity (Curies) *
I	0.001	20
II	0.05	20
III	3	200
IV	20	200
V	20	5000
VI, VII	1000	50,000
Special Form	20**	5000

* Quantities exceeding type B are "large quantity (large radioactive source). These quantities involve all of the
" Type B package requirements plus other provisions unique to the specific package design. Refer to 49 CFR 173.395 (c) or 49 CFR 173.394 (c) for packaging requirements.

** Except for Californium 252, wherein the limit is 2 Ci.

F. SHIPMENT OF SMALL OR EXEMPT QUANTITY MATERIALS (Table 2 and 49 CFR 173.391)

1. Package the material to meet the following conditions:

   a. Strong tight package to prevent leakage during transit.

   b. Surface dose rate not greater than 0.5 mrem/hr at any point.

   c. No contamination on external surface of package. Refer to Section M.

   d. Mark outside of inner container "Radioactive".

2. Complete a Radioactive Shipment Record (RSR). Refer to Section K. Mark the RSR with "No Label Required" immediately following the description.

G. SHIPMENT OF MANUFACTURED ARTICLES (Table 2 and 49 CFR 173.391)

1. Package the material to meet the following conditions:

   a. Strong tight package to prevent leakage during transit.

   b. Dose rate for any unpackaged device not greater than 10 mrem/hr @ 4 inches from device.

   c. Surface dose rate not greater than 0.5 mrem/hr at any point if shipped as mixed cargo.

   d. Surface dose rate not greater than 2 mrem/hr at any point for exclusive use shipments.

   e. No contamination on external surface of package. Refer to Section M.

2. Complete a Radioactive Shipment Record (RSR). Mark the RSR with "No Label Required" immediately following the description. Refer to Section K.

H. SHIPMENT OF LOW SPECIFIC ACTIVITY MATERIALS (Table 2 and 49 CFR 173.392)

1. Mixed Shipments (173.395)

a. Package the material to meet the following conditions for normal form material.

(1) For L.S.A. quantities which do not exceed Type "A" quantities (see Table 3) use Specification 7A container (49 CFR 178.350). Refer to Figure 2. Refer to section 49 CFR 173.393 (g) for liquid radioactive material.

(2) For L.S.A. quantities which do not exceed Type "B" quantities, refer to 49 CFR 173.395 (b) for container requirements and Figure 2.

(3) For quantities greater than Type "B" quantities refer to note in Table 3.

(4) A package must be used so that the external dose rate is not greater than 200 mrem/hr at any point on the surface and the transport index is not greater than 10 (i.e. 10 mr/hr @ 3 feet).

b. If package weight exceeds 110 pounds, mark the weight plainly and durably on the outside of the package (49 CFR 172.310 (a).

NOTE

Not required for exclusive use vehicle. See 49 CFR 173.392 (b).

c. Assure that the package has been labeled "Type A" or "Type B" with letters at least 1/2 inch high and that the letters are durable and plain. (49 CFR 172.310 (a) (2).

d. Survey the package for dose rate and contamination to assure acceptability for shipment. (Refer to Section M).

e. Label the package as specified in Section J of this procedure.

f. Complete the radioactive shipment record (RSR) per Section K.

g. Placard the vehicle in which the package is to be shipped if a Radioactive Yellow III label is required. See Figure 3. for placard design.

NOTE

For shipping via aircraft see Section P for special details.

2. Sole Use Vehicles Except Aircraft (49 CFR 173.392 c)

a. Package the material to meet the following conditions:

(1) Strong tight package to prevent leakage during transit. Type B and large quantities must be shipped in Type B containers per 10 CFR 71.

NOTE

When shipping material in special casks, refer to the handling and loading procedure for that cask.

(2) No contamination on external surface of package. Refer to Secton M.

(3) External dose rate does not exceed:

(a) 1000 mrem/hr @ 3 feet from external surface of package, (closed vehicle).

(b) 200 mrem/hr at external surface of vehicle (closed vehicle).

(c) 10 mrem/hr at 6 feet from vehicle surface.

(d) 2 mrem/hr in any normally occupied position in vehicle.

NOTE

After the truck is loaded and the final radiation survey is to be performed a Laboratory Foreman will accompany the technician to survey the truck. The radiation level can not exceed the DOT limits of 200 mr/hr contact, 10 mr/hr at 6 feet and 2 mr/hr in a normally occupied position in the cab.

For administrative purposes the following limits should be adhered to:

Surface at vertical plane of truck - 165 mr/hr
Surface at truck underbelly - 165 mr/hr
Six feet from vertical plane of truck - 8 mr/hr

NOTE

For casks, measurements must be made 6 feet from the cask surface.

Surface at rear of truck cab - 1.6 mr/hr

Exceeding the administrative limits must be approved by a Laboratory Supervisor or higher authority.

The radiation measurement in the cab shall be surveyed with an E-400 or teletector which reads less than 2 mr/hr and is calibrated at a point less than 2 mr/hr. The shipment should also be surveyed with two different instruments to insure you do not have a low reading instrument. Final measurements for the truck will be made using instruments assigned solely for radwaste shipments.

b. Stencil or mark the outside of the package with "Radioactive - L.S.A.".

c. Survey package as required for RSR.

d. Perform survey of vehicle before loading. Refer to Section M. There must not be any loose radioactive material in vehicle. Also refer to Section Q for vehicle used full time for transporting radioactive materials only.

e. Load vehicle with package (s). See Barnwell Site Disposal Criteria, HNP-8401.

f. brace package as necessary to prevent shifting or leaking during transit.

g. Survey outside of vehicle to confirm requirements of Section H.2.a. are not exceeded. Record results on Data Sheet 1 of Data Package 2 or Data Sheet 2 of Data Package 3 and file the data sheet with the pink copy of the R.S.R.

h. Placard the vehicle with radioactive placards on the front, rear, and on each side. See Figure 5 for placard designs.

NOTE

For shipping via aircraft see Section P for special details.

i. Complete the radioactive shipment record (RSR). See Section K.

I. SHIPMENT OF TYPE A AND B QUANTITIES

NOTE

Refer to Figure 2 for typical Type A and B packaging. All packages must be approved by a Laboratory Foreman or a higher classification. These persons must be knowledgeable in NRC, DOT regulations, Chem-Nuclear requirements, and Georgia Power Company Procedures for radioactive shipments.

1. Package the material to meet the following conditions (49 CFR 173.393):

   a. The package must be a DOT specification Type A or B container and so labeled. Also see handling and loading procedure for the specific cask.

   b. The package must incorporate a seal which is not readily breakable and while intact, will be evidence that the package has not been illicitly opened.

   c. The smallest outside dimension must be at least 4 inches.

   d. Shielding efficiency and leak tightness under conditions normally incident to transportation must be maintained.

   e. For large quantities see 49 CFR 173.394 (c), 173.395 (c).

   f. For pyrophoric materials see 49 CFR 173.393 (f).

   g. For liquid materials see 49 CFR 173.393 (g) and (n) (7).

   h. No contamination on surface of the package (Refer to Section M).

i. For mixed loading shipment, dose rate must not exceed:

(1) 200 mrem/hr at the surface.

(2) 10 transport index (10 mr/hr at 3 feet).

j. For sole use shipments, dose rate must not exceed:

(1) 1000 mrem/hr at 3 feet from package surface (closed vehicle).

(2) 200 mrem/hr at the surface of the vehicle.

(3) 10 mrem/hr at 6 feet from surface of vehicle, 2 mrem/hr in any normally occupied area of vehicle.

NOTE

After the truck is loaded and the final radiation survey is to be performed a Laboratory Foreman will accompany the technician to survey the truck. The radiation level can not exceed the DOT limits of 200 mr/hr contact, 10 mr/hr at 6 feet and 2 mr/hr in a normally occupied position in the cab.

For administrative purposes the following limits should be adhered to:

Surface at vertical plane of truck - 165 mr/hr
Surface at truck underbelly - 165 mr/hr
Six feet from vertical plane of truck - 8 mr/hr

NOTE

For casks, measurements must be made 6 feet from the cask surface.

Surface at rear of truck cab - 1.6 mr/hr

Exceeding the administrative limits must be approved by a Laboratory Supervisor or higher authority.

The radiation measurement in the cab shall be surveyed with an E-400 or teletector which reads less than 2 mr/hr and is calibrated at a point less than 2 mr/hr. The shipment should also be surveyed with two different instruments to insure you do not have a low reading instrument. Final measurements for the truck will be made using instruments assigned solely for radwaste shipments.

2. Survey the package for dose rate and contamination to assure acceptability for shipment (Refer to Section M).

3. Label the package as specified in Section J.

4. Complete the radioactive shipment record (RSR) per Section K or Section L.

5. Placard the vehicle in which the package is to be shipped if a Radioactive Yellow III label is required. See Figure 3 for placard details.

NOTE

For shipping via aircraft see Section P for special details.

J. PACKAGE LABELING

NOTE

Not required for L.S.A. exclusive use vehicle. See 49 C.F.R. 173.392 B. Each package of radioactive material must be labeled, unless exempt, on two opposite sides, with a distinctive warning label.

1. Refer to Figure 4 for label description.

2. Select the appropriate label from Table 4 below using the radiation survey.

3. Insert on two labels the applicable information as required by using legible printing with weather resistant marking.

4. Affix the labels to the package on opposite sides.

TABLE 4

RADIOACTIVE MATERIAL PACKAGES LABEL CRITERIA
(172.403)
DOSE RATE LIMITS

LABEL	AT ANY POINT ON ACCESSIBLE SURFACE OF PACKAGE	AT THREE FEET FROM EXTERNAL SURFACE OF PACKAGE (TRANSPORT INDEX)
"RADIOACTIVE-WHITE I"	0.5 mR/hr	0
"RADIOACTIVE-YELLOW II"	50 mR/hr	1.0 mR/hr
"RADIOACTIVE-YELLOW III"*	200 mR/hr	10 mR/hr

* Requires Vehicle Placarding
(This label mandatory for any fissile Class III (173.389A) or large quantity package (173.389B), regardless of dose rate levels.) These limits in table come from 173.393 (i).

K. COMPLETING THE RADIOACTIVE SHIPMENT RECORD (RSR)

NOTE

An RSR will be completed for every shipment of radioactive material whether it is "exempt" or not.

Refer to HNP-8017, Control and Accountability of Radioactive Material.

1. Non-Fissile Material

Enter the following information on the R.S.R. Refer to figure 5 and 6.

a. Block #1 - Enter name of company, addresses, license number, and individual's name if sent to anyone's attention. Enter a phone number if it is known. Enter name of freight line or truck company as carrier.

b. Block #2 - Specify type of waste; generally it will be compacted waste and resins.

c. Block #3 - Identify shipment as to whether is is normal form or special form (section R of this procedure). Usually it will be normal form. If it is normal form then indicate the physical form.

d. Block #4 - Indicate class of material by checking appropriate box. See block 16 line 6.

e. Block #5 - Indicate the type of quantity by checking the appropriate box.

f. Block #6 - Indicate type of vehicle.

g. Block #7 - Indicate if any special instructions are included.

h. Block #8 - Indicate if prior notification of shipment has been given.

i. Block #9 - Indicate if placards have been affixed to vehicle.

j. Block #10 - Indicate if labels are affixed to containers.

k. Block #11 - Indicate container specifications (i.e. 7A or special permit #, etc.)

l. Block #12 - Indicate that we do have a copy of the receivers license and that it does cover this type of material. Must be signed by shipper.

m. Block #13 - Have driver read and sign exclusive use statement.

n. Block #14 - Give driver his copies of the appropriate papers and have sign block #14.

o. Block #15, line 1 - Indicate transport group number and list all radioisotopes identified.

Line 2 - Use correct section and list the measurements indicated. In section "d" list the survey instruments used by model and serial number.

Line 3 - Give the contamination level measurements. Use the average reading found.

p. Block #16 - Indicate that the packages have been correctly labeled and marked.

q. Block #17 - The technician controlling this shipment will verify that the certificate statement is true and then sign the statement.

r. Block #18 - After the technician is satisfied that the shipment is correct he will sign the first line authorizing the release of the shipment. Before the final release, an authorized, knowledgeable laboratory foreman or higher supervision must review all aspects of shipment for compliance to applicable regulations and then sign and date the release.

s. Block #19 - Indicate that the shipment does not exceed the limit of 10 nanocuries per gram of transuranics.

t. Figure 11 - List package numbers as they are loaded. If this is a drum shipment then list the drum numbers. If other items, then list the items sequentially (if they are not already numbered) as they are loaded. In the second column record the contact dose rate as measured directly with an instrument. The third column is for the dose rate at three feet from the package surface (this is the transport index or T.I.). Estimate the activity of each drum by section N of this procedure using the appropriate formulas, graphs, or tables and the dose rate at contact. Record the activity in the fourth column. Perform wipe smears on the drums or packages and record the contamination levels in the fifth column. List the quantity of the package in the appropriate units (ie. cubic feet, liters, etc.) in the sixth column. See item 11 on figure 9. Determine the total weight of each package and record the weight in the seventh column. If the weight is over 110 pounds and the shipment is mixed freight the weight must be labeled on the package (see 172.310 (a). The right side of figure 7 is a continuation of the left side. Total columns 4, 6 and 7 and list these totals in the spaces provided.

2. Fissile Material

Enter the following information in the appropriate space on the RSR.

Refer to Figures 14, and 15. Figure 15 is to be used as a continuation sheet along with Figure 14 when shipping large numbers of containers.

a. Shipped To - receiver's name, address and license number. See HNP-8017 for instructions on verification of license.

b. Number, Date - number and date of shipment.

c. Shipped Via - motor freight, air express, etc. Give name of carrier.

d. Remarks/Description - describe (i.e. six irradiated fuel bundles, L.P.R.M. assemblies, T.I.P. drive parts etc.) Include remarks such as fissile class if needed or Type A or B or Large Quantity shipment.

NOTE

More than one item or type of material can be shipped or the same RSR.

e. Physical State - check physical state, identify SN material type and isotope(s).

f. SNM Net Wt., Enrichment Isotopic Wt., Curies, Specific Activity, Concentration - complete if SNM is being shipped.

g. Container, No. of Containers, DOT/BE No., Serial No., Weight, Seal No. - complete for all radioactive shipments. If not applicable put NA.

h. Transport Group - check appropriate block.

i. Radiation Survey Data - enter data required.

j. Surveyed By - signature of surveyor.

k. Radiation Units - complete if shipping fissile material.

l. Placard Required - Check block if shipping a yellow II/I label package.

m. Shipment Approval - a Laboratory Foreman or a higher classification must sign here. The person approving the shipment must be knowledgeable in the NRC and DOT regulations, Chem Nuclear requirements and Georgia Power Company Procedures for radioactive shipments.

n. Method of Shipment - identify carrier.

o. Marking and Labeling - record the type of label and marking on the package.

p. Shipment Originator - place of origin of the package, normally it will be Plant Hatch.

q. Date -

2. Distribute the RSR copies as follows:

   a. Original - to package destination.

   b. Yellow - to driver of vehicle transporting package.

   c. Pink - File in H.P. office.

3. If a shipment is not exempt from packaging and labeling, the shipment receiver must be notified by telephone or letter, before the shipment arrives. Some exceptions are, (1) if the shipment receiver expects a shipment at regular time intervals or (2) if he knows it is coming.

L. RADWASTE SHIPMENTS TO CHEM NUCLEAR

1. When shipping radioactive waste to Chem Nuclear complete an RSR form (Figure 5 & 6), the Chem-Nuclear Record Form (Figure 8 and 9) and (Figure 10 & 11) and the South Carolina Prior Notification Form and Shipment Certification Form, (Figure 12, 18, and 19).

CAUTION

NO LIQUID WASTES ARE TO BE SHIPPED TO BARNWELL.

NOTE

It is very important that these forms be complete and instructions for completion followed. When shipping waste, current copy of these forms supplied by the vendor, shall be used. Forms in Fig. 8,9,10,11 and 12 are only specimen forms.

2. Assure that Barnwell Site Disposal/Criteria is complied with.

3. Distribute the Chem-Nuclear Record Form as prescribed below:

   a. Original - To Chem-Nuclear

   b. Yellow - To Chem-Nuclear

   c. Pink - File in H.P. office.

4. Distribute the RSR as prescribed for other shipments.

NOTE

When shipping radioactive waste to U.S. Ecology, Inc. complete a Radioactive Waste Shipment and Disposal Form (Figure 13). When shipping waste, current copy of these forms supplied by the vendor, shall be used. Form in Fig. 13 is only a specimen form.

M. SURVEY FOR CONTAMINATION CONTROL (49 CFR 173.397)

1. The following are permissible levels of removable (non-fixed) radioactive contamination.

   a. Package for mixed cargo shipments:
   Beta-gamma not greater than 2200 dpm/100 cm^2
   Alpha not greater than 220 dpm/100 cm^2

   b. Packages for exclusive use shipments:
   Beta-gamma not greater than 22,000 dpm 100 cm^2.
   Alpha not greater than 2200 dpm/100 cm^2

   c. Transport vehicles - accessible surface (49 CFR 177.843):
   Dose Rate not greater than 0.5 mrem/hr
   Beta-gamma not greater than 2200 dpm/100 cm^2
   Alpha not greater than 220 dpm/100 cm^2

NOTE

A vehicle for transporting radioactive material as exclusive use must be surveyed prior to loading of packages for shipment from Plant Hatch and after removal of radioactive packages shipped to Plant Hatch.

   d. Transport vehicle used solely for transporting radioactive materials (49 CFR 177.843):
   Dose rate (interior surface) not greater than 10 mrem/hr.

   Dose rate (3 ft. from interior surface) not greater than 2 mrem/hr.

   These vehicles must be stenciled with the words, "For Radioactive Materials Use Only" in lettering at least 3 inches high in a conspicuous place on both sides of the exterior of the vehicle. The vehicle must be closed at all times other than loading and unloading.

2. Perform smear survey on packages using a sufficient number of smears to assure a representative assessment. Refer to HNP-8012. Results must meet criteria in M.1 before shipment can be made.

3. Perform a smear and dose rate survey on the transport vehicle (exclusive use) prior to loading package(s). Use a sufficient number of smears to assure a representative assessment. Refer to HNP-8012. Record results on Data Sheet 1 of Data Package 2 or Data Sheet 2 of Data Package 3. Results must meet criteria in M.1 before packages can be loaded. Notify Health Physics supervisor if limits are exceeded.

N. ESTIMATING CURIE CONTENT OF PACKAGES

1. Resin in a 55 gallon drum.

a. Obtain a grab sample from each batch of resin and perform an isotopic analysis.
b. Determine the average weight (lbs.) per drum for each batch of resin. ie. weight of the resin after subtracting the weight of the empty drum .
c. Sum the specific activities of all the radionuclides present to obtain the specific activity of the drum contents (uCi/g).
d. Estimate the activity of the drum contents as follows:

$$\text{Activity (mCi)} = \text{specific activity of drum contents uCi/g} \times 453.6 \text{ g/lb.} \times \text{Average drum weight lbs.} \times \frac{1 \text{ mCi}}{10^3 \text{ uCi}}$$

e. To determine the quantity of Transport Group II isotopes normally found in spent resin, a sample of primary coolant shall be sent to an outside vendor (Teledyne) for Strontium analysis once per quarter. When significant fuel leaks are identified, as specified by the Health Physics Radiochemistry Superintendent or his designated alternate, this analysis will be done more frequently. The contribution of Transport Group II isotopes, which is determined from the ratio of the Cs^{137} activity to the activity of Sr^{90}, must be added to the total curie content of the shipment.

The following example calculation illustrates this method:

Given: Total curie content = 150 mCi
(excluding contribution from Group II isotopes)
Activity of Sr^{90} = 1.5 E-07 uCi/ml
Activity of Cs^{137} = 3.0 E-04 uCi/ml

Ratio: $\frac{\text{Activity of } Sr^{90}}{\text{Activity of } Cs^{137}} = \frac{1.5\text{ E-07}}{3.0\text{ E-04}} = 5.0\text{ E-02}$

Contribution from Group II Isotopes:

150 mCi x 5.0 E-02 = 7.5 mCi

Total Curie Content:

150 mCi + 7.5 mCi = 157.5 mCi

f. Sum the specific activities of the radionuclides present with half-lives longer than five (5) years (uCi/g).
g. Calculate the volume of the resin accounting for any settling in the container (cm^3).
h. Estimate the concentration (uCi/cm^3) of the radionuclides present with half-lives longer than five (5) years as follows:

$$\text{Concentration } \frac{uCi}{cm3} = \frac{(\text{Specific activity of radionuclides with T 1/2} > 5 \text{ yrs. uCi/gm}) \times (453.6 \text{ g/lb}) \times (\text{Average drum Weight LBS})}{(\text{volume of resin } cm^3)}$$

2. Trash

a. Measure the exposure rate at contact of each accessible side and top of the container in mR/hr.
b. Average the highest readings collected at each point (mR/hr).
c. Estimate the Curie content using the formula below:

$$mCi \quad (\text{avg. mR/hr}) \sum_{i=1}^{j} \frac{a(i)}{6\,E(i)\,n(i)}$$

where, * 6 = constant
* avg. mR/hr is obtained from Step b.
* a(i) is the fractional abundance of the i^{th} isotope
* E(i) is the energy(ies) of the predominant gamma(s) emitted by the i^{th} isotope (Mev)
* n(i) is the branching ratio of the predominant gamma(s) of the i^{th} isotope.
* j is the number of isotopes present.

O. SHIPMENT OF EMPTY CONTAINERS (49 CFR 173.29)

1. Containers originally used to ship radioactive material may be shipped as Empty containers if the following requirements are met:
   a. Containers must be securely closed so that no residual material can leak out.
   b. Radiation level must not exceed 0.5 mrem/hr at any point on the external surface of the package.
   c. Contamination on the surface of the package must not exceed values as specified in Section M.
   d. All shipping labels and all stenciled, painted, or engraved markings showing original contents must be removed, obliterated, or covered.
   e. An "Empty" label must be placed on the outside of the package. This label must be a square 6 inches on a side with the word "Empty" printed in black letters at least 1 inch high on a white background.
   f. The Bill of Lading must be marked "Empty Container, which originally contained radioactive material" immediately following the description.

P. SHIPMENT BY AIRPLANE

Packages to be shipped by airline must meet the following DOT regulations:

49 CFR 175.75 (a) (3)
49 CFR 175.85 (b)
49 CFR 175.85 (d)
49 CFR 175.700
49 CFR 175.710
49 CFR 173.393 (n) (7)
49 CFR 173.393 (p)

G. INCOMING EMPTY VEHICLES (49 CFR 177.843).

1. Once a vehicle used for carrying Low Specific Activity radioactive material in truckload lots arrives, the vehicle must be surveyed. The vehicle cannot be loaded for normal use until:

   a. In the case of a common carrier,

      (1) Radiation levels at any accessible surface must not be more than 0.5 mrem/hr.

      (2) Contamination on any accessible surface must not exceed:
      Beta-gamma- 2200 d/m per 100 cm^2
      Alpha - 220 d/m per 100 cm^2

   b. In the case of a vehicle which is used only for the transportation of radioactive material and is marked For Radioactive Materials Only.

      (1) Radiation levels must not exceed 10 mrem/hr at any accessible interior surface and 2 mrem/hr at 3 feet from any interior surface

      (2) There are no smearable contamination limits.

R. DEFINITION (49 CFR 173.389)

1. Fissile Material

   Fissionable material, typically U-235 and Pu 239. (U-233, Pu-238 and Pu-241 are other less frequently encountered fissionable material). Less than 15 grams U-235 is considered non-fissile.

2. Normal Form

   Radioactive material not in Special Form. Normal Form radioactive materials are grouped into Transport Groups. Normal form materials are typically liquids and powders.

3. Radioactive Material

   Any material which spontaneously emits ionizing radiation. Materials in which the radioactivity is uniformly distributed and which has a specific activity less than 0.002 uCi per gram are not considered to be radioactive materials.

4. Special Form

Radioactive material in a form which if released from the package might present some direct radiation hazard but would present little hazard due to radiotoxicity and little possibility of contamination. To be classified as Special Form material, the material must meet the following requirements:

a. Must be in massive solid form or encapsulated.

b. Must have no overall dimension less than 0.5 mm or have at least one dimension greater than 5.0 mm.

c. Each item must not dissolve or convert into dispersible form to the extent of more than 0.005% by weight when:

(1) Immersed for 1 week in water at pH 6-8, 68° F, and a maximum conductivity of 10 umho/cm.

(2) Immersed for 1 week in air at 86° F.

d. Each item must not break, crumble or shatter if a steel rod 1 inch in diameter, weighing 3 pounds, and having a flat end is dropped from a distance of 40 inches into the item.

e. Each item must not melt, sublime or ignite at temperatures below 1000° F.

f. If the material is encapsulated, it must also withstand a free drop thru 30 feet on to an unyielding surface and it must withstand heating to 1475° F for 10 minutes.

5. Transport Group:

One of seven groups into which Normal Form radionuclides are classified according to their radiotoxicity and their relative potential hazard in transportation.

6. Transport Index:

he number placed on a package to designate the degree of ntrol required for transportation. This number is the arger of the following:

a. The highest radiation level in mrem/hr at 3 feet from any accessible external surface of the package.

b. For Fissile Class II packages only, the number obtained by dividing 50 by the maximum number of packages that may be transported together.

7. Type A Quantity:

That quantity of radioactive material which requires Type A or general packaging requirements.

8. Type B Quantity:

That quantity of radioactive material which requires Type B packaging. Type B packaging must meet all the requirements that Type A packaging does plus it must meet the standards for hypothetical accident conditions in transportation (see 49 CFR 173.398c).

S. Semi-Annual Report of Solid Waste and Irradiated Fuel Shipments.

Record, every semi-annual period on, Figure 20 of Data Package 5, the following information.

1. Cubic meters and total curies of spent resins, filter sludges, evaporator bottoms, etc. for 6 month period.

2. Cubic meters and total curies of dry compressible waste, contaminated equipment etc. for 6 month period.

3. Cubic meters and total curies of irradiated components, control rods, fuel channels, etc. for 6 month period.

4. Other items that contain licensable amounts of radioactive materials not covered above for 6 month period.

5. Breakdown of percent and curies of major nuclides for each of the four categories above.

6. Number of solid waste shipments, mode of transportation and destination of the shipments.

7. Number of irradiated fuel shipments, mode of transportation and the destination of the shipments.

FIGURE 1

"NORMAL FORM" R.A.M. (173.389(D))

(RADIOACTIVE MATERIAL - N.O.S.)

INCLUDES ANY MATERIAL WHICH DOES NOT QUALIFY AS "SPECIAL FORM".

NORMAL FORM MATERIALS ARE CLASSIFIED INTO EITHER OF SEVEN TRANSPORT GROUPS.

WASTE MATERIAL IN PLASTIC BAG

LIQUID IN BOTTLE WITHIN METAL CONTAINER NO FIRE RESISTANCE

POWDER IN GLASS OR PLASTIC BOTTLE

LOW-MELTING, COMBUSTIBLE AND OR FRANGIBLE SOLID

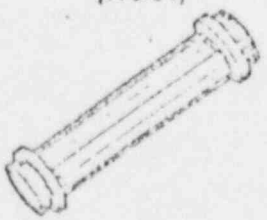
"SPECIAL FORM" R.A.M. (173.389(G) AND 173.398(A))

MAY PRESENT A DIRECT RADIATION HAZARD IF RELEASED FROM PACKAGE, BUT LITTLE HAZARD DUE TO CONTAMINATION

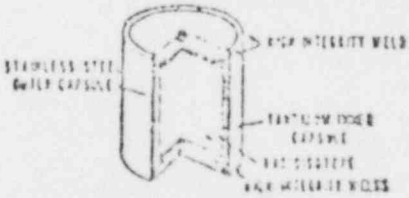
"SPECIAL FORM" R.A.M. MAY BE "NATURAL" CHARACTERISTIC, I.E., MASSIVE SOLID METAL, OR "ACQUIRED" THROUGH HIGH INTEGRITY ENCAPSULATION

MASSIVE SOLID METAL

DOT SPEC. 2R* (178.34)



HIGH INTEGRITY ENCAPSULATION AS A SEALED SOURCE

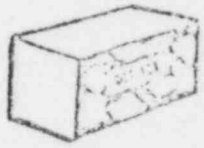


*SPEC. 2R CONTAINMENT DOES NOT AUTOMATICALLY QUALIFY AS "SPECIAL FORM" SPECIFIC EVALUATION IS NECESSARY AGAINST 173.398(A)

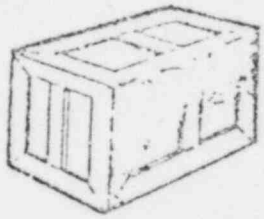
FIGURE 2

TYPICAL TYPE A PACKAGING

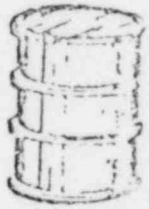
PACKAGE MUST WITHSTAND NORMAL CONDITIONS (173.398(B)) OF TRANSPORT ONLY WITHOUT LOSS OR DISPERSAL OF THE RADIOACTIVE CONTROL CONTENTS.



FIBERBOARD BOX



WOODEN BOX



STEEL DRUM

TYPICAL SCHEMES

DOT SPECIFICATION 7A
TYPE "A" PACKAGE

TYPICAL TYPE B PACKAGING SCHEMES

PACKAGE MUST STAND BOTH NORMAL (173.398(B)) AND ACCIDENT (173.398(C)) TEST CONDITIONS WITHOUT LOSS OF CONTENTS.

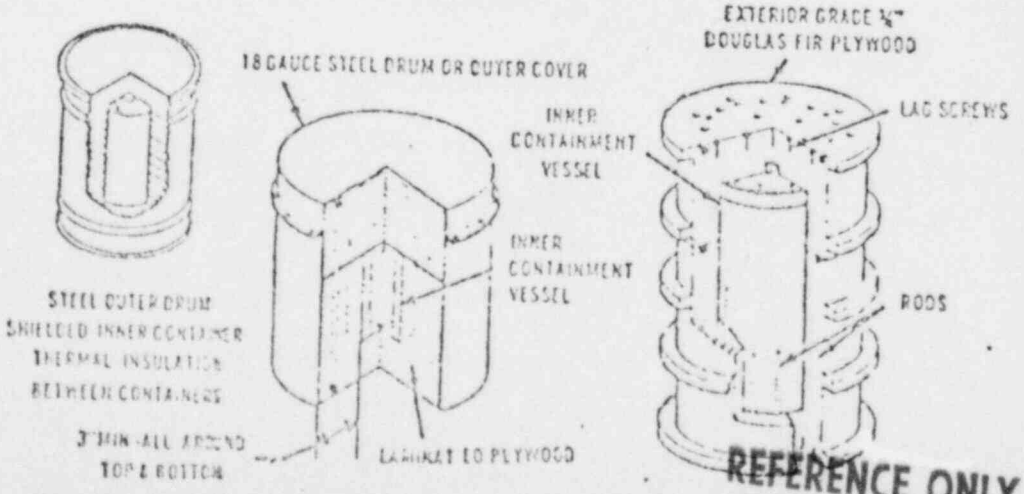


FIGURE 3

VEHICLE PLACARD FOR RADIOACTIVE MATERIALS

[172.556 (A).2]

PLACARD IS TO BE DISPLAYED ON FRONT, REAR, AND EACH SIDE OF TRANSPORT VEHICLE

Georgia Power

FIGURE 4

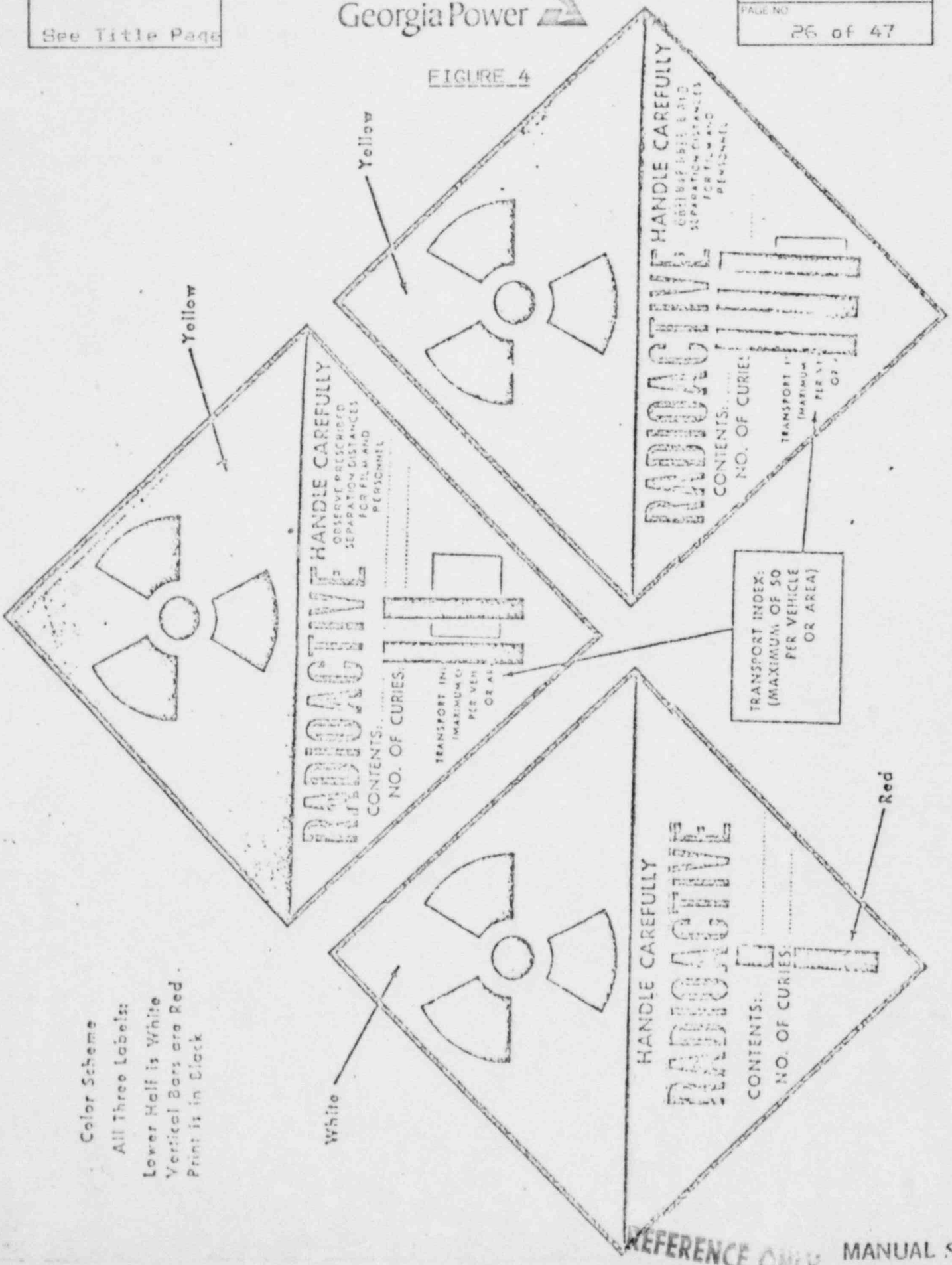


FIGURE 5

GEORGIA POWER COMPANY
SHIPMENT RECORD
FOR NON-FISSILE RADIOACTIVE MATERIAL

1.

Shipment #
From: Ga. Power Co./Plant E. I. Hatch
Unit 1 License DPR-57 ☐
Unit 2 License # NPF-5 ☐
P. O. Box 442
Baxley, Ga. 31513

In Case of Emergency Call (212) 307-7781
TO: _____ License # _____
_____
_____
_____
ATTN: _____ Phone _____
CARRIER _____

SHIPMENT ID-CHECK APPROPRIATE BOX(ES)

2.

☐Evaporator Concentrates ☐Resins
☐Compacted Waste ☐Sludge
☐Bulk Waste
Others _____

FORM ID-CHECK APPROPRIATE BOX(ES)

3.

☐Normal Form* ☐Physical Form
☐Special Form ☐Solid ☐Liquid
☐Gas ☐Chemical Form ☐Nitrates
☐Sulfates ☐Phosphates ☐Oxides
☐Carbonates Other _____

*ONLY REQUIRED IF MATERIAL IS IN NORMAL FORM

SHIPPING NAME
Check appropriate box

4.

☐Radioactive Devices, n.o.s.
☐Radioactive Materials, LSA, n.o.s.
☐Radioactive Materials, Limited Qty, n.o.s.
☐Radioactive Materials, n.o.s.
☐Radioactive Materials, Special Form, n.o.s.
HAZARD CLASS: Radioactive Material

TYPE-CHECK APPROPRIATE BOX(ES)

5.

☐LSA ☐Type A Quantity/Container
☐LSA-BULK* ☐Type B Quantity /Container
☐LSA-LIQUID ☐Large Quantity
☐DEVICE ☐Limited Quantity

*IF THESE ARE CHECKED, TYPE A, B, OR LARGE QUANTITY MUST ALSO BE CHECKED.

VEHICLE INFORMATION-CHECK APPROPRIATE BOXES

6.

☐Private Motor Carrier
☐Rail Sole Use
☐Rail Not Sole Use
☐Passenger Carrying Transport Vehicle
☐Closed Transport
☐U.S Mail
☐Truck, Van, Car Sole Use
☐Truck, Van, Car Not Sole Use
Other _____

SPECIAL INSTRUCTIONS-CHECK APPROPRIATE BOX

7.

Any special instructions for safely opening this/the packages is/are attached to this shipping form.
☐Yes ☐Not Applicable

NOTIFICATION-CHECK APPROPRIATE BOX

8.

The consignee has been notified as to date of shipment and estimated time of arrival.
☐Yes ☐Not Applicable *REQUIRED FOR TYPE B OR LARGE QUANTITY

PLACARDS-CHECK APPROPRIATE BOX

9.

"Radioactive" placards are affixed to both sides and both ends of transport vehicle.
☐Yes ☐Not Applicable *REQUIRED IF VEHICLE HAS YELLOW II OR SOLE USE LSA

LABELS-CHECK APPROPRIATE BOX

10.

Required labels (white I, yellow II, yellow III) are affixed to opposite sides of each package.
☐Yes ☐Not Applicable

CONTAINER SPECIFICATION

11.

DOT Specification No. _____ Special Permit No. *USNRC _____
*REQUIRED FOR TYPE B OR LARGE QTY. PACKAGES

ACCEPTANCE STATEMENT

12.

There is a copy of the license or certificate on file indicating that the consignee is authorized to receive this material.

_____
Signature

EXCLUSIVE USE STATEMENT

13.

If this transport vehicle is designated as "SOLE USE", it is understood that it will be loaded by the consignor, unloaded by the consignee and no other material will be carried in/out the cargo carrying body and that the material is not to be transferred to another cargo body unless under the direction of the consignor, consignee, or authorized agent.
☐Yes ☐Not Applicable _____
DRIVER'S SIGNATURE

DISTRIBUTION

14.

The driver must have a copy of this document in his possession.

_____
DRIVER'S SIGNATURE

FIGURE 6

RADIOLOGICAL INFORMATION

1. TRANSPORT GROUP: I II III IV V VI ☐ EXEMPT FROM DOT PACKAGING SPECS.

Radionuclides-Abbreviations Authorized:

a.____ b.____ c.____ d.____ e.____ f.____ g.____ h.____

i.____ j.____ k.____ l.____ m.____ n.____ o.____ p.____

2. SURVEY DATA-USE APPROPRIATE SECTION. SURVEY UNITS TO BE MREM/HR. NUMBERS IN PARENTHESES ARE THE LIMITS FOR THOSE MEASUREMENTS.

a. Sole Use-Closed Transport
3' Ext Surface Pkg (1000) _____
Ext Surface Vehicle/Car (200) _____
6' Outer Lateral Surfaces, Vehicle (10) _____
Normally Occupied Position (2) _____

b. Sole Use-Open Transport
Contact Ext Pkg (200) _____
6' Outer Edges Vehicle (10) _____
Normally Occupied Position (2) _____

c. Non Sole Use-Open or Closed Transport
Contact Ext Surface Pkg (200) _____
3' Ext Surface Pkg (10) _____

d. Survey Instruments
Inst._____ Ser. No._____
Inst._____ Ser. No._____

3. CONTAMINATION DATA

Beta-Gamma (22,000DPM/100CM^2) _____ DPM/100CM^2
*Alpha (2,200DPM/100CM^2) _____ DPM/100CM^2

*UNLESS MATERIAL IS ALPHA EMITTER OR PACKAGE HAS BEEN SUBJECT TO ALPHA CONTAMINATION, INSERT NA ON ALPHA LINE.

SHIPPING DOCUMENTS (APPROPRIATE MODE) 16

1. Weight*	☐ Yes	☐ Not Applicable
2. Consignee Name & Address**	☐ Yes	☐ Not Applicable
3. Type Packaging Marking (Type A or Type B)	☐ Yes	☐ Not Applicable
4. LSA Packages Marked "Radioactive LSA"	☐ Yes	☐ Not Applicable
5. Limited Quantity Packages, Interior Package Marked "Radioactive"	☐ Yes	☐ Not Applicable
6. Shipping Name Marking ***	☐ Yes	☐ Not Applicable

* REQUIRED ON EACH PACKAGE OVER 110 LBS., EXCEPT IF LSA SOLE USE
** REQUIRED UNLESS VEHICLE IS SOLE USE
*** SEE BLOCK #4

CERTIFICATE 17

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

_____
Shipper's Signature

AUTHORIZATION 18

This record completed by _____
DATE

Survey data, packaging, labeling and marking checked for compliance with applicable regulations toman _____
Signature DATE

TRANSURANICS 19

Nuclear power generating facilities do not exceed transuranics limits of 10 NANO CI/GRAM.

Is this statement applicable? ☐ Yes ☐ No

If No then give the amount of NANO Curies per gram _____

FIGURE 7

DATA

UNIT#________ TYPE WASTE________ UNIT#________ TYPE WASTE________

Pkg. #	Contact [a] (mr/hr)	TI [b] (mr/hr)	ACT. (mCi)	Contamination [c]	Qty [d]	Pounds	Pkg. #	Contact [a] (mr/hr)	TI [b] (mr/hr)	ACT. (mCi)	Contamination [c]	Qty [d]	Pounds
TOTALS							TOTALS						

GRAND TOTALS

Shipment-Millicuries________(Do not use scientific notation)

POUNDS- ____________________ QUANTITY ____________________

REFERENCE ONLY

NOTES
a. Contact reading for billing purposes.
b. TI to be filled out if packages bear Yellow II or Yellow III labels.
c. Contamination levels in DPM/100 cm². See section M.
d. Qty-Enter quantity used in cubic feet, gallons, milliliters as appropriate.
e. For mixed freight shipments TI cannot exceed 50.
f. When using yellow III labels vehicle must be placarded.

MANUAL SET

REFERENCE ONLY

FIGURE 8

*CHEM-NUCLEAR SYSTEMS INC.
RADIOACTIVE SHIPMENT RECORD FORM

FIGURE 8

BARNWELL WASTE MANAGEMENT FACILITY
Operated by: CHEM-NUCLEAR SYSTEMS, INC.
P. O. Box 726, Barnwell, South Carolina 29812
(803) 259-1781
RADIOACTIVE SHIPMENT RECORD FORM
Page ______ of ______

FROM: Company Name: ______
Contact: ______
Address: ______
______
______
Telephone # ______
TO: ______
______

Carrier Name ______
Driver Signature ______
Date & Time Rec'd ______

Shipping Date ______
Customer Survey
No. ______
(16)
Type of Cask ______
Trailer # ______

CNSI USE ONLY
Arrival Date ______ Survey No. ______
Date Buried ______ By ______
Radiation Reading ______ Weight ______
Trench No. ______ KCC ______
LOC Code ______ Items ______
Total PERS EXP ______

(1) Item Number	(2) Radio-nuclide	(3) Physical Form	(4) Chemical Form	(5) Waste Description	(6) SNM (Grams)	(7) Source (Pounds)	(8) Activity (Millicuries)	(9) Gross Weight	(10) Transport Group	(11) Container Cu. Ft.*	(12) Container Spec.	(13) Rad. Level (mr/hr) Surface / 3 ft.	(14) External Removable Contamination Dpm/100cm²	(15) Label Used
TOTAL														

IMPORTANT: This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Signature ______
Company ______ Date ______
(See Reverse Side for Instructions for Completing This Form)

Copies: White-Accompany Shipment, Canary-Customer, Pink-Carrier

"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. 46-13536-01 as amended, and the effective Barnwell Site Criteria ... and 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. ( ) ______

Form No. CNS 301
9-79

FIGURE 9

CHEM-NUCLEAR SYSTEMS INC.
RADIOACTIVE SHIPMENT RECORD FORM

CHEM-NUCLEAR SYSTEMS, INC.

INSTRUCTIONS FOR COMPLETING RADIOACTIVE SHIPMENT RECORD FORM

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

GENERAL
Customer or shipper must provide (printed or typed) information in all numbered column headings.

Indicate company name, contact address and phone number, company name of carrier who is transporting the material and the date of the shipment in spaces provided.

An authorized representative of the company must sign and date the State of South Carolina and DOT Certification statements.

Column heading entries are to be made as follows:

(1) Item or container number - list each container separately. Identification on package itself shall match number in this column.

(2) Radionuclide - list each radioisotope contained in each container (See Note #3). The terms MFP and MCP are **not permitted.** Use as many lines as are required.

(3) Physical State - indicate state - solid, gas, biological.

(4) Chemical Form - reference section 172.203 of 49 CFR.

examples:

	waste	chemical form
1.	solidified liquid	urea formaldehyde (UF) (solidification media)
2.	resin	metallic oxide deposited on resin
3.	laboratory trash	Na or Ki, $SrCl_2$, etc.

(5) Waste description examples: (evaporator bottoms), (filter materials), (solidified resins), (irradiated metals), (animal carcasses), et cetera.

(6) SNM (Special Nuclear Material) grams - weight in grams of material as defined in 10 CFR Part 20.3 (S.C. Title A 1.2.24) cannot exceed 50 grams per 4.0 cubic feet or larger container.

(7) Source Pounds - weight in pounds of material as defined in 10 CFR Part 20.3 (S.C. Title A 1.2.24).

(8) Record the activity (millicurie) quantity of **each** isotope in **each** container (including the activity of the SNM and Source Pounds).

(9) Gross Weight - weight in pounds of the disposable container (including contents). All packages in excess of 110 pounds must have weight indicated (see 49 CFR 172.310).

(10) See Section 173.390 of 49 CFR.

(11) Record external volume of container (7.5 ft^3 for a 55 gallon drum, 4.0 ft^3 for a 30 gallon drum, and 0.85 ft^3 for a 5 gallon pa

(12) Indicate DOT/NRC container specification if applicable, such as Spec 7A, Type B package, strong tight container, et cetera.

(13) Record the highest measured radiation levels for each disposable container at the specified distances. Transportation Index Number (TI) equals mR/hr reading at 3 feet.

(14) Removable contamination levels on containers shall not exceed levels set forth in Section 173.397 (a) of 49 CFR.

(15) Packages shall be labeled as required by Sections 172.101, 172.200, 172.400, 172.403 and 173.397 of 49 CFR.

(16) Record cask identification number from name plate on cask.

(17) Record the trailer identification number in space provided.

Note: 1) The total line at the bottom of each page must be completed for columns 1, 6, 7, 8 and 11 by the customer.

2) Each resin shipment must be accompanied by an isotopic analysis representing this shipment which includes each isotope, the abundance of each and the total curie content.

3) If more than one container in the shipment contains the same percent abundance of each radionuclide, then a listing of radionuclides and their percentage abundance is required only for the container of the series. Subsequent containers in a series must be so described. The listing of radionuclides should be in Column #2. In addition, only the total millicurie content for each container in the series need be listed in Column #8.

4) Additional shipping papers may be required - refer to 49 CFR 172.201 through 172.203.

FIGURE 10

CHEM-NUCLEAR SYSTEMS, INC.
P.O. BOX 726
BARNWELL, S.C. 29812
Telephone (803) 259-3577 or 259-3578

PNP FORM

1. Category of Shipment:	2. Date: Revised Date:
3. Shipper's Name:	Street Address:
City:	State: / Zip:
4. Emergency Contact Person:	Emergency Telephone No.
5. Carrier's Name:	Street Address:
City:	State: / Zip:
6. Emergency Contact Person	Emergency Telephone No.
7. Volume of Shipment: Cubic Feet:	8. Estimated Total Activity (For Type B & Large Quantity)
9. Estimated Date of Shipment:	
10. Estimated Date of Arrival of Shipment:	
11. Routes Shipment Will Follow In State Of South Carolina (Be Specific):	

12. _____
Signature/Name of Person Completing Form

13. _____
Telephone Number

Copy #1: Chem-Nuclear Systems, Inc.
Copy #2: State of South Carolina, DPEC
Copy #3: Attach to RSR Form
Copy #4: Shipper's Copy

FIGURE 11

DEFINITIONS

The Prior Notification Plan (PNP) is required by the State of South Carolina. Prior notification is required for shipments falling into the following categories:

Category of Shipments:

Category I: Shipments containing Type B or Larger Quantity Packages (twelve days notice required).
Category II: All Cask Shipments (Five days notice required).
Category III: Non-Cask shipments greater than 75 cubic feet (ten 55-gallon drums) (Five days notice required).

Specific items as per front of form:

Item (1) Category of shipment (see above).
(2) Date: the date this form is filled out or revised.
(3) Shipper's name: Specific company and plant name, location by name of street, city, state, and zip code.
(4) Name of person to be contacted in case of an emergency with the shipment, with the appropriate EMERGENCY telephone number.
(5) Name of transportation company picking up this shipment for delivery with street address, city, state, and zip code of major home office.
(6) Name of the person to be contacted in case of an emergency with the shipment, with the appropriate EMERGENCY telephone number.
(7) External volume of the liner, box, container used to contain the radioactive material during shipment. (The actual volume of the package to be disposed of).
(8) The estimated total activity for Category I (Type B or Larger Quantity packages). The actual computed activity must be telephoned to Chem-Nuclear Systems, Inc. on the day of actual shipment.
(9) The "estimated date of shipment". The actual date will be provided by telephone on the date of shipment.
(10) The "estimated date of shipment ARRIVAL". This date will be revised when the "actual shipment date" is determined and telephoned to Chem-Nuclear Systems, Inc. Additionally, if the shipment is delayed enroute and will not arrive on the estimated date, CNSI will be advised by the shipper of the "revised estimated arrival date".
(11) Specify the route that the shipment will follow during its travel in the State of South Carolina.
(12) Signature and name (printed) of the person completing this form with office telephone number.

SPECIAL NOTE:

Receipt of mailgram or letter must be twelve (12) business days prior to shipment of Category I, and five (5) business days prior to shipment of Category II and III shipments. Send to:

CHEM-NUCLEAR SYSTEMS, INC.
Post Office Box 726
Barnwell, South Carolina 29812

Telephone No: (803) 259-3577 or 259-3578

FIGURE 12

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 should 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.

3. Prior notification is required of all radioactive waste shipments as defined in paragraph 2 of Interim Regulations for the Transportation of Radioactive Waste into or within South Carolina except as provided in paragraph 4.1.2 of the Regulation.

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

Item Number

1. Self Explanatory
2. Self Explanatory
3. This item applies to all shipments of radioactive waste transported to and within the State of South Carolina.
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 exclusive 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 thru 21. Self Explanatory

Certification: To be signed only by an authorized representative or agent of the shipper

SHIPPER: _____

EXPRESS: _____

CITY: _____ STATE: _____

PHONE: _____

DATE SHIPPED: _____ SHIPMENT NO: _____

CARRIER: _____

RADIOACTIVE WASTE SHIPMENT & DISPOSAL FORM

US ECOLOGY, INC.

EXECUTIVE OFFICE: (502) 426-7100

P.O. BOX 7246 ◦ LOUISVILLE, KENTUCKY 40207

Illinois Office: (315) 454-2376

NO. 01525 PAGE ____ OF ____

☐ P. O. Box 578
Beatty, NV 89003
(702) 553-2203

Permit Number _____

☐ P. O. Box 638
Richland, WA 99352
(509) 377-2411

Permit Number _____

APPROVAL	DATE
See Title Page	See Title Page

E. I. HATCH NUCLEAR PLANT

Georgia Power

TOTAL QUANTITY	PROPER SHIPPING NAME & HAZARD CLASS (PER 49 CFR 172.101)	IDENTIFICATION NUMBER	TOTAL WEIGHT IN POUNDS
	Waste Radioactive Device, N.O.S. – Radioactive Material	UN2911	
	Waste Radioactive Material, Fissile, N.O.S. – Radioactive Material	UN2918	
	Waste Radioactive Material, Low Specific Activity, N.O.S. – Radioactive Material	UN2912	
	Waste Radioactive Material, N.O.S. – Radioactive Material	NA9189	
	Waste Radioactive Material, Limited Quantity, N.O.S. – Radioactive Material	UN2910	
	Waste Radioactive Material, Special Form, N.O.S. – Radioactive Material	NA9202	

(1) Container No.	(2) Cubic Feet	(3) Weight (Pounds)	(4) Physical Form	(5) Chemical Form	(6) Radionuclide	(7a) Special Nuclear Material (Grams)	(7b) Source Material (Kilograms)	(8) Activity ☐ Curies ☐ Millicuries	(9) Radiation Levels mR/HR Surface	Radiation Levels mR/HR 3 Feet	(11) Transport Group	(12) Transport Index	(13) Label	(14) Fissile Class	(15) Type of Container
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
													Radioactive –		
TOTALS															

FIGURE 13

REFERENCE ONLY

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

_____ _____
Authorized Signature Title

DISPOSAL SITE COPY

THIS IS TO CERTIFY THAT ARTICLES ARE IN COMPLIANCE WITH ALL REGULATIONS APPLICABLE AT THE DESIGNATED DISPOSAL SITE.

_____ _____
Authorized Signature Title

MANUAL SET

PROCEDURE NO	REVISION NO	PAGE NO
HNP-8016	12	35 of 47

FIGURE 14

RADIOACTIVE SHIPMENT RECORD
FISSION MATERIAL

NO. _____
DATE _____

SHIPPED FROM: GEORGIA POWER COMPANY
PLANT E.I. HATCH
BAXLEY, GEORGIA 31513
LICENSE NO. DPR-57

SHIPPED TO: _____
LICENSE NO. _____
ATTENTION: _____

SHIPPED VIA: _____

REMARKS/DESCRIPTION: _____

PHYSICAL STATE: ☐ SOLID ☐ LIQUID ☐ GAS ☐ SPECIAL FORM ☐ LARGE QUANTITY

☐ SN MATERIAL-TYPE _____ ☐ BY- PRODUCT - ISOTOPE _____

SNM NET WT.	ENRICHMENT	ISOTOPIC WT.	CURIES	SPECIFIC ACTIVITY	CONCENTRATION

CONTAINER	NUMBER OF CONTAINERS	DOT/RE NO.	SERIAL NO.	WEIGHT	SEAL NUMBER

TRANSPORT GROUP: ☐ I ☐ II ☐ III ☐ IV ☐ V ☐ VI ☐ EXEMPT FROM D.O.T PACKAGING SPECS.

HEALTH PHYSICS SURVEY

READINGS TAKEN AFTER MATERIAL IS COMPLETELY PACKAGED.

MAXIMUM RADIATION AT SURFACE CONTACT _____ MR/HR; AT 3 FEET _____ MR/HR.

PRINCIPAL EMISSION: ☐ GAMMA ☐ NEUTRON ☐ ALPHA ☐ BETA

SMEAR RESULTS: _____ DPM/100 cm^2 (BETA - GAMMA); _____ DPM/100 cm^2 (ALPHA)

SURVEYED BY: _____ DATE _____

TRANSPORTATION

RADIATION UNITS: FISSILE CLASS _____ _____/PKG. FISSILE CLASS _____ _____ PKG./SHIPMENT

☐ PLACARD REQUIRED

SHIPMENT APPROVAL _____

TRANSPORTATION AND SHIPPING RELEASE

THIS IS TO CERTIFY THAT THE ABOVE NAMED ARTICLES ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION, ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPT. OF TRANSPORTATION.

METHOD OF SHIPMENT _____

MARKING & LABELING _____ RADIATION UNITS/PKG. _____

SHIPMENT ORIGINATOR _____ DATE _____

PROCEDURE DATA PACKAGE:

DOCUMENT NO: HNP-8016-1

SERIAL NO: R12-

MPL NO: N/A

RTYPE: G15.14

XREF: N/A

TOTAL SHEETS: 2

FREQUENCY: As Required

COMPLETED BY: _____

DATE COMPLETED: _____

I HAVE REVIEWED THIS DATA PACKAGE FOR COMPLETENESS AND AGAINST ACCEPTANCE CRITERIA IN ACCORDANCE WITH HNP-830.

ACCEPTANCE _____ UNACCEPTABLE _____

REVIEWED BY: _____

DATE REVIEWED: _____

REMARKS: _____

FIGURE 15
Page 1 of 2

DATA PACKAGE 1

GEORGIA POWER COMPANY
RADIOACTIVE SHIPMENT RECORD
CONTAINER LOADING RECORD

FROM _____
_____
_____

DATE _____ 19___
PAGE _____ OF _____

ITEM NO.	RADIATION LEVEL (mr/hr) SURFACE	RADIATION LEVEL (mr/hr) AT 3 FEET	EXTERNAL CONTAMINATION SURVEY (CPM)	ISOTOPE(S)	MASS (GRAMS)	SOURCE (POUNDS)	RADIOACTIVE (MILLICURIES)	PHYSICAL STATE (SOLID, LIQUID, GAS)	TRANS GROUP	LARGE USED	CONTAINER PUBLIC REF

FIGURE 15
Page 2 of 2

PROCEDURE DATA PACKAGE

DOCUMENT NO: HNP-8016-2

SERIAL NO: R12-

MPL NO: N/A

RTYPE: G15.14

XREF: N/A

TOTAL SHEETS: 2

FREQUENCY: As Required

COMPLETED BY: _____

DATE COMPLETED: _____

I HAVE REVIEWED THIS DATA PACKAGE FOR COMPLETENESS AND AGAINST ACCEPTANCE CRITERIA IN ACCORDANCE WITH HNP-830.

ACCEPTANCE _____ UNACCEPTABLE _____

REVIEWED BY: _____

DATE REVIEWED: _____

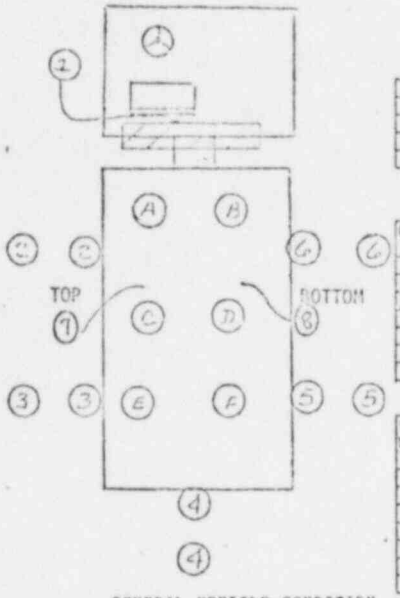
REMARKS: _____

FIGURE 16
Page 1 of 2

DATA PACKAGE 2
(Data Sheet 1)

TRUCK SURVEY MAP

NO. _____



	UNLOADED	LOADED
DATE		
TIME		
LOCATION		
INSTRUMENT		

(UNLOADED)* LOCATION (SURFACE)	DOSE RATE mr/hr	UNLOADED * LOCATION	SMEAR SURVEY DPM/100 cm² ** DAY	N
1		A		
2		B		
3		C		
4		D		
5		E		
6		F		

(LOADED)* LOCATION	DOSE RATE mr/hr SURFACE 36" AWAY
1	
2	
3	
4	
5	
6	
7	
8	

RECORD HIGHEST READING MEASURED AT DISTANCE OF INTEREST

GENERAL VEHICLE CONDITION _____

INSPECTED BY _____ VEHICLE OPERATOR _____

REMARKS _____ DATE _____

SURVEYED BY _____ DATE _____

REVIEWED BY _____ DATE _____
HEALTH PHYSICS SUPERVISOR

NOTE

THE RADIATION LEVEL SHOULD NOT EXCEED 200 mr/hr AT SURFACE, 10 mr/hr AT 6 FT. AWAY FROM SURFACE AND 2 mr/hr AT ANY NORMALLY OCCUPIED POSITION.

* See NOTE at H.2.a.(3)(d).

** Record results in dpm/100 cm^2. See Section M and Q for limits.

Assure that seals have been attached to all vehicles after loading. For incoming unloaded "Sole Use Vehicle's" the following limits shall apply:

SMEARABLE CONTAMINATION ≤ 2200 DPM/100 cm^2 BETA, GAMMA AND ≤ 220 DPM/100 cm^2 ALPHA. FIXED CONTAMINATION ≤ .5 mr/hr AT SURFACE.

FIGURE 16
Page 2 of 2

PROCEDURE DATA PACKAGE

DOCUMENT NO: HNP-8016-3

SERIAL NO: R12-

MPL NO: N/A

RTYPE: G15.14

XREF: N/A

TOTAL SHEETS: 2

FREQUENCY: As Required

COMPLETED BY: _____

DATE COMPLETED: _____

I HAVE REVIEWED THIS DATA PACKAGE FOR COMPLETENESS AND AGAINST ACCEPTANCE CRITERIA IN ACCORDANCE WITH HNP-830.

ACCEPTANCE _____ UNACCEPTABLE _____

REVIEWED BY: _____

DATE REVIEWED: _____

REMARKS: _____

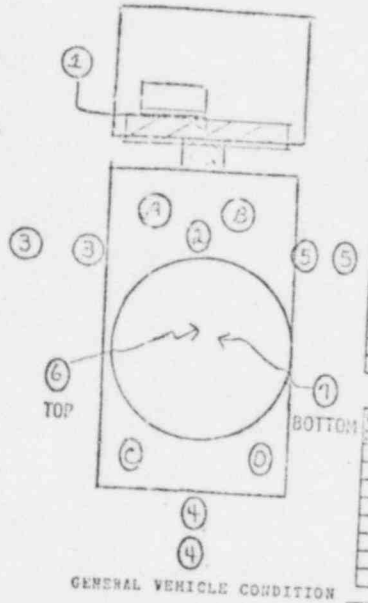
FIGURE 17
Page 1 of 2

DATA PACKAGE 3
(Data Sheet 2)

TRUCK SURVEY MAP

NO. _____

	UNLOADED	LOADED
DATE		
TRUC		
LOCATION		
INSTRUMENT		



(UNLOADED) LOCATION	DOSE RATE (SURFACE) mr/hr	UNLOADED * LOCATION	SMEAR SURVEY RESULTS **
1		PALLET 1	
2		PALLET 2	
3		PALLET 3	
4		A	
5		B	
6		C	
		D	

(LOADED)* LOCATION	DOSE RATE mr/hr SURFACE (6" AWAY)
1	
2	
3	
4	
5	
6	
7	
8	

RECORD HIGHEST READING MEASURED AT DISTANCE OF INTEREST

GENERAL VEHICLE CONDITION _____

INSPECTED BY _____ VEHICLE OPERATOR _____

REMARKS _____ DATE _____

SURVEYED BY _____ DATE _____

REVIEWED BY _____ DATE _____
HEALTH PHYSICS SUPERVISOR

NOTE

THE RADIATION LEVEL SHOULD NOT EXCEED 200 mr/hr AT SURFACE, 10 mr/hr AT 6 FT. AWAY FROM SURFACE AND 2 mr/hr AT ANY NORMALLY OCCUPIED POSITION.

* See NOTE at H.2.a.(3)(d).

** Record results in dpm/100 cm^2. See Section M and Q for limits.

Assure that seals have been attached to all vehicles after loading. For incoming unloaded "Dole Map Vehicle's" the following limits shall apply: SMEARABLE CONTAMINATION < 2200 DPM/100 cm^2 BETA, GAMMA AND < 220 DPM/100 cm^2 ALPHA. FIXED CONTAMINATION < .5 mr/hr AT SURFACE.

FIGURE 17
Page 2 of 2

PROCEDURE DATA PACKAGE

DOCUMENT NO: HNP-8016-4

SERIAL NO: R12-

MPL NO: N/A

RTYPE: G15.19

XREF: N/A

TOTAL SHEETS: 3

FREQUENCY: As Required

COMPLETED BY: _____

DATE COMPLETED: _____

I HAVE REVIEWED THIS DATA PACKAGE FOR COMPLETENESS AND AGAINST ACCEPTANCE CRITERIA IN ACCORDANCE WITH HNP-830.

ACCEPTANCE _____ UNACCEPTABLE _____

REVIEWED BY: _____

DATE REVIEWED: _____

REMARKS: _____

FIGURE 13
Page 1 of 3

DATA PACKAGE 4

Form BHA-CF
(5/80)

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, occuring 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

FIGURE 18
Page 2 of 3

DATA PACKAGE 4

Form 418-RHC
(5/80)

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

Use Printer Page for Instructions

1. Name and Address of Shipper:

2. Person Responsible for Radioactive Waste Shipment:
(a) Name
(b) Title
(c) Telephone No. ( )

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. Type of Transport Vehicle:

11. Trailer No. and Owner

12. Routes Shipment will follow in State of South Carolina (be specific):

Manifest Boundary

13. Type Container or Cask:

14. Container Spec.

15. Total No. of Containers

16. Waste Description: Physical and Chemical Form

17. Prominent Radionuclides:

18. Total Curies:

19. Transport Group:

20. Total Cubic Feet:

21. Waste Classification:

[] Radioactive LSA
[] Radioactive LSA greater than Type A quantities
[] Bulk LSA
[] Limited quantities and radioactive devices

Normal Form	Special Form	Fissile
[] Type A quantity	[] Type A quantity	[] Class I
[] Type B quantity	[] Type B quantity	[] Class II
[] Large quantity	[] Large quantity	[] Class III

Certification

I hereby certify on behalf of the above-named shipper 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 has complied with all the provisions as required by Act No. 499 of 1980, the South Carolina Radioactive Waste Transportation and Disposal Act.

Date

Typed Name and Title of Agent of Shipper

Signature

Acknowledgement of Receipt

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 or Authorized Agent

Typed or Printed Name and Title

Page 3 of 3

HNP-8016 R12

REFERENCE ONLY

FIGURE 18
Page 3 of 3

MANUAL SET

PROCEDURE DATA PACKAGE

DOCUMENT NO: HNP-8016-5

SERIAL NO: R12-

MPL NO: N/A

RTYPE: G15.14

XREF: N/A

TOTAL SHEETS: 2

FREQUENCY: As Required

COMPLETED BY: _____

DATE COMPLETED: _____

I HAVE REVIEWED THIS DATA PACKAGE FOR COMPLETENESS AND AGAINST ACCEPTANCE CRITERIA IN ACCORDANCE WITH HNP-830.

ACCEPTANCE _____ UNACCEPTABLE _____

REVIEWED BY: _____

DATE REVIEWED: _____

REMARKS: _____

FIGURE 19
Page 1 of 2

DATA PACKAGE 5

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (YEAR)_____

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
FOR UNIT _____

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

1. Type of waste	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	. E	
	Ci	. E	E
b. Dry compressible waste, contaminated equip. etc.	m^3	. E	
	Ci	. E	E
c. Irradiated components, control rods, etc.	m^3	. E	
	Ci	. E	. E
d. Other (describe)	m^3	. E	
	Ci	. E	. E

2. Estimate of major nuclide composition (by type of waste)

ISOTOPE	PERCENT	CURIES
a.		
b.		
c.		
d.		

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination

COMPLETED BY	DATE

FIGURE 19
Page 2 of 2