

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION V

Report No. 81-02

License No. 04-01043-10 Priority IV Category E (1-A)

Licensee: SRI International

333 Ravenswood Avenue

Menlo Park, California 94025

Facility Name: Hot Cell Facility

Inspection at: Building 131, Camp Parks Military Reservation

Inspection Conducted: June 9, 1981

Inspectors: B. A. Riedlinger 6/30/81  
B. A. Riedlinger, Radiation Specialist Date Signed

D. D. Skov 6/30/81  
D. D. Skov, Radiation Specialist Date Signed

Approved by: H. E. Book, for 6/30/81  
R. D. Thomas, Chief, Materials Radiation Protection Section Date Signed

Approved by: H. E. Book 6/30/81  
H. E. Book, Chief, Radiological Safety Branch Date Signed

Summary:

Inspection on June 9, 1981, Report No. 81-02

This report contains the results of a second confirmatory survey made at the Camp Parks Hot Cell Facility following notification by the licensee that the building had been decontaminated to acceptable levels for release to unrestricted use. A total of 9 inspector hours were expended by two inspectors who performed the survey on June 9, 1981.

Results: The confirmatory survey, consisting of direct field measurements and wipe analysis, determined that contamination was present in several locations of the Hot Cell Area within Building 131 which exceeded NRC guidelines for release to unrestricted use. The NRC survey was therefore terminated until the licensee performs the required decontamination, performs a final survey, and submits the survey results for evaluation by the NRC.

RV From 219 (1)

## DETAILS

### 1. Person Contacted

James L. Thomas, Radiation Safety Officer, SRI International

### 2. Background

On April 21 and 22, 1981, two inspectors from NRC:RV conducted a confirmatory survey for final clearance of the Camp Parks Hot Cell Facility (Building 131). The results of that inspection as contained in report 81-01 which was sent to the licensee, indicated that additional decontamination was required in some areas of Building 131.

The NRC Region V office received a report on May 14, 1981 and a follow-up letter on June 3, 1981 from Mr. James Thomas, SRI International, which gave the results of a further decontamination and radiation survey which was performed by the licensee as requested by NRC:RV.

Based on the results of the licensee survey, a second confirmatory survey was carried out by two NRC:RV inspectors on June 9, 1981 with the objective of final clearance of Building 131.

The survey criteria were based on the requirements established by "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material", November, 1976.

### 3. Reference Sources

An NRC Region V strontium-90 counting source (Serial No. 7722) was selected for use in the calibration of portable survey instruments and laboratory proportional counter. The Sr-90 calibration source yielded 2520 disintegrations per minute of activity on August 25, 1977. Based on a half-life of 28 years, the source was calculated to have a decay-corrected activity of 2300 disintegrations per minute in June, 1981.

### 4. Field Radiation Detection Instruments

Beta-gamma surface contamination levels were measured with two portable survey instruments:

- a. Eberline Model E-520 with pancake GM detector Model HP-260 (NRC 8251)
- b. Eberline Model E-520 with pancake GM detector Model HP-260 (NRC 8253)

Both instruments were calibrated with a Sr-90 counting source described above (#7722) which yielded an average of 500 gross counts per minute

(NRC 8251) and 550 gross counts per minute (NRC 8253) on the X0.1 scale. The measurement was made with the source in surface contact with the detector window (thickness 1.4-2.0 mg/cm<sup>2</sup>) and the instrument response adjusted to the slowest setting available (maximum counter-clockwise position) to minimize instrument meter needle fluctuation. The background radiation measured an average of 75 counts per minute (NRC 8251) and 150 counts per minute (NRC 8253). Under these conditions, the instruments gave 19.6 and 21.7 percent efficiencies. The average efficiency was, therefore, 20 percent.

5. Acceptable Contamination Release Levels

As with the previous confirmatory survey conducted on April 21 and 22, 1981, it was assumed for the purpose of the present survey that all contamination detected was due to strontium-90. This assumption was based on the large quantity of strontium-90 used under the license as well as other factors which are discussed in the previous NRC:RV confirmatory survey report (May 13, 1981) No. 81-01.

The acceptable surface contamination levels which are applicable for the present survey and which are taken from the guidelines document for decontamination and release of facilities to unrestricted use are summarized in Table I:

TABLE I  
ACCEPTABLE SURFACE CONTAMINATION LEVELS

	<u>MAXIMUM</u>	<u>AVERAGE</u>	<u>REMOVABLE</u>
Radiation	1.0 mrad/hr at 1 cm	0.2 mrad/hr at at 1 cm	N/A
Contamination	3,000 dpm/100 square centimeters	1,000 dpm/100 square centimeters	200 dpm/100 square centimeters

6. Meter Allowable Readings

Meter allowable readings (MAR), exclusive of natural background radiation, were calculated based on the response of the field instrument to the strontium-90 reference source and on the release levels for surface contamination. Maximum and average MAR values were developed for spot (less than 100 cm<sup>2</sup>) and wide areas (greater than or equal to 100 cm<sup>2</sup>) of contamination as defined using the methodology described in the first confirmatory survey report 81-01. The details of the MAR calculations are described in Attachment 1 and the MAR values are tabulated below (Table II).

TABLE II

FIELD INSTRUMENT CONTAMINATION LIMITS\*

<u>AREA OF CONTAMINATION</u>	<u>MAXIMUM MAR</u>	<u>AVERAGE MAR</u>
Spot (<100 cm <sup>2</sup> )	600 cpm	200 cpm
Wide (>100 cm <sup>2</sup> )	90 cpm	30 cpm

\*Readings with subtraction of natural background radiation.

7. Wipes Survey

Removable contamination was evaluated by wiping the surface using Whatman #42 filter paper by moderate pressure over an area of 100 square centimeters. The wipes were counted in a Region V NMC PC-55 gas flow proportional counter (NRC Serial No. 383). With a background of 67 cpm and use of the Sr-90 reference source (Serial No. 7722, 2520 dpm on 8-25-77), the efficiency of the proportional counter was determined as 67 percent on June 10, 1981.

8. Inspection Details

a. Building Interior Survey

The NRC Region V confirmatory survey which was performed April 21 and 22, 1981 determined that several areas of the Building 131 Hot Cell Facility remained contaminated to a level of activity above the release levels according to NRC guidelines. These areas as described in NRC:RV Report 81-01, included the former Hot Cell Area at the south end of the building, the porch area south of the hot cell, crawl space under the porch, the roof over the porch, and the restroom at the north end of the building.

The previous survey also determined that some other areas of Building 131 met the requirements of the NRC guidelines with respect to fixed and removable contamination and therefore fulfilled the criteria for release to unrestricted use. See Report 81-01.

In the current survey, attention was therefore directed to those areas of Building 131, particularly the Hot Cell location, which were identified as contaminated by the previous NRC survey and which was reported to be decontaminated according to the survey reports of May 6 and June 1, 1981 received by NRC:RV from SRI International.

The results of the survey measurements performed with the field instruments on June 9, 1981 and of the wipes taken on the same day and analyzed on June 10, 1981 are tabulated in Attachment II. The locations of the direct survey and wipes are shown in Figures I and II.

(1) West Wall of Hot Cell Area

The entire wall from the floor to the ceiling and from the south wall to the door on the west wall was thoroughly surveyed with the GM pancake probes. Several locations were noted to be in excess of the release limits specified in Tables I and II.

(2) East Wall of Hot Cell Area

A thorough survey was performed over nearly the entire East Wall of the Hot Cell Area using pancake GM detectors. The maximum direct reading was 15,000 cpm. This and a number of other locations on the wall were noted to exceed the release levels for contamination by reference to Tables I and II. A spot survey for removable contamination was made consisting of one wipe which indicated detectable activity, but which was below the release limits.

(3) South Wall of Hot Cell Area

A spot survey for fixed and removable contamination was made over the South Wall of the Hot Cell Area. One location was detected which did not meet the NRC guidelines for fixed contamination.

b. Building Exterior Survey

A spot survey was completed in the crawl space under the west location of the porch area adjacent to the Hot Cell Area. A direct survey indicated a maximum reading of 150 cpm (with background subtracted) over an approximately one square foot area on the ground which is marginally in excess of the NRC guidelines.

c. Conclusion

A survey of the former Hot Cell Area indicated that several locations on the East, West and South Walls were contaminated with radioactive material in excess of the release limits as established by NRC guidelines. These results are contrary to the licensee reports of April 6, May 6, and June 1, 1981 which indicated complete decontamination of the Hot Cell Facility to activity levels which are considered acceptable for release to an unrestricted area.

On the basis of the above result, it is concluded that:

1. The decontamination and resurvey efforts on the part of the licensee have not been carried out with sufficient care and thoroughness to ensure that the release limits are not exceeded and which would permit return of Building 107 to unrestricted use.
2. More adequate surveys need to be performed by the licensee to identify and evaluate the extent of all locations of existing contamination in order to assess the need for additional decontamination relative to NRC guidelines.

d. Exit Meeting

The licensee representative was informed during the exit meeting on June 9, 1981, that the Hot Cell Area was still contaminated to unacceptable levels and that additional effort would be required by the licensee to effect decontamination. A final survey and written report should be completed by the licensee and submitted to NRC Region V for evaluation. The licensee representative did not state when the decontamination effort would continue or when a report would be forthcoming.



## ATTACHMENT 1

### I. Meter Allowable Readings (MAR) Contamination Calculations

In order to equate the acceptable contamination limits established in Table I of this report, to the MAR values for fixed contamination, it was necessary to establish calculated values for spot and wide surface area contamination levels. For the purpose of calculating instrument response for spot contamination areas, it was assumed that all radioactivity is contained within a 15 cm<sup>2</sup> surface area, which is the sensitive area of the pancake GM detector. For the wide surface area contamination, it was assumed that the radioactive material was distributed over an area in excess of 15 cm<sup>2</sup>.

The pancake GM detector had an established efficiency of 20%.

To be equivalent to the acceptable limits specified in Table 1, the MAR values have been calculated and extrapolated to a 100 cm<sup>2</sup> area.

#### a. Spot Contamination:

$$\text{MAR (maximum)} = (3,000 \text{ dpm}) (.20) = 600 \text{ cpm}$$

Therefore, a MAR of 600 cpm is equivalent to 3,000 dpm per 100 square centimeters.

$$\text{MAR (average)} = (1,000 \text{ dpm}) (.20) = 200 \text{ cpm}$$

Therefore, a MAR of 200 cpm is equivalent to 1,000 dpm per 100 square centimeters.

#### b. Wide Area Contamination:

$$\begin{aligned} \text{MAR (maximum)} &= 600 \text{ cpm} \left( \frac{15 \text{ cm}^2}{100 \text{ cm}^2} \right) \\ &= 90 \text{ cpm} \end{aligned}$$

Therefore, a MAR of 90 cpm is equivalent to 3,000 dpm per 100 square centimeters.

$$\begin{aligned} \text{MAR (average)} &= 200 \text{ cpm} \left( \frac{15 \text{ cm}^2}{100 \text{ cm}^2} \right) \\ &= 30 \text{ cpm} \end{aligned}$$

Therefore, a MAR of 30 cpm is equivalent to 1,000 dpm per 100 square centimeters.

ATTACHMENT II

DIRECT READING AND WIPE TEST CONTAMINATION SURVEY

1. Direct Survey with Eberline G-M Pancake Probe on June 9, 1981.

<u>Location Noted on Figures I &amp; II</u>	<u>Description of Location</u>	<u>Meter Reading with Background Subtract</u>
A	On East Wall, 2' from North door, 0.8' above floor	250 cpm (1,250 dpm per 100 cm <sup>2</sup> )
B	On East Wall, 12' from North door, 0.8' above floor	300 cpm (1,500 dpm per 100 cm <sup>2</sup> )
C	On East Wall, 8.8' from South wall, 3.1' above floor	1,550 cpm (7,750 dpm per 100 cm <sup>2</sup> )
D	On East Wall, 6.8' from South wall, 4.1' above floor	2,050 cpm (10,250 dpm per 100 cm <sup>2</sup> )
E	On East Wall, 4.7' from South wall, 4.1' above floor	10,000 cpm (50,000 dpm per 100 cm <sup>2</sup> )
F	On East Wall, 2' from South wall, 0.8' above floor	1,050 cpm (5,250 dpm per 100 cm <sup>2</sup> )
G	On East Wall, 3' from North door, 8.7' above floor	15,000 cpm (75,000 dpm per 100 cm <sup>2</sup> )
H	On West Wall, 5.8' from door, 0.8' above floor	850 cpm (4,250 dpm per 100 cm <sup>2</sup> )
I	On West Wall (concrete under baseboard), 9.5' from door, 0.8' above floor	550 cpm (2,750 dpm per 100 cm <sup>2</sup> )
J	On West Wall (concrete under baseboard), 2.8' from door, 0.8' above floor	750 cpm (3,750 dpm per 100 cm <sup>2</sup> )
K	On West Wall, 1' from South Wall, 4' above floor	350 cpm (1,750 dpm per 100 cm <sup>2</sup> )
L	On West Wall, 2.7' from South Wall, 6.7' above floor	1,050 cpm (5,250 dpm per 100 cm <sup>2</sup> )
M	On West Wall, 3.6' from South Wall, 1.5' below ceiling	450 cpm (2,250 dpm per 100 cm <sup>2</sup> )
N	On West Wall, 5.3' from South Wall, 1.5' below ceiling	150 cpm (750 dpm per 100 cm <sup>2</sup> )



<u>Location Noted on Figures I &amp; II</u>	<u>Description of Location</u>	<u>Meter Reading with Background Subtract</u>
O	On South wall, 22.7' from West Wall, 0.8' above floor	850 cpm (4,250 dpm per 100 cm <sup>2</sup> )
P	On South Wall, 8.1' from West Wall, 0.8' above floor	250 cpm (1,250 dpm per 100 cm <sup>2</sup> )
Q	On ground in crawl space under porch	150 cpm (750 dpm per 100 cm <sup>2</sup> )

2. Wipe Survey with No. 42 Whatman filter paper and NRC:RV gas flow proportional counter.

<u>Location Noted on Figure I</u>	<u>Description of Location</u>	<u>Results in <sup>2</sup> dpm per 100 cm</u>	
		<u>Alpha</u>	<u>Beta-Gamma</u>
G	On East Wall, 3' from North door, 8.7' above floor	0	173
O	On South Wall, 22.7' from West Wall, 0.8' above floor	0	116
P	On South Wall, 8.1' from West Wall, 0.8' above floor	0	179

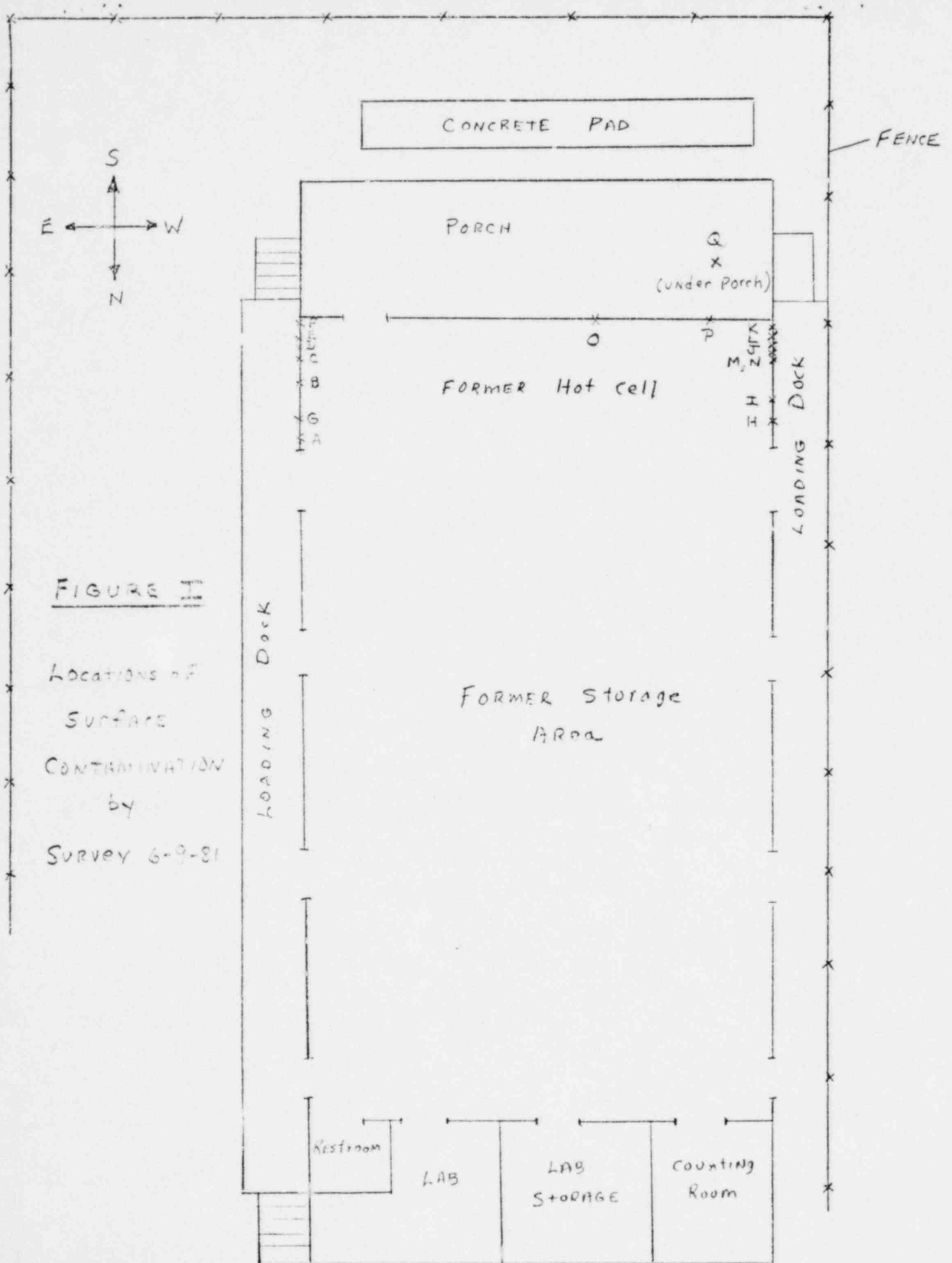


FIGURE I

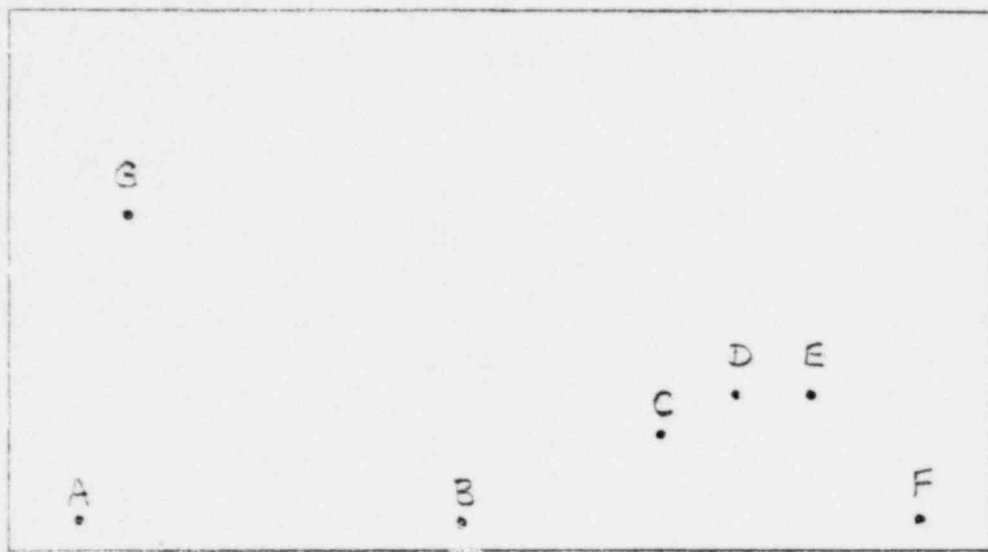
LOCATIONS OF  
SURFACE  
CONTAMINATION  
by  
SURVEY 6-9-81

FIGURE II LOCATIONS OF SURFACE CONTAMINATION BY SURVEY

EAST WALL (6-9-81)

ORIENTATION  
FACING WALL FROM  
BLDG. INTERIOR

CEILING



WEST WALL (6-9-81)

ORIENTATION  
FACING WALL FROM  
BLDG. INTERIOR

CEILING

