

YUCCA MOUNTAIN PROJECT

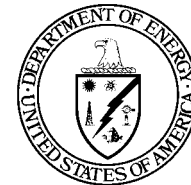
Studies

Subsurface Performance Confirmation Facility Design

Presented to:
Nuclear Waste Technical Review Board

Presented by:
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Assistant Manager for Licensing

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U.S. Department of Energy
Office of Civilian Radioactive
Waste Management

Regulatory Background for Performance Confirmation Program

- **Performance Confirmation means the program of tests, experiments, and analyses which is conducted to evaluate the accuracy and adequacy of the information used to determine with reasonable assurance that the performance objectives for the period after permanent closure will be met. [10CFR60.2]**
- **The repository shall be designed so as to permit implementation of a performance confirmation program that meets the requirements of Subpart F [10CFR60.137]**

10CFR60 - Subpart F

Performance Confirmation Program

60.140 General Requirements

- (a) The performance confirmation program shall provide data which indicates, where practicable, whether**
 - (1) Actual subsurface conditions encountered and changes in those conditions during construction and waste emplacement operations are within the limits assumed in the licensing review**
 - (2) Natural and engineered systems and components required for repository operation, or which are designed and assumed to operate as barriers after permanent closure, are functioning as intended and anticipated.**
- (b) The program shall have been started during site characterization and it will continue until permanent closure.**

Summary of Performance Confirmation Strategy

The strategy of the Performance Confirmation program is to utilize multiple data acquisition methods to produce an overall data set which is adequate to confirm (or revise) licensing assumptions about repository performance

Performance Confirmation Data Needs

- **Seismicity**
- **Natural Resources**
- **Stratigraphy**
- **Altered Zone Characteristics**
- **Fracture and Fault Zone Characteristics**
- **Groundwater Characteristics**
- **Emplacement Drift Geometry**
- **Drift Environment**
- **Materials Remaining in the Repository after Closure**
- **Waste Package Characteristics**
- **Radionuclide Containment Parameters**

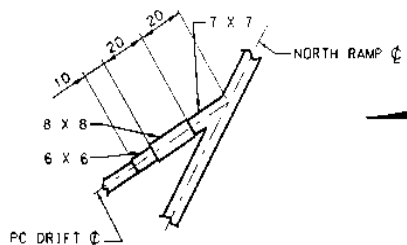
Data Acquisition Methods

- **Sampling during construction**
- **Mapping during construction**
- **Alcove-based testing (non-emplacment areas)**
- **Borehole instruments**
- **Ventilation monitoring**
- **Remote data acquisition from within emplacement drifts**
- **Recovery of WPs or testing surrogate WPs**

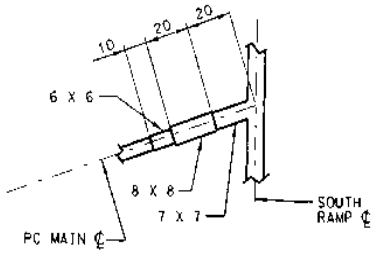
Design Implementation of PC

Observation Drift

- **Borehole Instruments in the Altered Zone (examples of parameters of data acquisition)**
 - Rock temperature
 - Rock stress and strain
 - Ground-water chemical composition; Eh & pH
 - Moisture content
 - Water vapor content/humidity



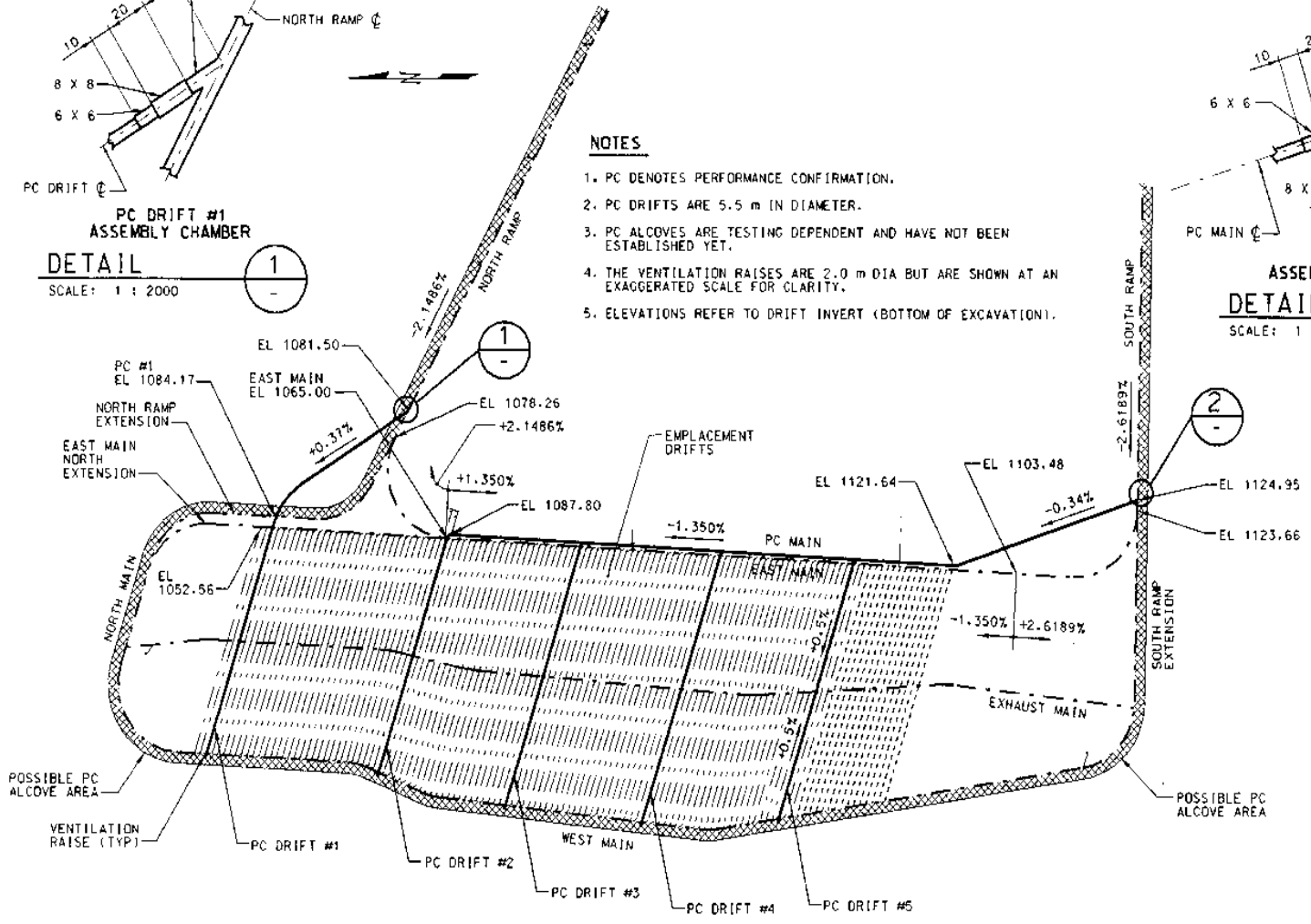
**PC DRIFT #1
ASSEMBLY CHAMBER**
DETAIL 1
SCALE: 1 : 2000



**PC MAIN
ASSEMBLY CHAMBER**
DETAIL 2
SCALE: 1 : 2000

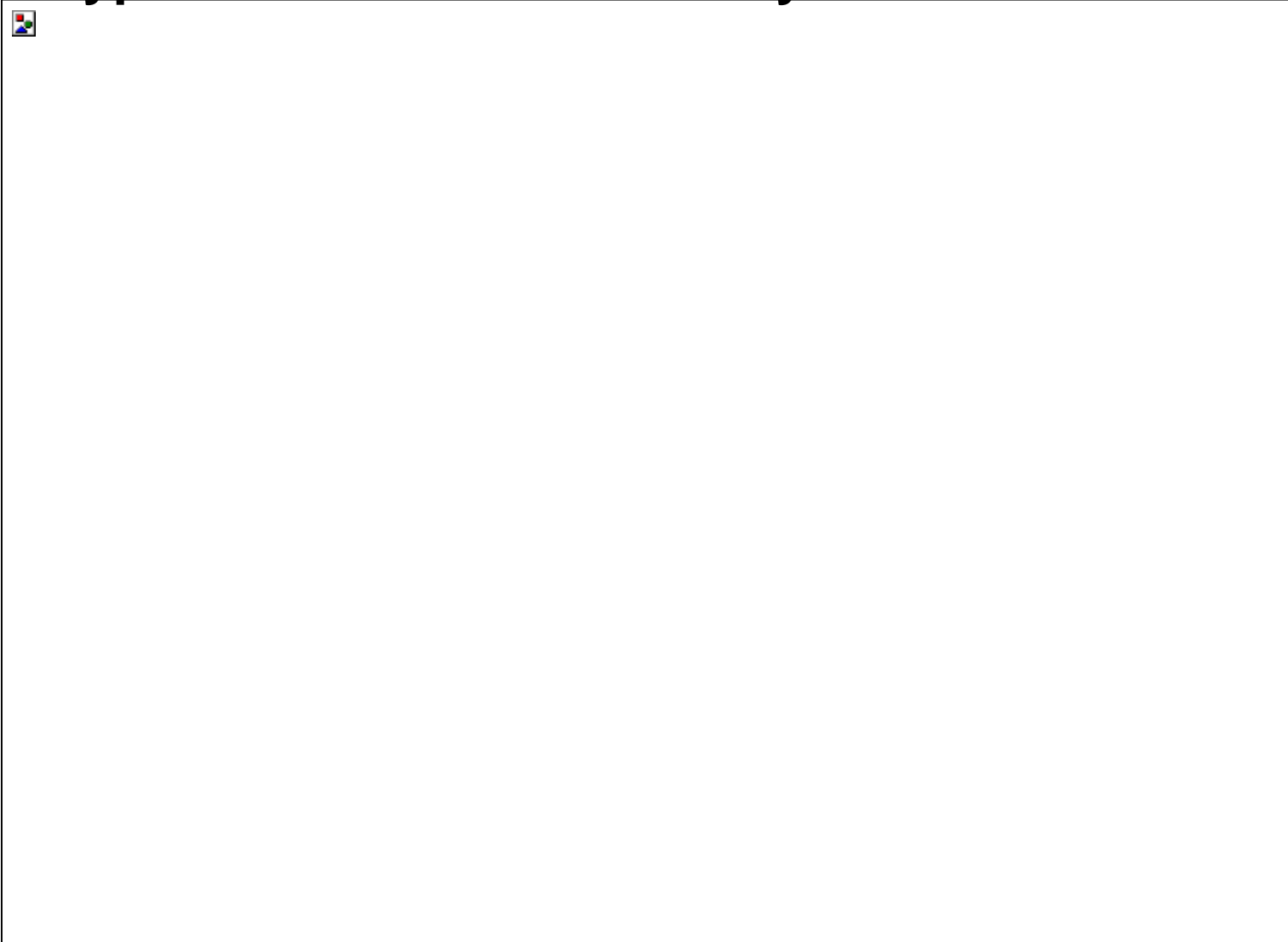
NOTES

1. PC DENOTES PERFORMANCE CONFIRMATION.
2. PC DRIFTS ARE 5.5 m IN DIAMETER.
3. PC ALCOVES ARE TESTING DEPENDENT AND HAVE NOT BEEN ESTABLISHED YET.
4. THE VENTILATION RAISES ARE 2.0 m DIA BUT ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY.
5. ELEVATIONS REFER TO DRIFT INVERT (BOTTOM OF EXCAVATION).

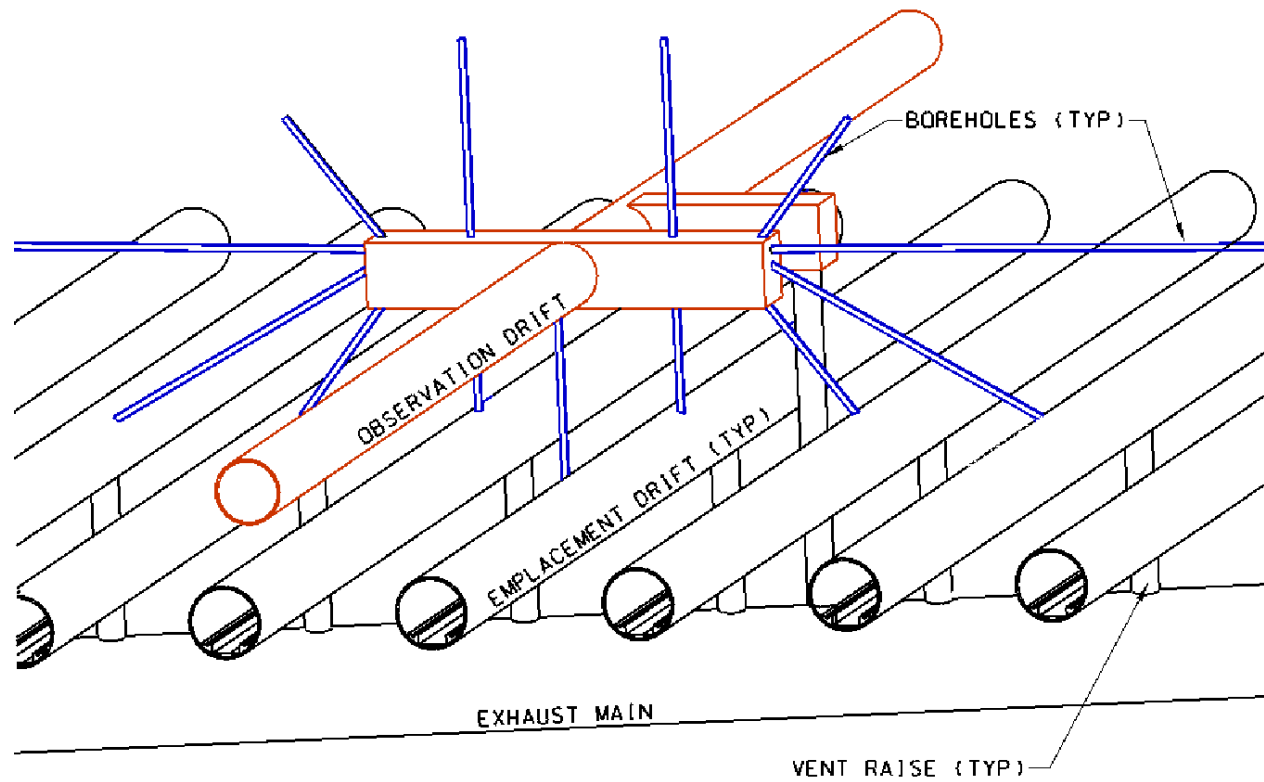


**LAYOUT SHOWING PERFORMANCE
CONFIRMATION FACILITIES**

Typical Observation Drift Layout for Six Drifts

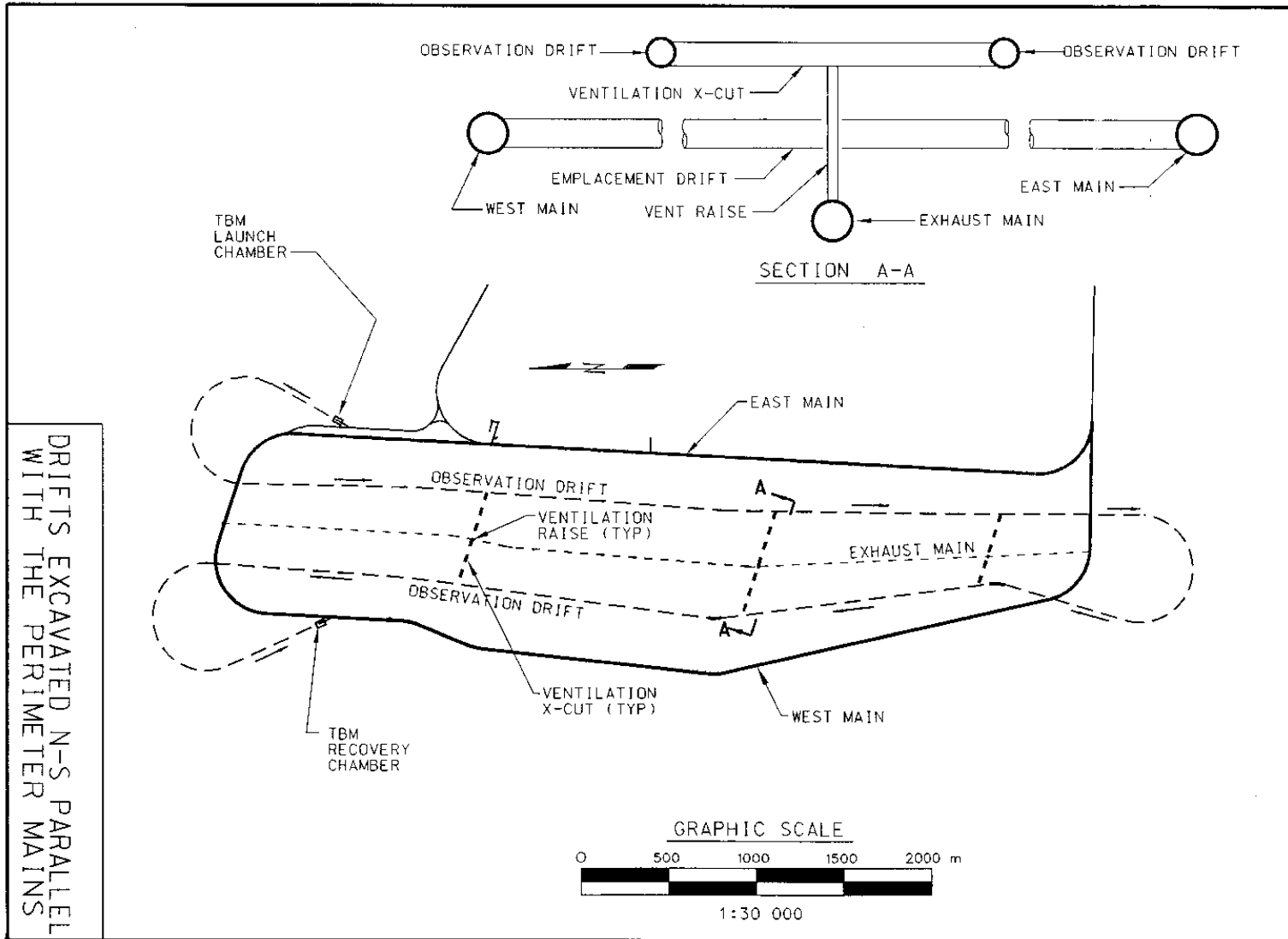


PC Observation Drifts (perspective)

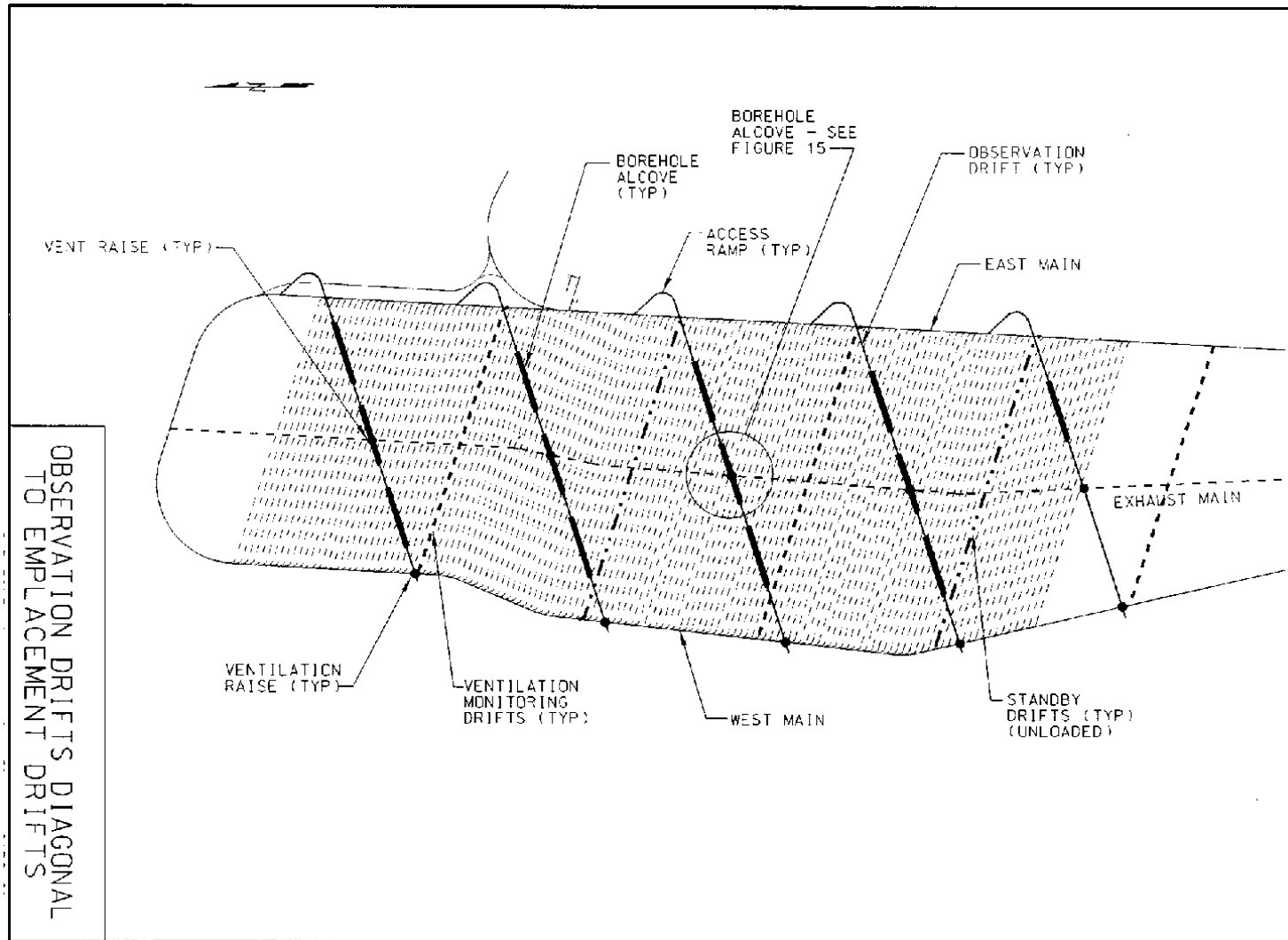


Options Considered

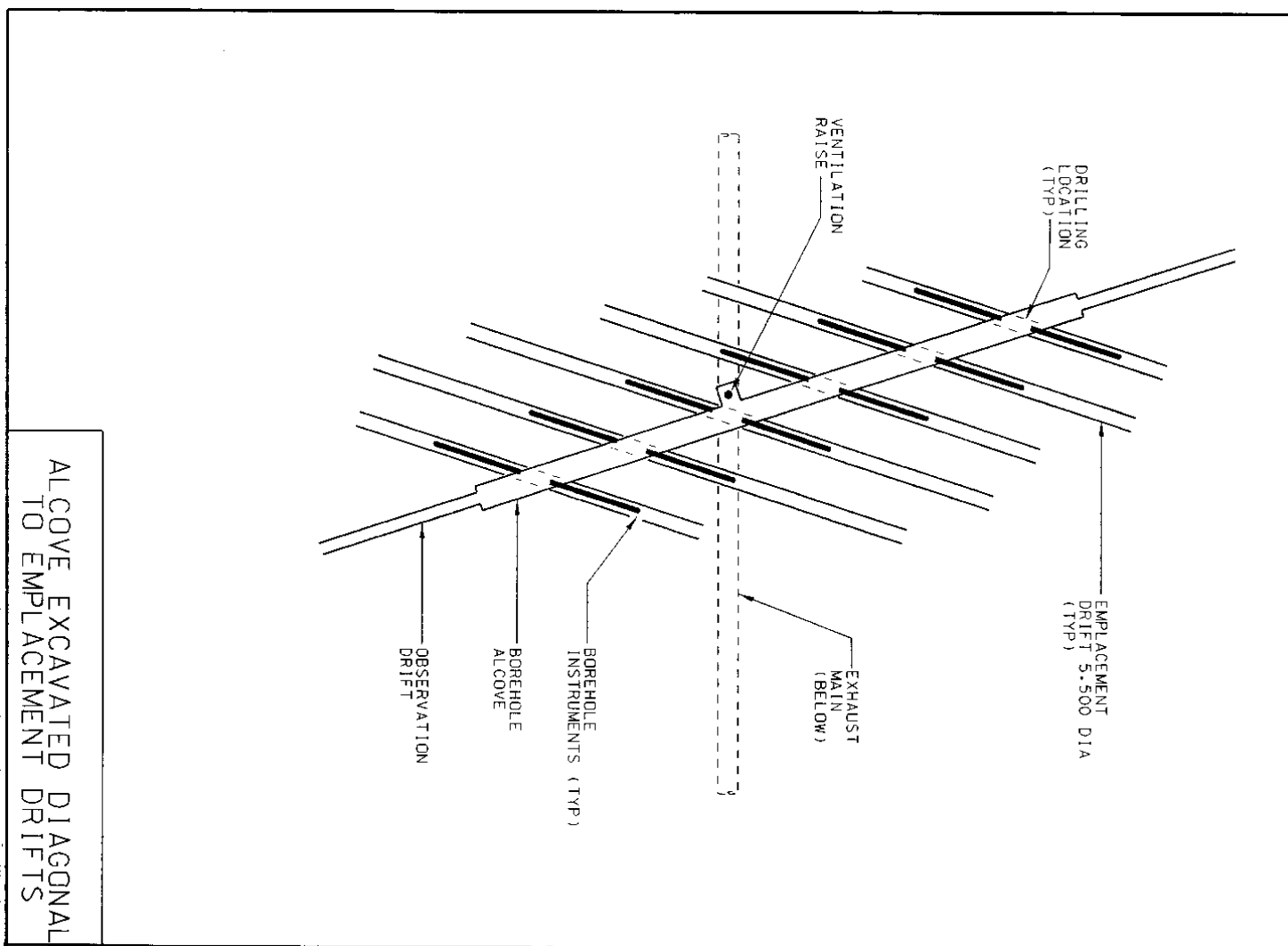
PC Observation Drifts



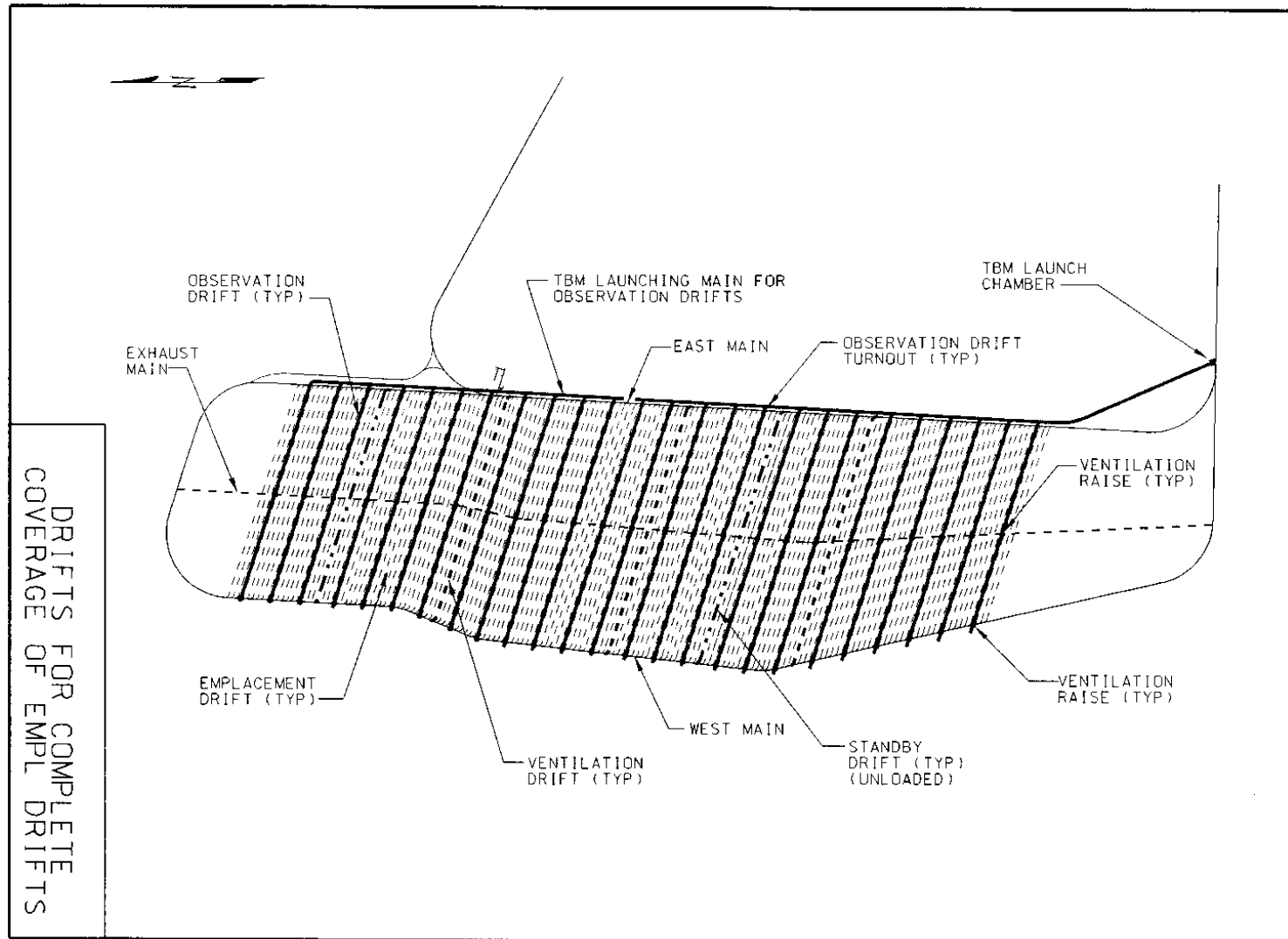
Observation Drifts Excavated Diagonal to Emplacement Drifts



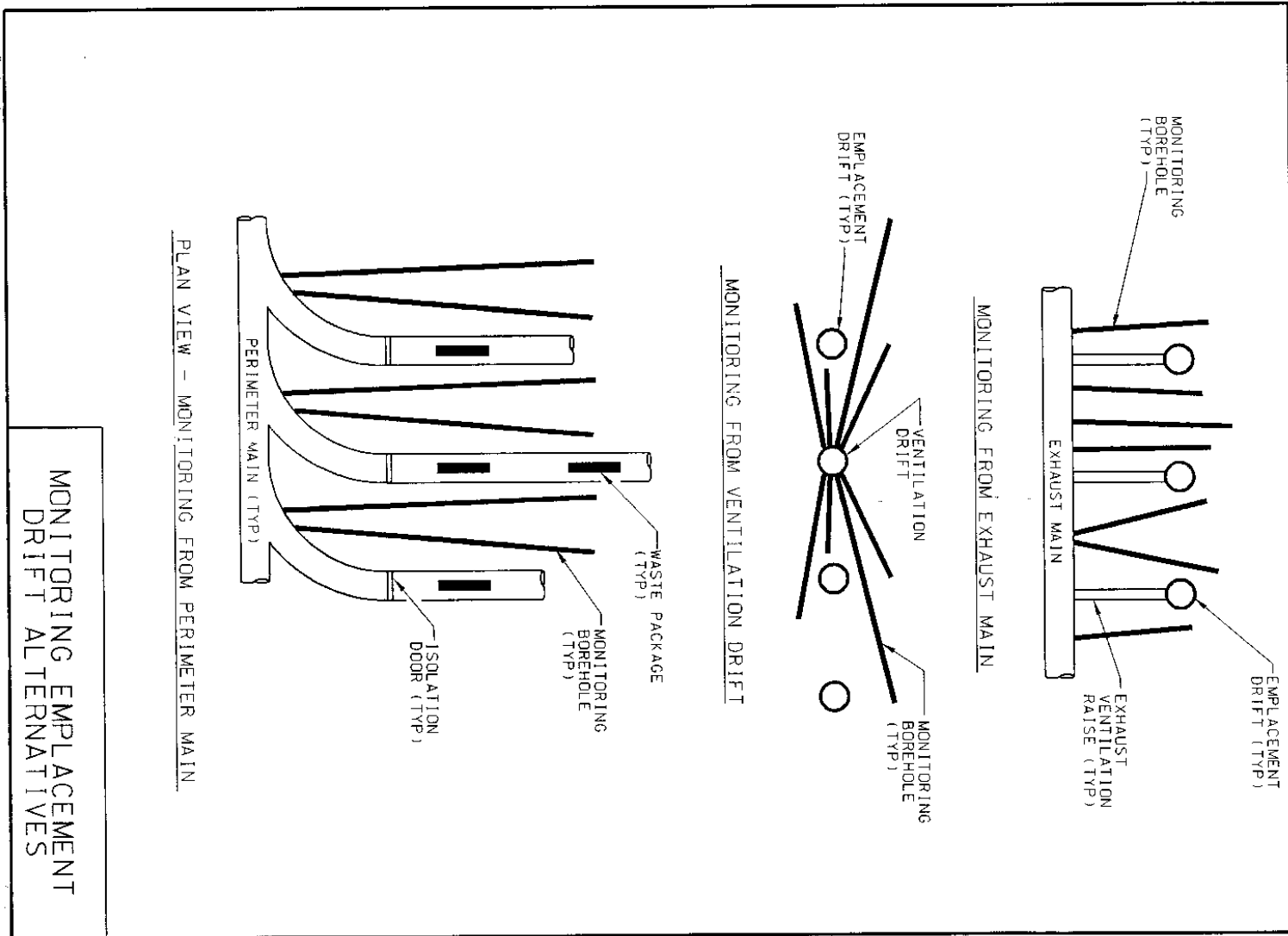
Borehole Alcove Excavated Diagonal to Emplacement Drifts



Observation Drifts for Complete Coverage of Emplacement Drifts



Performance Confirmation Monitoring Alternatives from Non-Emplacement Drifts



Summary

- **Performance Confirmation Facility Design**
- **is designed to permit implementation of the Performance Confirmation Program**
- **is integrated with design of the entire system**
- **is flexible and can be modified to match options in the system**
- **will work as designed, but will evolve with time as the design, modeling, and assessments evolve**