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OPERATION OF SAMPLE REFRIGERATION UNITS AND SAMPLE RECEIVING, HANDLING AND STORAGE

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1.0 OBJECTIVE

The purpose of this Standard Operating Procedure (SOP) is to define routine procedures for checking the operation and cleaning of the Sample Refrigeration Units (SRUs) and freezer; and to establish a procedure for receiving, logging, storing and disposing of samples submitted to the Scientific, Engineering, Response and Analytical Services (SERAS) Laboratory for analysis. In addition, this SOP provides sample storage procedures to be followed in the event of sample overload or any SRU and/or freezer malfunction.

2.0 APPLICABILITY

This SOP applies to all samples submitted to the SERAS facility, whether the samples are to be subcontracted or analyzed at the SERAS Laboratory. This SOP also applies to samples stored in the two large SERAS walk-in SRUs and freezer located in the sample receiving trailer.

3.0 DESCRIPTION

3.1 Operational Check of the SRU and Freezer

3.1.1 Routine Check

A National Institute for Standards and Technology (NIST)-calibrated thermometer is present in each SRU and freezer. Once each scheduled workday, the temperature will be checked and recorded by the Sample Receiving Technician (SRT) or by laboratory personnel. This will be done when the temperatures of the SRU/freezer are stable, preferably at the start of each workday. The SRU temperature must be 4 ± 2 degrees Celsius ($^{\circ}\text{C}$), and the freezer temperature must be less than or equal to (\leq) -5°C . If the temperature of the SRUs or the freezer is not within the acceptance limits, the procedure outlined in Section 3.1.2 of this SOP will be initiated.

Daily temperature readings of the SRU and freezer will be recorded in a dedicated logbook identified by a unique logbook number. This logbook will be peer reviewed and signed periodically by the SERAS Data Validation and Report Writing (DV&RW) Group Leader. The SRUs and freezer will be inspected daily by the SRT for cleanliness. Any spills will be cleaned up immediately as described in Section 3.2.1 of this SOP.

3.1.2 In Case of Malfunction

If the SRU or freezer temperature is outside the acceptance criteria listed in section 3.1.1, an additional reading will be taken approximately one hour later after the refrigerator or freezer has remained closed the entire hour. If the refrigerator temperature is still outside the acceptance range, the SRU temperature control will be adjusted to a cooler or warmer setting accordingly. If the freezer temperature is not at or below -5°C , then the freezer temperature control will be turned to a colder setting. The temperature of the SRU and/or the freezer will be monitored and recorded in the temperature logbook on an hourly basis until the temperature stabilizes within the acceptance range. If the SRU and/or the freezer temperature does not stabilize within six hours, servicing of the unit will be



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initiated, and alternate emergency storage procedures outlined in Section 3.4.3 of this SOP will be implemented.

3.2 Cleaning and Maintenance of the SRU and Freezer

3.2.1 Spills

The SRUs will be inspected daily for cleanliness and any spills. All spills will be cleaned up in accordance with SERAS SOP #3013, *SERAS Laboratory Safety Program*. The clean-up materials will be disposed of according to SERAS SOP #1501, *Hazardous Waste Management*.

3.2.2 Health and Safety

At a minimum, nitrile gloves, safety glasses, and laboratory coats will be worn during cleaning of the SRU. When working with potentially hazardous material, United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA) and Corporate health and safety procedures will be followed.

3.2.3 Maintenance

Daily temperature checks will be used to determine the need for SRU or freezer maintenance. The freezer will be defrosted periodically on an as-needed basis.

3.3 Sample Receiving

Sample receiving, log-in and custody procedures to be followed during regular working hours and after hours are described in this section.

3.3.1 Procedure During Regular Hours

1. The SERAS Task Leader (TL) will complete a Projected Work Assignment (PWA) (Attachment 1, Appendix A) prior to initiation of field activities. The PWA provides a preliminary indication of the number of samples to be collected, matrix, types of analyses requested, approximate field sampling dates and requested analytical data requirements for preliminary data and final analytical reports. This is subject to change due to unpredictable field events. The PWA will be transmitted to the **SRT, Analytical Section Leader, Subcontracting Representative and Analytical Group Leaders to facilitate coordination of laboratory activities.**

During field activities, the TL will notify the SRT of the number of samples being shipped, the types of analyses requested, and when the samples are being shipped to the SERAS facility, leaving a detailed message on the "Sample Hotline," which was established for this purpose. The SRT, in turn, will inform the Analytical Group Leaders. The TL will telephone the SRT to confirm the samples have arrived intact and complete. Any problems with the shipment will be addressed to the TL by the



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SRT.

2. Sample shipments will be received by the shipping/receiving clerk in the shipping/receiving area. The shipping/receiving clerk will notify the SRT that samples have arrived. The samples will be kept in the designated sample receiving area until the SRT is available.
3. The SRT will move the sample shipping containers to the sample receiving trailer where the containers will be opened under a hood and examined for physical integrity. The samples in the shipping container will be compared with those listed on the enclosed Chain of Custody (COC) record (Attachment 2, Appendix A). The SRT will measure and document the internal cooler temperature using a calibrated thermometer on the COC record, sign the "Received By" section along with the date and time received.
4. For samples to be analyzed at SERAS, samples will be given an internal SERAS tracking number and logged into an electronic spreadsheet maintained by the SRT. The internal SERAS laboratory number consists of a five digit sequential number starting with 00001 and continuing to 99999. Once 99999 is reached, the numbering scheme starts over again. The SERAS log-in number is written on the sample labels affixed to the sample containers.

After the samples have been logged in, the SRT will make sufficient copies of the COC record (depending on the type of analyses requested) and transfer custody of the samples to a group representative. The samples will be delivered by the SRT to the appropriate laboratory along with a copy of the COC record. A representative from the appropriate laboratory group will sign the COC record to acknowledge transfer of the samples. Additional copies of the COC record will be given to the appropriate Analytical Group Leaders, the DV&RW Group Leader and the Analytical Section Leader.

After the representatives from each group have signed the original COC acknowledging receipt and custody of the samples, the original COC is delivered to the DV&RW group leader or their designee for incorporation into the final report.

Once the samples have been transferred to the responsible laboratory groups, the samples will be stored in the respective laboratories' sample storage refrigerators in preparation for analysis. After completion of the analysis, at the end of each month or when notified by the department, the SRT will regain custody of any remaining samples by having a representative from the laboratory group sign the COC record, thereby relinquishing possession of the samples. The SRT will remove the relinquished samples from the laboratories' sample storage refrigerators or freezers, and place them in the SRU or the Sample Receiving freezer, as appropriate, for storage or in preparation for disposal.

5. Samples transferred to a subcontract laboratory should be packed in separate



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shipping containers and shipped directly from the site to the subcontract laboratory. If the shipping container is received at the SERAS facility, and the COC record inside the cooler indicates that the entire shipment of samples is to be subcontracted, the SRT will take the shipping container to the sample receiving trailer. The SRT will open the shipping container under the hood and visually examine the samples for physical integrity. The number of samples in the shipping container will be compared with those listed on the COC record to verify the number of samples and types of analyses. The SRT will note the approximate internal cooler temperature on the COC, sign the "Received by" section with the date and time received. The SRT will then repack the samples, as outlined in SERAS SOP #2004, *Sample Packaging and Shipment*, adding additional ice if necessary to maintain the temperature, and sign the COC record relinquishing custody of the samples. The shipping containers will be sealed as outlined in the above referenced SOP, and shipped to the subcontracted laboratory.

When part of a shipment of samples arriving at the SERAS facility is to be subcontracted, all samples will be logged in first, as in step 4. The SRT will complete a new COC record for the samples to be subcontracted, sign the COC record relinquishing custody of the samples, and pack the samples as per SERAS SOP #2004, *Sample Packaging and Shipment* for shipping. The new COC record will reference the original COC record for traceability.

3.3.2 After Hours Procedures

1. If samples are to be delivered after hours and the SRT is not available, the TL or their designee will obtain the key for SRU No. II from the SRT or the DV&RW Group Leader. SRU No. II has a locked inner door that prevents unauthorized access to samples currently under custody.
2. Upon delivery, the TL or designee will place the sample shipping containers inside SRU No. II and fill out the After Hours Log (Attachment 4, Appendix A), located inside the SRU. The TL or their designee will open the sample shipping container and measure the internal cooler temperature using a thermometer provided in the SRU. The temperature will be noted on the COC record. The TL or their designee will then sign the COC record and seal the container, prior to locking the SRU.
3. At the beginning of the next work day, the TL or designee will inform the SRT that the shipping container has been placed inside the SRU. The SRT will follow the procedures detailed in section 3.3.1.

3.3.3 Potential Problems

1. Discrepancy in number of samples - If there is a discrepancy between the number of samples in the shipping container and those listed on the COC record, the SRT will note the discrepancy on the COC record and notify the TL. If the TL is unavailable, the appropriate Group Leader will be notified immediately.



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2. Broken/damaged sample bottles - If any of the sample bottles received are broken, damaged or leaking, the SRT will note the problem on the COC record and notify the TL immediately. If the TL is unavailable, the appropriate Group Leader will be notified immediately.
3. Documentation errors - If there are any documentation errors, the SRT will note the problem on the COC record and notify the TL to initiate corrections. If the TL is unavailable, the appropriate Group Leader will be notified immediately. The SRT is not authorized to change or correct the COC record. The COC records will also be reviewed once received by the DV&RW Group.

3.4 Sample Storage

Procedures for sample storage under routine conditions, overload conditions and in the event of emergency SRU/freezer malfunction are described in this section. Procedures for inventory are also outlined in this section.

3.4.1 Normal Conditions

All samples, except tissue samples, will be stored on the shelves in the SRUs in labeled crates. Tissue samples will be stored in the freezer, which is maintained by the Biology Group. Samples will be transferred to the appropriate laboratories for analysis by the SRT as described in section 3.3.1. After analysis is completed, custody of the samples will be transferred back to the SRT, and the samples stored in the SRU or the freezer, as appropriate.

4.2 Overload Conditions

In the event that all shelf space in both of the SRUs is full, the samples will be stored in coolers or crates stacked on the floors of the SRUs. In the event that all floor space in the SRUs is occupied, the samples will be packed in ice, to maintain the temperature at 4EC, and stored in coolers. The coolers will be stacked in the sample receiving trailer or in the laboratories.

NOTE: Samples that are to be analyzed for Volatile Organic Compounds (VOCs) will be stored separately from all other samples due to the potential for contamination.

Refer to Section 3.4.3 for details on sample packaging and storage.

3.4.3 Emergency SRU and Freezer Malfunction Conditions

In the event that the SRU or freezer temperature does not stabilize within six hours, as described in Section 3.1.2 of this SOP, or any other observable SRU/freezer malfunction, the SRT will notify the DV&RW Group Leader and the other Analytical Group Leaders. The DV&RW Group Leader will evaluate information from the SRT or designee



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regarding the malfunction of the SRU and initiate alternate storage procedures, if necessary.

The DV&RW Group Leader will coordinate with the other Analytical Group Leaders to obtain laboratory personnel to assist in the initial packing and storage of samples in coolers, as well as, daily ice replenishment.

3.4.3.1 Sample Handling and Alternate Storage for Samples in the SRU

1. The SRT will coordinate with the DV&RW Group Leader to make arrangements to obtain sufficient coolers or ice chests for the temporary storage of samples. The SRT will also obtain bubble wrap, Ziplock, or similar, bags [4-Liter (L)], plastic garbage bags (4 mil), adhesive labels, waterproof markers, and crushed ice or small cubed ice, as necessary.
2. The bottom of the coolers will be covered by a double layer of bubble wrap (Figure 1, Appendix B). If smaller sample jars are to be stored, the bottom of the cooler will be covered by a triple or quadruple layer of bubble wrap as needed to prevent water run-off from melting ice reaching the samples.

Samples can be placed in Ziplock bags and placed inside a large garbage bag, which is placed in the cooler on top of the bubble wrap layers. The plastic garbage bags will be closed (Figure 2, Appendix B) and ice will be placed on top of the sample filled garbage bags to maintain a temperature of 4 ± 2 °C.

3.4.3.2 Labeling, Storage and Maintenance of Coolers

The SRT will maintain, in a bound logbook or electronic spreadsheet, a listing of all the coolers in use and their contents. An entry will be made for each cooler every time the ice is changed, and coolers will be numbered and clearly marked as to their contents. Three large labels will be affixed on the cooler, on the top, front and side respectively (Figure 3, Appendix B). The labels will be affixed with duct tape or strong adhesive tape.

The coolers will be checked daily, and any excess water drained. The ice bags will be checked daily, drained, and replenished with fresh ice. In case of ice bag breakage, fresh ice bags will be used. The garbage bags in which the sample bottles are packed will be visually inspected daily for breakage, and replaced as needed. If a garbage bag containing samples is found broken, then the samples inside that bag will be checked to ensure that no water has leaked into the Ziplock bags. If any leaks in the Ziplock bags are found, those Ziplock bags will be replaced.

A log will be maintained of the daily ice replenishment and maintenance check of the coolers. The log will be reviewed daily and initialed by the DV&RW Group Leader.



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Coolers will be stacked four high on the floor in the SRU, in an area where the SRU maintenance is not being performed. Heavier coolers will be kept on the floor. Figure 4, Appendix B indicates the most efficient manner of stacking coolers.

3.4.3.3 Sample Handling and Alternate Storage for Samples in the Freezer

Samples kept in the freezer in the sample receiving area will be transferred to the freezer in the tissue laboratory, in the event of freezer malfunction. The SRT will complete the COC record for all samples transferred to the tissue laboratory for alternate storage. The COC record will be signed by the appropriate laboratory representative.

3.4.4 Health and Safety

When working with potentially hazardous materials, United States Environmental Protection Agency (EPA), Occupational Safety and health Administration (OSHA) and corporate health and safety procedures will be followed. More specifically, the following health and safety procedures are applicable:

1. Samples will be handled only by personnel who have passed all requirements for working in the laboratory. Laboratory requirements include, but are not limited to: safe handling of hazardous materials in the laboratory, proper use of personal protective devices, fit testing and proper use of respiratory protection, location and use of laboratory safety equipment, safe handling of compressed gases, location and use of fire equipment, proper cleanup of spills, segregation and identification of hazardous wastes, Federal Hazard Communications Training (Right-To-Know) and chemical hygiene safety training established under OSHA Title 29 Code of Federal Regulations Part 1910 (29CFR1910).
2. The sample containers will be kept in a well ventilated area.
3. Latex gloves, safety glasses, steel-toed boots, laboratory coat and/or Tyvek overalls will be worn while handling samples and heavy containers.

3.5 Sample Disposal

The inventory database will be reviewed monthly by the SRT. Samples may be returned to the site or designated for disposal as soon as the SERAS TL or EPA/ERT Work Assignment Manager (WAM) determines that the samples are no longer needed. Samples will automatically be destined for disposal or returned to the site six months after collection unless requested to be held by the SERAS TL or EPA/ERT WAM.

Prior to designating samples for disposal, the SRT and Hazardous Waste Coordinator (HWC) must determine the extent of contamination of the samples. Samples analyzed by SERAS or a



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subcontracted laboratory will have analytical data available. Data may be accessed from preliminary data or final data, if available.

The analytical data is checked to ensure that the samples results correspond to the actual samples to be disposed. Many projects have identical sample numbers from one sampling event to the next. Care must be taken to verify the collection date and when possible the location code. The samples can then be consolidated and the data summarized. Water samples are typically consolidated into five gallon jerry cans. The bottles are triple rinsed with a 10 percent (%) volume of water for a quantitative transfer. Additional rinses are performed if sediment or particulates remain in the original bottle. The pH of the consolidated water samples is recorded on the pail and the hazardous waste description form. Soil samples are typically transferred into a five gallon open head poly pail in their original containers. The highest concentration of each constituent is noted on the hazardous waste description form. Consolidated samples destined for disposal are considered waste and are handled in accordance with SERAS SOP #1501, *Hazardous Waste Management*.

3.6 Sample Security

The sample receiving trailer, the walk-in SRUs and the freezer located in the sample receiving trailer will be locked at all times. The SRT and DV&RW Group Leader are the only individuals who possess a key to the sample receiving trailer, the SRUs and the freezer. All transfer of samples in and out of the SRU, freezer or sample receiving trailer will be done by the SRT. In the event that the SRT is unavailable, the DV&RW Group Leader or his designee may perform the functions of the SRT.

The Analytical Group Leaders are responsible for the security of samples transferred to their laboratory groups for analyses and alternate storage.

The Organic Group Leader is responsible for samples transferred to the tissue laboratory freezer for analysis and storage. The SRT is responsible for maintaining a record of all samples transferred to laboratories and retrieving the same samples when analysis is completed or alternate storage is no longer required.

3.7 Quality Assurance/Quality Control

- The refrigerators and freezer will be labeled with the temperature acceptance criteria.
- Glass thermometers used for recording temperatures will be calibrated on an annual basis and the readings documented in a logbook.
- Probe-type thermometers will be calibrated on a quarterly basis and the readings documented in a logbook.
- Thermometers used for recording temperatures will be tagged with the date of calibration against the NIST-thermometer with a correction factor, if applicable.

4.0 RESPONSIBILITIES

4.1 Sample Receiving Technician



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The SRT is responsible for the following functions:

- Ensure that every sample is entered into the electronic spreadsheet according to the COC record, assigned a SERAS number, and delivered to the appropriate laboratories. Record the internal temperature of the sample shipping container on the COC record.
- Fill out the COC record and ship the samples to the subcontract laboratory, if the samples are to be subcontracted.
- Ensure that the SRUs and the sample receiving trailer are locked and secure at all times when samples are present.
- Contact the **Analytical Group Leaders and the DV&RW Group Leader** in the event of any observable malfunction of the SRUs or freezer.
- Maintain the dedicated logbook(s) for the SRUs and freezer temperatures, the bound logbook for alternate storage of samples, documentation of all samples transferred to the laboratories for analysis or storage, and an inventory of samples in the SRUs.
- Inspect and maintain the cleanliness of the SRUs and freezer.

4.2 Task Leaders

Task Leaders are responsible for the following functions:

- Inform the SRT, Analytical Section Leader and Analytical Group Leaders of anticipated sample(s) by filling out a PWA, prior to initiation of field activities.
- Complete a COC record and notify the SRT of the total number of samples and types of analyses requested prior to shipping the samples, or the day before samples are scheduled to arrive at SERAS using the "Sample Hotline." Inform the SRT, via the "Sample Hotline," of any changes to the PWA. Notify the SRT if sample delivery is expected after hours.
- Contact the SRT after the shipment of samples to confirm sample receipt and condition.

4.3 **DV&RW Group Leader**

The DV&RW Group Leader is responsible for the following functions:

- Resolve any problems that arise as expeditiously as possible. Evaluate information from the SRT or laboratory personnel as to the nature and magnitude of any malfunctions, and initiate procedures for "alternate" storage as outlined in Section 3.4.3 of this SOP, if required.
- Review and sign the dedicated temperature logbook(s) for SRU and freezer on a periodic basis. Review and sign the bound logbook for alternate storage of samples daily when



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alternate storage procedures are in effect.

- Ensure that all thermometers used for the documentation of the SRU and freezer temperatures are calibrated against a National Institute of Standards and Technology (NIST) thermometer according to the type and use of the thermometer.
- In the absence/unavailability of the SRT, security will be the responsibility of the DV&RW Group Leader, or designated individual.

4.4 Group Leaders

The Group Leaders are responsible for notifying the SRT of any malfunctions observed and assisting with the implementation of alternate storage procedures.

4.5 Analytical Section Leader

The Analytical Section Leader is responsible for expeditiously resolving problems, as they arise and for updating this SOP as necessary.

4.6 Quality Assurance Officer

The Quality Assurance Officer (QAO) is responsible for the review of this SOP and for periodically checking the implementation of this SOP.

5.0 APPENDICES

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APPENDIX A
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ATTACHMENT 1 Projected Work Assignment

PROJECTED WORK ASSIGNMENT

WA # _____ WA Name: _____ Work Plan Due Date: _____
 TL _____ WAM _____ Comments: _____

This form should be filled out by the Task Leader upon receipt of the Work Assignment and following the Project Scoping meeting with the WAM, and distributed to Parry Bhambra, Vinod Kansal, Yi-Hua Lin, Jay Patel, Joseph Soroka, John Johnson, Doreen Brady, Larry Martin, Pat Mulrooney, and Raj Singhvi. The information entered on this form will be used by the S & A Section to plan and allocate resources for this project. The total number of samples and analyses for each matrix for this project should be entered where indicated along with the anticipated shipment date. If multiple sampling events are planned, the analytical work requested for each shipment date for each should be entered. The analytical schedule should be entered however current schedules for other projects may require an adjustment to that requested. Special analytical requirements including unique matrices, analytical parameters, detection limits, methods, should be provided in the Additional Requirements section below or otherwise communicated to the distribution list indicated above or other appropriate S & A staff. The Task Leader will notify the distribution list prior to each sampling event.

ANALYTICAL WORK REQUESTED

Analysis	Number of Samples by Matrix				Analytical Schedule	
	Water	Soil/ Sediment	Air	Shipment Date(s)	Prelim	Validated
BNA						
VOA						
PCB/Pest						
Metals						

Check Appropriate Special Requirements

Special Detection Limits:

- Yes (please explain in Additional Requirements)
- No

Suspected Concentrations:

- Low ppb
 - Low ppm
 - High ppm
- explain in Additional Requirements)

Suspected Contaminants:

- BNAs
- VOCs
- Other (please indicate above and explain in Additional Requirements)
- PCB/Pest
- Metals

Additional Requirements: _____



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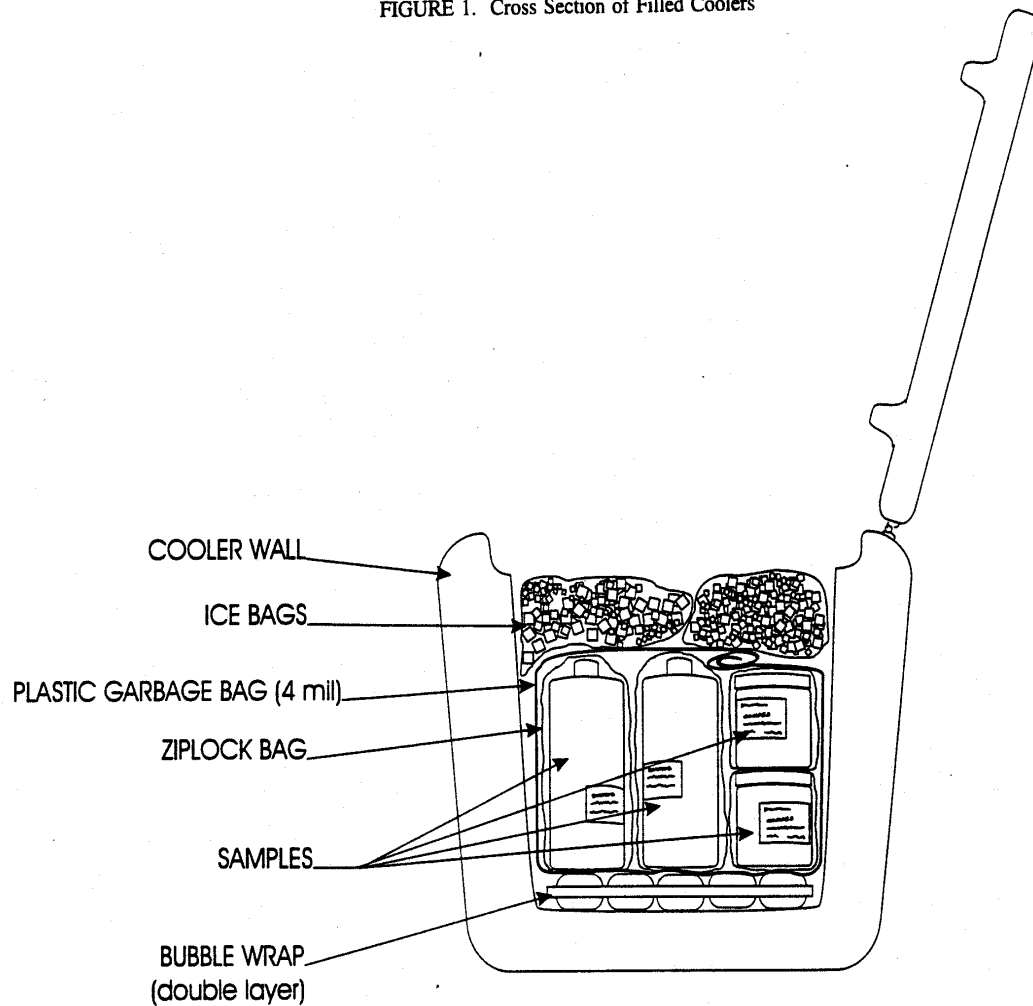


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FIGURE 1. Cross Section of Filled Coolers





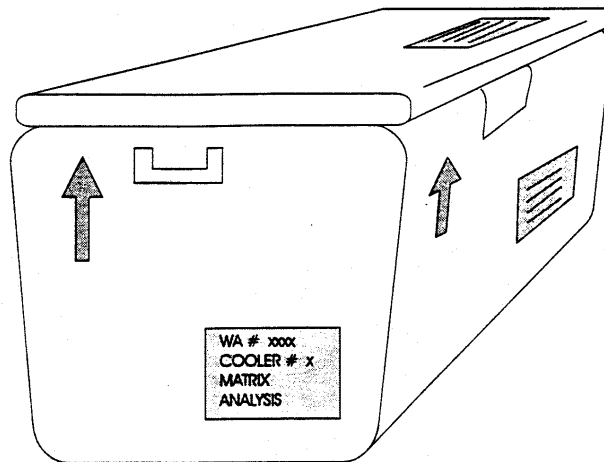
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FIGURE 3. Labeling of Sample Storage Coolers

FIGURE 2. Diagram of Sealed Sample Storage Bag





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FIGURE 4. Efficient Stacking of Coolers

