NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

DOCKET NUMBER 50-289

FILE NUMBER INCIDENT REPORT

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

TO: Mr. J P O'Reilly	FROM: Met. Edison Company Reading, Pa. 19603 R.C. Arnold	DATE OF DOCUMENT 3-10-77 DATE RECEIVED 3-21-77

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DESCRIPTION: Ltr trans the following: (1P)

ENCLOSURE: Suppl to Lic. Event Rpt 76-42-1P concerning the concrete pipe installations described in the FSAR & with attached piping layout in the vicinity of intake screen house....(1cy encl rc'd)

(4P)

DO NOT REMOVE

PLANT NAME: Three Mile Island Unit 1

ACKNOWLEDGED

DHL

NOTE: IF PERSONNEL EXPOSURE IS INVOLVED SEND DIRECTLY TO KREGER/J. COLLINS

FOR ACTION/INFORMATION

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METROPOLITAN EDISON COMPANY (SUBSIDIARY OF GENERAL PUBLIC UTILITIES CORPORATION)

POST OFFICE BOX 542 READING, PENNSYLVANIA 19603 TELEPHONE 215 – 929-3601

50-289

March 10, 1977
GQL 0308

Mr. J. P. O'Reilly, Director
Office of Inspection and Enforcement, Region 1
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Sir:

As stated by Mr. R. C. Arnold in the telephone conversation with Mr. R. Reid on February 18, 1977, Met-Ed is submitting this letter as a supplement to Licensee Event Report 76-42/1P. Should you require any additional information concerning this subject, please call either myself or Mr. D. G. Mitchell (ext. 169).

Sincerely,

R. C. Arnold
Vice President

RCA:DGM:lw
Attachment

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1. A general description of the concrete pipe installations since such a description is not contained in the FSAR.

There are six separate underground River Water pipe lines between the Intake Screen House and the Heat Exchanger Vault. These are all seismic class 1 with the exception of the 30" Secondary Services line which is seismic class 3. The attached sketch shows the layout of these lines in the vicinity of the Screen House. The 20" Reactor Building Emergency Cooling "A" line, the 24" Decay Heat "B" line, and the 30" Nuclear Services Supply line all emanate from the north side of the Screen House. Those which are to the south side are the 20" Reactor Building Emergency Cooling "B" line, the 24" Decay Heat "A" line, and the 30" Secondary Services line. All lines are constructed from lengths of prestressed concrete pipe having an embedded steel cylinder. All piping was supplied by the Price Brothers Company in accordance with the American Water Works Association (AWWA) Standard C301-64. Piping sections consist of either straight lengths or elbows, all joined by bell and spigot connections. The longest straight section being 20 feet.

The bell and spigot joints are used to: 1) provide a flexible joint adjacent to all structural wall penetrations to prevent direct shearing of the pipe and 2) along straight piping runs to provide the flexibility to sustain the thermal, dead load, overburden, and seismic loads anticipated during unit operations. Each bell and spigot is welded to its respective prestressed steel pipe liner at the time of manufacture. All connections use a rubber O-ring to seal against leakage and incorporate a rigid stop to prevent the maximum leak free extension from being exceeded. Such rigid stops are achieved by the use of either a harness clamp or a limit stop ring. Pipe joints within 10 feet of an elbow or a structural wall fitting are connected with a harnessed clamp, all other joints use the welded limit stop rings to limit joint displacement.

Thrust blocks are provided at all changes of direction in the piping runs to provide restraint for the elbow thrusts. These blocks are constructed of concrete and reinforced with rebar. Each elbow is encapsulated by a thrust block to restrain pipe movement.

All of the pipe runs were laid approximately 10 feet below grade level. Installation of the pipe was performed by first surveying the affected area, then excavating to a depth of 6" (+1") below the bottom of pipe elevation. Sand was then laid and compacted up to the elevation which matched the bottom of the pipe. After the pipe sections were joined together, another survey of the top of pipe elevations was taken. Sand was then placed on both sides of the pipe in layers and compacted until the pipe was covered with 6" (+1") of sand. Finally, the controlled backfill was placed in compacted layers until grade elevation was reached.

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Piping runs were excavated as described herein, however, placement of this piping at the Screen House was unique. This was due to the fact that in the immediate vicinity surrounding the Screen House major excavation of the virgin soil was required prior to the installation of the pipe. This was necessary in order to build the large cofferdam in the Susquehanna River which was required to support the excavation needed to reach bedrock for the Screen House foundation. As a result, major recompaction of this underlying soil was required prior to installation of the concrete piping and thrust blocks next to the Screen House. After this was completed, the lines were laid as described above.

2) The original design qualification of the pipes from a seismic standpoint and our basis for concluding the design is adequate.

The concrete piping was originally analyzed by Gilbert Associates, Inc. This analysis assumed a "Pin-ended semi-infinite beam on an elastic foundations: model for both the overburden and seismic cases. The overburden pipe deflection was determined by combining the pipe and overburden weights. Once found, then the seismic and overburden deflections were added to determine the loading resulting from a seismic disturbance. From this a bending moment and resulting stress was calculated and found to be within acceptable limits.

It should be noted that the calculated overburden and seismic deflection was approximately 1/2 inch based upon proper soil compaction. The pipe deflections on the north side of the Screen House were 1.2, 4, and 6 inches due to thrust block settlement. As a result, the piping failed due to excessive stresses. The original analysis shows that such deflections would result in unacceptable levels of stress. There is, therefore, no reason to doubt the validity of the original calculational techniques. That is, if the required soil compaction exists under the pipes, stresses in excess of the original design calculations will not occur.

Our evaluation of the River Water pipe problems experienced indicated that in the area of the failed piping the required soil compaction did not exist. Because of this, test borings were taken on the south side of the Screen House where the underlying virgin soil was also removed and recompacted. This was done in order to establish the adequacy of the soil compaction in that area. These test borings showed that the soil compaction beneath the thrust blocks and piping was properly compacted.

The piping away from this immediate area of the Screen House was excavated from virgin soil and is therefore not considered to be susceptible to settlement. As a result, we concluded that settlement of the lines to the north of the Screen House was a singular and isolated case. As a result of the repairs performed on these north side lines, the previous piping stresses were relieved and all of these nuclear safety related lines now meet all seismic class 1 requirements.

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3) The requirements of our monitoring program and how much settling is allowable before the seismic qualifications of the system are threatened.

The surveillance program specified that the three thrust blocks north of the Screen House be surveyed every two weeks following startup. If these measurements indicated less than a 1/16 inch drop per month after at least two months, then the surveillance would be reduced to once per month.

As a result of the repairs performed on these north side lines, the previous piping stresses were relieved. Because of the increased flexibility of the replacement pipe sections for the failed 20" and 24" pipes, these lines can settle an additional 1" at the thrust blocks and still retain their seismic class 1 flexibility. The 30" line may experience settlement of 1/2" at the thrust block and still retain its seismic class 1 flexibility.

CONCLUSION:

Metropolitan Edison feels that the responses contained in this letter should clarify the areas of concern expressed by the NRC. The point we wish to emphasize is that the area to the north side of the Screen House was unique. Repairs to the pipes in this area have restored them to a seismic 1 classification. Our surveillance program will continue to monitor these lines as long as necessary to establish their integrity at all times during operation. As a result, Met-Ed considers all of these nuclear safety related lines to be fully operational at this time and to meet all seismic class 1 requirements.

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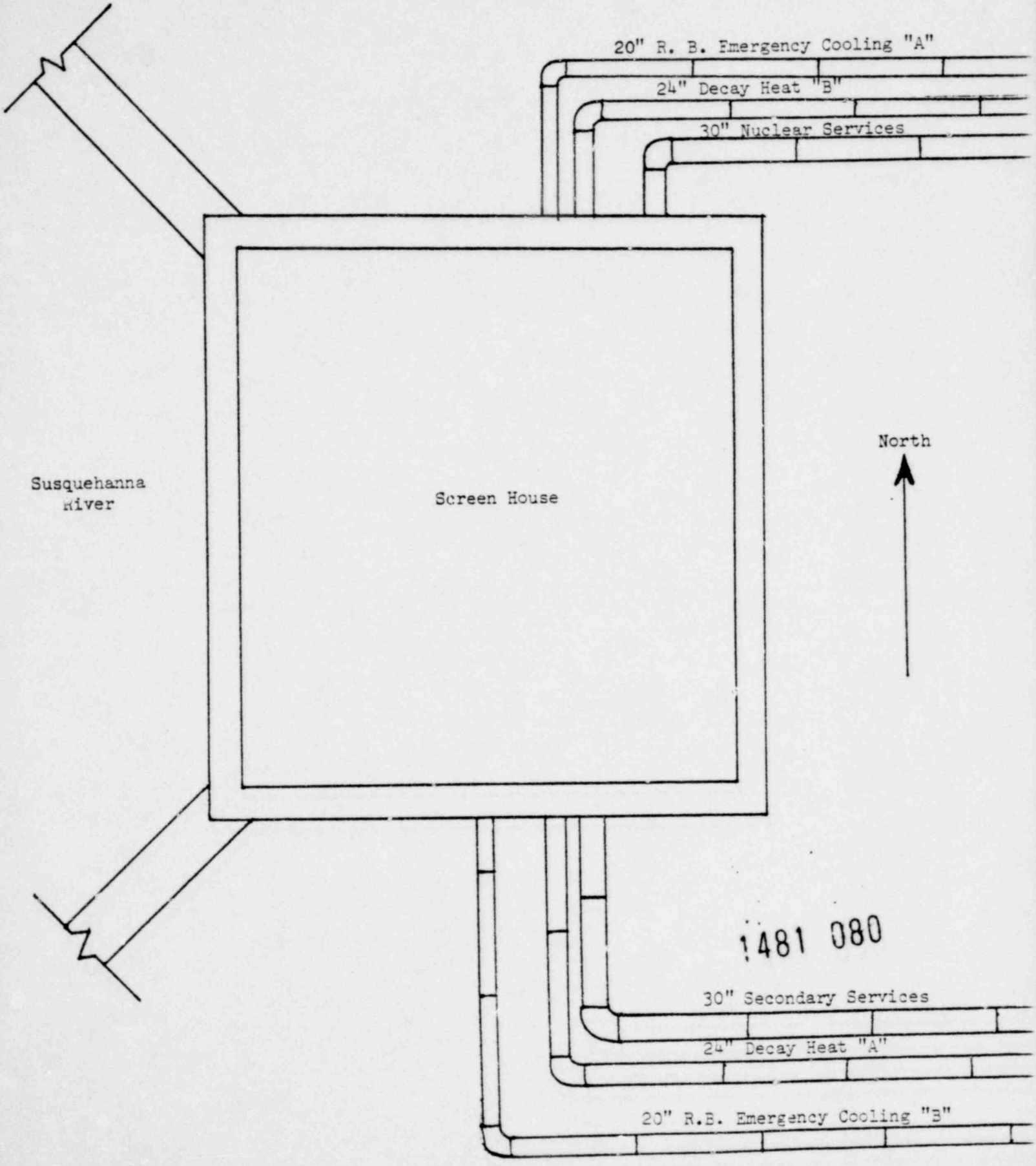
PIPING LAYOUT IN THE VICINITY OF INTAKE SCREEN HOUSE



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