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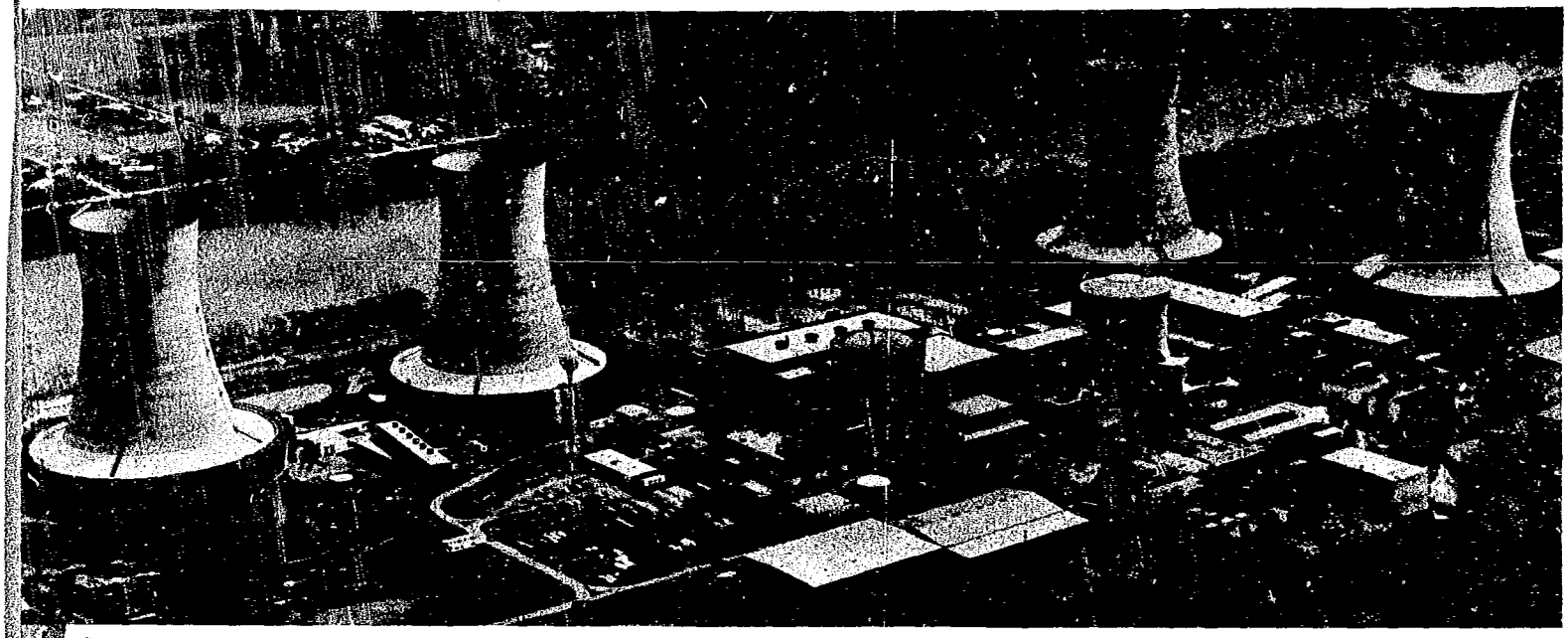
August 1981



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QUICK LOOK REPORT
ENTRY 6
THREE MILE ISLAND UNIT 2

Bechtel Northern Corporation/
General Public Utilities Nuclear Corporation

Prepared for the
U.S. Department of Energy
Three Mile Island Operations Office
Under DOE Contract No. DE-AC07-76ID01570

GEND-INF--006

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QUICK LOOK REPORT
ENTRY 6
THREE MILE ISLAND UNIT 2
February 3 and 5, 1981

Bechtel Northern Corporation/
General Public Utilities Nuclear Corporation

Edited and Published August 1981

by

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Idaho Falls, Idaho 83415

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ABSTRACT

This report summarizes tasks performed during Entry 6 at Three Mile Island Unit 2. During the entry into containment, which was made on February 3 and 5, 1981, work on the source range monitor and phase one of the closed circuit television system was completed. In addition, several loose samples were removed, photographs were taken, and a decontamination test was accomplished.

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FIGURES

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INTRODUCTION

Entry 6 into the reactor building at Three Mile Island, Unit 2 occurred on February 3 and 5, 1981. This report is intended to provide the raw data obtained from the entry. No conclusions or interpretations are given from the data.

During the entry, work on the source range monitor and phase one of the closed circuit television system was completed. In addition, several loose samples were removed and photographs were taken.

Table 1 is the Entry 6 task summary, and Table 2 shows the Elevation 305 radiation survey (also see Figure 1). Table 3 lists the preliminary TLD readings, and Table 4 is an equipment list.

TABLE 1. ENTRY 6 TASK SUMMARY

Data Acquisition Task Number	Task Description	Task Accomplished	Problems Encountered	Comments/ Significant Findings
1, 6[a]	CCTV Installation	8 cameras installed	Camera number 7 not working	To be repaired next entry
			Penetration R507 physical orientation not per plan	Rotation of R507 90° made half of terminals planned for use inaccessible
			Wiring in R507 not per plan; no nuts on some terminals	Field change of wiring ECM completed on February 4, 1981
			Excess cable bracket interferes with camera panning operation when camera wires catch on it	Camera number 4 cannot be panned until this problem is resolved
			Turned stairwell lights out; planned power supply for camera numbers 1 and 2 deenergized	Cause unknown, but may be related to switch gear malfunction of February 5, 1981
37	Loose sample removal, Elevation 347	Completed as planned	None	

TABLE 1. (continued)

Data Acquisition Task Number	Task Description	Task Accomplished	Problems Encountered	Comments/ Significant Findings
14, 36	Photographs	Completed as planned	None	
42B	Decontamination test	Completed as planned	TURCO strippable coat could not be removed	
N/A	Ante-room support and overall radiological control	N/A	Five men contaminated	Refer to Radiological Investigative Report, 81-003
27A, C, D, O, 29, 30	Smears, acetate pads, and paint scrapes on Elevation 347	Completed as planned with minor exceptions	TURCO smears not taken could not be removed	Taken during decon test because strippable coat

NOTE: Containment temperature, 62°F; containment pressure, 0.2 in. hg; relative humidity, <100%; airborne activity, <MPC.

a. Only radiation surveys done to support CCTV are data acquisition tasks.

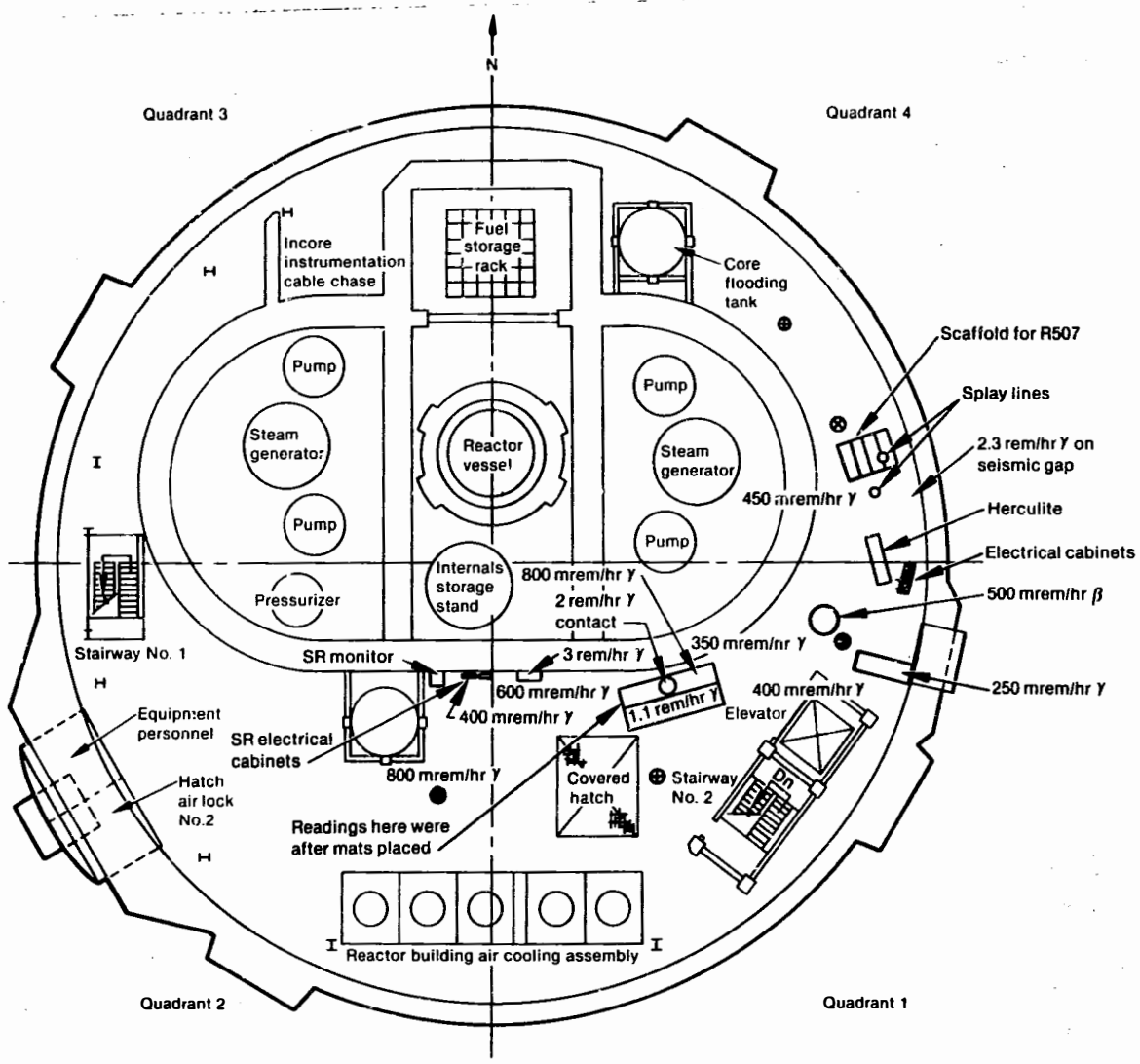
TABLE 2. ENTRY 6, ELEVATION 305 RADIATION SURVEY

Data Acquisition Task Number	Instrument	Gamma Dose Rate (mrem/hr)	Beta Dose Rate[a] (mrad/hr)	Location on Figure 1
6	RO-2A	800	--[b]	Drain cover between air cooler C and CFT B
1	RO-2A	400	--	SR Monitor
6	RO-2A	3000	--	Penetration East of SR Monitor
6	RO-2A	1100	--	Rubber mat by elevator
6	RO-2A	2000	800	Rubber mat contact
1	RO-2A	600	--	General area between hatch and D-ring
1	RO-2A	400	--	Elevator
1	RO-2A	250	--	Ramp
1	RO-2A	350	--	Between ramp and D-ring
6	RO-2A	--[c]	500	Drain cover by ramp
1	RO-2A	300	--	Ramp staging area
6	RO-2A	2300	--	Seismic gap under penetration
1	RO-2A	450	--	Scaffold assembly area near R507
1	RO-2A	200	--	General area up on staging under R507
1	RO-2A	250 to 300	--	General area on staging

a. All beta readings shown have been corrected for detector efficiency.

b. No beta reading taken.

c. Actual gamma reading not recorded.



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Note: Rust on floor has bled through paint.
Dose rate after drain covers were placed was only slightly lower.
A total of five drains were covered.

Figure 1. Entry 6, Elevation 305 radiation survey.

TABLE 3. ENTRY 6 PRELIMINARY TLD READINGS

Team Member	Whole Body (mrem) Gamma	Skin (mrem) Beta	Maximum Extremity (mrem) Gamma	Maximum Extremity (mrem) Beta	Approved Dose Limit (mrem)	Whole Dose Estimates (mrem)
February 3						
Team 1						
HP #1	570	0	610	0	1000	600
I&C #1	670	0	670	0	1000	600
Util #1	290	0	330	0	1000	340
Util #2	240	0	280	0	1000	340
Util #3	240	0	260	0	1000	340
Team 2						
Elec #1	180[a]	0	240	0	1000	600
I&C #2	550	0	600	0	1000	600
Team 3						
Ops #1	280	0	290	0	1000	600
Util #4	620[b]	0	770	0	1000	600
Team 4						
Bechtel #1	370	0	590	0	1000	600
HP #2	280	0	480	0	1000	600
Ops #2	160	0	260	0	1000	600
Ops #3	160	0	260	0	1000	600
Ops #4	160	0	280	0	1000	600
Util #5	140	0	270	0	1000	600
Util #6	150	0	240	0	1000	600
Team 5						
I&C #3	710[b]	0	750	0	1000	500
HP #3	630[b]	0	820	0	1000	500
Elec #2	360[b]	0	450	0	1000	500
Util #7	280	0	400	0	1000	500
Util #8	240	0	370	0	1000	500
Util #9	520	0	660	0	1000	500

TABLE 3. (continued)

Team Member	Whole Body (mrem) Gamma	Skin (mrem) Beta	Maximum Extremity (mrem) Gamma	Maximum Extremity (mrem) Beta	Approved Dose Limit (mrem)	Whole Dose Estimates (mrem)
February 5						
Contingency Team						
Elec #3	410	0	490	0	1000	600
Elec #4	410	0	540	0	1000	600
Team 6						
I&C #4	670	0	780	0	1000	600
I&C #5	490	0	600	0	1000	600
Util #10	340	0	440	0	1000	600
Util #11	260	0	380	0	1000	600
HP #4	550	0	730	0	1000	600
Team 7						
Bechtel #2	350	0	380	0	1000	300
Bechtel #3	370	0	410	0	1000	300
HP #5	340	100	420	0	1000	300

a. Exited early due to illness.

b. Performed additional work at penetration R507 in accordance with approved contingencies.

TABLE 4. ENTRY 6 EQUIPMENT LIST

Survey Equipment		Protective Clothing/Individual		Tools and other Equipment	
Type	Quantity	Type	Quantity	Description	Quantity
RO-2A	3	PC's w/hoods, gloves	2	CCTV camera with tripod stand, dolly, control box, pan tilt box	8
Teletector	1	Firemans boots, pair	1	Junction box with stand	1
		Wet suits (10 men only)	1	Rubber mat (4 x 16 feet)	2
		MSA purifier or particulate respirator	1	Drain covers - hot spot labels	28
		BZA samples	1	Transmission line	8
				Power line w/extension cord	4
				SR monitor TDR box on cart	1
				SR monitor jumpers	1
				Electrical tool bag	1
				Tie raps	100
				Lead blankets	10
				Staging poles	12
				Staging tool bucket	1
				Wood planks - staging	3

TABLE 4. (continued)

Survey Equipment		Protective Clothing/Individual		Tools and other Equipment	
Type	Quantity	Type	Quantity	Description	Quantity
				Nylon rope (50 foot roll)	1
				Nikonos III camera w/flash (35 mm)	1
				Two-way radio/team	1-2
				12 foot ladder	1
				Spotlights	3
				Small lights/individual	1
				Pencil dosimeter/individual	3
				Team 1 survey map on clipboard	1
				Decon test equipment bags	3

ENTRY 6 DEBRIEF
FEBRUARY 3, 1981

Team 1

G. Cicotte (Met-Ed HP)

Performed HP support in accordance with scenario

- felt more radios would have been helpful
- noted higher beta readings in areas of dust buildup
- MSA purifiers were comfortable
- suggest nonskid herculite be added to personnel access ramp (ramp is slippery)
- rubber mat installed cut beta dose rate significantly
- recommend shielding small hole to the right of the SR monitor, if further work is scheduled there.

G. Pierce (Met-Ed I&C)

Performed SR monitor work and assisted HP in putting down rubber matting

- felt communication between team members was a minor problem
- felt undress assistance should be provided on a one-to-one ratio basis
- tried to work in lowest dose rate area as possible.

R. Stetler (Met-Ed Utility)

Helped construct staging and shield building spray line penetrations near work area

- no problems noted
- no specific comments not already mentioned.

M. Seltzer (Met-Ed Utility)

Helped construct staging and shield building spray line penetrations near work area

- no major problem
- no specific comments not already mentioned.

W. Douglass - Team Leader (Met-Ed Utility Foreman)

Supervised staging and shielding installation; determined initial power cable routing path

- the job went as well as could be expected
- face to face communication was difficult inside the RB, due to noise level.

Team 2

W. Condran - Team Leader (Met-Ed Electrical Foreman)

Ran power cable from Elevation 347 to Elevation 305; removed covers of penetration R507; after 40 minutes in building felt dizzy and tired and notified command center he would be exiting

- normally in excellent physical condition
- woke up on morning of entry with "backache"
- considered not making entry, but overall personal assessment was "not really sick"
- post entry diagnosis by physician "flu--temperature 103°F"
- made descent from staging and transit out of building unassisted, but accompanied by the other team member.

J. St. Clair (Met-Ed I&C)

Worked on electrical penetration and assisted running power cord from Elevation 347 to Elevation 305.

- did not notice Condran was sick until he announced he was returning to the ante-room
- felt overall planning of the job was good
- was surprised by the fact that the penetration R507 was rotated 90° from the outside orientation
- this problem caused excessive time to remove one cover (one hour)
- exiting job site with Condran and returning with Booher to finish was not a tiring task
- comments on condition of building: all tie-raps were brittle to the point of breaking; page phone boxes rusty; stairs and wall near penetration flaking paint; conduit near R507 covered with a greasy film
- recommended putting non-skid material on both ramps
- noted triaxial cables in front of R507 were inproperly installed; could result in high noise levels depending on application of the hookup.

Team 3

R. Booher - Team Leader (Met-Ed Ops)

Moved camera stands and cable into building, assembled stands from camera numbers 1 through 4 and rolled them into position; assisted St. Clair after Condran exited

- high noise level noted when working
- noted telephone headset in good condition near CTF B
- noted epoxy in penetration R507 decomposed; particles were saw-dust size.

R. Warner (Met-Ed Utility)

Assisted Booher in movement and assembly of camera stands

- no specific comments not already mentioned.

Team 4

D. Machiela - Team Leader (Bechtel)

Transported camera stands and cable for camera numbers 5 through 8 to Elevation 347 assembled them, and rolled them into position; collected samples; took photographs (35)

Digital Notes:		
	First trip up stairs	Digital - 33
	Back on Elevation 305	Digital - 51
	Second trip up stairs	Digital - 77
	Back on Elevation 305	Digital - 100
	Third trip up stairs	Digital - 135

- moved metal ladder (floor was cleaner underneath and wet - took photo) and large tool box (chained on one side) to locate camera number 5
- all tool boxes on Elevation 347 were locked
- proceeded with photos and sample collection
  - heavy yellow lifting sling was very stiff (not burnt at all) - no identification number printed on sling itself, but a tag had serial number 760 on it (took photo)
  - vent ducts looked clean - not rusted or bowed in any way
  - picked up paint chips (2) at end of enclosed stairwell
  - noticed that there was a lot of water on plastic bag on top of video camera; also water on floor in many places and in construction supports on containment walls

- picked up rad sign on grating over Core Flood Tank A; couldn't find any barrier rope
- picked up the telephone with as much cord as possible
- noticed that the old decon test areas were definable, but were not significantly different from rest of floor area
- moved to fueling bridge for samples
- bridge is not easily accessible, must climb on and over rails and bridge structure; platform is very narrow (radio and purifier kept bumping sides)
- removed four control buttons and took photos for location (two of the buttons unscrewed easily, needed vice grips on other two)
- picked up operator's manual; came up in pieces and was partially stuck on bridge; no difference in color of bridge under manual took photos of top of CRDM's and cable trays
- moved to vertical rope on vent duct; it is attached to the duct 20 to 25 feet up; 1/2 to 3/4 inch rope-nylon; broke it off with my hands, very brittle all the way through; changes to hemp rope; 8 to 9 feet up; hemp rope looked to be darkened; couldn't tell why
- removed nylon rope from alignment studs; again very brittle; pulled rope out of the middle of one of the studs; not as brittle; took photos
- took photos of inside of head storage stand; hard to see in; photos should be OK
- cage opening around stairs to top of D-rings rather small
- noticed what looked like another charred rad sign over by incore seal table
- picked up (2) paint chips by incores
- took photos of the other charred manual on north side of fuel pool on top of control box and cable trays
- took photo of the elevator door

- wrapped up samples and proceeded down; stopped at door; half-way down; took photos of door and into elevator shaft and overheads; proceeded to Elevation 305
- took photos of wired penetration, overheads, penetration 211/212, and finished rolls on miscellaneous items including elevator door.

C. Boyle (Met-Ed HP)

Provided HP coverage for moving equipment to Elevation 347, sample removal and photographs

- heavy boots were awkward
- no sense of time in containment
- noted swirl marks on the floor where water had passed through drains.

R. Johnson (Met-Ed Ops)

Carried equipment, assembled camera stands

- lost one nut and washer going up stairs
- recommended roping off access in enclosed stairwell to levels below Elevation 305.

R. Fountain (Met-Ed Ops)

Carried equipment, assembled camera stands

- felt three trips up and down steps was difficult
- recommended lubricating the hatch doors.

W. Ogle (Met-Ed Ops)

Carried equipment, assembled camera stands

- felt equipment carrying should be limited to two trips up and down stairs.

A. Meyers (Met-Ed Utility)

Carried equipment, assembled camera stands

- no specific comments not already mentioned.

K. Conway (Met-Ed Utility)

Carried equipment, assembled camera stands

- no specific comments not already mentioned.

Team 5

D. Weaver - Team Leader (Met-Ed I&C Foreman)

Routed power and transmission cable; worked at penetration R507 as part of contingencies allowed

- noted differences between planned ECM for penetration wiring and "as built" condition
- he communicated the facts to the command center and an alternative wiring plan was approved (J. Brummer)
- wired as much of this change as possible
- had to exit once to fix radio.

W. Griffith (MSS HP)

Provided HP support for cable routing team; worked as second man with Weaver at R507; placed drain hot spot covers

- non-skid booties are cracking at the edge and coming off in containment
- general cleanup needed.

C. Ressinger (Met-Ed Utility)

Routed cable; wore wetsuit for climbing

- exhausted at the end of his time in the building
- felt staging tools, etc. inside containment could have been more orderly
- felt cable running team could have used more people.

H. Cole (Met-Ed Utility)

Routed cable

- felt cable running team could have used more people
- noted several tripping hazards exist on Elevation 347
- would have preferred use of a digital dosimeter.

J. Yurejefcic (Met-Ed Utility)

Routed cable; in charge of team on Elevation 347

- could have used one additional man in cable running team
- when job completed, assisted Weaver at R507
- when both radios broke down, exited with Weaver
- got stomach cramps in ante-room, causing command center to use Griffith with Weaver when Weaver returned to R507.

ENTRY 6 DEBRIEF
FEBRUARY 5, 1981

Contingency Team

C. Behney - Team Leader (Met-Ed Electrical)

Worked at penetration R507

- had to return to air lock for RO-2A
- verified radiation readings were normal then climbed up staging to R507
- installed bottom cover in five minutes
- completed wiring as planned except that one spare wire (No. 96) had no connector
- work time lengthened some when radio failed (earpiece cord unplugged during work)
- installed front cover and waited for test results on cables installed; performed cleanup
- when test was completed, reinstalled top cover and left staging
- final task was to mount junction box on fabricated stand.

T. Defrancisco (Met-Ed Electrical)

Worked at penetration R507

- had to sit on pipe for completion of work
- at some point in job, tore crotch out of wetsuit (discovered in ante-room while undressing)
- would not recommend wearing two wetsuits for this job.

Team 6

E. Heffner - Team Leader (Met-Ed I&C)

Carried in and installed cameras

- noticed stairwell lights were out; had not been specifically briefed on whether this was normal or abnormal
- initially got cameras 5, 6, and 8 working
- camera 7 came on, but went out while being repositioned
- had problems on Elevation 305 getting power to cameras 1 and 2
- finally all cameras on Elevation 305 running off planned power supply for 3 and 4 (it is believed that some outlets tested energized on November 13, 1980, are now deenergized and that the cause is unknown)
- momentarily lost camera 4 when panning (the camera cables sometimes catch on excess cable brackets)
- did not realize actions in entry would result in skin contamination.

R. Fernback (Med-Ed I&C)

Carried in and installed cameras

- noted accumulation of equipment and trash in building as well as booties which have failed in the building
- pulled up extension cord to power cameras 3 and 4
- did not realize actions in entry would result in skin contamination
- had problem with radio volume
- ramp slippery
- removal of camera cord bracket will take about two minutes per camera.

B. Baumgardner (Met-Ed Utility)

Carried in and installed cameras

- no specific comments not already mentioned.

M. Cross (Met-Ed Utility)

Carried in and installed cameras

- no specific comments not already mentioned.

J. Morton (Met-Ed Utility)

Provided HP support for camera installation

- watched evolutions from lowest dose rate area possible
- while providing HP support, was not aware that actions of Heffner and Fernbeck would result in skin contamination.

Team 7

C. Shorts - Team Leader (Bechtel NFO)

Decontamination test acetate pads; strong/mild decon solution

- completed task per plan except could not remove TURCO strippable coat
- lost some time when ziplock bags were found shut
- ran out of gloves early
- would have preferred two piece wetsuit
- inspected CRD cable trays on Elevation 347; noted one cable had a scalloped effect
- strippable coat removed floor grit.

T. Lazo (Bechtel NFO)

Decontamination test strong decon solution, comparison tests and paint scrapes

- paint remover worked well
- pad #30 was face down
- no problem with procedure or time usage
- earpiece fell out, but it felt good when dressing
- got tired at the end when removing trash on Elevation 305
- it took too long to get undressed
- ran out of gloves early
- herculite in the airlock interferred with operation of both doors.

R. Shepard (Met-Ed HP)

Decontamination HP support; smears

- had trouble getting ziplock bags open
- aborted TURCO smears
- didn't take smears on far side of fuel handling bridge due to access problems
- handle came off his RO-2A
- spent some time on Elevation 305 looking for RO-2A
- recommended installation of a step-off pad at the inner door
- strong foam smears - "clean"
- mild foam smears - "black"
- suggested wiping gloves with Maslinn instead of changing gloves
- recommended removal of trash by team.

DECONTAMINATION TESTS

The smears taken (shown on Table 5 and Figure 2) not relating to decontamination techniques testing were performed to indicate the amount of contamination present on vital equipment, such as electrical cable and the fuel handling bridge. This data will be used to aid in the assessment of radiation damage to this equipment. These smears were all taken on Elevation 347 at the locations indicated.

Presented in Tables 6 through 11 are the preliminary results of the contamination sampling methods comparison test. Each table lists the results of a single test. Each of the six tests were performed at a specific location as indicated. All comparison test samples will be shipped to EG&G Idaho's test laboratory for final analysis.

Tables 12 through 23 present the results of decontamination tests. Each table lists the results of smear and acetate adhesion pad samples taken before and after the use of any decontamination method. Twelve separate decontamination tests, performed during either the fifth or sixth entry, were tested for before test and after test contamination levels. The smear and acetate adhesion pad samples presented here were all taken within the areas of their respective tests.

TABLE 5. ENTRY 6 SURFACE CONTAMINATION

Data Acquisition Task Number	Specimen	Sample Number	Location[a]	Cs-134 (μCi/100 cm^2)[b]	Cs-137 (μCi/100 cm^2)[b]	Cs-60 (μCi/100 cm^2)[b]	Comments
27(C)	6-143	56543	1	1.3	9.1	$<4.1^{-3}$[c]	CRD cable chase--top
27(C)	6-144	56544	1	1.3	9.7	$<1.4^{-3}$	CRD cable chase--middle
27(C)	6-145	56545	1	1.3	9.3	$<6.9^{-4}$	CRD cable chase--bottom
27(O)	6-146	56546	2	2.0^{-4}	1.7^{-3}	$<1.8^{-5}$	Aux fuel handling bridge
27(O)	6-147	56547	2	1.9^{-4}	1.6^{-3}	$<2.9^{-5}$	Aux fuel handling bridge
27(C)	6-148	56548	3	2.3^{-1}	1.7	$<6.0^{-4}$	Communications box
27(C)	6-149	56549	3	2.8^{-1}	2.1	$<6.0^{-4}$	Communications box
27(C)	6-150	56550	3	1.0^{-1}	7.6^{-1}	$<6.0^{-4}$	Communications conduit

TABLE 5. (continued)

Data Acquisition Task Number	Specimen	Sample Number	Location[a]	Cs-134 ($\mu Ci/100\ cm^2$)[b]	Cs-137 ($\mu Ci/100\ cm^2$)[b]	Cs-60 ($\mu Ci/100\ cm^2$)[b]	Comments
27(C)	6-151	56551	3	1.7^{-2}	1.3^{-1}	$<6.0^{-4}$	Communications conduit
27(D)	6-153	56553	4	4.4^{-3}	3.8^{-2}	$<1.8^{-5}$	Instrument rack 432
27(C)	6-154	56554	5	3.9^{-1}	2.8	$<6.1^{-4}$	CRD cable chase - top
27(C)	6-155	56555	5	5.9^{-1}	4.3	7.6^{-4}	CRD cable chase - middle
27(C)	6-156	56556	5	1.6	1.2	$<7.0^{-4}$	CRD cable chase - bottom
27(A)	6-159	56559	6	3.0	22.0	$<7.9^{-4}$	Penetration R-599
27(A)	6-160	56560	6	7.2^{-3}	5.9^{-2}	2.0^{-4}	Penetration R-598
27(A)	6-161	56561	6	1.5^{-1}	1.1	$<3.2^{-4}$	Penetration R-598

TABLE 5. (continued)

Data Acquisition Task Number	Specimen	Sample Number	Location[a]	Cs-134 (μCi/100 cm^2)[b]	Cs-137 (μCi/100 cm^2)[b]	Cs-60 (μCi/100 cm^2)[b]	Comments
27(D)	6-162	56562	7	7.6^{-1}	5.5	1.2^{-3}	Terminal box
27(D)	6-152	56552	8	1.5^{-1}	1.1	1.1^{-3}	Terminal box TB MR4

a. See Figure 2 for corresponding number locations.

b. All samples counted by on-site B&W Counting Lab.

c. "Less than" symbol (<) implies results below lower limit detectable (LLD).

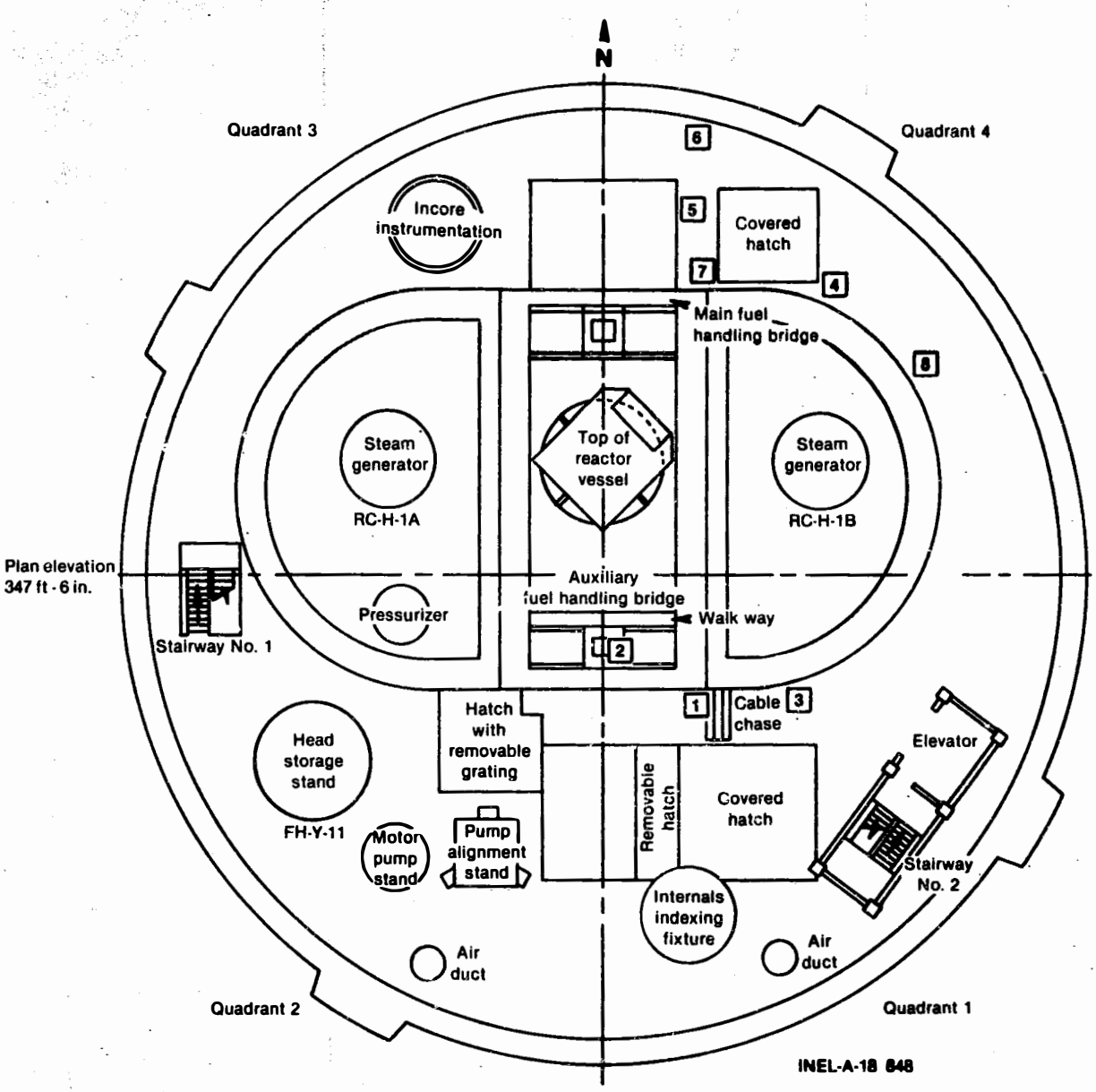

Figure 2. Entry 6, Elevation 346 smears.

TABLE 6. CONTAMINATION SAMPLING TEST, COMPARISON 1, CONTAINMENT LINER NEAR HEAD STORAGE STAND

	Sample Number		Cs-137 (μCi)	Cs-134 (μCi)
	GPU	Bechtel		
Scrapes[a]	56401	6-001	1.3	1.8^{-1}
Acetate Pads[b]	56402	6-002	7.2^{-3}	9.8^{-4}
	56403	6-003	3.7^{-3}	4.3^{-4}
Swipes[c]	56404	6-004	5.0^{-3}	7.2^{-4}
	56405	6-005	3.2^{-3}	4.2^{-4}

a. Scrapes assumed to be 19.35 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Swipes assumed to be 100 cm^2.

TABLE 7. CONTAMINATION SAMPLING TEST, COMPARISON 2, LEFT SIDE OF DECONTAMINATION AREA PAINTED CONCRETE

	Sample Number		Cs-137 (μCi)	Cs-134 (μCi)
	GPU	Bechtel		
Scrapes[a]	56422	6-022	9.3	1.3
Acetate Pads[b]	56423	6-023	3.7	5.2^{-1}
	56424	6-024	2.8	3.6^{-1}
Swipes[c]	56425	6-025	4.5	6.3^{-1}
	56426	6-026	3.3	4.5^{-1}

a. Scrapes assumed to be 19.35 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Swipes assumed to be 100 cm^2.

TABLE 8. CONTAMINATION SAMPLING TEST, COMPARISON 3, RIGHT SIDE OF DECONTAMINATION AREA PAINTED CONCRETE

	Sample Number		Cs-137 (μCi)	Cs-134 (μCi)
	GPU	Bechtel		
Scrapes[a]	56501	6-101	6.4	8.9^{-1}
Acetate Pads[b]	56502	6-102	1.2	1.6^{-4}
	56503	6-103	1.9	2.4^{-1}
Swipes[c]	56504	6-104	3.1	4.3^{-1}
	56505	6-105	4.2	5.8^{-1}

a. Scrapes assumed to be 19.35 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Swipes assumed to be 100 cm^2.

TABLE 9. CONTAMINATION SAMPLING TEST, COMPARISON 4, D-RING WALL NEAR SOUTHEAST END OF REFUELING POOL

	Sample Number		Cs-137 (μCi)	Cs-134 (μCi)
	GPU	Bechtel		
Scrapes[a]	56506	6-106	3.8^{-1}	5.4^{-2}
Acetate Pads[b]	56507	6-107	7.2^{-3}	8.8^{-4}
	56508	6-108	6.1^{-3}	7.7^{-4}
Swipes[c]	56509	6-109	2.3^{-2}	2.9^{-3}
	56510	6-110	3.2^{-2}	4.4^{-3}

a. Scrapes assumed to be 19.35 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Swipes assumed to be 100 cm^2.

TABLE 10. CONTAMINATION SAMPLING TEST, COMPARISON 5, D-RING WALL NEAR NORTHEAST END OF REFUELING POOL

	Sample Number		Cs-137 (μCi)	Cs-134 (μCi)
	GPU	Bechtel		
Scrapes[a]	56511	6-111	1.4^{-1}	1.8^{-2}
Acetate Pads[b]	56512	6-112	1.7^{-3}	1.9^{-4}
	56513	6-113	4.1^{-3}	4.5^{-4}
Swipes[c]	56514	6-114	6.1^{-3}	7.5^{-4}
	56515	6-115	2.7^{-3}	3.7^{-4}

a. Scrapes assumed to be 19.35 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Swipes assumed to be 100 cm^2.

TABLE 11. CONTAMINATION SAMPLING TEST, COMPARISON 6, LINER NEAR NORTHEAST END OF REFUELING POOL

	Sample Number		Cs-137 (μCi)	Cs-134 (μCi)
	GPU	Bechtel		
Scrapes[a]	56516	6-116	3.1^{-2}	4.7^{-3}
Acetate Pads[b]	56517	6-117	2.1^{-3}	2.8^{-4}
	56518	6-118	7.2^{-4}	8.5^{-5}
Swipes[c]	56519	6-119	7.7^{-3}	9.4^{-4}
	56520	6-120	6.3^{-3}	7.1^{-4}

a. Scrapes assumed to be 19.35 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Swipes assumed to be 100 cm^2.

TABLE 12. STRONG FOAM DECONTAMINATION TEST ON LINER--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56410	6-010	6.5^{-3}	8.4^{-4}		
	56411	6-011	6.6^{-3}	8.0^{-4}		
	56412	6-012			2.2^{-3}	3.3^{-4}
	56413	6-013			4.1^{-3}	5.5^{-4}
Acetate Pads[b]	56406	6-006	2.5^{-3}	3.0^{-4}		
	56407	6-007	4.1^{-3}	4.9^{-4}		
	56408	6-008			5.9^{-3}	7.5^{-4}
	56409	6-009			1.4^{-2}	1.9^{-3}

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

TABLE 13. MILD FOAM DECONTAMINATION TEST ON LINER--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56418	6-018	8.5^{-3}	1.1^{-3}		
	56419	6-019	1.6^{-2}	2.0^{-3}		
	56420	6-020			2.4^{-3}	3.0^{-4}
	56421	6-021			4.1^{-3}	5.0^{-4}
Acetate Pads[b]	56414	6-014	3.1^{-3}	4.5^{-4}		
	56415	6-015	4.6^{-3}	6.5^{-4}		
	56416	6-016			1.5^{-2}	1.9^{-3}
	56417	6-017			2.1^{-2}	2.4^{-3}

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

TABLE 14. NEW STRONG DECON DECONTAMINATION TEST ON PAINTED CONCRETE FLOOR--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56431	6-031	3.2	4.4^{-1}		
	56432	6-032	7.1^{-1}	9.9^{-2}		
	56433	6-033			5.8^{-2}	6.6^{-3}
	56434	6-034			5.5^{-2}	6.9^{-3}
Acetate Pads[b]	56427	6-027	1.7^{-1}	2.0^{-2}		
	56428	6-028	7.2^{-1}	9.4^{-2}		
	56429	6-029			1.6^{-2}	2.1^{-3}
	56430	6-030			2.7^{-1}	3.2^{-2}

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

TABLE 15. STRONG DECON DECONTAMINATION TEST ON PAINTED CONCRETE FLOOR--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56441	6-041	9.9^{-1}	1.3^{-1}		
	56442	6-042	9.3^{-1}	1.2^{-1}		
	56443	6-043			6.2^{-1}	8.8^{-2}[c]
	56444	6-044			5.2^{-1}	7.2^{-2}[c]
	56445	6-045			6.4^{-1}	8.9^{-2}[d]
	56446	6-046			4.7^{-1}	6.6^{-2}[d]
Acetate Pads[b]	56435	6-035	6.4^{-1}	8.3^{-2}		

TABLE 15. (continued)

Sample Number		Before Decontamination Tests		After Decontamination Tests	
GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
56436	6-036	7.8^{-1}	9.8^{-2}		
56437	6-037			9.2^{-2}	1.2^{-2}[d]
56438	6-038			3.7^{-2}	4.8^{-3}[d]
56439	6-039			7.0^{-2}	9.0^{-3}[c]
56440	6-040			2.7^{-2}	3.2^{-3}[c]

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Scrubber used.

d. Scrubber not used.

TABLE 16. MILD DECON DECONTAMINATION TEST ON PAINTED CONCRETE FLOOR--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56451	6-051	1.9	2.7^{-1}		
	56452	6-052	1.1	1.5^{-1}		
	56453	6-053			1.5^{-1}	2.1^{-2}
	56454	6-054			8.3^{-1}	1.1^{-1}
Acetate Pads[b]	56447	6-047	1.6^{-1}	2.1^{-2}		
	56448	6-048	3.8^{-1}	4.8^{-2}		
	56449	6-049			1.0^{-1}	1.2^{-2}
	56450	6-050			2.9^{-2}	3.9^{-3}

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

TABLE 17. LOW PRESSURE WATER DECONTAMINATION TEST ON PAINTED CONCRETE FLOOR--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56459	6-059	1.9	2.7^{-1}		
	56460	6-060	6.2	8.6^{-1}		
	56461	6-061			1.7	2.3^{-1}
	56462	6-062			2.1	2.9^{-1}
Acetate Pads[b]	56455	6-055	4.1^{-1}	4.9^{-2}		
	56456	6-056	9.6^{-1}	1.2^{-1}		
	56457	6-057			5.0^{-1}	6.5^{-2}
	56458	6-058			7.0^{-1}	8.3^{-2}

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

TABLE 18. HIGH PRESSURE WATER DECONTAMINATION TEST ON PAINTED CONCRETE--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56467	6-067	3.9	5.3^{-1}		
	56468	6-068	3.9^{-1}	5.3^{-1}		
	56469	6-069			2.2^{-1}	3.0^{-2}
	56470	6-070			9.1^{-1}	1.2^{-1}
Acetate Pads[b]	56463	6-063	2.6^{-1}	3.2^{-2}		
	56464	6-064	5.4^{-1}	7.1^{-2}		
	56465	6-065			3.5^{-2}	4.3^{-3}
	56466	6-066			6.0^{-1}	7.1^{-2}

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

TABLE 19. TURCO STRIPPABLE COATING DECONTAMINATION TEST ON PAINTED CONCRETE--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56477	6-077	5.7	7.9^{-1}		
	56478	6-078	3.0^{-3}	3.7^{-4}		
	56479	6-079			6.5^{-1}	9.0^{-1}[c]
	56480	6-080			9.8^{-3}	1.2^{-3}[c]
	56481	6-081			1.9	2.6^{-1}[d]
	56482	6-082			1.1	1.6^{-1}[d]
Acetate Pads[b]	56471	6-071	3.1^{-1}	3.9^{-2}		
	56472	6-072	3.5^{-1}	4.5^{-2}		
	56473	6-073			2.3^{-3}	2.7^{-4}[c]
	56474	6-074			3.4^{-3}	4.6^{-4}[c]
	56475	6-075			4.2^{-1}	5.2^{-2}[d]
	56476	6-076			8.4^{-2}	1.1^{-2}[d]

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Not used--cross contaminated in bag.

d. Top of coating.

TABLE 20. IMPERIAL STRIPPABLE COATING DECONTAMINATION TEST ON PAINTED CONCRETE--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56492	6-092	5.7	7.8^{-1}		
	56493	6-093	2.7	3.8^{-1}		
	56494	6-094			3.1^{-1}	4.2^{-4}[c]
	56495	6-095			2.9^{-1}	4.1^{-2}[c]
	56496	6-096			1.4	2.0^{-1}[d]
	56497	6-097			7.1^{-1}	9.7^{-2}[d]
Acetate Pads[b]	56486	6-086	3.1^{-1}	1.6^{-2}		
	56487	6-087	3.4^{-1}	4.2^{-2}		
	56488	6-088			1.8^{-1}	2.4^{-2}[c]
	56489	6-089			2.0^{-1}	2.4^{-2}[c]
	56490	6-090			9.6^{-2}	1.2^{-2}[d]
	56491	6-091			1.2^{-1}	1.6^{-2}[d]

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Beneath strippable coating.

d. On top of strippable coating.

TABLE 21. TURCO STRIPPABLE COATING DECONTAMINATION TEST ON DIAMOND PLATE--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56523	6-123	2.0	2.7^{-1}		
	56524	6-124	2.1	2.9^{-1}		
	56525	6-125			2.0^{-1}	2.5^{-2}[c]
	56526	6-126			1.2^{-1}	1.4^{-2}[c]
	56527	6-127			2.4^{-1}	3.5^{-2}[d]
	56528	6-128			1.3^{-1}	1.6^{-2}[d]
Acetate Pads[b]	56521	6-121	4.7^{-2}	5.8^{-3}		
	56522	6-122	4.2^{-2}	5.5^{-3}		

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Beneath strippable coating.

d. On top of strippable coating.

TABLE 22. IMPERIAL STRIPPABLE COATING DECONTAMINATION TEST ON DIAMOND PLATE--RAW DATA

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
Swipes[a]	56534	6-134	3.2	4.5^{-1}		
	56535	6-135	1.6	2.2^{-1}		
	56536	6-136			1.1	1.5^{-1}[c]

TABLE 22. (continued)

	Sample Number		Before Decontamination Tests		After Decontamination Tests	
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)	Cs-137 (μCi)	Cs-134 (μCi)
	56537	6-137			5.9×10^{-1}	8.0×10^{-2} [c]
	56538	6-138			4.4×10^{-1}	6.4×10^{-2} [d]
	56539	6-139			1.1	1.5×10^{-1} [d]
Acetate Pads [b]	56532	6-132	1.3	1.8×10^{-1}		
	56533	6-133	5.3×10^{-2}	6.6×10^{-3}		

a. Swipes assumed to be 100 cm^2.

b. Acetate pads assumed to be 6.45 cm^2.

c. Beneath strippable coating.

d. On top of strippable coating.

TABLE 23. ACTIVITY COMPARISON OF STRIPPABLE COAT SAMPLES--RAW DATA

	Sample Number		Cs-137 (μCi)	Cs-134 (μCi)
	GPU	Bechtel		
Imperial (painted concrete)	56498	6-098	8.2	1.1
	56499	6-099	8.2	1.1
	56500	6-100	10.2	1.4

TABLE 23. (continued)

	Sample Number			
	GPU	Bechtel	Cs-137 (μCi)	Cs-134 (μCi)
Imperial (diamond plate)	56540	6-140	6.6	9.2^{-1}
	56541	6-141	9.9	1.4^{-2}
	56542	6-142	8.1	1.1
TURCO (diamond plate)	56529	6-129	3.0	4.1^{-1}
	56530	6-130	5.2^{-1}	6.9^{-2}
	56531	6-131	3.6	5.0^{-1}

ENTRY 6, CAMERA CABLE ROUTING

During Entry 6, phase one of the closed circuit television system was completed. Figure 3 shows the cable routing and camera placement diagram for Elevation 305. Figure 4 shows the cable routing and camera placement diagram for Elevation 347. Cameras had a 360 degree field of view.

PROBLEMS ENCOUNTERED ON FEBRUARY 5, 1981, ENTRY 6

During containment Entry 6 on February 5, 1981, several problems were encountered involving radiological control. Until the writing of this report, these problems had been addressed in Radiological Deficiency Report (RIR) 81-003 of February 6, 1981, initiated by T. E. Morris of the Containment Access Group (CAG). The RIR was returned to the CAG with assigned follow-up responsibilities on February 27, 1981.

A total of five men suffered skin contamination during the entry. An electrical technician became contaminated in the crotch area after his wet suit tore while he worked astride a pipe. He was performing electrical maintenance on penetration R507 for the closed circuit television (CCTV) system.

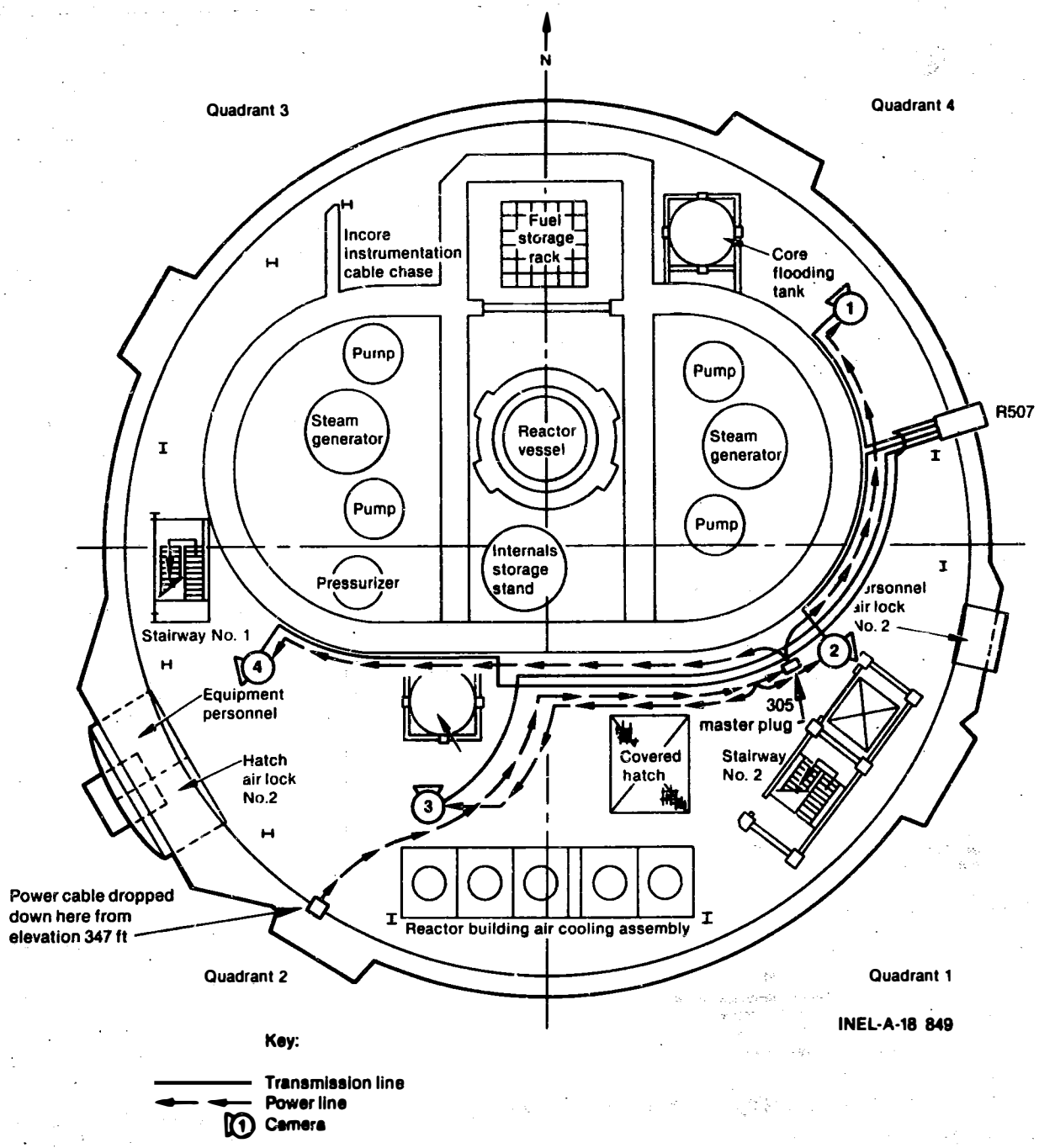

Figure 3. Entry 6, Elevation 305 camera cable routing diagram.

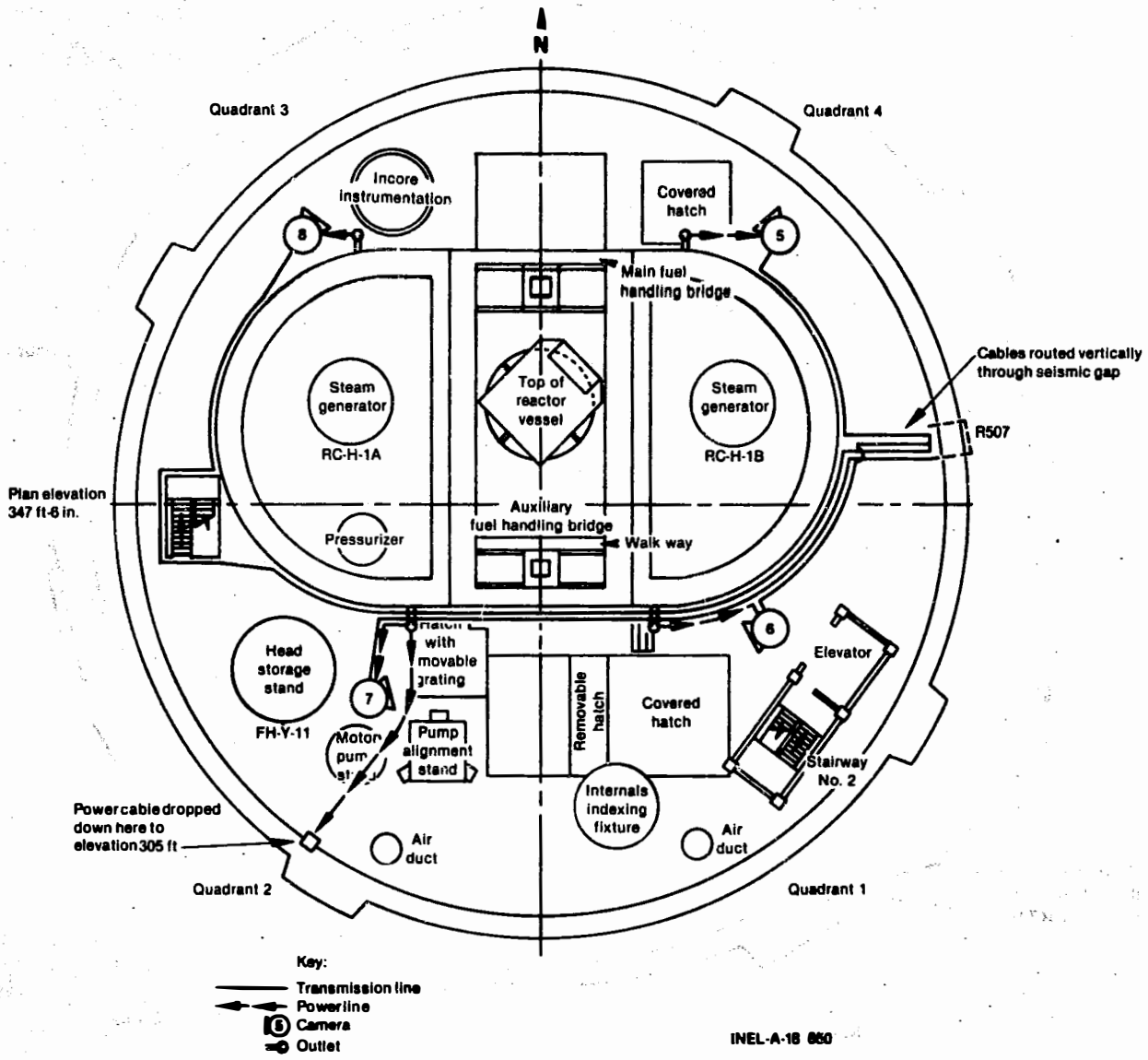

Figure 4. Entry 6, Elevation 347 camera cable routing diagram.

Two other I&C technicians became contaminated on their inner legs while installing and troubleshooting CCTV cameras. These men were not wearing wetsuits. The exact cause of their contamination is not known. During the entry they transported and hooked up cameras and handled electrical cable. These men were working under the coverage of a Met-Ed Health Physics (HP) Technician.

Two other HP technicians also became contaminated on the knee and upper leg while undressing entry team members in the ante-room. These men were wearing single protective clothing when this occurred.

Radiological Control in the ante-room proved to be another problem area during the entry. On the second entry day, February 5, 1981, airborne particulate activity levels increased to 1×10^{-8} µC/ml, requiring the ante-room team members to wear respiratory protection. In addition, the surface contamination levels in the ante-room were higher then normal.

To correct these ante-room problems the CAG will train individuals to work in the ante-room during containment entries. These personnel shall have limited HP support. In addition, the tracking of contamination into the ante-room will be minimized by the following actions:

- Installation of step-off pads at the inner reactor building door and in the airlock
- Wipe down of entry team members wetsuits prior to exit
- Monitor exit using CCTV system
- Emphasize personnel action necessary to limit spread of contamination and prevent skin contamination.