ENCLOSURE 2

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-245/89-13

Docket No. 50-245

License No. DPR-21 Category C

Licensee: Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06101

Facility Name: Millstone Nuclear Generating Station Unit 1

Meeting At: NRC Region I, King of Prussia, Pennsylvania

Meeting Conducted: June 21, 1989

Prepared by: P. O'Connell 6-29-89
P. O'Connell, Radiation Specialist, FRPS, FRSSB — date

Approved by: W. Pasciak 6-29-89
W. Pasciak, Chief, Facilities Radiation Protection Section, Facilities Radiological Safety and Safeguards Branch — date

Meeting Summary: Enforcement Conference at NRC Region I, King of Prussia, Pennsylvania, on June 21, 1989, to discuss the findings of NRC Inspection Report No. 50-245/89-13. The topics discussed related to the shipment of a high pressure pump and trailer with removable external radioactive contamination from the licensee's reactor site to a vendor site in Moorestown, New Jersey.

The meeting was attended by NRC and licensee management and lasted for approximately two hours.

DETAILS

1. Participants

1.1 Northeast Nuclear Energy Company

H. Haynes, Station Services Superintendent, Millstone
S. Scace, Station Superintendent, Millstone
F. Sears, Vice President, Nuclear & Environmental Engineering
J. Sullivan, Health Physics Operations Supervisor, Millstone
G. Van Noordennen, Licensing Supervisor, Millstone

1.2 NRC Personnel

M. Boyle, Senior Project Manager, NRR
R. Bellamy, Chief, FRSSB, RI
M. Knapp, Director, DRSS, RI
J. Gutierrez, Regional Council, RI
L. Kolonawski, Resident Inspector, Millstone Unit One
P. O'Connell, Radiation Specialist, RI
W. Pasciak, Chief, FRPS, RI
W. Thomas, Radiation Specialist, RI
E. Wenzinger Sr., Chief, DRP Br. 1, RI

2.0 Purpose

The Enforcement Conference was held at the request of NRC Region I to discuss the circumstances relating to the shipment of a high pressure pump and trailer, which had removable external contamination, from the licensee's reactor site to a vendor's site in Moorestown, New Jersey. The discussions at this meeting focused on: the identified apparent violations, their safety significance, the root cause of the event, and licensee corrective actions to prevent recurrence.

3.0 Licensee Presentation

Licensee management began their presentation by emphasizing that they are committed to making the necessary changes in their program to preclude recurrence of this type of incident. The licensee stated that prior to this incident they made several improvements in their Health Physics Program. The improvements included the reorganizing of the Health Physics Department into two groups, Operations and Support; increased staffing to reduce the need for contractor Health Physics support; and a general upgrade of Health Physics procedures. Licensee management stated that this incident demonstrated that their program still has some weaknesses, particularly in the area of management review of proposed work activities.

Licensee personnel provided the NRC with handouts which provided an outline of the event and the licensee's corrective actions. These handouts are included in this report as Attachment 1. Licensee personnel reviewed with NRC management the chronology of the incident, the root causes of the incident, related radiological survey and calculation data, and the licensee's assessment of the safety significance of this incident. The licensee also reviewed the corrective actions which the licensee has implemented. These actions included adopting an interim policy of surveying all vehicles prior to their leaving the site and having upper plant management reemphasize the importance of thorough reviews of new procedures or other changes by the Plant Operations Review Committee (See Attachment 2). The licensee also provided timely notification to other utilities of the incident in order to decrease the possibility of a similar incident happening elsewhere (See Attachment 3).

Licensee evaluation of long term corrective actions was still in progress. The licensee committed that the final long term corrective actions will be developed and implemented by September 1, 1989.

4.0 Concluding Statements

Licensee management stated that they had no additional qualifying information for the findings presented in NRC Inspection Report No. 50-245/89-13.

NRC Region I management acknowledged that the actions presented appeared to be responsive to the NRC's concerns. NRC Region I management stated that the licensee would be informed of the need for and the nature of appropriate enforcement action relative to this incident at a later time.

Attachment 1.

Docket No. 50-245

Enforcement Conference

CONTAMINATION OF THE WESTINGHOUSE HYDROLAZER SYSTEM USED AT MILLSTONE UNIT ONE

NORTHEAST NUCLEAR ENERGY COMPANY
JUNE 21, 1989

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ATTACHMENTS

CONTAMINATION OF THE WESTINGHOUSE HYDROLAZER SYSTEM USED AT MILLSTONE UNIT ONE

DESCRIPTION OF EVENT

On Monday, May 15, 1989 a Westinghouse hydrolazer trailer being temporarily stored at the Westinghouse maintenance facility in Moorestown, New Jersey was found by Westinghouse to be radioactively contaminated. Westinghouse notified NNECo on May 15, 1989 and stated they believed the contamination originated at Millstone Station. The hydrolazer trailer had been used at Millstone Unit One to decontaminate the refueling cavity.

Investigation of radiological survey data, operating logs and discussions with involved personnel addressed four possible causes of the contamination. These four possible causes are:

1. The hydrolazer water tank was internally contaminated due to it's prior use at Consolidated Edison's Indian Point Unit Two.
2. Contaminated water was supplied to the hydrolazer water tank at Millstone One.
3. The hydrolazer water tank and trailer were intentionally contaminated by others.
4. Water from the reactor cavity was inadvertently siphoned, or drained back into the hydrolazing unit.

After review it has been concluded that the fourth possible cause is most likely. Further rationale for this conclusion is provided in the Analysis of Event section of this report.

Other than the hydrolazer unit, no people or facilities,were contaminated from this event. Appropriate NRC, State of Connecticut DEP notifications were made on May 16,1989 in accordance with requirements of 10 CFR 50.72.

Our evaluation indicated this was not reportable per 10CFR 50.73.

Chronology

Date	Event
May 4,1989	Westinghouse hydrolazer crew onsite.
May 5	Equipment setup.
May 8	"Upper Drywell Shielding" (Cattle Chute) hydrolazed (refueling equipment).
May 10	Reactor Cavity hydrolazed.
May 11	Westinghouse equipment and crew leave site.

May 12 Hydrolazer trailer arrives at Westinghouse maintenance facility in Moorestown, N.J.

May 15 Westinghouse Survey of trailer reveals contamination in the hydrolazer tank and on the trailer.

CAUSE OF EVENT

Millstone procedures SHP 4917 Unconditional Radiological Release of Material For Unrestricted Use and HP905/2905/3905 Control And Accountability of Radioactive Material provide instruction for controlling and accounting for radioactive material and to provide a means for the unconditional release of material from contaminated areas for unrestricted use.

These H.P procedures successfully address the majority of possible contamination circumstances. However, they did not effectively deal with the contamination of the hydrolazer trailer because they do not address situations in which a possible, but unintentional flow path from a contaminated area to a clean area could exist.

The hydrolazing activity in question and all similar activities are performed using approved procedures. These procedures require Plant Operations Review Committee (PORC) review and approval. This review process is considered to be effective at Millstone. However, in this instance the process failed to identify the potential siphoning scenario and to cause sufficient safeguards to be implemented.

ANALYSIS OF EVENT

For operation at Millstone Unit One, the hydrolazer trailer was situated outside of the Reactor Building at the railway access as illustrated in Attachment One. As shown in Attachment One, water was supplied from the demineralized water storage tank to the hydrolazer supply tank. The hydrolazer pump discharge line was run into the Reactor Building, and up approximately 100 feet to the refuel floor where the hydrolazing was performed. Page 3 of Attachment One is a schematic of the water supply.

The hydrolazer trailer consists of a 60 gallon supply tank, a pump, and a diesel engine. Attachment Two is a diagram of the trailer. There are three connections to the tank: an inlet located on one end at the top, a pump suction located on the bottom center, and a bypass line located near the bottom, below the inlet line. The tank is vented to atmosphere through a vent panel near the top of the tank.The bypass line has an in–line valve and connects the discharge side of the pump back to the tank. Tank level is normally regulated by an inlet float valve. However, it was learned from Westinghouse that the float was not operable during the period of May 4 – May 12, 1989 and tank level was being maintained by the equipment operator through visual inspection. The hydrolazer pump is a positive displacement pump designed to deliver discharge pressures up to 11,000 PSI.

Three types of hydrolazing attachments were used. They were a 'remote lance' for the upper drywell shielding, a 'control gun' in the cavity, and a 'flex lance' in the cavity drains. The control gun has a trigger to shut off water flow while the remote and flex lances have no local control of water flow. During the hydrolazer activity there were periods when these attachments were required to be submerged.The remote lance was underwater during the entire effort to decontaminate the upper drywell shielding. The flex lance was submerged while cleaning the drains. The control gun was used in "open air" and not normally submerged.

Operation of all three hydrolazing attachments required coordination between the person hydrolazing and the pump operator at the trailer in order to regulate line pressure. The lance operator communicated by hand signals to a worker at the reactor cavity rail, who communicated to the pump operator via headset. The pump operator controls pressure by varying the speed of the diesel engine.

Radiological data

Six categories of radiological survey data were evaluated as listed below:

1. water supply;
2. the water supply hose;
3. the hydrolazer trailer including the tank, pump, diesel and fuel tank, and interconnecting lines;
4. the pressure hose;
5. reactor cavity water and wall;
6. area surveys.

All contamination survey data are included in Attachments Three through Ten. The significance of the data for each category is discussed below.

Water supply – Water samples taken from the demineralized water storage tank and the condensate storage tank show no radioactivity and no identifying peaks when isotopically analyzed. Results of weekly CST samples were the same for May 2, May 9, and May 15. Based on this, the water supply was eliminated from consideration as the source of contamination.

Water supply hose – The two sections of water supply hose used during the decon activity were obtained from the Millstone warehouse. Smear surveys of the inside and outside of the two sections of supply hose showed no radioactive contamination. One of the hoses was smeared internally at the center by cutting open the hose. These sample results confirm that the water supply was free of radioactive contamination.

Cavity Water – Reactor water samples routinely show the isotopes of Cr–51, Mn–54, Co–58, Fe–59, Co–60, Zn–65, and Cs–137. Zinc–65 is the predominant isotope. Unit 1 uses the zinc injection process to reduce Co–60 deposition and ultimately lower radiation levels throughout the reactor coolant system associated piping. An isotopic analysis of a smear of the cavity wall showed the same isotopes except for Cs–137. The relative abundance of Zn–65 in the cavity wall sample is much smaller although it is still almost 15% of the total activity. Variation of the Zn–65 relative abundance would occur because of mixing from other sources of water such as the spent fuel pool and because of differing plateout characteristics of different isotopes. Routine Unit One rad waste samples show typical isotopic mixes with 40–70% Zn–65. Thus the values of 20–65% relative abundances of Zn–65 seen in the hydrolazer tank, on the trailer, and in the pressure hoses would be within the expected range of values for contamination by cavity water.

Hydrolazer trailer – All the survey results on pages one through eight of Attachment Six are Westinghouse results provided to NNECo. The highest level of contamination was inside the tank below the supply inlet near the bypass inlet. There was also contamination inside the inlet connector on both sides of the supply valve, inside the bypass line on both sides of the bypass valve, and inside the tank outlet fitting for the pump suction line. The interior of the suction line from the tank to the pump was not contaminated except for some small amount of contamination in the line near the tank. These levels and distribution of contamination suggests that the contamination could have entered the tank either through the inlet supply line or through the bypass line. Since there is a lack of evidence of supply water contamination, the bypass line becomes the suspected route of contamination. Moreover, the absence of any significant level of contamination in the pump suction line suggests contamination of the tank after completion of pumping activities. There is also contamination on the tank,on the tank mount structures, and on the deck of the trailer under and around the tank. External contamination is thought to have occurred as a result of draining the supply tank by the Westinghouse operators in preparation for transporting the unit offsite.

NNECo obtained smears from Westinghouse of the trailer deck, the interior of the supply line inlet fitting, both sides of the water filter located inside the tank on the outlet line and of the vacuum hose used to clean the inside of the tank. Westinghouse also provided a crud sample from the bottom of the tank and residual water from the pump supply line. All samples were isotopically analyzed and found to have isotopes common to Millstone Unit One. The most predominant isotope identified was Zn–65 with a relative abundance ranging from 20–65%. This finding makes Unit One cavity water the primary suspect for the source of contamination discussed further below.

Pressure hose – Six sections of high pressure hose were used.Five sections of the hose and all the lances were found to be externally contaminated when the equipment was being disassembled. The external contamination was attributed to contamination originating on the refuel floor, therefore this was not cause for concern at the time. This equipment was not released by NNECo. One section of hose was clean and released to Westinghouse. After the trailer contamination was discovered by Westinghouse on May 15, the five sections were checked internally by inserting Q–tips in the ends. All five were internally contaminated. The section of hose kept by Westinghouse was subsequently found to have internal contamination. Isotopic analyses of smears of the hoses showed the same characteristic isotopic mix as the tank contamination samples.

Area surveys – A survey for removable contamination of the area where the hydrolazer had been operated was initiated upon notification by Westinghouse. Attachment Nine page 1 provides the details of this survey. No detectable contamination was found.

A survey for fixed contamination was conducted on May 17. The survey indicated one spot of contamination of approximately 2 cm^2 in area (Attachment Nine Page 2). Analysis of the contaminated asphalt indicated Zn–65, C0–58 and Co–60.

Discussion of possible scenarios and conclusions reached

As previously mentioned four possible contamination scenarios have been considered:

1. The hydrolazer water tank was internally contaminated due to it's prior use at Indian Point Two. This has been discounted based on discussion with Consolidated Edisons personnel and radiological data from that facility.

2. Contaminated water was supplied to the hydrolazer water tank at Millstone One. This has been discounted by radiological data.

3. The hydrolazer water tank and trailer were intentionally contaminated by others.

This possibility is discounted for the following reasons:

- The Westinghouse contractor was the only bidder on the cavity decon work and a minimum number of people on–site knew of the crew's function. The general decon contractor declined to bid on this activity. Additionally there is no evidence of any animosity between contractor and any personnel while they were on site.

- The door to the railway access hatch was for the most part closed during the time period in question which would make it quite difficult to obtain a sample of primary water and pass through radiation detection equipment to exit the containment building unnoticed.

4. Water from the reactor cavity, was inadvertently siphoned or drained back into the hydrolazer unit. This is considered the probable scenario.

Discussion of the probable scenario

It has not been possible to identify the specific system operation which caused this event. From discussions with Westinghouse personnel, no specific operational sequence could be identified that caused feedback. Certain factors are supportive of the feedback or siphoning scenario. These factors include a system pathway which could have allowed feedback, a pattern of contamination which follows that pathway, and isotopic analysis from contamination samples which clearly indicate Millstone Unit One cavity water as the primary contaminant.

ASSESSMENT OF SAFETY SIGNIFICANCE

Maximum potential doses resulting from the hydrolazer trailer contamination were estimated based on post–incident surveys. Four dose categories were established – public dose due to release of contaminated water, internal dose to a worker, internal dose to a member of the public, and skin dose to a worker. In each category, considered conservative assumptions were made to postulate the worst case dose scenario. For this reason the doses are considered maximum potential doses.

All of the maximum potential dose estimates are well within the 10 CFR 20 whole body limits of 500 mRem in a year for a member of the public and 1,250 mRem in a quarter for a worker and the skin dose limit of 7,500 mRem in a quarter for a worker.

1. Public dose due to off–site release of liquids via the storm drains

MAXIMUM INDIVIDUAL:

WHOLE BODY:	2.69E-3 mRem
GI (MAX ORGAN):	7.92E-3 mRem

POPULATION:

WHOLE BODY:	7.28E-3 person Rem

2. Internal dose to worker:

WHOLE BODY:	0.3 mRem
GI (MAX ORGAN):	0.8 mRem

3. Internal dose to public:

WHOLE BODY:	0.03 mRem
GI (MAX ORGAN):	0.09 mRem

4. Skin dose to worker: 38 mRem (5 cm radius)

Methodology and Assumptions for Determining Doses

1. Public dose from off–site release

The release pathway was from water spilling and draining out of the hydrolaze tank, onto the ground, into the yard storm drain, and out to the discharge quarry. It was assumed that the total volume of the tank (60 gal) with a radionuclide concentration equal to cavity water (0.1 uCi/cc) was released. The computer code LADTAP2 was used to calculate the public doses resulting from this release. The actual dose will probably be lower because the cavity water activity concentration of 0.1 uCi/cc is the upper limit of measurements taken of the cavity water. Also, the 60 gallon release of cavity water is an upper limit because of the dilution with supply water.

2. Internal dose to worker

The worst scenario for intake of radioactive material would be transfer of contamination from the trailer deck onto a hand and then transferred to food being eaten. The following assumptions were made:

- The average trailer deck contamination of 15,000 DPM/100 cm^2 seen in the trailer survey is 10% of the activity deposited before being washed off by rain.
- Contamination from a 1,000 cm^2 area was transferred by contact to a hand.
- Ten percent of the hand contamination was ingested.

With these assumptions an intake of 0.08 uCi is postulated.Using the isotopic mix seen in the trailer smears and the dose conversion factors from Regulatory Guide 1.109, the internal dose was calculated. All Westinghouse personnel involved in this evolution recieved a whole body count upon leaving the site with no indication of internal activity.

3. Internal dose to public

The public internal dose was calculated in the same way as worker internal dose. With the public dose however the activity is reduced by a factor of ten because of wash–off prior to leaving the site.

4. Skin dose

It was assumed that a 100 cm^2 area of deck contamination of 150,000 DPM/100 cm^2 was transferred to a 5 cm diameter circle of skin. The activity was assumed to reside on the skin for 24 hours. Using the isotopic mix seen in the trailer smears and the Code VARSKIN the skin dose was calculated.

Based on the above, NNECo concluded that this event was not significant with respect to the actual consequences to plant personnel or the public.

<u>CORRECTIVE ACTION</u>: **Immediate**

Following discovery of the contamination incident,meetings were held between the Health Physics Supervisor and the Radiation Protection Supervisors to discuss the hydrolazer release from the site and to obtain input on program weaknesses which need to be resolved. During these meetings, requirements were established for surveys of any equipment with a potential for contamination due to a positive interface with a contaminated area/system.

As an interim measure to prevent recurrence NNECo has instituted a program for surveying all vehicles leaving the protected area.

To make station supervision aware of the situation, the Station Superintendent has issued a memo to all members of the unit PORCs. This event is to be used to reemphasize the need for comprehensive evaluations of new and contractor procedures with an emphasis on the "What if..." possibilities. This memo was copied to the Superintendent of the Haddam Neck Station.

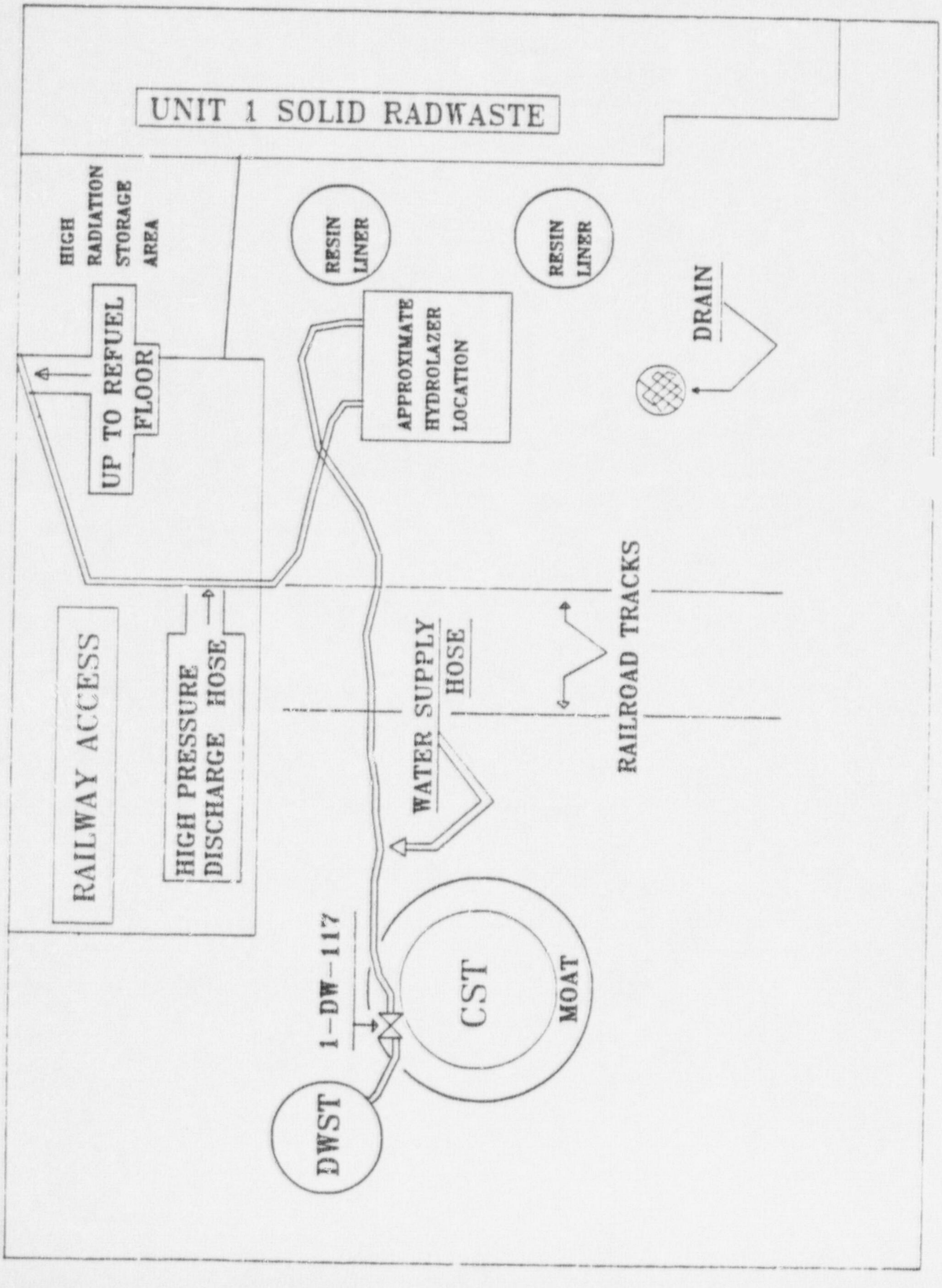
To make other utilities aware of the possibility of such an unanticipated contamination occurrence, a NETWORK entry was prepared and issued.

In addition this report was reviewed by Haddam Neck management. It was determined that sufficient controls are in place to prevent a similar event from happening at that facility.

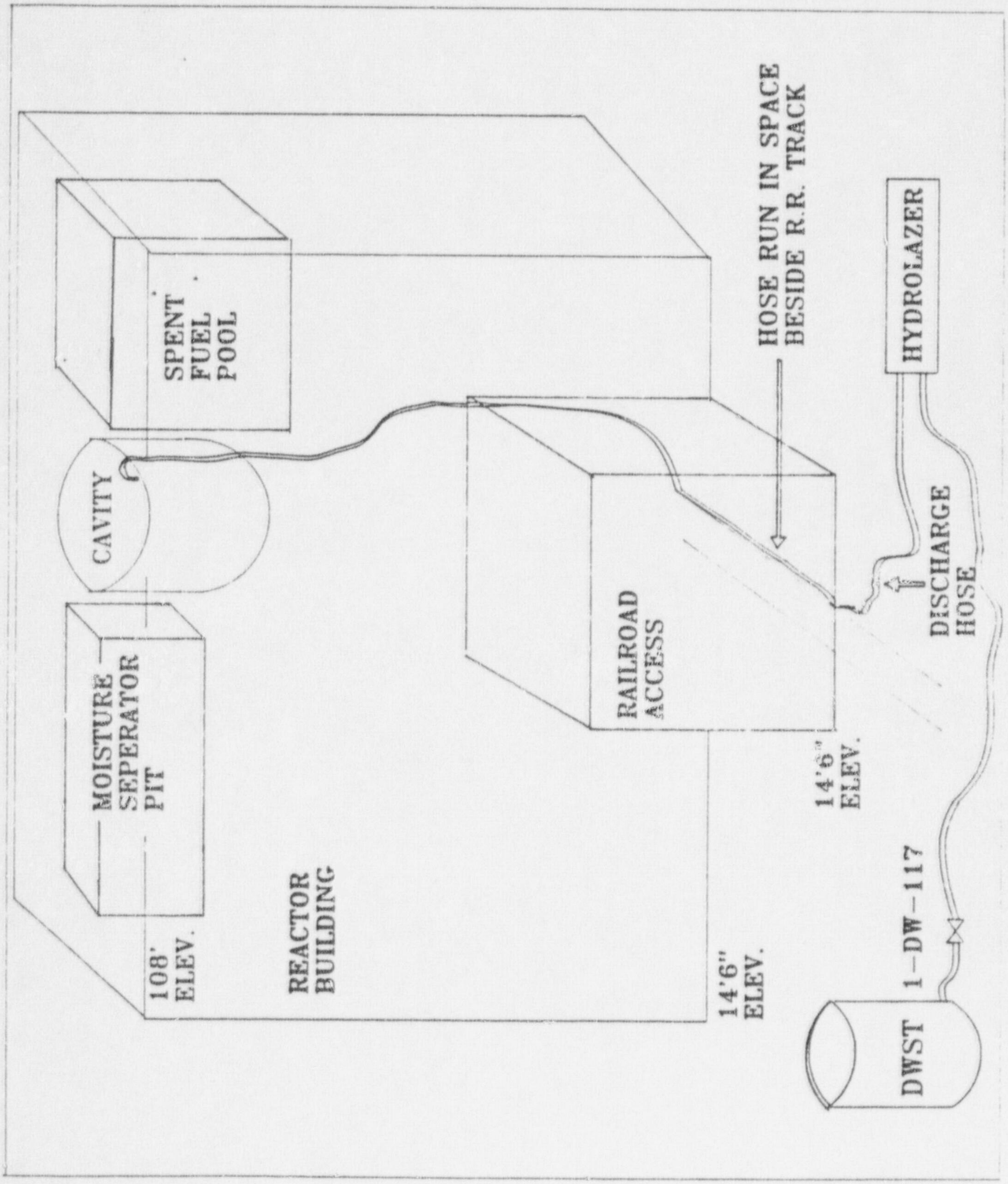
<u>Corrective Action:</u> **Long Term**

Evaluation of long term corrective action is in progress. By September 1, 1989 Millstone will have implemented final corrective actions that will address both the upgrade of our radiological controls program, to insure contaminated equipment is not released from the Millstone site and enhancements in work control processes that are deemed appropriate based on our detailed event analysis.

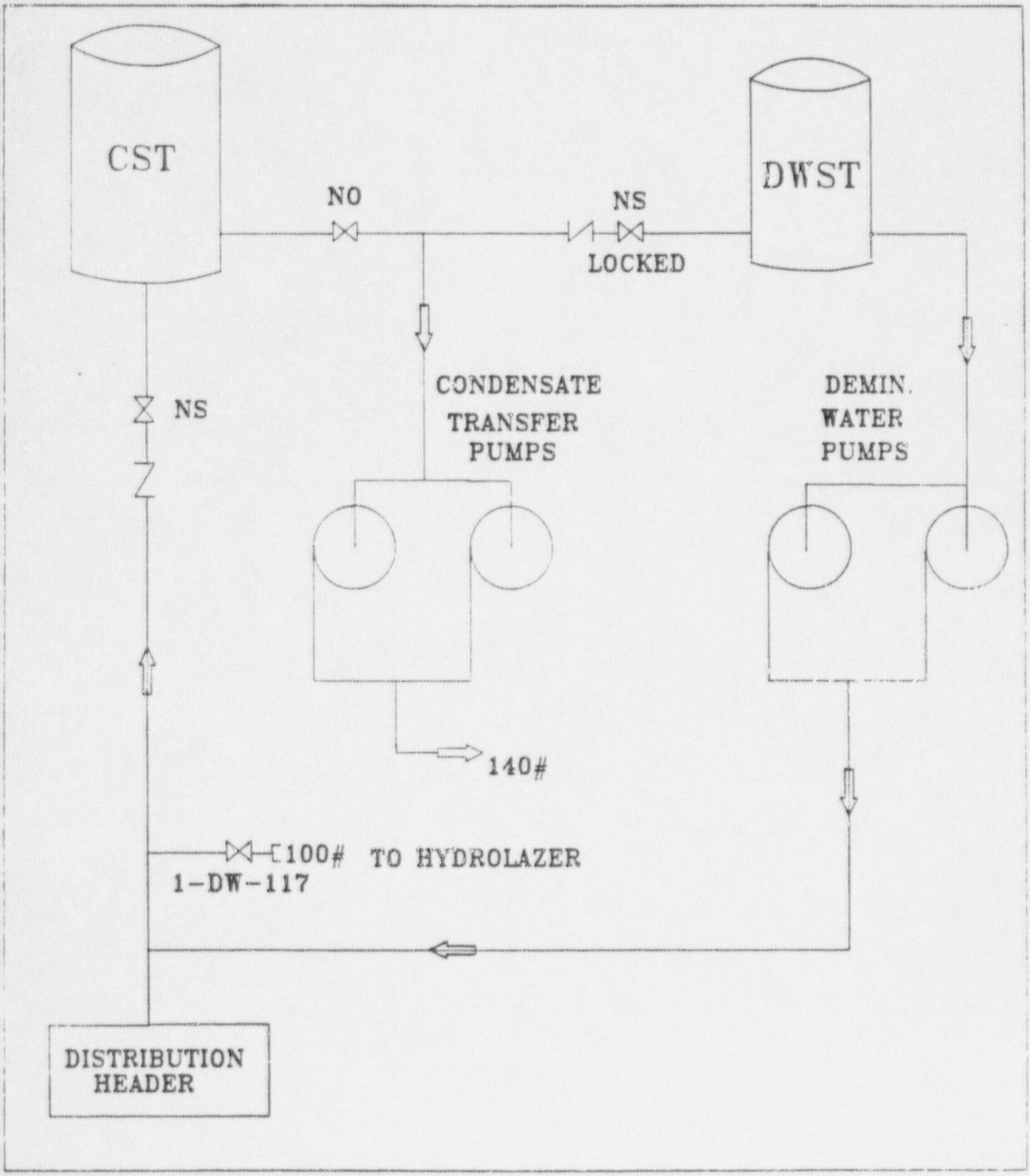
HYDROLAZE TRAILER LOCATION



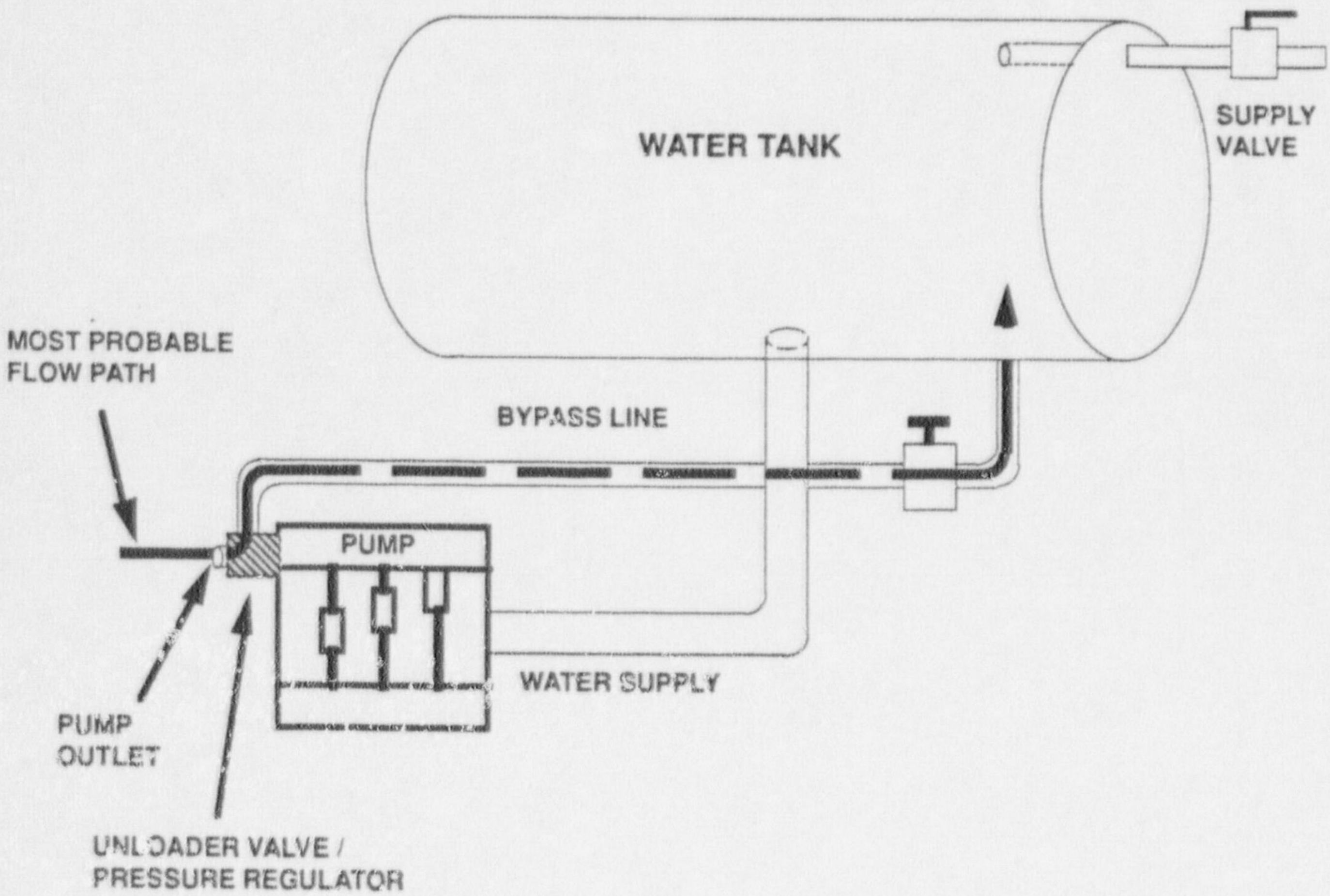
HYDROLAZE TRAILER LOCATION



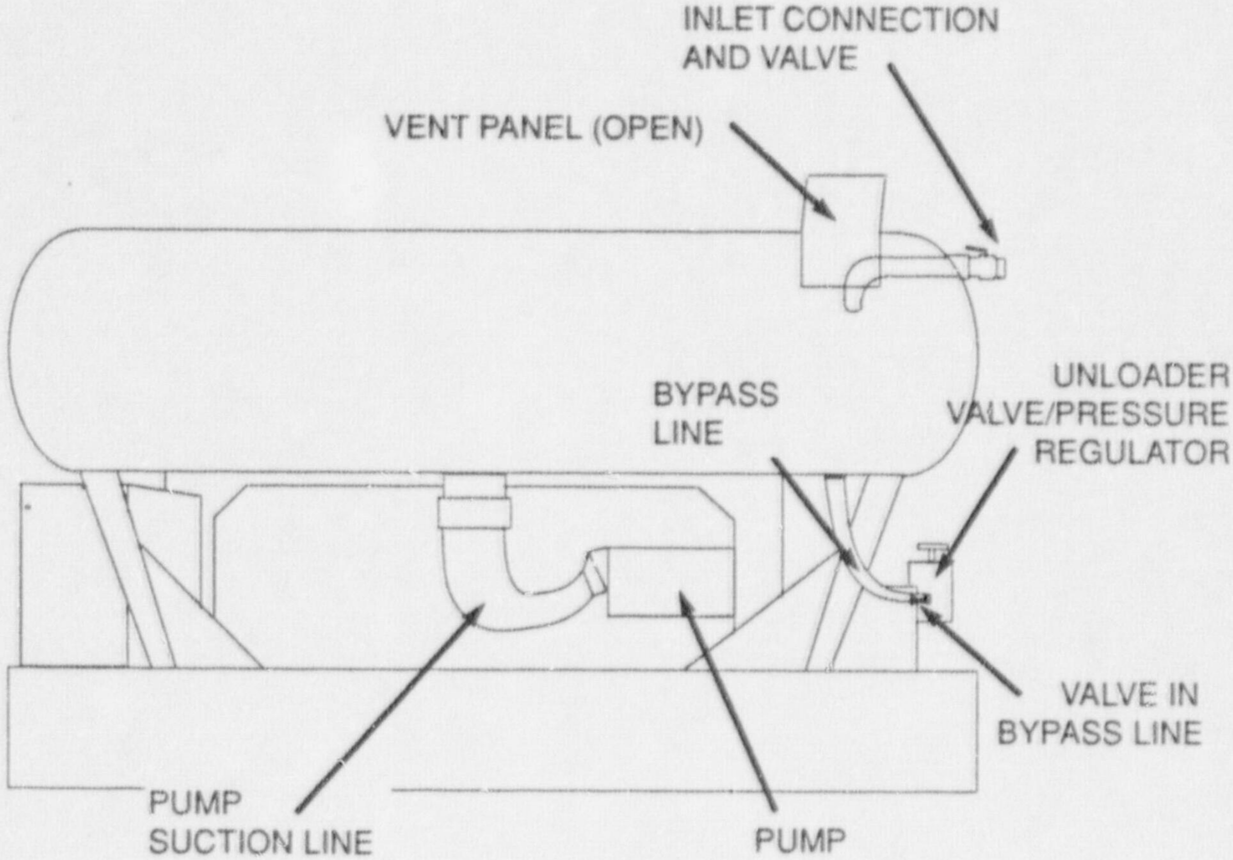
HYDROLAZE WATER SUPPLY

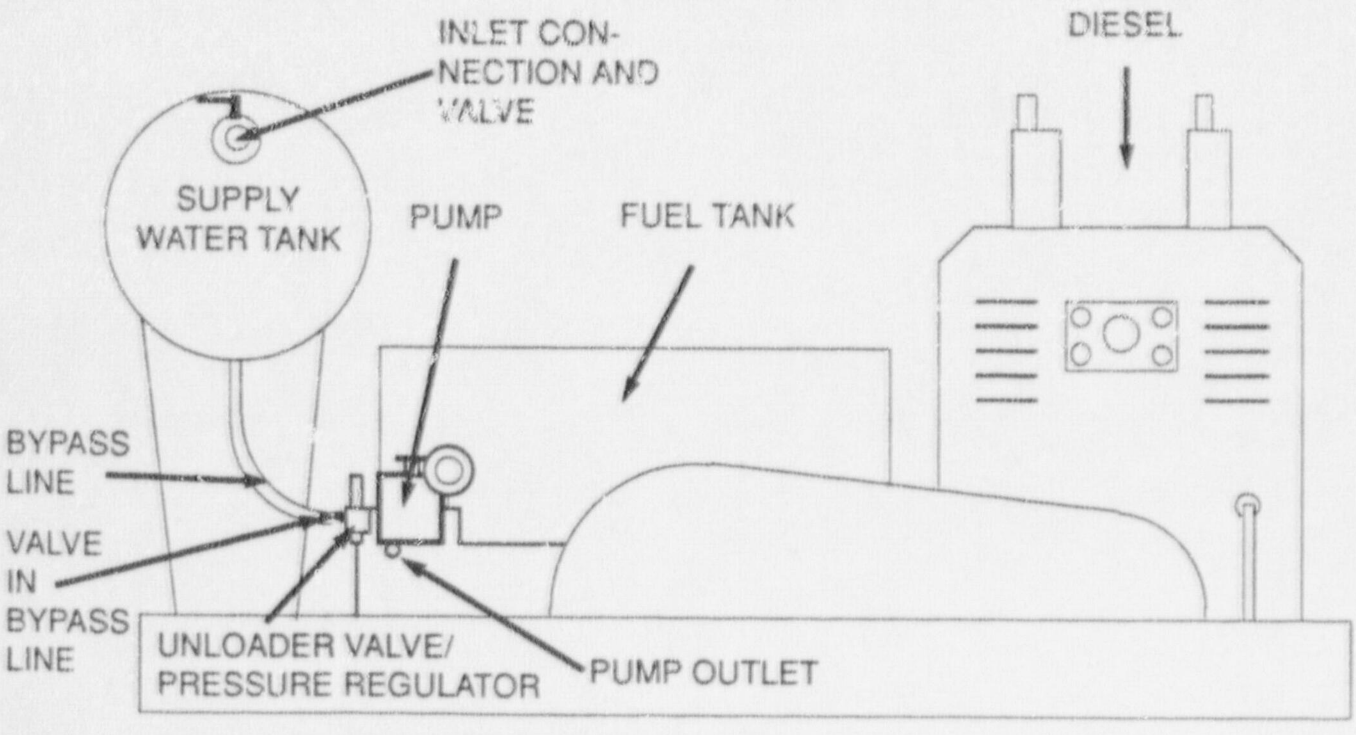


HYDROLAZE SYSTEM DESIGN



HYDROLAZE TRAILER – BACK AND SIDE VIEWS





RADIOLOGICAL DATA: ISOTOPIC ANALYSES OF WATER SUPPLY

Sample	Date	Volume	Count Time	Results
CST[1]	5/2/89	1,000 ml	30 min	No radionuclides identified
CST[1]	5/9/89	1,000 ml	30 min	No radionuclides identified
CST[1]	5/16/89	1,000 ml	30 min	No radionuclides identified
DWST[2]	5/15/89	1,000 ml	30 min	No radionuclides identified
DWST[2]	5/18/89	1,000 ml	30 min	K-40 only

1) Condensate Storage Tank

2) Demineralized Water Storage Tank sampled via valve 1-DW-117

Analyses performed at Millstone Nuclear Power Station

ATTACHMENT FOUR

RADIOLOGICAL DATA: WATER SUPPLY HOSE

Surveys Performed by Millstone Nuclear Power Station

Removable Contamination

Sample	Date	Results (dpm/100cm^2)
External	5/15/89	$<1000\ \beta\gamma$ $<20\ \alpha$
Internal	5/15/89	$<1000\ \beta\gamma$ $<20\ \alpha$
External – Large Area	5/15/89	$<1000\ \beta\gamma$ $<20\ \alpha$
Connectors	5/15/89	$<1000\ \beta\gamma$ $<20\ \alpha$

Fixed Contamination

Sample	Date	Results (dpm/frisk)
External	5/15/89	$<5000\ \beta\gamma$ $<100\ \alpha$ (both hoses)
Internal	5/18/89	$<5000\ \beta\gamma$ $<100\ \alpha$ (one hose)

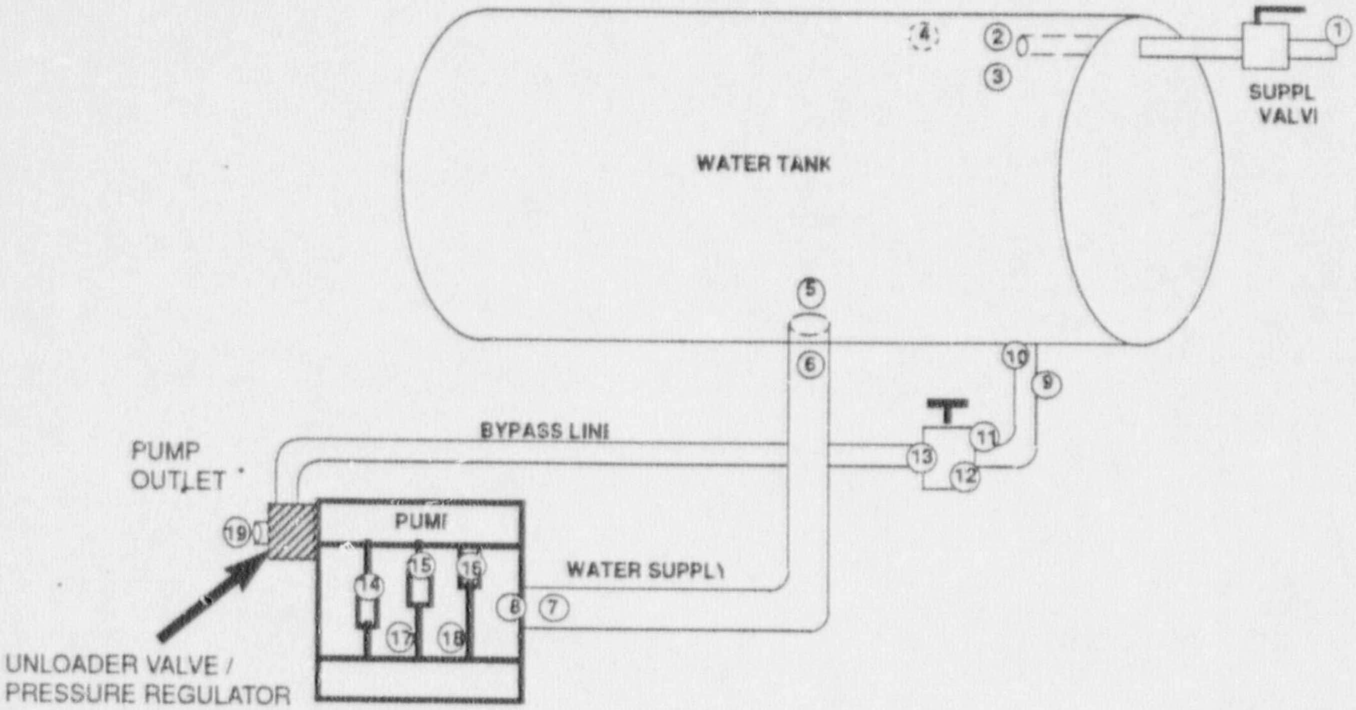
Isotopic Analyses of Smears

Sample	Date	Count time	Results
External	5/15/89	10 min	No radionuclides identified (both hoses)
Internal	5/18/89	10 min	No radionuclides identified (one hose)

ATTACHMENT FIVE

RADIOLOGICAL DATA: HYDROLAZE TRAILER SURVEY OF MAY 15, 1989

Survey on May 15, 1989 by Westinghouse

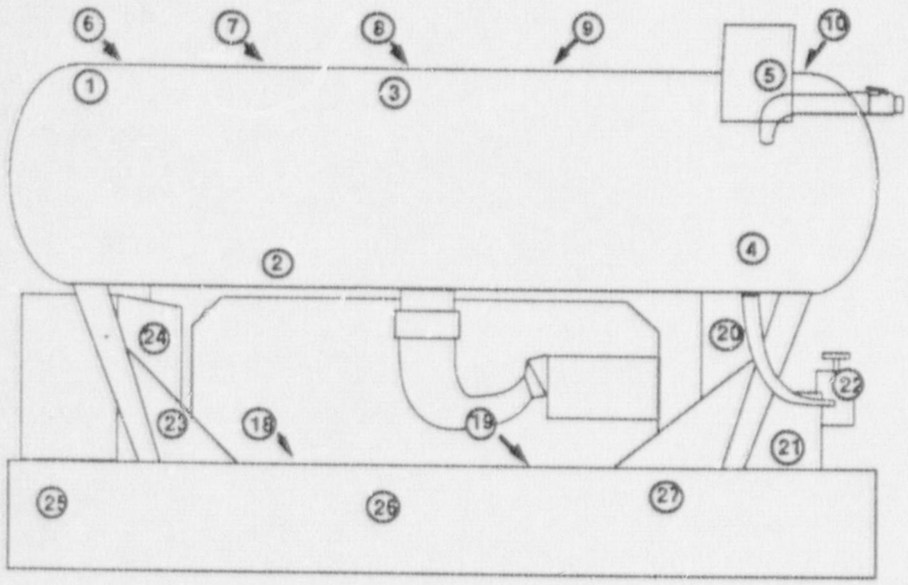


No.	dpm/100cm²	Location
1	1263	Water Inlet Fittings
2	1663	Water Inlet Inside
3	10863	Water Inlet Inside
4	2863	Inside Lid
5	1963	Tank Fitting for Suction Hose
6	550	Inside Suction Hose Tank End
7	<MDA	Inside Suction Hose Pump End
8	<MDA	Pump Inlet
9	15413	Bypass Hose by Water Tank
10	5125	Tank Fitting for Bypass
11	<MDA	Bypass Hose by Valve
12	1188	Inside Bypass Valve Tank
13	438	Inside Bypass Valve Pump
14	<MDA	Plunger
15	<MDA	Plunger
16	<MDA	Plunger
17	<MDA	Plunger Housing Base
18	<MDA	Plunger Housing Base
19	~~<MDA~~ [illegible]	Water Outlet

RADIOLOGICAL DATA: SURVEY OF HYDROLAZE TRAILER WATER TANK AND TRAILER

EXTERNAL CONTAMINATION

Survey on May 15, 1989 by Westinghouse



○ = smear location

6–10 taken on motor side of tank

11–17 taken inside water tank

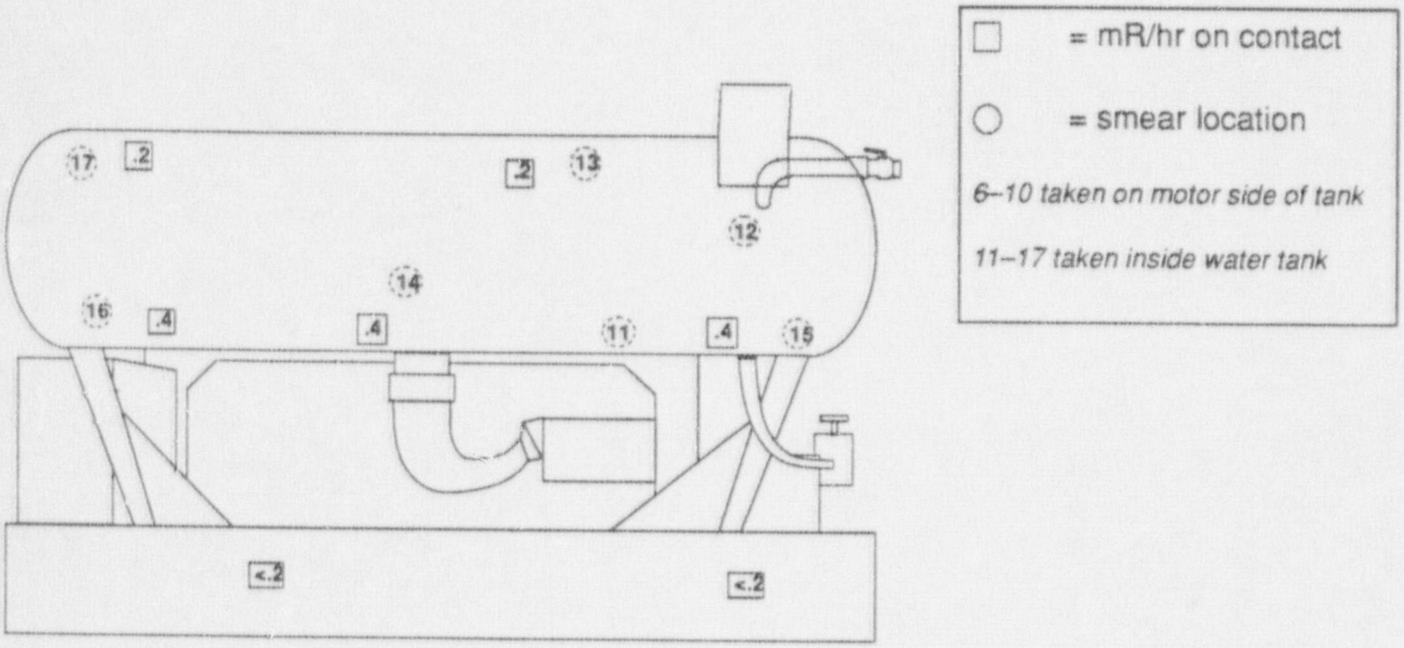
All results in dpm/100cm² (MDA = minumum detectable activity)

Smear Number	Results	Smear Number	Results
1	<MDA	18	15538
2	<MDA	19	4538
3	613	20	<MDA
4	<MDA	21	438
5	1063	22	<MDA
6	<MDA	23	<MDA
7	<MDA	24	<MDA
8	<MDA	25	2538
9	300	26	1200
10	600	27	2875

RADIOLOGICAL DATA: SURVEY OF HYDROLAZE TRAILER WATER TANK AND TRAILER

Internal Contamination and Dose Rates

Survey on May 15, 1989 by Westinghouse



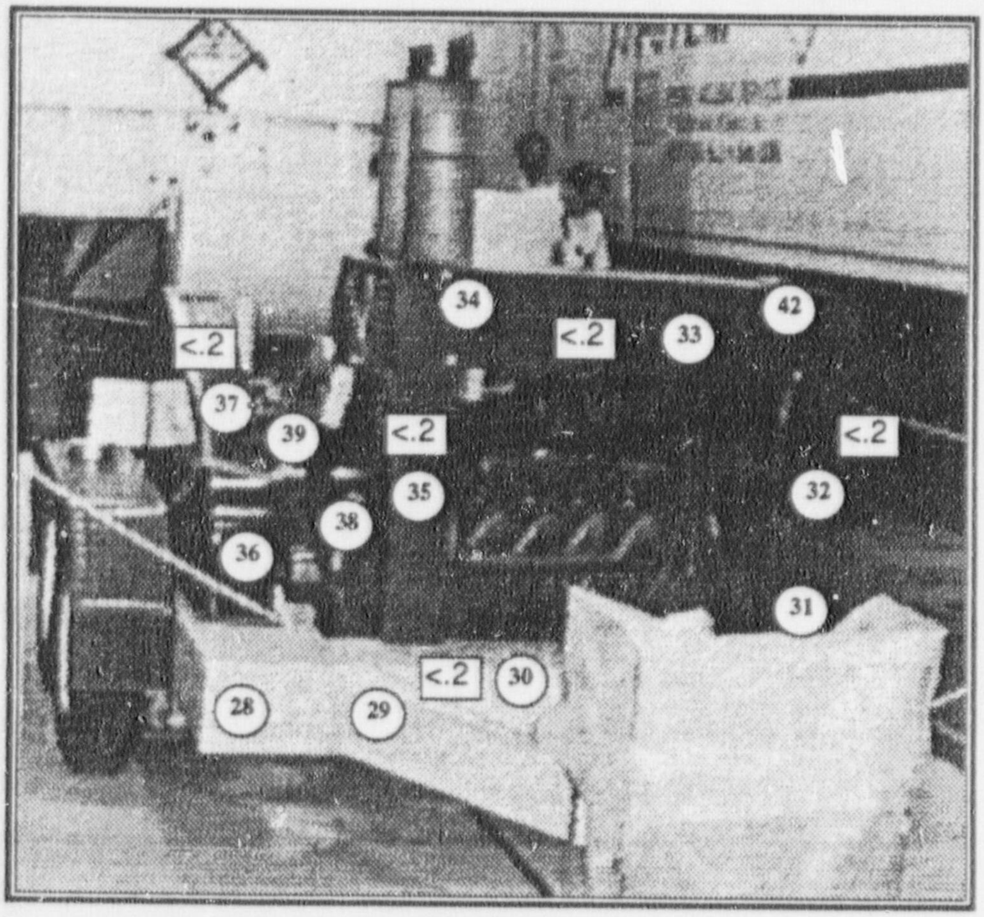
All results in dpm / 100cm² (MDA = minumum detectable activity)

Smear #	Results
11	675
12	1150
13	3400
14	9925
15	225088
16	813
17	3788

RADIOLOGICAL DATA: SURVEY OF HYDROLAZE TRAILER

EXTERNAL CONTAMINATION AND DOSE RATES

Survey on May 15, 1989 by Westinghouse



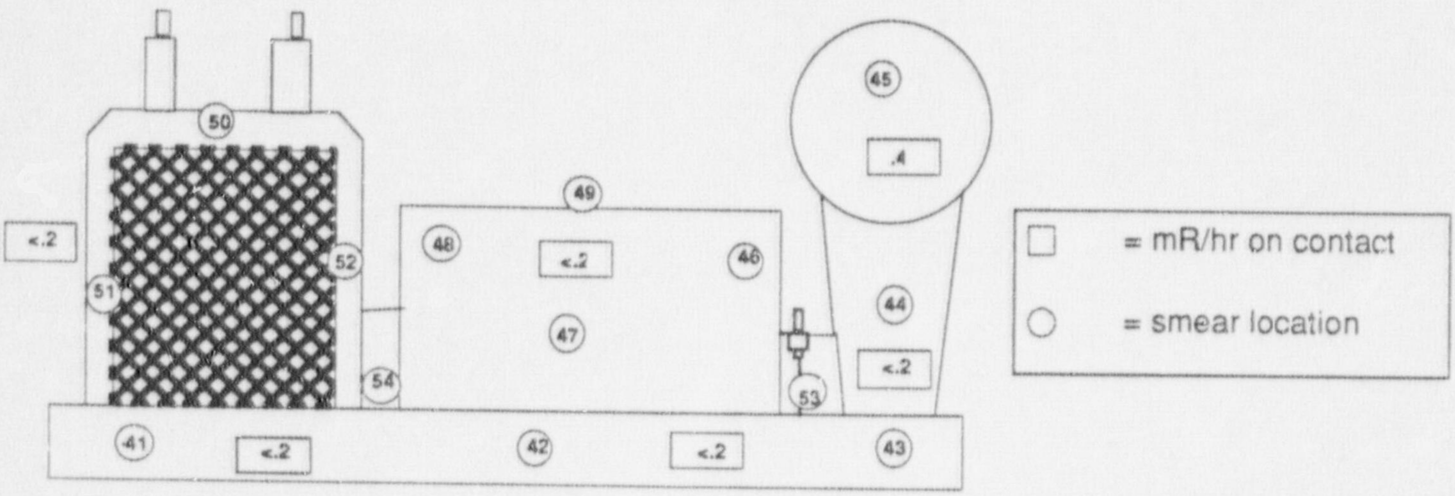
□	=	mR/hr on contact
○	=	smear location

All results in dpm/100cm2 (MDA = minimum detectable activity)

Smear #	Results
28	<MDA
29	<MDA
30	<MDA
31	<MDA
32	<MDA
33	<MDA
34	<MDA
35	<MDA
36	<MDA
37	<MDA
38	<MDA
39	<MDA
40	<MDA

RADIOLOGICAL DATA: SURVEY OF HYDROLAZE TRAILER
EXTERNAL CONTAMINATION AND DOSE RATES

Survey on May 17, 1989 By Westinghouse

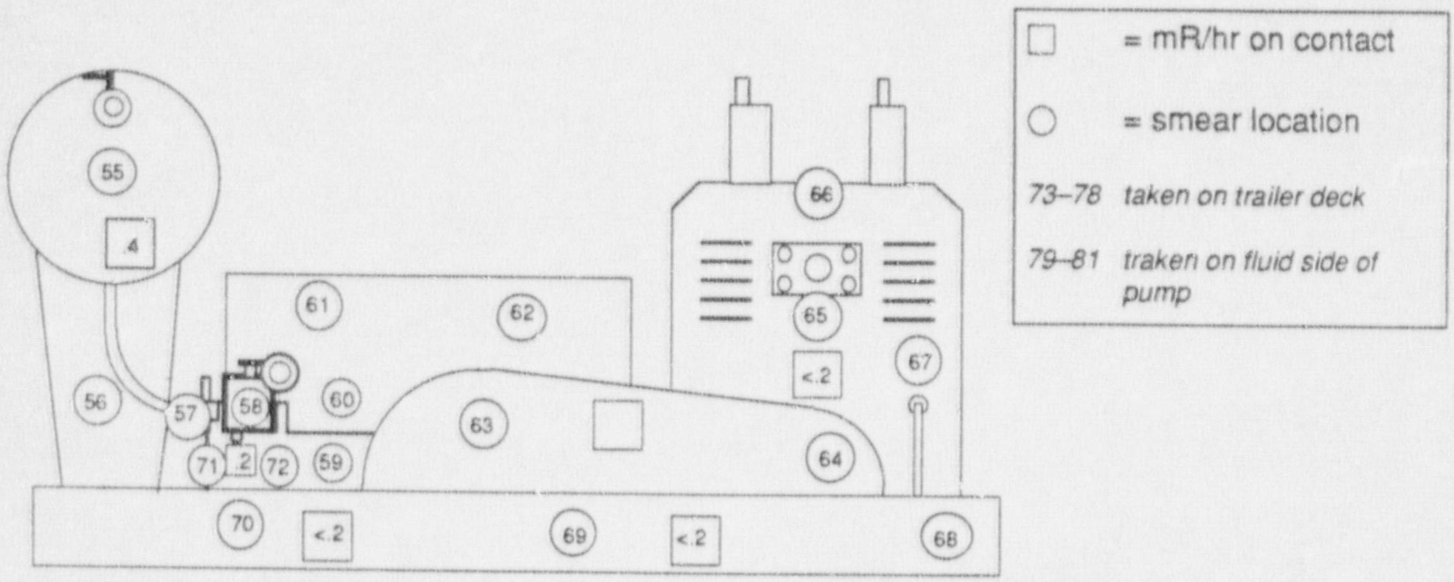


All results in dpm/100cm2 (MDA = minimum detectable activity)

Smear #	Results
41	<MDA
42	<MDA
43	363
44	338
45	<MDA
46	<MDA
47	<MDA
48	<MDA
49	<MDA
50	<MDA
51	<MDA
52	<MDA
53	26375
54	<MDA

RADIOLOGICAL DATA: SURVEY OF HYDROLAZE TRAILER
PUMP SIDE OF TRAILER

Survey on May 15, 1989 by Westinghouse



All results in dpm/100cm2 (MDA = minimum detectable activity)

Smear #	Results	Smear #	Results	Smear #	Results	Smear #	Results
55	500	62	<MDA	71	25075	81	<MDA
56	1213	63	<MDA	72	7437		
57	<MDA	64	<MDA	73	<MDA		
58	<MDA	65	<MDA	74	<MDA		
59	<MDA	66	<MDA	75	9613		
60	<MDA	67	<MDA	77	300		
61	<MDA	68	<MDA	78	288		
62	<MDA	69	<MDA	79	<MDA		
63	<MDA	70	1525	80	<MDA		

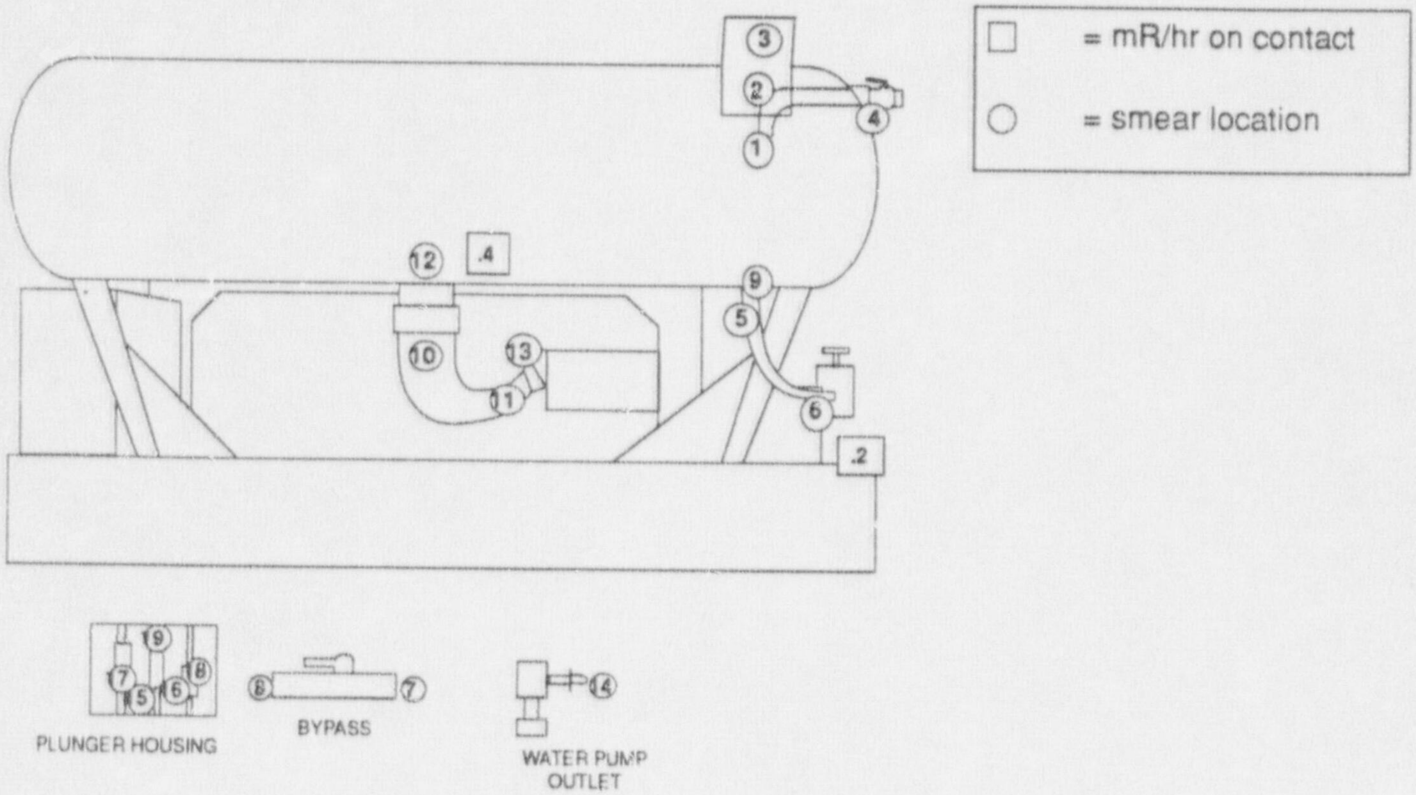
SMEAR LOCATIONS FOR MAY 15, 1989 SURVEY BY WESTINGHOUSE

Smear	Location
1	Outside of water tank
2	See Figure
3	See Figure
4	See Figure
5	See Figure
6	See Figure
7	See Figure
8	See Figure
9	See Figure
10	Outside of water tank
11	Inside of water tank
12	See Figure
13	See Figure
14	See Figure
15	See Figure
16	See Figure
17	See Figure
18	Trailer deck
19	Trailer deck
20	Water tank mount
21	Face of water block
22	Face of water block
23	Water tank mount
24	Water tank mount
25	Trailer frame
25	Trailer frame
26	Trailer frame
27	Trailer frame
28	Trailer frame
29	Trailer frame
30	Trailer frame
31	Trailer frame
32	Motor Cover
33	Motor Cover
34	Motor Cover
35	Motor Cover
36	Pulley Cover
37	Pulley Cover
38	Pulley Cover
39	Pulley Cover
40	Top of motor cover

Smear	Location
41	Trailer frame
42	Trailer frame
43	Trailer frame
44	Tank mount – outside
45	End of water tank
46	Fuel Tank
47	Fuel Tank
48	Fuel Tank
49	Fuel Tank
50	Radiator cover
51	Radiator cover
52	Radiator cover
53	Trailer deck
54	Trailer deck
55	End of tank – outside
56	Water tank mount
57	Water supply line
58	Pump
59	Pump
60	Pump
61	Fuel tank
62	Fuel tank
63	Pulley cover
64	Pulley Cover
65	Face of motor cover
66	Face of motor cover
67	Face of motor cover
68	Trailer frame
69	Trailer frame
70	Trailer frame
71	Trailer deck
72	Trailer deck
73	Trailer deck
74	Trailer deck
75	Trailer deck
76	Trailer deck
77	Trailer deck
78	Trailer deck
79	Fluid end of pump
80	Fluid end of pump
81	Fluid end of pump

RADIOLOGICAL DATA: SURVEY OF HYDROLAZE TRAILER

Survey on May 17, 1989 by Westinghouse



All results in dpm/100cm2 (MDA = minimum detectable activity)

Smear #	Results	Smear#	Results
1	10863	11	<MDA
2	1663	12	1963
3	2863	13	<MDA
4	1263	14	10038
5	15413	15	<MDA
6	388	16	<MDA
7	438	17	<MDA
8	1188	18	<MDA
9	5125	19	<MDA
10	550		

SMEAR LOCATIONS FOR MAY 17, 1989 SURVEY BY WESTINGHOUSE

Smear #	Location
1	Water inlet – inside
2	Water inlet – inside
3	Inside vent lid
4	Water inlet fitting
5	Bypass hose by water tank
6	Bypass hose by pump
7	Inside bypass valve – pump side
8	Inside bypass valve – tank side
9	Tank fitting for bypass
10	Inside suction hose – tank end
11	Inside suction hose – pump end
12	Tank fitting for suction hose
13	Pump inlet
14	Water outlet
15	Plunger housing base
16	Plunger housing base
17	Plunger
18	Plunger
19	Plunger

RADIOLOGICAL DATA: ISOTOPIC ANALYSES OF SAMPLES

Sample	1	2	3	4	5	6	7
Activity μCi (unless noted)	5.3E-2	1.5E-2	3.2E-2	5.5E-3	1.3E-3	9.5E-2	5.4E-3 (μCi/ml)
% Of Total Activity For							
Co-58	2.4	NI	2.2	NI	NI	1.4	1.7
Co-60	36.9	21.3	31.3	30.6	44.8	30.1	30.6
Cr-51	18.0	17.1	15.9	22.2	NI	15.0	17.7
Fe-59	4.8	7.3	7.4	NI	NI	6.4	8.1
Mn-54	15.3	17.6	17.7	18.0	15.8	15.6	19.2
Zn-65	22.4	36.6	25.6	29.4	39.2	31.5	23.1

NI = not identified

Sample identification

1 - Smear of trailer
2 - Smear of water filter inside tank on outlet line (pump side)
3 - Smear of water filter inside tank on outlet line (tank side)
4 - Smear of vacuum hose used to clean inside of tank
5 - Smear of inside of inlet line outboard of valve
6 - Crud from bottom of tank
7 - Water sample from tank

All samples were obtained by Westinghouse
All analyses were performed at Millstone

SMEAR SURVEY OF HOSE SECTIONS AT MILLSTONE

Hose connection swipe samples from Unit I Cavity Decon Hydrolazer Hose[1]

Hose #	Smear #	Internal (dpm/"Q-Tip")[2]	Smear #	External(dpm/Smear)[2]
1	1	25,000	11	5,000
	2	90,000	12	30,000
2	3	5,000	13	15,000
	4	30,000	14	450,000
3	5	2,000	15	<1,000
	6	2,000	16	<1,000
4	7	10,000	17	<1,000
	8	10,000	18	<1,000
5	9	25,000	19	<1,000
	10	20,000	20	<1,000

Results of May 17, 1989 survey of sections of hose #5[1]

Two cuts were made in the hose and cotton (Q–Tips) swabs were used to sample the interior of the hose. The saw used had a new blade.

Cotton Swabs of hose (cut) ends: *(Measured thru 8 mils of plastic)*

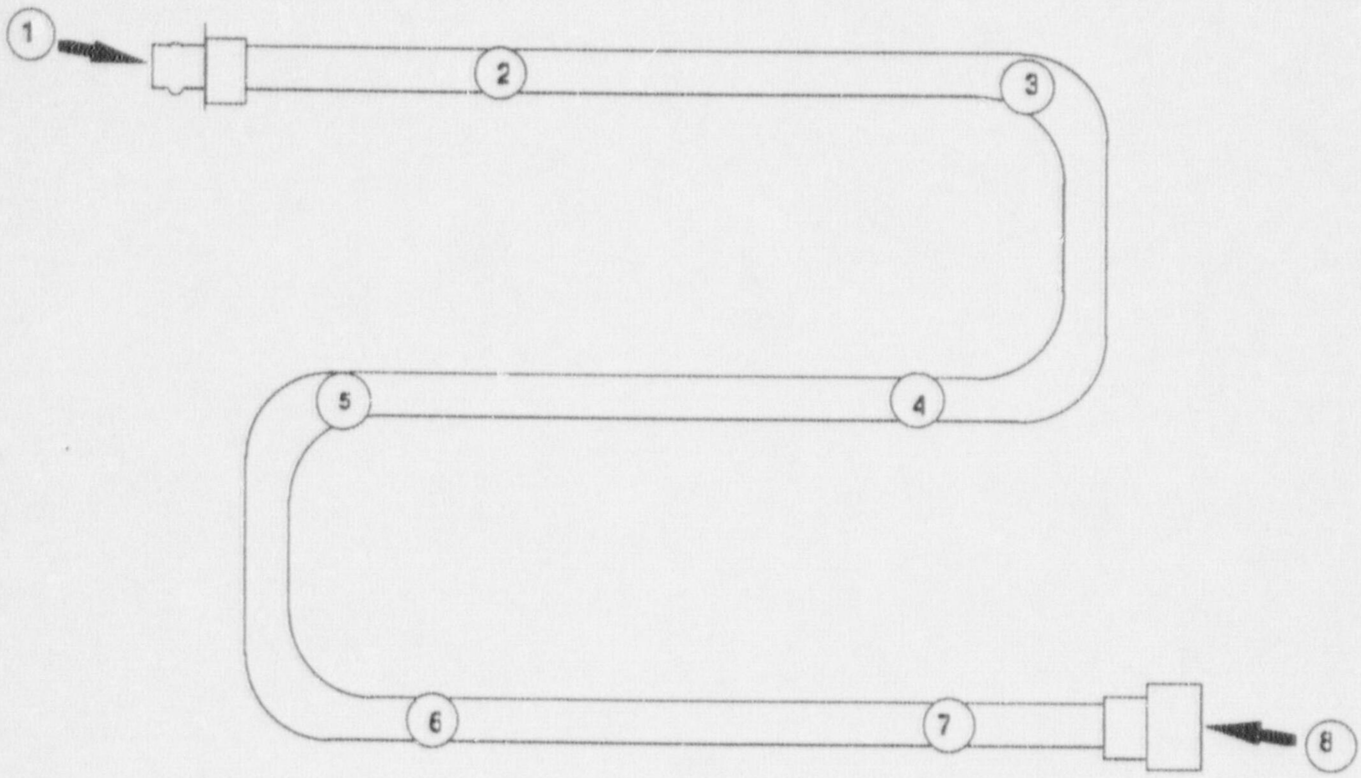
Q–Tip	CCPM[2]
#1	700
#2	100
#3	1200
#4	100

1 – Alpha c··ntamination not detectable in any sample

2 – Beta-Gamma activity

RADIOLOGICAL DATA: SMEAR SURVEY OF HOSE SECTION

Survey on May 15, 1989 by Westinghouse



SMEAR #	DPM/100cm²
1	4900
2	<MDA
3	<MDA
4	<MDA
5	<MDA
6	<MDA
7	<MDA
8	5050

MDA = minimum detectable activity

RADIOLOGICAL DATA: ISOTOPIC ANALYSES OF PRESSURE HOSE SMEARS

Sample	1	2	3	4	5	6	7
Actitivity (µCi)	3.4E-3	3.1E-2	2.7E-1	1.5E-1	4.7E-2	4.0E-3	1.1E-1
% Of Total Activity							
Co-58	NI	NI	2.1	1.6	1.4	NI	1.6
Co-60	27.9	16.5	22.3	26.3	26.8	42.1	27.3
Cr-51	NI	9.9	18.9	13.8	20.9	NI	21.8
Fe-59	NI	NI	12.2	6.2	6.8	NI	6.7
Mn-54	21.2	8.9	20.7	13.7	18.0	22.3	17.0
Zn-65	51.0	64.7	23.8	38.4	26.1	35.6	25.6

NI = Not Identified

Smear identification:

1 – Hose end taken May 15 – Millstone
2 – Inside swab of hose #3 taken on May 15 – Millstone
3 – External smear of cavity hose taken on May 17 – Millstone
4 – Inside of cavity hose taken on May 17 – Millstone
5 – Swab #1 of hose #5 – Millstone
6 – Swab #2 of hose #5 – Millstone
7 – Swab #3 of hose #5 – Millstone

All analyses were performed at Millstone

RADIOLOGICAL DATA: ISOTOPIC ANALYSES OF REACTOR WATER AND CAVITY WALL

SAMPLE	1	2	3	4
Activity mCi/ml (unless noted)	1.0E-2	1.1E-2	2.1E-2	3.1E00(mCi)
% OF TOTAL ACTIVITY				
Co–58	0.4	0.5	1.0	2.4
Co–60	2.0	1.5	3.2	20.3
Cr–51	0.8	0.3	1.2	15.9
Fe–59	NI	NI	1.5	18.4
Mn–54	1.3	1.2	4.1	28.7
Zn–65	93.8	94.8	88.3	14.3
Cs–137	1.7	1.7	0.7	NI

NI = Not Identified

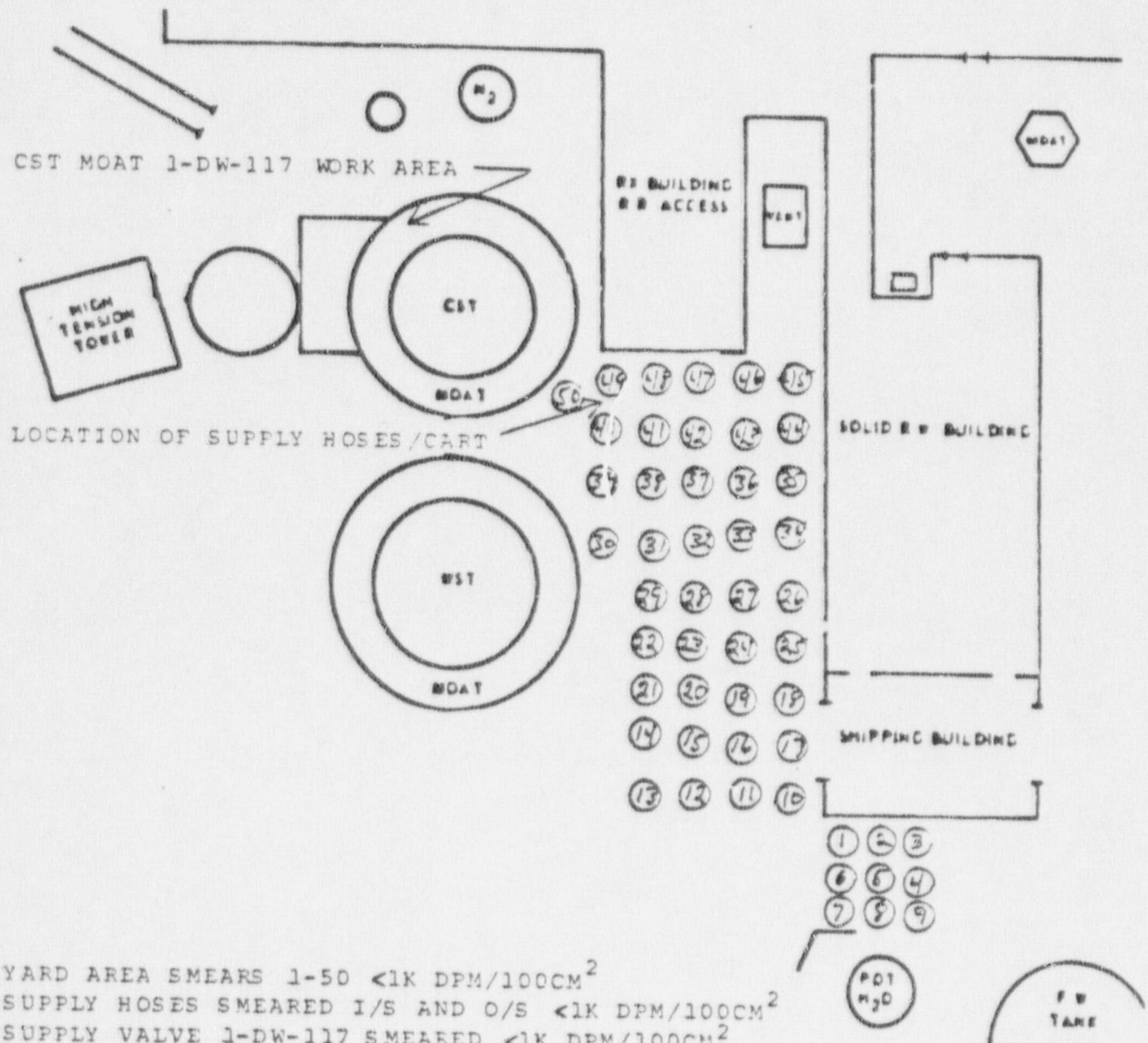
Sample Identification:

1 – Reactor Water – May 8 – Millstone Unit 1
2 – Reactor Water – May 9 – Millstone Unit 1
3 – Reactor Water – May 10 – Millstone Unit 1
4 – Reactor Cavity Wall – May 17 – Millstone Unit 1

All analyses were performed at Millstone

RADIOLOGICAL DATA: AREA SURVEY OF TRAILER LOCALE AT UNIT 1

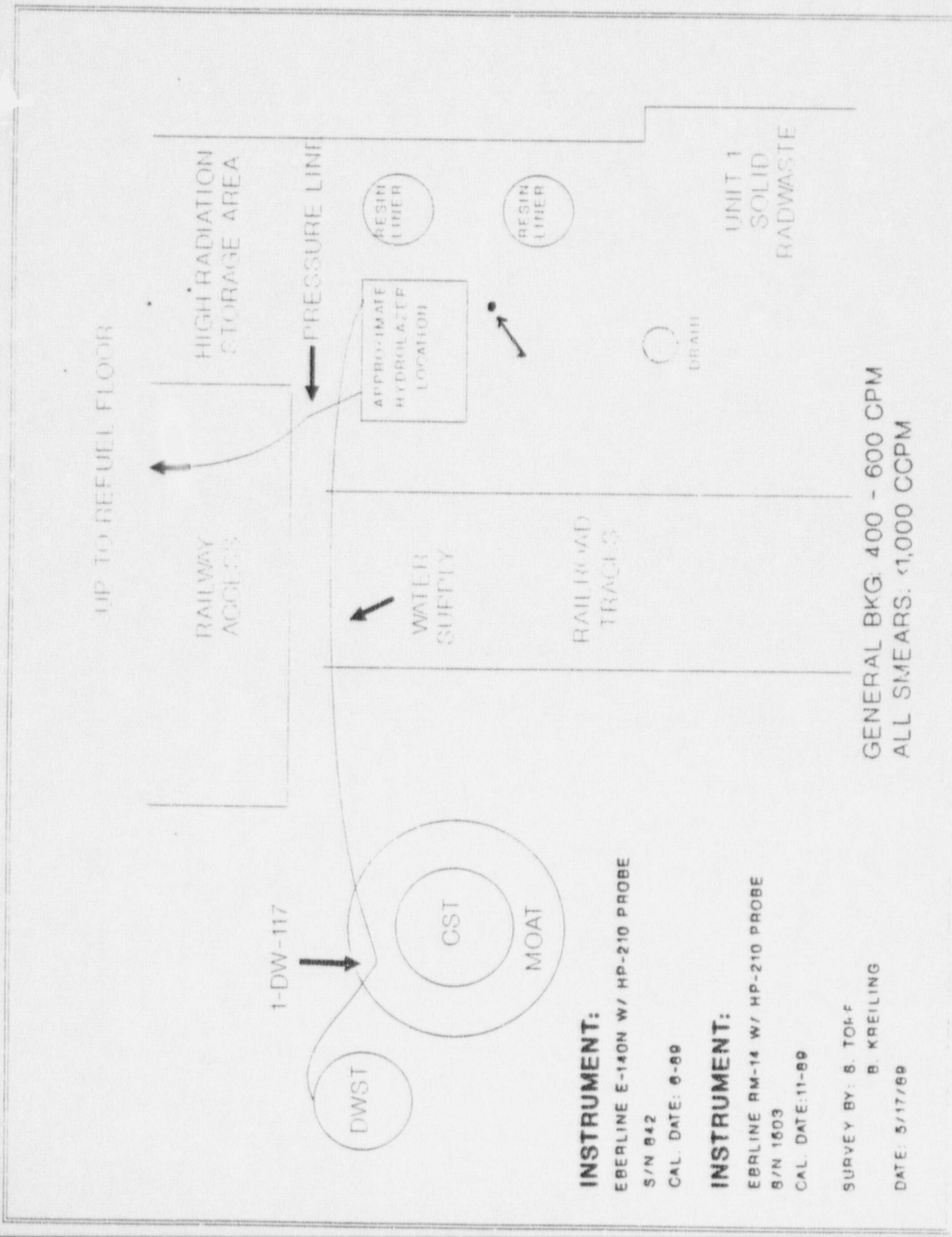
Survey on May 15, 1989 By Millstone



YARD AREA SMEARS 1-50 <1K DPM/100CM^2
SUPPLY HOSES SMEARED I/S AND O/S <1K DPM/100CM^2
SUPPLY VALVE 1-DW-117 SMEARED <1K DPM/100CM^2
SUPPLY VALVE 1-DW-117 WORK AREA SMEARED <1K DPM/100CM^2

RADIOLOGICAL DATA: AREA SURVEY OF TRAILER LOCALE AT UNiT 1

Survey on May 17, 1989 By Millstone



CALCULATIONS:

1. Public dose:

(60 gal) X (0.1 μCi/gm) x (4 x 10^3 gm/gal) = 24 mCi released

See LADTAP2 printout for dose results.

2. Internal dose:

(15,000 DPM/100 cm^2) x 10 = 150,000 DPM/100 cm^2 initial contamination

(150,000 DPM/100 cm^2) x (1,00 cm^2) = 1,500,00 DPM on contaminated hand (150,000 DPM for public)

(1,500,000 DPM) x 0.1 = 150,000 DPM (0.08 μCi) ingested (0.008 μCi for public)

The following values were used to calculate dose

	%	μCi	mRem/μCi/(RG-1.109)	mRem
Co-60	20	0.016	4.7	0.075
Zn-65	20	0.016	7.0	0.112
Co-58	3	0.0024	1.7	0.004
Mn-54	25	0.02	0.9	0.018
Cr-51	16	0.013	0	0
Fe-59	16	0.013	4.0	0.052
			TOTAL:	0.261

For the maximum organ dose the ratio of maximum organ to whole body dose found by LADTAP2 was used to factor the internal whole body dose.

$$\frac{7.92 \times 10^{-3}}{2.69 \times 10^{-3}} \times 0.3 \text{ mRem} = 0.9 \text{ mRem}$$

(GI ORGAN)

3. Skin dose

(150,00 DPM/100 cm^2) x 100 cm^2 = 150,00 DPM on skin

Used with 5 cm^2 radius on skin and 24 hour exposure in VARSKIN

See VARSKIN printout for dose results.

Attachment 2.

NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

MEMO

June 20, 1989
MP-13224

TO: PORC MEMBERS

From: S.E. Scace
Station Superintendent
Millstone Nuclear Power Station
(Ext 4300)

Subject: Procedure Review Approval Process

By now you should all be aware of the recent incident in which a contaminated hydrolazer trailer was released from the site without being surveyed. Your Superintendent has additional details of the event.

An extensive investigation of the activities for which the trailer was used concluded that the contamination most likely resulted from water siphoning back to the trailer from the refuel cavity during a period of hydrolazer inactivity.

The decontamination work was done using a vendor procedure reviewed and approved by PORC.

This emphasizes the need to ask the WHAT IF questions, especially when reviewing new and third party procedures. I realize that we can never address all possible scenarios which might occur, but I feel that we can increase our efforts to step back, take a good look and ask "*What if .....?*"

I have asked each superintendent to use this incident to reinforce the need to thoroughly examine and question these types of issues as they come before PORC.

SES/fdd

cc: W.D.Romberg
D.B. Miller Jr.

ATTACHMENT 3.

I N T E R O F F I C E   M E M O R A N D U M

Date: 15-Jun-1989 03:51pm EST
From: MICHAEL R. STROUT
STROUMR AT A1 AT BERLN1
Dept: NUCLEAR OPERATIONS
Tel No:

TO: Harry F. Haynes (HAYNEHF AT A1 AT MP0001)

Subject: NUCLEAR NETWORK OPERATING EXPERIENCE ENTRY

UNIT..............................MILLSTONE UNIT ONE
EVENT DATE........................MAY 16,1989
NSSS/AE...........................GE/EBASCO
RATING............................654MWe
DATE OF COMMERCIAL OPERATION......DECEMBER 26, 1970

Millstone Nuclear Power Station conducted a hydrolase decontamination of the Unit 1 cavity during May 1989. During the work process it is postulated that siphoning occured feeding contaminated water back through the hose to the pump and supply tank. The hydrolaser unit was positioned outside of the reactor building in a clean area on the 14'-6" elevation while the decontamination was conducted on the refueling floor 108' elevation. The hydrolaser trailer was released without survey since it had been in a clean area. Millstone was notified of the hydrolaser unit contamination once it was surveyed at the vendor facility. Millstone continues to investigate this occurrence.