TOLEDO EDISON

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Docket No. 50-346

License No. NPF-3

Serial No. 931

April 25, 1983

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz
Operating Reactor Branch No. 4
Division of Operating Reactors
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Stolz:

Your letter dated July 21, 1982 (Log No. 1036) requested information for a post-implementation review of NUREG-0737 Item II.B.3 Post-Accident Sampling System. We are providing the requested information as an attachment per our letter of September 29, 1982 (Serial No. 863) for the Davis-Besse Nuclear Power Station Unit No. 1.

As discussed in your Order Confirming our commitments dated March 14, 1983 (Log No. 1245), the schedule for completing the Post-Accident Sampling System is December 31, 1983. Therefore, some of the information needed to provide responses to your requested information will not be available until after December 31, 1983. These items are indicated in our responses.

Very truly yours,

RPC:LDY:lah
attachment

cc: DB-1 NRC Resident Inspector

A046

Criterion: (1) The licensee shall have the capability to promptly obtain reactor coolant samples and containment atmosphere samples. The combined time allotted for sampling and analysis should be 3 hours or less from the time a decision is made to take a sample.

Clarification: Provide information on sampling(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 IE) bus, that can be energized in sufficient time to meet the three-hour sampling and analysis time limit).

Response: The Post Accident Sampling System (PASS) is to provide the capability to obtain highly radioactive reactor coolant grab samples after an accident. System drawings are attached. The grab samples can be taken from the following:

1. Pressurizer liquid and vapor spaces
2. Reactor Coolant Cold leg loop 2
3. Containment Emergency Sump via the Decay Heat System
4. Letdown System

The Post Accident Sampling System consists of 2 panels, the control panel C1708 to be installed in room 106 at Elevation 545 and the sample SKID S1708 which will be mounted in room 106A.

The following instruments will be mounted on the control panel:

5 sigma indicators	
inlet pressure	
cooler temp inlet	
cooler temp outlet	Dual Indicator
sample flow	
sample pressure	
dissolved H_2 concentration	

The following indicators will be mounted on the control panel:

Pressurizer Vapor Sample
Pressurizer Liquid Sample
RCS Cold Leg Loop 2
Containment Sample Isolation Valve A
Containment Sample Isolation Valve B
Sample Flow

The following control switches will be mounted on the control panel:

Letdown System Sample Isolation Valve
Decay Heat Loop 1 Sample Isolation Valve
Decay Heat Loop 2 Sample Isolation Valve
Isolation Valve for Normal Sample from RCS
Isolation Valve for Decay Heat Sample from Normal Sample System
PASS Isolation Valve
Demin Water to PASS Isolation Valve
Demin Water to Sample Cooler
Pressurizer Undiluted Sample Isolation Valve
High Pressure Grab Sample Hydrogen Sample Isolation and Bypass Valves
Pressure Control Valve for High Pressure Sample
Bypass Isolation Valve for Quench Tank
Depressurized Undiluted Sample Isolation Valve
Undiluted Sample Grab Sample Isolation and Bypass Valves
Undiluted Sample Isolation Valve to RCDT or Quench Tank
Diluted Sample Isolation and Bypass Valves
Diluted Sample Isolation Valve to RCDT or Quench Tank
Sample Panel Discharge Valve to RCDT or Quench Tank
Demin Water Pump
Sample Pump
Pressure Control Valve Control

Several types of samples are capable of being obtained from the PASS. These are:

1. Pressurized undiluted samples

2. Depressurized undiluted samples

3. Diluted samples

The capability to obtain diluted samples is provided by the installation of 2 metering pumps. These are controlled by Potentiometers and control switches on the PASS Panel. Control Valves are provided for sample isolation.

The following equipment will be mounted on the sample SKID:

- Cooler outlet temp sensor
- Sample inlet pressure
- Sample System Flow
- Pressure control valve
- Bypass Isolation valve
- High Pressure sample isolation valve
- Grab sample isolation valve
- Hydrogen Concentration Analyzer
- Pressure control valve for high pressure sample pressure control
- High Pressure Sample to Quench Tank or RCDT isolation valve
- Depressurized sample inlet isolation valve
- Depressurized sample to Quench Tank or RCDT isolation valve
- Sample metering pump
- Sample metering pump isolation valve
- Demin water pump
- Demin water purge isolation valve
- Diluted sample flow
- Dilute sample to Quench Tank or RCDT isolation valve
- Sample panel isolation valve
- Depressurized Sample pressure

Auxiliary equipment to be mounted on sample SKID will be:

- High pressure sample discharge pressure to RCDT or Quench Tank
- Depressurized sample pressure
- Sample pump and Demin pump discharge check valves
- Sample cooler bank

The calculated sample time (15 minutes or less) is the time required under normal operating conditions to obtain a sample. The undiluted and diluted samples will be reduced in pressure to a maximum value of 50 psig. The high pressure sample will be obtained between a pressure range of 1,800 to 2,000 psig.

The power supply for the PASS is the non-essential bus. In the event of a loss of off-site power there is no backup power source. However, power can be restored which will allow the sample to be taken and analyzed within the three hour time frame.

The Post Accident Containment Atmosphere Sample System is to obtain a containment atmosphere grab sample after an accident. The sample can be obtained from the installed post accident containment radiation monitoring system or a location in the spent fuel area. Samples taken from either location will include particulate, noble gases and iodine. If the sample location at the post accident radiation containment air monitor is inaccessible then the spent fuel area grab sample of containment air will be utilized.

Criterion: (2) The licensee shall establish an on-site radiological and chemical analysis capability to provide, within three-hour frame established above, quantification of the following:

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

Clarification: 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 nonvolatile radionuclides such as ^{133}Xe, ^{131}I, ^{137}Cs, ^{134}Cs, ^{85}Kr, ^{140}Ba and ^{88}Kr (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.)

Response: 2. (a) A description of the on-site counting equipment is contained in Procedure AD 1850.04 Section 5.4, (see Attachment II) Post Accident Radiological Sampling and Counting, which includes volatile and nonvolatile radionuclides. In order to reduce the background, the samples will be diluted or counted in a shielded container.

A procedure to evaluate core damage has not been developed but will be prepared by December, 1983.

2. (b) There are two hydrogen analyzers that can be used to determine the hydrogen concentration in the containment. These analyzers provide a local and remote readout in the control room for expeditous input to the operators in accordance with NUREG 0737 Item II.F.1.6. A grab sample may be obtained for off-site analysis although the three-hour time frame could not be met if this were done. (See attached drawings)

2. (c) There are provisions to perform the analyses listed in Regulatory Guide 1.97 Rev. 2. Gross activities will not be performed since a gamma isotopic analysis is performed. Boron analysis can be made using an automatic titrator located behind lead shielding. Chloride and pH analysis will be performed at an off-site laboratory. Containment air samples can be analyzed for hydrogen using the installed hydrogen analyzer and gamma emitting radionuclides via a grab sample. Dissolved hydrogen in the reactor coolant system will be monitored.

2. (d) On-line monitors are not used for post accident sampling.

Criterion: (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.

Clarification: 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.

Response: The reactor coolant sampling system does not require an isolated auxiliary system to be placed in operation to obtain a sample. The containment sample isolation valves, which are controlled from the control room, are environmentally qualified.

The containment atmosphere sampling does not require an isolated auxiliary system to be placed in operation.

Criterion: (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 H_2 gas in reactor coolant samples is considered adequate. Measuring the O_2 concentration is recommended, but is not mandatory.

Clarification: 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 <0.1 ppm by measurement of a dissolved hydrogen residual of $\geq$ 10 cc/kg is acceptable for up to 30 days after the accident. Within 30 days, consistent with minimizing personnel radiation exposures (ALARA), direct monitoring for dissolved oxygen is recommended.

Response: A dissolved hydrogen monitor is provided for measurement of reactor coolant concentrations. The system utilizes electrochemical sensors to measure the hydrogen partial pressure in the liquid coolant sample. These measurements are converted by the electronics to concentration of dissolved hydrogen in $cc H_2$(STP) per kilogram of water.

It is felt that analyzing for oxygen directly is not required. However, depending on radiological conditions at the time, a portable "ppb" oxygen monitor will be made available for daily measurement of dissolved oxygen concentrations.

Criterion: (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 on-site.

Clarification: BWR's on sea or brackish water sites and plants which use sea or brackfish 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 <0.1 ppm, consistent with the guidelines above in clarification No. 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.

Response: Davis-Besse does not use brackish or sea water for an essential heat exchanger and there is a double barrier between the primary coolant and the cooling water.

Samples can be diluted by up to a factor of 1,000 to yield a lower level of detection of 10 ppm chloride. Arrangements have been made for off-site analysis with results within four days. Either diluted or undiluted samples may be analyzed. If a diluted sample is sent, an undiluted sample will be taken and retained for analysis within 30 days, consistent with ALARA.

Criterion: (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).

Clarification: 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.

Response: The radiation levels have been evaluated with the source terms listed in Regulatory Guide 1.4. The initial accident radiation zone maps are being revised to be completed by December, 1983.

Criterion: (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).

Clarification: 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.

Response: Boron analysis can be made using an automatic titrator located behind lead shielding.

Criterion: (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 off-site 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.

Clarification: 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.

Response: No inline monitoring is used. Monitoring capability and equipment for all required analysis is described in our response to Criterion 2(c).

Criterion: (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 the 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 measure and reduction of personnel exposure should be provided. Sensitivity of on-site liquid sample analysis capability should be such as to permit measurement of nuclide concentration in the range from approximately 1μ 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.

Clarification: (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.

Response: (9) (a) A reactor coolant system water up to 10 Ci/g can be collected with the post accident system which will be completed by December, 1983. The system can dilute samples by a factor of 1,000. Dilution is accomplished by use of a metering pump and demineralized water. The samples are transferred in containers that are shielded with 3 inches of lead. Normal samples can be collected up to a radiation level of approximately 1-R/hr. There is no lower limit for collecting samples with the emergency samples, the upper limit is 10 Ci/g.

(9) (b) The background radiation levels in the counting room are not expected to increase significantly to prevent use of the equipment. Should the levels increase to a level where the counting room would become unavailable for use, the counting equipment would be moved to another predetermined location in accordance with procedure AD 1850.04.

The error contribution from radioactive samples in the room will not interfere more than a factor of 2 because excess samples will be removed from the counting room. Samples will be diluted or counted inside a shielded container.

Criterion: (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: 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:

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

- Boron: measure 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.

- 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.

- Hydrogen or Total Gas: monitored to estimate core degradation and corrosion potential of the coolant.

An accuracy of ± 10% is desirable between 50 and 2,000 cc/kg but ± 20% can be acceptable. For concentration below 50 cc/kg the tolerance remains at ± 5.0 cc/kg.

- 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.

- pH: measured to assess coolant corrosion potential.

Between a pH of 5 to 9, the reading should be accurate withing ± 0.3 pH units. For all other ranges ± 0.5 pH units is acceptable.

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 similar 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 Iodine
Cs^+	250	Cesium Nitrate
Ba^{+2}	10	Barium Nitrate
La^{+3}	5	Lanthanum Chloride
Ce^{+4}	5	Ammonium Cerium Nitrate
Cl^-	10	
B	2,000	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	Adsorbed 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.

Response:

Gamma emitting radionuclides can be measured within a factor of 2 across the entire range.

Boron analysis will be performed using an automatic tritator with an accuracy of ± 5%.

Chloride analysis will be performed off-site with an accuracy of ± 10% for concentrations greater than 500 ppb and ± 50 ppb for concentrations less than 500 ppb.

The on-site hydrogen monitor has an accuracy of 4% between 20 and 2,000 cc/kg.

It is felt that analyzing for oxygen directly is not required. However, depending on radiological conditions at the time a portable "ppb" oxygen monitor will be made available for daily measurement of dissolved oxygen concentration.

The pH of liquid samples will be measured to an accuracy of ± 0.3 units.

The response to the test matrix will be provided after clarification is received from the Davis-Besse NRC Project Manager.

Criterion: (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 restrictions 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 system.

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

Clarification: (11) (a) A description of the provisions which address each of the items in clarification 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.

Response: (11) (a) The PASS system has installed provisions to purge the sample lines before samples are taken. The samples are taken from the installed sample locations on the pressurizer, cold leg loop 2, discharge of decay heat pump loop 1 and 2 and the letdown system, which are representive of core conditions. By purging the lines to the reactor coolant drain tank or the quench tank a representative sample can be obtained. The flow through the PASS tubing is greater than 15 ft./sec. to prevent blockage of sample lines by loose material in high pressure lines. The PASS has installed flow restrictors which will limit loss of coolant in the event of a rupture of a sample line. The operator during sampling will be able to tell from the PASS panel if a rupture has occurred and can notify the control room to isolate the sample system. These valves are automatically isolated on SFAS actuation and are environmentally qualified. The sample locations will allow for backup from various points in the event a sample location is rendered inoperable by a steam or gas pocket. When the system pressure is reduced and the plant is on the decay heat system, a sample can also be taken.

(11) (b) The room ventillation where the PASS is located is designed to exhaust through charcoal absorbers and HEPA filters. A fan must be replaced in this system before it is considered operable.

The containment atmosphere sample locations exhaust through a charcoal absorber and a HEPA filter.

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Docket No. 50-346
License No. NPF-3
Serial No. 931
April 25, 1983
Attachment II

AD 1850.04

5.4 Onsite Counting Facility

4 In order to meet the 3-hour post-accident radiological sampling and analysis requirement for RCS and containment atmosphere samples, an operational, adequately equipped, onsite counting facility must be available.

The location chosen for the Onsite Counting Facility must be set up where the radiation level is low, such as the entrance lobby on the east side of the Office Building (585 ft. elevation)or in the Water Plant Lab.

5.4.1 Equipment

A Canberra Model 8100 or 8180 multichannel pulse height analyzer (MCA), presently onsite, has been assigned for use in the Onsite Counting Facility in the event of an accident. Should utilization of the Facility be required, a Ge(Li) detector assembly will be removed from the Counting Room (603 ft. elevation) and relocated in a low radiation area where it will be connected with the Canberra MCA and other necessary equipment to provide the required gamma spectral analysis capability.

Efficiency charts and/or data tables are available in the counting room manual to provide necessary counting information for each of the following samples:

1. Reactor coolant

2. Containment atmosphere (noble gases)

3. Stack exhaust (noble gases)

4. Stack particulates filter

5. Stack iodine cartridge.

5.4.2 Procedure

Upon declaration of an emergency requiring activation of the Onsite Counting Facility, the following procedure will be followed:

4 1. If the Counting Room cannot be used transport Canberra Model 8100 or 8180 to a suitable location, i.e., the Station Lobby, Water Plant Lab, or Radiological Testing Lab at the DBAB.

2. In Counting Room, gradually reduce high voltage to the Ge(Li) detector until high voltage is off. Turn off power to the NIM bin in which the high voltage supply and amplifier are located.

3. Disconnect cables at the Ge(Li) detector, amplifier, and MCA.

4. Remove Ge(Li) detector from shield and immediately place in a dewar of LN_2. Relocate in a low radiation area with NIM bin containing high voltage and amplifier. Bring a sample shelf assembly along.

5. Reconnect high voltage, pre-amp power, and signal cables between the NIM bin components and the Ge(Li) detector per Attachment 3.

6. Turn on NIM bin power and gradually bring high voltage up to normal operating voltage (3000 volts). Allow about 15 minutes for the system to stabilize.

7. To achieve 0.5 kev/channel energy calibration, adjust the amplifier fine gain until the number of channels between two reference peaks is two times the difference between the peaks in kev. Then adjust the baseline until a reference peak is in the channel equal to two times the energy in kev. It is not necessary to have exactly 0.5 kev/channel.

8. Determine background spectrum before counting samples. Good operating practice would recommend the stationing of an operating thin-window G-M

survey meter with audible output at the Onsite Counting Facility. This would alert personnel to high atmospheric noble gas activity which could disrupt counting.

9. After counting appropriate samples, the data reduction necessary to determine the activity for each principal gamma emitter will be performed per RC 4502.00, Gamma Spectral Analysis.

10. Specific information for counting the RCS sampling system (i.e., the 40-cc bomb inside 3-inches of lead shielding).

4

(1) Remove the collimator pin from the shielding.

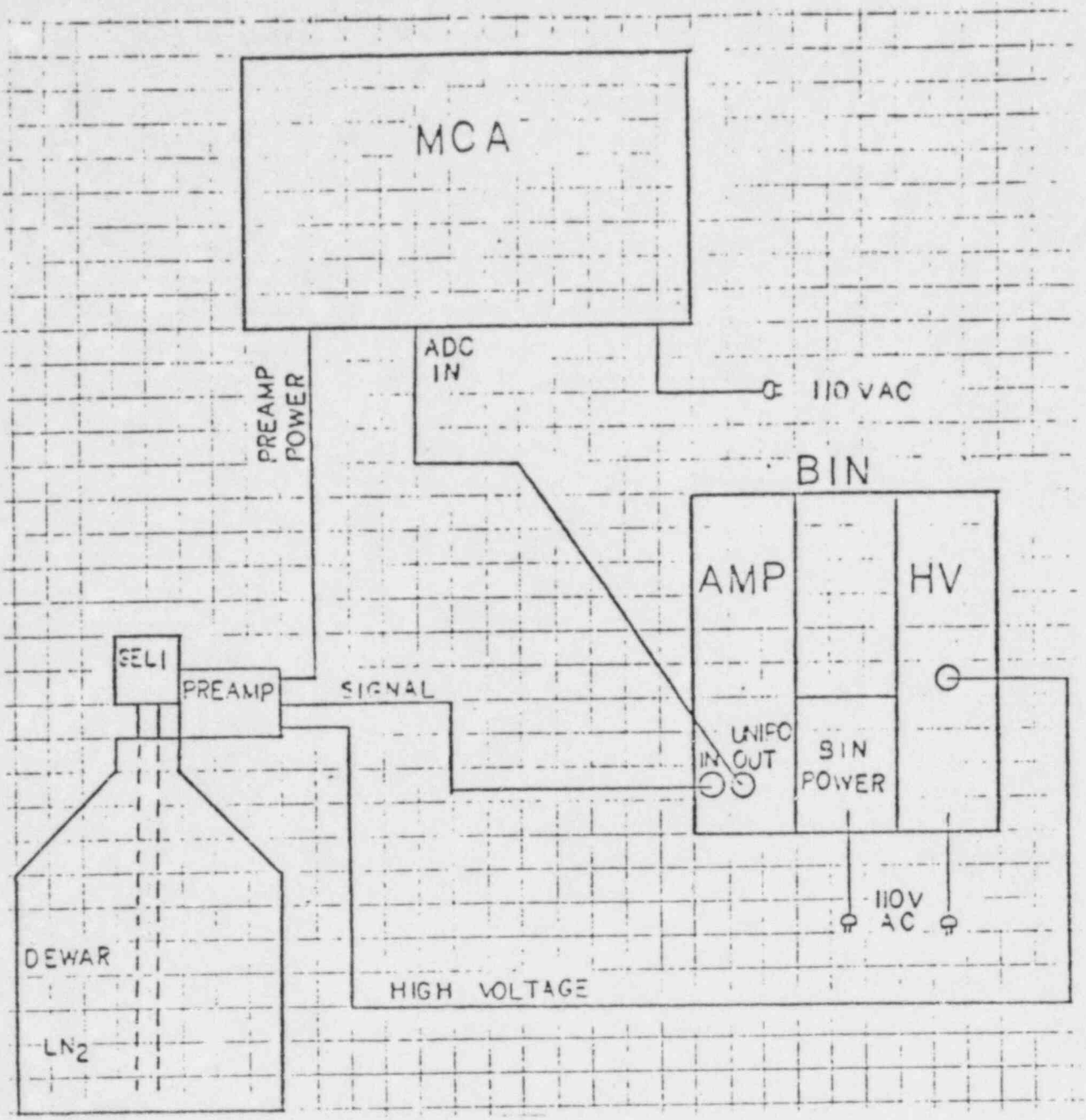
(2) Use Attachment 4 for radionuclide data.

(3) Use Attachment 5 for efficiencies. These efficiencies in Attachment 5 are for counting at 1 1/4 inches between the container (at the collimator) and the detector edge with the collimator centered on the center of the detector. To get efficiencies for one foot divide the 1 1/4 inch efficiencies by 116. To get three foot efficiencies, divide the 1 1/4 inch efficiencies by 1208.

(4) Use Attachment 6 for instructions to perform calculations manually if the computer is not available.

(5) If the RCS sampling system is needed to collect another sample, the sample which has been counted will be flushed out of the bomb when the next sample is to be recirculated.

Portable GeLi Gamma Spectroscopy System



NUCLIDE	GAMMA ABUND	HALF-LIFE(MIN)	KEV
CR-51	9.800000E-02	39893.7	320.070
MN-54	0.99970	450144.	834.827
CO-60	0.99860	2.768861E+06	1173.21
ZN-65	0.50750	351504.	1115.52
KR-87	0.49400	76.0000	402.590
ZR-95	0.54600	94320.0	756.720
ZR-97	0.93300	1026.00	743.400
NB-95	0.99000	50544.0	765.790
I-131	0.82000	11577.6	364.500
I-132	0.98000	136.800	667.700
I-133	0.87000	1248.00	529.889
I-134	0.15300	52.6000	1072.55
XE-133	0.37100	7617.60	80.9970
XE133M	0.10200	3155.04	233.180
XE-135	0.90600	550.200	249.741
XE135M	0.81200	15.3000	526.620
CS-137	0.85000	1.578379E+07	661.638
CS-138	0.75000	32.2000	1435.86
BA-140	0.23800	18417.6	537.389
KRB5M	0.75500	268.800	151.180
Y91M	0.94900	49.7000	555.570
HG-203	0.81500	67334.4	279.210
SN-113	0.64000	165600.	391.700
SR-85	1.00000	93888.0	513.960
BA-133	0.67000	5.729040E+06	355.700
NA-22	0.99950	1.377072E+06	1274.52
TA-182	0.35800	165600.	1121.30
NA-24	0.99993	900.000	1368.60
I-135	0.29300	396.600	1260.41
W-187	0.32000	1434.00	685.700
BE-7	0.10300	76723.2	477.590
AR-41	0.99160	109.620	1293.64
SC-46	0.99984	120744.	889.259
KR-85	4.300000E-03	5.639688E+06	513.990
RB-88	0.22100	17.8000	1836.00
EU-152	0.26710	7.148160E+06	344.300
SB-124	0.98000	86688.0	602.700
CU-64	5.000000E-03	762.600	1345.80
BR-84	0.41600	31.8000	881.600
Y-91	2.200000E-03	84254.4	1208.00
Y-92	0.13720	211.800	934.500
TE-132	0.88000	4680.00	228.200
XE131M	2.000000E-02	17265.6	163.930
KR-90	0.58000	0.53866	121.500
XE-137	0.32000	3.84000	455.380
XE-138	0.29000	14.1700	258.310
XE-139	0.45000	0.67333	218.590
CS-139	6.700000E-02	9.30000	1283.23
BA-139	0.19000	83.3000	165.800
PU-238	3.800000E-04	4.614768E+07	43.4500
NP-239	0.27800	3384.00	106.140
MN-56	0.99000	155.220	846.600
SR-91	0.33400	585.000	1024.30
RB-89	0.64100	15.6000	1031.88
CS-134	0.88000	1.083787E+06	795.800
CS-136	1.00000	18720.0	818.500
CO-57	0.85200	388800.	122.060
CE-141	0.48000	46728.0	145.400
KR-89	0.22500	3.16000	220.900
PA-233	0.34000	38880.0	311.890
CE-143	0.41300	1980.00	293.260
F-18	1.94000	109.700	511.000
CE-144	0.10800	409248.	133.530
AU-198	0.94700	3882.24	411.800
AG110M	0.73300	360576.	884.650
NI-65	0.25700	153.600	1481.90
FE-59	0.56500	64224.0	1099.22
TC99M	0.90000	361.800	140.300
LA-140	0.95330	2415.60	1596.18
CO-58	0.99440	102571.	810.757
KR-88	0.28000	171.600	196.300
MO-99	0.14000	4001.40	739.580
CL-38	0.40000	37.1800	1642.40
NB-97	0.99000	73.6000	658.100
SR-92	0.90000	162.600	1383.94
RB-88	0.22100	171.600	1836.00

KEV ********** EFFICIENCIES FOR GEOMETRY 30 DETECTOR 1 **********

40 ML,STEEL + LEAD,COLLIMATED,1.25 INCHES

KEV										
10	1.141E-08	1.837E-08	2.794E-08	4.053E-08	5.657E-08	7.640E-08	1.003E-07	1.286E-07	1.615E-07	1.991E-07
20	2.416E-07	2.890E-07	3.412E-07	3.984E-07	4.603E-07	5.270E-07	5.983E-07	6.741E-07	7.542E-07	8.383E-07
30	9.264E-07	1.018E-06	1.113E-06	1.212E-06	1.313E-06	1.418E-06	1.524E-06	1.633E-06	1.745E-06	1.858E-06
40	1.973E-06	2.089E-06	2.206E-06	2.325E-06	2.444E-06	2.564E-06	2.684E-06	2.805E-06	2.925E-06	3.046E-06
50	3.166E-06	3.286E-06	3.406E-06	3.525E-06	3.643E-06	3.761E-06	3.877E-06	3.992E-06	4.107E-06	4.220E-06
60	4.331E-06	4.442E-06	4.551E-06	4.658E-06	4.764E-06	4.868E-06	4.970E-06	5.071E-06	5.170E-06	5.267E-06
70	5.362E-06	5.456E-06	5.547E-06	5.637E-06	5.725E-06	5.810E-06	5.894E-06	5.976E-06	6.056E-06	6.134E-06
80	6.210E-06	6.284E-06	6.357E-06	6.427E-06	6.495E-06	6.561E-06	6.626E-06	6.688E-06	6.749E-06	6.808E-06
90	6.865E-06	6.920E-06	6.973E-06	7.024E-06	7.074E-06	7.122E-06	7.168E-06	7.212E-06	7.255E-06	7.296E-06
100	7.335E-06	7.373E-06	7.409E-06	7.443E-06	7.476E-06	7.507E-06	7.537E-06	7.566E-06	7.592E-06	7.618E-06
110	7.642E-06	7.665E-06	7.686E-06	7.706E-06	7.724E-06	7.742E-06	7.758E-06	7.772E-06	7.786E-06	7.798E-06
120	7.810E-06	7.820E-06	7.828E-06	7.836E-06	7.843E-06	7.849E-06	7.853E-06	7.857E-06	7.860E-06	7.861E-06
130	7.862E-06	7.862E-06	7.861E-06	7.859E-06	7.856E-06	7.852E-06	7.848E-06	7.842E-06	7.836E-06	7.829E-06
140	7.822E-06	7.813E-06	7.804E-06	7.795E-06	7.784E-06	7.773E-06	7.761E-06	7.749E-06	7.736E-06	7.723E-06
150	7.709E-06	7.694E-06	7.679E-06	7.663E-06	7.647E-06	7.630E-06	7.613E-06	7.595E-06	7.577E-06	7.559E-06
160	7.540E-06	7.520E-06	7.500E-06	7.480E-06	7.460E-06	7.439E-06	7.417E-06	7.396E-06	7.374E-06	7.351E-06
170	7.329E-06	7.306E-06	7.283E-06	7.259E-06	7.236E-06	7.212E-06	7.187E-06	7.163E-06	7.138E-06	7.113E-06
180	7.088E-06	7.063E-06	7.037E-06	7.011E-06	6.985E-06	6.959E-06	6.933E-06	6.907E-06	6.880E-06	6.853E-06
190	6.827E-06	6.800E-06	6.773E-06	6.745E-06	6.718E-06	6.691E-06	6.663E-06	6.636E-06	6.608E-06	6.580E-06
200	6.552E-06	6.525E-06	6.497E-06	6.469E-06	6.441E-06	6.412E-06	6.384E-06	6.356E-06	6.328E-06	6.300E-06
210	6.271E-06	6.243E-06	6.215E-06	6.187E-06	6.158E-06	6.130E-06	6.102E-06	6.073E-06	6.045E-06	6.017E-06
220	5.988E-06	5.960E-06	5.932E-06	5.904E-06	5.875E-06	5.847E-06	5.819E-06	5.791E-06	5.763E-06	5.735E-06
230	5.707E-06	5.679E-06	5.651E-06	5.623E-06	5.595E-06	5.568E-06	5.540E-06	5.[illegible]12E-06	5.485E-06	5.457E-06
240	5.430E-06	5.402E-06	5.375E-06	5.348E-06	5.321E-06	5.293E-06	5.266E-06	5.2[illegible]06	5.213E-06	5.186E-06
250	5.159E-06	5.087E-06	5.063E-06	5.039E-06	5.016E-06	4.993E-06	4.970E-06	4.947E-[illegible]	4.925E-06	4.903E-06
260	4.880E-06	4.859E-06	4.837E-06	4.815E-06	4.794E-06	4.773E-06	4.752E-06	4.731E-06	4.711E-06	4.690E-06
270	4.670E-06	4.650E-06	4.630E-06	4.610E-06	4.591E-06	4.571E-06	4.552E-06	4.533E-06	4.514E-06	4.495E-06
280	4.477E-06	4.458E-06	4.440E-06	4.422E-06	4.404E-06	4.386E-06	4.368E-06	4.350E-06	4.333E-06	4.316E-06
290	4.299E-06	4.282E-06	4.265E-06	4.248E-06	4.231E-06	4.215E-06	4.198E-06	4.182E-06	4.166E-06	4.150E-06
300	4.134E-06	4.118E-06	4.103E-06	4.087E-06	4.072E-06	4.056E-06	4.041E-06	4.026E-06	4.011E-06	3.996E-06
310	3.982E-06	3.967E-06	3.953E-06	3.938E-06	3.924E-06	3.910E-06	3.896E-06	3.882E-06	3.868E-06	3.854E-06
320	3.840E-06	3.827E-06	3.813E-06	3.800E-06	3.786E-06	3.773E-06	3.760E-06	3.747E-06	3.734E-06	3.721E-06
330	3.709E-06	3.696E-06	3.683E-06	3.671E-06	3.658E-06	3.646E-06	3.634E-06	3.622E-06	3.610E-06	3.598E-06
340	3.586E-06	3.574E-06	3.562E-06	3.550E-06	3.539E-06	3.527E-06	3.516E-06	3.504E-06	3.493E-06	3.482E-06
350	3.471E-06	3.460E-06	3.449E-06	3.438E-06	3.427E-06	3.416E-06	3.405E-06	3.394E-06	3.384E-06	3.373E-06
360	3.363E-06	3.352E-06	3.342E-06	3.332E-06	3.322E-06	3.312E-06	3.301E-06	3.291E-06	3.281E-06	3.272E-06
370	3.262E-06	3.252E-06	3.242E-06	3.233E-06	3.223E-06	3.213E-06	3.204E-06	3.195E-06	3.185E-06	3.176E-06
380	3.167E-06	3.157E-06	3.148E-06	3.139E-06	3.130E-06	3.121E-06	3.112E-06	3.103E-06	3.094E-06	3.086E-06
390	3.077E-06	3.068E-06	3.060E-06	3.051E-06	3.042E-06	3.034E-06	3.026E-06	3.017E-06	3.009E-06	3.001E-06
400	2.992E-06	2.984E-06	2.976E-06	2.968E-06	2.960E-06	2.952E-06	2.944E-06	2.936E-06	2.928E-06	2.920E-06
410	2.912E-06	2.905E-06	2.897E-06	2.889E-06	2.882E-06	2.874E-06	2.866E-06	2.859E-06	2.851E-06	2.844E-06
420	2.837E-06	2.829E-06	2.822E-06	2.815E-06	2.807E-06	2.800E-06	2.793E-06	2.786E-06	2.779E-06	2.772E-06
430	2.765E-06	2.758E-06	2.751E-06	2.744E-06	2.737E-06	2.730E-06	2.724E-06	2.717E-06	2.710E-06	2.703E-06
440	2.697E-06	2.690E-06	2.683E-06	2.677E-06	2.670E-06	2.664E-06	2.657E-06	2.651E-06	2.64[illegible]E-06	2.638E-06
450	2.632E-06	2.626E-06	2.619E-06	2.613E-06	2.607E-06	2.601E-06	2.595E-06	2.588E-06	2.582E-06	2.576E-06
460	2.570E-06	2.564E-06	2.558E-06	2.552E-06	2.547E-06	2.541E-06	2.535E-06	2.529E-06	2.523E-06	2.517E-06
470	2.512E-06	2.506E-06	2.500E-06	2.495E-06	2.489E-06	2.483E-06	2.478E-06	2.472E-06	2.467E-06	2.461E-06

KEV										
480	2.456E-06	2.450E-06	2.445E-06	2.439E-06	2.434E-06	2.429E-06	2.423E-06	2.418E-06	2.413E-06	2.407E-06
490	2.402E-06	2.397E-06	2.392E-06	2.387E-06	2.382E-06	2.376E-06	2.371E-06	2.366E-06	2.361E-06	2.356E-06
500	2.351E-06	2.346E-06	2.341E-06	2.336E-06	2.331E-06	2.326E-06	2.322E-06	2.317E-06	2.312E-06	2.307E-06
510	2.302E-06	2.298E-06	2.293E-06	2.288E-06	2.283E-06	2.279E-06	2.274E-06	2.269E-06	2.265E-06	2.260E-06
520	2.256E-06	2.251E-06	2.246E-06	2.242E-06	2.237E-06	2.233E-06	2.228E-06	2.224E-06	2.220E-06	2.215E-06
530	2.211E-06	2.206E-06	2.202E-06	2.198E-06	2.193E-06	2.189E-06	2.185E-06	2.180E-06	2.176E-06	2.172E-06
540	2.168E-06	2.164E-06	2.159E-06	2.155E-06	2.151E-06	2.147E-06	2.143E-06	2.139E-06	2.135E-06	2.131E-06
550	2.127E-06	2.122E-06	2.118E-06	2.114E-06	2.110E-06	2.107E-06	2.103E-06	2.099E-06	2.095E-06	2.091E-06
560	2.087E-06	2.083E-06	2.079E-06	2.075E-06	2.071E-06	2.068E-06	2.064E-06	2.060E-06	2.056E-06	2.053E-06
570	2.049E-06	2.045E-06	2.041E-06	2.038E-06	2.034E-06	2.030E-06	2.027E-06	2.023E-06	2.019E-06	2.016E-06
580	2.012E-06	2.009E-06	2.005E-06	2.001E-06	1.998E-06	1.994E-06	1.991E-06	1.987E-06	1.984E-06	1.980E-06
590	1.977E-06	1.973E-06	1.970E-06	1.966E-06	1.963E-06	1.960E-06	1.956E-06	1.953E-06	1.950E-06	1.946E-06
600	1.943E-06	1.939E-06	1.936E-06	1.933E-06	1.930E-06	1.926E-06	1.923E-06	1.920E-06	1.916E-06	1.913E-06
610	1.910E-06	1.907E-06	1.904E-06	1.900E-06	1.897E-06	1.894E-06	1.891E-06	1.888E-06	1.885E-06	1.882E-06
620	1.878E-06	1.875E-06	1.872E-06	1.869E-06	1.866E-06	1.863E-06	1.860E-06	1.857E-06	1.854E-06	1.851E-06
630	1.848E-06	1.845E-06	1.842E-06	1.839E-06	1.836E-06	1.833E-06	1.830E-06	1.827E-06	1.824E-06	1.821E-06
640	1.818E-06	1.815E-06	1.813E-06	1.810E-06	1.807E-06	1.804E-06	1.801E-06	1.798E-06	1.796E-06	1.793E-06
650	1.790E-06	1.787E-06	1.784E-06	1.782E-06	1.779E-06	1.776E-06	1.773E-06	1.771E-06	1.768E-06	1.765E-06
660	1.762E-06	1.760E-06	1.757E-06	1.754E-06	1.752E-06	1.749E-06	1.746E-06	1.744E-06	1.741E-06	1.738E-06
670	1.736E-06	1.733E-06	1.730E-06	1.728E-06	1.725E-06	1.723E-06	1.720E-06	1.718E-06	1.715E-06	1.712E-06
680	1.710E-06	1.707E-06	1.705E-06	1.702E-06	1.700E-06	1.697E-06	1.695E-06	1.692E-06	1.690E-06	1.687E-06
690	1.685E-06	1.682E-06	1.680E-06	1.678E-06	1.675E-06	1.673E-06	1.670E-06	1.668E-06	1.665E-06	1.663E-06
700	1.661E-06	1.658E-06	1.656E-06	1.654E-06	1.651E-06	1.649E-06	1.646E-06	1.644E-06	1.642E-06	1.639E-06
710	1.637E-06	1.635E-06	1.633E-06	1.630E-06	1.628E-06	1.626E-06	1.623E-06	1.621E-06	1.619E-06	1.617E-06
720	1.614E-06	1.612E-06	1.610E-06	1.608E-06	1.605E-06	1.603E-06	1.601E-06	1.599E-06	1.597E-06	1.594E-06
730	1.592E-06	1.590E-06	1.588E-06	1.586E-06	1.584E-06	1.581E-06	1.579E-06	1.577E-06	1.575E-06	1.573E-06
740	1.571E-06	1.569E-06	1.567E-06	1.565E-06	1.562E-06	1.560E-06	1.558E-06	1.556E-06	1.554E-06	1.552E-06
750	1.550E-06	1.548E-06	1.546E-06	1.544E-06	1.542E-06	1.540E-06	1.538E-06	1.536E-06	1.534E-06	1.532E-06
760	1.530E-06	1.528E-06	1.526E-06	1.524E-06	1.522E-06	1.520E-06	1.518E-06	1.516E-06	1.514E-06	1.512E-06
770	1.510E-06	1.508E-06	1.506E-06	1.504E-06	1.502E-06	1.500E-06	1.499E-06	1.497E-06	1.495E-06	1.493E-06
780	1.491E-06	1.489E-06	1.487E-06	1.485E-06	1.483E-06	1.482E-06	1.480E-06	1.478E-06	1.476E-06	1.474E-06
790	1.472E-06	1.471E-06	1.469E-06	1.467E-06	1.465E-06	1.463E-06	1.461E-06	1.460E-06	1.458E-06	1.456E-06
800	1.454E-06	1.452E-06	1.451E-06	1.449E-06	1.447E-06	1.445E-06	1.444E-06	1.442E-06	1.440E-06	1.438E-06
810	1.437E-06	1.435E-06	1.433E-06	1.431E-06	1.430E-06	1.428E-06	1.426E-06	1.425E-06	1.423E-06	1.421E-06
820	1.419E-06	1.418E-06	1.416E-06	1.414E-06	1.413E-06	1.411E-06	1.409E-06	1.408E-06	1.406E-06	1.404E-06
830	1.403E-06	1.401E-06	1.399E-06	1.398E-06	1.396E-06	1.395E-06	1.393E-06	1.391E-06	1.390E-06	1.388E-06
840	1.386E-06	1.385E-06	1.383E-06	1.382E-06	1.380E-06	1.378E-06	1.377E-06	1.375E-06	1.374E-06	1.372E-06
850	1.371E-06	1.369E-06	1.367E-06	1.366E-06	1.364E-06	1.363E-06	1.361E-06	1.360E-06	1.358E-06	1.357E-06
860	1.355E-06	1.354E-06	1.352E-06	1.351E-06	1.349E-06	1.348E-06	1.346E-06	1.345E-06	1.343E-06	1.342E-06
870	1.340E-06	1.339E-06	1.337E-06	1.336E-06	1.334E-06	1.333E-06	1.331E-06	1.330E-06	1.328E-06	1.327E-06
880	1.325E-06	1.324E-06	1.322E-06	1.321E-06	1.319E-06	1.318E-06	1.317E-06	1.315E-06	1.314E-06	1.312E-06
890	1.311E-06	1.309E-06	1.308E-06	1.307E-06	1.305E-06	1.304E-06	1.302E-06	1.301E-06	1.300E-06	1.298E-06
900	1.297E-06	1.295E-06	1.294E-06	1.293E-06	1.291E-06	1.290E-06	1.289E-06	1.287E-06	1.286E-06	1.285E-06
910	1.283E-06	1.282E-06	1.280E-06	1.279E-06	1.278E-06	1.276E-06	1.275E-06	1.274E-06	1.272E-06	1.271E-06
920	1.270E-06	1.268E-06	1.267E-06	1.266E-06	1.264E-06	1.263E-06	1.262E-06	1.261E-06	1.259E-06	1.258E-06
930	1.257E-06	1.255E-06	1.254E-06	1.253E-06	1.252E-06	1.250E-06	1.249E-06	1.248E-06	1.246E-06	1.245E-06

KEV

940	1.244E-06	1.243E-06	1.241E-06	1.240E-06	1.239E-06	1.238E-06	1.236E-06	1.235E-06	1.234E-06	1.233E-06
950	1.231E-06	1.230E-06	1.229E-06	1.228E-06	1.226E-06	1.225E-06	1.224E-06	1.223E-06	1.222E-06	1.220E-06
960	1.219E-06	1.218E-06	1.217E-06	1.216E-06	1.214E-06	1.213E-06	1.212E-06	1.211E-06	1.210E-06	1.208E-06
970	1.207E-06	1.206E-06	1.205E-06	1.204E-06	1.202E-06	1.201E-06	1.200E-06	1.199E-06	1.198E-06	1.197E-06
980	1.196E-06	1.194E-06	1.193E-06	1.192E-06	1.191E-06	1.190E-06	1.189E-06	1.187E-06	1.186E-06	1.185E-06
990	1.184E-06	1.183E-06	1.182E-06	1.181E-06	1.180E-06	1.178E-06	1.177E-06	1.176E-06	1.175E-06	1.174E-06
1000	1.173E-06	1.172E-06	1.171E-06	1.170E-06	1.168E-06	1.167E-06	1.166E-06	1.165E-06	1.164E-06	1.163E-06
1010	1.162E-06	1.161E-06	1.160E-06	1.159E-06	1.158E-06	1.156E-06	1.155E-06	1.154E-06	1.153E-06	1.152E-06
1020	1.151E-06	1.150E-06	1.149E-06	1.148E-06	1.147E-06	1.146E-06	1.145E-06	1.144E-06	1.143E-06	1.142E-06
1030	1.141E-06	1.140E-06	1.139E-06	1.138E-06	1.136E-06	1.135E-06	1.134E-06	1.133E-06	1.132E-06	1.131E-06
1040	1.130E-06	1.129E-06	1.128E-06	1.127E-06	1.126E-06	1.125E-06	1.124E-06	1.123E-06	1.122E-06	1.121E-06
1050	1.120E-06	1.119E-06	1.118E-06	1.117E-06	1.116E-06	1.115E-06	1.114E-06	1.113E-06	1.112E-06	1.111E-06
1060	1.110E-06	1.109E-06	1.108E-06	1.107E-06	1.106E-06	1.105E-06	1.104E-06	1.104E-06	1.103E-06	1.102E-06
1070	1.101E-06	1.100E-06	1.099E-06	1.098E-06	1.097E-06	1.096E-06	1.095E-06	1.094E-06	1.093E-06	1.092E-06
1080	1.091E-06	1.090E-06	1.089E-06	1.088E-06	1.087E-06	1.086E-06	1.086E-06	1.085E-06	1.084E-06	1.083E-06
1090	1.082E-06	1.081E-06	1.080E-06	1.079E-06	1.078E-06	1.077E-06	1.076E-06	1.075E-06	1.074E-06	1.074E-06
1100	1.073E-06	1.072E-06	1.071E-06	1.070E-06	1.069E-06	1.068E-06	1.067E-06	1.066E-06	1.065E-06	1.065E-06
1110	1.064E-06	1.063E-06	1.062E-06	1.061E-06	1.060E-06	1.059E-06	1.058E-06	1.058E-06	1.057E-06	1.056E-06
1120	1.055E-06	1.054E-06	1.053E-06	1.052E-06	1.051E-06	1.051E-06	1.050E-06	1.049E-06	1.048E-06	1.047E-06
1130	1.046E-06	1.045E-06	1.045E-06	1.044E-06	1.043E-06	1.042E-06	1.041E-06	1.040E-06	1.039E-06	1.039E-06
1140	1.038E-06	1.037E-06	1.036E-06	1.035E-06	1.034E-06	1.034E-06	1.033E-06	1.032E-06	1.031E-06	1.030E-06
1150	1.029E-06	1.029E-06	1.028E-06	1.027E-06	1.026E-06	1.025E-06	1.025E-06	1.024E-06	1.023E-06	1.022E-06
1160	1.021E-06	1.020E-06	1.020E-06	1.019E-06	1.018E-06	1.017E-06	1.016E-06	1.016E-06	1.015E-06	1.014E-06
1170	1.013E-06	1.012E-06	1.012E-06	1.011E-06	1.010E-06	1.009E-06	1.008E-06	1.008E-06	1.007E-06	1.006E-06
1180	1.005E-06	1.005E-06	1.004E-06	1.003E-06	1.002E-06	1.001E-06	1.001E-06	9.999E-07	9.992E-07	9.984E-07
1190	9.976E-07	9.968E-07	9.961E-07	9.953E-07	9.946E-07	9.938E-07	9.930E-07	9.923E-07	9.915E-07	9.908E-07
1200	9.900E-07	9.893E-07	9.885E-07	9.877E-07	9.870E-07	9.863E-07	9.855E-07	9.848E-07	9.840E-07	9.833E-07
1210	9.825E-07	9.818E-07	9.810E-07	9.803E-07	9.796E-07	9.788E-07	9.781E-07	9.774E-07	9.766E-07	9.759E-07
1220	9.752E-07	9.743E-07	9.737E-07	9.730E-07	9.723E-07	9.716E-07	9.708E-07	9.701E-07	9.694E-07	9.687E-07
1230	9.680E-07	9.672E-07	9.665E-07	9.658E-07	9.651E-07	9.644E-07	9.637E-07	9.630E-07	9.623E-07	9.616E-07
1240	9.609E-07	9.602E-07	9.594E-07	9.587E-07	9.580E-07	9.573E-07	9.567E-07	9.560E-07	9.553E-07	9.546E-07
1250	9.539E-07	9.532E-07	9.525E-07	9.518E-07	9.511E-07	9.504E-07	9.497E-07	9.491E-07	9.484E-07	9.477E-07
1260	9.470E-07	9.463E-07	9.456E-07	9.450E-07	9.443E-07	9.436E-07	9.429E-07	9.423E-07	9.416E-07	9.409E-07
1270	9.403E-07	9.396E-07	9.389E-07	9.382E-07	9.376E-07	9.369E-07	9.363E-07	9.356E-07	9.349E-07	9.343E-07
1280	9.336E-07	9.329E-07	9.323E-07	9.316E-07	9.310E-07	9.303E-07	9.297E-07	9.290E-07	9.284E-07	9.277E-07
1290	9.271E-07	9.264E-07	9.258E-07	9.251E-07	9.245E-07	9.238E-07	9.232E-07	9.226E-07	9.219E-07	9.213E-07
1300	9.206E-07	9.200E-07	9.194E-07	9.187E-07	9.181E-07	9.175E-07	9.168E-07	9.162E-07	9.156E-07	9.149E-07
1310	9.143E-07	9.137E-07	9.131E-07	9.124E-07	9.118E-07	9.112E-07	9.106E-07	9.099E-07	9.093E-07	9.087E-07
1320	9.081E-07	9.075E-07	9.069E-07	9.062E-07	9.056E-07	9.050E-07	9.044E-07	9.038E-07	9.032E-07	9.026E-07
1330	9.020E-07	9.013E-07	9.007E-07	9.001E-07	8.995E-07	8.989E-07	8.983E-07	8.977E-07	8.971E-07	8.965E-07
1340	8.959E-07	8.953E-07	8.947E-07	8.941E-07	8.935E-07	8.929E-07	8.923E-07	8.917E-07	8.912E-07	8.906E-07
1350	8.900E-07	8.894E-07	8.888E-07	8.882E-07	8.876E-07	8.870E-07	8.865E-07	8.859E-07	8.853E-07	8.847E-07
1360	8.841E-07	8.835E-07	8.830E-07	8.824E-07	8.818E-07	8.812E-07	8.807E-07	8.801E-07	8.795E-07	8.789E-07
1370	8.784E-07	8.778E-07	8.772E-07	8.767E-07	8.761E-07	8.755E-07	8.749E-07	8.744E-07	8.738E-07	8.733E-07
1380	8.727E-07	8.721E-07	8.716E-07	8.710E-07	8.704E-07	8.699E-07	8.693E-07	8.688E-07	8.682E-07	8.677E-07
1390	8.671E-07	8.665E-07	8.660E-07	8.654E-07	8.649E-07	8.643E-07	8.638E-07	8.632E-07	8.627E-07	8.621E-07
1400	8.616E-07	8.610E-07	8.605E-07	8.600E-07	8.594E-07	8.589E-07	8.583E-07	8.578E-07	8.572E-07	8.567E-07
1410	8.562E-07	8.556E-07	8.551E-07	8.546E-07	8.540E-07	8.535E-07	8.529E-07	8.524E-07	8.519E-07	8.513E-07
1420	8.508E-07	8.503E-07	8.498E-07	8.492E-07	8.487E-07	8.482E-07	8.476E-07	8.471E-07	8.466E-07	8.461E-07
1430	8.455E-07	8.450E-07	8.445E-07	8.440E-07	8.435E-07	8.429E-07	8.424E-07	8.419E-07	8.414E-07	8.409E-07
1440	8.404E-07	8.398E-07	8.393E-07	8.388E-07	8.383E-07	8.378E-07	8.373E-07	8.368E-07	8.363E-07	8.357E-07
1450	8.352E-07	8.347E-07	8.342E-07	8.337E-07	8.332E-07	8.327E-07	8.322E-07	8.317E-07	8.312E-07	8.307E-07
1460	8.302E-07	8.297E-07	8.292E-07	8.287E-07	8.282E-07	8.277E-07	8.272E-07	8.267E-07	8.262E-07	8.257E-07
1470	8.252E-07	8.247E-07	8.242E-07	8.237E-07	8.232E-07	8.227E-07	8.222E-07	8.218E-07	8.213E-07	8.208E-07
1480	8.203E-07	8.198E-07	8.193E-07	8.188E-07	8.184E-07	8.179E-07	8.174E-07	8.169E-07	8.164E-07	8.159E-07

KEV										
1490	8.155E-07	8.150E-07	8.145E-07	8.140E-07	8.136E-07	8.131E-07	8.126E-07	8.121E-07	8.116E-07	8.112E-07
1500	8.107E-07	8.102E-07	8.098E-07	8.093E-07	8.088E-07	8.083E-07	8.079E-07	8.074E-07	8.069E-07	8.065E-07
1510	8.060E-07	8.055E-07	8.051E-07	8.046E-07	8.041E-07	8.037E-07	8.032E-07	8.027E-07	8.023E-07	8.018E-07
1520	8.013E-07	8.009E-07	8.004E-07	8.000E-07	7.995E-07	7.991E-07	7.986E-07	7.981E-07	7.977E-07	7.972E-07
1530	7.968E-07	7.963E-07	7.959E-07	7.954E-07	7.950E-07	7.945E-07	7.941E-07	7.936E-07	7.932E-07	7.927E-07
1540	7.923E-07	7.918E-07	7.914E-07	7.909E-07	7.905E-07	7.900E-07	7.896E-07	7.891E-07	7.887E-07	7.882E-07
1550	7.878E-07	7.874E-07	7.869E-07	7.865E-07	7.860E-07	7.856E-07	7.852E-07	7.847E-07	7.843E-07	7.838E-07
1560	7.834E-07	7.830E-07	7.825E-07	7.821E-07	7.817E-07	7.812E-07	7.808E-07	7.804E-07	7.799E-07	7.795E-07
1570	7.791E-07	7.786E-07	7.782E-07	7.778E-07	7.773E-07	7.769E-07	7.765E-07	7.761E-07	7.756E-07	7.752E-07
1580	7.748E-07	7.743E-07	7.739E-07	7.735E-07	7.731E-07	7.727E-07	7.722E-07	7.718E-07	7.714E-07	7.710E-07
1590	7.705E-07	7.701E-07	7.697E-07	7.693E-07	7.689E-07	7.685E-07	7.680E-07	7.676E-07	7.672E-07	7.668E-07
1600	7.664E-07	7.660E-07	7.655E-07	7.651E-07	7.647E-07	7.643E-07	7.639E-07	7.635E-07	7.631E-07	7.627E-07
1610	7.623E-07	7.618E-07	7.614E-07	7.610E-07	7.606E-07	7.602E-07	7.598E-07	7.594E-07	7.590E-07	7.586E-07
1620	7.582E-07	7.578E-07	7.574E-07	7.570E-07	7.566E-07	7.562E-07	7.558E-07	7.554E-07	7.550E-07	7.546E-07
1630	7.542E-07	7.538E-07	7.534E-07	7.530E-07	7.526E-07	7.522E-07	7.518E-07	7.514E-07	7.510E-07	7.506E-07
1640	7.502E-07	7.498E-07	7.494E-07	7.490E-07	7.486E-07	7.482E-07	7.478E-07	7.475E-07	7.471E-07	7.467E-07
1650	7.463E-07	7.459E-07	7.455E-07	7.451E-07	7.447E-07	7.443E-07	7.440E-07	7.436E-07	7.432E-07	7.428E-07
1660	7.424E-07	7.420E-07	7.416E-07	7.413E-07	7.409E-07	7.405E-07	7.401E-07	7.397E-07	7.394E-07	7.390E-07
1670	7.386E-07	7.382E-07	7.378E-07	7.375E-07	7.371E-07	7.367E-07	7.363E-07	7.359E-07	7.356E-07	7.352E-07
1680	7.348E-07	7.344E-07	7.341E-07	7.337E-07	7.333E-07	7.329E-07	7.326E-07	7.322E-07	7.318E-07	7.315E-07
1690	7.311E-07	7.307E-07	7.304E-07	7.300E-07	7.296E-07	7.292E-07	7.289E-07	7.285E-07	7.281E-07	7.278E-07
1700	7.274E-07	7.270E-07	7.267E-07	7.263E-07	7.259E-07	7.256E-07	7.252E-07	7.249E-07	7.245E-07	7.241E-07
1710	7.238E-07	7.234E-07	7.230E-07	7.227E-07	7.223E-07	7.220E-07	7.216E-07	7.212E-07	7.209E-07	7.205E-07
1720	7.202E-07	7.198E-07	7.195E-07	7.191E-07	7.187E-07	7.184E-07	7.180E-07	7.177E-07	7.173E-07	7.170E-07
1730	7.166E-07	7.163E-07	7.159E-07	7.156E-07	7.152E-07	7.149E-07	7.145E-07	7.142E-07	7.138E-07	7.135E-07
1740	7.131E-07	7.128E-07	7.124E-07	7.121E-07	7.117E-07	7.114E-07	7.110E-07	7.107E-07	7.103E-07	7.100E-07
1750	7.096E-07	7.093E-07	7.090E-07	7.086E-07	7.083E-07	7.079E-07	7.076E-07	7.072E-07	7.069E-07	7.066E-07
1760	7.062E-07	7.059E-07	7.055E-07	7.052E-07	7.048E-07	7.045E-07	7.042E-07	7.038E-07	7.035E-07	7.032E-07
1770	7.028E-07	7.025E-07	7.021E-07	7.018E-07	7.015E-07	7.011E-07	7.008E-07	7.005E-07	7.001E-07	6.998E-07
1780	6.995E-07	6.991E-07	6.988E-07	6.985E-07	6.981E-07	6.978E-07	6.975E-07	6.971E-07	6.968E-07	6.965E-07
1790	6.962E-07	6.958E-07	6.955E-07	6.952E-07	6.948E-07	6.945E-07	6.942E-07	6.939E-07	6.935E-07	6.932E-07
1800	6.929E-07	6.926E-07	6.922E-07	6.919E-07	6.916E-07	6.913E-07	6.909E-07	6.906E-07	6.903E-07	6.900E-07
1810	6.896E-07	6.893E-07	6.890E-07	6.887E-07	6.884E-07	6.880E-07	6.877E-07	6.874E-07	6.871E-07	6.868E-07
1820	6.864E-07	6.861E-07	6.858E-07	6.855E-07	6.852E-07	6.849E-07	6.845E-07	6.842E-07	6.839E-07	6.836E-07
1830	6.833E-07	6.830E-07	6.826E-07	6.823E-07	6.820E-07	6.817E-07	6.814E-07	6.811E-07	6.808E-07	6.805E-07
1840	6.801E-07	6.798E-07	6.795E-07	6.792E-07	6.789E-07	6.786E-07	6.783E-07	6.780E-07	6.777E-07	6.774E-07
1850	6.770E-07	6.767E-07	6.764E-07	6.761E-07	6.758E-07	6.755E-07	6.752E-07	6.749E-07	6.746E-07	6.743E-07
1860	6.740E-07	6.737E-07	6.734E-07	6.731E-07	6.728E-07	6.725E-07	6.722E-07	6.719E-07	6.716E-07	6.713E-07
1870	6.710E-07	6.707E-07	6.704E-07	6.701E-07	6.698E-07	6.695E-07	6.692E-07	6.689E-07	6.686E-07	6.683E-07
1880	6.680E-07	6.677E-07	6.674E-07	6.671E-07	6.668E-07	6.665E-07	6.662E-07	6.659E-07	6.656E-07	6.653E-07
1890	6.650E-07	6.647E-07	6.644E-07	6.641E-07	6.638E-07	6.635E-07	6.632E-07	6.629E-07	6.627E-07	6.624E-07
1900	6.621E-07	6.618E-07	6.615E-07	6.612E-07	6.609E-07	6.606E-07	6.603E-07	6.600E-07	6.597E-07	6.595E-07
1910	6.592E-07	6.589E-07	6.586E-07	6.583E-07	6.580E-07	6.577E-07	6.574E-07	6.572E-07	6.569E-07	6.566E-07
1920	6.563E-07	6.560E-07	6.557E-07	6.554E-07	6.552E-07	6.549E-07	6.546E-07	6.543E-07	6.540E-07	6.537E-07
1930	6.535E-07	6.532E-07	6.529E-07	6.526E-07	6.523E-07	6.520E-07	6.518E-07	6.515E-07	6.512E-07	6.509E-07
1940	6.506E-07	6.504E-07	6.501E-07	6.498E-07	6.495E-07	6.493E-07	6.490E-07	6.487E-07	6.484E-07	6.481E-07
1950	6.479E-07	6.476E-07	6.473E-07	6.470E-07	6.468E-07	6.465E-07	6.462E-07	6.459E-07	6.457E-07	6.454E-07
1960	6.451E-07	6.448E-07	6.446E-07	6.443E-07	6.440E-07	6.438E-07	6.435E-07	6.432E-07	6.429E-07	6.427E-07
1970	6.424E-07	6.421E-07	6.419E-07	6.416E-07	6.413E-07	6.410E-07	6.408E-07	6.405E-07	6.402E-07	6.400E-07
1980	6.397E-07	6.394E-07	6.392E-07	6.389E-07	6.386E-07	6.384E-07	6.381E-07	6.378E-07	6.376E-07	6.373E-07
1990	6.370E-07	6.368E-07	6.365E-07	6.362E-07	6.360E-07	6.357E-07	6.354E-07	6.352E-07	6.349E-07	6.347E-07
2000	6.345E-07	6.341E-07	6.339E-07	6.336E-07	6.333E-0	6.331E-07	6.328E-07	6.326E-07	6.323E-07	6.32 -07

Manual Calculations for Gamma Spectroscopy

Sample No._____ Description_____

Sample Date and Time_____

Counting Date and Time_____ Decay Time_____min

Volume_____ml Count Time_____sec

Detector_____ Geometry_____

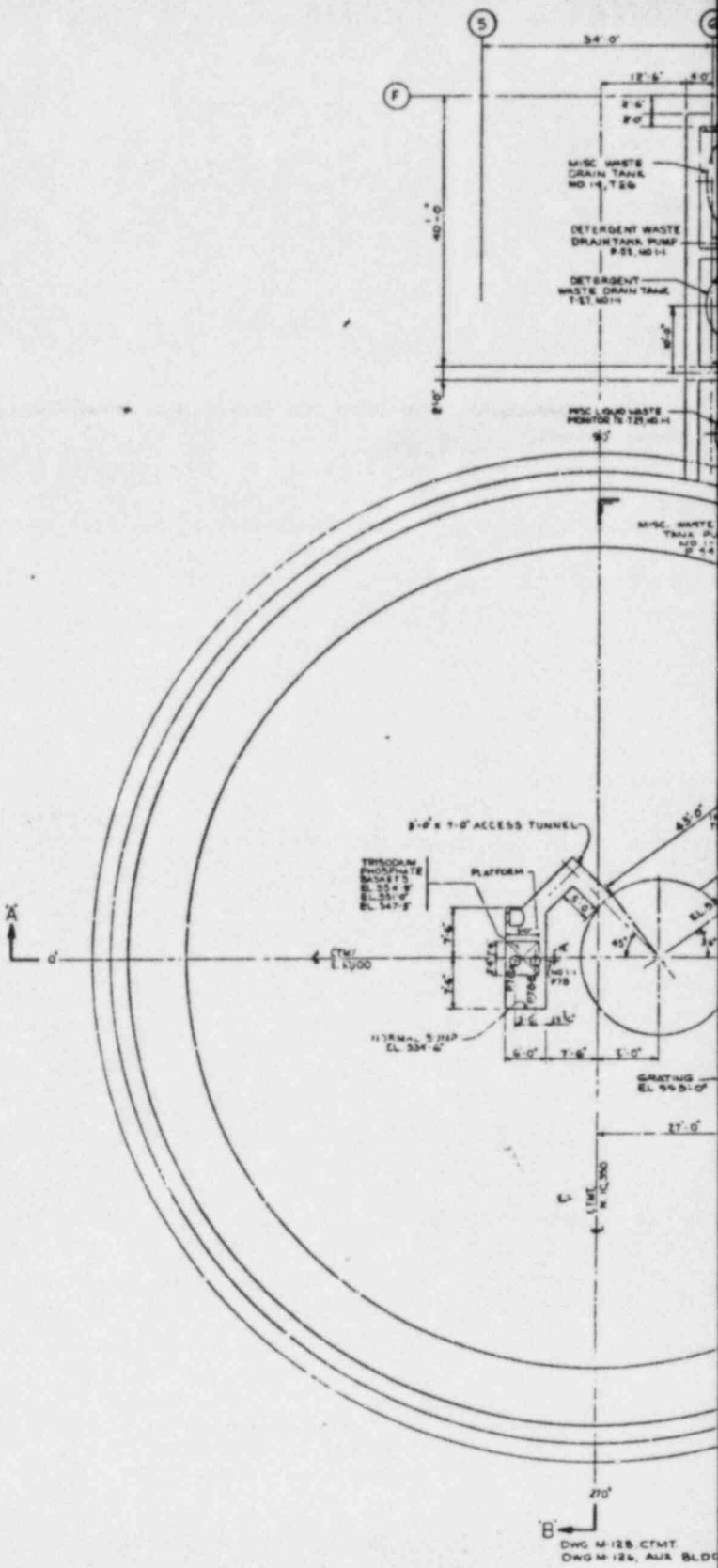
Nuclide_____ Energy_____kev

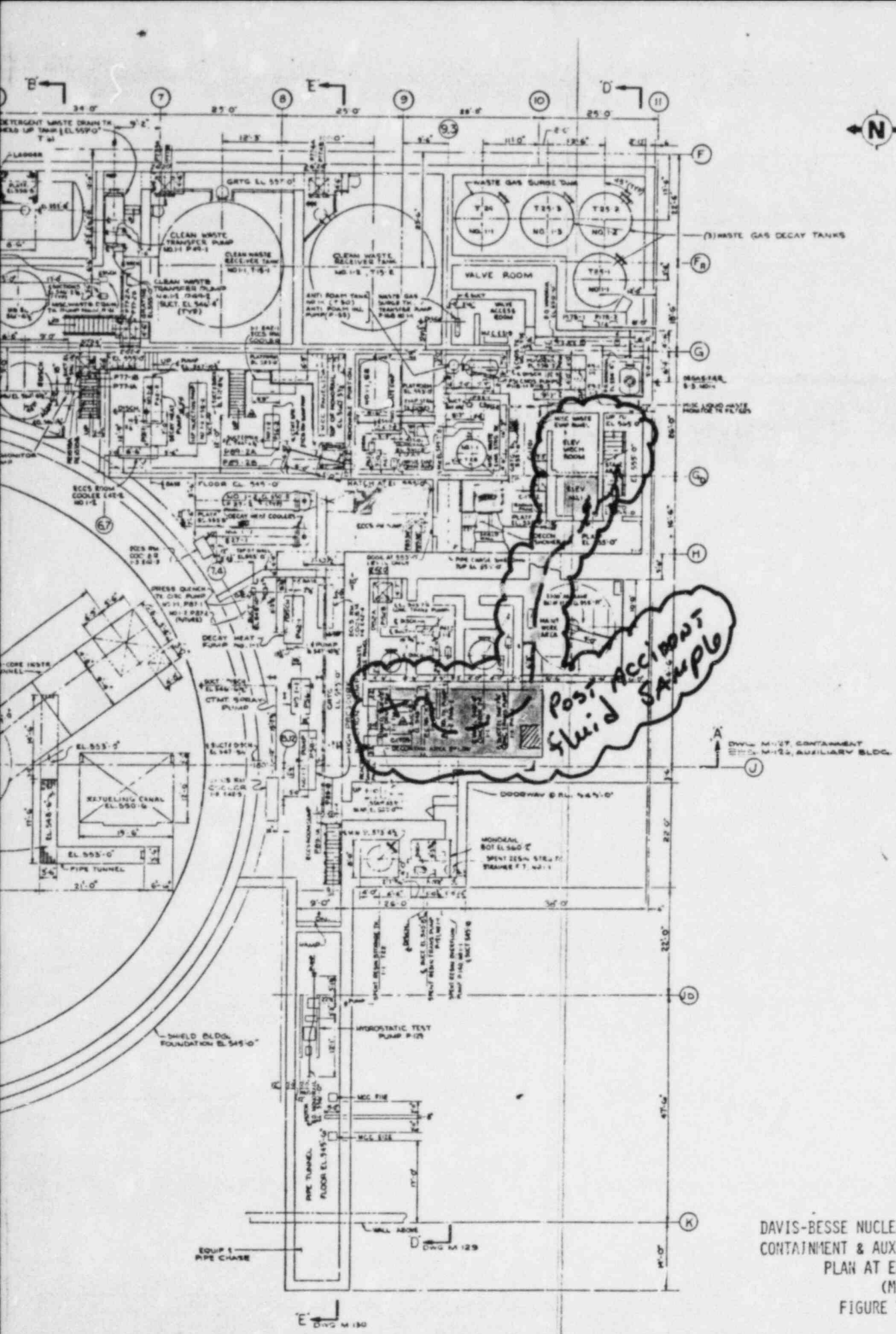
$$\mu Ci/ml = \frac{A - B \times \left(\frac{C + D}{2}\right)}{3.7 \times 10^4 \times E \times F \times G \times H \times J}$$

Where:

A = Counts in total peak area
B = Number of channels integrated
C = Counts in first channel of peak
D = Counts in last channel of peak
E = Efficiency for the detector and geometry used
F = Volume of sample in milliliters
G = Gamma abundance of photopeak (decimal fraction)
H = Decay factor $e^{-\lambda t_1}$. Where λ equals 0.693147 divided by the half life and t_1 is the decay time in the same units as the half-life.
J = $\frac{(1 - e^{\lambda t_2})}{\lambda}$ where t_2 is the count time in seconds and λ is in inverse seconds. If the count time is less than 10% of the half-life, simply enter the count time in seconds for "J".

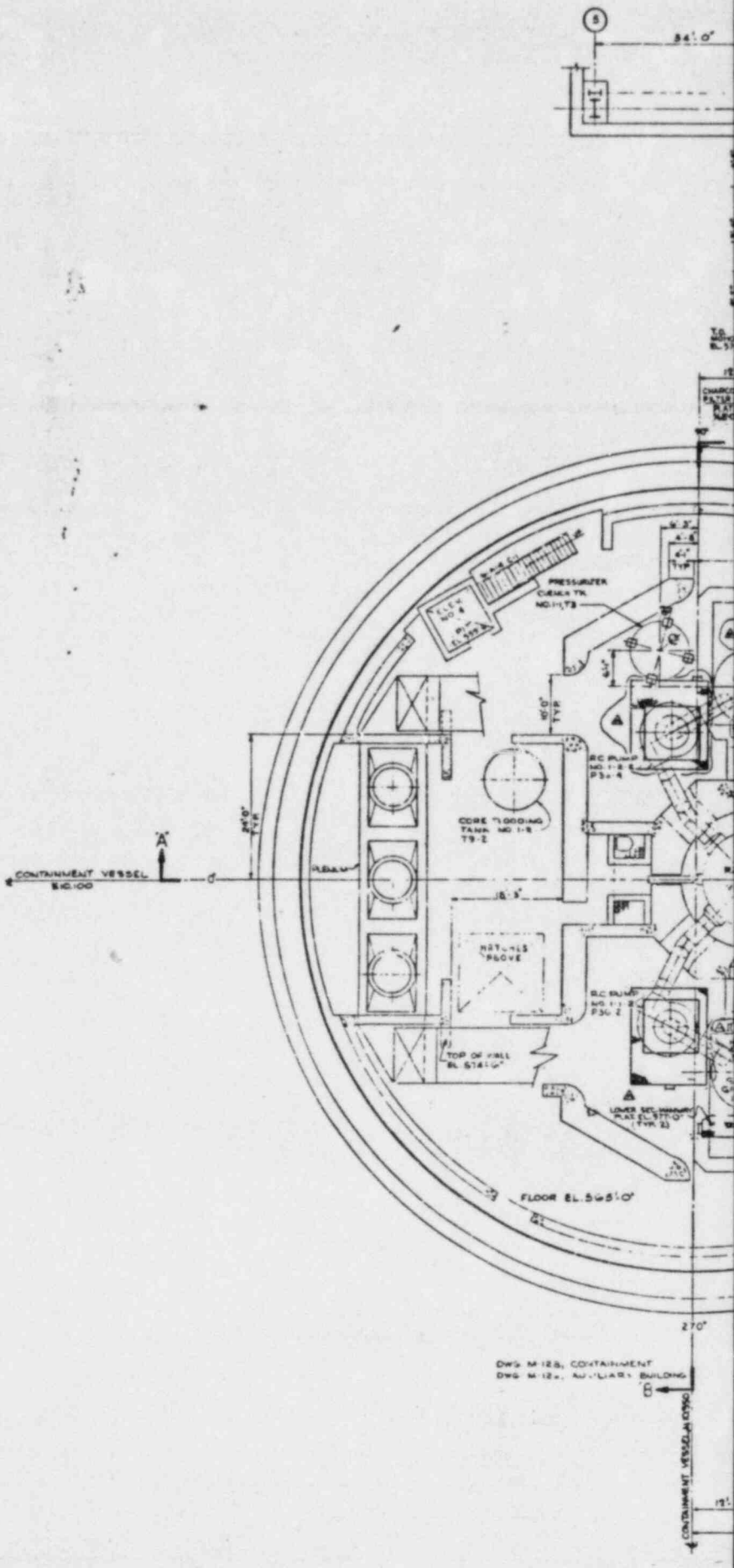
END

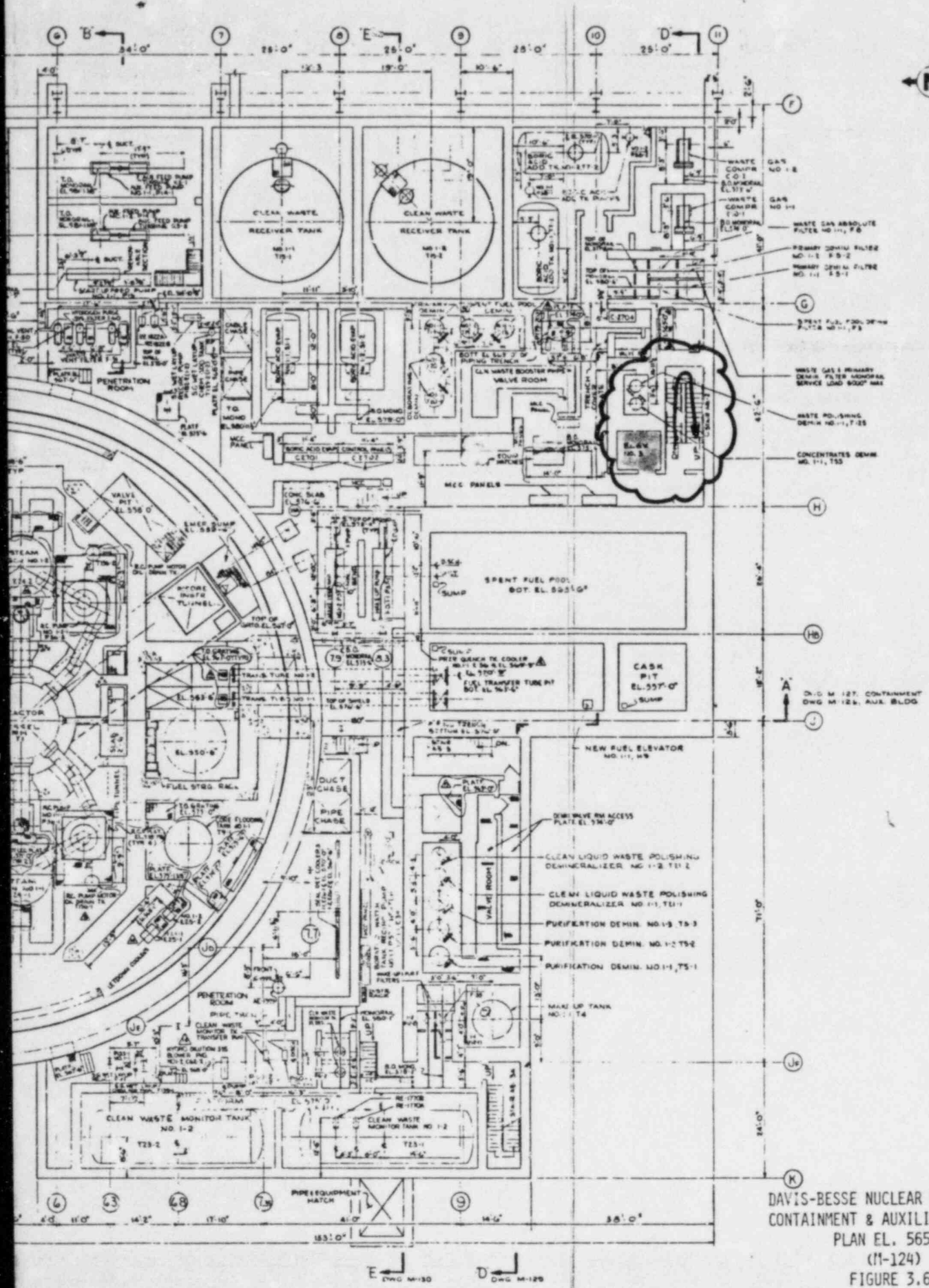

5
F
34'-0"
MISC. WASTE DRAIN TANK NO 1-1, T-69
DETERGENT WASTE DRAIN TANK PUMP P-53, NO 1-1
DETERGENT WASTE DRAIN TANK T-57, NO 1-1
MISC LIQUID WASTE MONITOR TK T-29, NO 1-1
MISC. WASTE TANK P NO 1-1
8'-0" x 7'-0" ACCESS TUNNEL
PLATFORM
TRITIUM CONCENTRATE BASKETS EL 534'-8" EL 539'-8" EL 547'-8"
CTMT EL 5100
EL 534'-6"
GRATING EL 553'-0"
27'-0"
CTMT N.C. 360
270°
B
DWG M-128, CTMT
DWG M-126, AUX BLDG



DAVIS-BESSE NUCLEAR POWER STATION
CONTAINMENT & AUXILIARY BUILDINGS
PLAN AT EL. 545'-0"
(M-125)
FIGURE 3.6-5

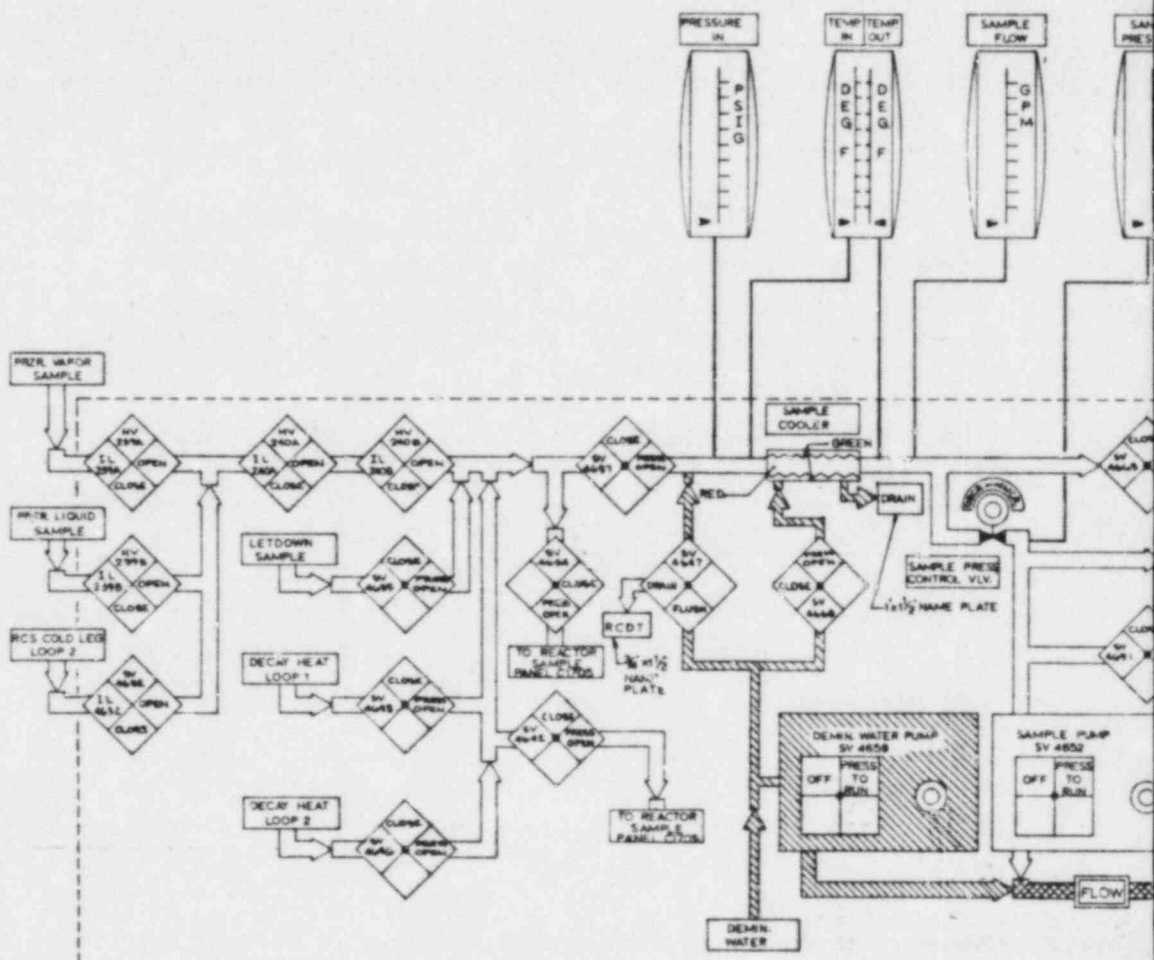
REVISION 0
JULY 1982


84'-0"
PRESSURIZER
CORE FLOODING TANK NO 1-2
T9-2
RC PUMP
P32-2
TOP OF WALL EL 574'-0"
FLOOR EL. 546'-0"
CONTAINMENT VESSEL EL 100
A
A
270°
DWG M-128, CONTAINMENT
DWG M-12_, AUXILIARY BUILDING



DAVIS-BESSE NUCLEAR POWER STATION
CONTAINMENT & AUXILIARY BUILDINGS
PLAN EL. 565'-0"
(M-124)
FIGURE 3.6-4

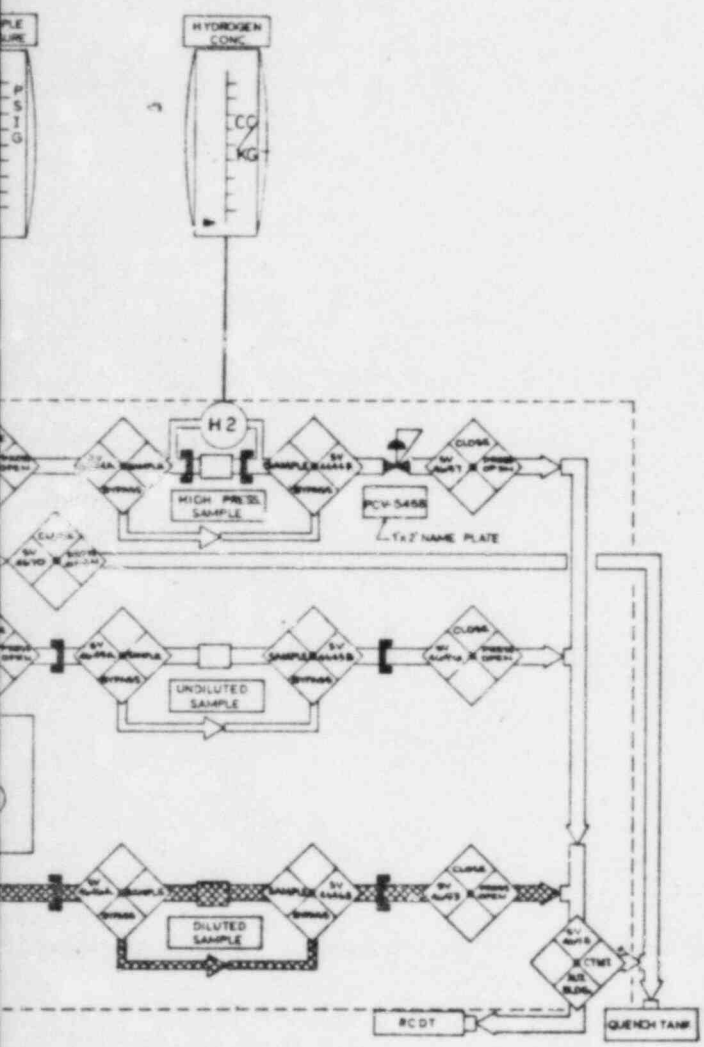
REVISION 0
JULY 1982


PRESSURE IN
PSIG
TEMP IN
TEMP OUT
DEG F
SAMPLE FLOW
GPM
PRZR. VAPOR SAMPLE
PRZR. LIQUID SAMPLE
RCS COLD LEG LOOP 2
LETDOWN SAMPLE
DECAY HEAT LOOP 1
DECAY HEAT LOOP 2
SAMPLE COOLER
GREEN
RED
DRAIN
SAMPLE PRESS CONTROL VLV.
1x1½ NAME PLATE
RCDT
¾" x 1½ NAME PLATE
TO REACTOR SAMPLE PANEL CLOSE
TO REACTOR SAMPLE PANEL OPEN
DEMIN. WATER PUMP SV 4658
SAMPLE PUMP SV 4652
OFF
PRESS TO RUN
FLOW
DEMIN. WATER

LAMICOID MIMIC COLORS

- RED
- BLACK
- GREEN
- ORANGE

ALL NAME PLATES TO BE 1x3 WHITE WITH BLACK LETTERS(EXCEPT AS NOTED)



INSTRUMENT NO.	SCALE RANGE
TI 4476	0-600 °F
TI 4477	0-250 °F
PI 4478	0-3000 PSIG
PI 4479	0-1PF PSIG
FI 4469	0-60 GPM
AI 5469	EF-2000 (1/Hg

*WITH PTIC TERMINAL BLOCK

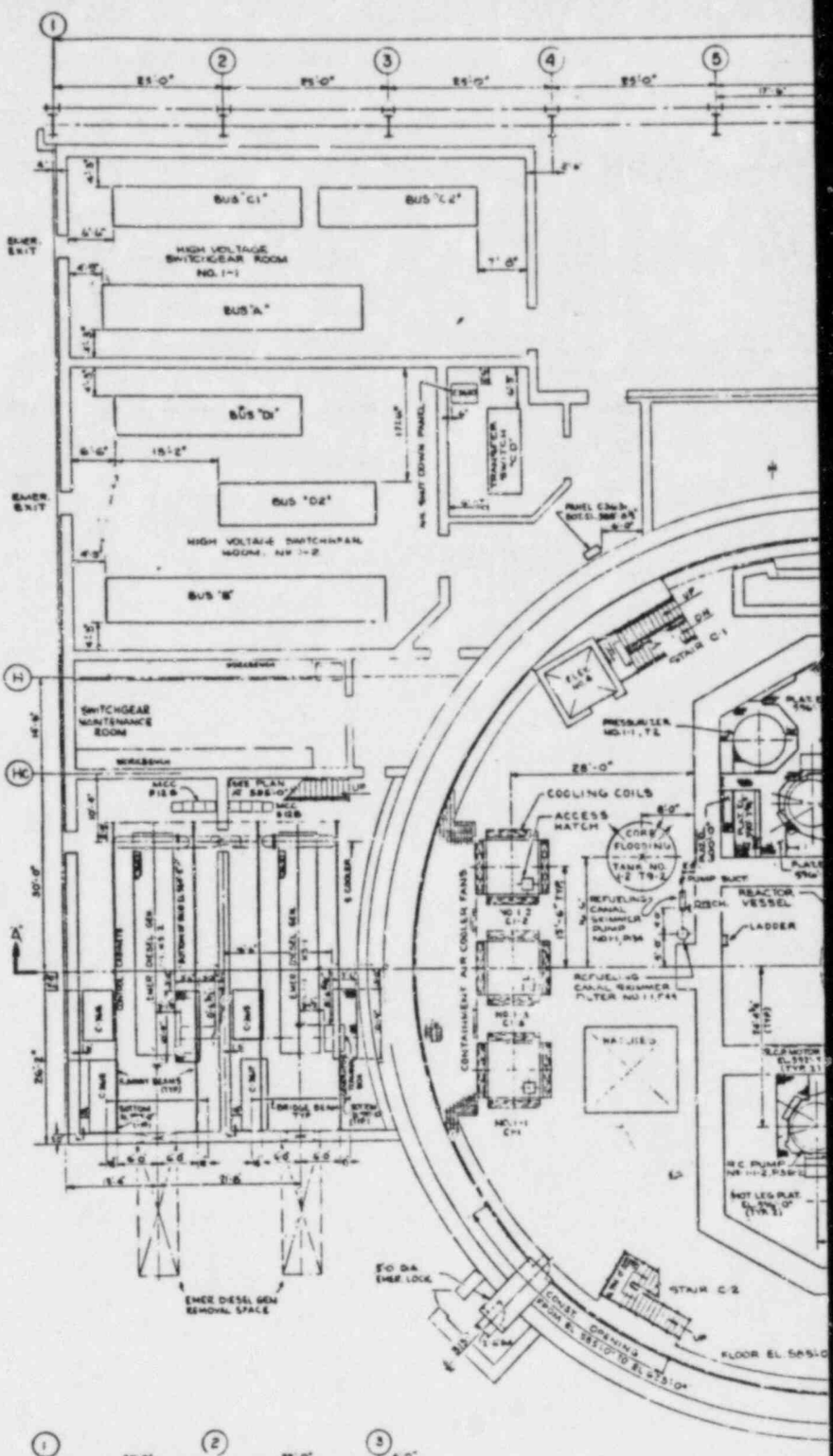
BECHTEL ASSOCIATES PROFESSIONAL CORPORATION (OHIO)

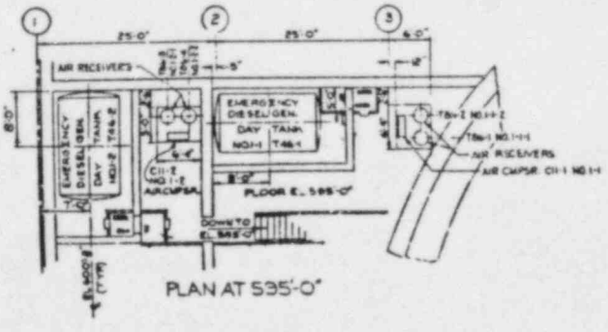
DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1

THE TOLEDO EDISON COMPANY

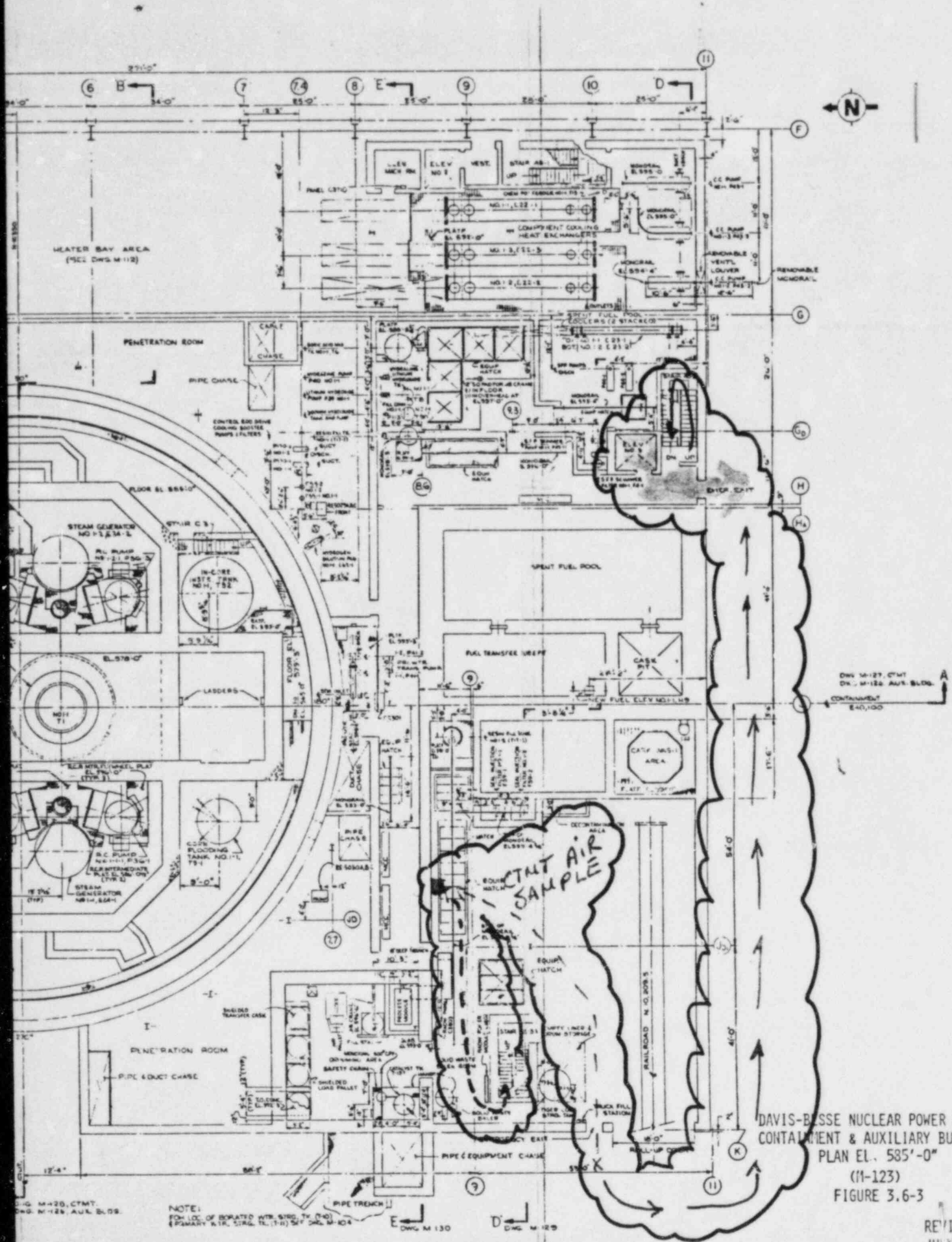
POST ACCIDENT SAMPLING PANEL C1708

JOB No.		NO.
12501	J-814	SH.2 OM


BUS "C1"
BUS "C2"
HIGH VOLTAGE SWITCHGEAR ROOM NO. 1-1
BUS "A"
BUS "D1"
BUS "D2"
HIGH VOLTAGE SWITCHGEAR ROOM NO. 1-2
BUS "B"
SWITCHGEAR MAINTENANCE ROOM
EMER EXIT
COOLING COILS
ACCESS HATCH
REACTOR VESSEL
LADDER
EMER DIESEL GEN REMOVAL SPACE
STAIR C-2
FLOOR EL. 595'-0"

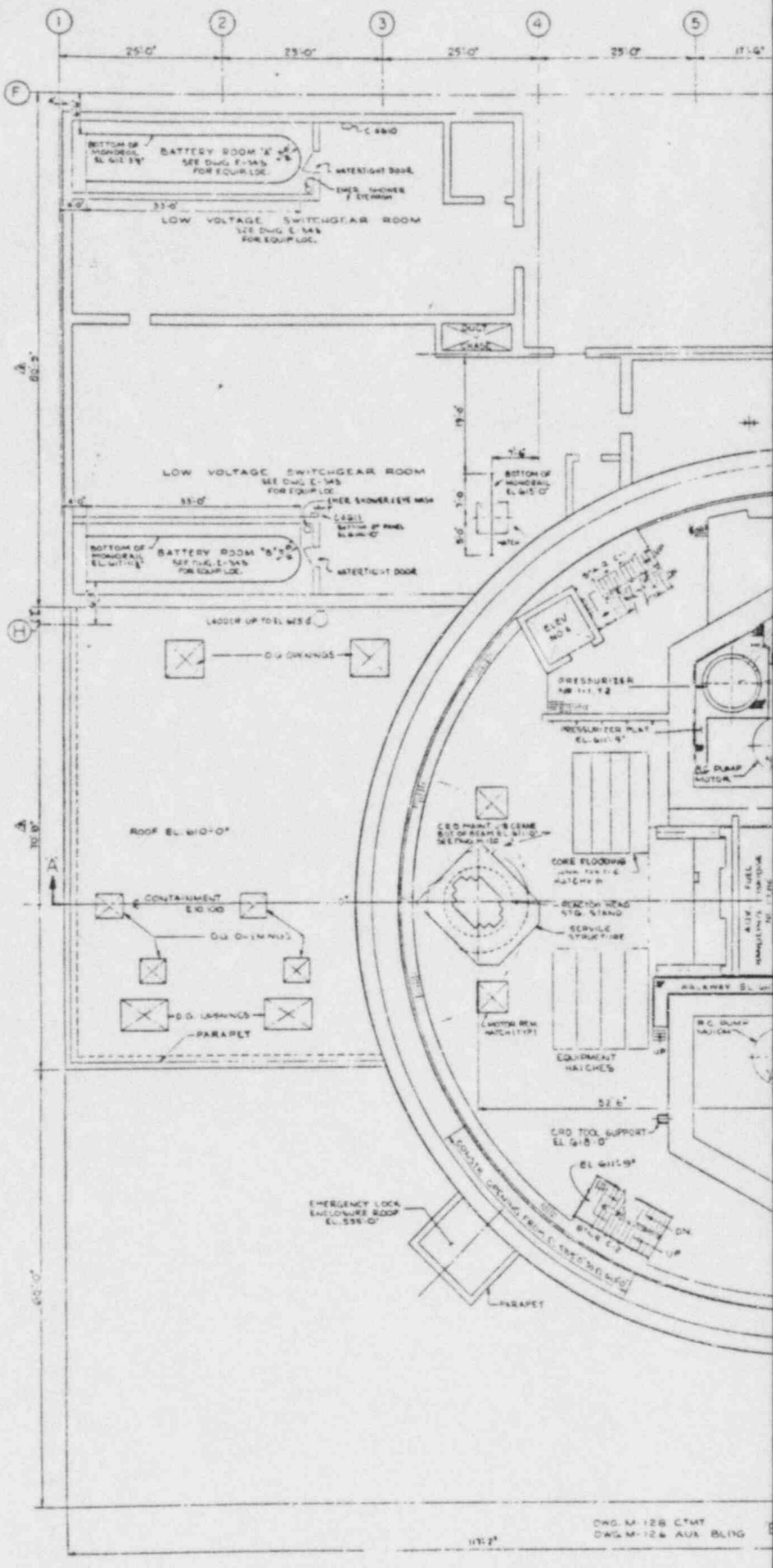

AIR RECEIVERS
EMERGENCY DIESEL GEN.
DAY TANK NO.1
AIR RECEIVERS
FLOOR EL. 595'-0"

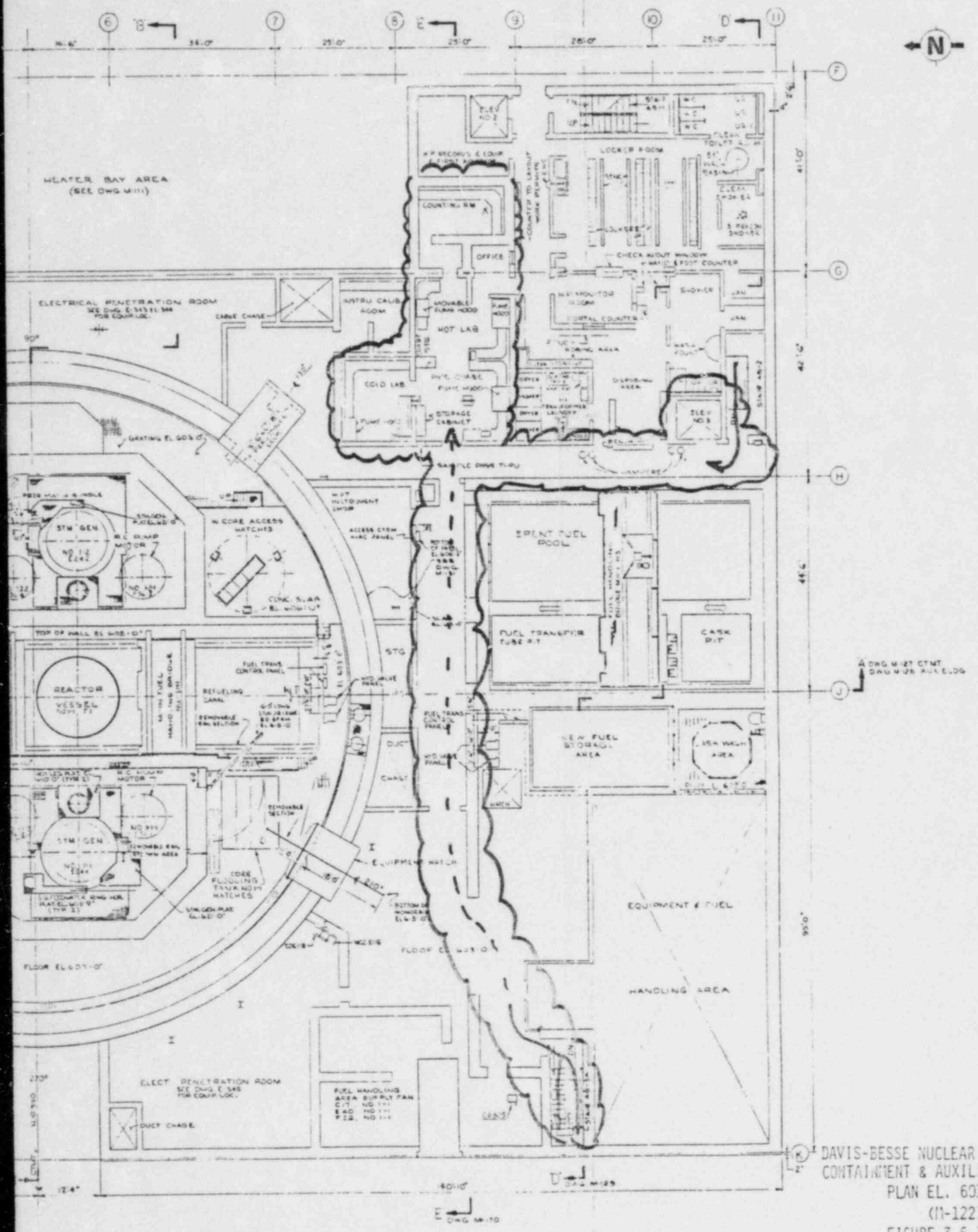
PLAN AT 595'-0"



DAVIS-BESSE NUCLEAR POWER STATION
CONTAINMENT & AUXILIARY BUILDINGS
PLAN EL. 585'-0"
(11-123)
FIGURE 3.6-3

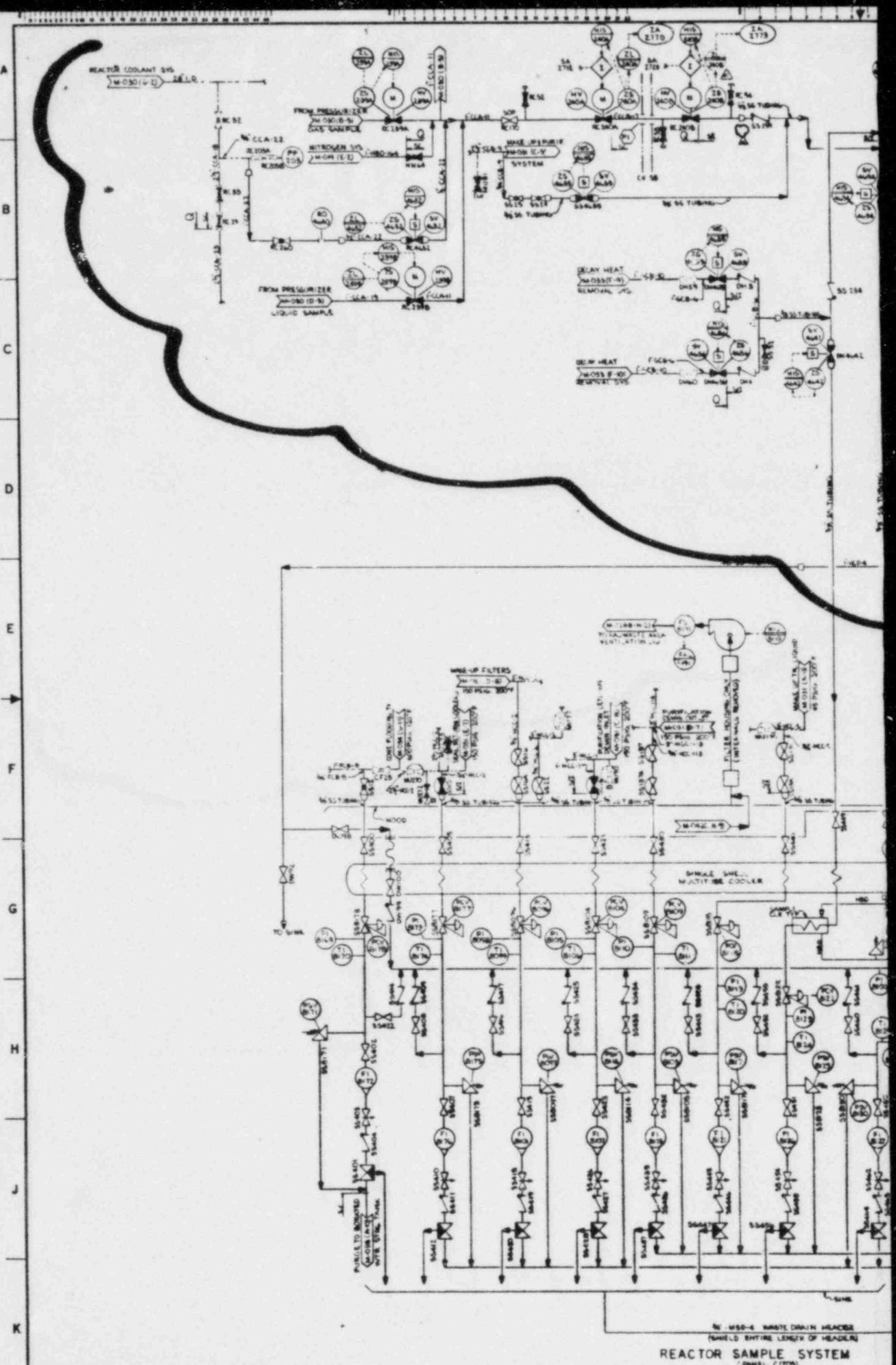
REVISION 0
JULY 1982

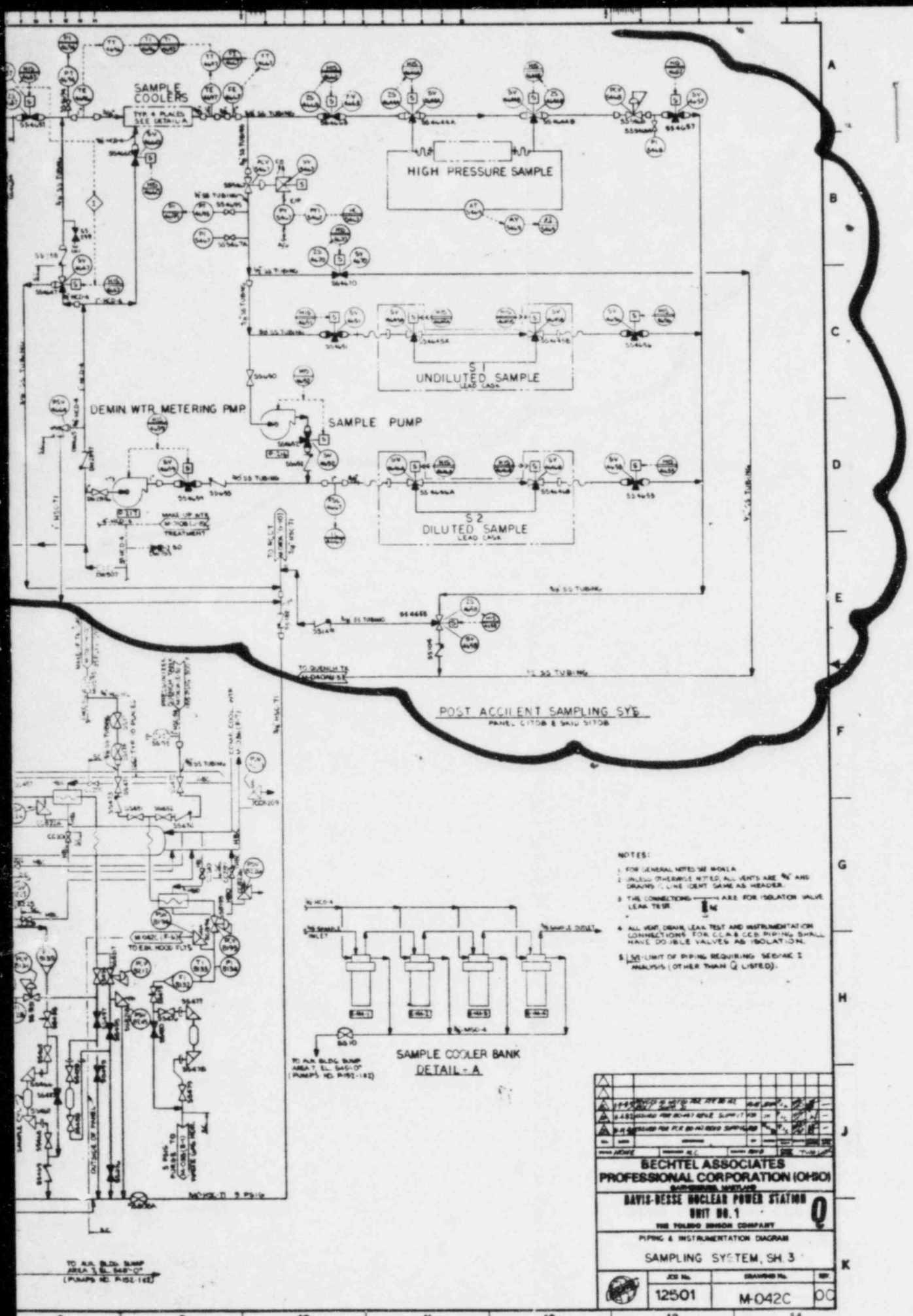

1
2
3
4
5
F
H
A
25'-0"
25'-0"
25'-0"
25'-0"
17'-6"
BATTERY ROOM "A"
SEE DWG. E-343 FOR EQUIP. LOC.
WATERTIGHT DOOR
EMER. SHOWER / EYEWASH
33'-0"
LOW VOLTAGE SWITCHGEAR ROOM
SEE DWG. E-343 FOR EQUIP. LOC.
LOW VOLTAGE SWITCHGEAR ROOM
SEE DWG. E-343 FOR EQUIP. LOC.
BATTERY ROOM "B"
SEE DWG. E-343 FOR EQUIP. LOC.
WATERTIGHT DOOR
LADDER UP TO EL 903'-0"
D.G. OPENINGS
ROOF EL. 910'-0"
CONTAINMENT E.L. 100
D.G. OPENINGS
D.G. OPENINGS
PARAPET
PRESSURIZER
PRESSURIZER PLAT
CORE FLOODING
REACTOR HEAD STG. STAND
SERVICE STRUCTURE
EQUIPMENT HATCHES
52'-6"
CRD TOOL SUPPORT
EL. 918'-0"
EMERGENCY LOCK ENCLOSURE ROOF EL. 599'-0"
PARAPET
DN
UP
DWG. M-128 CTMT
DWG. M-126 AUX. BLDG



DAVIS-BESSE NUCLEAR POWER STATION
CONTAINMENT & AUXILIARY BUILDINGS
PLAN EL. 603'-0"
(M-122)
FIGURE 3.6-7

REVISION 0
JULY 1982


REACTOR COOLANT SYS
FROM PRESSURIZER
NITROGEN SYS
MAKE-UP PUMP
SYSTEM
DELAY HEAT
REMOVAL SYS
FROM PRESSURIZER
LIQUID SAMPLE
MAKE-UP FILTERS
SHIELD SHELL
MULTITUBE COOLER
TO SHIM
PURGE TO BORATED
WASTE DISPOSAL
SYSTEM
WASTE DRAIN HEADER
(SHIELD ENTIRE LENGTH OF HEADER)
REACTOR SAMPLE SYSTEM
(PANEL C705)
A
B
C
D
E
F
G
H
J
K
1
2
3
4
5
6
7


SAMPLE COOLERS
HIGH PRESSURE SAMPLE
S1
UNDILUTED SAMPLE
LEAD CASK
DEMIN WTR METERING PMP
SAMPLE PUMP
S2
DILUTED SAMPLE
LEAD CASK
POST ACCIDENT SAMPLING SYS
PANEL C170B & SKID S170B
SAMPLE COOLER BANK
DETAIL - A
NOTES:
1 FOR GENERAL NOTES SEE SHEET 1
2 UNLESS OTHERWISE NOTED, ALL VENTS ARE ¾" AND DRAINS 1", LINE IDENT SAME AS HEADER.
3 THE CONNECTIONS ARE FOR ISOLATION VALVE LEAK TEST.
4 ALL VENT, DRAIN, LEAK TEST AND INSTRUMENTATION CONNECTIONS FOR CLASS CCD PIPING SHALL HAVE DOUBLE VALVES AS ISOLATION.
5 LIMIT OF PIPING REQUIRING SEISMIC I ANALYSIS (OTHER THAN Q LISTED).
BECHTEL ASSOCIATES PROFESSIONAL CORPORATION (OHIO)
DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1
THE TOLEDO EDISON COMPANY
PIPING & INSTRUMENTATION DIAGRAM
SAMPLING SYSTEM, SH. 3
12501
M-042C
00