NMED/DOE/AIP-92/1

# AIR QUALITY MONITORING

**Prepared by:**

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**Air Quality Bureau**

**DOE Oversight and Monitoring**
**WIPP Project Site**

**NEW MEXICO ENVIRONMENT DEPARTMENT**

**July 1, 1992**

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July 1, 1992

## ABSTRACT

THE ENVIRONMENTAL OVERSIGHT AND MONITORING AGREEMENT BETWEEN THE DEPART - MENT OF ENERGY AND THE STATE OF NEW MEXICO PROVIDES THAT THE STATE WILL CONDUCT A COMPREHENSIVE REVIEW OF THE CURRENT WIPP AIR MONITORING SYSTEMS AND WILL RECOMMEND ANY MODIFICATIONS OR IMPROVEMENTS NECESSARY FOR THOSE SYSTEMS.

'E PRELIMINARY DRAFT OF THIS REVIEW WILL BE DELIVERED TO THE PROJECT MANAGER, AIR QUALITY BUREAU ON OR BEFORE THE WEEK ENDING 6-12-92.

THE FINAL DRAFT OF THIS REVIEW WILL BE DELIVERED TO THE PROJECT MANAGER, AIR QUALITY BUREAU ON OR BEFORE 7-17-92.

AIR QUALITY MONITORING

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## ABBREVIATIONS

| | |
|---|---|
| Am | Americium |
| AIRDOS-EPA | One component of the CAP-88 computer model |
| ARM | Area Radiation Monitor |
| CAM | Continuous Air Monitor |
| CAP-88 | Clean Air Act Assessment Package -1988. Computer model to calculate effective dose equivelents to public |
| CFM | Cubic Feet Per Minute |
| CH | Contact Handled Waste |
| Ci/Yr | Curies per Year |
| CO | Carbon Monoxide |
| CPM | Counts per Minute |
| Cuft | Cubic feet |
| Dac-Hrs | One Derived Air Concentration averaged over one hour |
| DOE | Department Of Energy |
| EEG | Environmental Evaluation Group (State of New Mexico) |
| FAS | Fixed Air Sampler |
| FSAR | Final Safety Analysis Report |
| HEPA | High Efficiency Particulate Air (filters) |
| Hi-Vol | High Volume Air Sampler |
| H2S | Hydrogen Sulphide |
| KW | Kilowatts |
| Lo-Vol | Low Volume Air Sampler |

| | |
|---|---|
| mrem/hr | Millirems per Hour |
| NMED | New Mexico Environment Department |
| NMP | New Mexico Potash Company mine site |
| NOx | Nitrogen Oxide |
| O3 | Ozone |
| PCA | Potash Company of America mine site |
| PM | Particulate Matter |
| Pu | Plutonium |
| QA | Quality Assurance |
| RH | Remote Handled Waste |
| SO2 | Sulphur Dioxide |
| Sta.A | Monitoring station at top of mine exhaust shaft |
| Sta.B | Monitoring station of mine exhaust after HEPA filters |
| Sta.C | Monitoring station at Waste Handling Building |
| Sta.D | Monitoring station at bottom of mine exhaust shaft |
| TLD | Thermoluminescent Dosimeter |
| TRU | Transuranic Waste |
| TRUPAC | Approved method of transporting Transuranic Waste |
| UNGND | Underground |
| VOC | Volatile Organic Compounds |
| WFF | WIPP Far Field - Location of Air Monitoring Equipment |
| WHB | Waste Handling Building |
| WID | Waste Isolation Division of Westinghouse |
| WIPP | Waste Isolation Pilot Plant |
| WIPP990.WND | WIPP site specific wind file for CAP-88 |
| WIPP1990.POP | WIPP site specific population files for CAP-88 |
| Zone 1 | 35 Acre area inside the secured chain link fence |
| Zone 2 | DOE exclusive use area (1446 acres). Includes Zone 1 |



# WIPP AIR QUALITY MONITORING

## A. SOURCES

### 1. General

Sources of radionuclide releases at the WIPP site are limited to Transuranic waste to be stored in containers in the underground repository. Inadvertent release from these containers would be drawn through the mine drifts by the 425,000 CFM exhaust fans and those particles not settling in the drifts would be expelled to atmosphere. At a preset detection level, at the top of the exhaust shaft, the high volume fans are automatically shut down and the system switched to filters. In this mode, air exhaust is reduced to 60,000 CFM and passed through HEPA filters. This system limits inadvertent releases to short bursts. With the CAM alarm setpoints set to forty (40) counts/min. of Plutonium the system switches to filtration in six minutes upon alarm. The confidence level of this happening is greater than 98% (REF I, Fig 2). Sources of on-site pollutant gases are Diesel engines, gasoline engines, and various VOC's which are released in small quantities from time to time.

### 2. Underground

a. TRU Waste;

Contact handled- 98% of the waste to be received at WIPP will be of this category. This waste has a surface dose rate of less than 200 mr/hr. At maximum capacity, the facility will store 6,200,000 cuft of this material.

Remote handled- 2% of the waste to be received at WIPP will be of this category. This waste has a surface dose rate of more than 200 mr/hr. At maximum capacity, the facility will store 250,000 cuft of this material.

Test Phase- will consist of bin-scale tests and alcove-scale tests to provide data for performance assessment. The scope of the alcove-scale test depends upon the results of the bin-scale tests. Test phase will involve Contact Handled Waste only.

All gas discharges from the bin and alcove testing will be directed to a common exhaust manifold containing a carbon sorption system. This manifold directs the test phase exhaust to the mine ventilation exhaust system downstream of the test area.

Due to the unknown implementation schedule of the Alcove test, only bin-scale is treated here.

Existing rooms 1,2, and 3 of panel one are to be used. A maximum of 233 bins with an internal volume of 42.4 cuft

or 9779 cuft will be placed. Discharges are expected to be various gases as well as radionuclides.

The estimated annual radionuclide release for the WIPP test in Ci/Yr is;

| | |
|---|---|
| Pu 238..... | 1.23E - 07 |
| Pu 239..... | 4.13E - 06 |
| Pu 240..... | 9.44E - 07 |
| Pu 241..... | 4.95E - 05 |
| Pu 242..... | 8.43E - 11 |
| Am 241..... | 3.22E - 07 |
| | 5.51E - 05 |

b. Diesel Equipment;
Most heavy-duty equipment underground is diesel powered. The remainder is electrical. All exhaust fumes are expelled from the mine by the 425,000 cfm mine exhaust system. In the event of a switch to filtration, all engines are immediately shut-down.

c. Salt Dust;
Salt dust is produced by underground mining operations. Salt particles from underground are borne by the 425,000 cfm air exhaust stream and are introduced into the outside air at that rate and approximately eleven meters high.

3. Above Ground
a. Salt Dust
Salt dust is produced by wind movement over surface storage piles and particles from underground being inserted into the airstream by the 425,000 cfm mine exhaust.

b. VOC's;
Organic compounds having saturated vapor pressures at 25 degrees C, greater than 1.0 mm Hg. (VOC's), may be emitted from the test waste bins to the mine ventilation system during the decomposition of the contents of the bins. Also, small amounts of VOC's are emitted on a daily basis from commercial solvents, paint, etc. used in mine maintenance.

c. Diesel and gasoline engine exhaust;
Approximately 300 employee vehicles are driven in, parked, and driven out each day. In addition, four (4) commercial diesel buses drive in and out each day. When the test phase begins, the TRUPAC diesel tractors will begin operations. Approximately fifteen (15) WIPP owned and operated autos and trucks see some activity on site each day.

d. Emergency diesel generators;
Upon loss of normal electrical power, one or both of the 1100 kw diesel generators located on site is started by



the Facility Operator. These generators then operate until such time as normal electrical power is restored.

B. SAMPLING
1. General

Air quality at WIPP is monitored by four different contractor groups and overseen by two different, independent state agencies. The Environmental Monitoring Group is concerned with the air outside the Zone 1 fence. On site, the Radiological Engineering, Operational Health Physics, and Dosimetry and Analytical Technology Groups monitor below surface and the thirty five acre area in Zone 1. Oversight is provided by the Environment Evaluation Group and by the New Mexico Environment Department. Instrumentation is provided by nineteen Alpha particle detecting Continuous Air Monitors, nineteen (19) Beta particle detecting Continuous Air Monitors, eighteen (18) Gamma Ray detecting Area Radiation Monitors, fifty six (56) Pu/Am detecting Fixed Air Samplers, eleven Low Volume Particulate Matter Samplers, six (6) High Volume Particulate Matter Samplers, thirty (30) Thermoluminescent Dosimeters, one (1) Sulphur Dioxide Monitor, one (1) Carbon Monoxide Monitor, one (1) Ozone Monitor, one (1) Hydrogen Sulphide Monitor, and one (1) Nitrogen Oxide Monitor. SEE FIG.1 & 2-2g One of the functions of the air monitoring system is to detect excess levels of airborne radioactivity in the underground exhaust air and to trigger a shift to filtration through the HEPA filters should excess levels be detected. The shift to filtration is implemented by the alarming of one CAM at station A or two CAM's underground.

2. Exhaust Shaft (Station A)

DOE order 5400.5, Radiation Protection of the Public and the Environment, Chapter 2, Paragraph 1.b. limits exposure of members of the public to radioactive materials released to the atmosphere as a consequence of routine DOE activities to a level that shall not cause members of the public to receive, in a year, an effective dose equivalent greater than 10 mrem.

To demonstrate compliance with the above limit, subparagraph 2 states that compliance is to be demonstrated by using CAP 88 or Airdos-PC or other codes specifically approved for this purpose. SEE FIG. 3-3d.

The effluent monitoring system is relied upon to detect releases from the facility which form the source term to be input into the codes to calculate the dose to offsite individuals.

DOE order 6430.1A, Sect. 1324, Paragraph 7.3.1 states that exhaust outlets that may contain Transuranics shall be provided with two monitoring systems.

In compliance with the above orders, two (2) Alpha CAM's, two (2) Beta CAM's, and one (1) Fixed Air Sampler are installed in an instrument enclosure at an elbow at the exhaust shaft collar. The CAMS are preset to alarm at 40 CPM and to automatically cause a shift to filtration upon alarm.

The data from this installation is routinely used to input one of the code programs i.e. AIRDOS, CAP-88, etc. to determine the individual at maximum risk (MIR) offsite. SEE FIG. 3a.
The WIPP Radiological Engineering Dept. updates these codes annually with new meteorological and population data, or on an exception basis, when so advised of a major change in conditions by the Environmental Monitoring Group.

3. Filtered Air Exhaust Shaft (Station B)

The purpose of Station B is to monitor emissions to atmosphere during a filtration mode. A shrouded sampling nozzle supplies a Fixed Air Sampler (FAS) and an Alpha Cam and a Beta Cam for detecting any radioactivity that might pass the HEPA filters.

The HEPA filters are certified (in place) to ensure a 99.95 percent capture efficiency for 0.7 - micron - diameter-particulates.

4. WIPP FAR FIELD

a. Lo Volume Air Sampler - There are two LoVol's within the fence at WFF. One is owned and operated by EEG, the other by WID. The WID sampler's filter is exchanged each Wednesday with the used one being taken to the site laboratory and analyzed for gross Alpha, gross Beta and suspended particulate matter.

b. Hi Volume Air Sampler - There is one HiVol within the fence at WFF. This sampler is classified as intermittent (as are all HiVols). Even though it remains certified, there are no plans to implement it even in an emergency.

c. Thermoluminescent Dosemeter (TLD) - The TLD previously reported at this location has been removed.

d. SO2 Monitor - There are two (2) SO2 Monitors in the enclosure at the WFF. One monitors SO2 as sampled. The other monitors SO2 as converted from H2S.

e. CO Monitor - There is one CO monitor within the enclosure at WFF.

f. O3 Monitor - There is one Ozone Monitor within the enclosure at WFF.



g. NOx Monitor - There is one NOx Monitor in the enclosure at WFF. It monitors NOx, NO and NO2.

h. H2S Monitor - H2S is converted to SO2 in a converter, then read by one of the SO2 monitors mentioned in (d) above.

5. Zones 1 & 2, 35 acres and 1920 acres.

a. Lo-Vol Air Samplers - There is one Lo-Vol located near the Engineering building (EEG). There is one Lo-Vol located just East of the WIPP site, and there is one Lo-Vol located just South of the WIPP site.

6. Ranches ( Smith, Mills, Angel )

a. Lo-Vol Air Samplers - There is one Lo-Vol at Smith Ranch and one at Mills Ranch.

b. Hi-Vol Air Sampler (intermittent) - There is one Hi-Vol at Angel Ranch.

7. Communities (5)

a. Lo-Vol Air Samplers - There is one Lo-Vol located on the roof of the State Police building at Carlsbad and one on the roof of the City Building at Eunice.

b. Hi-Vol Air Samplers (intermittent) - There are Hi-Vol's located at Carlsbad, Artesia, Loving, and Hobbs. When these filters are collected, they are analyzed for gross Alpha, gross Beta, and suspended particulate matter.

8. Control Station

a. Lo Volume Air Samplers - There are two (2) Lo Volume Air Samplers at a site located about five (5) miles South east of the WIPP site. One of these units is permanently located, the other is a control "rover". The "rover" moves from site to site on a quarterly basis.

9. VOC sampling

a. Although samples are taken throughout the underground, the two locations of most concern to Air Quality are located at the exhaust shaft (Sta. A) and the air intake shaft. These locations are labled VOC-1 and VOC-2 respectively. VOC-2 monitors surface produced VOC's entering the underground and VOC-1 monitors those coming up, with the difference being VOC's added in the waste storage area. The samplers are operated in a pressurized mode, which yields sample volumes greater than 6 liters at STP. The sample gas is pumped into the stainless-steel canisters by a system which regulates the rate and duration of the sampling event and the final canister gas pressure. Until the proper testing facilities are available at WIPP, the SUMMA canisters will be shipped to outside labs for analysis.

C. QUALITY ASSURANCE;

Section 11.0 of the Operational Environmental Monitoring Plan for the Waste Isolation Pilot Plant defines the policies and practices that are applied to provide confidence in the quality of data generated. Quality Assurance activities associated with the plan include;

1. Organization of participants
2. Documented QA program
3. Design control
4. Procurement document control
5. Instructions, procedures and drawings
6. Document control
7. Control of purchased items
8. Identification and control of items
9. Control of processes
10. Inspection
11. Test control
12. Control of measuring and test equipment
13. Handling, storage and shipping
14. Inspection, test and operating status
15. Control of non-compliance items
16. Corrective actions
17. Quality Assurance records
18. Audits

The above listed QA activities are made in accordance with the following documents;

Management and Operating Contractor Quality Program Manual (WP-QPM) - Outlines the overall QA policy for the WIPP project.

Environmental Procedures Manual (WP 02-03) includes the detailed procedures necessary to perform individual Radiological and Environmental Programs Section activities.

WIPP Procedure Manuals - A series of manuals and single procedures which describe actions required to complete a range of tasks (e.g. calibration, records management, and procurement).

Adherence to the policies and procedures in these documents ensures compliance with Federal QA regulations including: ANSI NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities," (ANSI, 1986) and EPA, QAMS-005/80, "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, (EPA, 1983b). This section fulfills the requirements of a QA plan specified in DOE Orders 5400.1 (DOE,1988d), 5400.3 (DOE,1988e), 5700.6B (DOE,1986c) and DOE 5400.xy (DOE, 1988f).



D. Recommendations

There are a total of one hundred and sixty four (164) air monitoring instruments and other devices located at or within a 50 mile radius of the Waste Isolation Pilot Plant. These instruments are monitored by four Westinghouse departments employing approximately thirty six scientists, engineers and technicians who concern themselves, full or part time, with air quality.

It is suggested that the State of New Mexico, Air Quality Bureau, establish a quality control procedure for monitoring existing and future instruments and procedures. A random sampling plan properly designed an implemented to make certain that policies are adhered to can be administered by the Air Quality Bureau Representative already on-site.

Incorporated into the above plan can be occasional audits and quarterly and/or annual reports. In addition, the existing split sampler at the FAS at Station A can be put into use to provide an additional check.

## REFERENCES


A. Waste Isolation Pilot Plant Site Environmental Report DOE/WIPP 91-008

B. Emergency Plan and Procedures, WP12-9, Revision 7

C. WIPP Final Safety Analysis Report, WP 02-9, Rev 0

D. WIPP Operational Environmental Monitoring Plan, DOE/WIPP 88-025

E. Code of Federal Regulations, 40 CFR-61-Subpart H

F. CAM Operations Report; Apr. 1992, Bates Estabrooks

G. Letter to John Arthur, DOE - from R.H. Neill, EEG with enclosers. Dated 5-4-92.

H. State of New Mexico, Environmental Oversight and Monitoring Agreement

I. Waste Isolation Pilot Plant Alpha Continuous Air Monitoring System - Kenneth B. Steinbruegge, Westinghouse Electric Corporation, Waste Isolation Division.

J. Waste Isolation Pilot Plant Safety Assessment Report - October 1991.

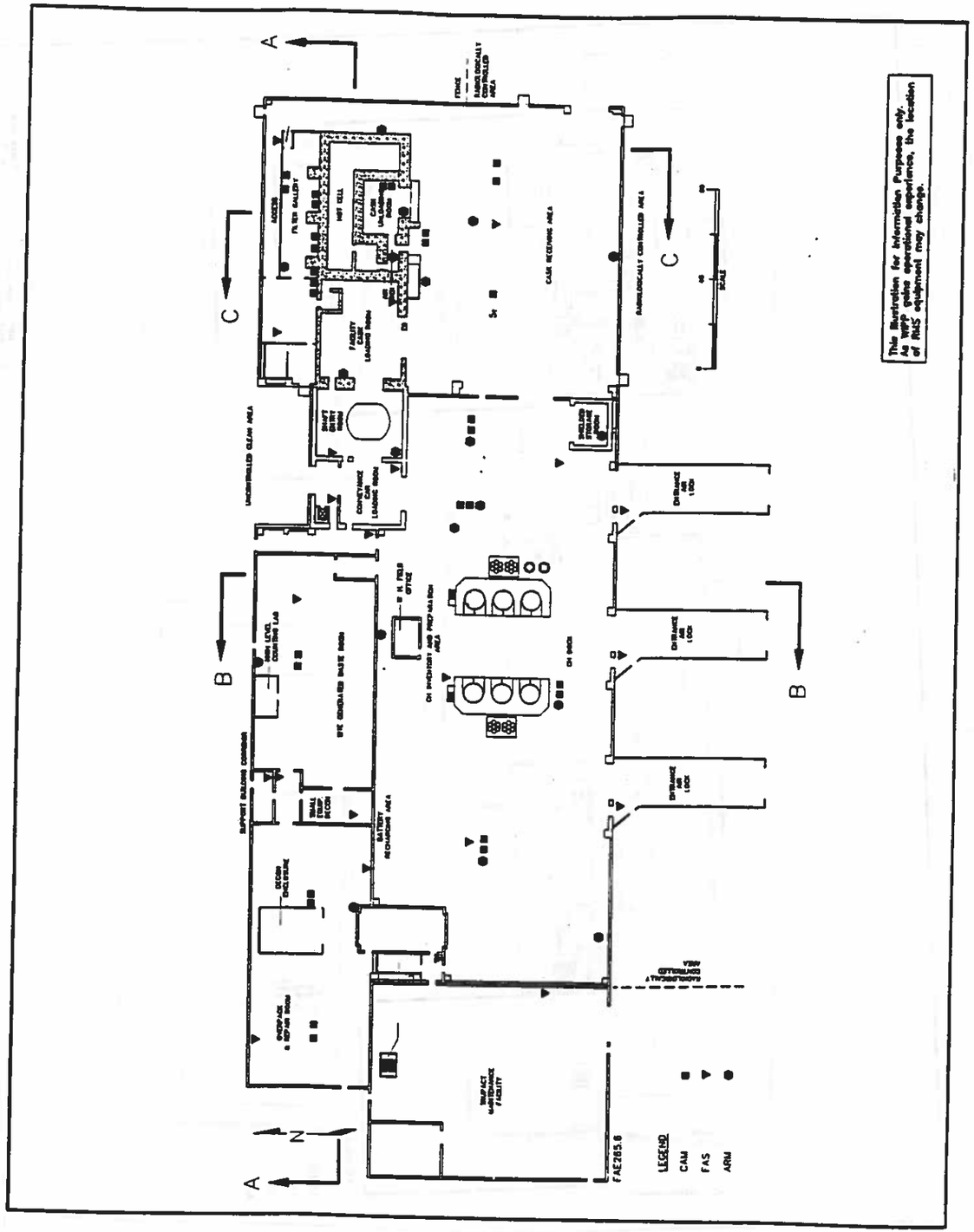
K. Radionuclide Emission Data Package for the Waste Isolation Pilot Plant (WIPP) - November 1990

L. Building and site layouts are copies of those found in Chapter 6 of WIPP FSAR 02-9.

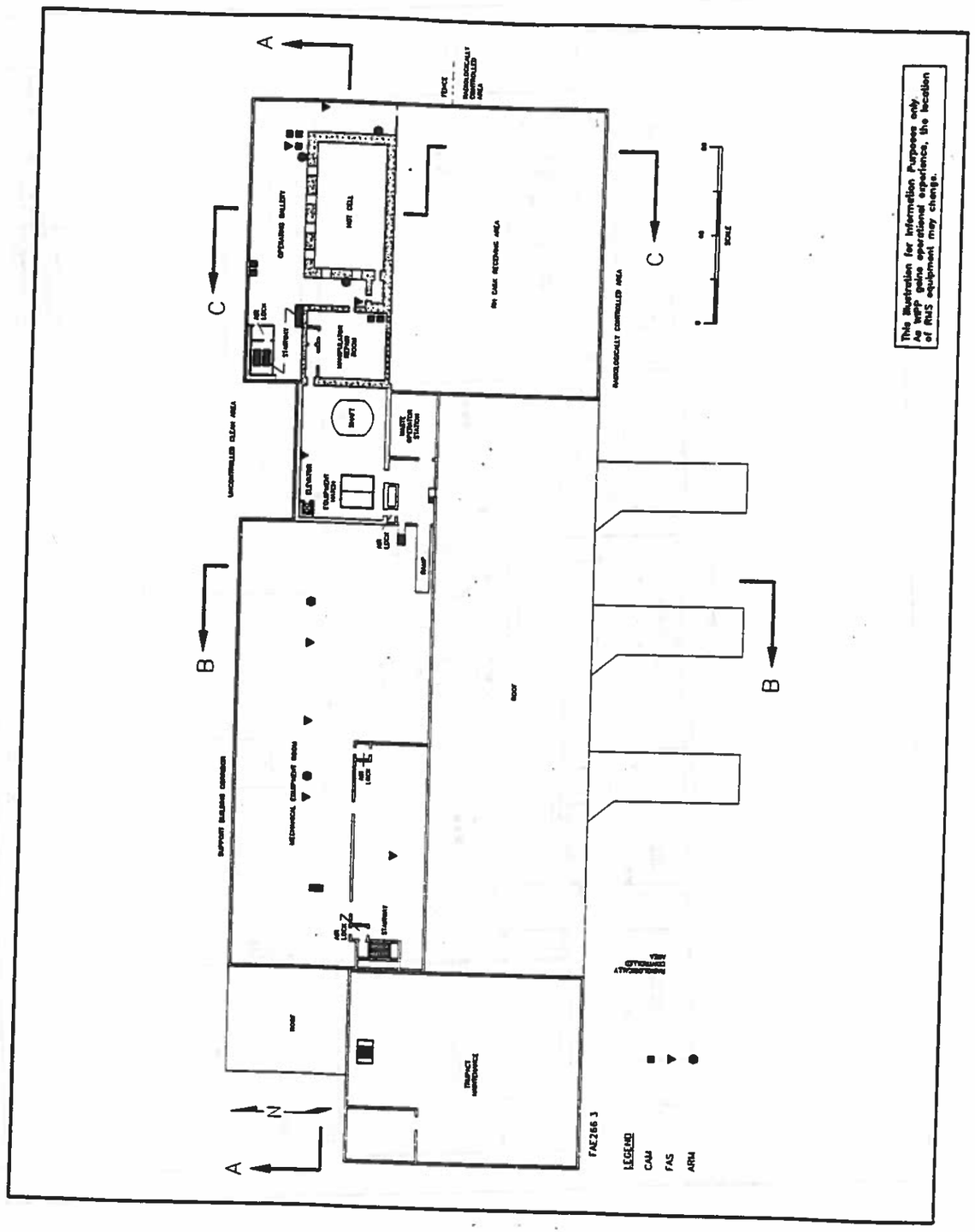
## WIPP MONITORING DEVICES, LOCATION AND QUANTITY

| LOCATION | A-CAM | B-CAM | ARM | FAS | LO VOL | HI VOL | TLD | SO2 | CO | O3 | H2S | NOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CARLSBAD | | | | | 1 | 1 | | | | | | |
| ARTESIA | | | | | | 1 | | | | | | |
| PCA | | | | | | | | | | | | |
| NMP | | | | | | | | | | | | |
| SMITH R. | | | | | 1 | | | | | | | |
| MILLS R. | | | | | 1 | | | | | | | |
| LOVING | | | | | | 1 | | | | | | |
| MONUMENT | | | | | | | | | | | | |
| HOBBS | | | | | | 1 | | | | | | |
| EUNICE | | | | | 1 | | | | | | | |
| ANGLE R. | | | | | | 1 | | | | | | |
| NOME | | | | | | | | | | | | |
| WFF | | | | | 2 | 1 | | 1 | 1 | 1 | 1 | 1 |
| ZONE 1 | | | | | 1 | | 13 | | | | | |
| ZONE 2 | | | | | 2 | | | | | | | |
| CONTROL | | | | | 2 | | | | | | | |
| STA. A | 2 | 2 | | 1 | | | | | | | | |
| STA. B | 1 | 1 | | 1 | | | | | | | | |
| STA. C | 1 | 1 | | | | | | | | | | |
| WHB | 9 | 9 | 16 | 28 | | | 12 | | | | | |
| UNGND | 6 | 6 | 2 | 14 | | | 5 | | | | | |
| OTHER | | | | 12 | | | | | | | | |
| | | | | | | | | | | | | |
| TOTAL | 19 | 19 | 18 | 56 | 11 | 6 | 30 | 1 | 1 | 1 | 1 | 1 |





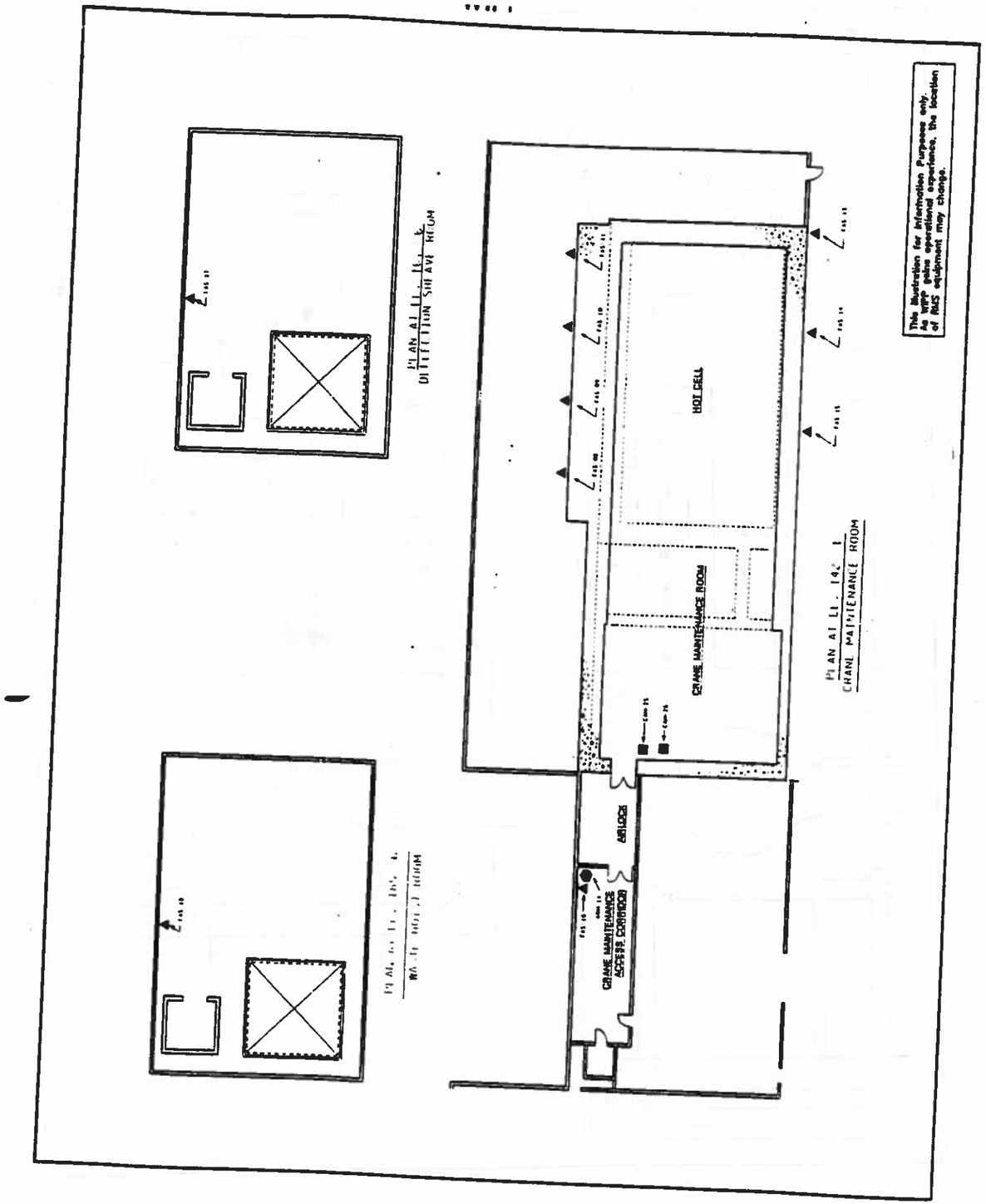

Location of Radiation Monitoring System Equipment in the Waste Handling Building (Ground Floor)



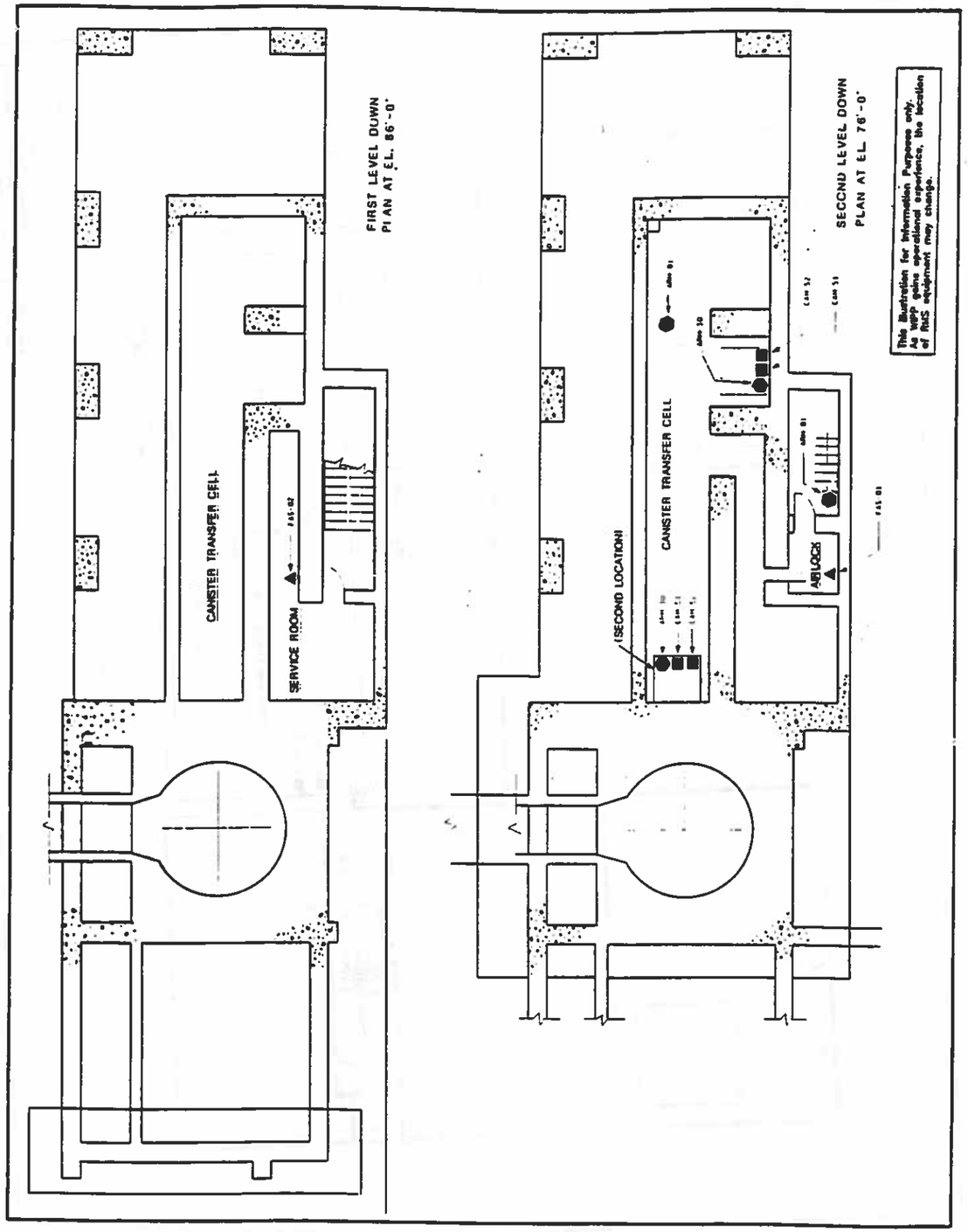

Locations of Radiation Monitoring System Equipment in the Waste Handling Building (Upper Floor)





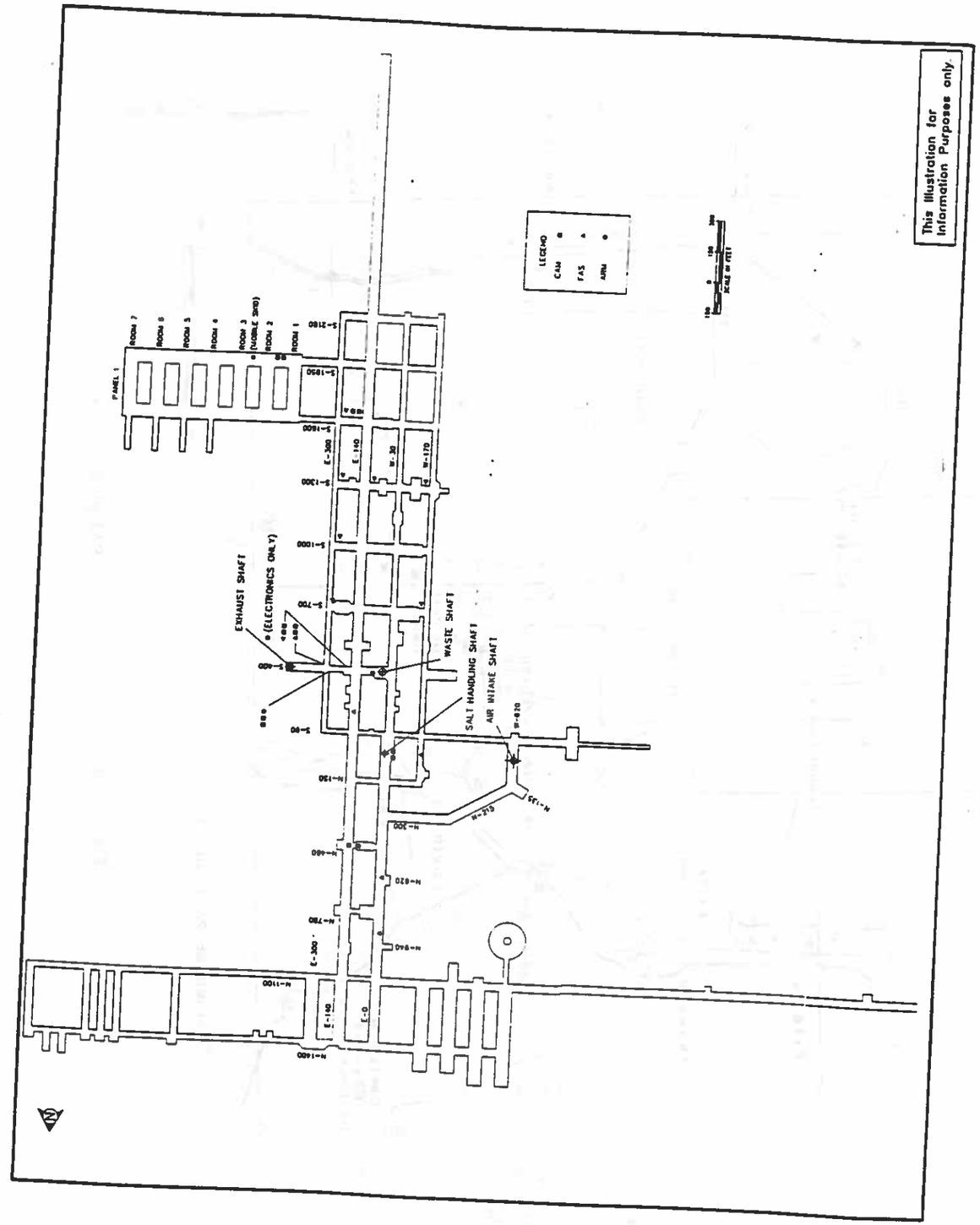



Locations of Radiation Monitoring System Equipment in the Waste Handling Building

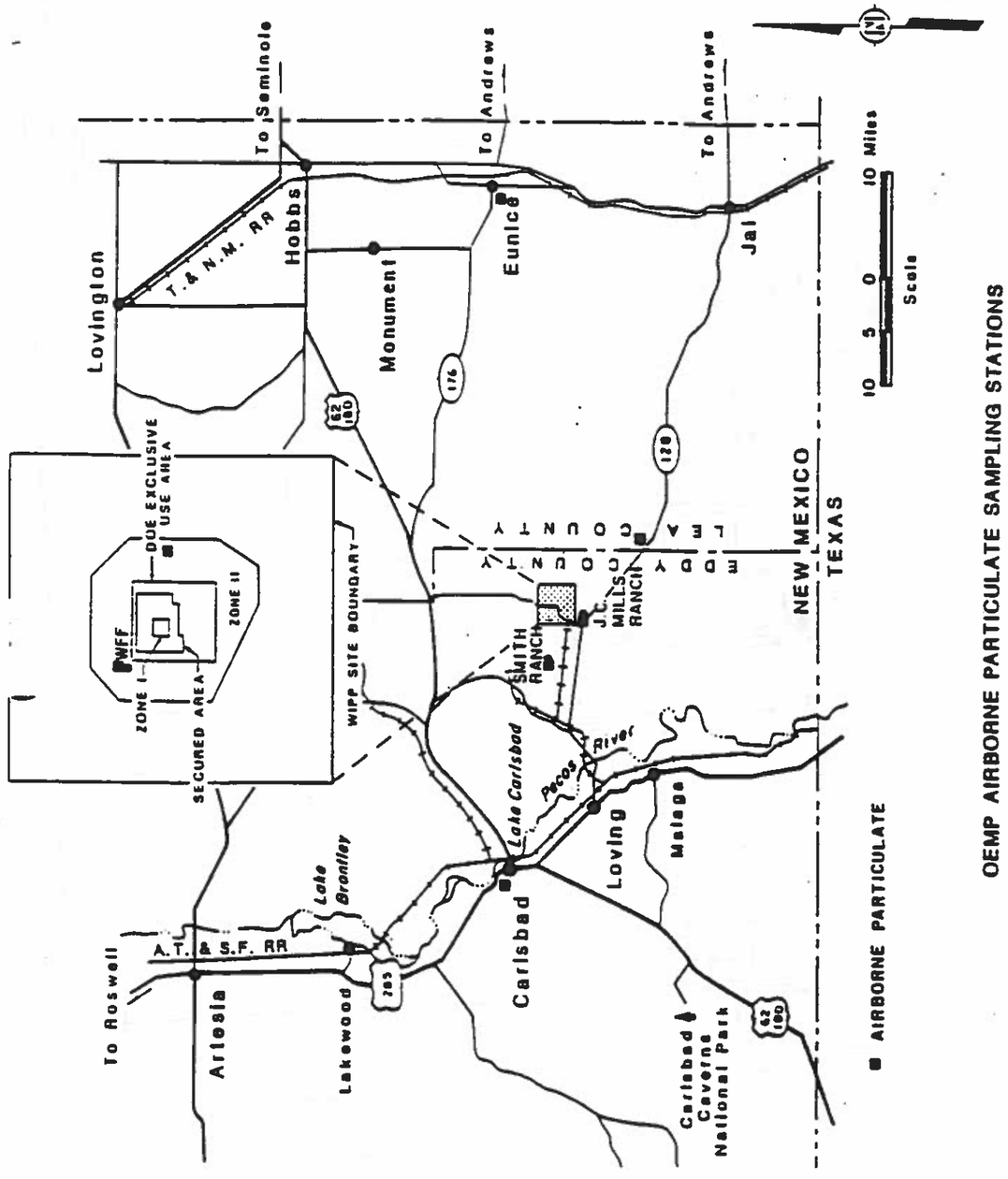



Location of Radiation Monitoring System Equipment in the Waste Handling Building






Locations of Radiation Monitoring System Equipment in the Waste Handling Building






## AREA TLD LOCATIONS,2ND QTR,1992

1. Conveyance car loading room
2. Shaft entry room
3. Shaft/WHB Airlock
4. WHB Field office
5. West CH deck
6. East CH deck
7. South Zone 1 fence behind WHB
8. Fence North of TRUPAC trailer parking area
9. Overpack repair room
10. Waste Handling Office
11. High level counting lab
12. Facility cask loading room
13. Filter bank duct
14. Top floor operating gallery
15. Safety building - first floor
16. Exhaust shaft filter bank, Room 105
17. Safety building - second floor
18. Warehouse, South side
19. Security building Vehicle trap, inside North wall of gate house
20. Cafeteria, Southeast corner, inside
21. Support building, 2nd floor
22. Support building, 1st floor
23. Underground, waste shaft parking area
24. Underground, room 1, panel 1
25. Underground, E-0 x just South of North 1100
26. Underground, South 1000 x just East of E-140

27. Underground, S-2180 x W-170

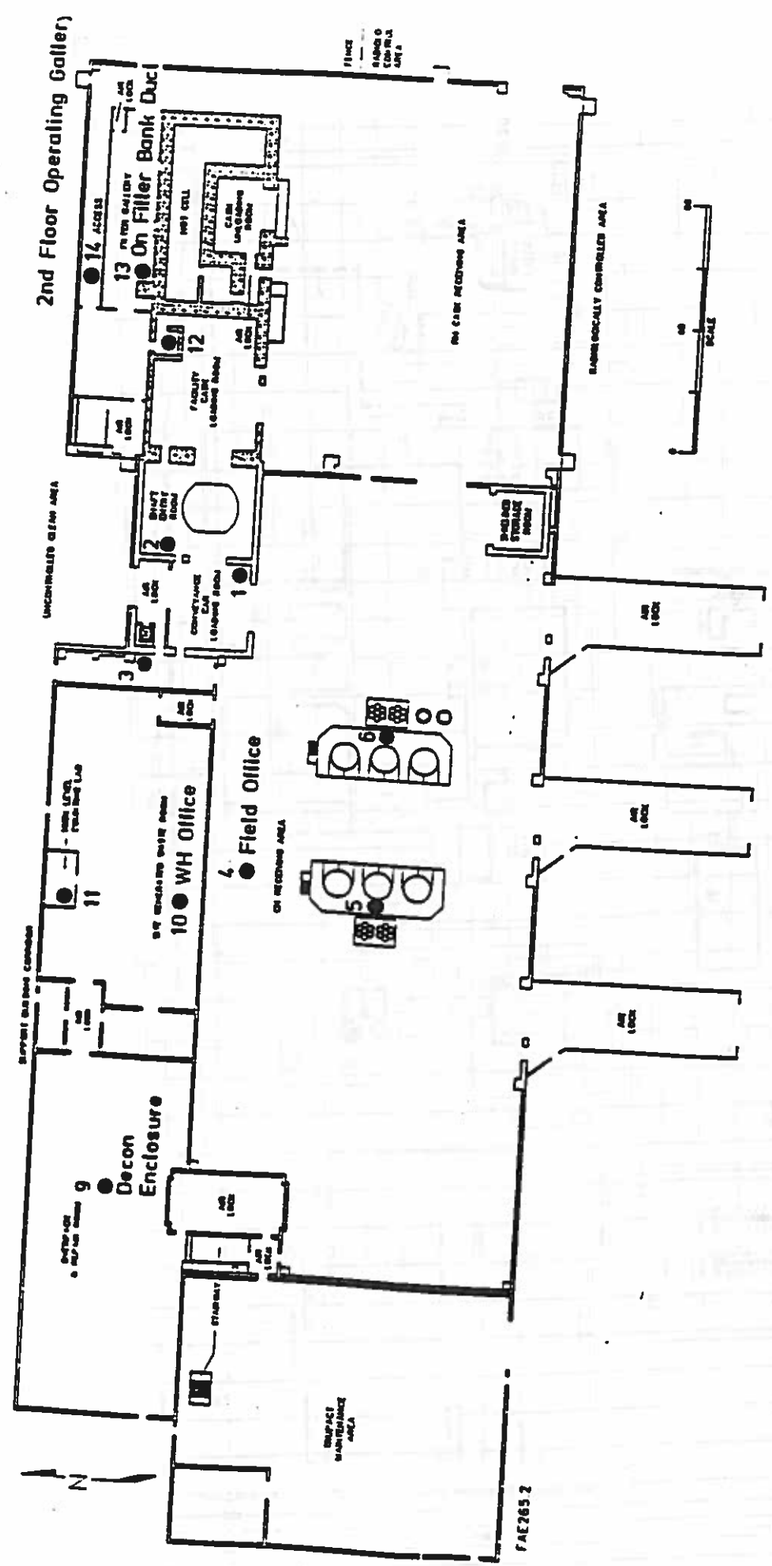
28. South corner of the chain link fence East side of parking lot

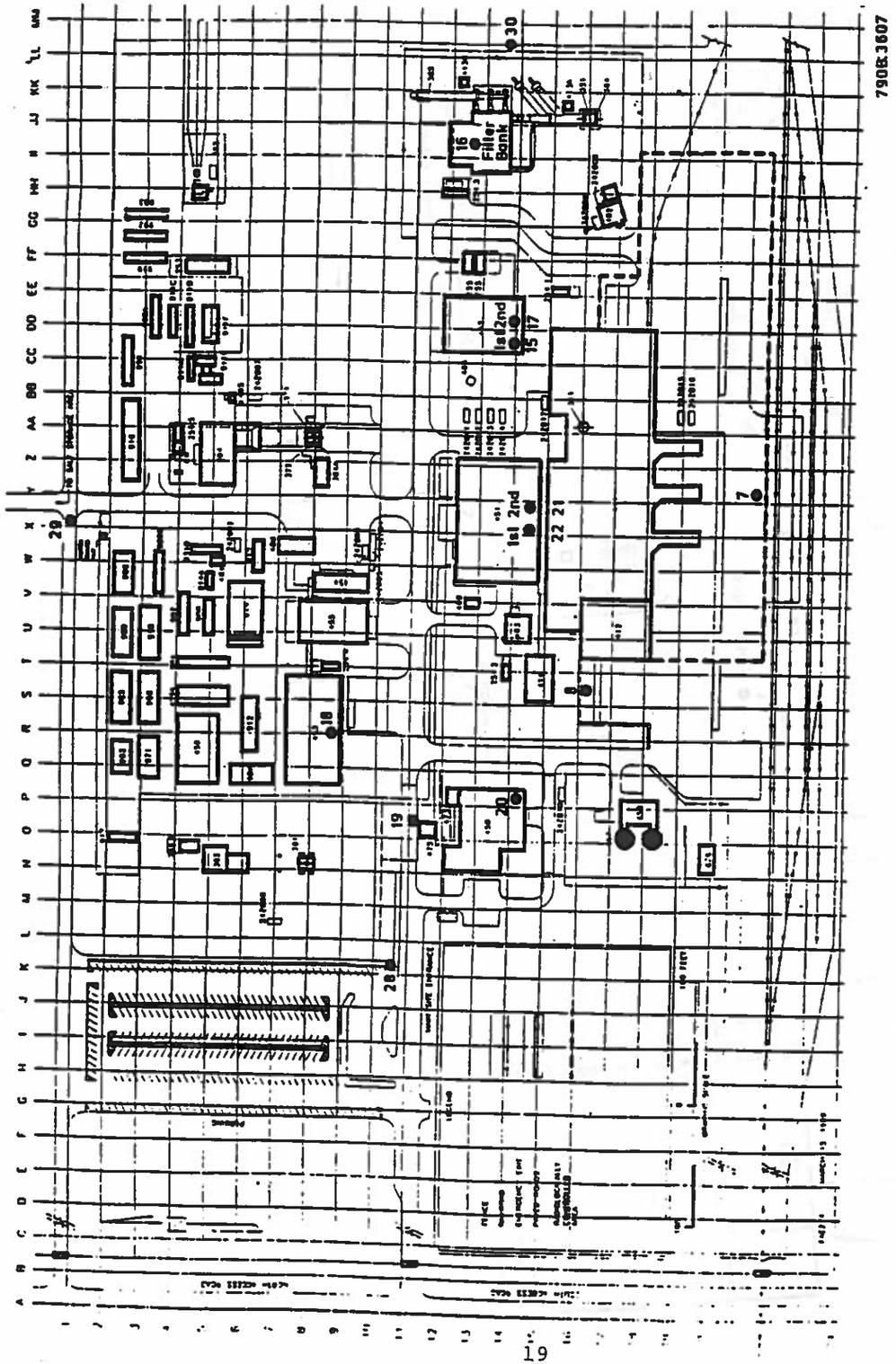
29. Adjacent to North salt pile access gate, inside Zone 1 fence

30. East Zone 1 chain link fence just East of main exhaust fan #2

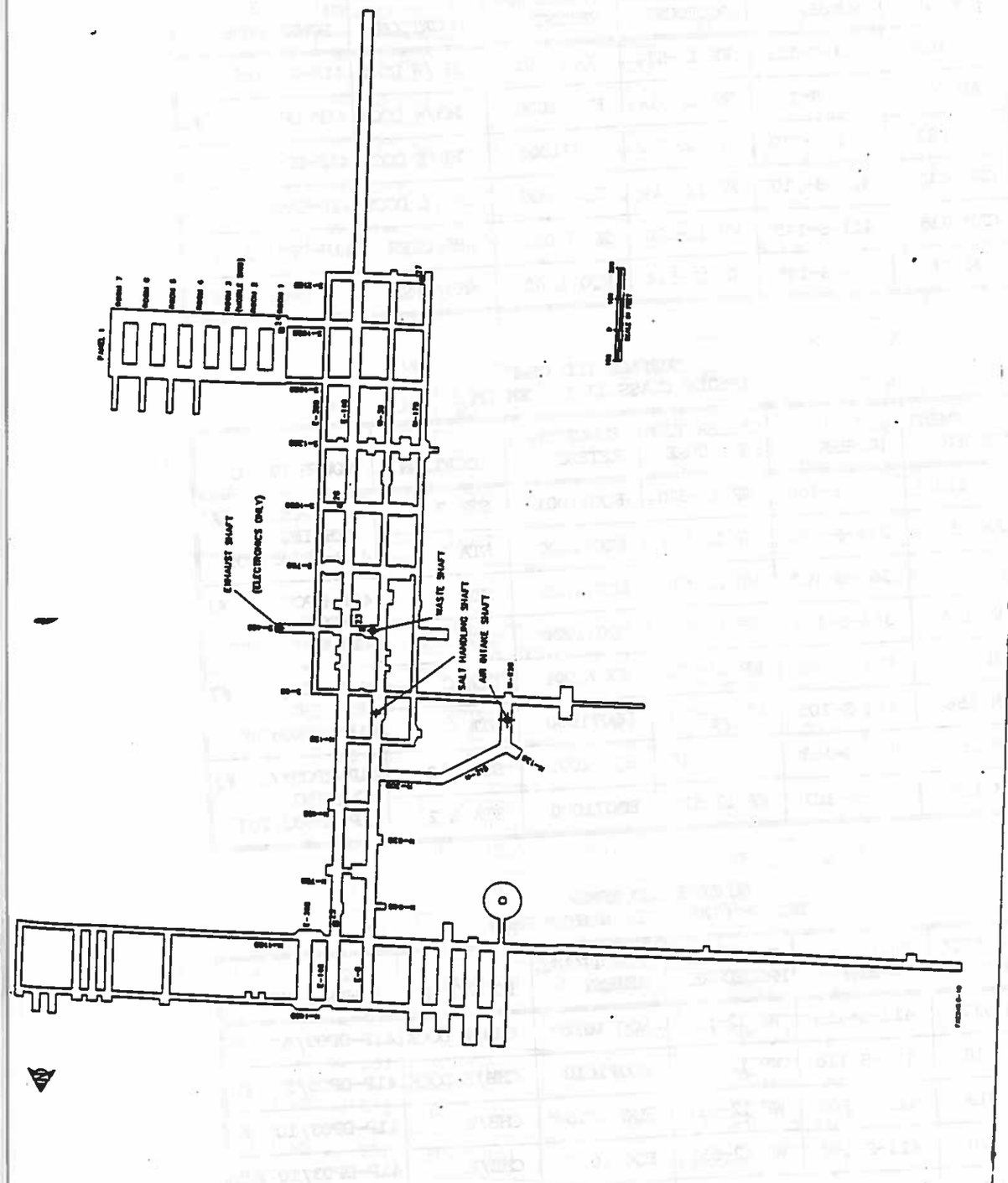







7908 3607
30
16
Filler Bank
15
17
1st 2nd
22 21
1st 2nd
7
29
18
19
20
28




EXHAUST SHAFT
(ELECTRONICS ONLY)
WASTE SHAFT
SALT HANDLING SHAFT
AIR INTAKE SHAFT

## SURFACE LCO CAMS
## DESIGN CLASS IIIA SYSTEM RMO1

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| CAM 029 | 411-S-113 | WP 12-530 | EQ071001 | CHB/W DOCK | 41P-DP03/5 #3 |
| CAM 030 | 411-S-113 | WP 12-514 | EQ071000 | CHB/W DOCK | 41P-DP03/5 #3 |
| CAM 031 | 411-S-110 | WP 12-530 | EQ071001 | CHB/E DOCK | 41P-DP03/5 #4 |
| CAM 032 | 411-S-110 | WP 12-514 | EQ071000 | CHB/E DOCK | 41P-DP03/5 #4 |
| CAM 035 | 411-S-145 | WP 12-530 | EQ071001 | WHB/OPRR | 41P-DP03/5 #13 |
| CAM 036 | 411-S-145 | WP 12-514 | EQ071000 | WHB/OPRR | 41P-DP03/5 #13 |

## SURFACE LCO CAMS
## DESIGN CLASS II SYSTEM EMO1

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| CAM 151 | 365-S-100 | WP 12-530 | EQ071001 | STA B | 41P-MPC03/2 #7 FEEDING 41P-UPS03/205 |
| CAM 152 | 365-S-100 | WP 12-514 | EQ071000 | STA B | |
| CAM 153 | 364-S-103 | WP 12-530 | EQ071001 | STA A 1 | 41P-MPC03/1 #1 FEEDING 41P-UPS03/202 |
| CAM 154 | 364-S-103 | WP 12-514 | EQ071000 | STA A 1 | |
| CAM 155 | 411-S-105 | WP 12-530 | EQ071001 | STA C | 41P-DP03/3 #7 FEEDING 41P-UPS03/45 |
| CAM 156 | 411-S-105 | WP 12-514 | EQ071000 | STA C | |
| CAM 157 | 364-S-101 | WP 12-530 | EQ071001 | STA A 2 | 41P-MPC03/1 #3 FEEDING 41P-UPS03/203 |
| CAM 158 | 364-S-101 | WP 12-514 | EQ071000 | STA A 2 | |

## SURFACE LCO ARMS
## DESIGN CLASS IIIA SYSTEM RMO3

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| ARM 017 | 411-S-113 | WP 12-531 | EQ071010 | CHB/W DOCK | 41P-DP03/5 #3 |
| ARM 018 | 411-S-110 | WP 12-531 | EQ071010 | CHB/E DOCK | 41P-DP03/5 #4 |
| ARM 019 | 411-S-202 | WP 12-531 | EQ071010 | CHB/E | 41P-DP03/10 #7 |
| ARM 020 | 411-S-192 | WP 12-531 | EQ071010 | CHB/E | 41P-DP03/10 #25 |
| ARM 023 | 411-S-145 | WP 12-531 | EQ071010 | WHB/OPRR | 41P-DP03/10 #14 |



## SURFACE NON-LCO CAMS
## DESIGN CLASS IIIA SYSTEM RMO1

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| CAM 027 | 411-S-109 | WP 12-530 | EQ071019 | CHB/W | 41P-DP03/5 #2 |
| CAM 028 | 411-S-109 | WP 12-514 | EQ071018 | CHB/W | 41P-DP03/5 #2 |
| CAM 033 | 411-S-159 | WP 12-530 | EQ071019 | WHB/SGWR | 41P-DP03/10 #14 |
| CAM 034 | 411-S-153 | WP 12-514 | EQ071018 | WHB/SGWR | 41P-DP03/10 #14 |
| CAM 037 | 451-S-165 | WP 12-530 | EQ071019 | WHB/SB CORR | 41P-DP03/15 #5 |
| CAM 038 | 451-S-183 | WP 12-514 | EQ071018 | WHB/SB CORR | 41P-DP03/15 #5 |
| CAM 039 | 451-S-164 | WP 12-530 | EQ071019 | WHB/SB CORR | 41P-DP03/15 #10 |
| CAM 040 | 451-S-182 | WP 12-514 | EQ071018 | WHB/SB CORR | 41P-DP03/15 #10 |
| CAM 053 | 411-S-118 | WP 12-530 | EQ071019 | WHB/OPRR | 41P-DP03/5 #18 |
| CAM 054 | 411-S-118 | WP 12-514 | EQ071018 | WHB/OPRR | 41P-DP03/5 #18 |
| CAM 055 | 411-S-111 | WP 12-530 | EQ071019 | CHB/E | 41P-DP03/5 #5 |
| CAM 056 | 411-S-111 | WP 12-514 | EQ071018 | CHB/E | 41P-DP03/5 #5 |

## SURFACE NON-LCO ARMS
## DESIGN CLASS IIIA SYSTEM RMO3

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| ARM 015 | 411-S-191 | WP 12-531 | EQ071020 | CHB/W | 41P-DP03/10 #7 |
| ARM 016 | 411-S-109 | WP 12-531 | EQ071020 | CHB/W | 41P-DP03/5 #2 |
| ARM 021 | 411-S-203 | WP 12-531 | EQ071020 | CHB/E | 41P-DP03/10 #25 |
| ARM 022 | 411-S-193 | WP 12-531 | EQ071020 | WHB/SGWR | 41P-DP03/10 #14 |
| ARM 024 | 411-S-196 | WP 12-531 | EQ071020 | WHB/2ND FLR | 41P-DP03/10 #1 |
| ARM 025 | 411-S-194 | WP 12-531 | EQ071020 | WHB/2ND FLR | 41P-DP03/10 #1 |
| ARM 026 | 411-S-205 | WP 12-531 | EQ071020 | WHB/W HOIST | 41P-DP03/10 #1 |
| ARM 027 | 451-S-210 | WP 12-531 | EQ071020 | SB/SCR | 41P-DP03/15 #4 |
| ARM 028 | 451-S-211 | WP 12-531 | EQ071020 | WHB/SB CORR | 41P-DP03/15 #10 |
| ARM 029 | 413-S-185 | WP 12-531 | EQ071020 | EFB | 41P-DP03/31 #32 |
| ARM 031 | 411-S-111 | WP 12-531 | EQ071020 | CHB/E | 41P-DP03/5 #5 |

SURFACE FAS
DESIGN CLASS IIIA SYSTEM RMD2

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| AS 005 | 411-S-216 | PWR | WP 12-508 | RH/CASK L R | N/A |
| FAS 006 | 411-S-217 | PWR | WP 12-508 | RHB/CENTER | N/A |
| FAS 007 | 411-S-218 | PWR | WP 12-508 | RH/2ND FLR | N/A |
| FAS 016 | 411-S-227 | PWR | WP 12-508 | HOIST TWR 3 | N/A |
| FAS 017 | 411-S-228 | PWR | WP 12-508 | HOIST TWR 4 | N/A |
| FAS 018 | 411-S-229 | PWR | WP 12-508 | HOIST TWR 5 | N/A |
| FAS 019 | 411-S-230 | PWR | WP 12-508 | CHB/W | N/A |
| FAS 020 | 411-S-231 | PWR | WP 12-508 | WHB/A L 100 | N/A |
| FAS 021 | 411-S-232 | PWR | WP 12-508 | CHB/W DOCK | N/A |
| FAS 022 | 411-S-233 | PWR | WP 12-508 | WHB/A L 101 | N/A |
| FAS 023 | 411-S-234 | PWR | WP 12-508 | CHB/E DOCK | N/A |
| FAS 024 | 411-S-235 | PWR | WP 12-508 | WHB/A L 102 | N/A |
| FAS 025 | 411-S-236 | PWR | WP 12-508 | WHB/CCLR | N/A |
| FAS 026 | 411-S-237 | PWR | WP 12-508 | WHB/W SHAFT | N/A |
| FAS 027 | 411-S-238 | PWR | WP 12-508 | WHB/EQ A L | N/A |
| FAS 028 | 411-S-239 | PWR | WP 12-508 | WHB/N A L | N/A |
| FAS 029 | 411-S-240 | PWR | WP 12-508 | WHB/SGWR | N/A |
| FAS 030 | 411-S-241 | PWR | WP 12-508 | WHB/ANTI-C | N/A |
| FAS 031 | 411-S-242 | PWR | WP 12-508 | WHB/SGWR AL | N/A |
| FAS 032 | 411-S-243 | PWR | WP 12-508 | WHB/TOOL RM | N/A |
| FAS 033 | 411-S-244 | PWR | WP 12-508 | WHB/OPRR | N/A |
| FAS 034 | 411-S-245 | PWR | WP 12-508 | WHB/TMF A L | N/A |
| FAS 035 | 411-S-246 | PWR | WP 12-508 | WHB/2ND FLR | N/A |
| FAS 036 | 411-S-237 | PWR | WP 12-508 | WHB/2ND FLR | N/A |
| FAS 037 | 411-S-248 | PWR | WP 12-508 | WHB/2ND FLR | N/A |
| S 038 | 411-S-249 | PWR | WP 12-508 | WHB/2ND FLR | N/A |
| FAS 039 | 411-S-250 | PWR | WP 12-508 | WHB/2ND FLR | N/A |



SURFACE FAS
DESIGN CLASS IIIA SYSTEM RMD2

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| FAS 041 | 451-S-252 | PWR | WP 12-508 | SB/ANAL LAB | N/A |
| FAS 042 | 451-S-253 | PWR | WP 12-508 | SB/ANAL LAB | N/A |
| FAS 044 | 451-S-255 | PWR | WP 12-508 | SB/CR CORR | N/A |
| FAS 045 | 451-S-256 | PWR | WP 12-508 | SB/SCR | N/A |
| FAS 046 | 451-S-257 | PWR | WP 12-508 | SB/I&C | N/A |
| FAS 047 | 451-S-258 | PWR | WP 12-508 | SB/POD | N/A |
| FAS 049 | 411-S-143 | PWR | WP 12-508 | WHB/OPRR | 41P-DP03/5 #15 |
| FAS 050 | 412-S-144 | PWR | WP 12-508 | TMF | 41P-DP03/5 #16 |
| FAS 151 | 413-S-140 | PWR | WP 12-508 | EFB | 41P-DP03/31 #25 |
| FAS 152 | 413-S-135 | PWR | WP 12-508 | EFB | 41P-DP03/31 #26 |
| FAS 153 | 413-S-136 | PWR | WP 12-508 | EFB | 41P-DP03/31 #29 |
| FAS 154 | 413-S-141 | PWR | WP 12-508 | EFB | 41P-DP03/31 #30 |
| AS 155 | 413-S-138 | PWR | WP 12-508 | EFB | 41P-DP03/31 #18 |

SURFACE FAS SKIDS
DESIGN CLASS II SYSTEM EMD1

| EQUIPMENT NUMBER | SKID NUMBER | CAL PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| SKID A-3 | 364-S-104 | PWR | WP 12-508 | STA A | 41P-MPC03/1 #5<br>41P-UPS03/204 |

SURFACE FAS SKIDS
DESIGN CLASS IIIB SYSTEM EMD1

| EQUIPMENT NUMBER | SKID NUMBER | CAL PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| SKID B-2 | 365-S-102 | PWR | WP 12-508 | STA B | 41P-MPC03/2 #5<br>41P-UPS03/206 |

| EQUIP UMBE |
|---|
| CAM 1 |
| CAM 1 |
| CAM 1 |
| CAM 12 |
| CAM 12 |
| CAM 12 |
| CAM 12 |
| CAM 13 |

| EQUIPME MBER |
|---|
| CAM 117 |
| CAM 118 |
| CAM 127 |
| CAM 128 |

**UNDERGROUND FAS**
**DESIGN CLASS IIIA SYSTEM RM02**

| NUM EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| FAS 106 | 534-S-139 | PWR | WP 12-508 | U/G N780/E00 | 53P-DP03/6 #5 |
| FAS 107 | 534-S-134 | PWR | WP 12-508 | U/G N460/E00 | 53P-DP03/6 #7 |
| FAS 108 | 534-S-137 | PWR | WP 12-508 | U/G S00/W170 | 53P-DP03/6 #4 |
| FAS 109 | 534-S-119 | PWR | WP 12-508 | U/G S H | 53P-DP03/6 #2 |
| FAS 110 | 534-S-120 | PWR | WP 12-508 | U/G S100/E140 | 53P-DP03/6 #3 |
| FAS 111 | 534-S-121 | PWR | WP 12-508 | U/G S400/E200 | 53P-DP03/5 #3 |
| FAS 113 | 534-S-123 | PWR | WP 12-508 | U/G S700/E300 | 53P-DP03/5 #4 |
| FAS 114 | 534-S-124 | PWR | WP 12-508 | U/G S700/W170 | 53P-DP03/5 #5 |
| FAS 115 | 534-S-125 | PWR | WP 12-508 | U/G S1000/E300 | 53P-MPC03/3 #1 |
| FAS 116 | 534-S-126 | PWR | WP 12-508 | U/G S1300/E300 | 53P-MPC03/3 #2 |
| FAS 117 | 534-S-142 | PWR | WP 12-508 | U/G S1300/E140 | 53P-MPC03/3 #3 |
| FAS 118 | 534-S-127 | PWR | WP 12-508 | U/G S1300/W70 | 53P-DP03/1 #3 |
| FAS 119 | 534-S-128 | PWR | WP 12-508 | U/G S1600/E200 | 53P-MPC03/3 #4 |
| FAS 121 | 534-S-130 | PWR | WP 12-508 | U/G RM 1 PANEL1 | 52P-DP03/20 #9 |

**UNDERGROUND ARMS**
**DESIGN CLASS IIIA SYSTEM RM03**

| EQUIPMENT NUMBER | SKID NUMBER | CALIBRATION PROCEDURE | FUNCTIONAL RETEST | LOCATION | POWER PANEL |
|---|---|---|---|---|---|
| ARM 105 * | 534-S-106 | WP 12-531 | EQ071010 | U/G S400/WH | 53P-DP03/5 #11 |
| ARM 106 | 534-S-107 | WP 12-531 | EQ071020 | U/G ROOM 1 | 52P-DP03/20 #11 |

* ARM 105 IS LCO



C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S  R E P O R T

Non-Radon Population Assessment
May 26, 1992 3:41 pm

Facility: Waste Isolation Pilot Plant
Address: P.O. Box 3090, Mail Drop 180
City: Carlsbad
State: NM Zip: 88220

| Effective Dose Equivalent (mrem/year) |
|---|
| 1.11E-04 |

At This Location: 7200 Meters West Northwest
Source Category: DOE Facilities
Source Type: Stack
Emission Year: 1992

Comments: Analyse test phase data for comprensive review of WIPP air monitoring system.

Dataset Name: CompRev-92
Dataset Date: May 26, 1992 3:40 pm
Wind File: WNDFILES\WIPP990.WND
Population File: POPFILES\WIPP1990.POP

## MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 7200 Meters West Northwest
Lifetime Fatal Cancer Risk: 7.97E-10

## ORGAN DOSE EQUIVALENT SUMMARY

| Organ | Selected Individual (mrem/y) | Collective Population (person-rem/y) |
|---|---|---|
| GONADS | 1.67E-05 | 5.05E-03 |
| BREAST | 1.67E-06 | 1.05E-06 |
| R MAR | 1.06E-04 | 3.21E-03 |
| LUNGS | 3.07E-04 | 8.66E-01 |
| THYROID | 1.66E-06 | 5.01E-06 |
| ENDOST | 1.31E-03 | 3.95E-03 |
| RMNDR | 5.82E-05 | 1.76E-01 |
| EFFEC | 1.11E-04 | 3.27E-04 |

## FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

| Risk Range | Number of People | Number of People In This Risk Range Or Higher | Deaths/Year In This Risk Range | Deaths/Year In This Risk Range Or Higher |
|---|---|---|---|---|
| 1.0E+00 TO 1.0E-01 | 0 | 0 | 0.00E+00 | 0.00E+00 |
| 1.0E-01 TO 1.0E-02 | 0 | 0 | 0.00E+00 | 0.00E+00 |
| 1.0E-02 TO 1.0E-03 | 0 | 0 | 0.00E+00 | 0.00E+00 |
| 1.0E-03 TO 1.0E-04 | 0 | 0 | 0.00E+00 | 0.00E+00 |
| 1.0E-04 TO 1.0E-05 | 0 | 0 | 0.00E+00 | 0.00E+00 |
| 1.0E-05 TO 1.0E-06 | 0 | 0 | 0.00E+00 | 0.00E+00 |
| LESS THAN 1.0E-06 | 93081 | 93081 | 3.28E-08 | 3.28E-08 |





## RADIONUCLIDE EMISSIONS DURING THE YEAR 1992

| Nuclide | Class | Size | Source #1 Ci/y | Source #2 Ci/y | TOTAL Ci/y |
|---|---|---|---|---|---|
| PU-238 | Y | 1.00 | 6.0E-08 | 6.0E-08 | 1.2E-07 |
| PU-239 | Y | 1.00 | 2.0E-06 | 2.0E-06 | 4.1E-06 |
| PU-240 | Y | 1.00 | 4.7E-07 | 4.7E-07 | 9.4E-07 |
| PU-241 | Y | 1.00 | 2.4E-05 | 2.4E-05 | 4.9E-05 |
| PU-242 | Y | 1.00 | 4.2E-11 | 4.2E-11 | 8.4E-11 |
| AM-241 | W | 1.00 | 1.6E-07 | 1.6E-07 | 3.2E-07 |

## SITE INFORMATION

Temperature: .16 degrees C
Precipitation: .24 cm/y
Mixing Height: 1435 m

## SOURCE INFORMATION

| Source Number: | 1 | 2 |
|---|---|---|
| Stack Height (m): | 10.52 | 10.52 |
| Diameter (m): | 6.49 | 6.49 |
| Plume Rise Momentum (m/s): (Exit Velocity) | 2.14E+00 | 2.14E+00 |

## AGRICULTURAL DATA

| | Vegetable | Milk | Meat |
|---|---|---|---|
| Fraction Home Produced: | 0.700 | 0.399 | 0.442 |
| Fraction From Assessment Area: | 0.300 | 0.601 | 0.558 |
| Fraction Imported: | 0.000 | 0.000 | 0.000 |

| | |
|---|---|
| Beef Cattle Density: | 4.13E-02 |
| Milk Cattle Density: | 1.14E-03 |
| Land Fraction Cultivated for Vegetable Crops: | 1.38E-03 |





## POPULATION DATA

| Direction | Distance (m) 400 | 1200 | 2400 | 4000 | 5600 | 7200 | 12050 |
|---|---|---|---|---|---|---|---|
| N | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WNW | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| W | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WSW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SW | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| SSW | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| S | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ESE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ENE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NNE | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Direction | Distance (m) 24150 | 40250 | 56350 | 80500 |
|---|---|---|---|---|
| N | 29 | 23 | 195 | 28 |
| NNW | 17 | 6 | 237 | 11 |
| NW | 28 | 17 | 61 | 15080 |
| WNW | 6 | 164 | 50 | 44 |
| W | 66 | 24952 | 39 | 33 |
| WSW | 1707 | 171 | 55 | 72 |
| SW | 0 | 17 | 11 | 44 |
| SSW | 6 | 28 | 105 | 17 |
| S | 6 | 16 | 56 | 17 |
| SSE | 0 | 29 | 12 | 47 |
| SE | 6 | 23 | 29 | 35 |
| ESE | 6 | 12 | 2150 | 315 |
| E | 6 | 18 | 2500 | 186 |
| ENE | 12 | 82 | 216 | 29115 |
| NE | 0 | 29 | 82 | 8224 |
| NNE | 29 | 5 | 58 | 6418 |