DL-041186_02

THE APPLIED RADIANT ENERGY CORP.

2432 LAKESIDE DRIVE
LYNCHBURG, VIRGINIA 24501
(804) 525-5252

April 11, 1986
(Retyped January 6, 1988)

Mr. Earl G. Wright
Senior License Reviewer
Nuclear Materials Safety Section
Division of Radiation Safety and Safeguards
United States Nuclear Regulatory Commission
Region II
101 Marietta St., N.W.
Atlanta, Georgia 30323

Docket No. 030-07099
License No. 45-11496-01

Dear Mr. Wright:

We are herein requesting an amendment to condition 13 of our Materials License (referenced above) as follows:

Condition 13: Licensed material shall be used by, or under the supervision of, Lawrence G. Barrett, James J. Myron, Rodney W. Bell, Thomas A. Garrett, Jesse D. Moon, Jr., John E. Hearle, or Christopher K. Conner. Licensed materials may be used by, or under the supervision of individuals designated by Lawrence G. Barrett (Radiation Protection Officer), James J. Myron and Rodney W. Bell (alternates).

1) Such individuals shall not be designated until they have received a training program that will include the following topics:

a) the principles and fundamentals of radiation safety and good safety practices related to the use of radioactive materials
b) the use of radiation detection instruments
c) operating and emergency procedures
d) the design and operation of the irradiator
e) all items, conditions and amendments of our present Material License

As ARECO shall be receiving an allocation of Cesium-137 from the DOE to be utilized in our facility in the near future, emphasis will be placed on the properties of and hazards associated with this radioisotope as well as the Cobalt-60 presently in our possession.

Special emphasis will be placed on training to insure competency in understanding the function of the leak detection system to be installed. Awareness of monitor and detector indications of leakage will be stressed as well as the necessity of informing the Radiation Protection Officer or his alternates named in Condition 13 if they are not the first ones to be aware of the situation.

The subject matter to be presented in the training program will not consist solely of the instructor's personal knowledge, but will be derived from existing literature, both published and generated by the company from our twenty years successful operation of a large radioactive isotope source (Cobalt-60).

A list of references and the subject matter with which they deal is attached and should serve as an outline of the program.

2) The length of the training program will be approximately 40 hours. The instructors will be James J. Myron, Ph.D., assisted by Rodney W. Bell, B.S. It will be conducted mainly in a typical classroom verbal format, but will include hands-on training as required for proper qualification. No employee will be eligible to undergo training to become a designated individual until they have been employed as a Technician for a period of not less than 90 days.

3) Upon completion of the training program, competency shall be verified by a written test comprised of approximately 50 questions. These will be diverse and will deal with an examinee's knowledge and understanding of basic fundamentals of radiation's effects on matter (stressing biological matter), the hazardous nature of radiation, radiation safety and protection against radiation. This written test will be biased towards questions regarding safety, emergency, and protection situations as they apply to the company's irradiator(s). Myron and Bell will devise, supervise, and grade this test. No course material or notes will be permitted to be present during the test; i.e., it will be a "closed book" exam. Test questions will be changed in large measure, if not totally, at different times that the test is given.

To complement this written test, each examinee will be required to answer oral questions on standard procedures for routine irradiation procedures. These verbal answers will be involved in a final competency score or grade.

4) Records will be kept to document every designated user's training and competency. They will include a signed statement by the person involved that they have received the radiation training program. There will also be a dated instructor-trainee log record, a copy of the written test, and the graded results for each individual taking the test. This grade will include the results of verbal questioning. These records will be maintained for at least the lifetime of our Materials License.

5) There will be at least one [illegible] designated individual or authorized user present at the irradiator facility during all hours of irradiator operation. It will be these individuals' responsibility to assure that unauthorized employees do not enter the irradiator pool area or access controlled by designated personnel or authorized users. Non-employee access to the facility may be prevented by keeping all doors locked except [illegible] the front office door shall be provided.

The radiation technician employee entrance and exit is protected by a sliding mesh gate which is locked from the inside when not in use. This gate covers the entire entrance/exit door. This is the sole entrance to the building when the front office is not occupied.

Authorized visitors whose presence would be required in the pool area will be accompanied by authorized users and shall be provided with an immediate reading dosimeter. Each visitor will also sign a visitor's log book.

As Mr. Barrett stated in a phone conversation of April 8, 1986 with you we are anxious to have Condition 13 amended as stated above as quickly as possible. Therefore, if you have any questions or need clarification of information, please call me immediately at (804) 239-4300.

Sincerely yours,

THE APPLIED RADIANT ENERGY CORP.

James J. Myron, Ph.D.
Director of Radiation Technical Services

JJM:dcs

Attachments: 1) Irradiator Training Program: References Used and Outline of Material to be Presented

2) Irradiator Training Program Sample Test

Irradiator Training Program:
References Used and Outline of Material
to be Presented

Reference 1) "Living with Radiation" 1. Fundamentals - prepared by F. L. Brannigan, U. S. Atomic Energy Commission

Chapter III - The Problem of Hazard - background exposure, relationship to other risks, hazard evaluation - effects of overexposure, external vs internal radiation problems.

Chapter IV - External Radiation Problem - highly penetrating radiation, effect on body, harmful effects of radiation exposure, units of measurement, levels of injury, genetic effects, long term exposure

Chapter V - Protection from External Radiation (with Subheadings)

Chapter VIII - Contamination (with Subheadings)

Chapter IX - Instruments and Personnel Dosimetry (with Subheadings)

While reference 1) is not highly technical or mathematical, it presents the subject material in a non-confusing, often graphical, style and covers the material listed in sections 1a) and 1b) above in a clear manner.

Reference 2) 10 CFR part 19 "Notices, Instructions and Reports to Workers; Inspections"

Reference 3) 10 CFR part 20 "Standards for Protection Against Radiation"

Reference 4) 10 CFR part 21 "Reporting of Defects and Non-Compliance"

Reference 5) 10 CFR part 30 "Rules of General Applicability to Domestic Licensing of by-product Material"

Reference 6) "A Review of Safety Issues that pertain to the Use of WESF Cesium Chloride Capsules in an Irradiator" by G. L. Tiney et al, (PNL - 5170) (UC - 70) prepared for the U. S. Dept. of Energy by Battelle Pacific Northwest Laboratory, July 1984

This report includes:

a) physical description and properties of the capsules
b) their utilization
c) performance requirements
d) potential mechanisms for Cesium-137 release (corrosion, thermal expansion)
e) capsule mechanical properties

Reference 7) Outline for Health Physics Lecture for new C & I Technicians (Applied Radiant Energy Corp.)

Main Headings: a) Familiarization with Instructions re Action to be Taken in Emergency Situations
b) Cobalt-60 and Gamma Rays (Cesium-137 material to be added)
c) Shielding
d) Safety Considerations and Methods used to Protect Personnel from Radiation

e) Personnel Monitors (use and care of)
f) Production Irradiator(s)
g) "Pool Work" (lowering and raising samples in and out of the pool for the irradiation process)

Each of these major headings contain varying numbers of subheadings and deal with material listed in sections 1a), b), and c) in a manner directly related to the use of the company's irradiator(s).

Reference 8) The Applied Radiant Energy Corp. - Irradiator Operating Procedures, Revised Nov 2, 1980

This company document includes:

a) radiation surveys
b) sample loading (in and out of the irradiator pool)
c) emergency procedures
d) a description of the pool, shielding, water purification system, interlock systems to prevent radiation exposure, plaque description and below pool storage capabilities, and ARECO's unique duo-dose irradiation procedure.

A thorough coverage of this material, especially d), of this reference complemented by hands-on training in necessary sample container manipulations, would cover the subject matter of section 1d.

Reference 9) ARECO's NRC Materials License #5-11496-01 and associated information. This is the reference to cover section 1e.

APPENDIX "C"

MASTER ENGINEER AND DESIGNERS

REPORT OF APRIL 11, 1986:

INVESTIGATION OF EXISTING IRRADIATOR POOL

PGS. 20-27

April 11, 1986

Messrs. L.G. Barrett and [illegible]
The Applied Radiant Energy Corp.
2432 Lakeside Drive
Lynchburg, VA 24501

Re: Investigation of Existing
Irradiator Pool
The Applied Radiant Energy Corp.
Lynchburg, Virginia
Project No. 155-004

Gentlemen:

As requested in our telephone conversation and as further defined in subsequent visits to your facility, we have performed an investigation of the existing irradiator pool at your plant on Lakeside Drive.

Our investigation was made to assist you in responding to the Request for Information contained in the letter dated March 11, 1986 from the Region II office of the Nuclear Regulatory Commission. Specifically, our investigation involved Items 3b and 9a, 9b, and 9c as enumerated in the aforementioned letter. The results of our investigation are as follows:

1. Condition of Existing Pool (Paragraph 3b)

Prior to visiting the site to observe the conditions of the pool, we reviewed drawings of the original construction, including Drawing No. 1 dated August 6, 1965 as prepared by Wiley & Wilson and shop drawings from Concrete Pipe and Products Company of Richmond, Virginia who provided the reinforced concrete pipe which form the walls of the pool.

After reviewing the construction drawings and shop drawings of the pool we visited the site to observe the present condition of the pool. Since this pool is completely below ground level, observations were limited to the top surface of the walls of the pool and to a visual inspection of the interior walls and base of the pool.

There have been some modifications to the steel support structure mounted on top of the pool wall, but otherwise construction appears to match the original contract documents. The interior surface of the pool is lined with an epoxy coating from the [illegible] of the pool up to the [illegible] openings through the [illegible] of the pool. No structural cracks or other [illegible]

pool walls or base. We particularly observed joints in the concrete pipe which are covered by the epoxy lining and could not observe any discernible cracks in the lining or in the pipe sections. The relative level of the top of the pool walls and the building floor slab indicate no differential settlment or tilting of the pool from its original constructed position. We also removed some of the steel plates around the top surface of the pool and observed the exterior of the pool walls. Again, we could see no indications of movement or settlement.

Approximately ten inches below the top of the pool wall (just below the drain openings) there appears to be some erosion or wear of the interior concrete surface of the pipe. This condition occurs along a section approximately two feet long on the south wall of the pool. We observed that this condition occurs approximately at the level where the epoxy lining stops and is more than likely at the maximum water level.

This erosion, which is not much more than a roughening of the interior concrete pipe surface, could have been caused by several conditions or occurrences. For instance, if the pool were allowed to sit for a extended period of time without a source plaque and in an unheated building, ice could form on the surface of the pool and enough moisture could penetrate the walls to cause freeze/thaw erosion of the interior pipe surface. This roughening of the concrete could also have been caused by a material handling mechanism which could have rubbed the wall at this point. In either case, we do not consider this surface roughening as having any detrimental effect on the structural integrity of the pool.

Measurements of pool depth and wall thickness taken at the site confirm information given on the design drawings and shop drawings. In addition to our investigation at the site we performed structural calculations to check the adequacy of the base slab of the pool to support the loaded cask weight of 29,300 pounds, which will be used to handle the fuel. The calculations indicate that the shearing stress in the pool bottom and the resulting soil bearing capacity from the loaded cask in the bottom of the pool are both well within allowable stresses.

2. Factors Affecting Pool Stability (Paragraph 9a, 9b, and 9c)

Inasmuch as this pool was constructed over [illegible] there are no soil borings taken at this [illegible] talked with the contractor who originally [illegible] to obtain his recollection of the soil [illegible]

Bill Pugh of C. L. Lewis and Company of Lynchburg, indicated that the first several feet (presumably three to five feet) from the surface consisted mainly of top soil and grey clay. The remaining depth of the excavation of some 25 feet was through red clay with some weathered rock being encountered just as foundation level was reached. Mr. Pugh indicated that no ground water was encountered during the construction and that the excavation stayed dry during the construction period. This information regarding the soil characteristics is confirmed by observing deep railroad cuts near the site and also by observations made at construction projects under way near the location of this facility.

The red clay and weathered rock encountered at the foundation level of this pool are normally considered to have a soil bearing capacity in the range of four to five thousand pounds for red clay and greater than five thousand pounds for the weathered rock. The soil pressure generated by the pool walls, foundation, and water without the cask is approximately 1500 pounds per square foot. With the additional load of the cask the area immediately under the cask is increased to a total soil pressure of approximately twenty-eight hundred pounds per square foot, well within the bearing capacity of the soil.

Mr. Pugh also provided information regarding the stability of the soil when he noted that the excavation remained open for some time after the pipe was installed and again there was no deterioration of the walls of the excavation or any problem with ground water. Mr. Pugh further commented that after the pool was completed and before the excavation was backfilled, the pool was filled and allowed to stand several days to test for leaks. Any leaks which were found were properly sealed and the pool refilled and tested again prior to the placement of the backfill around the pool.

Exhibits 1 and 2 are attached to indicate the location and relative elevation of the facility with regard to adjacent streams. Exhibit 1 is a portion of the Lynchburg, Virginia Geological Survey Map. This exhibit indicates that the facility is located approximately 500 feet east of the intersection of Highways 221, running east and west, and 291, running north and south. The high elevation in the area is at the intersection of these two highways at approximately 840 feet above sea level. The facility is located at Elevation 820. On Exhibit 2 the [illegible] foot contour can be seen running just at the rear of the facility [illegible]. There is good natural drainage from the plant location.

There are no large streams or lakes very close to the facility, however, there are four small streams which originate in the area of the intersection of the two highways. The closest of these streams (see Point 2 on Exhibit 2) is located approximately 750 feet southeast of the plant at Elevation 755 feet. Another small stream (Point 3) is located 1100 feet north of the facility at Elevation 780 feet. There are two other small streams which originate west of Highway 291 (see Points 4 and 5). One of these streams is 1400 feet west of the facility at Elevation 770 feet and the other is approximatley 1700 feet southwest at Elevation 780 feet. We do not feel that flooding is a potential danger at this facility due to its relatively high elevation and natural drainage in almost every direction.

Potential for Flooding

Lynchburg is not considered to be an earthquake zone. The BOCA code indicates the State of Virginia as Zone 1 which is about the lowest listing given to any area in the Continental United States as taken from Chart 916 in the BOCA code. The construction details of the interlocking joint between the sections of reinforced concrete pipe and the attachment and anchorage of the pipe to the foundation slab give this pool structure considerable resistance to horizontal forces. See Exhibits 3 and 4 for pool wall and base construction details.

Earth-Quake Considerations

We trust that the information provided in this letter is adequate for your response to the NRC letter, however, if we can be of additional assistance, please let us know.

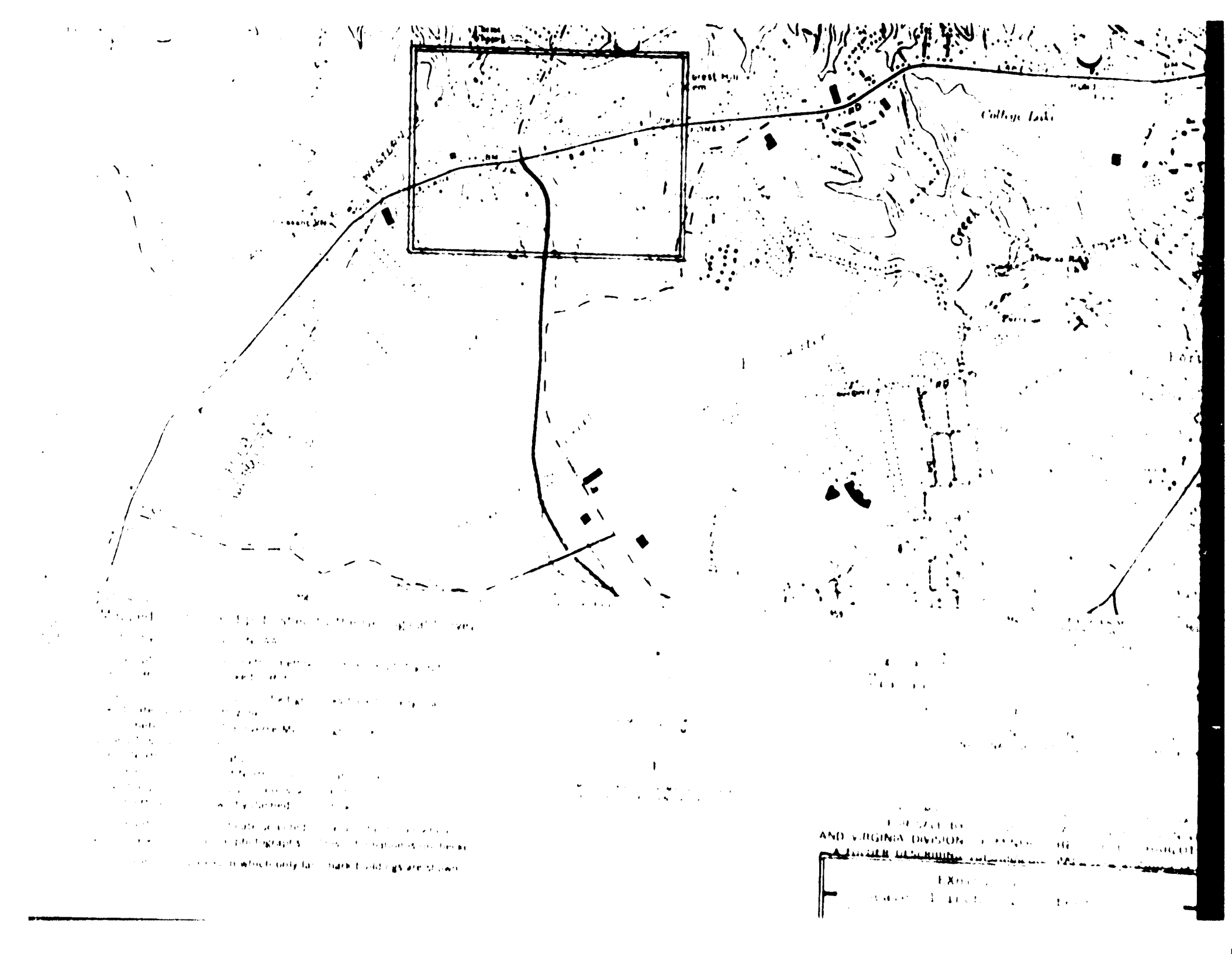
Very truly yours,

MASTER ENGINEERS AND DESIGNERS, P.C.

Charles M. Parker, P.E.
Project Manager

CMP:apl

Enclosures (4)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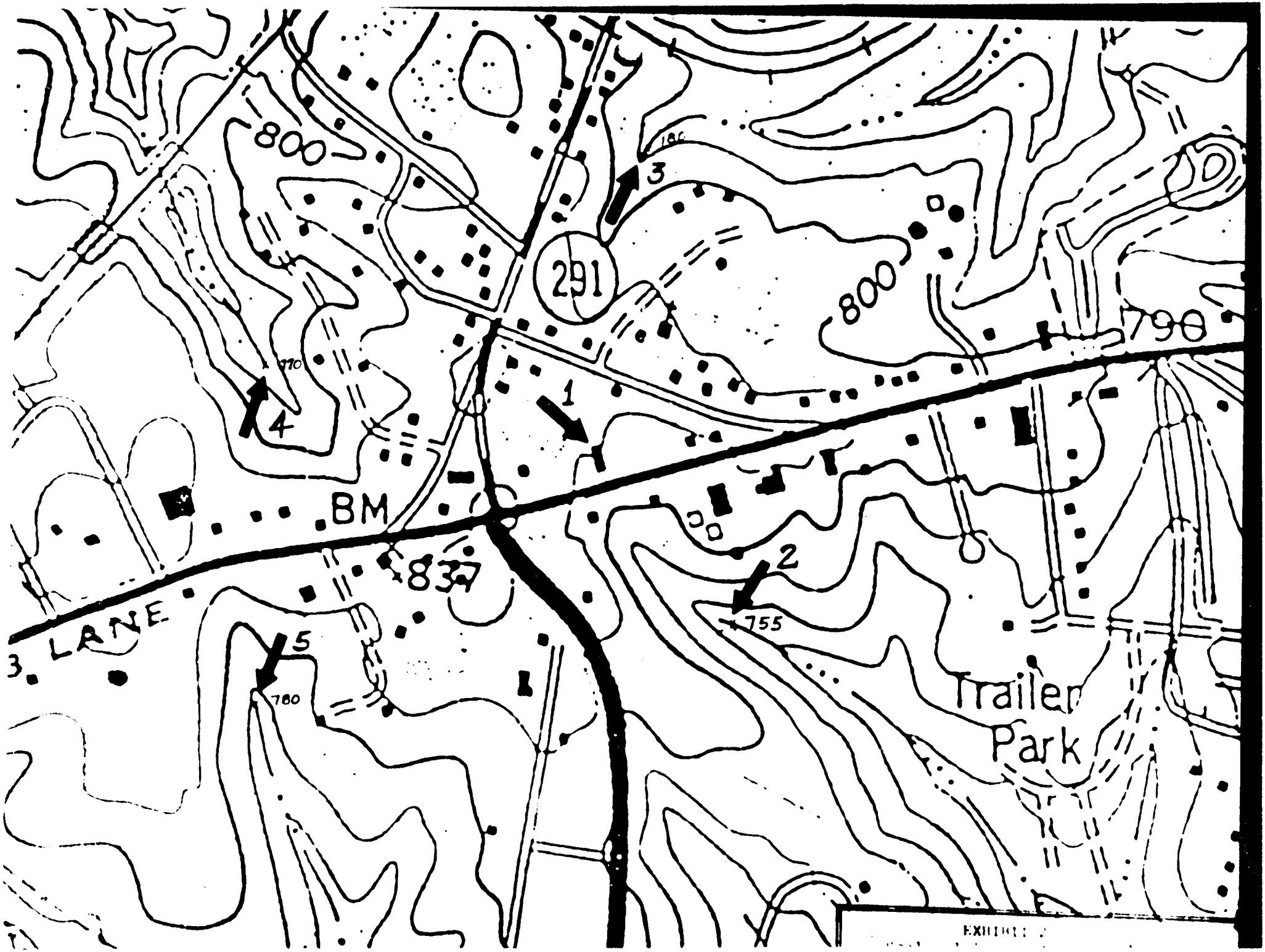
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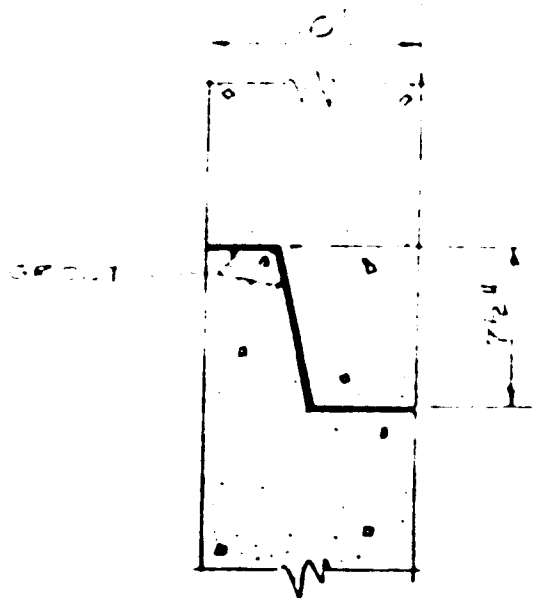
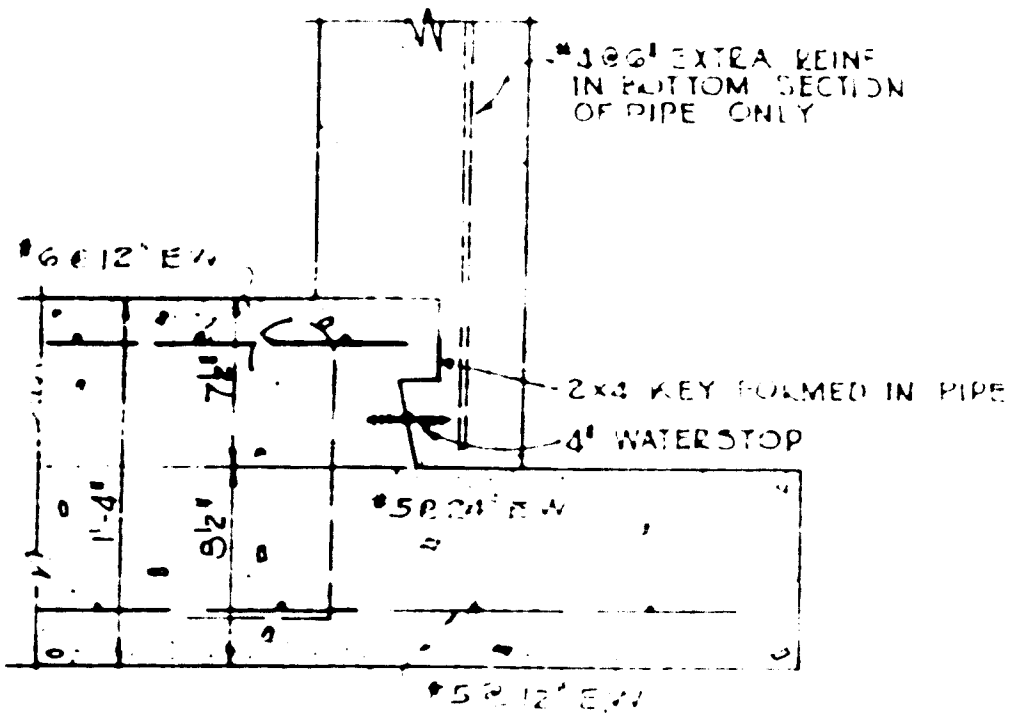
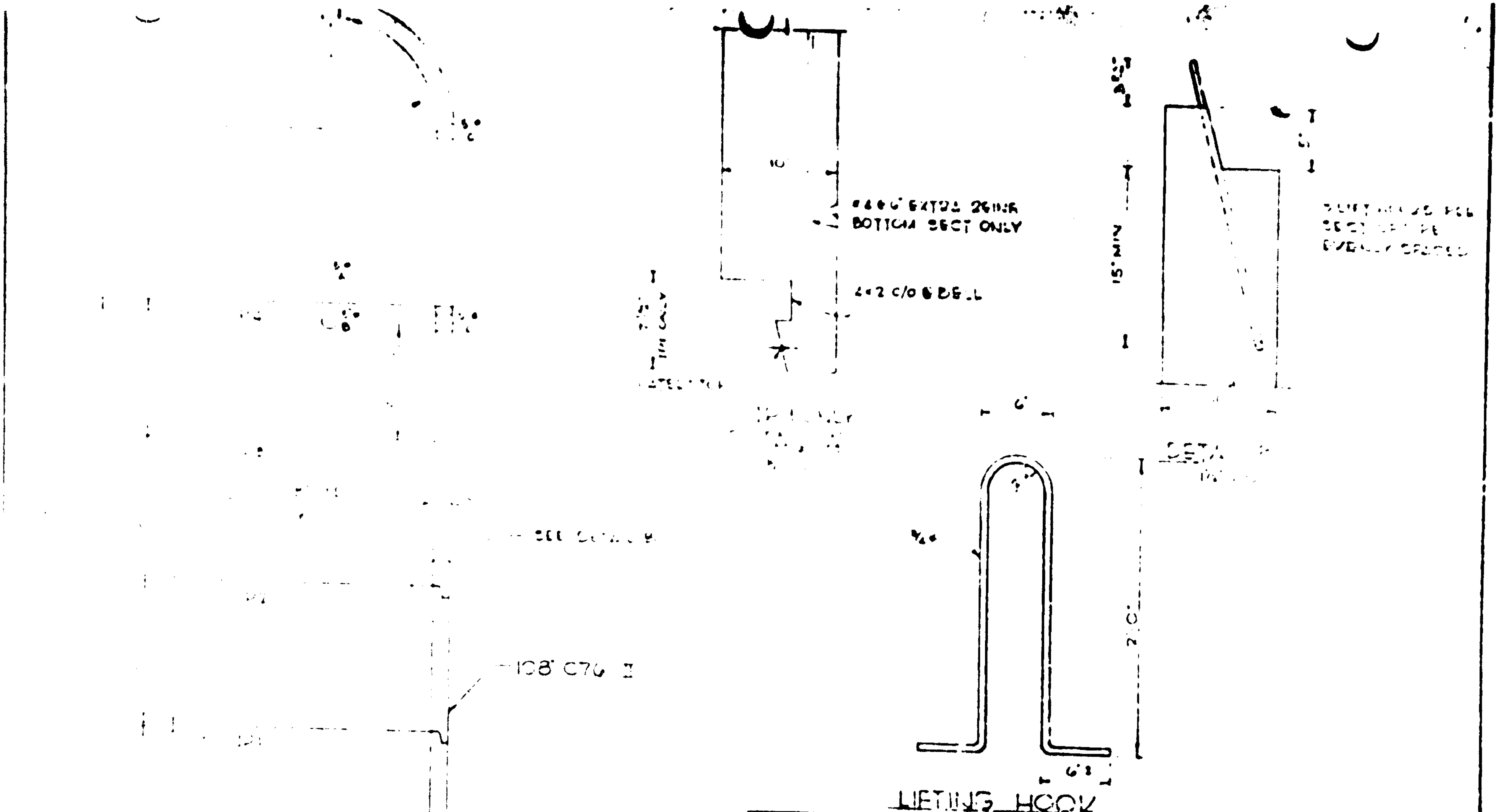


DETAIL A
SCALE: 1½" = 1'-0"

DETAIL A



DETAIL B
SCALE 1½" = 1'-0"



108" IRRADIATOR POOL
Nordion Corp

CONCRETE PIPE & PRODUCTS CO., INC.
RICHMOND VIRGINIA — JESSUP, MARYLAND

DATE	
SCALE	
DWG NO	DD-65-17A

C L LEWIS ICC

EXHIBIT 4

APPENDIX "D"

LETTER OF AGREEMENT FOR EMPLOYEE TREATMENT

FROM

LYNCHBURG GENERAL HOSPITAL