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RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-DA-170, REV 0

Document Title: Bolting Sequence For Attaching The Container To The Strong-back For 241SY101

Release Date: October 4, 1994

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This document was reviewed following the
procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

* * * * *

WHC Information Release Administration Specialist:

Kara Broz

(Signature)

October 4, 1994

(Date)

SUPPORTING DOCUMENT

1. Total Pages 12

2. Title

Bolting Sequence For Attaching The Container To
The Strong-back For 241SY101.

3. Number

WHC-SD-WM-DA-170

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6. Author

Name: T. C. Mackey

Signature

Organization/Charge Code 8D430/N2B6F

7. Abstract

This bolting sequence is for attaching the container to the strong-back for 241-SY-101. It is routed for your approval.

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9. Impact Level SQ

BOLTING SEQUENCE
FOR
ATTACHING THE CONTAINER TO THE STRONG-BACK
FOR 241SY101

September 1994

PREPARED BY: 9/15/94
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Westinghouse Hanford Company
Hanford Operations and Engineering Contractor
for the
U. S. Department of Energy

DESIGN VERIFICATION METHOD

The need for design verification has been reviewed with the method selected as indicated below: (ESR/Work Plan # NA / WP-23480-309).

<u>X</u>	Independent Review
<u> </u>	Alternate Calculations
<u> </u>	Qualification Testing
<u> </u>	Formal Design Review

R. B. Pan
Cognizant/Project/Design Manager

SD #WHC-SD-WM-DA-170

ECN #

DWG(S) #

INDEPENDENT REVIEW CHECKLIST

Document Reviewed Bolting Sequence - Container to Strong-back

Author T.C. Mackey / J. V. Egger

<u>Yes</u>	<u>No</u>	<u>N/A</u>	
☒	☐	☐	Problem completely defined.
☐	☐	☒	Are computer analysis applications documented in the report per EP 2.1? (code, version, hardware, input, output files)
☐	☐	☒	Is the software verification documentation either referenced or included in the report?
☐	☐	☒	Computer code error reports reviewed for impact if any.
☐	☐	☒	Data used in calculations explicitly stated in document.
☐	☐	☒	Data checked for consistency with original source information as applicable.
☐	☐	☒	Mathematical derivations checked, including dimensional consistency of results.
☐	☐	☒	Models appropriate and used within range of validity or use outside range of established validity justified.
☐	☐	☒	Hand calculations checked for errors.
☐	☐	☒	Code run streams correct and consistent with analysis documentation.
☐	☐	☒	Acceptability limits on analytical results application and supported. Limits checked against sources.
☐	☐	☒	Safety margins consistent with good engineering practices.
☒	☐	☐	Conclusions consistent with analytical results and application limits.
☒	☐	☐	Results and conclusions address all points required in the problem statement.

B. L. Jorissen
Reviewer

B. L. Jorissen

7/19/94

Date

C O N T E N T S

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BOLTING SEQUENCE FOR ATTACHING THE CONTAINER TO THE STRONG-BACK

1.0 INTRODUCTION

This supporting document includes information for the proper bolting sequence for attaching the container to the strong-back. The design of the container and strong-back is found in supporting document WHC-SD-WM-DA-165 (WHC 1994a) and is in accordance with *Standard Arch-Civil Design Criteria, Design Loads for Facilities* (SDC 4.1) Safety Class 3.

2.0 SUMMARY OF RESULTS

The following bolting sequence has been found, through field testing, to be the most effective method of attaching the container (WHC 1994d) to the strong-back (WHC 1994b). The diameter, length, and type of bolts required are calculated in WHC-SD-WM-DA-165 (WHC 1994a) and are shown in the drawings of WHC 1994b and WHC 1994c. This supporting document summarizes the bolt requirements and provides the fit up and bolting sequence required to most effectively attach the container to the strong-back.

3.0 DISCUSSION

During the fabrication process, the container attachment lugs are placed flush up against the strong-back attachment assemblies. After the container attachment lugs are matched to the strong-back attachment assemblies, the container attachment lug is welded into position. Finally, the container attachment lug is match drilled to the strong-back attachment assembly. This fabrication process ensures that a close fit up can be achieved between the container, the attachment assemblies, and the strong-back.

After the containers were matched to the strong-back, the containers were removed and painted. In order to effect the same match of the container to the attachment assemblies and strong-back, the container must be relocated to the matched position. The bottom of the attachment assemblies have slotted holes which allows the assembly to slide laterally during fit up.

4.0 CONCLUSIONS

This bolting sequence has been found to be structurally effective for attaching the container to the strong-back. Adherence to this supporting document for field installation should greatly reduce or eliminate field fit up and bolting problems.

5.0 RECOMMENDATIONS

The following recommendations shall be followed to ensure that the container is properly bolted to the strong-back:

Prior to installing any bolts, verify that the threaded portion of the bolts and nuts are clean and undamaged. Do not add lubricant of any type to the bolt or nut thread. The only lubricant that may be on the nut or bolt thread is the trace of machine oil that was applied at the factory during fabrication.

Never reuse bolts that have been previously torqued. Any bolts that have been torqued should be identified and removed from service.

Align the container, attachment assemblies and strong-back;

- The strong-back has four bearing blocks, two per side and approximately 24 feet apart, that are designed to support the weight of the container. The container attachment lugs (see Figure 1) should rest on the four bearing blocks. Carefully place the container into the strong-back. Insure that the container support is properly positioned on the deck of the hydraulic trailer.
- Place all four of the attachment assemblies on the strong-back. Verify that the bolts are A325, and verify the length and location of the bolts as shown in Figure 2. Loosely install all the 1" bolts and washers so that the attachment assemblies are free to slide laterally (see Figure 3a).
- Re-position the container as necessary to best match up to all four of the attachment assemblies. Some differences between the container, attachment assemblies, and strong-back are inevitable however no more than about 1/4" gap between mating surfaces should be present. This gap will become less as the bolts are tightened.

Install bolts

Note that "Snug tight" is defined as "the full effort of a man using an ordinary spud wrench". Therefore, do not use a breaker bar or excessive force to tighten the bolt. Only use full effort and an ordinary wrench to snug up the bolt.

- Install, to finger tight condition, all of the 2 1/2" bolts, nuts and washers (see Figure 3b). Do not use a wrench to tighten the bolts at this time.
- Install, to finger tight condition, all of the 1" bolts and washers. Do not use a wrench to tighten the bolts at this time.
- Determine which attachment assembly has the largest gap between the vertical face of the attachment assembly and the face of the container attachment lug. Proceed to tighten, only to a "snug tight" condition, the 2 1/2 " bolt at this attachment assembly.

- Document the length of the 2 1/2" bolt with a micrometer. If this can not be done then document the amount of gap between the vertical face of the attachment assembly and the face of the container attachment lug. The bolt length or gap will be checked after tightening the 1" bolts at the bottom of the assembly.
- Determine the next attachment assembly that has the largest gap, as described above, and tighten the 2 1/2" bolt as described above. Continue this process until all four of the 2 1/2" bolts are "snug tight".
- Determine which attachment assembly has the largest gap between the horizontal face of the attachment assembly and the horizontal face of the strong-back. Proceed to tighten, only to a "snug tight" condition, the 1" bolts at this attachment assembly. Sequence bolt tightening as "tightening shall progress systematically from the most rigid part of the joint to its free edges".
- Document the length of the 2 1/2" bolt with a micrometer. If this cannot be done then document the amount of gap between the vertical face of the attachment assembly and the face of the container attachment lug. Compare the bolt length or gap measurement with the measurement taken after the 2 1/2" bolts were tightened. If the bolt length or gap has increase more than .0833" then contact the engineer for further direction. If the bolt length or gap is less than .0833" then the bolted connection is adequate.
- Determine the next attachment assembly that has the largest gap, as described above, and tighten the 1" bolts as described above. Continue this process until all twenty four of the 1" bolts are "snug tight".

6.0 REFERENCES

- AISC, 1989, *Manual of Steel Construction*, 9th Edition, American Institute of Steel Construction, Chicago, Illinois.
- SDC 4.1, Rev. 12, 1989, *Standard Arch-Civil Design Criteria*, Westinghouse Hanford Company, Richland, Washington, 1993.
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- WHC 1994b, Strongback, drawing H-2-83736, Rev. 0, Westinghouse Hanford Company, Richland, Washington, 1994.
- WHC 1994c, Hydrogen Mixer Pump Storage Transport Assembly Arrangement, H-2-83750, Rev. 0, Westinghouse Hanford Company, Richland, Washington, 1994.
- WHC 1994d, Hydrogen Mixer Pump Storage Container, drawing H-2-83734, Westinghouse Hanford Company, Richland, Washington, 1994.

Figure 1 Container Attachment Lugs

For Information Only
From H-2-83734 sheet 7

Attachment Assembly

Figure 2 Strong-back and Container

PLAN (HYDROGEN MIXER PUMP CONTAINER)

SCALE : 1/2" = 1'-0"

For Information Only
From H-2-83750 sheet 1

Figure 3a Attachment Assembly Plan View

Figure 3b Attachment Assembly Side View

For Information Only
From H-2-83736 sheet 5