Cavity / Transfer Canal

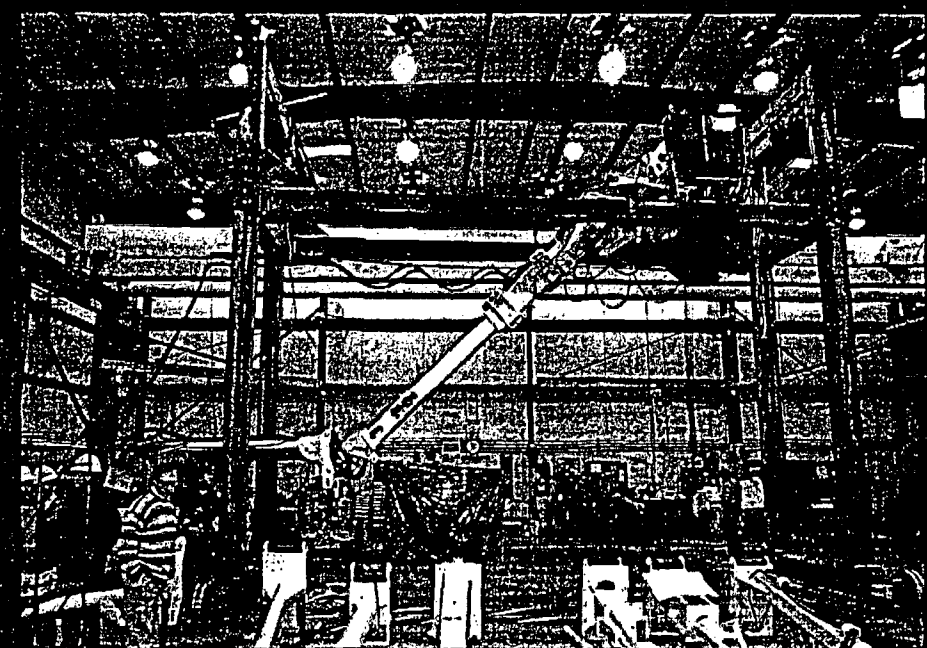
- 12:45 to 12:50 – Safety / Intro
- 12:50 to 13:10 – LAG PowerPoint
- 13:10 to 13:30 – WPIR Review
- 13:30 – 13:40 – Break
- 13:40 – 14:00 – RSR
- 14:00 – 14:15 – RWP
- 14:15 – 14:45 - Questions

A-132

Cavity Decon – GMM-1400

Louis A. Grant GMM-1400 Machine

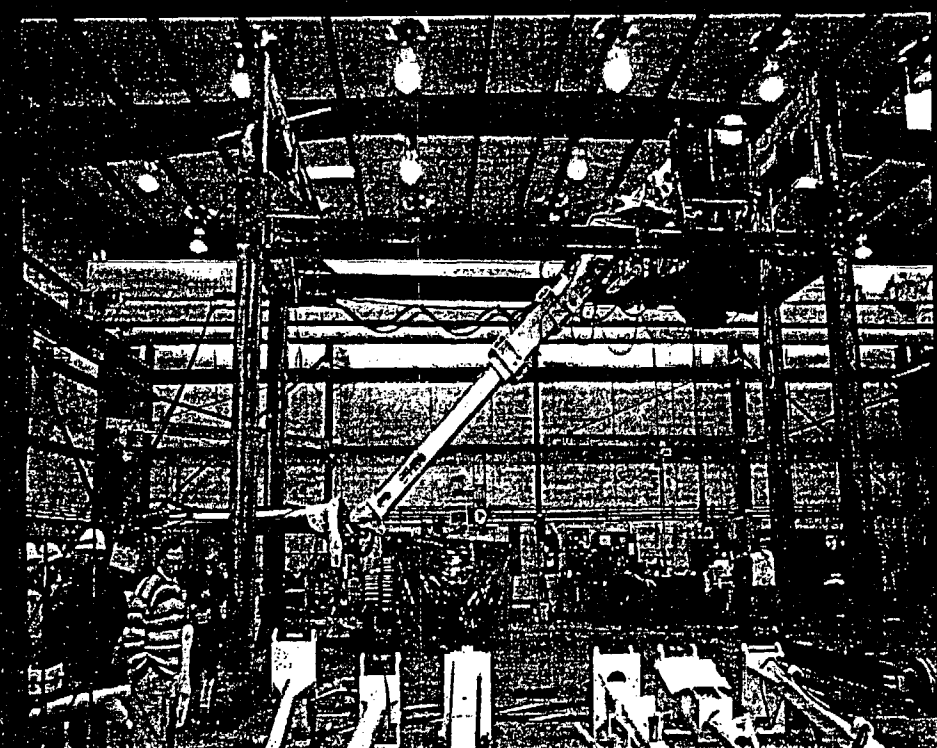
- Developed for Neutron Shield Tank removal.
- Adapted for Reactor Cavity Decontamination.
- Carrier beams and gantry legs designed to sit on the existing cavity rails.
- Various quick disconnect "end effectors" perform required cavity decontamination tasks.



Cavity Decon – GMM-1400

Louis A. Grant
GMM-1400 Machine

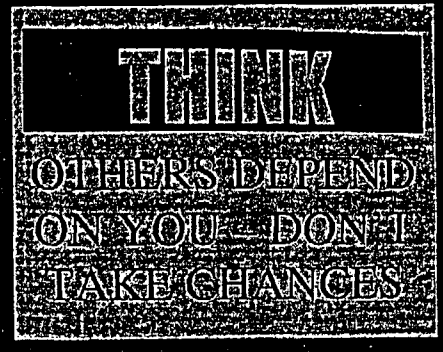
- Remotely operated from shielded area through radio controls and video cameras.
- Work is performed under P.O. with Louis A. Grant.
- Bechtel owns the GMM-1400 and all associated end effectors required to perform complete cavity decon including cavity liner removal if necessary.
- Equipment has been mocked up and tested at Grant facility.



Cavity Decon - Safety

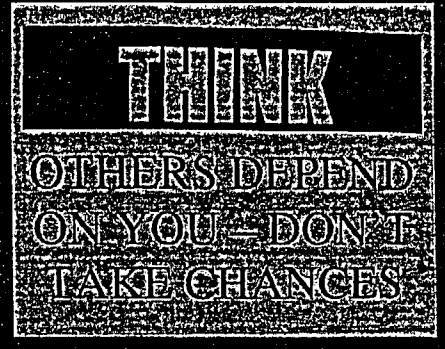
Overview of potential Safety issues:

- Fall Protection – Once cavity is drained, fall protection will be required while were constructing the railing around the pool. Any work that is performed within six feet of the cavity edge, where there is no railing in place will require fall protection to be worn.
- Tie-off points – Swivels that have only been used for fall protection (not rigging) may be used, secured to the floor, per Gordon Stokes (Rigging Eng.) specs.
- Housekeeping – Should be a daily activity, going to break, lunch or at the end of the day – need to tidy up the area to preclude the creation of tripping and fire hazards.
- Lay down/Storage areas – Keep them neat, if we hang "caution" barrier tape around the area we need to make sure we have the appropriate tag, stating "Lay down/Storage area" and who the contact person is.
- Pinch points/Line of fire – Need to be aware of our surroundings don't put yourselves between a load or under it.



Cavity Decon - Safety

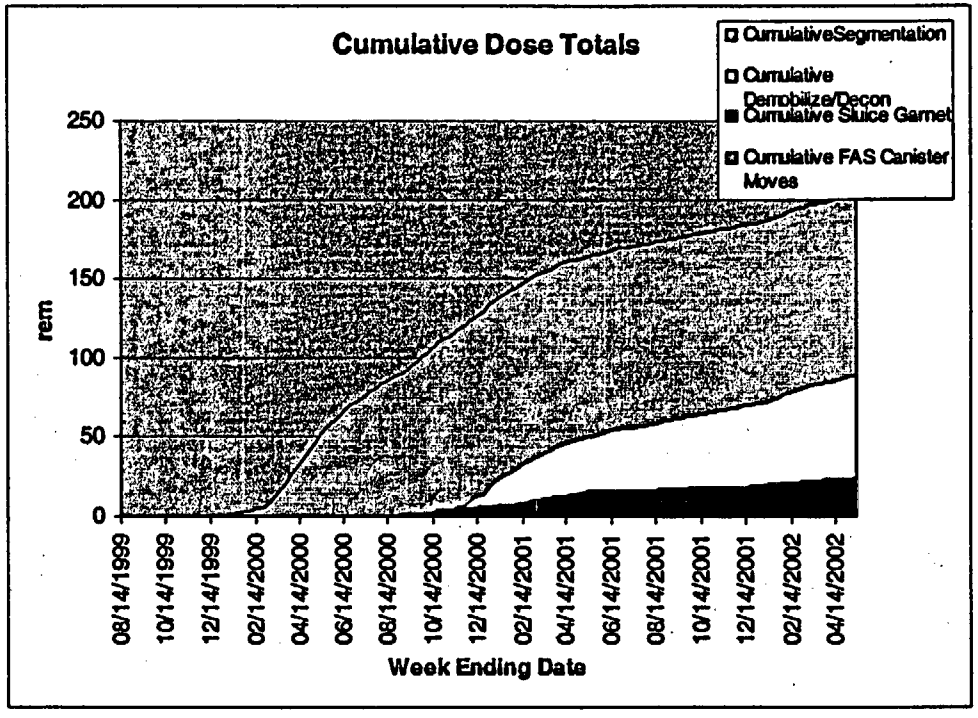
- Material handling – If were handling anything with sharp or rough edges, leather gloves will be worn over rubber gloves (No exceptions).
- Cautions while overhead work is in progress, polar crane mods will be in effect sometime during the course of the cavity work. Hardhats will be worn at all times while overhead work is in progress.
- Roll back "Before" cavity decon work begins, this begins with PCI/Drulard leaving the area clean.
- Prior to beginning your work task, check the area to determine what problems or hazards may exist.
- If your activity may endanger fellow workers or nearby equipment
- or materials, take the necessary steps to safeguard them.
- You should review the safety and health requirements for each work task with your supervisor prior to starting work. You will not be required to do a task that may result in injury or illness to yourself or to others.
- Any questions or concerns please contact the Bechtel Safety Dept.



Cavity Decon – Initial Conditions

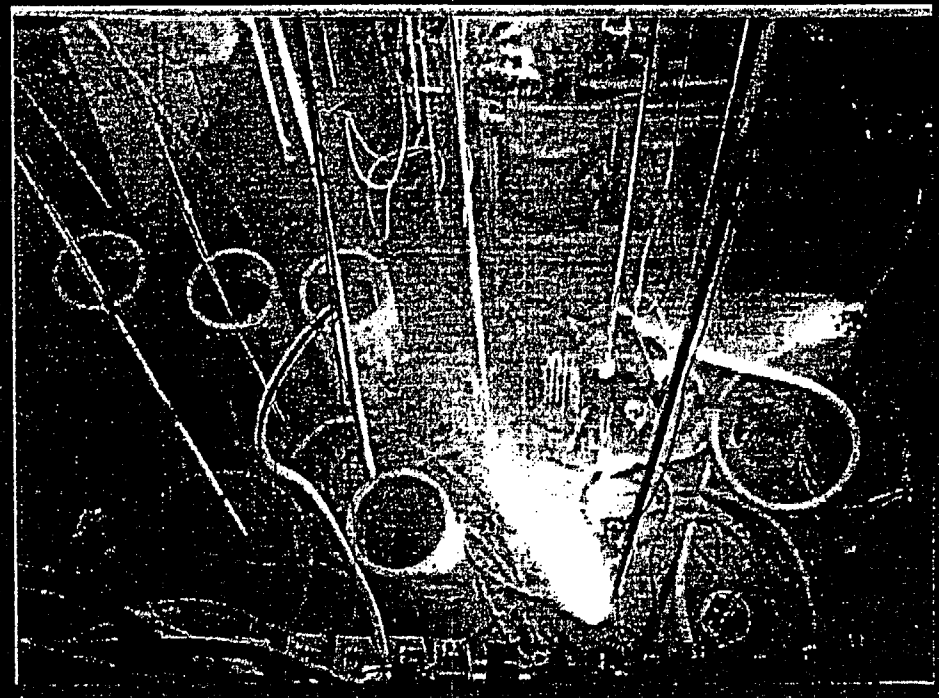
Reactor Cavity – Historical Status

- Cavity became highly contaminated as a result of Reactor Segmentation Activities
- Spread over 3600 Ci of activity throughout the cavity. Average underwater dose rates were in the hundreds of R/hr.
- Approximately 200 rem has been expended performing the segmentation and recovering from it.
- GMM-1400 provides opportunity for dose minimization..
- Reactor Vessel Removal and Neutron Shield Tank removal will require thousands of man-hours to be spent in and around the Reactor Cavity.



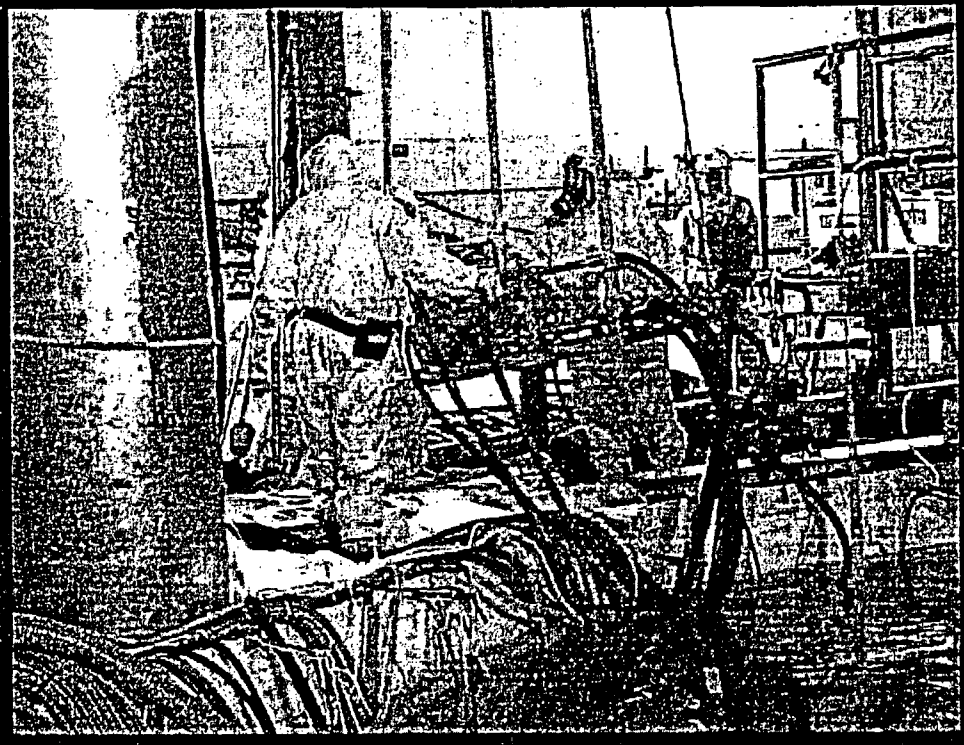
Cavity Current Radiological Conditions

- Cavity floor currently reads 0.3 to 15 R/hr. Average of 2 to 4 R/hr. Anticipated dose rates on cavity floor if drained now would be 10 to 30 R/hr.
- Cavity contains high dose rate irradiated items (e.g. 91 items greater than 3/8" reading from 36 R/hr to 1500 R/hr recovered to date).
- Cavity is painted carbon steel and has not been drained since 1996. Paint is flaking, chips frequently read in the R/hr range.
- Despite vacuuming to date, high dose rate cutting debris must still be removed from guide tube area, stud holes and vessel flange.

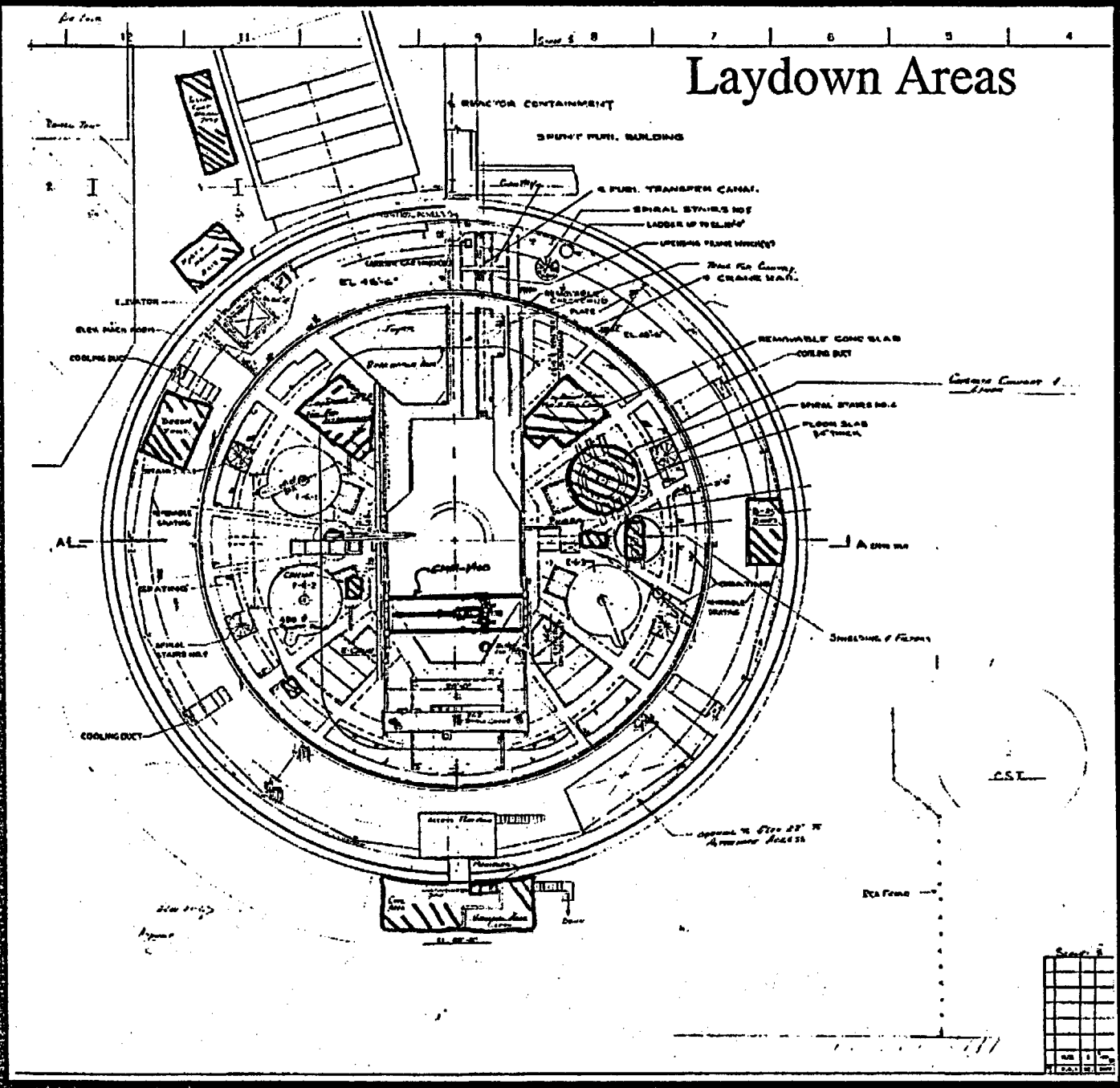


Cavity Decon Radiological Challenges

- Minimize dose to personnel from filters and equipment as final vacuuming of debris.
- Minimize risk of unplanned exposure from irradiated material on items removed from cavity.
- Control airborne radioactivity potential during drain down.
- Reduce dose rates sufficiently to allow personnel access to the cavity
- Find and remove high dose rate items prior to initial entry to minimize risk of unplanned exposure from irradiated items for personnel accessing cavity after drain down.
- Utilize strippable coating to allow removal of hot spots/particles in cavity.
- Reduce dose rates in cavity from cavity floors and walls to meet dose goals for vessel removal.

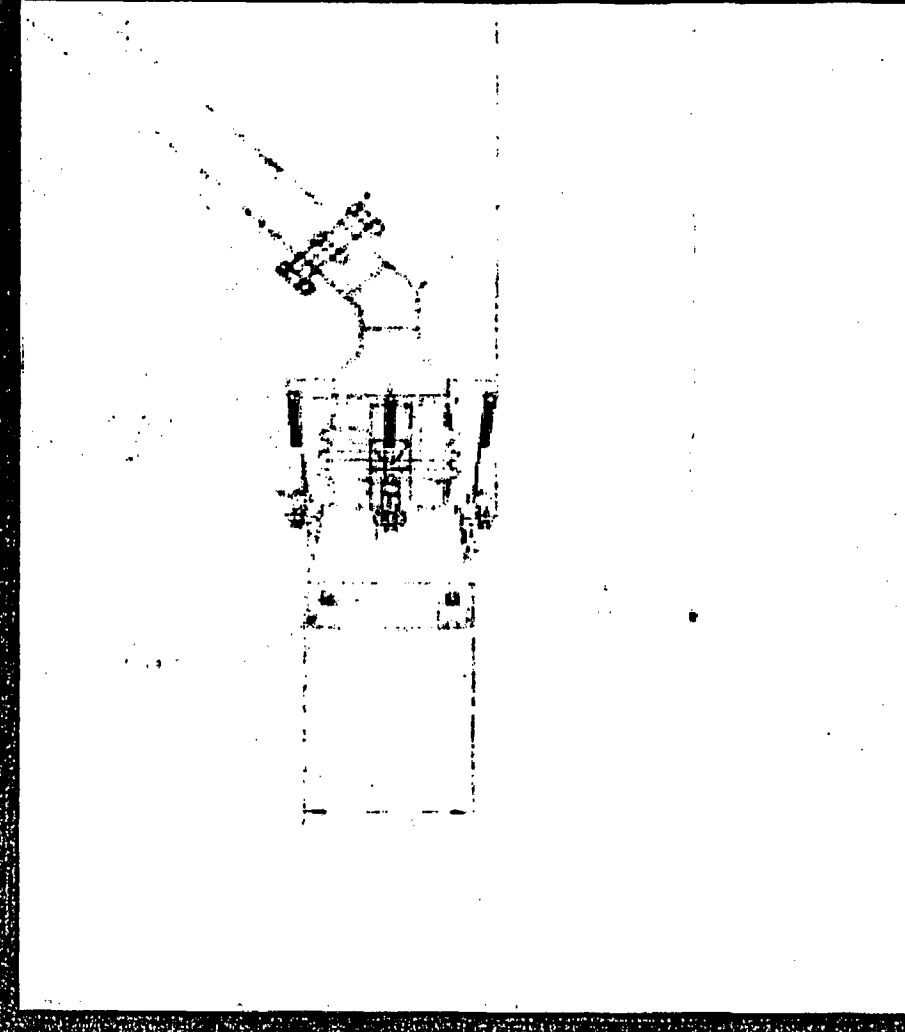


Laydown Areas



Cavity Decon - Vacuum

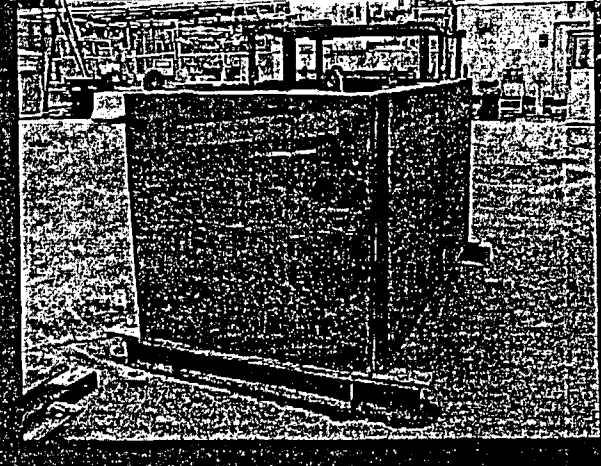
- CAVITY VACUUM
- Vacuum end effector consists of a square shaped vacuum head, approximately 1 sq. ft with an adjustable clearance between the face of the vacuum and wall/floor surface.
- The Vacuum head is also spring mounted to permit the face of the vacuum to flex and remain parallel to any surface imperfections.
- The Vacuum attachment will be connected to the GMM-1400 through the quick disconnect and manipulated by the to GMM-1400 to cover all surfaces within the cavity.
- The Tri-nuke 260 will provide the suction and filtration for the initial vacuum of the Cavity floor.
- Louis A Grant will perform the Cavity vacuuming which will continue as required to obtain the desired results as directed by Bechtel Supervision and HP.

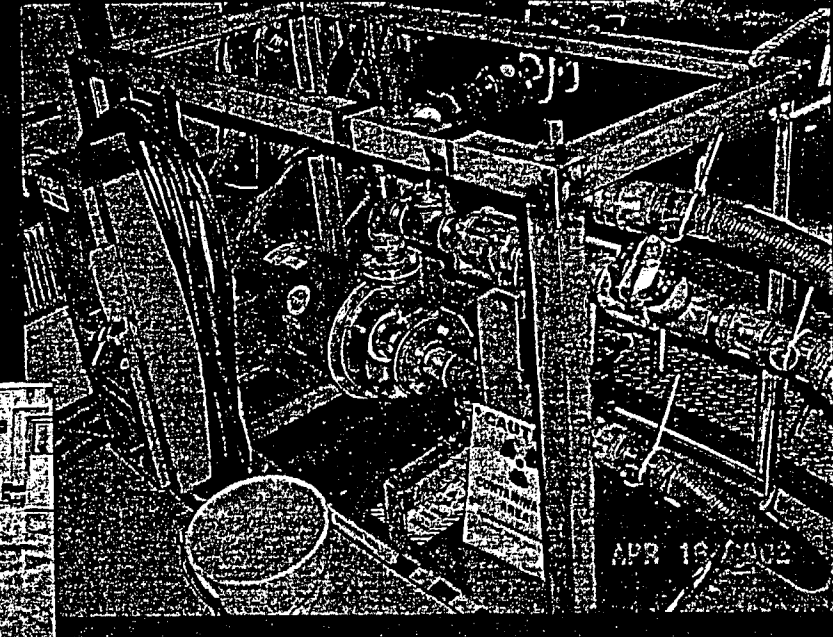


Cavity Aggressive Decon Vacuum Filtration Equipment

- **CAVITY AGGRESSIVE DECON FILTRATION SYSTEM**

- 200 GPM flow rate.
- High dirt loading filters to capture paint chips hydrolazed from cavity walls including any fine material which may be left behind as part of the segmentation evolution.
- Shielding provided around Filter Unit t reduce personnel exposure.
- System set up on Charging Floor.

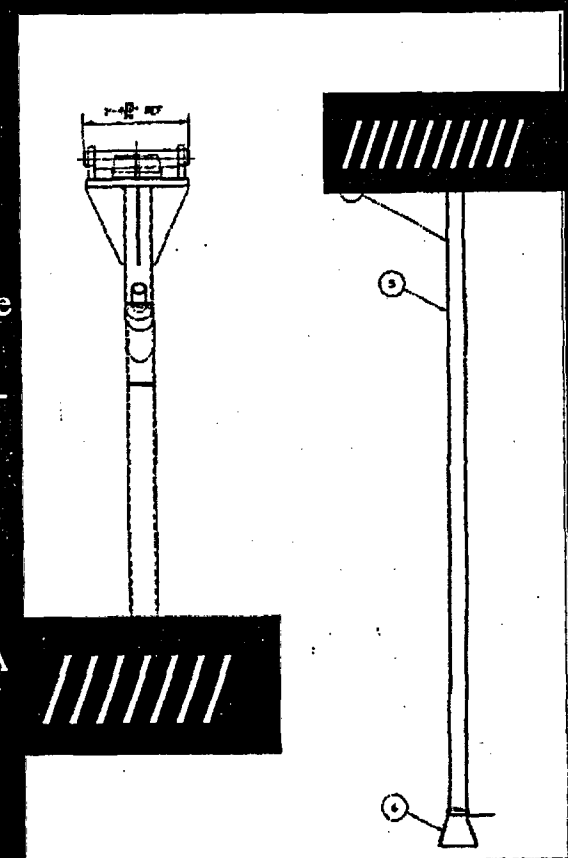




Cavity Decon – Guide Tube Assembly & ALARA Shield Vacuum

- **ALARA SHIELD & GUIDE TUBE SPOT VACUUM**

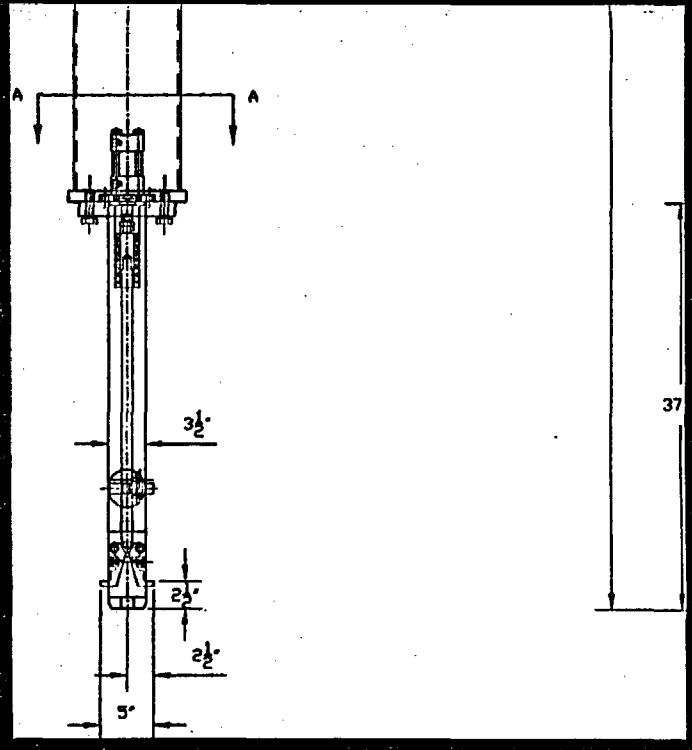
- Remove center section of the existing work platform, lower cameras into RPV to get a view of the existing conditions on top of the ALARA shield and on top of the Upper Support Plate.
- The Vacuum attachment will be connected to the GMM-1400 through the quick disconnect and manipulated by the to GMM-1400 over the specific areas requiring vacuuming.
- Make connection between end attachment and suction/filtration system.
- Louis A. Grant to vacuum RPV flange area and ALARA shield as directed by HP.
- Louis A. Grant to vacuum Guide Tube assembly cap screw heads to remove any possible debris that may interfere with removal of the cap screws.
- Once the end effector is cleared by HP and allowed to come out of the pool, disconnect any lines which may be attached to the tool and place tool in the specified lay down area.



Cavity Decon – Guide Tube Removal

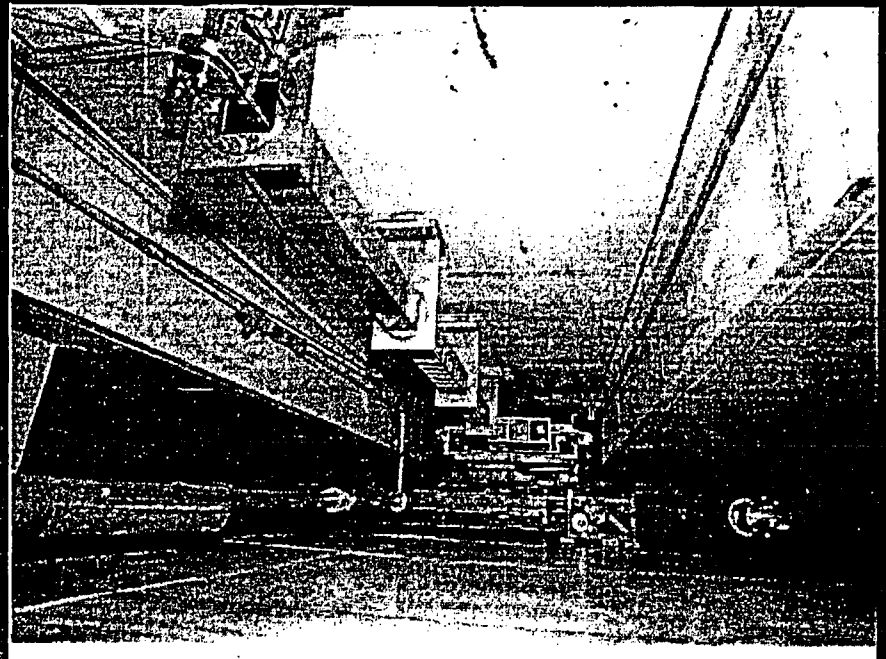
- **GUIDE TUBE REMOVAL**

- The Torque Wrench Attachment (not shown) will be connected to the GMM-1400 through the quick disconnect and manipulated via camera by the Louis A.Grant operator in an attempt to unscrew the Guide tube Assembly cap screws.
- If the cap screws are damaged such that unscrewing them is not an option then the tool will have to be changed to accommodate drilling out the cap screws (tool not shown).
- Under HP and Bechtel supervision, Louis A. Grant to remove Guide Tube Assembly from its existing position and place on top of the ALARA shield.



Transfer Canal Decon

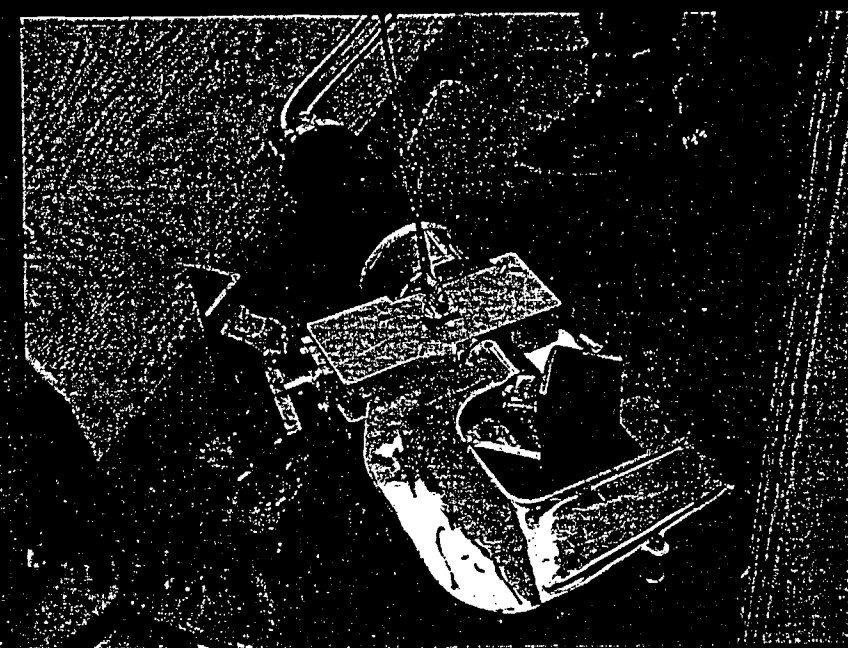
- **TRANSFER CANAL EQUIPMENT REMOVALS (Parallel with Cavity)**
- Assemble MEGA –TECH tool suspended off A-frame to perform segmentation of the transfer canal components. (ie; rail, support steel and miscellaneous equipment.) *See picture on following page.*
- Upon completion of the equipment removals and after cavity decon the transfer canal will be turned over to a sub-contractor for aggressive decon and vacuum
- GMM-1400 boom is too large to perform any decontamination work in Transfer Canal. (hydrolase and instacote to be performed manually)



Transfer Canal Decon – MEGA TECH Tooling

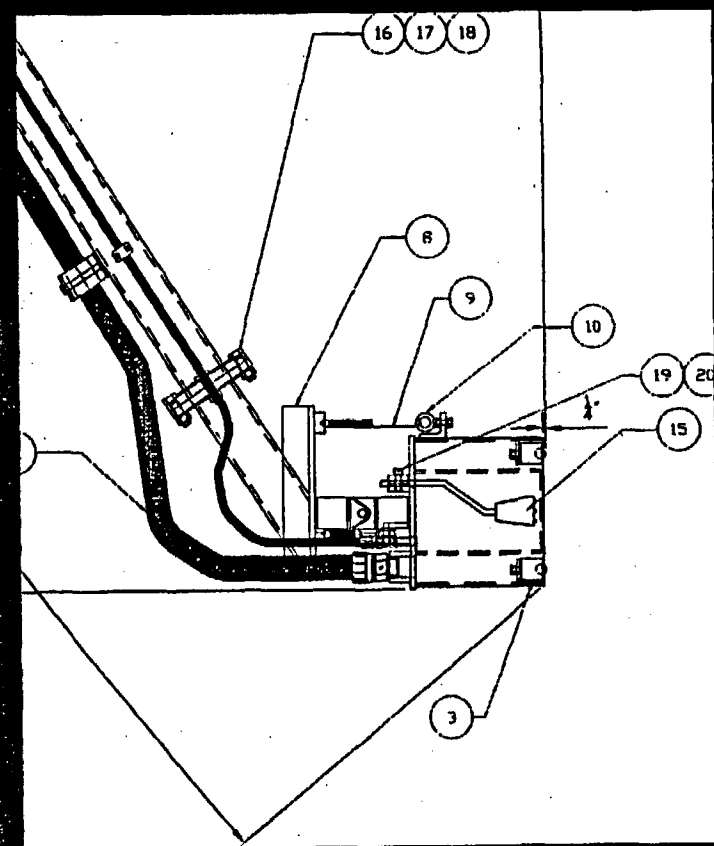
MEGA–TECH TOOL SEGMENTING 1:1 MOCK-UP OF TRANSFER CANAL

- A 1:1 scale mock-up of a portion of the canal was constructed and segmented using the MEGA-TECH tool.
- The mock-up was performed not only to verify tool performance but to verify that the tool could perform under the existing spatial limitations.
- The mock-up represented the actual size of a portion of the Transfer Canal, one section of rail system including all the structural steel supporting the rail.
- Enough can be removed from the Canal to effect an efficient/cost effective decon of the Canal.
- It is estimated that use of this tooling will save approx. 17.5 Rem in exposure.



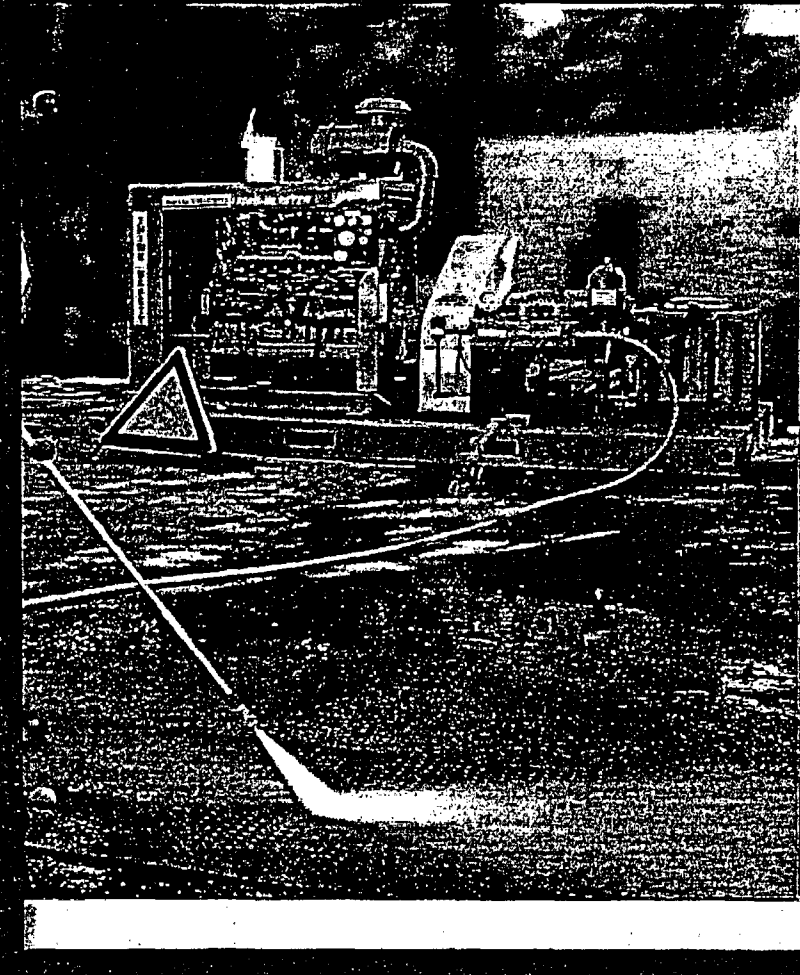
Cavity Decon - Hydrolase

- **AGGRESSIVE CAVITY DECON WITH HYDROLASE/CAPTURE HOOD**
- The Hydrolase/Capture hood will be connected to the GMM-1400 through the quick disconnect and manipulated from the remote operator location.
- The filtration system will provide the suction and filtration for the Hydrolase activity, whereas a sub-contractor will provide the hydrolase pump.
- Additionally, the hydrolase/capture hood the hydrolase nozzle will be changed out for a longer tipped hydrolase fixture capable of reaching the corners and around protuberances.



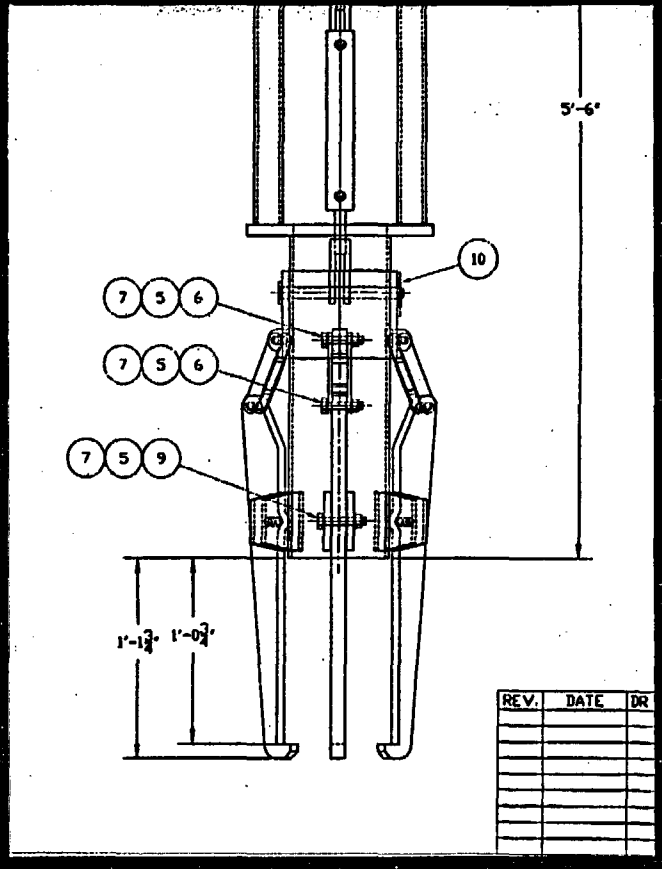
Cavity/Canal Decon – Hydrolaze Unit

- **36, 000 # HYDROLASER UNIT**
- Will be on trailer unit located outside Reactor Building.
- Supplies hydrolazer unit on GMM-1400 for Cavity decon
- Counterbalanced multiple nozzle lance suspended from Polar Crane for Canal decon.



Cavity Decon – Stud Hole Cover

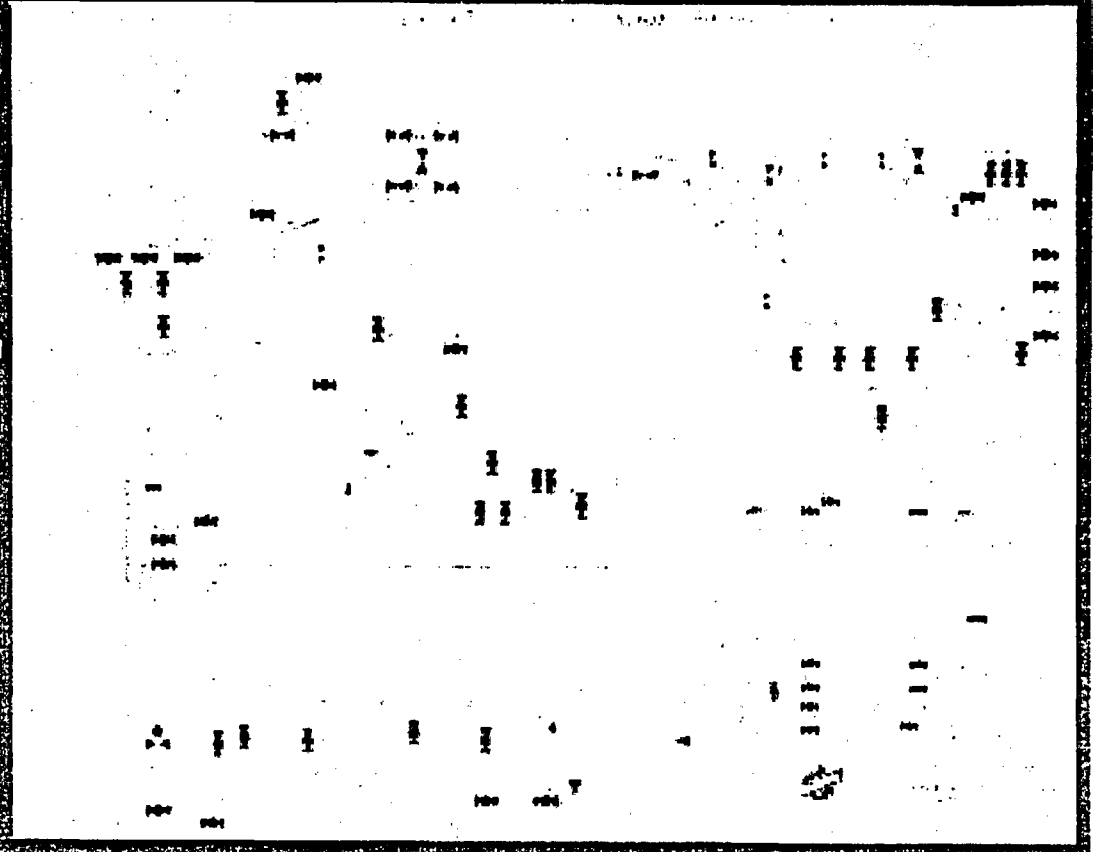
- **STUD HOLE COVER REMOVAL**
- Stud Hole Cover will be unscrewed manually with long handled tools and removed with the GMM-1400
- Stud hole covers have to be removed, staged and replaced by Louis A. Grant.
- Once the stud cover removal activity is complete the end effector will have to be replaced with the Stud Hole Vacuum attachment.
- The Cavity Decon filtration system will be connected to the stud hole vacuum attachment to collect and filter out any debris.



Cavity Decon – Cavity Drain Down/Water Processing

DRAIN DOWN / WATER PROCESSING

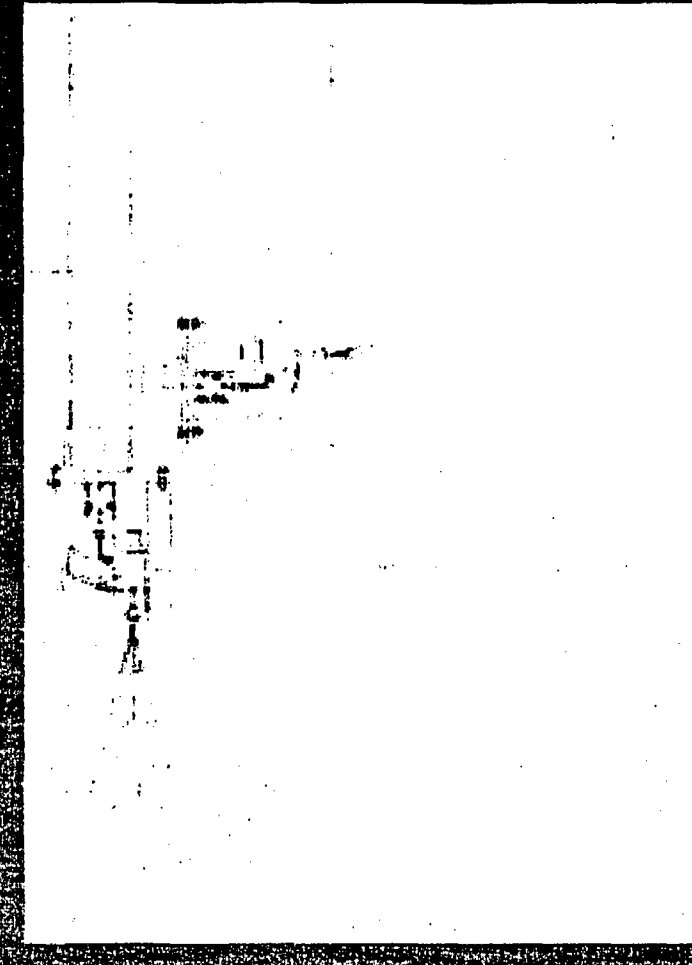
- The current system consists of two 100,000 gallon storage tanks, a charcoal and cartridge prefilter arrangement and two ion exchange vessels set up in series.
- Water will be processed before storage in one of the 100,000 gallon storage tanks due to offsite dose considerations.
- Water is processed to two 12,000 gallon test tanks prior to discharge.
- The initial cavity drain down will consist of 240,000 gallons.
- Drain down rates are approximately 900 gpm. Processing rates are are approximately 45 gpm.
- Water will be processed and discharged during the cavity drain down to support the entire water inventory of the cavity.



Cavity Decon – InstaCote

- INSTACOTE

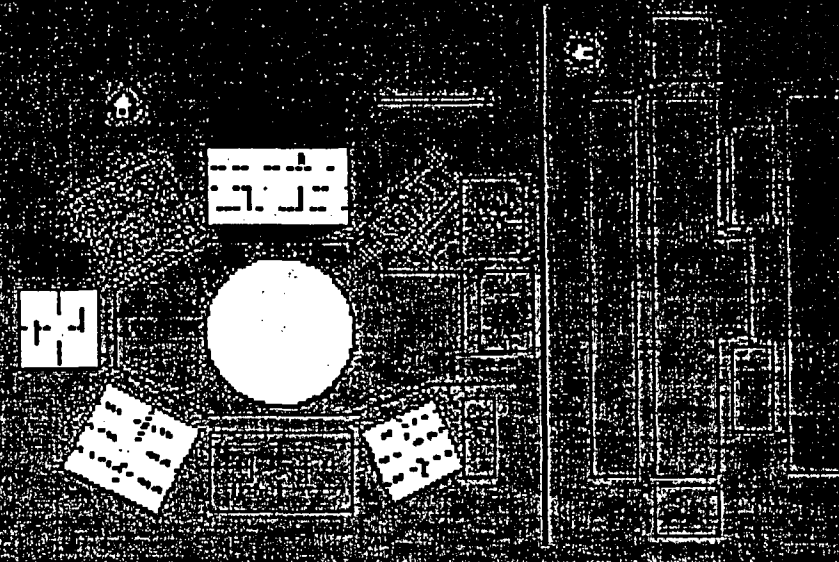
- InstaCote will be applied to all surfaces of the Cavity and Transfer Canal.
- Application of the InstaCote will be performed by a sub-contractor.
- Instacote will minimize airborne potential and can be used as a decontamination tool for hot spots.



Cavity Decon – Liner Cut Plan

CAVITY LINER CUT PLAN (IF REQUIRED)

- Cavity Liner removal will be performed only in the event that the cavity decon activity does not reduce does rates low enough to favor all the work activities associated with RPV removal. (PO-3000-187)
- The Hydraulic Hammer with a chisel point will be used for segmenting and peeling away the cavity liner.
- The hammer will be connected to the GMM-1400 through the quick disconnect and manipulated by the to GMM-1400 to produce all the desired cut lines.
- Cut/rip 3' vertical lines in the cavity plate.
- Cut/rip horizontal lines approximately 7' down along the vertical cut. DO NOT COMPLETE the horizontal cut across the verticals; allow a small section of horizontal liner section to remain.
- Punch a hole through the liner plate towards one of the edges to allow for rigging of the section from the transport containers at the disposal facility. The hole can be made by simply punching the tip of the bit through the liner plate.
- Pinch bit behind liner and peel section away from cavity wall and allow liner section to remain hanging from the tab.
- Change tool from hydraulic hammer to hydraulic shear.
- Use shear to get a final rip on the liner section and work liner section free from the cavity wall.
- Survey liner section and dispose of in the appropriate container.



WPIR Review

- WP&IR No. 24265-000-CIV-3000-00097-001
- Setup & Demobilization of Louis A. Grant (LAG) Equipment

WPIR Review

- WP&IR No.
  24265-000-GEN-3000-00077-001
  Aggressive Decontamination of Reactor Cavity Walls and Floor

WPIR Review

WP&IR No.
24265-000-GEN-3000-00101-000

Transfer Canal Aggressive Decontamination, Cleaning and Equipment Removals

BREAK

- 10 minutes only, please

RSR 02-04

- Written to include the specific controls for Setup and operation of the Cavity Filtration system, Vacuum System, and operation of the Louis A. Grant (LAG) Machine for various tasks.
- Includes cutout, packaging and shipping of the Transfer Canal installed equipment, and Hydrolazing

RSR 02-04

- **Underwater Filtration System**

1. Used **ONLY** for Cavity, Reactor Vessel, and Transfer Canal Vacuum or water clarity functions.
2. Dose Rate Cutoffs (Underwater)

- 60 R/hr contact, average of 30 R/hr.
- When these values are reached, remove the filter from service.

RSR 02-04

- **Underwater Filtration System (cont.)**

3. Utilized with the Tri-Nuke 260, with drop out cans that have a maximum of 3/8 inch mesh holes, for GTCC Recovery.

RSR 02-04

- Underwater Filtration System (cont.)

4. Sort table to remain in place until Cavity Vacuuming is complete, and GTCC recovery is finished

RSR 02-04

- **Underwater Filtration System (cont.)**

5. High Dirt Loading Filter (HDLF) is to be blown down in a shielded enclosure, for shipping.

RSR 02-04

- Cavity Filtration System

1. This system is to be used for general cavity filtration and aggressive decon of the Cavity Walls and Floor.
2. **Do not** use this system for vacuuming without **Rad Engineering** approval.

RSR 02-04

- Cavity Filtration System (Cont.)

3. System is installed and shielded on the Charging Floor
4. Enclosure will be built with High Rad control capabilities

RSR 02-04

- Cavity Filtration System (Cont.)

5. Primary Shielding around filters for servicing the units.
6. Secondary Shielding for general walkways.

RSR 02-04

- Cavity Filtration System (Cont.)

7. Anticipated dose rates

- Filter Vessel (10 micron): 2-5 R/hr
- Filter Vessel (2 micron): 5-10 R/hr
- G/A outside Shielding: 1 to 3 mR/hr
- G/A Charging Floor: 0.2 – 10 mR/hr

RSR 02-04

- Operation of the Louis A. Grant (LAG) Machine

1. Establish work station in a low dose area.
2. Construct a laydown area, with a bullpen and HEPA ventilation for servicing or storing LAG end effectors.

RSR 02-04

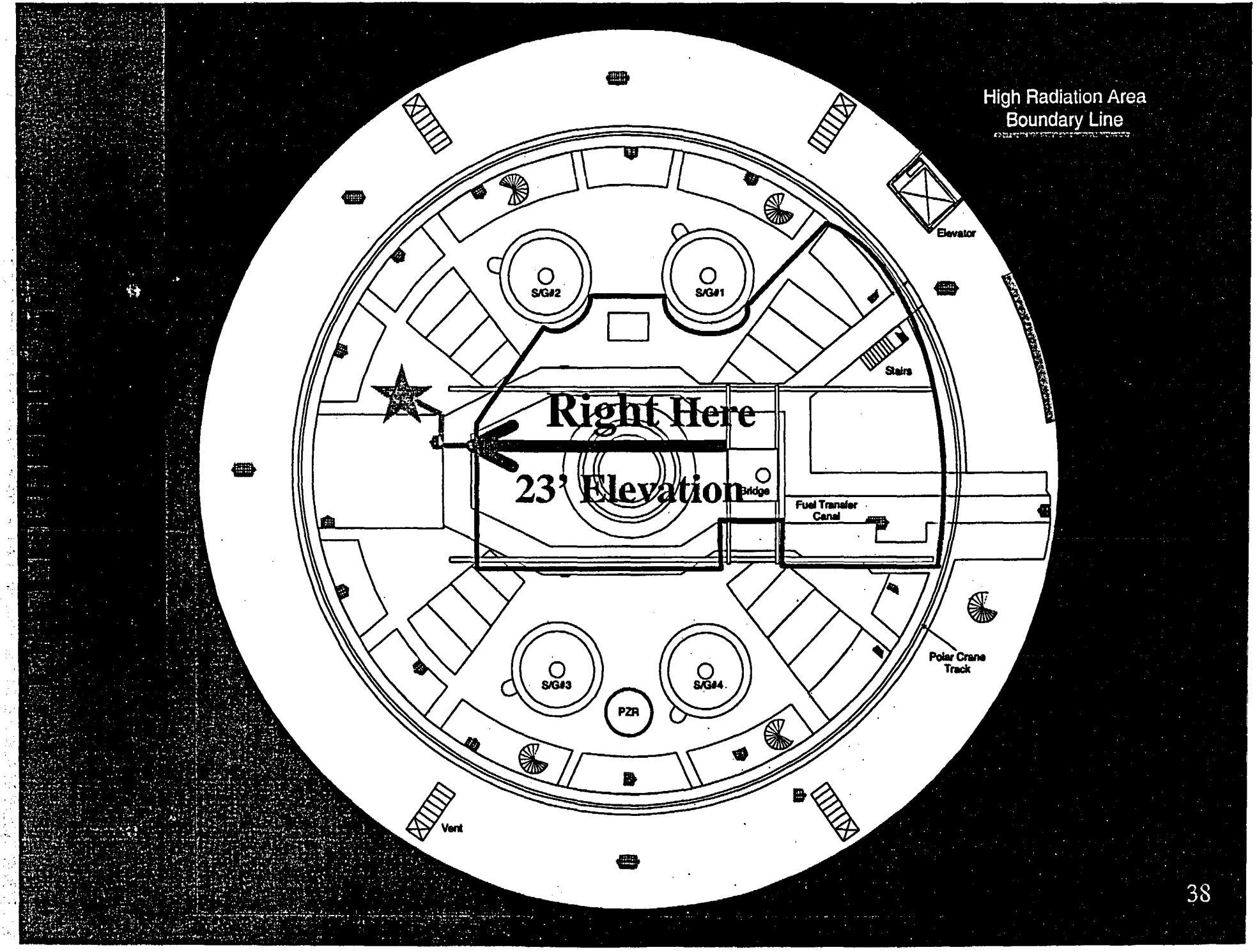
- Operation of the LAG Machine (cont.)

3. ARM's will be installed near the cavity
4. Under alarm conditions, put the boom assembly back into the Cavity, and notify RPS – Ops / Designee.
5. **No individual** will enter the High Rad Boundary while the LAG Machine is in use, without an **HP PRESENT**.

RSR 02-04

- Operation of the LAG Machine (cont.)

6. For aggressive hydrolazing, LAG Machine radiological controls are the same.
7. Under **NO CIRCUMSTANCES** is any machine driven Hydrolazer to be used at the Cavity west end in the area of the Cavity Purification High suction point.


High Radiation Area
Boundary Line
Elevator
S/G#2
S/G#1
Stairs
Right Here
23' Elevation
Bridge
Fuel Transfer
Canal
Polar Crane
Track
S/G#3
S/G#4
PZR
Vent

RSR 02-04

- Operation of the LAG Machine (cont.)

8. Various controls will be in place for LAG operations. RSR covers the material in detail.

RSR 02-04

- Loading, Processing and Transfer of The In – Situ liners.

1. Controls are the same for any liner, basket or whatever being removed from the water.
2. Basically the same as the controls we've already got in place.

RSR 02-04

- Transfer Canal Work
- Broke out into three phases

1. Equipment Cutout
2. Packaging and Shipping
3. Hydrolazing

RSR 02-04

- Transfer Canal (Equipment cutout)

1. Mainly done **underwater**
2. Radiological Controls very similar to what we already use.

RSR 02-04

- Transfer Canal (Packaging and Shipping)

1. Dose rate cutoffs determine where material goes.
2. Material either handled on Charging Floor or cutup and loaded underwater.

RSR 02-04

- Transfer Canal (Hydrolazing)

1. Done with Reactor Cavity full of water.
2. No capture system
3. Filtration system with same controls as was specified for the Cavity vacuuming.

Radiation Work Permit 2144 Task 1

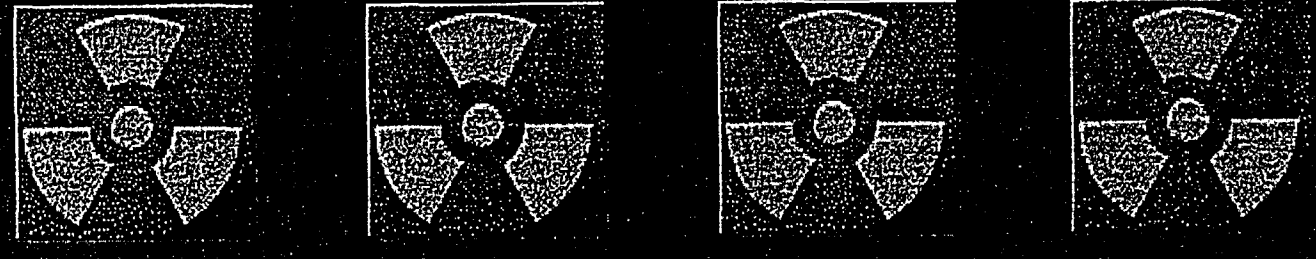
Rx Cavity set up and operation of the: (LAG) machine, vacuum/filtration system, Xfer canal equipment removal/hydrolazing, and packaging/shipping of equipment IAW RSR #02-04 Rev-0, and support work as authorized by RPS-Ops.

Radiation Work Permit 2144 – Task 1 continued

Plant Code	Year	RWP#	Rev. #	RWP Start Date	RWP Expiration Date	RWP Type	RWP Category	Rad. Area Type
1	2	2144	0	7/10/02	12/31/02	S2	S2	LHRA

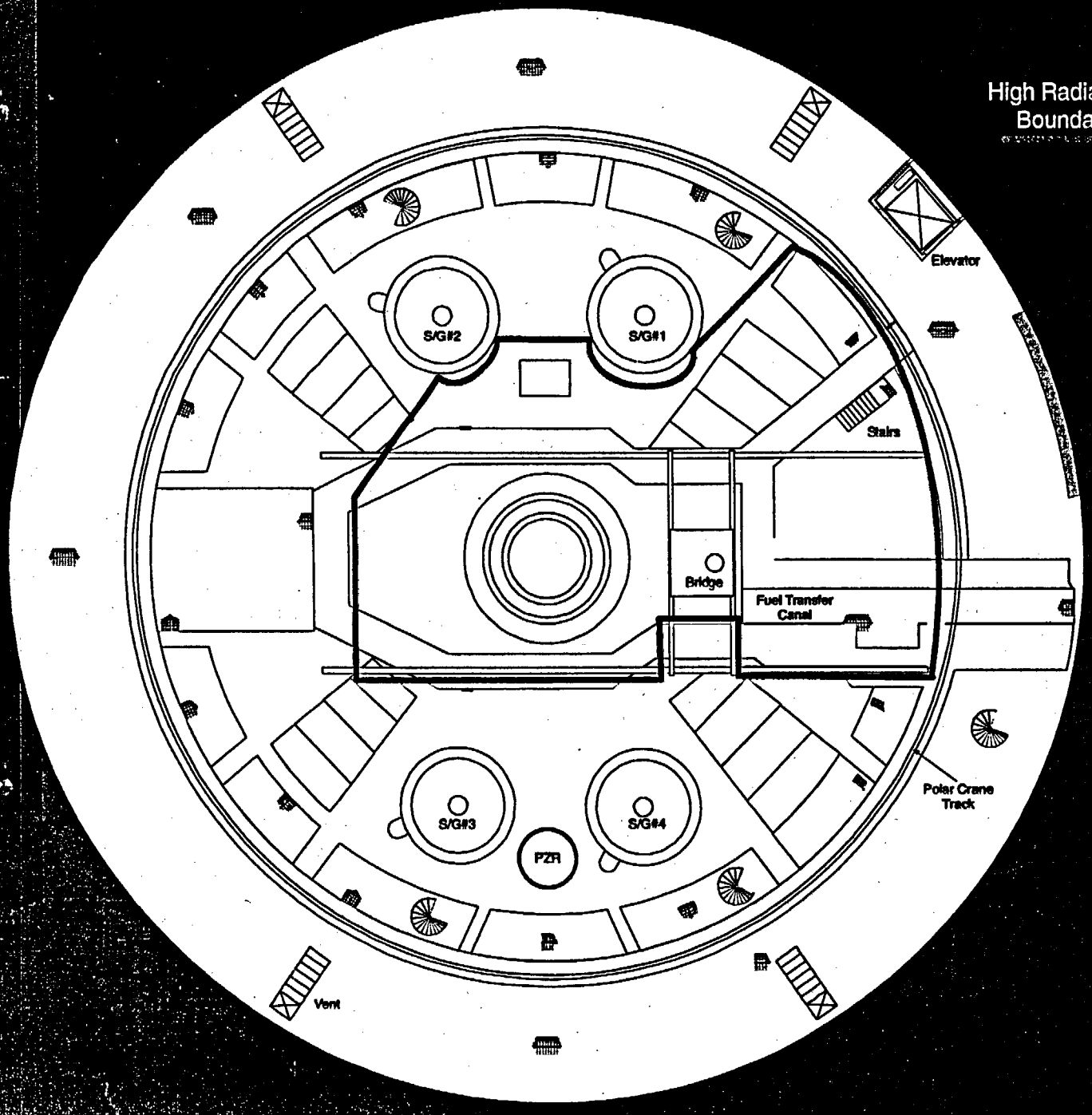
Responsible Individual	Extension	Department or Company	Job Supervisor	Extension	Department or Company
Bickford	3926	Bechtel	Bickford	3926	D&D Eng.

- Estimated Job Hours – 12295
- Authorized Job Hours – 12295
- Internal Dose (DAC) – None estimated
- External dose (mrem) estimated – 5773
- External dose (mrem) authorized - 5773



Below are expected radiological conditions. Contact HP for Current Conditions

	Radiation (mR/hr)	Contamination (DPM/100cm^2)	Airborne
RCA General Area	<1 – 10 mR/hr	<1K	<.3 DAC
CTMT General Areas	1 – 30 mR/hr	<1K – 10K	<.3 DAC
Rx Cavity Top Side	1 – 5 mR/hr	<1K – 20K	<.3 DAC
Xfer Canal Top Side	1 – 8 mR/hr	<1K – 20K	<.3 DAC

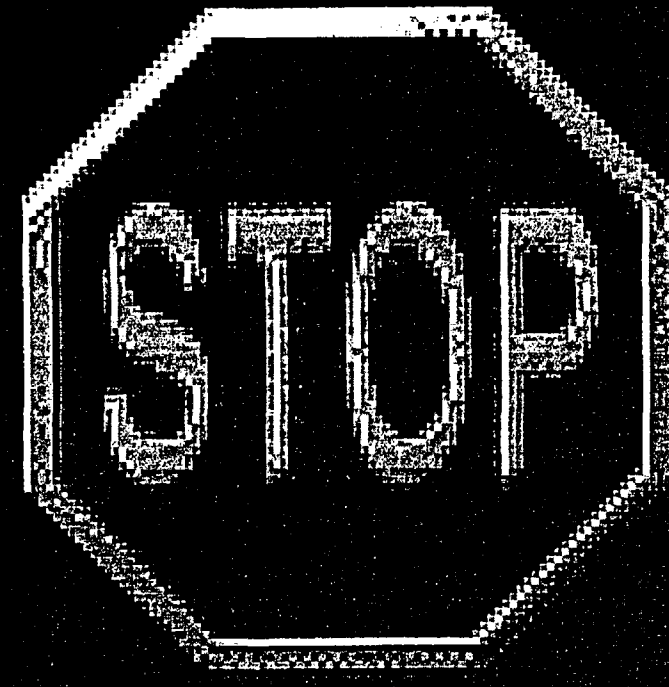

High Radiation Area
Boundary Line
Elevator
S/G#2
S/G#1
Stairs
Bridge
Fuel Transfer
Canal
Polar Crane
Track
S/G#3
PZR
S/G#4
Vent

Specific RWP instructions

- Weekly RWP brief for LAG machine set up and transfer canal equipment set up.
- Locked High Radiation controls as stated in RSR# 02-04, Rev. 0.
- Finger Rings, High Radiation Controls, Respirator Requirements, and Lapel Requirements are as stated in RSR# 02-04, Rev. 0.

Activities NOT Authorized on this RWP:

- Removal of items from the water without HP presence.
- Decon of equipment without HP approval.
- Flying liners/trash baskets or filters without HP presence.
- Breach of contaminated systems without HP presence.



- Entry into posted High Radiation Area without HP notification [HP presence is required for entry into HRA around the reactor cavity when the LAG machine is in operation.]

TLD and Electronic Dosimeter Required for entry into the RCA.

Electronic Dosimeter Set points:

- Dose Limit Alarm (Stay Time):

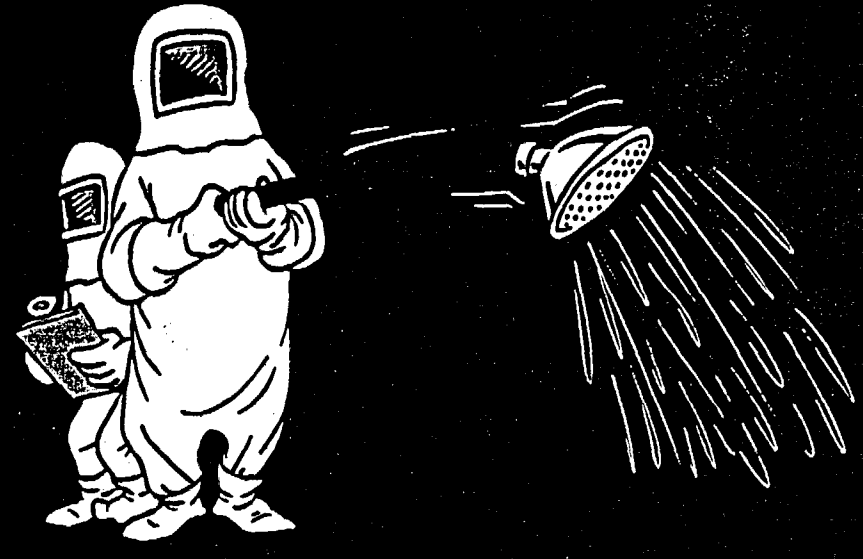
100 mrem

- Dose Rate Alarm:

500 mR/hr

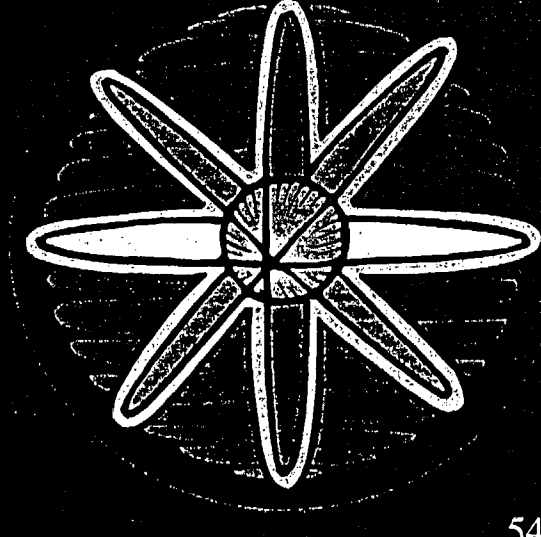
Protective Clothing requirements:

- Coveralls
- Rubber Gloves
- Cotton Liners
- Booties
- Rubber Shoe Covers
- *Additional P.C.'s as per HP



HP Instructions

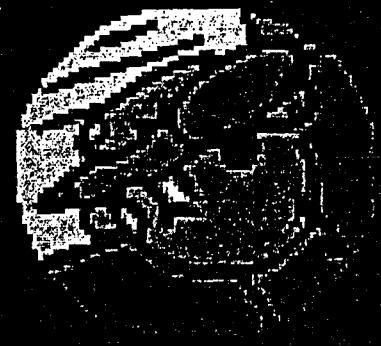
- Underwater dose rate of items.
- Dose rate surveys of items being removed from the cavity.
- Work area/General area air sampling
- Radiation, Contamination and hot particle surveys.
- Relocation of dosimetry.
- Notifications as required in the RSR



HP Instructions continued

- **Constant coverage for:**
  - work in the pool
  - entry into HRA around the reactor cavity when the LAG machine is in operation.
  - Flying liners or trash
  - Changing or flying filters
- **General coverage for all other activities.**

The FOLLOWING ITEMS SHALL BE DOCUMENTED ON THE PRE-JOB BRIEFING SHEET:



- Dose rate levels in the immediate work area.

- HP Tech. Monitoring Requirements.
  Constant HP Coverage or stay times (LHRA Only)