

M-ESR-F-00147  
May 12, 2008  
Revision 0

**TANK 5 SLUDGE VOLUME ESTIMATION AFTER THE SEVENTH PHASE OF  
MECHANICAL SLUDGE REMOVAL (U)**

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## **Purpose**

The purpose of this report is to document the mapping of remaining sludge in Waste Tank 5 after completion of the transfer from Tank 5 to Tank 7. The waste transfer was finished on May 9, 2008.

## **Background**

Prior to Mechanical Sludge Removal Phase 6, the supernate level in Tank 5 was 3 inches. Following the transfer of supernate from Tank 7 and inhibited water additions the liquid level in Tank 5 was 123 inches. The SMPs located in Risers 1, 3 and 8 were started on May 6th. The 7th Phase of MSR included a 32 hour period of the SMPs in Risers 3 and 8 being indexed towards the sludge mound near Risers 5 and 6, followed by oscillation of all three pumps for the remainder of the run. The Tank 5 to 7 transfer began at 15:00 on May 7. SMP 7 in Riser 1 was shutdown at 13:30 on May 8. SMPs 5 and 6 in Risers 3 and 8 were shutdown at 17:30 on May 8. The Tank 5 to Tank 7 transfer ended at 02:00 on May 9. The final observed liquid level was 3.5 inches per visual inspection and radar reading. During the pump down of Tank 5, exposed sludge mounds were observed and mapped. The camera installed in Riser 7 was replaced on Friday, May 9. A camera inspection was performed on Saturday, May 10 and witnessed by the sludge mapping engineers. The much improved video quality was used to slightly adjust the contour of the sludge mounds as shown in this report.

## **Sludge Mound Mapping**

The sludge mapping was performed by monitoring Tank 5 during the transfer with 2 cameras. Cameras were installed in Risers 2 and 7. The picture quality from the Riser 7 camera was poor from the beginning of the mapping onward, limiting the detail that could be seen at any significant distance from Riser 7. During completion of the transfer, final tank levels were determined by tank inspection using landmarks and radar. As mounds appeared, they were mapped on sheets of paper with a scaled grid across the tank area (Attachment B). The in-tank cooling coils, tank columns, SMP columns, and the transfer pump sleeve were used as reference points to estimate exposed sludge mound areas as accurately as possible.

## **Sludge Mapping Calculation Method**

The exposed mound area and height are inputs in a spreadsheet to calculate the volume of the wet sludge left in the tank. The data is charted in a spreadsheet to obtain a 3-D picture of the tank bottom and the mounds.

Two mounds remained unmoved from the previous MSR Phase. The sludge mound trail located beneath Riser 1 is too low to be impacted by the flow of the SMP in Riser 1 as that SMP is suspended 13 inches from the tank floor due to horizontal cooling coils in its footprint.

The main remaining sludge mound, located between Risers 5 and 6, is nested between a fence of horizontal return coils. This fence protected the main body of the mound during the 6<sup>th</sup> MSR phase. The overall volume of the mound changed somewhat from Phase 6, but not to a significant extent.

The assumed tank wide sludge layer remained at 0.25 inches. This assumption was based on camera inspection of well-lit areas of the tank where fine detail of the tank floor was observed. In particular were the hex nuts on the column bases, and the weld fixing the angled horizontal coil supports to the floor.

Based on the modified tank wide sludge layer and the volumes of the observed mounds the remaining material volume calculated by the spreadsheet is 3,453 gallons.

### **Summary**

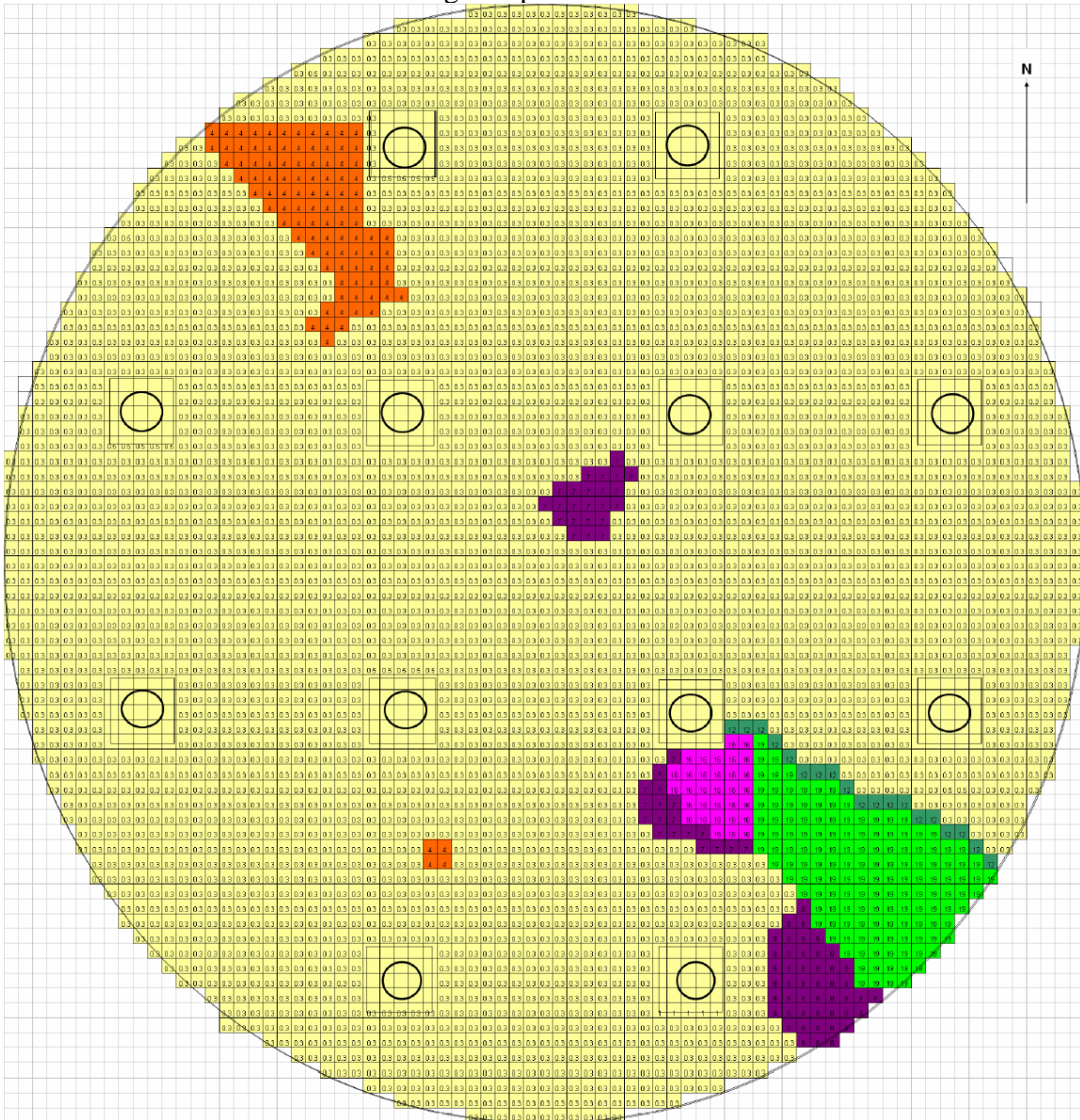
Using the sludge mapping calculation, it is estimated that approximately 3,453 gallons of waste remain in Tank 5. If the estimated sludge volume before phase 7 was 3,465 gallons per M-ESR-F-00145, then approximately 12 gallons were removed. This insignificant change in sludge volume is indicative that the Mechanical Sludge Removal process has removed as much sludge as possible and that Tank 5 is ready to begin chemical cleaning.

### **Reference**

1. LWO-LWE-2008-00096, Tank 5 Campaign 6 Mechanical Sludge Removal Strategy
2. M-ESR-F-00145, Tank 5 Sludge Volume Estimation After the Sixth Phase of Bulk Sludge Removal
3. U-ESR-F-00024, Tank 5 Waste Removal Operations Plan

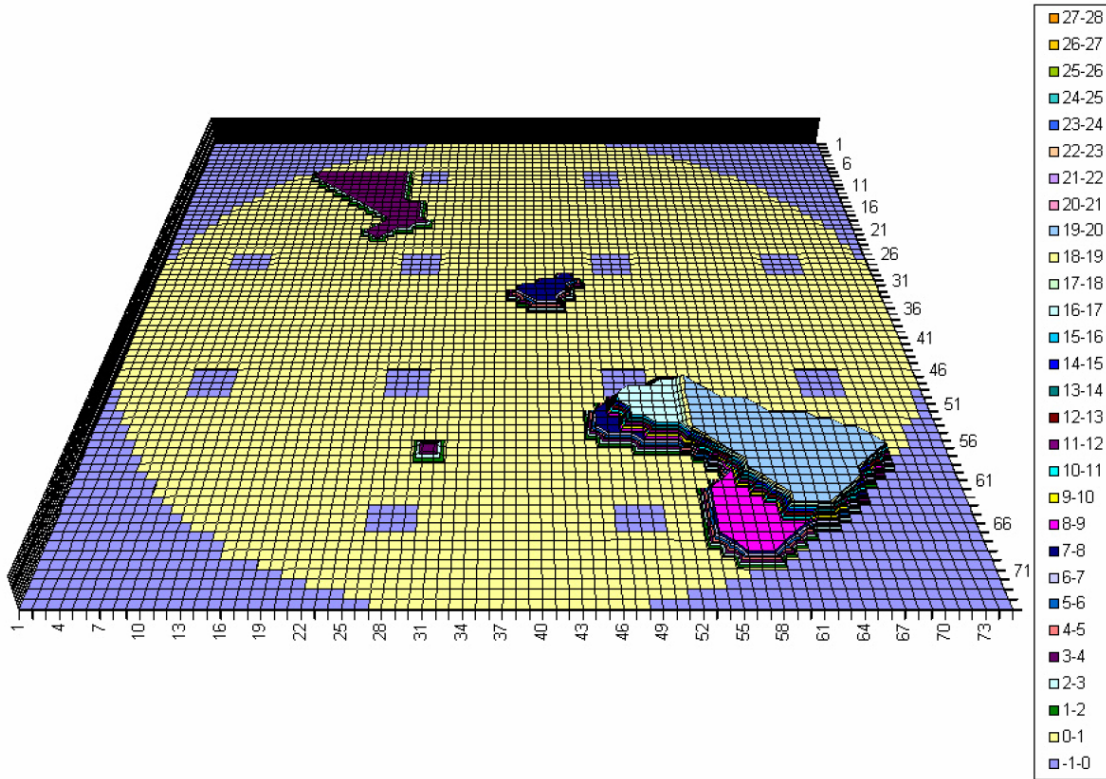
Attachment A

Sludge Map – Plain View

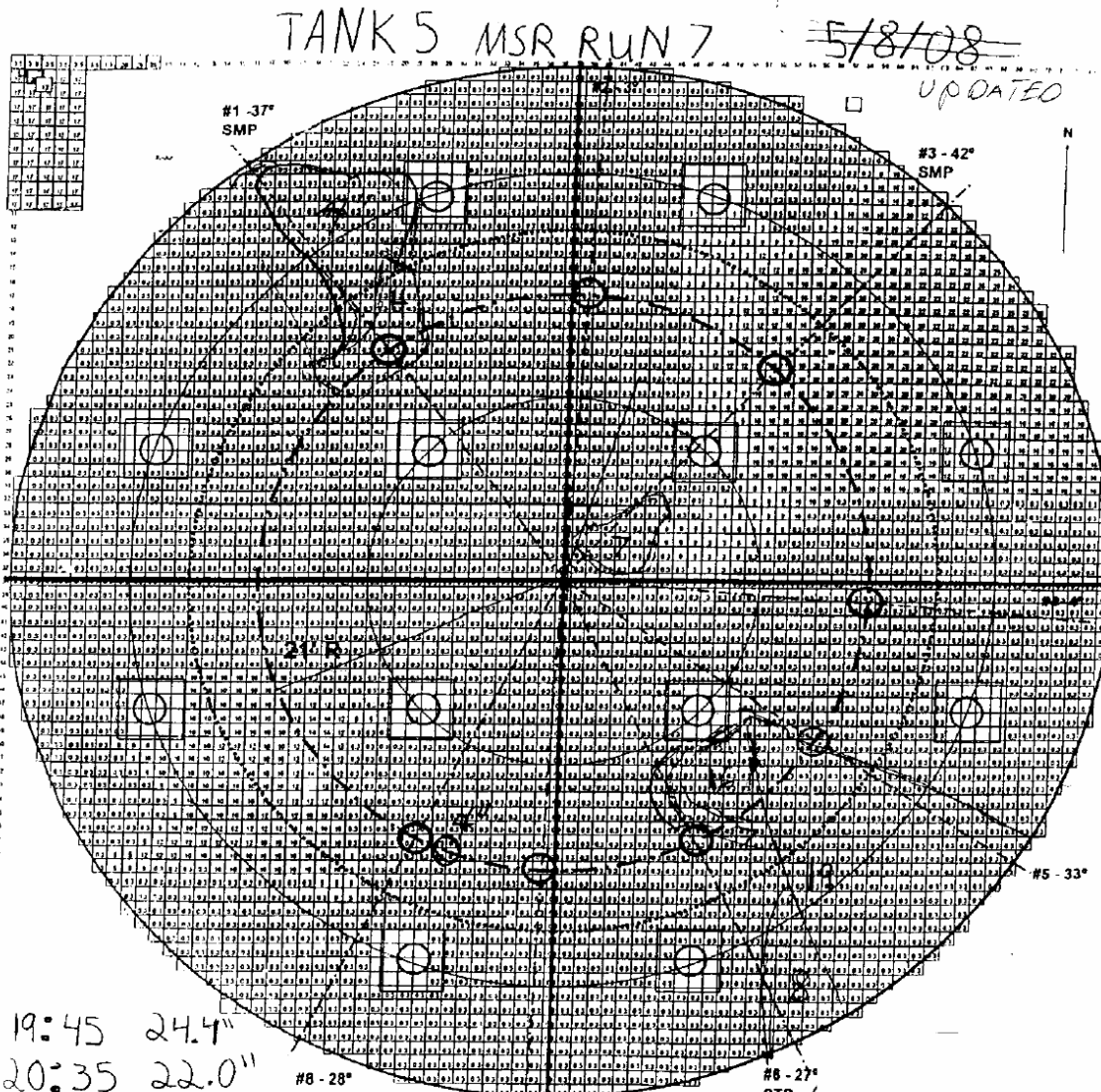


**Attachment A**

Sludge Map – 3 Dimensional View



Attachment B



19:45 24.4"  
20:35 22.0"  
21:40 18.2"  
22:45 15.0"  
23:45 12.5"  
00:55 5.7"  
02:05 END

#8 - 28° SMP

#7 - 3°

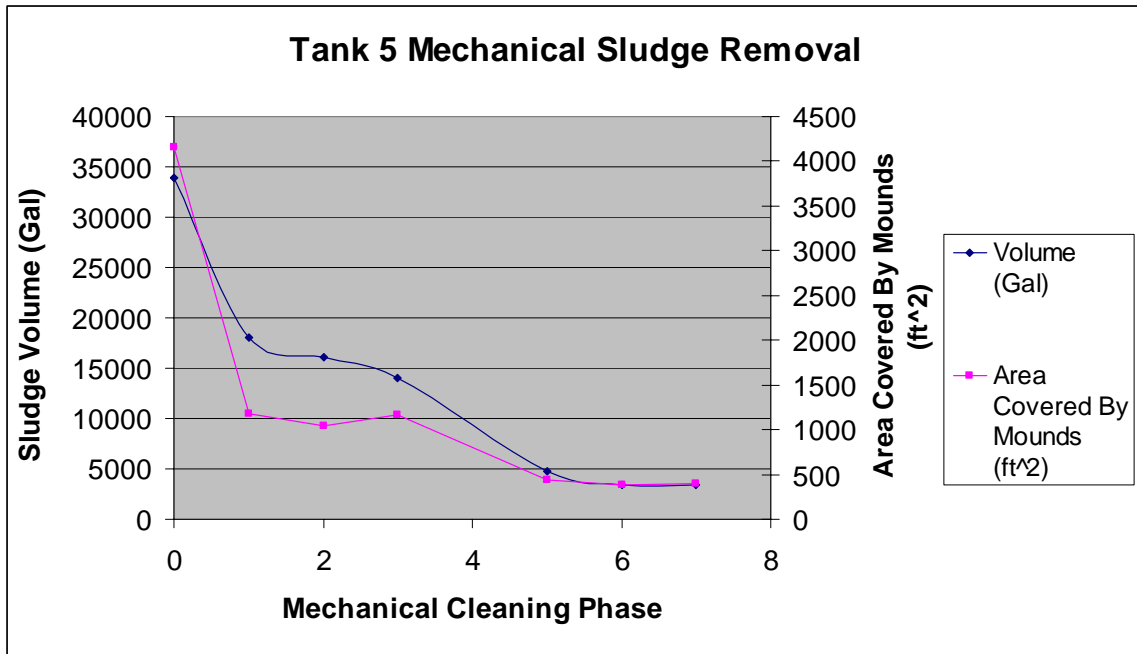
#8 - 27° STP

BOARD NO. TANKS - 1, 3, 5, 7, 9, AND 11

Time	Depth
19:45	24.4
20:35	22.0
21:40	18.2
22:45	15.0
23:45	12.5
00:55	5.7

POST  
MAP  
5/10/08

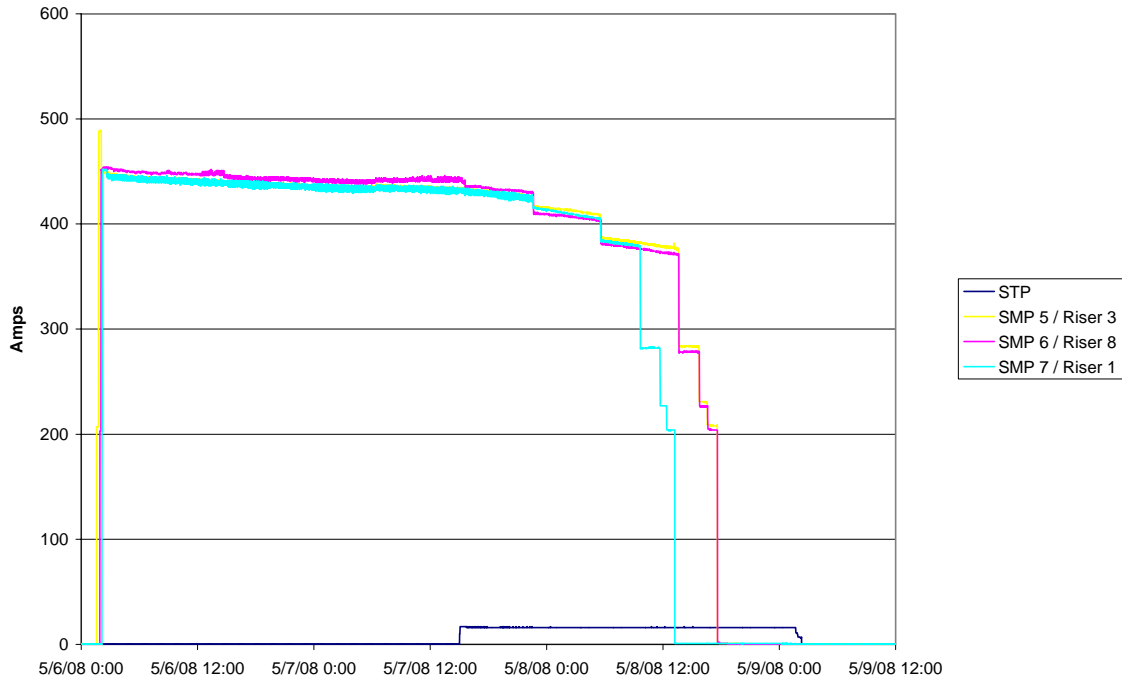
Attachment C





**Attachment D**

**Pump Current and Run Times**



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**Distribution**

R. Boisvert	704-26F
J. Cantrell	704 26H
N. Chapman	704 70F
V. Chander	704 70F
V. Cordaro	704 70F
N. Davis	766H
M. Harrell	241 108F
J. Herbert	241 108F
M. Hubbard	241 162H
W. Isom	704 26F
R. Jolly	704 70F
D. Little	766H
B. Martin	766H
S. Middleton	704S
L. Minor	241 100F
S. Nicholson	704 26F
K. Parkinson	703H
J. Purohit	704 71F
R. Salmon	704 26F
W. Stephens	704 26F
L. White	704 26F