
Nuclear Services Support Facility Radioactive Materials Acceptance Criteria

Revision 15

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- Non-Proprietary
- Proprietary
- Restricted Information
- Safeguards Information
- Sensitive Security Information

- New
- Title Change
- Revision
- Rewrite
- Cancellation

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1 PURPOSE AND SCOPE

1.1 Purpose

EnergySolutions accepts low-level radioactive material and/or waste for processing at the Nuclear Services Support Facility (NSSF) located at 740 Osborn Road, Barnwell, SC. This document outlines the responsibilities of both the customer and EnergySolutions and describes what constitutes an acceptable shipment for receipt at the NSSF.

Any deviations from the requirements of this document must be approved by the Barnwell Licensing Department, to avoid refusal of shipment or additional charges.

1.2 Scope

This document applies to any individual shipping radioactive material and/or waste to the NSSF, and to EnergySolutions personnel involved with shipping and receiving shipments for processing at the NSSF.

Any questions regarding this procedure or License 287-02 should be directed to the Barnwell Licensing Department (Telephone: 803-541-5004) unless otherwise specified.

2 COMMITMENTS

None

3 REFERENCES

3.1 References

- 3.1.1 South Carolina Department of Health and Environmental Control (SC DHEC) Radioactive Material License 287-02.
- 3.1.2 CS-QA-PR-002, NSSF Quality Assurance Records
- 3.1.3 Code of Federal Regulations, Title 49
- 3.1.4 S.C. Regulation 61-83, Transporting of Radioactive Waste into or Within South Carolina
- 3.1.5 ES-AD-PR-008, Condition Reports
- 3.1.6 ES-QA-PR-005, Records
- 3.1.7 S20-AD-010, Barnwell Waste Management Facility Site Disposal Criteria Chem-Nuclear Systems Barnwell Office
- 3.1.8 Additional Security Measurements (ASM) on the Transportation of Radioactive Material Quantities of Concerns issued by the U. S. NRC (EA-05-007, July 19, 2005), and associated NRC updates.
- 3.1.9 Federal Motor Carrier Safety Regulation, PART 393, Subpart I – Protecting Against Shifting and Falling Cargo

3.1.10 Code of Federal Regulations, Title 10

3.1.11 S.C. Regulation 61-63, Radioactive Materials (Title A), Part XII

4 **GENERAL**

4.1 **Definitions**

4.1.1 *EnergySolutions* Equipment – Equipment owned or operated under contract by *EnergySolutions*.

4.1.2 Radioactive materials and/or radioactive waste – Radioactive materials and/or low-level radioactive waste that have been pre-approved by the Barnwell Licensing Department for receipt, processing, decontamination, storage, consolidation, solidification, encapsulation, or repackaging for disposal. A contract, purchase order or written letter of authorization in form and substance acceptable to *EnergySolutions* certifying compliance with Reference 3.1.1, of this procedure and current low level radioactive waste disposal regulations (federal, state, and local), shall be in the possession of *EnergySolutions* prior to shipment.

4.1.3 Outer Surfaces – the external surfaces of equipment that will be accessed during the normal handling of the component.

4.1.4 Inaccessible Surfaces – the internal surfaces of equipment that require specific effort to access including the uses of tools or the operation of the equipment.

Note: **NSSF Management should be consulted for specific definition of outer surfaces and inaccessible surfaces for specific equipment.**

4.2 **Responsibilities**

4.2.1 *EnergySolutions* NPS Personnel

- Ensure that *EnergySolutions* equipment is decontaminated to the extent possible prior to packaging and shipping equipment to the NSSF.
- Ensure that *EnergySolutions* equipment shipped to the NSSF complies with this procedure.
- Ensure that prior notifications are completed in accordance with Section 5.2.
- Ensure that Attachment 6.3, *EnergySolutions* Services Equipment Shipping Checklist is completed and provided with the shipping paperwork.

- Ensure Barnwell Complex Licensing, Radiation Safety, NSSF, and RSO are present for necessary approvals of equipment shipments.

4.2.2 NSSF Personnel

- Ensure that shipments received at the NSSF comply with this procedure or have obtained the necessary pre-approvals as allowed in this procedure.
- Initiate Condition Reports as required per Reference 3.1.5

4.2.3 Barnwell Complex Licensing and Radiation Safety Personnel

- Ensure that radioactive material possession limits of Reference 3.1.1 are not exceeded.
- Review and approve prior notifications in accordance with Section 5.2.
- Assign Shipment ID Numbers in accordance with Section 5.2.

4.2.4 Plant Personnel

- Ensure that prior notifications, permits, and approvals are obtained prior to packaging and shipping radioactive material / waste to the NSSF.
- Ensure the shipment is properly blocked, braced, and secured. Shippers should verify that their shipments meet the applicable requirements in Reference 3.1.9.
- Provide the proper radiological surveys, equipment inventories, and radiological characterizations for each shipment in accordance with this procedure.
- Provide the proper radioactive material shipment records as required by Reference 3.1.1, 3.1.3, 3.1.4, and 3.1.10.

4.3 Precautions and Limitations

Any deviations from the requirements of this document must be approved by the Barnwell Licensing Department, to avoid refusal of shipment or additional charges.

4.4 Records

All records shall be generated, maintained, and retained in accordance with this procedure and References 3.1.2 and 3.1.6.

5 REQUIREMENTS AND GUIDANCE

5.1 General Information

5.1.1 Telephone Numbers

Nuclear Services Support Facility (NSSF)

Prior Notification (803) 541-5017 or 5013 Barnwell, SC

EnergySolutions Barnwell, SC Office (803) 541-5004

EnergySolutions Barnwell, SC Licensing FAX (803) 259-1744

5.1.2 Normal Hours of Operations

The hours of operations are normally Monday through Thursday,
7:00 a.m. to 5:30 p.m.

5.1.3 Holidays

The NSSF normally observes the following holidays:

New Year's Day

Memorial Day

Independence Day

Labor Day

Thanksgiving Day and the day after

Christmas Day and the day before/after

5.2 **Prior Notification**

5.2.1 All radioactive material / waste shipments to the NSSF require prior notification. Notifications are to be made to the NSSF Prior Notification telephone number provided in Step 5.1.1.

5.2.2 Shipper making shipments containing Radioactive Material Category 1 or Category 2 Quantity shipments to the NSSF shall comply with the notification requirements of Reference 3.1.11 and Section 5.7.

5.2.3 Shippers making shipments containing Nationally Tracked Sources, as defined in 10 CFR 20.1003 shall comply with the notification requirements of Reference 3.1.10 and Section 5.8.

5.2.4 Prior to making the notification telephone call, a Radioactive Material Shipment Record (Attachment 6.1, Radioactive Material Shipment Record) must be completed and faxed or emailed along with a radiological survey (i.e., equipment and container, waste, etc.) and physical inventory list to the Barnwell Licensing Department at (803) 259-1744 or call telephone numbers provided in Step 5.1.1 for email addresses.

5.2.5 The completed Attachment 6.1, Radioactive Material Shipment Record, radiological survey(s), and physical inventory will be submitted to the NSSF Manager/Supervisor or designee and Barnwell Licensing Department for approval.

5.2.6 After approval, a Shipment ID Number will be assigned to the shipment by the Barnwell Licensing Department and the customer will be notified.

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The approved Radioactive Material Shipment Record (Attachment 6.1) will be faxed or emailed to the customer for their records. A copy of the completed Attachment 6.1 shall be included with the shipment manifest.

- 5.2.7 Shipments arriving at the NSSF without a Shipment ID Number (assigned by the Barnwell Licensing Department) will not be accepted until the shipment is approved and a Shipment ID Number assigned.
- 5.2.8 Certain wastes may require SC DHEC approval before being accepted for processing. This is determined during the prior notification process. If required, a request for acceptance will be submitted to SC DHEC after the appropriate information has been obtained from the customer and the processing methods determined.
- 5.2.9 For any shipment not received within forty-five (45) days after the prior notification date, the Barnwell Licensing Department will contact the customer. After sixty days (60) days of the shipment not being received, the Barnwell Licensing Department will contact both the customer and SC DHEC.

5.3 Permits

Each radioactive waste generator or broker/processor shipping radioactive waste to the NSSF for processing and subsequent disposal will be responsible for obtaining a SC DHEC Radioactive Waste Transport Permit in accordance with Reference 3.1.4.

5.4 Acceptance Criteria

5.4.1 Permissible Radioactivity Limits

- 5.4.1.1 Any radioactive material with atomic numbers 1-92, inclusive, the NSSF is limited to 10 curies total of all radionuclides. This applies only to *EnergySolutions* equipment shipments.
- 5.4.1.2 For radioactive material with atomic numbers 93 and above, the NSSF is limited to 10 millicuries total of all radionuclides as incidental to the byproduct materials. This applies only to *EnergySolutions* equipment shipments.
- 5.4.1.3 For radioactive material with atomic numbers 1-92, inclusive, the NSSF is limited to 5,000 curies total of all radionuclides. This limit is applicable to radioactive materials and/or wastes for receipt, processing, decontamination, storage, consolidation, solidification, encapsulation, and repackaging for transport to authorized licenses.
- 5.4.1.4 For source material, the NSSF is limited to 1000 pounds total. This limit is applicable to radioactive materials

and/or wastes for receipt, processing, decontamination, storage, consolidation, solidification, encapsulation, and repackaging for transport to authorized licenses.

- 5.4.1.5 For any radioactive material with atomic numbers 93 and above, excluding Special Nuclear Material (SNM), the NSSF is limited to 100 grams total. This limit is applicable to radioactive materials and/or wastes for receipt, processing, decontamination, storage, consolidation, solidification, encapsulation, and repackaging for transport to authorized licenses. This activity must also be incidental to the total activity in these items.
- 5.4.1.6 SNM is limited to 100 grams total. This limit is applicable to radioactive materials and/or wastes for receipt, processing, decontamination, storage, consolidation, solidification, encapsulation, and repackaging for transport to authorized licenses. This activity must also be incidental to the total activity in these items.

5.5 **EnergySolutions Equipment**

- 5.5.1 EnergySolutions equipment shall be prepared for shipment using the following precautions as a minimum. EnergySolutions equipment should be decontaminated to the extent practicable before packaging and shipping.
 - 5.5.1.1 Smearable contamination levels on outer surfaces shall not exceed 50,000 dpm/100 cm² beta gamma or 2,500 dpm/100 cm² alpha without prior approval from the Barnwell Licensing Department and Radiation Safety. Inaccessible surfaces are not subject to this criterion.
 - 5.5.1.2 Inaccessible surfaces of EnergySolutions equipment shall be decontaminated to the extent possible to ensure that residual waste that may be trapped in, on, or between inaccessible surfaces of equipment are removed prior to shipment. Residual waste consisting of irradiated metals, gross amounts of resins, or other residual wastes may require additional charges for the proper management and disposal of these residual wastes.
 - 5.5.1.3 Smearable contamination levels on inaccessible surfaces of EnergySolutions equipment should not exceed 10 times the smearable contamination on the outer surfaces of the equipment.
 - 5.5.1.4 Direct radiation levels should not exceed 1R/hr at contact or 200 mrem/hr at 1 meter without prior approval from the

- Barnwell Licensing Department and Radiation Safety.
- 5.5.1.5 EnergySolutions equipment used, maintained, or stored in an area that may contain “Hot Particles” (fuel pool work) shall be surveyed for hot particles prior to packaging. The radiological survey indicating that the equipment is free of hot particles shall accompany the shipment.
- 5.5.1.6 Equipment, which has been used in the transfer of liquids, shall be drained prior to packaging.
- 5.5.1.7 Gasketed blank flanges, plugs, or caps shall be installed on all open pipes or hoses, which could contain any moisture. Pipes or drains, which are not easily plugged, shall have a plastic bag filled with absorbent taped over the opening to prevent the egress of any moisture. Ensure equipment is properly secured to prevent shifting during shipment.
- 5.5.1.8 Contaminated equipment shall be packaged and shipped in accordance with accordance with Reference 3.1.1, 3.1.3, 3.1.4, and 3.1.10.
- 5.5.1.9 If THERMEX processing equipment is shipped to the NSSF refer to Attachment 6.4, Thermex Equipment Skids Draining Guidelines.
- 5.5.2 Prior to sealing of shipment, the materials to be shipped must be visually inspected for evidence of leakage.
- 5.5.3 After the inspection has been satisfactorily completed, the shipping container shall be sealed. The container shall be protected from adverse weather conditions prior to shipment. For mobile trailer units ensure doors, panels, etc. are locked and sealed to prevent tampering during shipment.
- 5.5.4 The EnergySolutions on-site personnel or in the absence of EnergySolutions on-site personnel, the shipper shall complete Attachment 6.3, EnergySolutions Services Equipment Shipping Checklist. The individual completing Attachment 6.3 shall fax or email the following completed documents to the responsible EnergySolutions NSSF Manager/Supervisor or designee, Licensing Department, and the NSSF RST.
- Attachment 6.1 Radioactive Material Shipment Record
 - Attachment 6.3, EnergySolutions Services Equipment Shipping Checklist
 - Radiological surveys
 - Physical Inventory

5.5.5 Upon receipt of satisfactory documentation described in Step 5.5.4, the NSSF Manager/Supervisor or designee, and Barnwell Licensing Department shall grant permission to ship the materials.

5.6 Radioactive Material / Waste Processing

The NSSF will accept various forms of radioactive materials / waste for processing.

5.6.1 Low activity materials such as contaminated soils, sand, gravel, etc. are acceptable on a case-by-case basis. These materials may be used as filler material for filling interstitial voids in other waste packages.

5.6.2 Radioactive components and sealed sources will be accepted for encapsulation in accordance with the following conditions:

5.6.2.1 Components and source containers must have appropriate lifting devices.

5.6.2.2 Dose rates at the external surfaces of the container or components may not exceed 10 R/hr without prior approval from the Barnwell Licensing Department and the Radiation Safety Officer (RSO).

Note: Sealed sources may require SC DHEC approval prior to disposal. See Section 5.8 for Nationally Tracked Sources.

5.6.3 The NSSF will accept packages of unstable waste that require additional processing to reach stability for disposal. This waste must be shipped to the facility in appropriate transport containers for overpacking into high integrity containers. The waste must meet all other license conditions and the waste containers must be less than or equal to 10 R/hr on contact unless approved by the Barnwell Licensing Department and the RSO prior to shipment.

5.6.4 The NSSF may provide decontamination services. This includes decontaminating and surveying components in accordance with contractual requirements.

5.7 Radioactive Material Category 1 or Category 2 Quantity Shipments

5.7.1 Category 1 or Category 2 shipments that contain radionuclides and quantities that are listed in Appendix A of Reference 3.1.11, which pose a concern for potential malevolent use and potential risk or consequences.

5.7.2 Shippers preparing shipments containing Category 1 or Category 2 to the NSSF should be familiar with the shipment requirements specified in Reference 3.1.11.

Note: Reference 3.1.8 contains sensitive information that cannot be included in this document.

5.7.3 The shipper of Category 1 or Category 2 shipments shall notify the Barnwell Licensing Department prior to making the shipment to the NSSF.

5.8 Nationally Tracked Sources

5.8.1 A nationally tracked source, as defined in 10 CFR 20.1003, refers to a sealed source containing a quantity equal to or greater than Category 1 or Category 2 levels of any radioactive material listed in Appendix E to Part 20 – “Nationally Tracked Source Thresholds”.

5.8.2 Effective January 31, 2009, shippers preparing waste shipments containing Category 1 and/or Category 2 nationally tracked sources to the NSSF shall comply with the reporting requirements specified in Reference 3.1.10, Section 20.2207 and obtain prior to shipment approval from the Barnwell Licensing Department.

5.8.3 Prior to shipping, the shippers shall provide the Barnwell Licensing Department the following information for review and approval.

5.8.3.1 Shipper’s name, shipping address, license number, SC Radioactive Waste Transport Permit number, and name of individual preparing the reported information.

Note: If the shipper is a broker, waste processor, etc., and is not the waste generator, the shipper must also provide the name, shipping address, license number, and SC Radioactive Waste Transport Permit number for each waste generator.

5.8.3.2 The manufacturer, model, and serial number of the source or, if not available, other information to uniquely identify the source.

5.8.3.3 The radioactive material in the source and current activity in becquerels and curies. The activity reported must be the same as the activity that will be listed on the shipment manifest.

5.8.3.4 The date the source strength is reported.

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5.8.3.5 The shipping date and estimated arrival date.

5.8.3.6 The waste manifest number and the waste disposal container number.

5.8.4 The Barnwell Licensing Department will notify the shipper of each source as being either approved or disapproved for shipment to the NSSF.

5.8.5 Upon source shipment arrival, the Barnwell Licensing Department will complete the source tracking transaction report as required in Reference 3.1.10, Section 20.2207 by the close of the next business day.

5.9 Acceptance and Acknowledgement of Materials & Shipments

5.9.1 All radioactive materials accepted for waste processing at the NSSF shall be prepared for disposal at a licensed disposal facility. The NSSF shall not accept for processing, materials which are prohibited from disposal at a licensed disposal facility.

5.9.2 Within seven (7) days of receipt, a letter acknowledging receipt of equipment, Attachment 6.2, Shipment Receipt Document, and a signed copy of the shipment manifest shall be forwarded to the customer by the Radiation Safety Department.

5.10 Prohibited Items

5.10.1 Mixed Waste

5.10.1.1 No mixtures of radioactive waste and hazardous waste as defined by Title 40 Code of Federal Regulations (CFR) Part 261 and S.C. Hazardous Waste Management Regulation 61-79.261 will be accepted.

5.10.1.2 A mixture of radioactive waste and waste which was classified as hazardous solely because it exhibited one or more of the hazardous characteristics defined in 40 CFR 261, Subpart C, but has been treated in a manner such that it no longer exhibits any other characteristics, will be reviewed by the Barnwell Licensing Department for acceptance on a case-by-case basis. As required by 40 CFR 261.24, the Toxicity Characteristic Leaching Procedure shall be used.

5.10.1.3 A description of the treatment process and results of the analytical tests of the final waste shall be submitted to the Barnwell Licensing Department for evaluation prior to shipment.

5.10.2 Polychlorinated Biphenyl Waste (PCB)

No PCB's or PCB items as defined in 40 CFR 761 shall be accepted for processing.

5.11 Radiation / Contamination Levels

Vehicles shall be decontaminated to the release limits specified in Reference 3.1.3 and/or NSSF release limits. Charges for decontamination services shall be assessed as necessary.

5.12 Shipment Discrepancies

5.12.1 The Barnwell Licensing Department and the Radiation Safety Officer (RSO) shall be advised of any discrepancies found during the receipt or processing of radioactive materials and/or waste.

5.12.2 The Barnwell Licensing Department shall notify or advise the customer of any discrepancies found during the receipt or processing of a shipment and shall initiate a Condition Report (CR) in accordance with Reference 3.1.5.

5.13 Required Communication

5.13.1 Each shipment of radioactive material shall be accompanied by a shipment manifest in accordance with Reference 3.1.3.

5.13.2 Each shipment of radioactive material shall also include, with the shipment manifest, the following information on a per package basis:

- 5.13.2.1 Isotopic Analysis that provides the radionuclides and their individual activity in millicuries or percent abundance
- 5.13.2.2 Radiation/Contamination survey of the contents
- 5.13.2.3 Physical inventory of contents
- 5.13.2.4 Statement of any unusual hazards

5.13.3 Each shipment of *EnergySolutions* equipment being shipped to the NSSF shall include Attachments 6.1, Radioactive Material Shipment Record and 6.3, *EnergySolutions* Services Equipment Shipping Checklist.

5.13.4 Each shipment of waste for processing will require a Uniform Low-Level Radioactive Waste Manifest Form.

6 ATTACHMENTS AND FORMS

- 6.1 Radioactive Material Shipment Record SC DHEC License 287-02
- 6.2 Shipment Receipt Document
- 6.3 *EnergySolutions* Services Equipment Shipping Checklist
- 6.4 Thermex Equipment Skids Draining Guidelines

Attachment 6.1

**RADIOACTIVE MATERIAL SHIPMENT RECORD
SC DHEC LICENSE 287-02**

Customer: _____ Shipment ID#: _____

SC DHEC Radioactive Waste Transport Permit Number: _____

Contact Name: _____

Phone Number: _____

Fax Number/Email Address: _____

ETA Barnwell: _____

Description of Shipment: _____

Total Number/Type of Packages: _____

Total Activity (mCi): _____

Radionuclides: _____

APPROVALS:

Barnwell Licensing Department

Date

NSSF Manager/Supervisor or Designee, Barnwell

Date

Requestor Contacted: _____

Date/Time

Initial

Attachment 6.2

SHIPMENT RECEIPT DOCUMENT

ENERGYSOLUTIONS

RADIATION SAFETY

DATE: _____

COMPANY: _____

ADDRESS: _____

ATTENTION:

This is to verify that the following shipment was received at the *EnergySolutions* – Nuclear Services Support Facility (NSSF) (SC DHEC Radioactive Material License #287-02), Barnwell, South Carolina.

SHIPMENT IDENTIFICATION NUMBER: _____

DATE OF RECEIPT: _____

RS TECHNICIAN: _____ DATE: _____

Note: This certification only verifies compliance with USDOT Transport Regulations, which can be verified at the time of receipt and does not imply total compliance with license conditions of the NSSF.

If any problems are encountered during unloading and/or processing, you will be promptly notified.

ATTACHED IS A COPY OF THE SIGNED MANIFEST.

Attachment 6.3

ENERGYSOLUTIONS SERVICES EQUIPMENT SHIPPING CHECKLIST

1. The materials to be shipped have been inspected within 24 hours of loading. No moisture noted.

_____ Date _____ EnergySolutions / Customer

2. Thermex Unit properly drained (See Attachment 6.4).

_____ Date _____ EnergySolutions / Customer

3. The shipping container is sealed and properly protected from adverse weather conditions.

_____ Date _____ EnergySolutions / Customer

4. The shipper conducted a thorough radiological survey of the shipment.

_____ Date _____ EnergySolutions / Customer

5. The shipment is properly loaded and secured.

_____ Date _____ EnergySolutions / Customer

6. A faxed or emailed copy of the completed checklist, radiological surveys, inventory sheets, and Attachment 6.1 of this procedure have been sent to the appropriate EnergySolutions NSSF Manager/Supervisor or designee and Barnwell Licensing Department.

_____ Date _____ EnergySolutions / Customer

7. A call made to the cognizant EnergySolutions NSSF Manager/Supervisor or designee for report of inspection and permission to ship material.

_____ Date _____ EnergySolutions / Customer

8. Acknowledgement

_____ Date _____ Shippers Signature

Attachment 6.4

THERMEX EQUIPMENT SKIDS DRAINING GUIDELINES

- 1 Thermex equipment skids must be properly drained to meet freestanding liquid requirements, prior to shipment. The following steps are guidelines for draining various Thermex components. Contact an EnergySolutions NSSF Manager/Supervisor or designee for specific detailed blow down and draining techniques, as well as any “Lessons Learned” from previous shipments.

- 1.1 RO SKID

Blow down skid in accordance with the Operating Procedure. Direct sample points and component drains to a receptacle on floor drain. Open all valves, vents, and drain ports (including pump housing drain plugs). Allow unit to drain for 24 hours prior to closing all valves, vents, sample points, and drain ports.

- 1.2 EQUAFLEX VESSELS

Remove media, rinse, and blow down vessel in accordance with Operating Procedure. Direct sample points and drains to a receptacle or floor drain. Open all valves, sample points, drains, and vents. Allow unit to drain for 24 hours prior to closing all valves, vents, and drains.

- 1.3 CDI UNITS

Blow down unit in accordance with the Operating Procedure. Direct sample points and drain valves to receptacle, floor drain, or drain pan. Open all valves, vents, and drains. Allow unit to drain for 24 hours prior to closing all valves, vents, and drains. Wipe any water out of pan.

Note: It is not possible to drain all water from the CDI membrane stack. Be sure to add absorbent to shipping box to capture any incidental free liquid released from stack.

- 1.4 PHASE SEPARATOR

Drain and blow down unit in accordance with the Operating Procedure. Direct sample points and drains to a receptacle or floor drain. Open all valves, vents, and drains. Allow unit to drain for 24 hours. Remove the coalescing tank lid and clean water tank lid and determine if water is entrapped within the coalescing plate packs and other horizontal surfaces within the unit. The unit should be tilted to run free liquid off the surfaces, and the coalescing plates lightly rapped to release water. Remove any free liquid released and allow the unit to dry for 24 hours prior to replacing lids.