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Alabama Power
the southern electric system

April 1, 1983

Docket Nos. 50-348
50-364

Director, Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. S. A. Varga

Joseph M. Farley Nuclear Plant - Units 1 and 2
NUREG-0737 Item II.B.3 Post Accident Sampling System

Gentlemen:

Attached is the additional information requested by your letter of July 22, 1982 in accordance with the schedule committed to in Alabama Power Company letter dated August 18, 1982.

If you have any questions, please advise.

Yours very truly,

F. L. Clayton, Jr.

FLCJr/GGY:mjh-D37
Attachment
cc: Mr. R. A. Thomas
Mr. G. F. Trowbridge
Mr. J. P. O'Reilly
Mr. E. A. Reeves
Mr. W. H. Bradford

A046

ATTACHMENT
Alabama Power Company (APCo) Responses to
NRC Questions/Criteria

NRC Criteria (1):

The licensee shall have the capability to promptly obtain reactor coolant samples and containment atmosphere samples. The combined time alloted for sampling and analysis should be 3 hours or less from the time a decision is made to take a sample.

NRC Clarification (1):

Provide information on sampling system(s) and analytical laboratories locations including a discussion of relative elevations, distances and methods for sample transport. Responses to this item should also include a discussion of sample recirculation, sample handling and analytical times to demonstrate that the three-hour time limit will be met (see (6) below relative to radiation exposure). Also describe provisions for sampling during loss of off-site power (i.e. designate an alternative backup power source, not necessarily the vital (Class 1E) bus, that can be energized in sufficient time to meet the three-hour sampling and analysis time limit).

APCo Response (1):

The Sample Room, Counting Room and Radiochemistry Lab for the Farley Nuclear Plant (FNP) Post Accident Sampling System are located on the 139' elevation of the Auxiliary Building (Figure 1). A pressurized Reactor Coolant Sample (RCS) can be promptly obtained from the remote sample station located on the 139' elevation of the Auxiliary Building. The pressurized sample is circulated through a 40 cc stainless steel sample bomb which purges any resident water and ensures that the resultant sample is representative of the coolant system (Figure 2). The sample is degassed and an aliquot of the gas is drawn off by microsyringe and injected into a gas chromatograph for analysis. The liquid portion of the sample is injected into a 50 cc shielded sample vial located in the sample room (Figure 3). The sample is then transported to the lab for analysis by means of a shielded sample transport cart which has been designed to minimize any radiation exposure.

In case of containment isolation prior to a sample request, approximately 30 minutes will be required to reestablish flow and obtain a representative sample at system pressure (system pressure [2200 psig]) provides the driving force for sample flow). If RHR has been initiated, an additional 15 minutes may be necessary due to the reduced system pressure. Sample preparation will then require 30 minutes to one hour, dependent upon the availability of the unaffected Unit's lab. Chemical and isotopic analyses will require approximately 30 minutes.

Containment atmosphere samples can be promptly obtained by means of a remotely activated inline air sampler parallel with RE-11/12 (Containment Leak Monitor) on the 121' elevation of the Auxiliary Building. The inline air sampler draws air through a 250 cc gas sample bomb, a particulate filter and an iodine cartridge, from the 134'6" elevation of containment. The hydrogen, oxygen and noble gas samples are collected by microsyringe through

a septum located on the 250 cc gas sample bomb. The particulate and iodine filters are collected by removing the sample holder by means of a self-sealing quick disconnect fitting (Figure 4). Collection and analyses of containment atmosphere samples require less than one hour from the time the sample is requested.

The Unit 1 and Unit 2 reactor coolant sampling systems and the Unit 1 containment atmosphere sampling system are powered from Class 1E load centers. The Unit 2 containment atmosphere sampling panel is powered from onsite AC load center and could be manually connected to a Class 1E power source during a loss of off-site power event. Alabama Power Company has determined that the Unit 1 and Unit 2 sampling systems can be energized, following a loss of off-site power, in sufficient time to meet the three-hour sampling and analysis time limit.

NRC Criteria (2):

The licensee shall establish an onsite radiological and chemical analysis capability to provide, within the 3-hour time frame established above, quantification of the following:

a) certain radionuclides in the reactor coolant and containment atmopshere that may be indicators of the degree of core damage (e.g., noble gases, iodines and cesiums, and non-volatile isotopes);

b) hydrogen levels in the containment atmosphere;

c) dissolved gases (e.g. H_2), chloride (time allotted for analysis subject to discussion below), and boron concentration of liquids.

d) Alternatively, have inline monitoring capabilities to perform all or part of the above analyses.

NRC Clarification (2):

2(a) A discussion of the counting equipment capabilities is needed, including provisions to handle samples and reduce background radiation to minimize personnel radiation exposures (ALARA). Also, a procedure is required for relating radionuclide concentrations to core damage. The procedure should include:

1) Monitoring for short and long lived volatile and non-volatile radionuclides such as 133Xe, 131I, 137Cs, 134Cs, 85Kr, 140Ba, and 88Kr (See Vol. II, Part 2, pp. 524-527 of Rogovin Report for further information).

2) Provisions to estimate the extent of core damage based on radionuclide concentrations and taking into consideration other physical parameters such as core temperature data and sample location.

2(b) Show a capability to obtain a grab sample, transport and analyze for hydrogen.

2(c) Discuss the capabilities to sample and analyze for the accident sample species listed here and in Regulatory Guide 1.97, Rev. 2.

2(d) Provide a discussion of the reliability and maintenance information to demonstrate that the selected on-line instrument is appropriate for this application. (See (8) and (10) below relative to back-up grab sample capability and instrument range and accuracy).

APCo Response (2):

2(a) Each unit at Farley Nuclear Plant has a radiochemistry laboratory (Figure 1) with radiological and chemical analysis capabilities (that supports three hour quantification of analysis) to dilute and aliquot samples that are extremely radioactive (i.e. up to 10 Ci/gm). Wet chemical analysis and separations are peformed in each laboratory under shielded conditions to keep personnel exposure as low as reasonably achievable (ALARA). In addition, each laboratory is equipped for gas chromatography. The FNP Emergency Operations Facility (EOF), located one-fourth mile southwest of the plant, has a radiochemistry lab equipped with a charcoal filter hood, a hold-up tank and drumming facilities for chemical and radioactive waste material. Each unit has a counting room equipped with solid state detectors coupled to multichannel analyzers, gross alpha and beta-gamma gas proportional counters, liquid scintillator and adequate computer access to reduce data and provide detailed printed reports of analyses. Detectors are shielded and compensated for reduction of Compton Scattering. The EOF is equipped with a counting room with solid state detectors, a multichannel analyzer, gross alpha and beta-gamma gas flow proportional counters and computer access to provide analytical analysis which equals that of the plant counting rooms.

Radionuclides in the reactor coolant and containment atmosphere which may be indicators of the degree of core damage (e.g., noble gases, iodines and cesiums, and short and long lived volatile and nonvolatile isotopes) can be determined by diluting an aliquot of the RCS sample or containment atmosphere to a point where analysis can be performed with less than 10% dead time on a multichannel analyzer. The dilution and isotopic analysis can be done in the radiochemistry lab of the unaffected unit if it is accessible or in the EOF radiochemistry lab if the unaffected unit is inaccessible. Whenever an iodine filter cartridge or particulate filter is too active to analyze, a sample of less volume can be collected or the sample can be divided into smaller portions and analyzed accordingly. Lead brick shielding and lead glass windows provide shielding during sample preparation and chemical analysis to keep personnel exposure ALARA. Procedures which relate radionuclide concentrations to core damage are contained in the Farley Nuclear Plant procedures which consider physical parameters such as core temperature and sample location. The Farley Nuclear Plant procedures have been reviewed and accepted by the NRC as documented in Supplement No. 5 to NUREG-0117. Additionally, Alabama Power Company is working with the Westinghouse Owners Group to determine if improved procedures can be developed to assess the extent of core damage.

2(b) Hydrogen levels in the containment atmosphere are normally measured by inline hydrogen analyzers. Remote readout from the hydrogen analyzers is provided in the control room. The procedures to obtain a grab sample, transport and analyze for hydrogen are the same as described in the APCo response to NRC Criteria (1).

2(c) Dissolved gases from the RCS are collected and analyzed as previously discussed in response to criteria one and two. This analysis includes percent of hydrogen in the containment atmosphere, cc/kg hydrogen in the RCS and μCi/cc of short and long lived volatile radionuclides. Liquid samples of non-volatile radionuclides are analyzed as described in response to criteria two.

2(d) The only inline instruments in the FNP post accident sampling system are containment hydrogen analyzers. Each unit has two analyzers that read out in the corresponding control room which are functionally tested and calibrated quarterly on a range of zero to one percent and zero to ten percent full scale.

NRC Criteria (3):

Reactor coolant and containment atmosphere sampling during post accident conditions shall not require an isolated auxiliary system [e.g., the letdown system, reactor water cleanup system (RWCUS)] to be placed in operation in order to use the sampling system.

NRC Clarification (3):

System schematics and discussions should clearly demonstrate that post accident sampling, including recirculation, from each sample source is possible without use of an isolated auxiliary system. It should be verified that valves which are not accessible after an accident are environmentally qualified for the conditions in which they must operate.

APCo Response (3):

No auxiliary system is required to maintain functionality of the FNP post accident sampling system. Sample cooling is provided by the component cooling water (CCW) system. Design changes which allow use of the CCW without resetting the safety injection signal are scheduled to be implemented during the second refueling outage for Unit 2 (scheduled for the fourth quarter of 1983), and the fifth refueling outage for Unit 1 (scheduled for the first quarter of 1984). Controls for all valves necessary to obtain such samples are accessible during post accident conditions.

NRC Criteria (4):

Pressurized reactor coolant samples are not required if the licensee can quantify the amount of dissolved gases with unpressurized reactor coolant samples. The measurement of either total dissolved gases or hydrogen gas in reactor coolant samples is considered adequate. Measuring the oxygen concentration is recommended, but is not mandatory.

NRC Clarification (4):

Discuss the method whereby total dissolved gas or hydrogen and oxygen can be measured and related to reactor coolant system concentrations. Additionally, if chlorides exceed 0.15 ppm, verification that dissolved oxygen is less than 0.1 ppm is necessary. Verification that dissolved oxygen is less than 0.1 ppm by measurement of a dissolved hydrogen residual of greater than or equal to 10 cc/kg is acceptable for up to 30 days after the accident. Within 30 days, consistent with minimizing personnel radiation exposure (ALARA), direct monitoring for dissolved oxygen is recommended.

APCo Response (4):

Both hydrogen and oxygen are degassed and analyzed as described in APCo response to Criteria (1) above. As previously discussed in APCo letter dated January 14, 1981 to the NRC, the onsite liquid analysis program can provide results within a factor of two error. Additional information concerning chloride and oxygen is contained in APCo response to Criteria (10).

NRC Criteria (5):

The time for a chloride analysis to be performed is dependent upon two factors: (a) if the plant's coolant water is seawater or brackish water and (b) if there is only a single barrier between primary containment systems and the cooling water. Under both of the above conditions the licensee shall provide for a chloride analysis within 24 hours of the sample being taken. For all other cases, the licensee shall provide for the analysis to be completed within 4 days. The chloride analysis does not have to be done onsite.

NRC Clarification (5):

BWR's on sea or brackish water sites, and plants which use sea or brackish water in essential heat exchangers (e.g. shutdown cooling) that have only single barrier protection between the reactor coolant are required to analyze chloride within 24 hours. All other plants have 96 hours to perform a chloride analysis. Samples diluted by up to a factor of one thousand are acceptable as initial scoping analysis for chloride, provided (1) the results are reported as _____ ppm Cl (the licensee should establish this value: the number in the blank should be no greater than 10.0 ppm Cl) in the reactor coolant system and (2) that dissolved oxygen can be verified at less than 0.1 ppm, consistent with the guidelines above in clarification (4). Additionally, if chloride analysis is performed on a diluted sample, an undiluted sample need also be taken and retained for analysis within 30 days, consistent with ALARA.

APCo Response (5):

Farley Nuclear Plant's service water comes from the Chattahoochee River which is a fresh water source. The service water is used to cool the

Component Cooling Water (CCW) which is chromated to prevent oxidation of components. The CCW system then cools the primary system components providing a double barrier between contaminated systems and the service water. Chloride analysis for the RCS is accomplished by ion specific electrodes in liquid samples using procedures where dilution is not necessary except in worst case conditions. Undiluted samples of chloride are retained for later analysis if deemed necessary.

Information pertaining to the initial scoping analysis of chloride and oxygen is presented in APCo response to Criteria (10). Alabama Power stated in letter dated February 9, 1981 that chloride analysis can be performed within 96 hours.

NRC Criteria (6):

The design basis for plant equipment for reactor coolant and containment atmosphere sampling and analysis must assume that it is possible to obtain and analyze a sample without radiation exposures to any individual exceeding the criteria of GDC 19 (Appendix A, 10 CFR Part 50) (i.e., 5 rem whole body, 75 rem extremities). Note that the design and operational review criterion was changed from the operational limits of 10 CFR Part 20 (NUREG 0578) to the GDC 19 criterion (October 30, 1979 letter from H. R. Denton to all licensees).

NRC Clarification (6):

Consistent with Regulatory Guide 1.3 or 1.4 source terms, provide information on the predicted personnel exposures based on person-motion for sampling, transport and analysis of all required parameters.

APCo Response (6):

The design basis for reactor coolant sampling and containment atmosphere sampling and analysis have provided for sampling under conditions of TID-14844 source terms without exceeding GDC 19. Time and motion studies have been conducted which conservatively estimate that a reactor coolant sample for hydrogen, oxygen, noble gases, iodines, cesiums, boron, chloride and non-volatile isotopes may be collected without exposing any personnel to more than 350 millirem whole body dose or measurable internal intake. Due to remote handling of the samples, the dose to the extremities of any personnel will be the same as the whole body dose. Containment atmosphere samples can be collected without exposing any personnel to more than 250 millirem whole body and 300 millirem extremity dose. Sample preparation and analysis may be performed without exposing any personnel to more than 200 millirem whole body or 300 millirem extremity dose. Shielding of the samples during transport and mobility of the transport device prevents personnel from receiving any significant radiation doses during transport of the samples from the collection area to the laboratory. These dose rates were based on worst case radiation zone values assuming a worst case accident.

NRC Criteria (7):

The analysis of primary coolant samples for boron is required for PWRs. (Note that Rev. 2 of Regulatory Guide 1.97 specifies the need for primary coolant boron analysis capability at BWR plants).

NRC Clarification (7):

PWR's need to perform boron analysis. The guidelines for BWR's are to have the capability to perform boron analysis but they do not have to do so unless boron was injected.

APCo Response (7):

Boron analysis of primary coolant samples is performed on undiluted liquid samples according to appropriate plant procedures which account for the possibility of NaOH in the sample due to containment spray.

NRC Criteria (8):

If inline monitoring is used for any sampling and analytical capability specified herein, the licensee shall provide backup sampling through grab samples, and shall demonstrate the capability of analyzing the samples. Established planning for analysis at offsite facilities is acceptable. Equipment provided for backup sampling shall be capable of providing at least one sample per day for 7 days following onset of the accident, and at least one sample per week until the accident condition no longer exists.

NRC Clarification (8):

A capability to obtain both diluted and undiluted backup samples is required. Provisions to flush inline monitors to facilitate access for repair is desirable. If an off-site laboratory is to be relied on for the backup analysis, an explanation of the capability to ship and obtain analysis for one sample per week thereafter until accident condition no longer exists should be provided.

APCo Response (8):

No inline sampling and analysis is conducted at Farley Nuclear Plant for any parameter except hydrogen in containment atmosphere. This is described in APCo response to Criteria 2(b).

NRC Criteria (9):

The licensee's radiological and chemical sample analysis capability shall include provisions to:

(a) Identify and quantify the isotopes of the nuclide categories discussed above to levels corresponding to the source terms given in Regulatory Guide 1.3 or 1.4 and 1.7. Where necessary and

practicable, the ability to dilute samples to provide capability for measurement and reduction of personnel exposure should be provided. Sensitivity of onsite liquid sample analysis capability should be such as to permit measurement of nuclide concentration in the range from approximately 1 micro Ci/g to 10 Ci/g.

(b) Restrict background levels of radiation in the radiological and chemical analysis facility from sources such that the sample analysis will provide results with an acceptably small error (approximately a factor of 2). This can be accomplished through the use of sufficient shielding around samples and outside sources, and by the use of a ventilation system design which will control the presence of airborne radioactivity.

NRC Clarification (9):

9(a) Provide a discussion of the predicted activity in the samples to be taken and the methods of handling/dilution that will be employed to reduce the activity sufficiently to perform the required analysis. Discuss the range of radionuclide concentration which can be analyzed for, including an assessment of the amount of overlap between post accident and normal sampling capabilities.

9(b) State the predicted background radiation levels in the counting room, including the contribution from samples which are present. Also provide data demonstrating what the background radiation levels and radiation effect will be on a sample being counted to assure an accuracy within a factor of 2.

APCo Response (9):

9(a) The FNP post accident sampling system is the normal pathway for routine sampling and will accomodate activity levels up to 10 Ci/gm. The shielded sample vial (Figure 3) is not normally used for routine sampling; however, it is available for sampling whenever deemed necessary by Health Physics surveys. Dilution of the samples is accomplished by pipetting one ml of the sample into a beaker of 999 ml of demineralized water and NaOH located behind a lead shield and lead glass window. If necessary, a second dilution may be performed as described above to further reduce the sample activity. The second dilution results in a reduction of 10^6 in activity. As the FNP analytical equipment has a range of 5E-7 to 10 micro Ci/gm, samples with an activity approaching 10 micro Ci/gm must be diluted as described above before an analysis can be performed.

Activity in filter samples can be reduced by sampling less volume of the filter or removing the used filter media (i.e., charcoal granuals) and mixing with clean media for dilution. Alternatively, a sample of less volume can be collected as described in APCo response to Criteria 2(a).

9(b) The background activity levels for any isotope being analyzed is less than 0.1% of the activity in the sample. The levels are determined by

collecting a spectrum with no sample and the detector shield closed. The spectrum is then analyzed using the geometry and volume intended for the sample. Whenever the results of the background analysis indicate isotopes are present in quantities greater than 0.1% of the quantity measured in the sample, the sample will be moved to an alternate laboratory and another analysis performed. Each sample will be removed from the counting room before another sample is brought in for analysis to prevent any background effects in the counting room area. With background isotopes less than 0.1% an accuracy within a factor of 2 is ensured.

NRC Criteria (10):

Accuracy, range and sensitivity shall be adequate to provide pertinent data to the operator in order to describe radiological and chemical status of the reactor coolant systems.

Clarification (10):

The recommended ranges for the required accident sample analyses are given in Regulatory Guide 1.97, Rev. 2. The necessary accuracy within the recommended ranges are as follows:

a) Gross activity, gamma spectrum: measured to estimate core damage, these analyses should be accurate within a factor of two across the entire range.

b) Boron: measured to verify shutdown margin. In general this analysis should be accurate within ± 5% of the measured value (i.e., at 6,000 ppm B the tolerance is ± 300 ppm while at 1,000 ppm B the tolerance is ± 50 ppm). For concentrations below 1,000 ppm the tolerance band should remain at ± 50 ppm.

c) Chloride: measured to determine coolant corrosion potential. For concentrations between 0.5 and 20.0 ppm chloride the analysis should be accurate within ± 10% of the measured value. At concentrations below 0.5 ppm the tolerance band remains at ± 0.05 ppm.

d) Hydrogen or Total Gas: monitored to estimate core degradation and corrosion potential of the coolant. An accuracy of ± 10% is desirable between 50 and 2000 cc/kg but ± 20% can be acceptable. For concentrations below 50 cc/kg the tolerance remains at ± 5.0 cc/kg.

e) Oxygen: monitored to assess coolant corrosion potential. For concentrations between 0.5 and 20.0 ppm oxygen the analysis should be accurate within ± 10% of the measured value. At concentrations below 0.5 ppm the tolerance band remains at ± 0.05 ppm.

f) pH: measured to access coolant corrosion potential. Between a pH of 5 to 9, the reading should be accurate within $\pm$ 0.3 pH units. For all other ranges $\pm$ 0.5 pH units is acceptable.

g) To demonstrate that the selected procedures and instrumentation will achieve the above listed accuracies, it is necessary to provide information demonstrating their applicability in the post accident water chemistry and radiation environment. This can be accomplished by performing tests utilizing the standard test matrix provided below or by providing evidence that the selected procedure or instrument has been used successfully in a similiar environment.

Standard Test Matrix
for
Undiluted Reactor Coolant Samples in a
Post Accident Environment

Constituient	Nominal Concentration (ppm)	Added as (chemical salt)
I^-	40	Potassium Iodide
Cs^+	250	Cesium Nitrate
Ba^{+2}	10	Barium Nitrate
La^{+3}	5	Lanthanum Chloride
Ce^{+4}	5	Ammonium Cerium Nitrate
Cl^-	10	
B	2000	Boric Acid
Li^+	2	Lithium Hydroxide
NO_3	150	
NH_4^+	5	
K^+	20	
Gamma Radiation (Induced Field)	10^4 Rad/gm of Reactor Coolant	Absorbed Dose

Notes:

1) Instrumentation and procedures which are applicable to diluted samples only, should be tested with an equally diluted chemical test matrix. The induced radiation environment should be adjusted commensurate with the weight of actual reactor coolant in the sample being tested.

2) For PWRs, procedures which may be affected by spray additive chemicals must be tested in both the standard test matrix plus appropriate spray additives. Both procedures (with and without spray additives) are required to be available.

3) For BWRs, if procedures are verified with boron in the test matrix, they do not have to be tested without boron.

4) In lieu of conducting tests utilizing the standard test matrix for instruments and procedures, provide evidence that the selected instrument or procedure has been used successfully in a similar environment.

All equipment and procedures which are used for post accident sampling and analyses should be calibrated or tested at a frequency which will ensure, to a high degree of reliability, that it will be available if required. Operators should receive initial and refresher training in post accident sampling, analysis and transport. A minimum frequency for the above efforts is considered to be every six months if indicated by testing. These provisions should be submitted in revised Technical Specifications in accordance with Enclosure 1 of NUREG-0737. The staff will provide model Technical Specifications at a later date.

APCo Response (10):

a) Gross Activity Gamma Spectrum

The error for dilution of a high activity sample is maintained at less than ± 10%. Analytical accuracy which is adjusted by count rate and count time is within ± 25%. Worst case additive error is maintained at less than or equal to ± 45% which is within a factor of two across the entire range.

b) Boron Analysis

Boron analysis at Farley Nuclear Plant is normally maintained with an accuracy of ± 10 ppm at 1000 ppm. Boron dilution is required whenever boron content is greater than 7000 ppm which creates an additional error of ± 10% per 1000 ppm. Boron dilution is not required for radiological concerns. FNP equipment allows analysis of undiluted samples containing up to 10 Ci/gm.

c) Chloride Analysis

Chloride analysis at FNP is performed using the ion specific electrode method with a range of 0.010 ppm to 35,000 ppm. Analysis accuracy is ± 5.8% at 0.020 ppm. No dilution is necessary to perform chloride analyses.

d) Hydrogen or Total Gas Analysis

Hydrogen analysis within the reactor coolant sytem at FNP is maintained at ± 10% accuracy for 100 cc/kg and above. A linear relationship is established using reference gases of 90% and 2% hydrogen by volume, which corresponds to approximately 4365 cc/kg and 100 cc/kg respectively. For hydrogen analysis below 100 cc/kg, the

concentration is established by comparing the unknown value with the extrapolated linear relationship such that an accuracy within ± 20% is maintained for concentrations between 100 cc/kg and 50 cc/kg, and an accuracy within 5 cc/kg for concentrations below 50 cc/kg.

e) Oxygen Analysis

Post accident dissolved oxygen analysis at FNP is performed by injecting an aliquot of the gases removed from the liquid reactor coolant sample into a gas chromatograph. This results in a lower sensitivity of 5 to 7 ppm, an upper bound equivalent to air saturated water (18 - 20 ppm), and an accuracy of 10%.

f) pH Analysis

pH Analysis at FNP is performed with ± 0.05 pH units per pH increment over the buffered span (i.e., if the pH is buffered at 4 and 10, the accumulated error will be 0.3 pH units).

g) Standard Test Matrix

The criteria for testing equipment in a gamma induced field of 10^4 Rad/gm of reactor coolant has not been performed in the past at FNP. Alabama Power Company is confident that existing equipment and procedures would provide satisfactory results during post accident analysis and the analysis of such test matrix would only be for confirmatory purposes. Such confirmation would be incompatible with the Farley ALARA program. In addition, since the Farley analytical equipment and practices reflect current industry standards, Alabama Power Company does not feel that there is sufficient justification for performing such confirmation testing.

NRC Criteria (11):

In the design of the post accident sampling and analysis capability, consideration should be given to the following items:

a) Provisions for purging sample lines, for reducing plateout in sample lines, for minimizing sample loss or distortion, for preventing blockage of sample lines by loose material in the RCS or containment, for appropriate disposal of the samples, and for flow restriction to limit reactor coolant loss from a rupture of the sample line. The post accident reactor coolant and containment atmosphere samples should be representative of the reactor coolant in the core area and the containment atmosphere following a transient or accident. The sample lines should be as short as possible to minimize the volume of fluid to be taken from containment. The residues of sample collection should be returned to containment or to a closed sytem.

b) The ventilation exhaust from the sampling station should be filtered with charcoal absorbers and high-efficiency particulate air (HEPA) filters.

NRC Clarification (11):

11(a) A description of the provisions which address each of the items in Criteria 11.a should be provided. Such items as heat tracing and purge velocities should be addressed. To demonstrate that samples are representative of core conditions, a discussion of mixing, both short and long term, is needed. If a given sample location can be rendered inaccurate due to the accident (i.e., sampling from a hot or cold leg loop which may have a steam or gas pocket) describe the backup sampling capabilities or address the maximum time that this condition can exist.

BWRs should specifically address samples which are taken from the core shroud area and demonstrate how they are representative of core conditions. Passive flow restrictors in the sample lines may be replaced by redundant, environmentally qualified, remotely operated isolation valves to limit potential leakage from sampling lines. The automatic containment isolation valves should close on containment isolation or safety injection signals.

11(b) A dedicated sample station filtration system is not required, provided a positive exhaust exists which is subsequently routed through charcoal absorbers and HEPA filters.

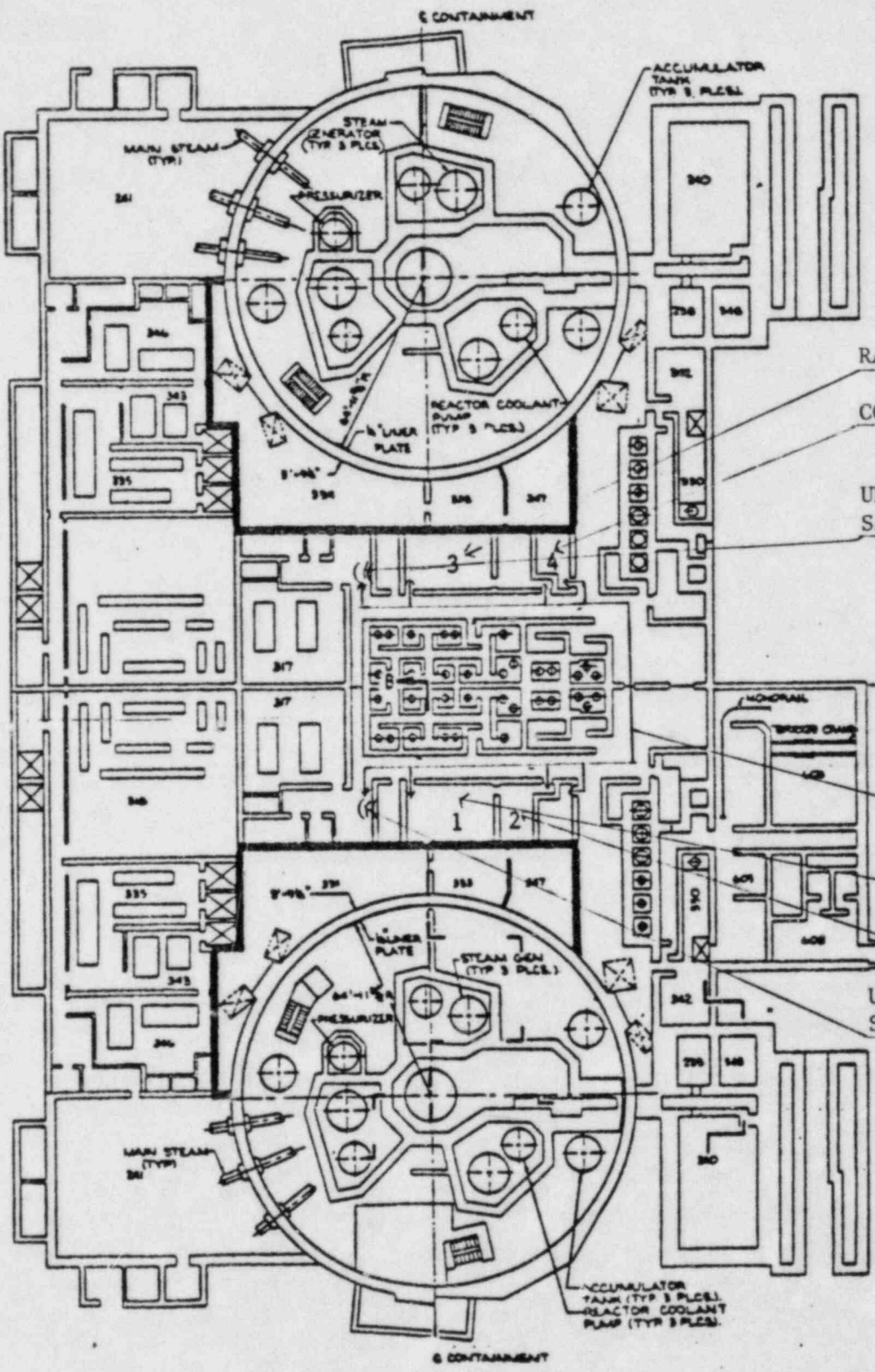
APCo Response (11):

11(a) The FNP post accident sampling system is a continuous use system with a flow rate of 0.6 gallons per hour. Sample lines are 3/8 inch stainless steel tubing which provide a delay of 1.2 minutes of sample flow and 10 half lives of N-16. Plateout in the sample lines is minimized by a linear flow velocity of approximately 132 feet per minute. Large radius bends and short piping has been utilized in the design of the system to minimize the volume of flow from containment. Redundant sample lines from the RHR pumps is provided to ensure a representative sample can be obtained if blockage of one of the sample lines occur. A flow monitor on the gross failed fuel detector and periodic switching of the sample lines assure unrestricted flow through the lines. Loss of coolant from a rupture of the lines is restricted to 0.6 gallons per minute which, along with any spillage or sample residue, is collected in the waste hold up tank. Sample volume is limited to 50 cc to prevent any excessive sample spillage. Sample residue is drummed for storage or processed in the waste processing demineralizer. All lines and valves in the penetration room and containment have been qualified and tested to meet NRC requirements. Two hydrogen dilution fans and four air cooler fans are utilized to obtain a representative sample of containment atmosphere.

During an accident which has been deemed not serious by Health Physics surveys, samples are taken from the vent stack and no heat tracing is required due to the proximity of the sample location. During accident conditions which have been deemed serious by Health Physics surveys, samples are remotely taken (RE 29B) and heat tracing is utilized.

11(b) The ventiliation exhaust from the sampling station is routed to the gaseous radwaste handling system which is equipped with HEPA filters and charcoal absorbers.

FIGURE 1



PLAN AT EL. 137'-0" & 139'-0"

Alabama Power

JOSEPH M. FARLEY
NUCLEAR PLANT
UNIT 1 AND UNIT 2

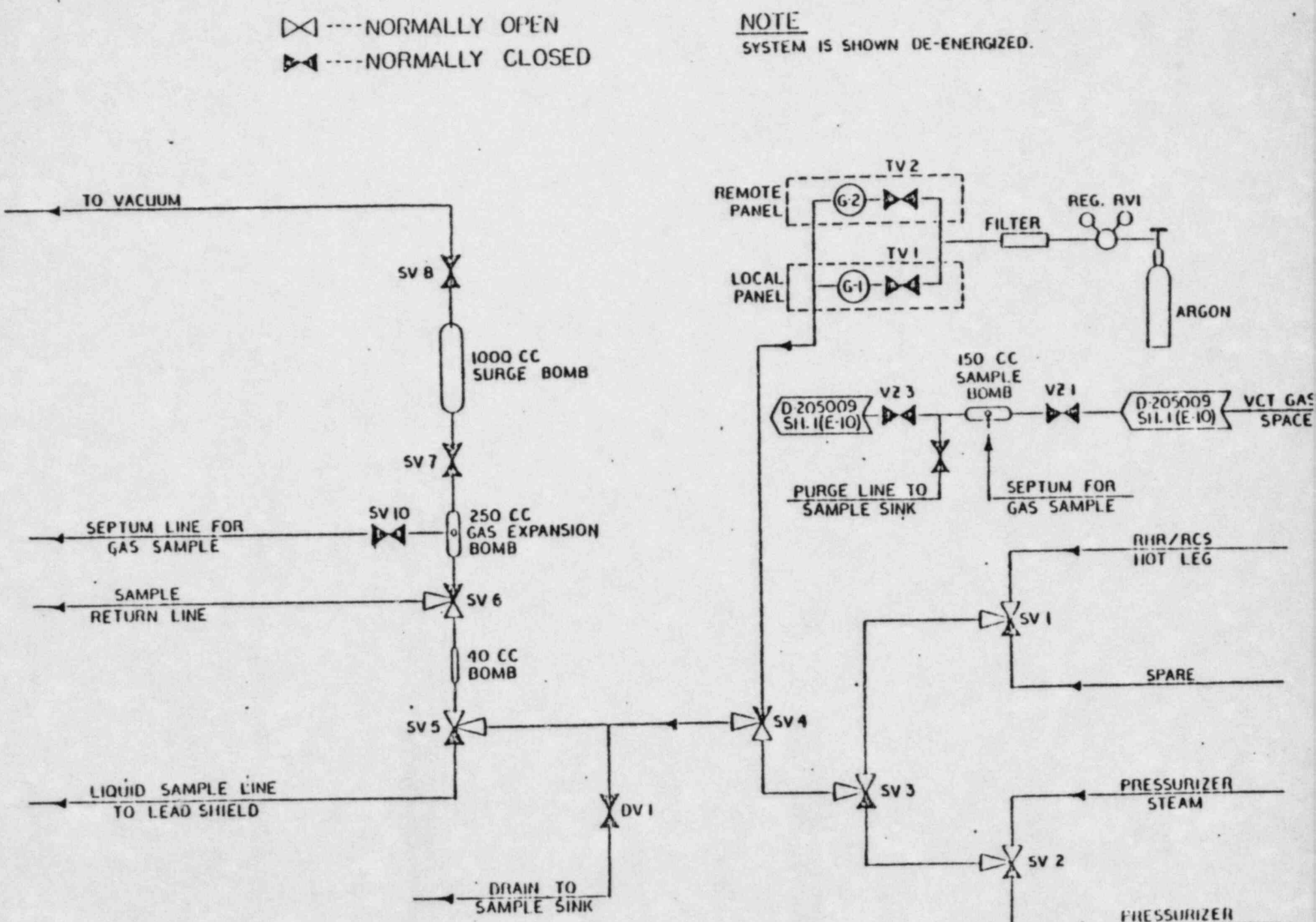
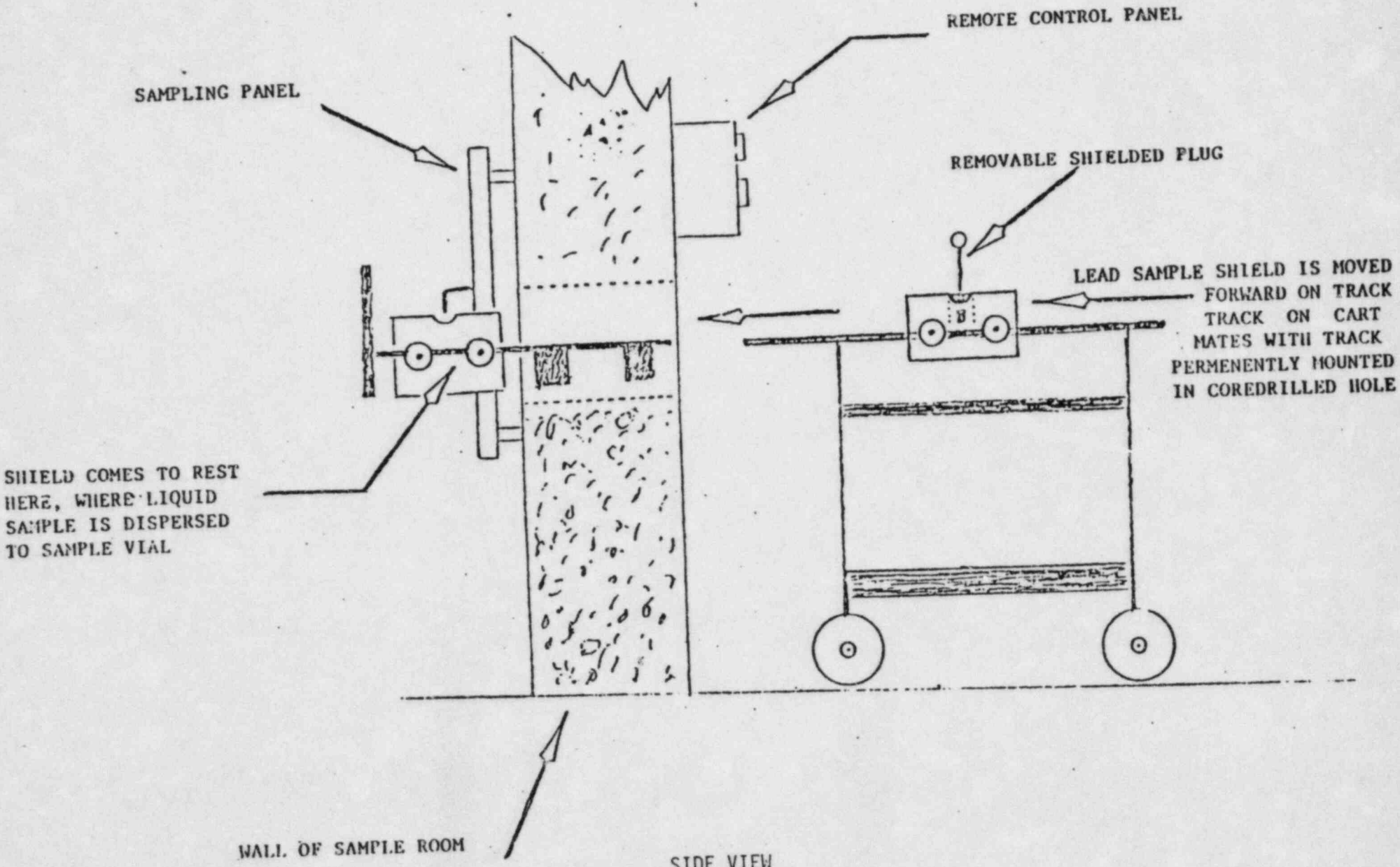


FIGURE 2

SIMPLIFIED DIAGRAM OF FNP SAMPLE SYSTEM

POSTE ACCIDENT SAMPLING SYSTEM

SIMPLIFIED OVERVIEW



SIDE VIEW

FIGURE 3

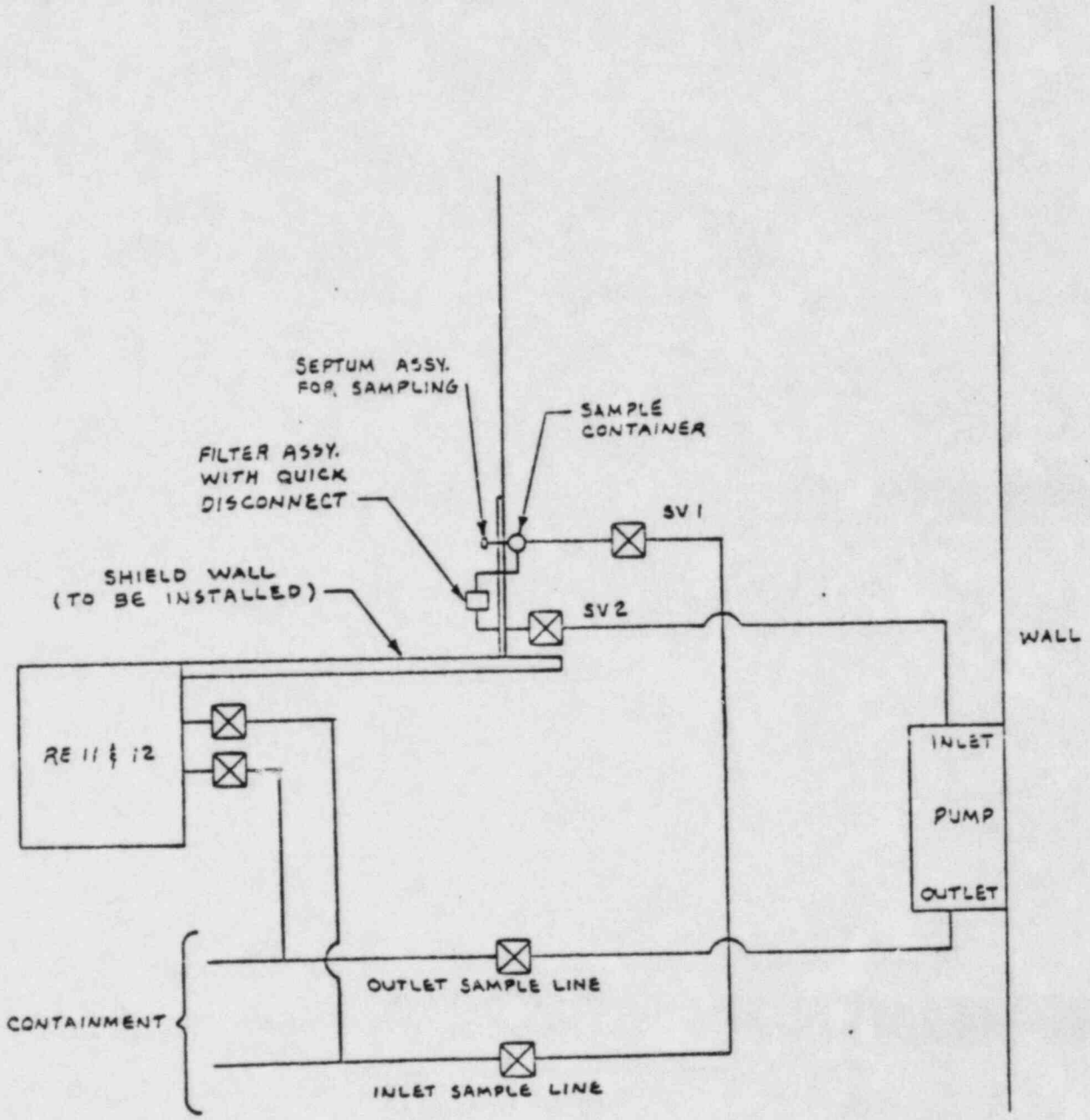
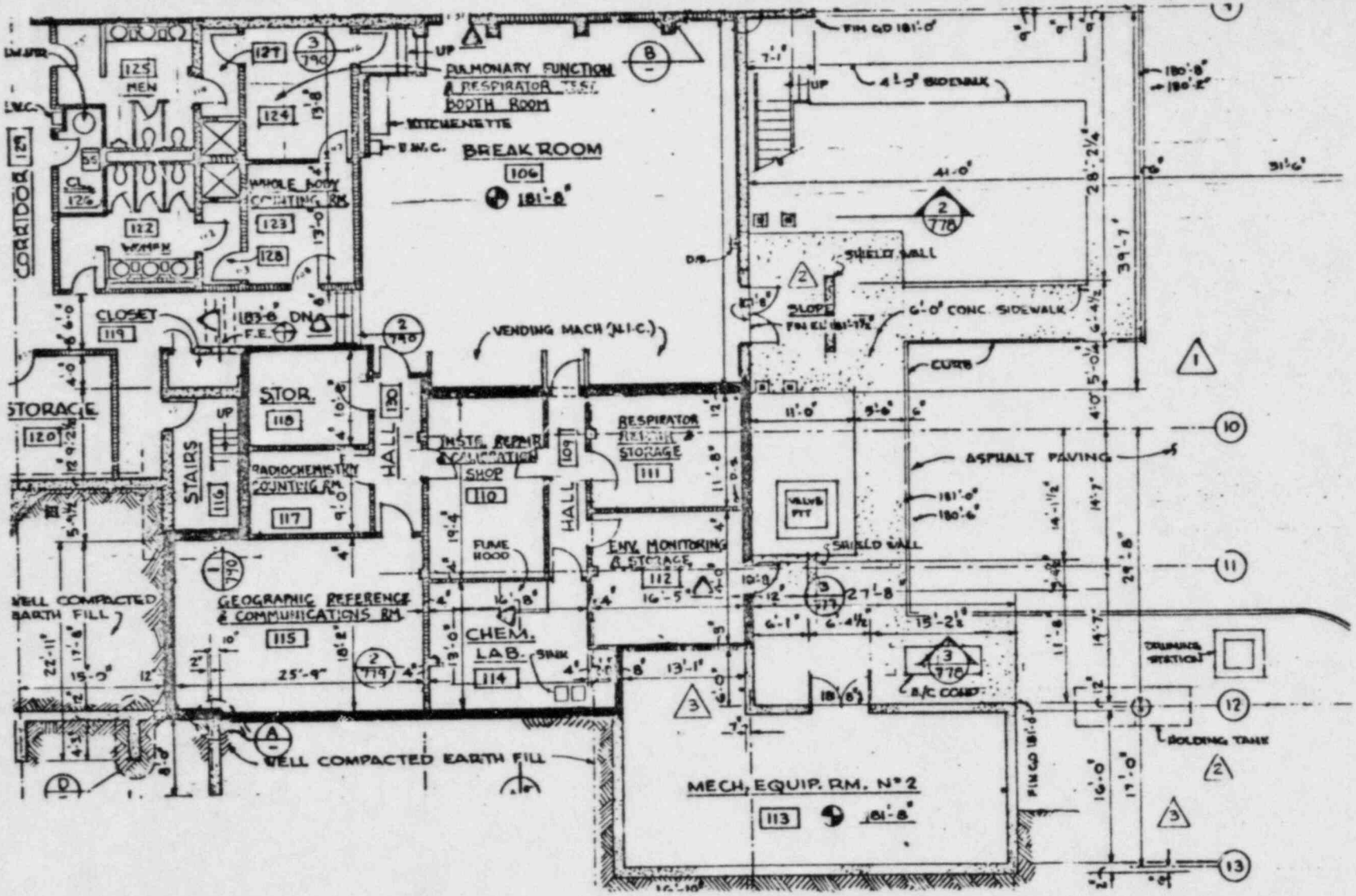


FIGURE 4

CONTAINMENT AIR SAMPLING SYSTEM



A PORTION OF THE FNP TRAINING CENTER WHICH INCLUDES THE EMERGENCY OPERATIONS FACILITY
The counting room and radiochemistry laboaratory a shown within the dark lines.

Figure 5