U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: INTRODUCTION OF FOREIGN MATERIALS IN THE ESF

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REQUIREMENTS

DOE REALIZES THE NEED TO MANAGE AND CONTROL FOREIGN MATERIALS INTRODUCED INTO THE ESF

BASIS

- 10 CFR 60.133
- ISSUE 1.11

10 CFR 60.133

POST CLOSURE DESIGN CRITERIA OF 10 CFR 60.133 REQUIRES THAT THE UNDERGROUND FACILITY AND ENGINEERED BARRIER SYSTEM BE DESIGNED TO:

- CONTRIBUTE TO CONTAINMENT AND ISOLATION
- ASSIST THE GEOLOGIC SETTING
- CONSIDER THERMAL AND THERMOMECHANICAL RESPONSE
  - PROVIDE FOR SUFFICIENT FLEXIBILITY

ISSUE 1.11

HAVE THE CHARACTERISTICS AND CONFIGURATIONS OF THE REPOSITORY AND REPOSITORY ENGINEERED BARRIERS BEEN ADEQUATELY ESTABLISHED TO:

- SHOW COMPLIANCE WITH THE POST CLOSURE AND DESIGN CRITERIA OF 10 CFR 60.133 AND
- PROVIDE INFORMATION FOR THE RESOLUTION OF THE PERFORMANCE ISSUE

MATERIALS

POTENTIALLY ADVERSE CHEMICAL EFFECTS MAY ARISE, EITHER DIRECTLY OR INDIRECTLY, AS A RESULT OF THE QUANTITY AND LOCATION OF MATERIALS INTRODUCED TO THE SITE SUCH AS:

- CONCRETE, SHOTCRETE, GROUTS, ORGANICS, ETC.

WATER

LIMIT THE USE OF WATER IN CONSTRUCTION, TESTING, OPERATION, AND DECOMMISSIONING TO PROVIDE FAVORABLE CONTAINMENT AND AN ISOLATION ENVIRONMENT

INTRODUCTION OF FOREIGN MATERIALS

- COULD CAUSE ADVERSE CHEMICAL CHANGES TO THE SITE, THEREBY IMPACTING WASTE ISOLATION CAPABILITY AND CONTAMINATING DATA
- WATER, OTHER FLUIDS/MATERIALS USED DURING CONSTRUCTION AND TESTING COULD AFFECT DATA QUALITY AND IMPACT WASTE ISOLATION
- TEST-TO-CONSTRUCTION INTERFERENCE
- TEST-TO-TEST INTERFERENCE

INTRODUCTION OF FOREIGN MATERIALS

(CONTINUED)

FOREIGN MATERIALS MAY:

- CONTAMINATE UNSATURATED FORMATIONS
- HAVE DELETERIOUS IMPACT FROM BIODEGRADABLE ORGANICS ON THE POSTCLOSURE PERFORMANCE
- ALTER THE GEOCHEMICAL ENVIRONMENT OF THE SITE
- AFFECT THE WASTE ISOLATION CAPABILITIES OF THE SITE

INTRODUCTION OF FOREIGN MATERIALS

(CONTINUED)

PLANS ARE REQUIRED TO CONTROL THE INTRODUCTION OF FOREIGN MATERIALS TO ENSURE THAT PERFORMANCE GOALS CAN BE MET

CURRENT STATUS

THE TEST AND EVALUATION PLAN (T&EP) REQUIRES:

- AUTHORIZATION TO PROCEED WITH THE TEST
- IDENTIFICATION OF CONTROLS AS NECESSARY

CURRENT STATUS

(CONTINUED)

INFORMATION FOR EACH TEST IS PROVIDED TO THE A&E VIA THE TEST PLANNING PACKAGE (TPP)

ENSURE THAT:

- WASTE ISOLATION CAPABILITY OF THE SITE WILL NOT BE COMPROMISED BY THE TEST (AP 5.32Q)
- FOR GENERAL ARRANGEMENTS TPPs HAVE IDENTIFIED CONSTRAINTS, e.g., DRY MINING, USE OF TRACER IN WATER, AND AIR

PLAN TO CONTROL INTRODUCTION OF FOREIGN MATERIAL

TO SUPPORT TITLE II ACTIVITIES

- A PLAN TO MANAGE AND CONTROL THE INTRODUCTION OF FOREIGN MATERIALS IS BEING PREPARED
- THE PLAN HAS UNDERGONE PROJECT REVIEW AND SHOULD BE ISSUED SHORTLY
- THE PLAN REQUIRES THAT THE PROJECT MAINTAIN A CONTROLLED DATA BASE FOR ALL THE MATERIALS TO BE USED

YMP FLUID AND MATERIAL MANAGEMENT PLAN (YMP/91-xx)

CONTROLLED DATA BASE

Listing of Fluid & Material to be Used with Planned Quantities, Locations, and Composition

PERFORMANCE ASSESSMENT

Sets Restrictions and Establishes Use Limits

Criteria :
- Waste Isolation
- Site Characterization Data Interference

SITE CHARACTERIZATION TESTERS

Through the Test Specific TPPs Identify Fluids & Materials Required for Testing

SITE CHARACTERIZATION A/E - CONSTRUCTOR

Identify Fluids & Materials Required for Construction and Operations

REPOSITORY A/E - OPERATOR

Identify Fluids & Materials Required for Construction, Operations, and Testing

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CONTENT OF CONTROLLED DATA BASE

THE CONTROLLED DATA BASE WILL CONTAIN A COMPREHENSIVE INVENTORY OF ALL APPROVED MATERIALS. IT WILL INCLUDE REFERENCE TO THE ANALYSIS SUCH AS:

- ANY IMPACT ON SITE CHARACTERIZATION DATA
- POSTCLOSURE CONSIDERATIONS
- IMPACT ON WASTE ISOLATION
- CONSTRAINTS ON USE OF MATERIAL

APPROVED FLUIDS AND MATERIALS LIST

FLUID/MATERIAL	DESCRIPTION	CHEMICAL COMPOSITION	WHEN USED	WHERE USED	QUANTITY
Anchor	Five per MPBX	Steel	Plate Loading Test	Main Test Level	50
Brake Fluid	Liquid oil (hydrocarbon)	Petroleum-based	Construction	Surface Underground	300 gal 30 gal (5 gal)
Epoxy Grout	Celtite 42-60 or 42-76	Epoxy (polyether resin)	TBD	TBD	TBD
Rockbolts	Solid, rebar type	Steel, ASTM-A 615-68 GR60 ASTM-A-307	TBD	TBD	TBD
Diesel Fuel	Liquid	Hydrocarbon	TBD	Surface Underground	280,000 gal 280,000 gal
Spray Paint	Liquid enamel	TBD	TBD	Surface and Underground	1000 cans
Steam cleaning compound	Biodegradable detergent	TBD	TBD	Surface and Underground	TBD
Lithium bromide	LiBr	LiBr	Water supply/ testing	Surface and underground	3000 lb
Sulfur hexafluoride	SF_6	SF_6	Testing	Underground	50 lb
Water	Dust control	H_2O	Site preparation	Surface	2,160,000 gal

This list was developed for 2 shaft configurations. Further revisions are to be made for Title II Design.
Reference: West, K., Nevada Nuclear Waste Storage Investigations, Exploratory Shaft Facility Fluids and Materials Evaluation. LA-11398MS, November 1988.

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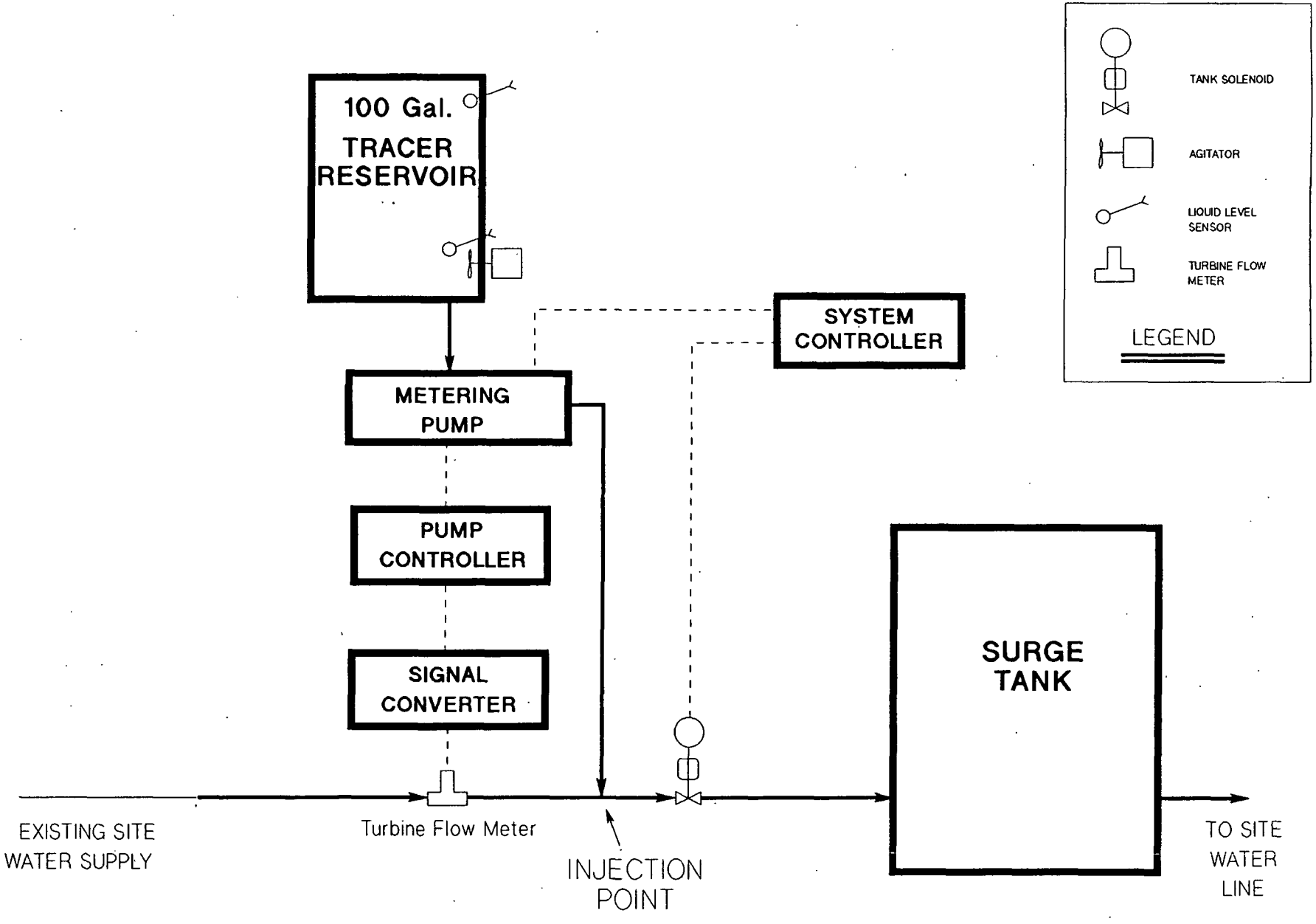
PROTOTYPE TRACER INJECTOR

YMP HAS ALSO DEVELOPED A PROTOTYPE APPARATUS TO INJECT TRACERS IN WATER USED FOR CONSTRUCTION IN THE ESF

- FIGURE 1 SHOWS THE FLOW DIAGRAM

TRACER INJECTION SYSTEM



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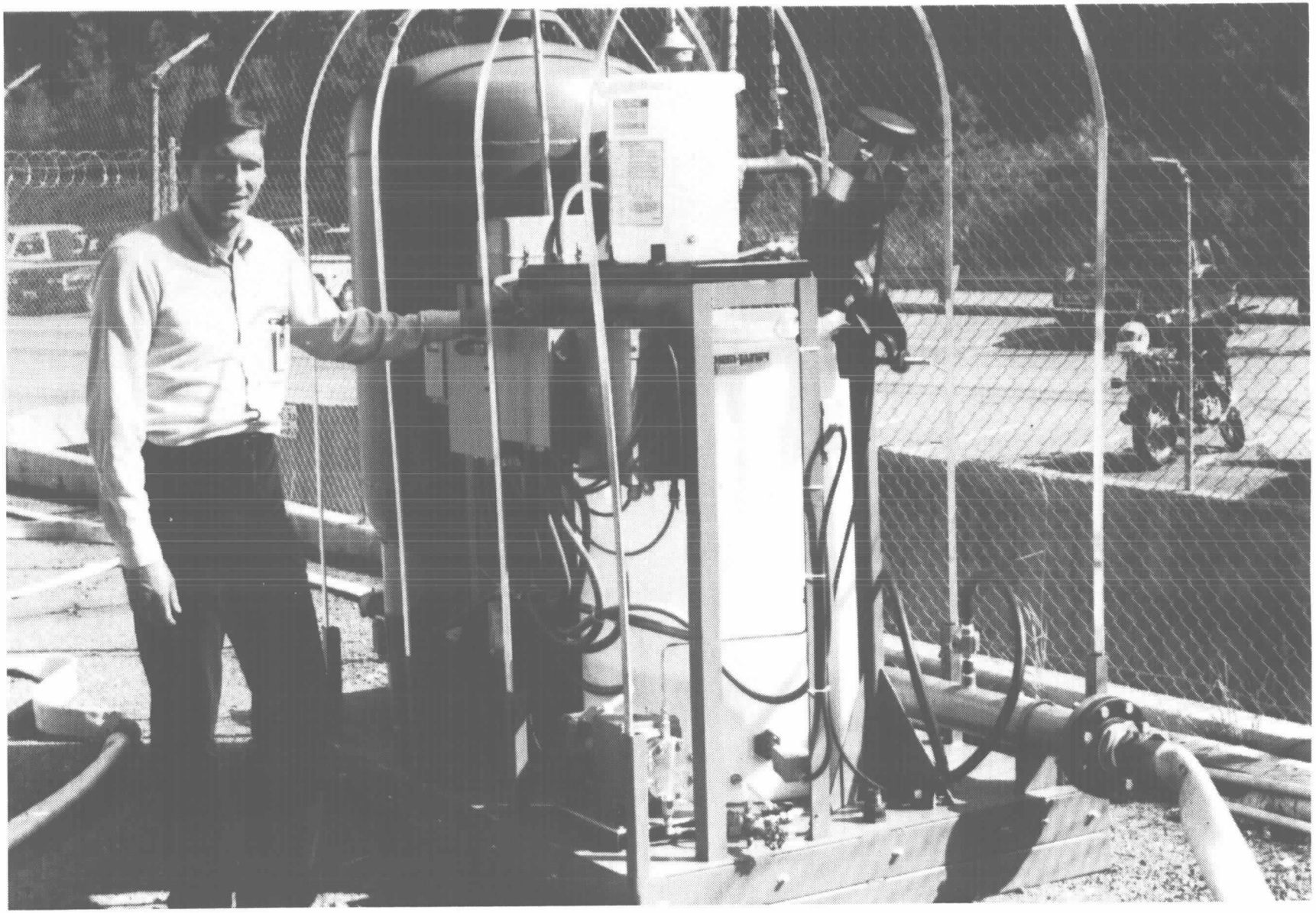
TRACER INJECTION SYSTEM

(CONTINUED)

- THIS APPARATUS WAS TESTED TO INJECT TRACER CONCENTRATION IN THE WATER AT APPROXIMATELY 20 PPM
- THE APPARATUS IS SIMPLE AND CAN BE CONNECTED TO THE ESF MAIN WATER LINE
- THE INJECTOR SYSTEM IS LOCATED AT NEVADA TEST SITE LOS ALAMOS WAREHOUSE

PROTOTYPE TRACER INJECTION SYSTEM



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SUMMARY

- PLANS, PROCEDURES, AND METHODS HAVE BEEN OR ARE BEING DEVELOPED TO ENSURE THAT FOREIGN MATERIALS USED IN THE ESF WILL NOT:
  - COMPROMISE SCIENTIFIC DATA
  - AFFECT THE WASTE ISOLATION CAPABILITY OF THE SITE
- A CONTROLLED DATA BASE WILL EXIST FOR ALL MATERIALS USED, INCLUDING THEIR COMPOSITIONS, QUANTITY, LOCATION, AND THEIR POTENTIAL IMPACT ON SITE PERFORMANCE