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DECONTAMINATION OF A CANYON CRANE AT THE SAVANNAH RIVER PLANT

by

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Slide #1 Title Slide

REACTOR PRODUCTS ARE SEPARATED AND PURIFIED THROUGH COMPLEX PROCESSES IN RADIOCHEMICAL SEPARATIONS PLANTS AT THE SAVANNAH RIVER PLANT. THE ACTUAL PROCESSING OF REACTOR IRRADIATED MATERIALS TAKES PLACE IN HEAVILY SHIELDED SECTIONS OF THE PLANT AND THESE SECTIONS ARE CALLED THE CANYONS. BECAUSE OF INTENSE RADIATION LEVELS, THE CANYONS ARE NOT ACCESSIBLE FOR DIRECT MAINTENANCE. THE DESIGN OF THE CANYON ALLOWS THE REMOTE REMOVAL, INSTALLATION, AND MAINTENANCE OF EQUIPMENT BY AN OVERHEAD BRIDGE CRANE. A CRANE OPERATOR, LOCATED IN A SHIELDED CAB, VIEWS THE OPERATIONS THROUGH BOTH A PERISCOPE AND CLOSED CIRCUIT TV SYSTEM. THE BRIDGE CRANES HAVE BEEN UTILIZED IN THE CANYON FACILITIES SINCE BEGINNING CANYON OPERATIONS IN 1954 AND REQUIRE ROUTINE PREVENTATIVE MAINTENANCE AND PERIODIC UPGRADES. MAINTENANCE ON THE CRANE IS PERFORMED IN A SPECIALLY DESIGNATED CRANE MAINTENANCE AREA. PERIODICALLY, BOTH THE CRANE AND THE CRANE MAINTENANCE AREA REQUIRE DECONTAMINATION TO ASSURE THAT EXPOSURES TO PERSONNEL USING THE CRANE AND PERFORMING ROUTINE MAINTENANCE ON THE CRANE ARE AS LOW AS REASONABLY ACHIEVABLE. IN 1984, EXPOSURE RATES ON THE CRANE HAD REACHED A POINT WHERE THE CONVENTIONAL DECONTAMINATION TECHNIQUES NO LONGER PRODUCED SATISFACTORY RESULTS CONSISTENT WITH OUR ALARA PROGRAM. DU PONT CONTRACTED WITH A VENDOR TO DECONTAMINATE THE CRANE USING HIGH-PRESSURE "FREON". THE LOW SURFACE TENSION, HIGH DENSITY, AND HIGH MOLECULAR WEIGHT OF "FREON" MAKE IT AN EFFECTIVE DECONTAMINATION AGENT. ADDITIONALLY, "FREON" DOES NOT CONDUCT ELECTRICALLY, SO DAMAGE TO THE CRANE'S ELECTRICAL SYSTEM WOULD BE MINIMIZED. THE DECONTAMINATION GOALS IN THIS CONTRACT WERE TO REDUCE RADIATION EXPOSURE RATES FROM THE CRANE, ITS COMPONENTS, AND THE CRANE MAINTENANCE ROOM TO LEVELS LESS THAN 25 mR/hr AT 45 cms.

Slide #2 Picture of Canyon Bldg.

Slide #3 Picture of Bridge Crane

IN THIS PAPER, I WILL REVIEW DECONTAMINATION OF THE CRANE IN TERMS OF THE HEALTH PHYSICS ASPECTS OF THIS WORK, CONTROLS DURING DECONTAMINATION EFFORTS, AND THE RESULTANT RADIATION EXPOSURE RATES FOR DECONTAMINATION EFFORTS.

Slide #4 HP Requirements

LET ME FIRST REVIEW SOME SPECIFIC H.P. REQUIREMENTS

- o RADIATION EXPOSURE HISTORIES AND LIMITS
- o DOSIMETRY REQUIREMENTS
- o TRAINING REQUIREMENTS
- o STOP WORK AUTHORITY

RADIATION EXPOSURE HISTORIES AND LIMITS

EXPOSURE HISTORIES OF THE SIXTEEN SUBCONTRACTOR PERSONNEL INVOLVED IN THE CRANE DECONTAMINATION WERE REQUIRED PRIOR TO STARTING WORK.

Slide #5 Graph Summary of Sub-contractor Personnel 1984 Exposure histories prior to decon work

THIS SLIDE SUMMARIZES THE 1984 EXPOSURE HISTORIES OF THESE EMPLOYEES PRIOR TO DECON.

AVERAGE 55 mrem MAX. 388 mrem

MIMIMUM 0 mrem

Slide #6 Radiation Dose Limits

THIS SLIDE SUMMARIZES THE DOSE LIMITS FOR SUBCONTRACTOR PERSONNEL.

RADIATION DOSE LIMITS

	MAX. INDIVIDUAL TOTAL DOSE EQUIV. ALLOWABLE AT SRP	SRP MAX. INDIVIDUAL TOTAL DOSE EQUIV.
1. WHOLE BODY, ACTIVE BLOOD FORMING ORGANS, GONADS, LENS OF EYE	1.25 rem	1.95 rem
2. SKIN	5.00 rem	10.00 rem

THE SAVANNAH RIVER PLANT EXPOSURE LIMITS ARE MORE RESTRICTIVE THAN FEDERAL GUIDES. SRP LIMITS FOR EXPOSURE APPLIED TO ALL SUBCONTRACTOR PERSONNEL. ALL PREVIOUS YEAR TO DATE OCCUPATIONAL EXPOSURE RECEIVED BY SUBCONTRACTOR PERSONNEL WERE APPLIED TOWARD PLANT EXPOSURE LIMITS.

PLANT EXPOSURE GOALS - SRP WORK GROUPS HAVE ANNUAL RADIATION EXPOSURE GOALS AS A PART OF THE PLANT ALARA PROGRAM. CUMULATIVE EXPOSURE OF SUBCONTRACTOR PERSONNEL INVOLVED IN DECONTAMINATION OF THE CRANE WAS INCLUDED IN THE OPERATING GROUPS EXPOSURE AND ACCOUNTED FOR IN THE OPERATING GROUPS ALARA PERFORMANCE.

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DOSIMETRY REQUIREMENTS

TLD BADGES-

- 1 WORN FOR DURATION OF DECON OPERATION
- 1 WORN, EXCHANGED, AND EVALUATED AT END OF EACH WORKING SHIFT.
- 1 DIRECT READING POCKET DOSIMETER WORN AT ALL TIMES DURING WORK.

WHOLE BODY COUNT -

- INITIAL AND FINAL AT SRP.
- ADDITIONAL WBC PERFORMED AT REQUEST OF SRP H.P.

BIOASSAY SAMPLES -

- INITIAL BIOASSAY SAMPLE SUBMITTED ON FIRST DAY BEFORE ENTERING REGULATED AREA.
- FINAL BIOASSAY SAMPLE SUBMITTED ON LAST DAY AFTER WORK COMPLETED AND BEFORE SUBCONTRACTOR PERSONNEL LEAVE SITE.
- ADDITIONAL BIOASSAY SAMPLES SUBMITTED AT REQUEST OF SRP H.P.

TRAINING

Slide #8
Training

PRIOR TO START OF DECONTAMINATION OPERATIONS, A TRAINING SESSION WAS HELD FOR ALL SUBCONTRACTOR PERSONNEL. WE RECOGNIZE THAT THIS PARTICULAR SUBCONTRACTOR WAS EXPERIENCED IN DECONTAMINATION TECHNIQUES; HOWEVER, OUR NORMAL PROCEDURE IS TO ASSURE THAT ALL PERSONNEL INVOLVED IN ANY JOB UNDERSTAND THE JOB PLAN, THE JOB CONDITIONS, AND THE SAFETY REQUIREMENTS OF THE JOB THEY ARE ABOUT TO PERFORM.

- o DISCUSSION OF PLANT RADIATION AND CONTAMINATION CONTROL PROCEDURES, PROTECTIVE CLOTHING REQUIREMENTS FOR THE JOB, AND EXPOSURE LIMITS. (INCLUDES PROPER MONITORING TECHNIQUES FOR CONTAMINATION AFTER PLASTIC SUIT REMOVAL.)
- o REVIEW OF HEALTH PROTECTION PROCEDURES AND MONITORING SERVICES TO BE SUPPLIED BY SRP H.P.
- o REVIEW OF PROCEDURES TO BE USED BY SUBCONTRACTOR PERSONNEL DURING DECON OPERATIONS.
- o REVIEW OF PROPER HANDLING OF ALL CHEMICALS TO BE USED.
- o PROPER METHOD FOR DONNING AND REMOVAL OF FULL FACE RESPIRATORS AND AIR-SUPPLIED PLASTIC SUITS. (SUBCONTRACTOR PERSONNEL WERE REQUIRED TO BE QUANTITATIVELY FIT TESTED AT SRP FOR A FULL FACE RESPIRATOR PRIOR TO WORK.)

STOP WORK AUTHORITY

HP AS A PART OF NORMAL OPERATIONS HAS THE AUTHORITY TO STOP WORK IMMEDIATELY. THIS APPLIES TO SUBCONTRACTORS AS WELL AS DU PONT PERSONNEL.

LET ME NOW TURN TO THE ACTUAL DECONTAMINATION OPERATIONS AND MAKE SOME COMMENTS ABOUT THE JOB ITSELF.

Slide #9
Picture of Crane
Prior to Decon.

THIS IS A PICTURE OF THE CANYON CRANE PRIOR TO DECONTAMINATION.

TYPICAL EXPOSURE RATES @ 45 cm INCLUDE:

IMPACT WRENCHES	1000 mR/hr
MONORAILS	600 mR/hr
BRIDGE	400 mR/hr
HOIST	150 mR/hr
CRANE MAINTENANCE ROOM	100 mR/hr
SUMP	1000 mR/hr
CCTV CAMERA	100 mR/hr

Slide #10
Picture of Remote
Decon Chamber
and ALARA Strippable
Coating on Wall

THIS IS A PICTURE OF THE REMOTE DECON CHAMBER. ALARA STRIPPABLE COATING HAS BEEN PAINTED ON THE WALL TO YOUR RIGHT.

RESULTS -

THE PROJECT WAS COMPLETED

- SAFELY
- ON SCHEDULE
- ALL GOALS WERE MET.

Slide #11
Goals
Rad. Exposure Rates Reduced

GOALS

o RADIATION EXPOSURE RATES REDUCED TO LESS THAN 25 mR/hour @ 45 cm

Slide #12
Rad. Levels VS. Goals

EXAMPLES: RADIATION LEVELS vs GOALS

Slide #13
Goals Exposure to Personnel Maintained ALARA

o EXPOSURE OF PERSONNEL WAS MAINTAINED ALARA

Slide #14
Decontamination Radiation Exposure

DECONTAMINATION OF CANYON CRANE

RADIATION EXPOSURE

	SRP FORECAST	ACTUAL
SUBCONTRACTOR	17.0 rem	2.5 rem

Slide #15
Summary of Sub-contractor Personnel 1984 Exp. Histories

SUMMARY OF SUBCONTRACTOR PERSONNEL 1984 EXPOSURE HISTORIES

EXAMPLE OF REDUCTION OF EXPOSURE RATES EFFECT ON PERSONNEL EXPOSURE FOR WORK ON CCTV CAMERA

Slide #16
Work on CCTV Cameras

SUMMARY

Slide #17
Picture of Completed Crane

MAINTENANCE AND UPGRADES WERE IMPLEMENTED IN A TIMELY MANNER.

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SLIDE 1

DECONTAMINATION OF A CANYON CRANE

AT THE

SAVANNAH RIVER PLANT

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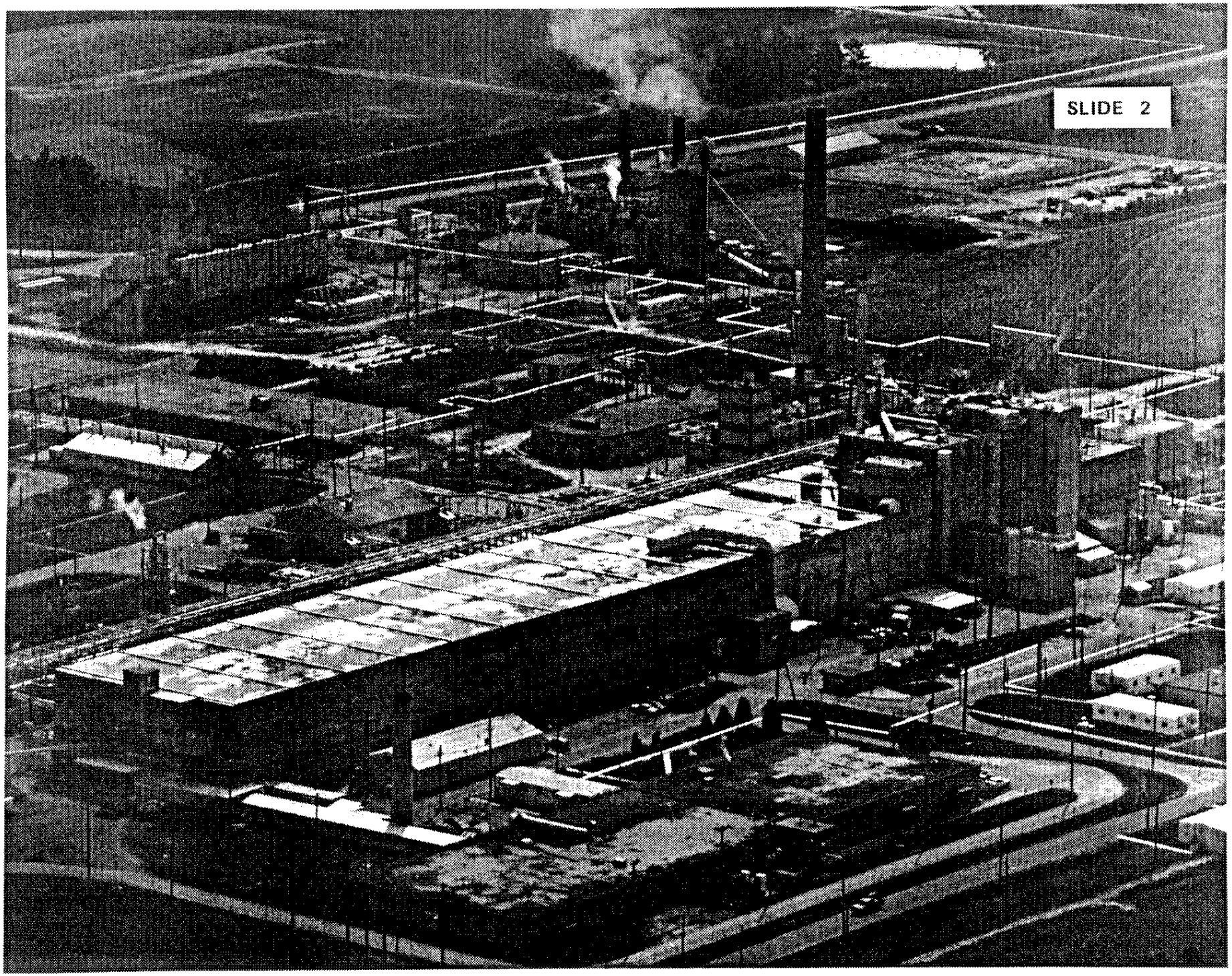
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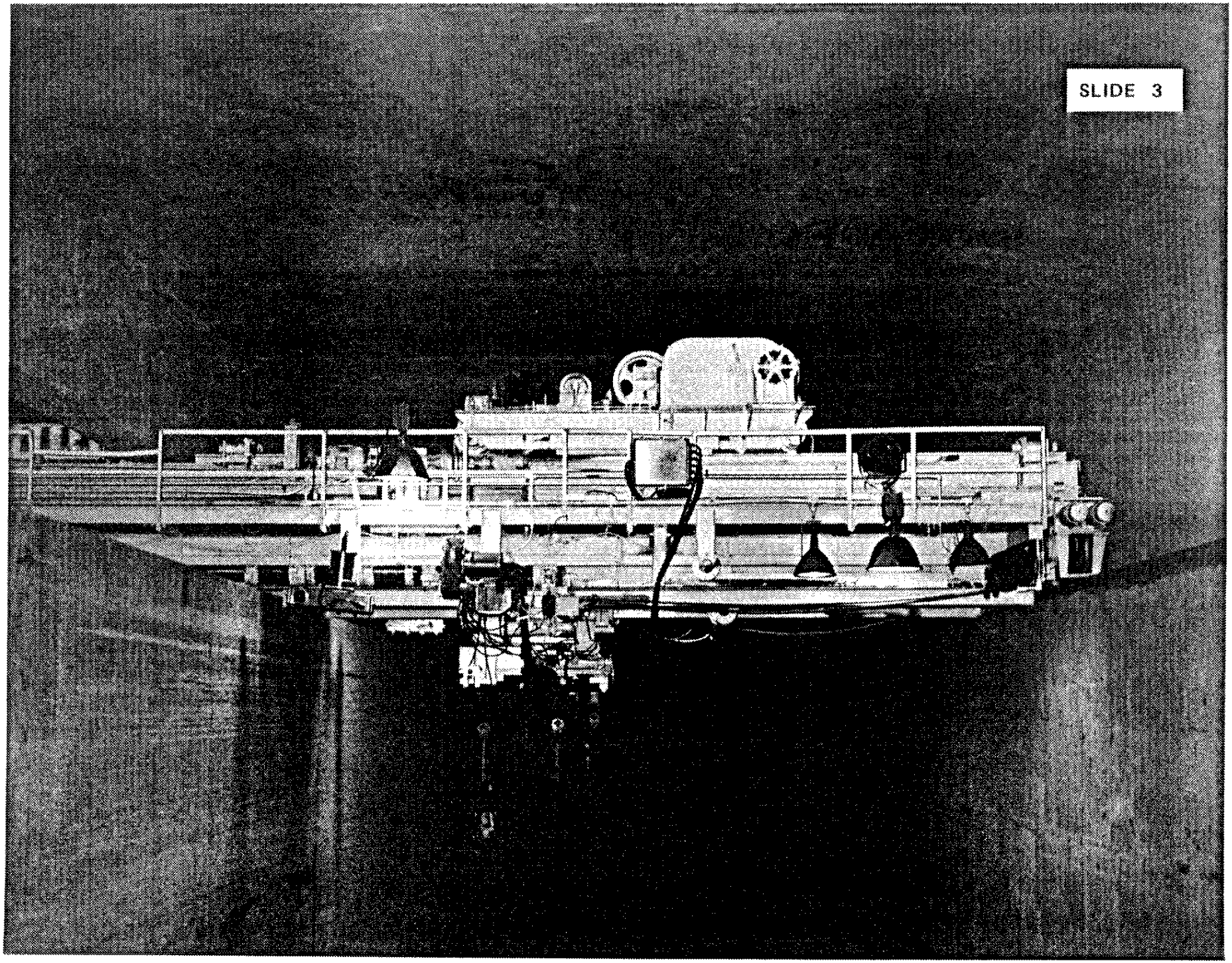
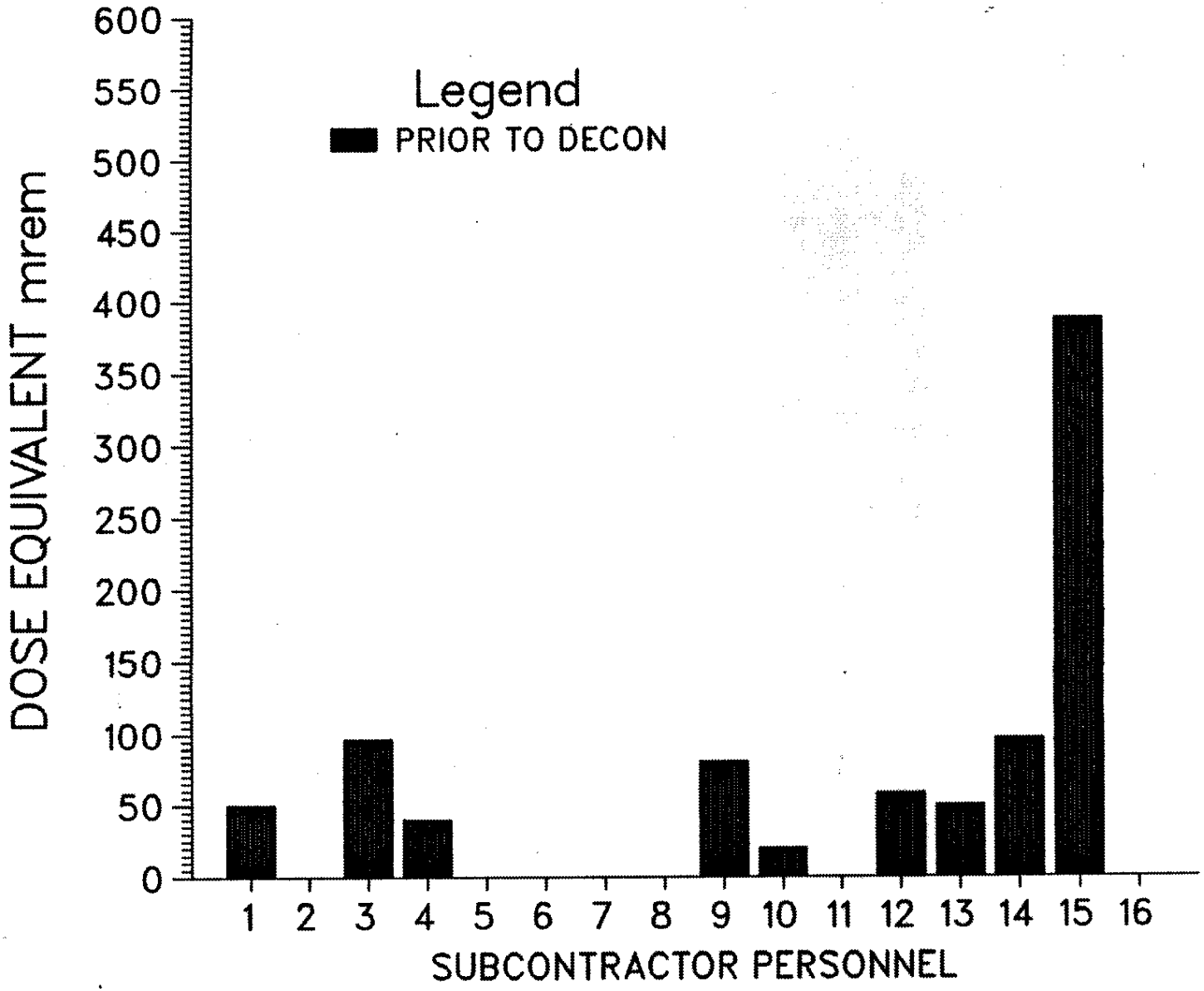

SLIDE 3

HEALTH PROTECTION REQUIREMENTS

- RADIATION EXPOSURE HISTORIES AND LIMITS
- DOSIMETRY REQUIREMENTS
- TRAINING REQUIREMENTS
- STOP WORK AUTHORITY

SUMMARY OF SUBCONTRACTOR PERSONNEL 1984 EXPOSURE HISTORIES PRIOR TO DECON WORK



DOSE EQUIVALENT LIMITS

	MAXIMUM INDIVIDUAL TOTAL DOSE EQUIVALENT ALLOWABLE FOR WORK AT SRP	MAXIMUM INDIVIDUAL TOTAL DOSE EQUIVALENT
1. WHOLE BODY, ACTIVE BLOOD FORMING ORGANS, GONADS, LENS OF EYE.	1.25 REM	1.95 REM
2. SKIN	5.00 REM	10.00 REM

SCREEN WILL BE

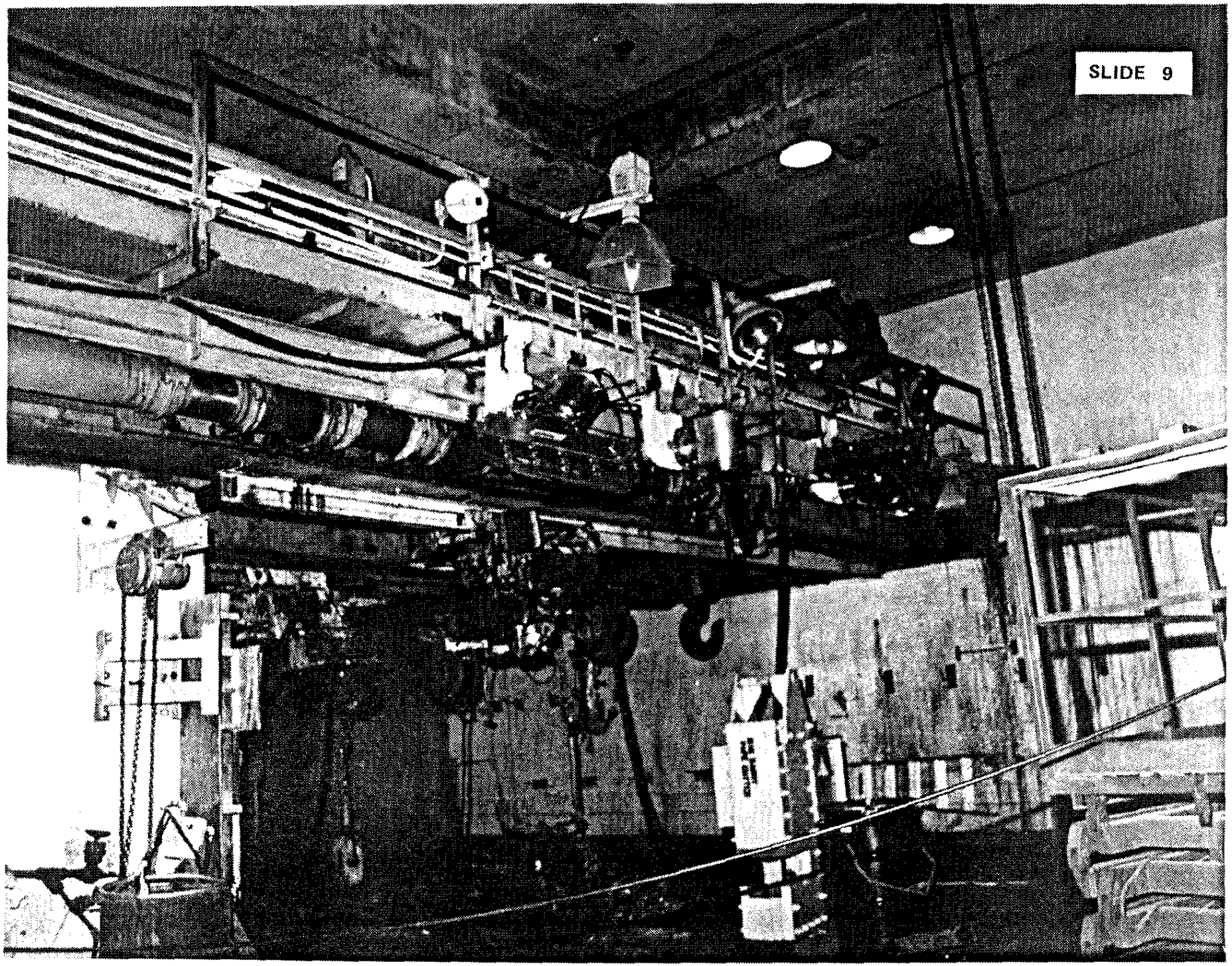
BLANK

DURING DISCUSSION OF

DOSIMETRY REQUIREMENTS

TRAINING

- DISCUSSION OF PLANT RADIATION AND CONTAMINATION CONTROL PROCEDURES, PROTECTIVE CLOTHING REQUIREMENTS, AND EXPOSURE LIMITS.
- REVIEW OF HEALTH PROTECTION PROCEDURES.
- REVIEW OF PROCEDURES TO BE USED BY PERSONNEL DURING DECONTAMINATION OPERATIONS.
- REVIEW OF PROPER HANDLING OF ALL CHEMICALS TO BE USED.
- PROPER METHOD OF DONNING AND REMOVAL OF FULL FACE RESPIRATORS AND AIR-SUPPLIED PLASTIC SUITS.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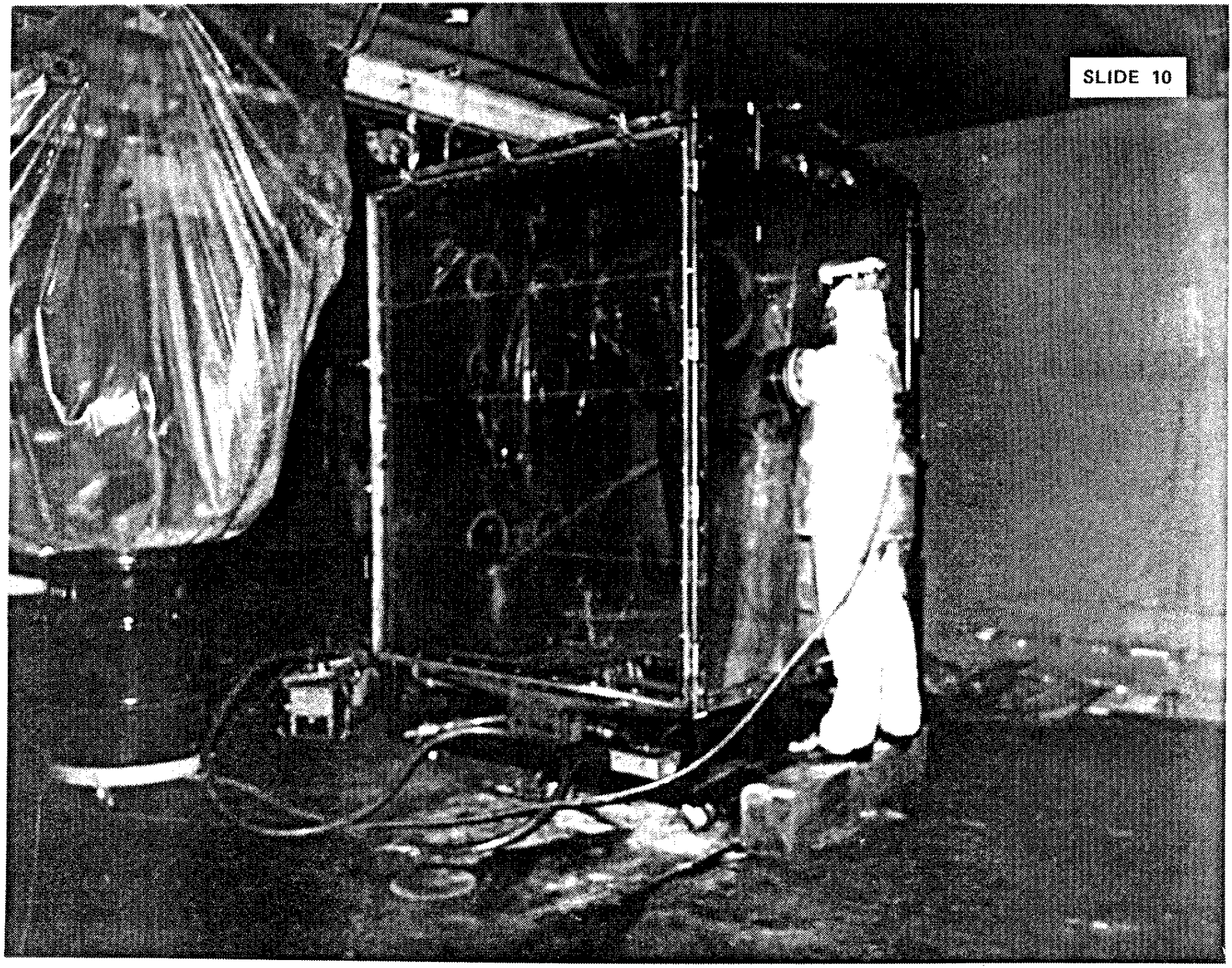

SLIDE 10

GOALS

- RADIATION EXPOSURE RATES WERE REDUCED TO 25 mR/hr OR LESS @ 45 cm FROM THE CRANE OR PIECE OF EQUIPMENT.

RADIATION LEVELS vs. GOALS

CRANE PART	PRE-DECON	GOAL	POST-DECON
IMPACT WRENCHES	1000 MR/HR	25 MR/HR	20 MR/HR
MONORAILS	600 MR/HR	25 MR/HR	20 MR/HR
BRIDGE	400 MR/HR	25 MR/HR	25 MR/HR
HOIST	150 MR/HR	10 MR/HR	10 MR/HR
CRANE MAINTENANCE RM.	100 MR/HR	10 MR/HR	5 MR/HR
SUMP	1000 MR/HR	25 MR/HR	20 MR/HR

LEVELS IN MR/HR AT 45 CMS

GOALS

- RADIATION EXPOSURE RATES WERE REDUCED TO 25 mR/hr OR LESS @ 45 cm FROM THE CRANE OR PIECE OF EQUIPMENT.

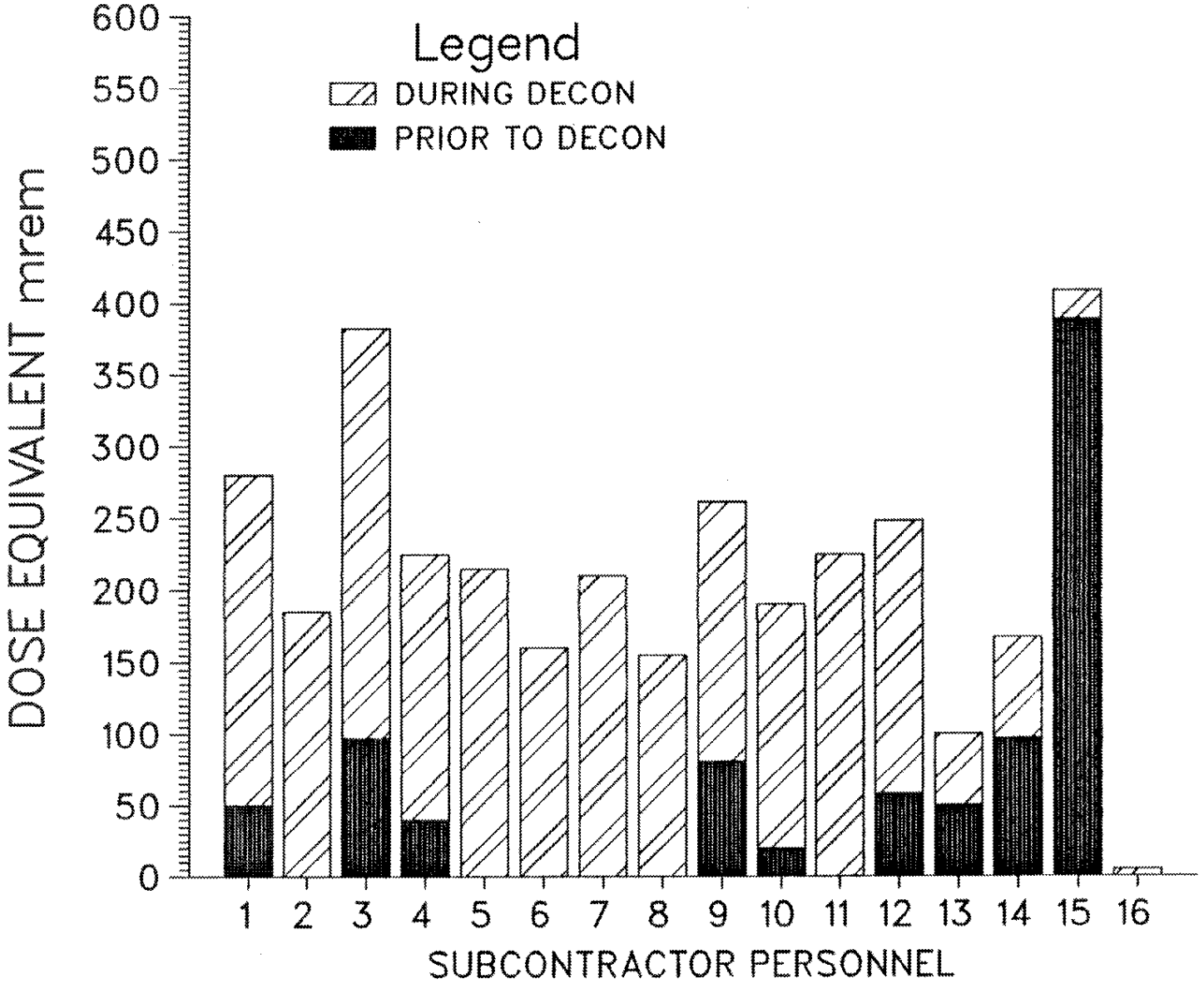
- EXPOSURE TO PERSONNEL WAS MAINTAINED ALARA.

DECONTAMINATION OF CANYON CRANE

RADIATION EXPOSURE

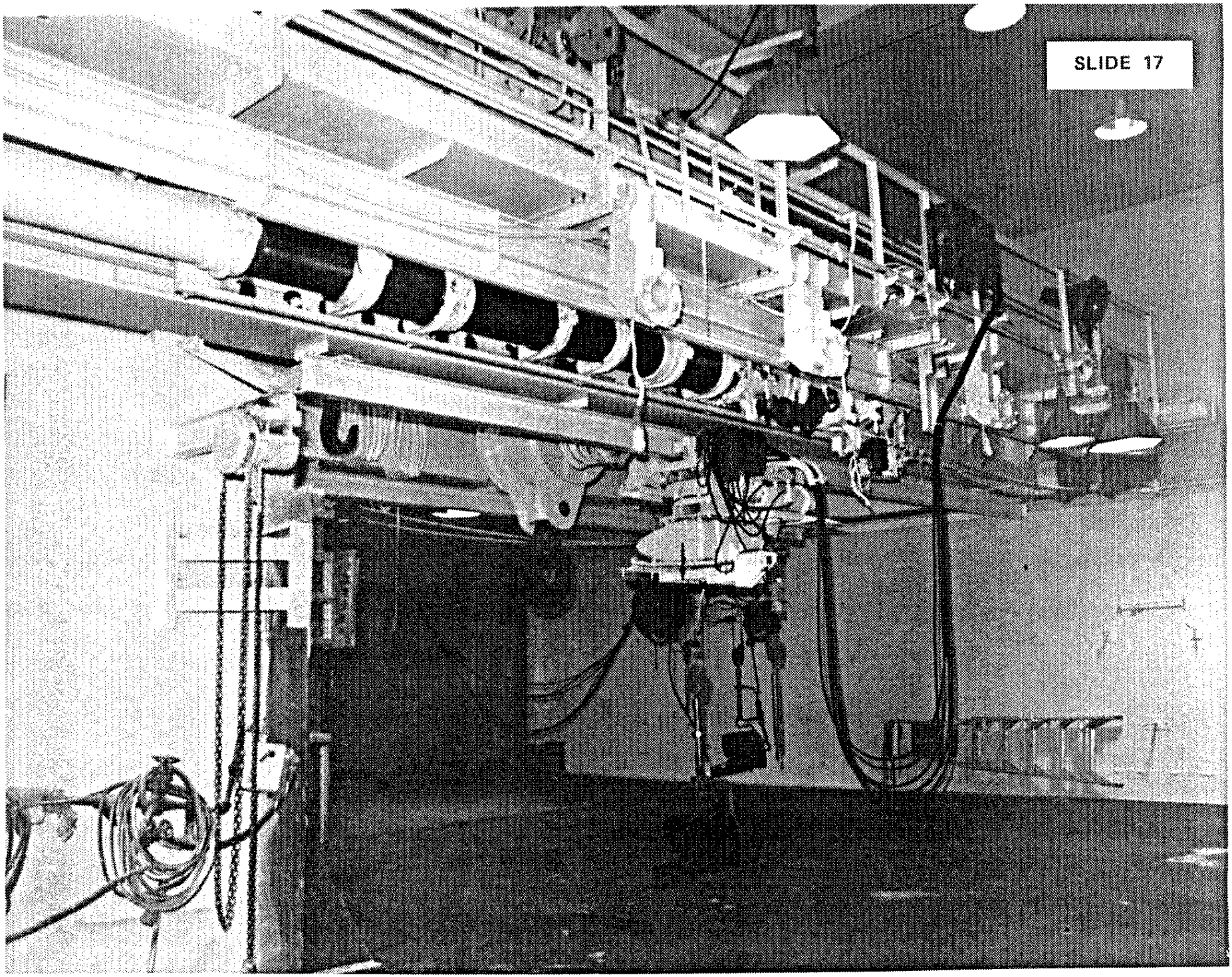
	FORECAST	ACTUAL
SUBCONTRACTOR	17.0 REM	2.5 REM

SUMMARY OF SUBCONTRACTOR PERSONNEL 1984 EXPOSURE HISTORIES AFTER DECON WORK



WORK ON CCTV CAMERAS

	BEFORE DECON	AFTER DECON
EXPOSURE RATE:	100 mR/HR	20 mR/HR
ETE:	435 mR	90 mR
PERSONNEL:	4 E&I AND 1 HP	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