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Civilian Radioactive Waste Management System  
Management & Operating Contractor

**Waste Package Operations FY-01 Closure Weld Technical Guidelines Document**

**TER-EBS-ND-000001 REV 00**

**November 2000**

Prepared for:

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Under Contract Number  
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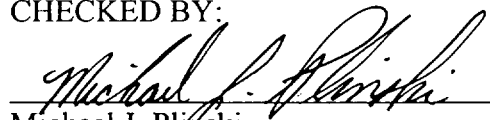
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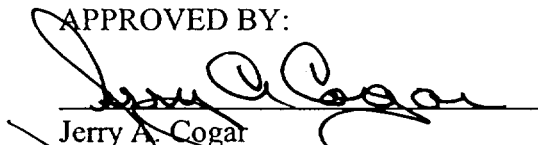
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## 1. STATEMENT OF WORK

The purpose of this document is to describe the scope and requirements of the fiscal year (FY-01) Waste Package Engineering Development of Alloy 22/stainless steel waste package development program (work package 11512234M3) to be conducted by Framatome Technologies, Inc. using their Safety Related Quality Assurance Program. The scope of this program will be to fabricate and test a mock-up representing approximately the top one-fourth of the waste package design. This mock-up may be fabricated using the cylinder-in-cylinder thermally enhanced fit method, if required, as well as semi-automatic welding and inspection techniques. As a result of waste package design enhancements, evaluations will be conducted to confirm closure weld processes. Tests will be conducted on the mock-up to verify the processes, as well as residual weld stress, and weld quality. Nondestructive examinations will also be conducted as a part of this development program in which identification of minimum detectable defect size will be determined. This information will ultimately contribute to the determination of weld defect rejection criteria. The intent of the development program is to demonstrate welding techniques that exhibit the required properties for further possible stress relieving and non-stress relieved welds and to demonstrate inspection techniques that confirms the integrity of the welds. This program is designed to investigate the feasibility of fabricating and welding an Alloy 22/stainless steel waste package while minimizing the resulting residual stresses field in the area of the welds.

## 2. QUALITY ASSURANCE REQUIREMENTS

This technical guidelines document was prepared in accordance with NLP-7-3, *Framatome Cogema Fuel and Framatome Technologies Incorporated Home Office Support*. The information provided in the report is to be indirectly used in the evaluation of the Monitored Geologic Repository waste package and engineered barrier segment. The waste package has been identified as Quality Level 1 item in the QAP-2-3, *Classification of Permanent Items*, evaluations (e.g., *Classification of the MGR Uncanistered Spent Nuclear Fuel Disposal Container System*) (CRWMS M&O 1999). The responsible manager has evaluated the report development activity in accordance with AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities* and determined that the Technical Work Plan, *Technical Work Plan for: Waste Package Design Description for LA* (Addendum A, CRWMS M&O 2000a) is applicable. The technical Work Plan has determined that the preparation and review of this document is subject to *Quality Assurance Requirements and Description* (DOE 2000) controls. There is no determination of importance evaluation developed in accordance with Nevada Line Procedure, NLP-2-0 *Determination of Importance Evaluations*, since the report does not involve any field activity.

The responsible manager performed the evaluation required by AP-SV.1Q, *Control of the Electronic Management of Information* and determined that the quality assurance requirements for the control of the electronic management of data are not applicable to the preparation of this technical guidelines document since it does not involve use of computer software or the control of electronic data (Addendum B, CRWMS M&O 2000a).

## 2.1 CONTROLS

The work described in the technical guidelines document shall be performed under the controls described in the current Framatome Technologies, Inc. Safety Related Quality Assurance Program and shall only use the safety related portion of the manual which implements the applicable *Quality Assurance Requirements and Description* (DOE 2000) requirements. Any applicable quality assurance requirements that are not addressed by the Framatome Technologies, Inc. Safety Related Quality Assurance Program are addressed in this technical guidelines document. The Framatome Technologies, Inc. Safety Related Quality Assurance Program shall be accepted by the Management and Operating Contractor Task Manager and the Office of Quality Assurance prior to the performance of work or service described in this document. Any changes or revisions to the Framatome Technologies, Inc. Safety Related Quality Assurance Program shall be evaluated and accepted by the Management and Operating Contractor, in writing, prior to the implementation of the revision.

## 2.2 RIGHT OF ACCESS

The Office of Civilian Radioactive Waste Management, Management and Operating Contractor, its agents or designees, shall have the right to inspect and evaluate Framatome Technologies, Inc. facilities, records, and activities at any time during the performance of the work described herein. This right shall extend to sub-tier suppliers and shall be coordinated through Framatome Technologies, Inc.

## 2.3 SUB-TIER SUPPLIERS

Framatome Technologies, Inc. shall be responsible for ensuring that the sub-tier suppliers implement a quality assurance program commensurate with the work or services rendered. When a sub-tier supplier is used to satisfy the specific actions defined in this technical guidelines document, the applicable technical and quality requirements imposed in this document and its supplements shall be transmitted and apply to sub-tier suppliers. Purchase orders subject to the requirements of the *Quality Assurance Requirements and Description* (DOE 2000) shall contain words to the effect of "Implement your quality assurance program which has been audited and accepted by Framatome Technologies, Inc. to meet the Framatome Technologies, Inc. Safety Related Quality Assurance Program," and be reviewed by Framatome Technologies, Inc. quality assurance for compliance.

Recognizing that there may be no qualified fabricators of the mock-up, Framatome Technologies, Inc. may choose to qualify a vendor in accordance with the Framatome Technologies, Inc. Safety Related Quality Assurance Program, by direct quality assurance monitoring, or dedicate the mock-up in accordance with their Quality Assurance Program. Should they choose the latter method, the critical characteristics for the development program are the type of material (i.e., stainless steel and nickel-base alloy) and the physical dimensions of the mock-up. Proving total compliance with all the requirements of the American Society for Testing and Materials specification is not essential since this is a development program utilizing a mock-up of a typical waste package, the designs of which are still in development.



## **2.4 DOCUMENTATION**

Documentation required to be submitted for acceptance, by Management and Operating Contractor objective evidence review, is identified in Section 4. All records and reports identified in this technical guidelines document must be referenced or be traceable to the technical guidelines document and shall be of sufficient quality to be reproduced legibly and be dated and bear the title and signature of an individual who is responsible for the content of the record.

## **2.5 RECORD RETENTION**

Record retention times shall be in accordance with the Framatome Technologies, Inc. Safety Related Quality Assurance Program as accepted by the Management and Operating Contractor with the exception that any records classified by Framatome Technologies, Inc. as nonpermanent will be submitted to Waste Package Department - Las Vegas for inclusion into the records package.

## **2.6 CORRECTIVE ACTION**

Deliverables and work or services performed that do not meet the requirements of the technical guidelines document and/or Framatome Technologies, Inc. Safety Related Quality Assurance Program shall be promptly reported and evaluated in accordance with the Framatome Technologies, Inc. corrective action system. These must then be submitted to the Management and Operating Contractor for disposition.

## **2.7 NONCONFORMANCE**

Framatome Technologies, Inc. shall submit a report of nonconformance to the Management and Operating Contractor for approval including recommended disposition and technical justification for the dispositions of "Use-As-Is" or "Repair." Additionally, Framatome Technologies, Inc. shall comply with the provisions of the Code of Federal Regulation, Title 10, Part 21, Reporting of Defects and Noncompliance (10 CFR 21). It is understood that due to the material being ordered early and subsequent design changes, nonconforming conditions may exist. These will be handled under the nonconformance process and will be accepted "as is" if they do not violate the critical dimensions on the sketch or affect the end use of the mock-up.

## **2.8 REPORTING**

The final report and test results provided to the Management and Operating Contractor (Waste Package Department – Las Vegas) under the terms and conditions of this technical guidelines document shall include the following, as applicable:

- Number of the technical guidelines document (i.e., TER-EBS-ND-000001 Rev 00)
- Name of organization (company) performing the test or analysis
- Unique identification of the sample or material analyzed
- Name or identification of the person(s) performing the analysis
- Unique identification of the instruments used in the performance of the analysis
- Unique identification of the reference standard used in the analysis
- Procedure or instruction, and revision, used to perform the analysis.

## **2.9 CERTIFICATE OF CONFORMANCE**

A Certificate of Conformance is required for all hardware or services performed. The Certificate of Conformance shall contain the following as a minimum:

- Identification of the material, equipment, or service provided
- Identification of the specific technical guidelines document requirements that are met (Requirements identified shall include any approved changes to the technical guidelines document test plan. Where maintenance or rework has been performed, include description of principal activity performed and identification of specific part(s) or hardware replaced.)
- Identification of any technical guidelines document requirements that have not been met, together with an explanation and the means for resolving the nonconformance(s)
- Signature or authentication otherwise by a person responsible for this quality assurance function and whose function and position are described in the Framatome Technologies, Inc. Safety Related Quality Assurance Program.
- A statement that work was performed in accordance with Framatome Technologies, Inc. Safety Related Quality Assurance Program including revision level.

## **2.10 MEASURING AND TEST EQUIPMENT**

Measuring and test equipment shall be calibrated by a Framatome Technologies, Inc. audited and approved organization and/or may be done in-house using standards that were calibrated by an audited and approved organization, and the calibration documentation shall include the following information:

- Identification of the measuring or test equipment calibrated
- Traceability to the calibration standard used for calibration
- Calibration data (including as-found/as-left data)
- Identification of the individual performing the calibration
- Identification of the date of calibration and the re-calibration due date or interval, as appropriate
- Results of the calibration and statement of acceptability
- References to any actions taken in connection with out-of-calibration or nonconforming measuring and test equipment including evaluation results, as appropriate
- Identification of the implementing document (including revision level) used in performing the calibration.

### 3. TECHNICAL REQUIREMENTS

#### 3.1 TEST PROGRAM OBJECTIVES

The objective of the test program is to evaluate low residual stress welding processes and demonstrate a selected process on an Alloy 22/stainless steel one-fourth length, full diameter cylinder mock-up. The evaluation will formally evaluate various weld processes using a decision-matrix type of methodology. Criteria for the matrix should include, but not be limited to residual stress, distortion, inspectability, remote access, weld quality, and weld time. Semi-automatic or automatic weld processes will be performed on the outer and middle Alloy 22 closer weld as well as the stainless steel inner lid shear ring weld. In addition, an ultrasonic examination investigation will be conducted in which a minimum detectable defect size will be identified for volumetric inspection. Residual stress measurements will be taken (e.g. rosette strain gage) on the Alloy 22 welds based on the weld process selection and residual stress mitigation processes. The work performed for this technical guidelines document must be conducted under the Framatome Technologies, Inc. Safety Related Quality Assurance Program.

#### 3.2 TEST PROGRAM

##### 3.2.1 Cylinder Construction

A mock-up will be constructed consisting of two cylinders (Attachment I). The outer cylinder will be nickel-based Alloy 22 (CRWMS M&O 2000b), ~1 inch thick by ~51 inches long. The outside diameter of the outer cylinder will be ~62 inches. The inner cylinder will be Nuclear Grade 316 stainless steel (CRWMS M&O 2000b), ~2.0 inch thick by ~37 inches long. A longitudinal datum line shall be scribed on the outer surface, centered on the longitudinal weld, of each cylinder after machining for reference purposes. The outer cylinder will be fabricated with a machined or installed ring to support the inner cylinder during the assembly of the inner and outer cylinders. The bottom end lids on each of the cylinders will be welded in place before the installation of the inner cylinder within the outer cylinder. Assembly of the inner cylinder within the outer cylinder will be thermally enhanced, if required, and will result in a final inner-outer cylinder interface tolerance of 1 to 5 mm (verified by measurement prior to assembly). If required, the outer cylinder shall be heated to a maximum temperature of 700° F, the inner cylinder is then fully inserted into (inside of) the outer cylinder to the point of contact with the support ring, and allowed to air cool. This mock-up may be fabricated by Framatome Technologies, Inc. or sublet in accordance with Section 2.3.

##### 3.2.2 Welding

The bottom lids will be welded on each of the cylinders during the fabrication, prior to the assembly of the two cylinders. The top end (closure) welds will be performed after the cylinder assembly. The configuration and welding process for these welds is to be determined. Welding procedure specifications and performance qualifications for all welds will be in accordance with the *American Society of Mechanical Engineers Boiler and Pressure Vessel Code*, Section III, Subsection NB, 1995 Edition, 1996 Addenda (ASME 1995). The longitudinal weld for the outer cylinder shall be radiographic, ultrasonic, and liquid penetrant inspected. The bottom end welds for the outer cylinder shall be ultrasonic and liquid penetrant inspected. The top end welds will be performed after the

cylinder assembly and shall be liquid penetrant inspected. In addition the Alloy 22 closure weld will be ultrasonically inspected. Inspection of these welds will be in accordance with the *American Society of Mechanical Engineers Boiler and Pressure Vessel Code* Section III, Subsection NB, 1995 Edition, 1996 Addenda (ASME 1995), or repaired/reworked to meet these criteria.

### **3.2.3 Residual Stress Measurements**

Analytical evaluations to predict the residual stresses following the Alloy 22 closure weld processes will not be required. Rather than have a prediction of the stresses, measurements will be taken, so that actual residual stresses can be determined in the areas near the weld. All of the measurements will be taken using American Society for Testing and Materials specification E 837-92 (ASTM 1992) and shall be taken by calibrated equipment in accordance with Section 2.10. Measurements will be taken on the outer cylinder and closure lid at six locations to be determined by the Waste Package Department - Las Vegas.

### **3.2.4 Outer Cylinder Anneal**

The outer cylinder shall be annealed after the bottom lid has been welded and inspected and stress measurements have been taken. The outer cylinder shall be furnace heated and held at a soak temperature of  $2050^{\circ}\text{F} \pm 50^{\circ}\text{F}$  for 20 minutes minimum. Cooling shall be performed using a water spray quench sufficient to cool the entire cylinder at a rate of  $100^{\circ}\text{F/minute}$  from the soak temperature to below  $700^{\circ}\text{F}$ .

### **3.2.5 Fit and Weld the Inner Lid–Top End**

After inner-outer cylinder assembly, the inner top lid is to be welded to the inner barrier using a shear ring and semi-automatic gas metal arc or other fusion welding process. Record the weld parameters; the filler material heat/lot number, type, and size used; and the method (i.e., gas metal arc). Record actual arc time and shrinkage as required. These records must be traceable to the mock-up. After the lid is welded, perform the nondestructive examination work scope for the inner lid per Section 3.2.9. Chart or describe any distortion to the inner and outer barrier.

### **3.2.6 Fit and Weld the Middle Lid–Top End**

After inner lid welding and inspection, the Alloy 22 middle lid is to be welded to the outer barrier using the semi-automatic gas tungsten arc or other fusion welding process. Record the weld parameters; the filler material heat/lot number, type, and size used; and the method (i.e., semi-automatic gas tungsten arc). Record actual arc time and shrinkage as required. These records must be traceable to the mock-up. After the lid is welded, perform the nondestructive examination work scope for the outer lid per Section 3.2.9. Chart or describe any distortion to the inner and outer barrier.

### **3.2.7 Fit and Weld the Outer Lid–Top End**

After middle lid welding and inspection, the outer top lid is to be welded to the outer barrier using the automatic gas tungsten arc or other fusion welding process based on the evaluation and process selection. Record the weld parameters; the filler material heat/lot number, type, and size used; and the method (i.e., automatic gas tungsten arc). Record actual arc time and shrinkage as required. These records must be traceable to the mock-up. After the lid is welded, perform the nondestructive examination work scope for the outer lid per Sections 3.2.8 and 3.2.9. Chart or describe any distortion to the inner and outer barrier.

### **3.2.8 Outer Lid Ultrasonic Inspection**

After the welding of the Alloy 22 outer lid, ultrasonic inspection shall be performed in accordance with *American Society of Mechanical Engineers Boiler and Pressure Vessel Code* Section III, Subsection NB, 1995 Edition, 1996 Addenda, (ASME 1995) acceptance criteria, or be repaired/reworked to meet these criteria.

### **3.2.9 Top Lid Liquid Penetrant Inspection**

After the welding of each of the top lids, liquid penetrant inspection shall be performed in accordance with *American Society of Mechanical Engineers Boiler and Pressure Vessel Code* Section III, Subsection NB, 1995 Edition, 1996 Addenda, (ASME 1995) acceptance criteria, or be repaired/reworked to meet these criteria.

### **3.2.10 Additional Work Scope**

A number of samples will be fabricated to support the materials corrosion/residual stress relief studies. The configuration of these samples will be at the direction of the Waste Package Department - Materials Section and will be described via change notice to this technical guidelines document and detailed in the final report. The testing performed will be described in another work package. The samples will be made from the same material as the waste package mock-up and tracability maintained. Any additional materials required will require the same material test reports as previously ordered material and will be submitted as part of the final report.

### **3.2.11 Closure Weld Scenario**

As a part of this work scope a closure weld scenario will be provided. This task will develop a description for the anticipated sequencing of the waste package through the hot cell and identify the main components required for welding non-destructive evaluation. For each of the main components, a description of the interface, controller, and interaction requirements will be provided.

## **4. REPORTING REQUIREMENTS**

Framatome Technologies, Inc. will submit weekly reports on the progress of the program schedule and budget information; these will be the basis for discussions on the program. The weekly reports will be submitted no later than the close of business on the last day of the workweek and should be

submitted by electronic correspondence. These reports will not become part of the records package because they will contain budget and schedule information.

Framatome Technologies, Inc. shall provide notification to Waste Package Department - Las Vegas of hold points at least one week prior to the hold point. Hold points will be established at the following points:

- Prior to the start of the program to explain quality assurance requirements
- Before welding of the inner and outer bottom lids
- Before outer cylinder anneal
- Before assembly of the inner and outer cylinder
- After welding the inner cylinder top lid and before the outer cylinder top lid welding.

The Waste Package Department - Las Vegas, may establish other hold points if needed. The Waste Package Department - Las Vegas personnel may elect to witness the hold points or waive them by electronic correspondence.

At the conclusion of the closure development testing, Framatome Technologies, Inc. will submit a final report and a data package to the Waste Package Department - Las Vegas no later than August 15<sup>th</sup>, 2001. Included will be, as applicable:

- Final report summarizing the work scope
- Welder and non-destructive evaluation personnel qualification records
- Qualified weld procedures
- Weld performance qualifications
- Weld control records
- Qualified non-destructive procedures
- All non-destructive evaluation reports
- Completed process traveler
- Equipment calibration records
- Cylinder assembly measurements (radial gap 0-4mm)
- Stress measurement procedures and records
- Materials test reports
- Nonconformance reports.
- Stress relief procedures
- Certificate of conformance
- Quality assurance requirements listed in Section 2.8

NOTE: All records must be entirely legible. There may be no obliterated areas. Records may not contain restrictions on publication such as copyright limitations. The acceptance criteria for all of the welding data will be the ability to duplicate the weld process based on the data provided. This will be determined by non-destructive evaluation.

The data package will be used by the Waste Package Department - Las Vegas to develop the FY-01 Closure Methods Report for this development program. This report will be the responsibility of Waste Package Department - Las Vegas, and they will have the responsibility for all of the data included in the report. The acceptance of the content of the program will be by submittal of an acceptance document to the Management and Operating Contractor. The acceptance document will contain the data supplied by Framatome Technologies, Inc. and the Certificate of Conformance issued by Framatome Technologies, Inc. Acceptability of the performance of the program will be by audit or other methods, as the Office of Civilian Radioactive Waste Management Quality Assurance deems appropriate.

## 5. WORK SCOPE CHANGES

Because this is a development program, there may be minor changes in Section 3, "Technical Requirements," as a result of the learning process associated with this type of program. This technical guidelines document will not be revised for these changes, unless other circumstances require a revision. These work scope changes will be identified by formal correspondence or Framatome Technologies, Inc. nonconformance process and must be approved by the Waste Package Department - Las Vegas. Changes in the work scope may be determined by budget and material availability. All work scope changes will be detailed in the FY-01 Closure Methods Report published by the Waste Package Department - Las Vegas.

## 6. CONCLUSIONS

The purpose of this closure weld development program is to select a weld process that provides a minimal amount of residual weld stress and demonstrate the selected process on a representative mock-up. The success of the development program will be based on the acceptance of the closure welds as required by utilizing the *American Society of Mechanical Engineer Boiler and Pressure Vessel Code*, Section III, Subsection NB, 1995 edition, 1996 addenda, Article NB-5000 (ASME 1995). This will be proven by the actual performance of the non-destructive evaluation portion of this development program. The criteria for the acceptance of the waste package closure weld have not yet been established; however, for this development program, the weld will be considered acceptable if it meets the ASME acceptance criteria or is repairable to meet these criteria. Successful stress mitigation will also be considered for determining final waste package processing; however, acceptance criteria for residual stress mitigation have not been established, and therefore do not directly impact the acceptance of the program. Upon completion, the mock-up will be sent for further testing as determined by the Waste Package Department - Las Vegas.

## 7. REFERENCES

### 7.1 DOCUMENTS CITED

Civilian Radioactive Waste Management System (CRWMS) Management and Operating Contractor (M&O) 1999. *Classification of the MGR Uncanistered Spent Nuclear Fuel Disposal Container System*. ANL-UDC-SE-000001 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990928.0216.

CRWMS M&O 2000a. *Technical Work Plan for: Waste Package Design Description for LA*. TWP-EBS-MD-000004 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20001107.0304.

CRWMS M&O 2000b. *Waste Package Containment Barrier Materials and Drip Shield Selection Report*. B00000000-01717-2200-00225 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000209.0300.

DOE (U.S. Department of Energy) 2000. *Quality Assurance Requirements and Description*. DOE/RW-0333P, Rev. 10. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000427.0422.

### 7.2 CODES, STANDARDS, REGULATIONS, AND PROCEDURES

10 CFR (Code of Federal Regulations) 21. Energy: Reporting of Defects and Noncompliance. Readily Available.

ASME 1995. *American Society of Mechanical Engineers Boiler and Pressure Vessel Code*. Section III, Rules for Construction of Nuclear Power Plant Components. Division 1 – Subsection NB. New York, New York: ASME. TIC: 245287.

ASTM E 837-92. 1992. *Standard Test Method for Determining Residual Stresses by the Hole-Drilling Strain-Gage Method*. Philadelphia, Pennsylvania: American Society for Testing and Materials. TIC: 249075.

AP-2.21Q, Rev. 0, ICN 0. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000802.0003.

AP-SV.1Q, Rev. 0, ICN 2. *Control of the Electronic Management of Information*. Washington D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000831.0065.

NLP-2-0, Rev. 5, ICN 1. *Determination of Importance Evaluations*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000713.0360.

NLP-7-3, Rev 02. *Framatome Cogema Fuel and Framatome Technologies Incorporated Home Office Support*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL19980217.0604

QAP-2-3, Rev. 10. *Classification of Permanent Items*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990316.0006



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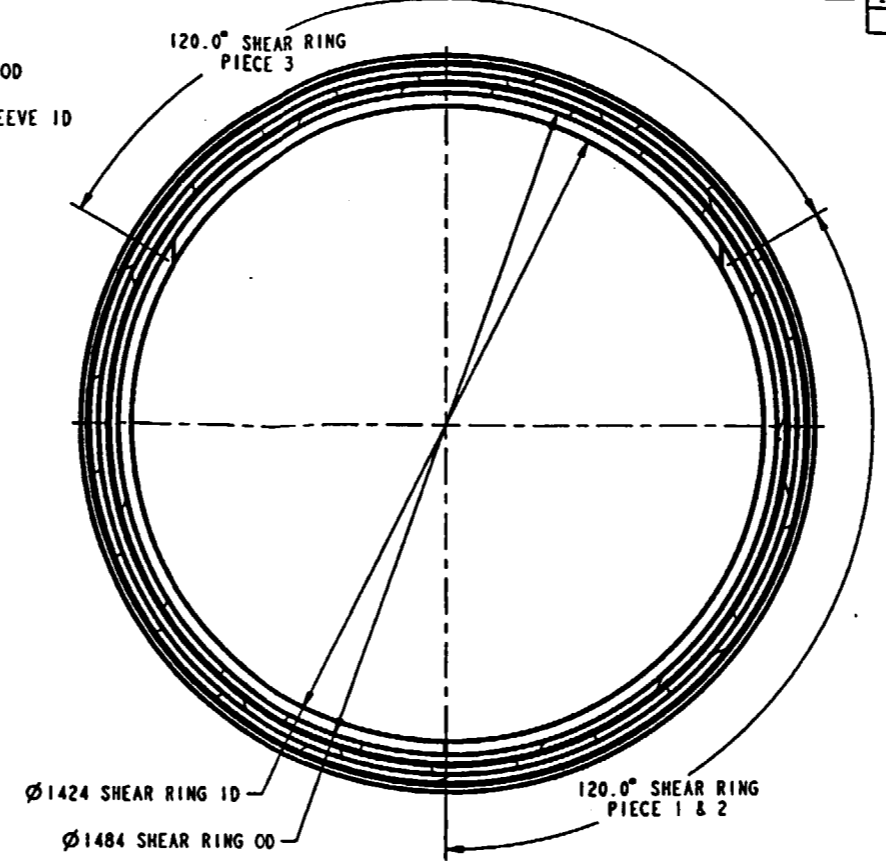
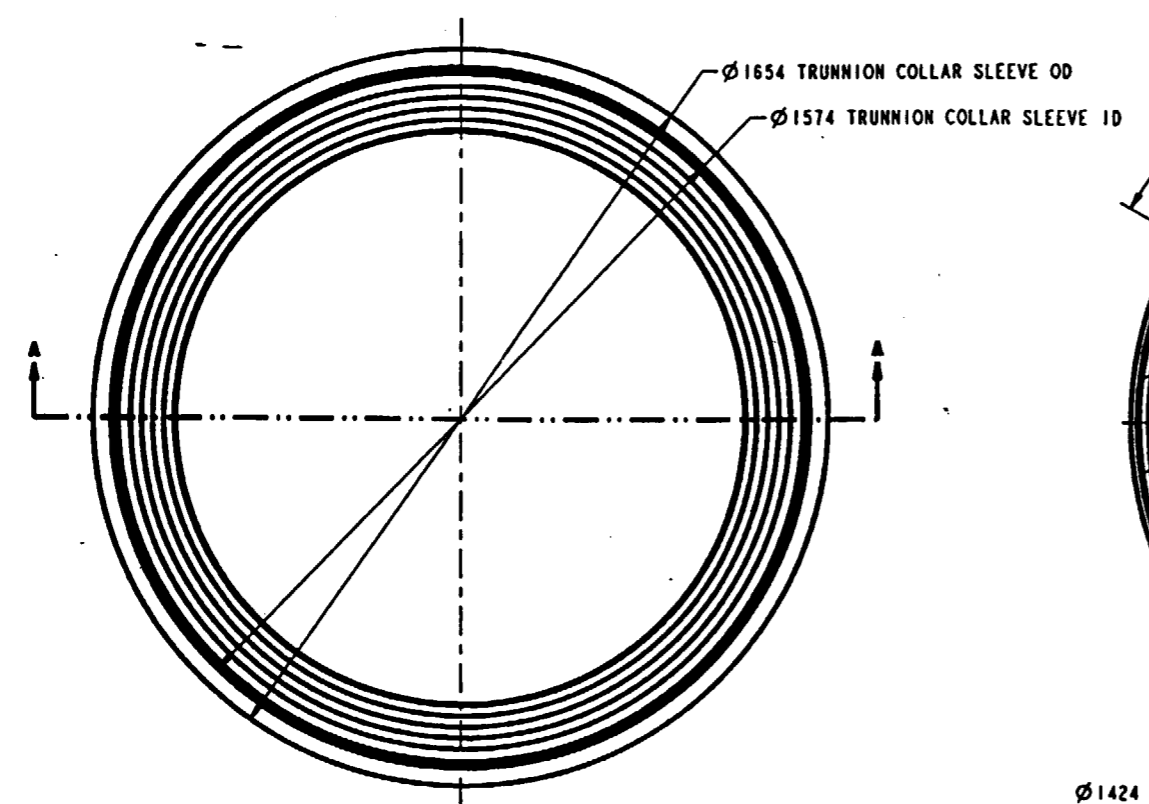
## 8. ATTACHMENTS

Attachment I – SK-0221 REV 01 *Waste Package Shear Ring Mock-up* (2 Pages)

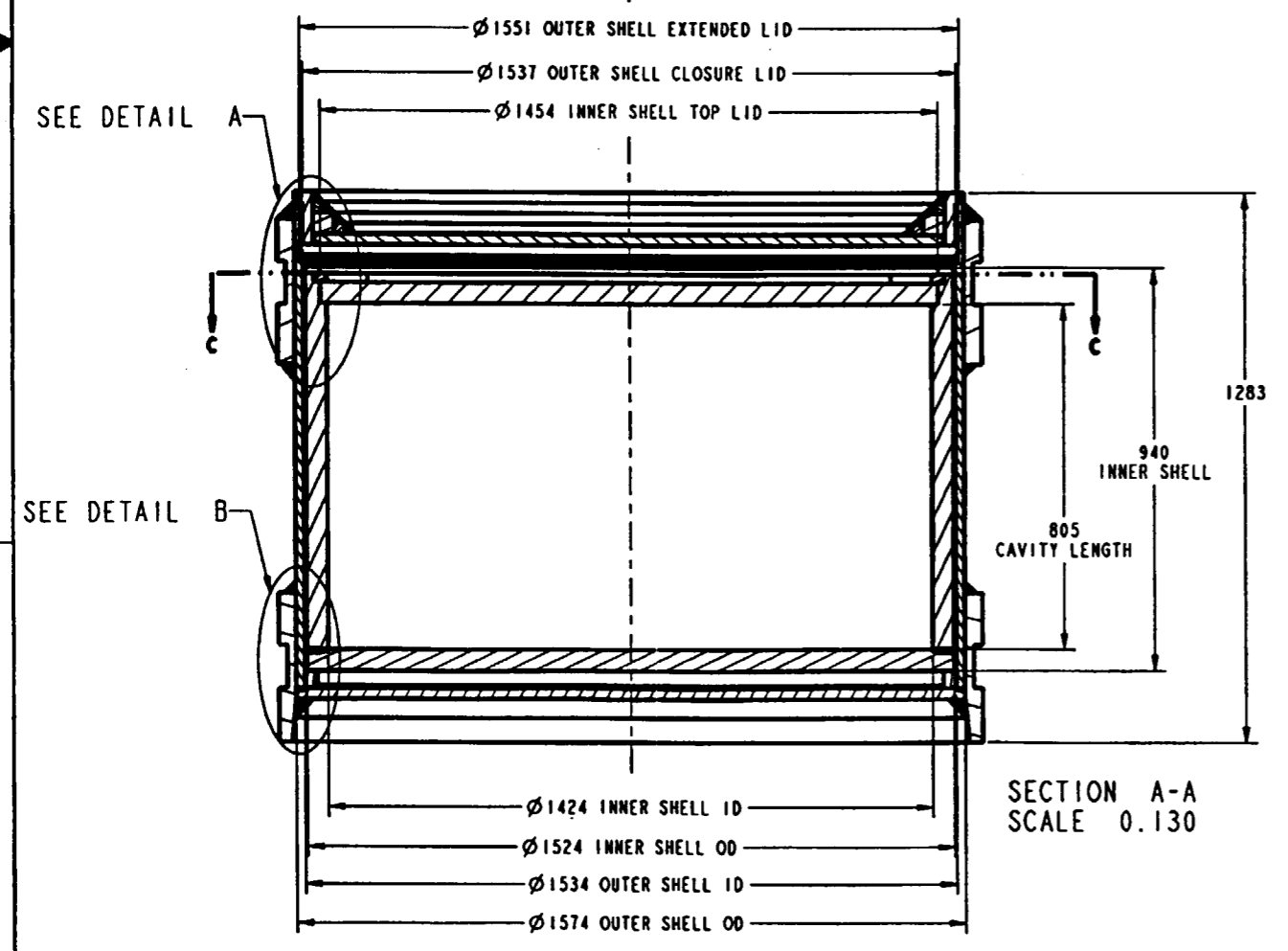
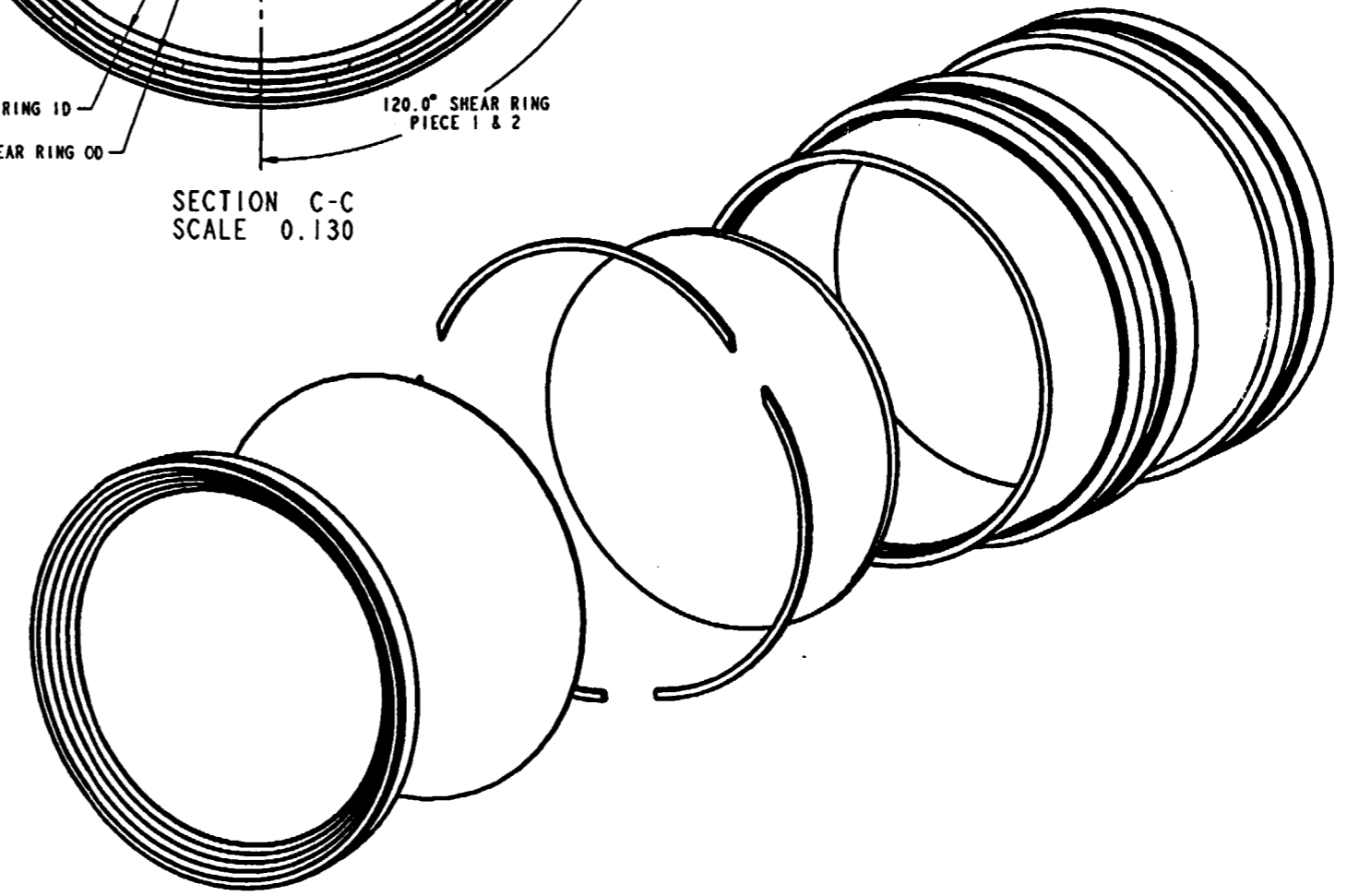
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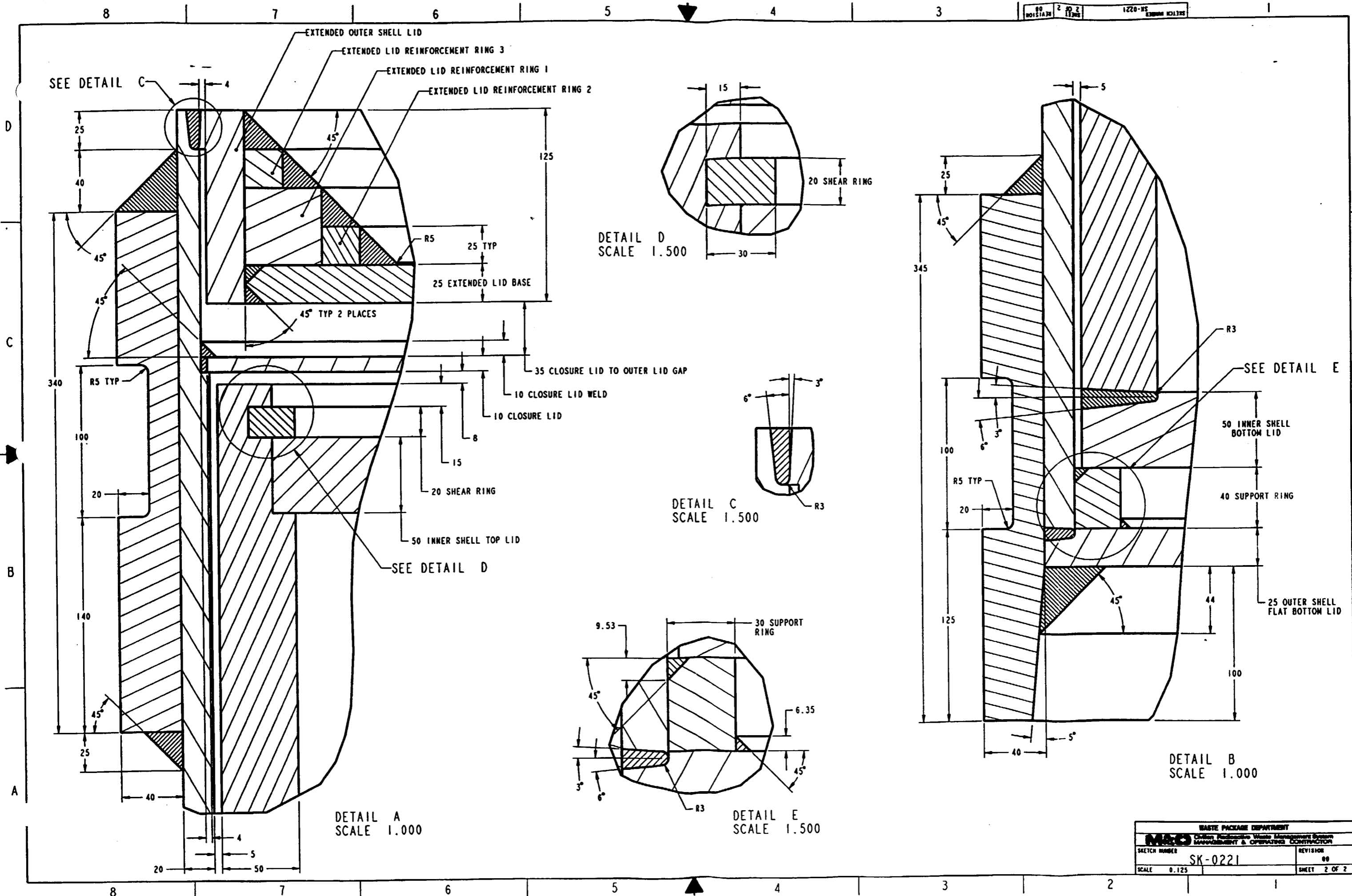


SECTION C-C SCALE 0.130



SECTION A-A SCALE 0.130

<p>"FOR INFORMATION ONLY"</p> <p>THIRD ANGLE PROJECTION</p> <p>DIMENSIONS ARE IN MILLIMETERS AND DEGREES UNLESS OTHERWISE NOTED</p> <p>DO NOT SCALE FROM SKETCH</p>	<p>SCALPEROV'S U90</p> <p>SKETCHED BY MARTIN LEWIS</p> <p>STRUCTURAL LEAD SCOTT BENNETT</p> <p>MANUFACTURING ENG MARK KRAPP</p> <p>MANUFACTURING MGR JERRY COGAR</p>	<p>DATE</p> <p>11/14/00</p> <p>11/14/00</p> <p>11/14/00</p>	<p>WASTE PACKAGE DEPARTMENT</p> <p><b>M&amp;O</b> Civilian Radioactive Waste Management System MANAGEMENT &amp; OPERATIONS CONTRACTOR</p> <p>TITLE</p> <p><b>WASTE PACKAGE SHEAR RING MOCK-UP</b></p> <p>SKETCH NUMBER</p> <p>SK-0221</p> <p>SCALE 0.125</p>	<p>REVISION</p> <p>00</p> <p>SHEET 1 OF 2</p>
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SEE DETAIL C

DETAIL D  
 SCALE 1.500

DETAIL C  
 SCALE 1.500

DETAIL E  
 SCALE 1.500

DETAIL B  
 SCALE 1.000

DETAIL A  
 SCALE 1.000

WASTE PACKAGE DEPARTMENT	
M&D Civilian Radioactive Waste Management System Management & Operations Construction	
SKETCH NUMBER	REVISION
SK-0221	00
SCALE 0.125	SHEET 2 OF 2