

FULL-SCALE DEMONSTRATION OF A MOBILE
LOW-LEVEL RADIOACTIVE WASTE
VOLUME REDUCTION SYSTEM
AT
DRESDEN NUCLEAR POWER STATION

A SUBMITTAL TO THE
U.S. NUCLEAR REGULATORY COMMISSION
FROM
COMMONWEALTH EDISON COMPANY

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I. INTRODUCTION

A. Background

In a letter from B. Rybak to H. R. Denton, dated 10APR84, Commonwealth Edison Company (CECO) notified the U.S. Nuclear Regulatory Commission (NRC) that CECO desired to conduct a full-scale demonstration of a mobile low-level radioactive waste volume reduction system (MVRS) at Dresden Nuclear Power Station (DNPS).

B. Purpose

The purpose of this transmittal is to provide information relevant to obtaining NRC approval for operation of the MVRS at DNPS. (A formal request for such approval will be transmitted to the NRC in the near future.)

C. Scope

The CECO Byron Station is equipped with a fluidized-bed incinerator-dryer system supplied by Aerojet Energy Conversion Company (AECC). The installed incinerator-drier represents employment by CECO of advanced technology for the volume reduction (VR) of low-level radioactive wastes. The Byron system will accept as input combustible dry active wastes (DAW), contaminated waste oils, and evaporator concentrates.

The Dresden Station full-scale demonstration of the MVRS represents a further step by CECO towards volume reduction of low-level radioactive wastes. Although supplied by the same vendor, the MVRS to be placed in service at DNPS utilizes a different technology, namely, controlled-air incineration. The input waste streams are also different. The use of the MVRS at DNPS is being restricted by contractual agreement between CECO and AECC to accept as input only those containers of low-level radioactive wastes with a contact dose-rate reading less than or equal to 25 mRem per hour per 7.5 cubic feet.

This document has been prepared to allow an independent review of the DNPS application of the MVRS without reference to any materials related to the system at Byron Station.

II. DESCRIPTION OF SYSTEM AND GENERAL LAYOUT

Aerojet Energy Conversion Company (AECC) has submitted to the NRC a Topical Report which describes the MVRS. Amendment 1 to the Topical Report has also been submitted. (The Amendment provided answers to question raised by the NRC in their review of the

original Topical Report.) This transmittal is intended to be a supplement to MVRS Topical Report No. AECC-4-NP (01MAY84) and its companion Amendment 1 (31AUG84). To expedite the review process, information which is contained within the Topical Report documents has not been duplicated within this transmittal.

A. System Description

The MVRS to be placed in service at DNPS is as described in Topical Report No. AECC-4-NP with only one exception -- the off-gas treatment system will utilize high-efficiency particulate air (HEPA) filters only. Charcoal filters are not required in the DNPS application because MVRS use will be restricted to very low-level DAW and slightly contaminated waste oils. Extensive industry testing has shown that neither of these waste streams contains radioiodines. (Documentation for this statement is discussed in further detail later in this transmittal.)

A System Schematic for the equipment to be utilized at DNPS is presented in Figure 1. Again, the only difference between the schematic of Figure 1 and that presented in Topical Report No. AECC-4-NP is the absence of charcoal adsorbers in the filtered exhaust air for the DNPS application.

B. General Layout

The general arrangement of the MVRS will be as presented in Topical Report No. AECC-4-NP. The plant layout and location of the MVRS equipment at DNPS will be as shown in Figure 2 through Figure 5. (Those figures also show the MVRS pad discussed in the following section of this transmittal.)

III. DESCRIPTION OF PLANT INTERFACE

A. MVRS Site Pad

A concrete support pad for the MVRS will be constructed at the DNPS site. The site pad provides a structural foundation for the trailer-mounted MVRS. The pad has been designed using an acceptable concrete slab-on-grade method combined with conventional concrete pavement design practices. The pad will be approximately 60' x 60' in plan with an overall thickness of approximately 8". The pad will consist of a poured-in-place concrete pavement designed to bear a nominal concentrated loading of approximately 20,000 pounds per square foot to allow for the MVRS trailer support jacks. The pad will contain the necessary tie-down anchors, recessed below the top surface of the pad.

The area surrounding the concrete pad will be paved with compacted gravel to allow for normal site drainage patterns in

the area. Sufficient area will be available for the truck tractors to enter from the east side, bring the trailers into position, and leave from the west side.

Foundation preparation will consist of overexcavation of all organic, soft, or fill soils and replacement with well graded sand and gravel fill. The existing plant drainage ditch in the area of the MVRS pad will be excavated for the installation of a concrete drainage pipe. One or more catch basins will be installed to maintain existing site drainage patterns.

B. Interface Services

The interface service requirements for the MVRS are electrical power and water, as described in Topical Report No. AECC-4-NP. CECO will provide permanent connector receptacles for required services to be positioned at an appropriate location adjacent to the pad. (CECO will also provide some supplemental services.) The service connections will be housed in a weatherproof enclosure as shown in Figure 6. and further described in the following paragraphs.

1. Electrical Power. The normal power supply for the connected load of approximately 250 kW will be 300 amp, 480 VAC, 60 Hertz service from the DNPS non-1E electrical distribution system. The power will be supplied from a feeder breaker in the electrical room of the adjacent Waste Water Treatment Building. The power supply will be brought via cable to a junction box installed at the MVRS interface termination enclosure.

A 120 VAC service line will also be supplied to the interface area to provide power for outdoor convenience outlets, heat tracing of portions of the service water piping, and area lighting.

A connection will be made to a grounding lug connected to the DNPS grounding grid.

2. Service Water. A service water line will be provided to the MVRS interface enclosure. The water will be supplied from the existing non-safety related service water system. This water supply contains less than 1000 ppm dissolved solids, undetectable suspended solids greater than 25 microns, and has a pH of approximately 7. Nominal pressure is 110 psig (to within +5 psig and -10 psig) at the source which will be the DNPS Unit 2/3 Heating Boiler Building.

3. Fire Protection Water. Fire protection water will be available from a hydrant located approximately 100 feet south of the MVRS pad. Outside fire fighting ability will be available via a hose cart, stationed at a nearby hose station, equipped with 300 feet of 2-1/2" fire hose, two adjustable fog nozzles, and a 2-1/2 gallon pressurized water fire extinguisher.

4. Propane Supply. CECO will provide a location for two 1000 gallon above-ground propane storage tanks. The tanks will be locally supplied, skid-mounted, and securely anchored in place during use.

5. Telephone Service. CECO will provide a telephone line to the interface enclosure.

C. Operational Interfaces

1. Waste Delivery. DAW will be delivered via truck, van, or other vehicle to the "Trash Loading Area" indicated in Topical Report No. AECC-4-NP.

Contaminated waste oils will be delivered in the same manner or via an oil storage truck. Waste oils will be pumped from the delivery vessel to the "Contaminated Oil Feed Tank" (T-12).

2. Ash Removal. Filled ash containers will be removed via truck, van, or other vehicle and taken to an existing low-level radioactive waste staging area.

3. Radiation Monitoring. Dose-rate monitoring in the area of the MVRS will be conducted according to existing practices. The MVRS will be added to existing schedules for such monitoring. Any required access control measures will be established according to the existing DNPS radiation control program.

The particulate filters and charcoal cartridges from the MVRS sampling systems will be periodically removed and analyzed using existing procedures for similar sampling media. Procedures will be established to define the frequency of such analyses.

IV. PLAN FOR SEGREGATION OF INPUT WASTES

A. Acceptable Waste Forms

1. DAW. The MVRS is designed for combustible low-level DAW only. Procedures will be prepared for separating DAW into combustible and non-combustible components. The combustible DAW will be placed into combustible containers to be used as feed to the MVRS (providing the activity level is acceptable as described section IV., B.).

2. Waste Oils. The only requirement for waste oils is that such oils be pumpable. Waste oils are presently collected in various containers for temporary storage prior to disposal. No new procedures are required for collection or segregation of waste oils.

B. Acceptable Activity Levels

1. DAW. Using existing procedures, the contact dose rate will be determined for each container. Containers with contact dose rates less than or equal to 25 mRem per hour per 7.5 cubic feet will be placed in a temporary holding area until an adequate supply is available to assure a meaningful run time for the MVRS.

2. Waste Oils. Using existing procedures, the contact dose rate will be determined for typical containers of waste oils. Those containers with contact dose rates less than or equal to 25 mRem per hour per 7.5 cubic feet will be placed in a temporary holding area until an adequate supply is available for transfer to the MVRS "Contaminated Oil Feed Tank" (T-12).

V. PROCESS CONTROL PROGRAM

A. AECC Process Control Program

As indicated in Topical Report No. AECC-4-NP, the service vendor will operate the equipment according to detailed procedures designed to provide the appropriate process control. Controlled copies of operating procedures will be provided by the service vendor to CECO.

B. CECO Administrative Controls

Prior to utilization of the MVRS, CECO will develop detailed procedures covering activities related to the MVRS. Such procedures will be developed, reviewed, and implemented according to established practices and policies.

C. 10 CFR Part 61

CECO has in place a program for implementation of 10CFR61. The existing program includes broad corporate guidelines and site-specific procedures, practices, and policies. Operation of the MVRS will be included under this existing program.

1. Sampling. Present practices cover both DAW and waste oils. Nevertheless, CECO plans to collect samples of the MVRS ash for analysis. (The MVRS system has been designed to provide for collection of ash samples.) Such samples will be analyzed according to the methods contained within the existing 10CFR61 implementation program.

2. Classification. Because of the contractually imposed restriction on the input to the MVRS, all product from the MVRS will be 10CFR61 Class A waste. Nevertheless, this fact will be

verified using existing methods.

3. Disposal. The present plan calls for collection of the ash in strong tight containers which have been designed to mate with the ash delivery system of the MVRS. Disposal will be conducted according to existing procedures for Class A wastes destined for shallow-land disposal.

VI. CALCULATION OF OFF-SITE DOSE CONTRIBUTION

A. Input Waste Characteristics

1. Activity. The expected radionuclide content of the wastes to be processed by the MVRS has been presented in Topical Report No. AECC-4-NP. Those data are based upon extensive studies published by the Electric Power Research Institute (EPRI), as indicated in the Topical Report. DNPS data were among the data base for the EPRI report.

Both the radionuclide content and the concentration of activity presented in Topical Report No. AECC-4-NP are appropriate bases for DNPS wastes.

2. Quantity. In Topical Report No. AECC-4-NP, calculations have been presented for an input rate of 5.2 Curies per year from a single-unit Boiling Water Reactor (BWR). Those calculations are appropriate bases for the DNPS application.

B. Release Rates

Expected release rates for specific radionuclides have been presented in Topical Report No. AECC-4-NP. Those release rates are appropriate for the expected release rates from operation at DNPS. (Because the Topical Report presents release rates per year per reactor, the expected release rates at DNPS will be double the values given in the Topical Report.)

C. Effluent Dose Assessment

1. Radionuclide Concentrations. Calculations presented in Topical Report No. AECC-4-NP show that the concentrations of radionuclides at a site boundary 1000 meters from the MVRS release point will be negligible. That is, such concentrations will be several orders of magnitude below the permissible concentrations listed in Table II, Column 1 of Appendix B to 10 CFR Part 20.

Calculations have been performed using the methods presented in the Dresden Off-Site Dose Calculations Manual (ODCM). Using DNPS site-specific parameters, which include a minimum site boundary

range of 593 meters north-northwest of the MVRS, we have verified the validity of the conclusion in the Topical Report for the DNPS site-specific application.

2. Dose Impact. Calculations have been performed which provide an assessment of the site boundary dose rates resulting from both the effluents and the direct radiation emanating from the MVRS during operation. Those calculations, using DNPS site-specific parameters including dual-unit operations, show the maximum off-site annual dose to a hypothetical individual at the nearest site boundary resulting from MVRS operations will be less than one mRem. Addition of the MVRS dose contribution to the off-site dose resulting from normal operations of the plant shows the ability of the station to meet the requirements of 40 CFR Part 190 is unchanged. That is, MVRS operations at DNPS will have no impact on the overall off-site doses from the plant.

VII. SAFETY CONSIDERATIONS

A. Postulated Accident Scenarios

Various accident scenarios involving the MVRS have been postulated and analyzed. The scenarios are the following:

- (1) Loss of Scrub Solution Inventory,
- (2) Loss of Scrub Solution and HEPA Filter Fire,
- (3) Explosive Loss of Flue Gas and Ash,
- (4) Fire in Waste Feed Airlock,
- (5) Fire in Waste Feed Preparation Area, and
- (6) Spill of Incinerator Ash in Process Area.

In no case does a postulated accident scenario have any affect on plant safety systems.

B. Conclusion on Safety

Based on the considerations presented in this transmittal, CECO has drawn the following conclusions:

(1) Operation of the MVRS at DNPS will not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, and, therefore, does not involve a significant hazards consideration;

(2) There is reasonable assurance that the health and safety of the public will not be endangered by operation of the MVRS at DNPS; and

(3) Operation of the MVRS at DNPS will be conducted in compliance with NRC regulations and NRC approval to operate the MVRS at DNPS will not be inimical to the common defense and security or to the health and safety of the public.

C. Negative Declaration for Environmental Impact Statement

On the basis of the foregoing, CECO has concluded that there would be no significant environmental impact attributable to the proposed operation of the MVRs at DNPS. As a result of this conclusion, CECO has further concluded that no environmental impact statement for the proposed operation of the MVRs at DNPS need be prepared, and that a negative declaration to this effect is appropriate.

VIII. CHANGES TO TECHNICAL DOCUMENTS

A. Technical Specifications

Because operation of the MVRs at DNPS has no significant impact on the site release criteria, no change to the Technical Specifications is required.

B. Final Safety Analysis Report (FSAR)

Because the postulated MVRs accident releases do not exceed the accident evaluations contained within the FSAR, no change to the FSAR is required.

C. Off-Site Dose Calculations Manual (ODCM)

Because operation of the MVRs has no significant impact on off-site doses, no change to the ODCM is required.

D. Generating Stations Emergency Plan (GSEP)

For the sake of completeness, and if required by the Nuclear Regulatory Commission, postulated MVRs accidents could be added to the GSEP listing of unusual events.

System Schematic

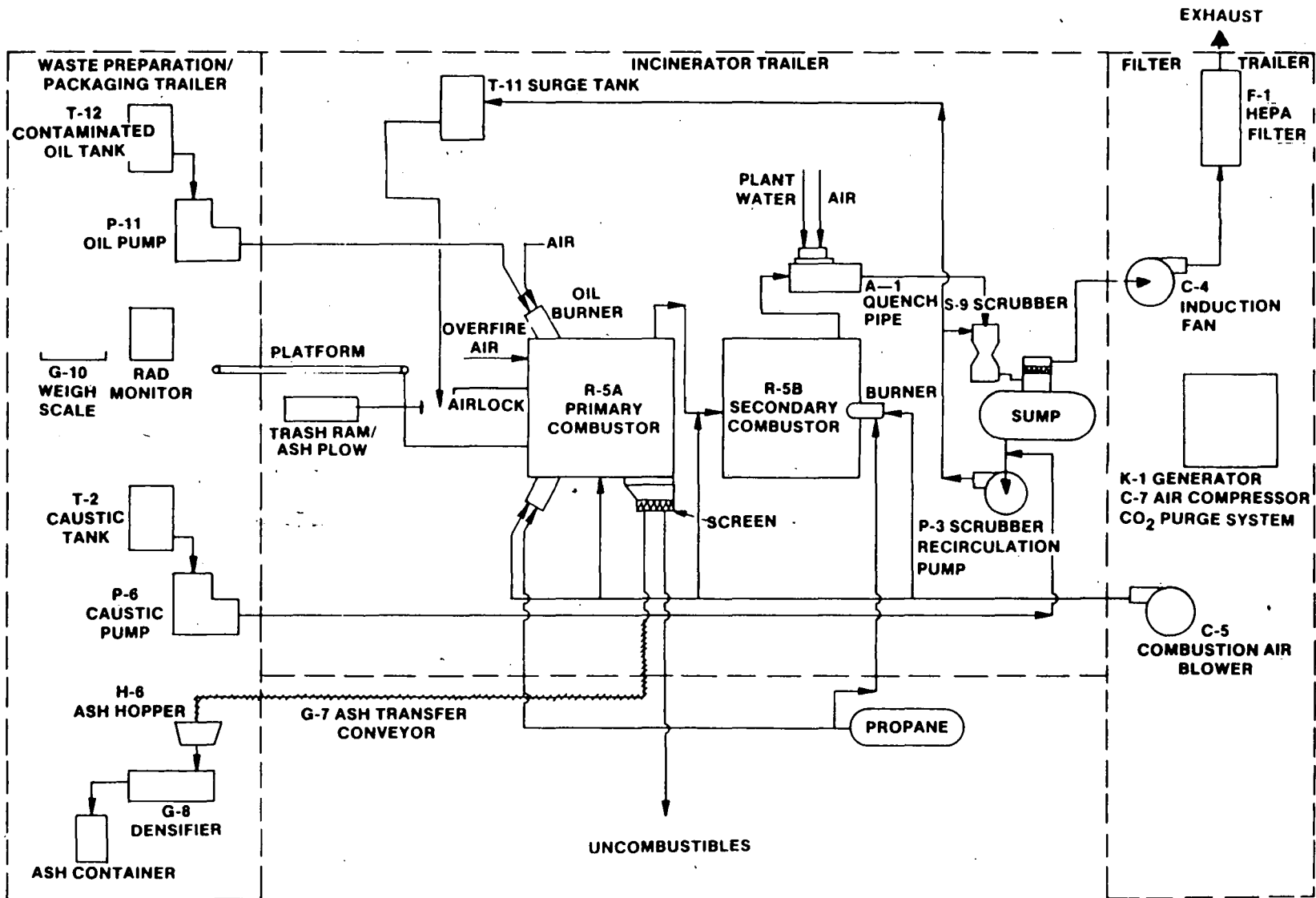
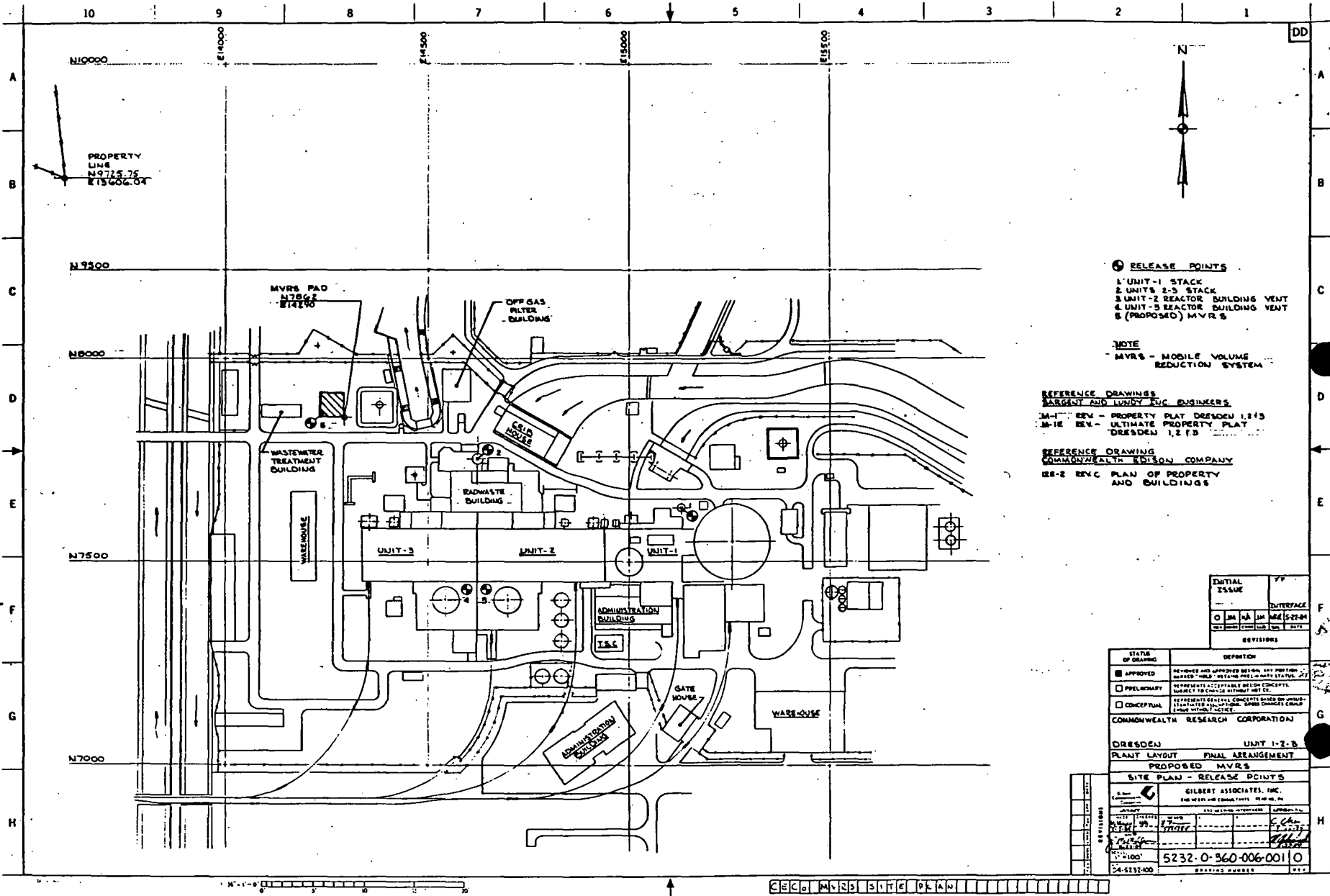


FIGURE 1



PROPERTY
LINE
N9725.75
E15606.04

- RELEASE POINTS
 1. UNIT-1 STACK
 2. UNITS 2-3 STACK
 3. UNIT-2 REACTOR BUILDING VENT
 4. UNIT-3 REACTOR BUILDING VENT
 5. (PROPOSED) MVRS

NOTE
 MVRS - MOBILE VOLUME
 REDUCTION SYSTEM

REFERENCE DRAWINGS
 BARGENT AND LUNDY INC. ENGINEERS
 M-1 REV - PROPERTY PLAN DRESDEN 1,2,3
 M-1E REV - ULTIMATE PROPERTY PLAN
 DRESDEN 1,2,3

REFERENCE DRAWING
 COMMONWEALTH EDISON COMPANY
 DE-2 REVC PLAN OF PROPERTY
 AND BUILDINGS

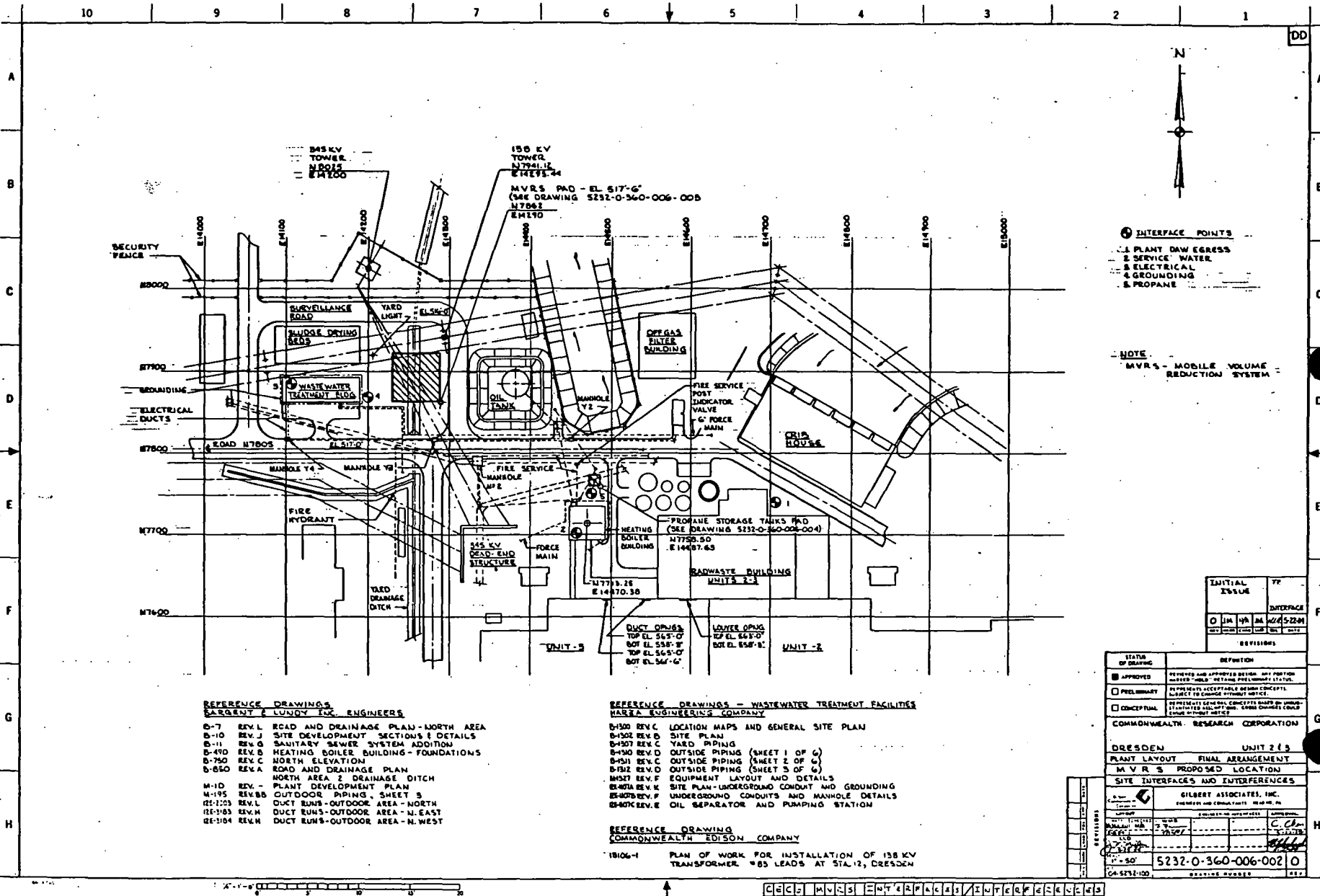
DRAFT ISSUE		DATE	BY	APP'D	INTERFACE
0	1A	10/11/84	JM	ME	SEDM
1	1B	11/15/84	JM	ME	SEDM
2	1C	12/10/84	JM	ME	SEDM
3	1D	1/10/85	JM	ME	SEDM

STATUS OF DRAWING	DEFINITION
<input checked="" type="checkbox"/> APPROVED	DESIGNED AND APPROVED DESIGN, NOT FOR CONSTRUCTION - FIELD OR FINAL PRELIMINARY DESIGN, ALL PERMITS ACCEPTABLE DESIGN CONCEPTS, SUBJECT TO CHANGE WITHOUT NOTICE.
<input type="checkbox"/> PRELIMINARY	PERMITS ACCEPTABLE DESIGN CONCEPTS, SUBJECT TO CHANGE WITHOUT NOTICE.
<input type="checkbox"/> CONCEPTUAL	PERMITS ACCEPTABLE DESIGN CONCEPTS, SUBJECT TO CHANGE WITHOUT NOTICE.

COMMONWEALTH RESEARCH CORPORATION	
DRESDEN	UNIT 1-2-B
PLANT LAYOUT	FINAL ARRANGEMENT
PROPOSED MVRS	
SITE PLAN - RELEASE POINTS	
1. NAME: SILBERT ASSOCIATES, INC. 2. ADDRESS: 200 WEST 40th STREET, PHOENIX, AZ 85018 3. PHONE: (602) 998-1100	4. PROJECT NO.: 5232-0-360-006-001 5. DRAWING NO.: 0 6. DATE: 10/11/84

CEC0 MVRS SITE PLAN

FIGURE 2



⊕ INTERFACE POINTS
 1 PLANT DAW EGRESS
 2 SERVICE WATER
 3 ELECTRICAL
 4 GROUNDING
 5 PROPANE

NOTE
 MVR-5 - MOBILE VOLUME
 REDUCTION SYSTEM

INITIAL	DATE	TYPE
O	10/19/84	INTERFACES
	10/24/84	5232-0-360-006-002

STATUS OF DRAWING	DEFINITION
<input checked="" type="checkbox"/> APPROVED	REVIEWED AND APPROVED BEING ANY PORTION MARKED "AS-BUILT" RETAINING PRELIMINARY STATUS.
<input type="checkbox"/> PRELIMINARY	REPRESENTS ACCEPTABLE DESIGN CONCEPTS SUBJECT TO CHANGE WITHOUT NOTICE.
<input type="checkbox"/> CONCEPTUAL	REPRESENTS CONCEPTS BASED ON UNDEVELOPED AND/OR TENTATIVE DESIGN CONCEPTS.

COMMONWEALTH RESEARCH CORPORATION	
DRESDEN	UNIT 2 (S)
PLANT LAYOUT FINAL ARRANGEMENT	
MVR-5 PROPOSED LOCATION	
SITE INTERFACES AND INTERFERENCES	
DATE	BY
10/19/84	O
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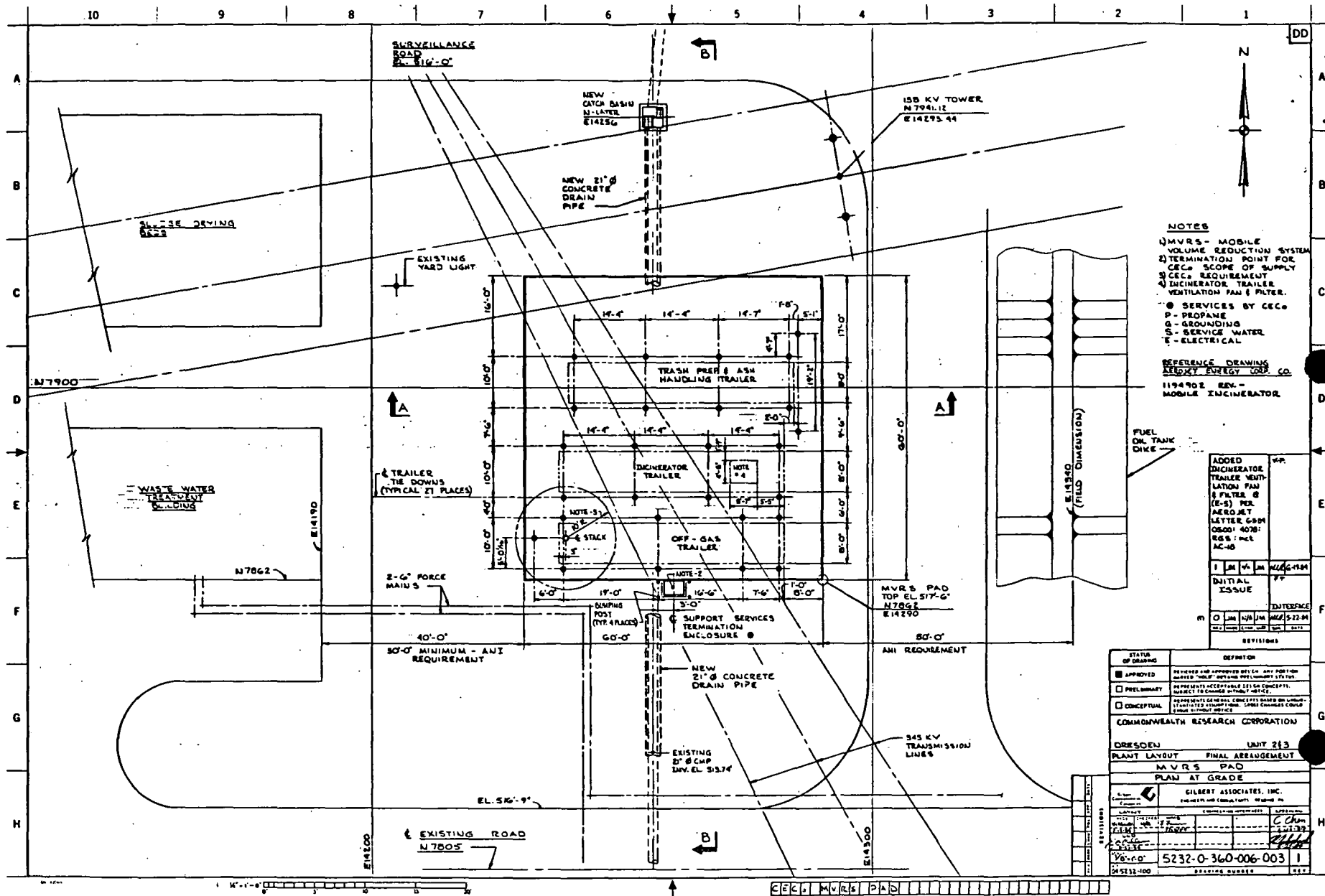
- REFERENCE DRAWINGS - ARGENT & LUNDY INC. ENGINEERS**
- D-7 REV. L ROAD AND DRAINAGE PLAN - NORTH AREA
 - D-10 REV. J SITE DEVELOPMENT SECTIONS & DETAILS
 - D-11 REV. G SANITARY SEWER SYSTEM ADDITION
 - D-470 REV. D HEATING BOILER BUILDING - FOUNDATIONS
 - D-750 REV. C NORTH ELEVATION
 - D-850 REV. A ROAD AND DRAINAGE PLAN NORTH AREA 2 DRAINAGE DITCH
 - M-10 REV. A PLANT DEVELOPMENT PLAN
 - M-195 REV. BB OUTDOOR PIPING, SHEET 5
 - GE-1203 REV. L DUCT RUNS - OUTDOOR AREA - NORTH
 - GE-1983 REV. M DUCT RUNS - OUTDOOR AREA - N. EAST
 - GE-3104 REV. M DUCT RUNS - OUTDOOR AREA - N. WEST

- REFERENCE DRAWINGS - WASTEWATER TREATMENT FACILITIES - HARTA ENGINEERING COMPANY**
- D-1300 REV. C LOCATION MAPS AND GENERAL SITE PLAN
 - D-1302 REV. D SITE PLAN
 - D-1307 REV. C YARD PIPING
 - D-1310 REV. D OUTSIDE PIPING (SHEET 1 OF 6)
 - D-1311 REV. C OUTSIDE PIPING (SHEET 2 OF 6)
 - D-1312 REV. D OUTSIDE PIPING (SHEET 3 OF 6)
 - W-1313 REV. F EQUIPMENT LAYOUT AND DETAILS
 - GE-1074 REV. K SITE PLAN - UNDERGROUND CONDUIT AND GROUNDING
 - GE-1075 REV. F UNDERGROUND CONDUITS AND MANHOLE DETAILS
 - GE-1076 REV. E OIL SEPARATOR AND PUMPING STATION

REFERENCE DRAWING - COMMONWEALTH EDISON COMPANY

18106-1 PLAN OF WORK FOR INSTALLATION OF 138 KV TRANSFORMER #85 LEADS AT STA. 12, DRESDEN

FIGURE 3



- NOTES**
- 1) MVR5 - MOBILE VOLUME REDUCTION SYSTEM
 - 2) TERMINATION POINT FOR CECS - SCOPE OF SUPPLY
 - 3) CECS REQUIREMENT
 - 4) INCINERATOR TRAILER VENTILATION FAN & FILTER.
- SERVICES BY CECS
 P - PROPANE
 G - GROUNDING
 S - SERVICE WATER
 E - ELECTRICAL

REFERENCE DRAWING
 1194902 REV. -
 MOBILE INCINERATOR

ADDED INCINERATOR TRAILER VENTILATION FAN & FILTER @ (E-5) PER AERONET LETTER 6591 05001 40781	W.P.
1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
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79	80
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87	88
89	90
91	92
93	94
95	96
97	98
99	100

STATUS OF DRAWING	DEFINITION
<input checked="" type="checkbox"/> APPROVED	DESIGNED AND APPROVED BY THE PROJECT ENGINEER ONLY. NOT VALID FOR CONSTRUCTION.
<input type="checkbox"/> PRELIMINARY	NO PROJECTIONS ACCEPTABLE. SEE CONCEPTS. SUBJECT TO CHANGE WITHOUT NOTICE.
<input type="checkbox"/> CONCEPTUAL	NO PROJECTIONS. GENERAL CONCEPTS BASED ON LIMITED INFORMATION. SPEED CHANGES SHOULD BE MADE WITHOUT NOTICE.

COMMONWEALTH RESEARCH CORPORATION

DESIGNED BY: UNIT 213
 PLANT LAYOUT: FINAL ARRANGEMENT
 MVR5 PAD
 PLAN AT GRADE

GILBERT ASSOCIATES, INC.
 ENGINEERS AND CONSULTANTS

DATE: 11/13/82
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]
 PROJECT NO: 5232-0-360-006-003
 SHEET NO: 1

FIGURE 4

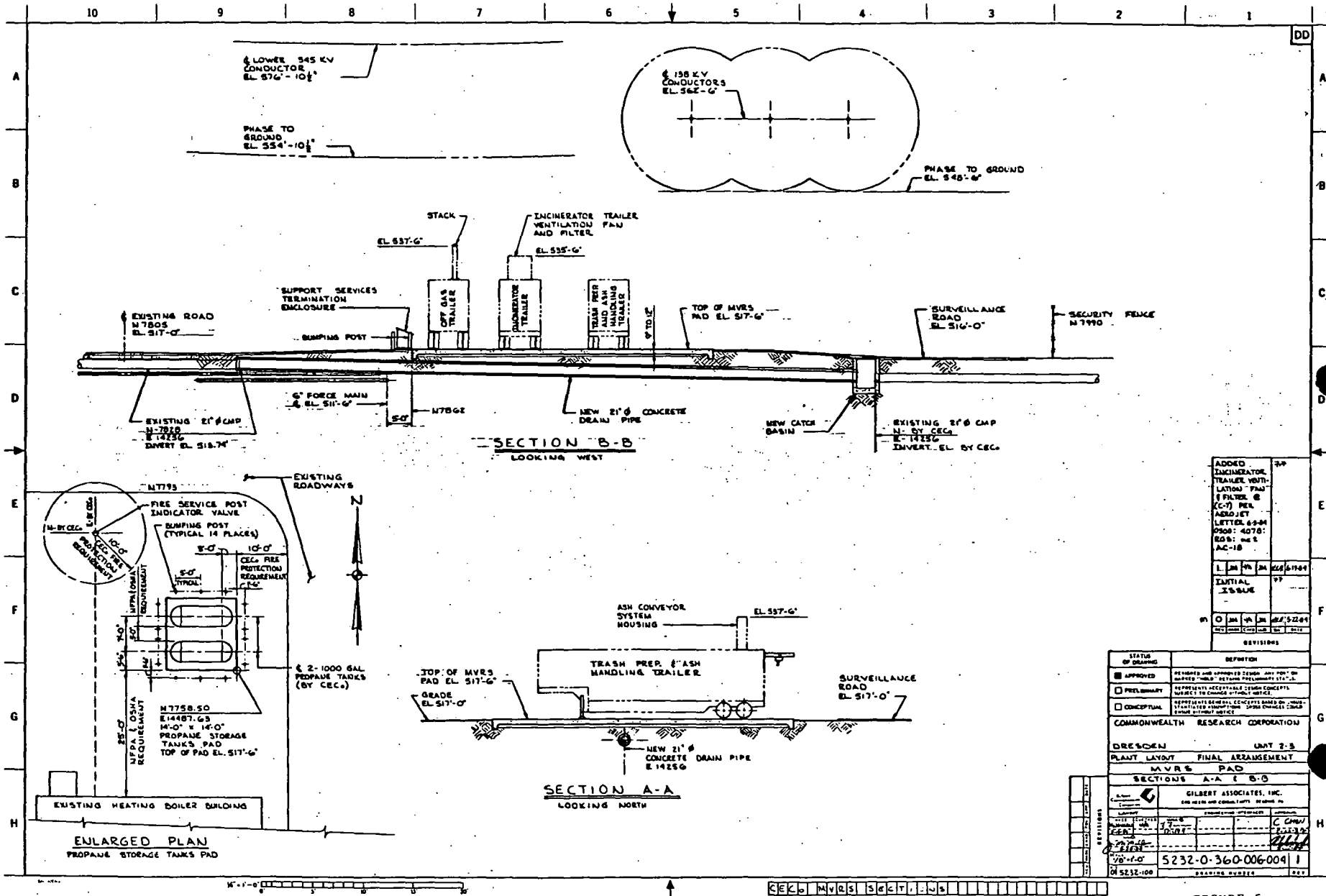


FIGURE 5

A

COMMONWEALTH RESEARCH CORP.

DRESDEN

UNIT 2&3

MADE CHKD

JM
3-30-84

DRAWING NUMBER

5232-0-360-010-005

REV

A

PLANT LAYOUT ENGRG. STUDY

MVRS INTERFACE

TERMINATION ENCLOSURE

PDS

ENG INTERF

GILBERT ASSOCIATES, INC
ENGINEERS AND CONSULTANTS
READING, PA

SCALE NONE

W.O. 045232100

ENGINEER APPROVAL DEPT DATE

REV	MADE	CH	PDS	APP	DATE	REV	MADE	CH	PDS	APP	DATE
	A	JM	MA	JM	MIA						3-30-84

CEC MVRS TERMINATION ENCLOSURE

INITIAL ISSUE

CONCEPTUAL

REFRESENTS GENERAL CONCEPTS BASED ON UNSUBSTANTIATED ASSUMPTIONS. GROSS CHANGES COULD ENSUE WITHOUT NOTICE.

PRELIMINARY

REPRESENTS ACCEPTABLE DESIGN CONCEPTS. SUBJECT TO CHANGE WITHOUT NOTICE.

APPROVED

REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

STATUS OF DRAWING

DEFINITION

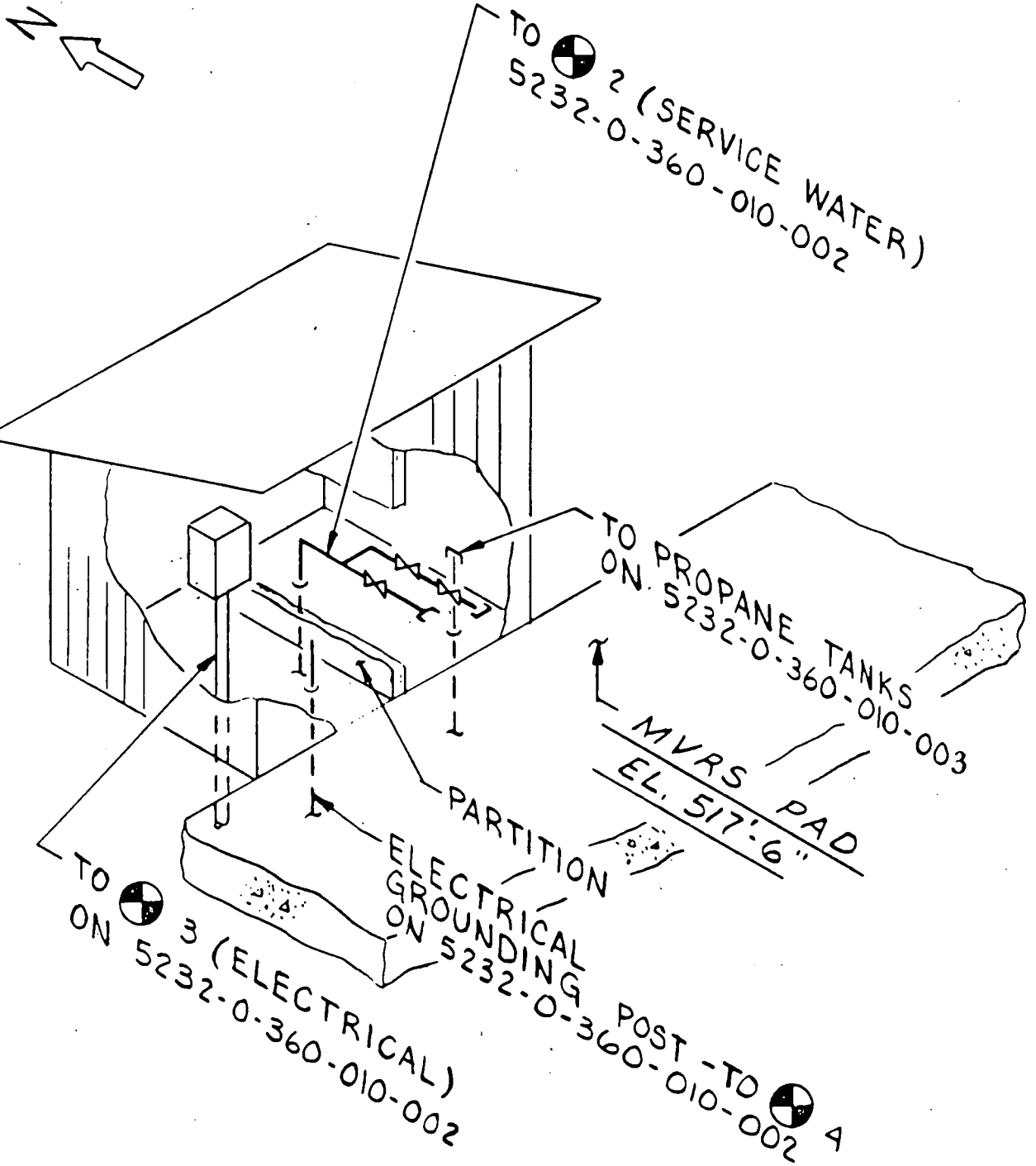


FIGURE 6