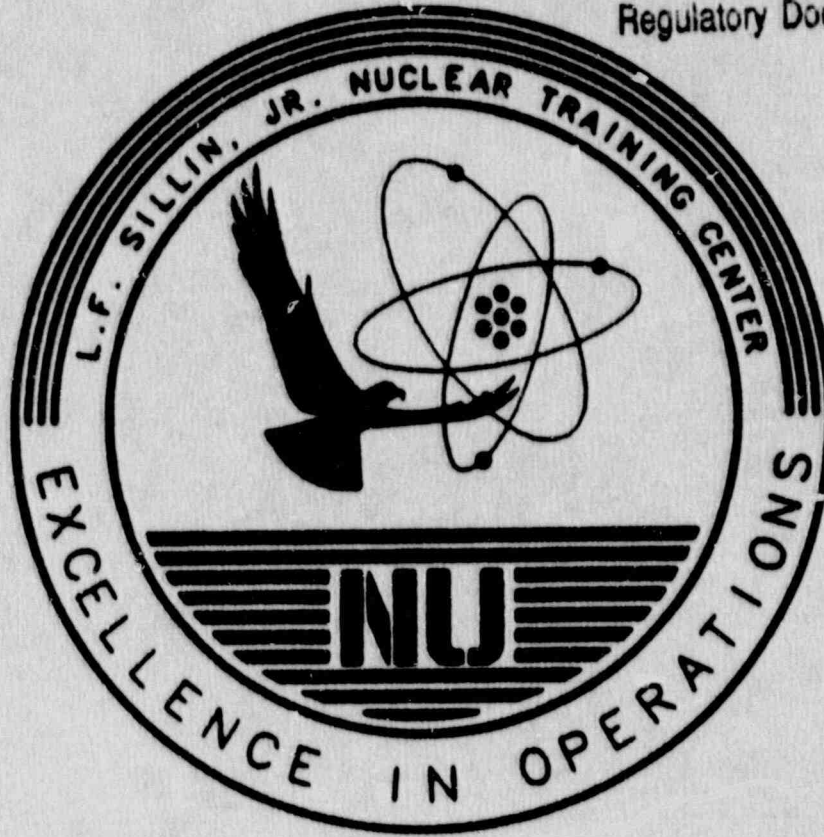


Docket # 50-245  
Accession # 9007160156  
Date 7/3/90 of Ltr  
Regulatory Docket File



MILLSTONE UNIT 1 SIMULATOR  
CERTIFICATION SU 3MITTAL

9007160159


**VOLUME 1**

**MILLSTONE UNIT 1 SIMULATOR  
DESIGN INFORMATION  
AND CERTIFICATION PROGRAM OVERVIEW**

MILLSTONE UNIT 1 SIMULATOR


CERTIFICATION SUBMITTAL

APPROVED:

  
\_\_\_\_\_  
Manager, Operator Training

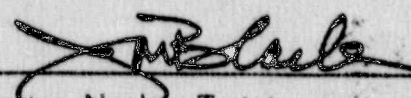
6/29/90  
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Date

APPROVED:

  
\_\_\_\_\_  
Manager  
Simulator Technical Support

6/29/90  
\_\_\_\_\_  
Date

APPROVED:

  
\_\_\_\_\_  
Director, Nuclear Training

7/2/90  
\_\_\_\_\_  
Date

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## INTRODUCTION

Northeast Utilities (NU) presently operates four plant specific simulators for Millstone Units 1, 2, 3 and the Haddam Neck Nuclear Power Plant at the Lelan F. Silitt, Jr. Nuclear Training Center in Waterford, Connecticut.

Within the Nuclear Training Department, the Operator Training Branch (OTB) and the Simulator Technical Support Branch (STSB) have responsibility for the operation and maintenance of all four simulators. This includes certification and ongoing compliance to regulatory requirements.

This certification submittal has been arranged in four volumes and is intended to provide an overview of the Millstone Unit 1 Simulator and its general applicability as an operator training tool.

**VOLUME 1:** Millstone Unit 1 Simulator Design Information and Certification Program Overview. This volume contains information on the MP1 simulator and its capabilities and also provides an overview of NU's Certification Program.

**VOLUME 2:** Nuclear Simulator Engineering Manual. This volume contains the generic procedures used to implement NU's certification methodology.

**VOLUMES 3 and 4:** Millstone Unit 1 Simulator Performance Test Summary. These two volumes contain specific performance test details, including:

- o Descriptions of the actual testing performed
- o Test abstracts
- o A summary of open, identified deficiencies
- o The four-year test schedule
- o Sample MP1 specific test procedures

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## NU CERTIFICATION PROGRAM OVERVIEW

The NU Certification Program has as its basis the following goals:

- o Ensure that each simulator possesses the capability to support the training program with which it is to be used.
- o Provide for certification in a timely, cost-effective manner, addressing the specific requirements of Regulatory Guide 1.149, NRC 10CFR55.45(b) and NUREG 1258.
- o Ensure ongoing compliance with the requirements set forth in ANSI/ANS-3.5, 1985.

The effort required to accomplish these goals has been divided into three main tasks: Definition of the Scope of Simulation, Validation of the Scope of Simulation, and Configuration Management.

## Scope of Simulation

The Scope of Simulation that NU is certifying is based upon the NU Simulator Training Guides and Performance Tests which encompass:

- (1) All events specified in ANSI/ANS-3.5, 1985 and Regulatory Guide 1.149, 1987.
- (2) The training requirements as specified in the various plant start-up, operating and emergency procedures.
- (3) Outside events (e.g., selected LERs, plant design changes, etc.) that affect the training programs and/or the trainer configuration.

## Simulator Validation

Validation of the Defined Scope of Simulation consists of two activities: Performance Testing and Verification.

### Simulator Performance Testing

A specific performance test has been developed for the Millstone 1 simulator which fulfills the testing requirements of ANSI/ANS-3.5, 1985 and INPO 86-026 Guideline for Simulator Training. The performance test includes the following sub-tests:

- o System Tests
- o Remote Functions Testing
- o Malfunction Testing
- o Simulator Operability Testing
- o Normal Operations Testing
- o Instructor Station Interface Testing
- o Real-Time Simulation Testing

The Acceptance Test Procedure (ATP), developed and implemented as part of simulator procurement, forms the basis for these tests. It is intended that the Simulator Performance Test be a dynamic document, i.e., it be updated to reflect modifications made to the simulator and/or new plant performance data.

The Simulator Performance Test has been used to establish baseline fidelity for the initial certification submittal and will be the vehicle for continuing fidelity verification. Volume 3 provides a detailed summary of the Millstone 1 performance test, including its content and results.



## **Verification**

This section contains activities which are requirements of certification, but do not fit within the context of performance testing, namely:

### **Defined Simulator**

#### **Operating Limits:**

This involves determining model limitations and identifying key parameters and their boundaries, and also, providing a method for alerting instructors when an operating limit is approached.

### **Plant-Referenced**

#### **Physical Fidelity:**

This activity involves conducting periodic comparisons of the simulator to the reference plant in the areas of panel simulation, instrument and control configuration, and ambient operating environment. Any identified discrepancies will be evaluated to determine the consequence to the simulator's ability to be used as an effective training tool.

### **Software Design**

#### **Verification:**

A review of the simulation diagrams was conducted against the defined Scope of Simulation to determine completeness. This overall review was done for initial certification only. Ongoing maintenance is provided for by the configuration management process, i.e., simulator documentation.

#### **Initial Conditions:**

Controls have been established for maintaining Initial Conditions used in the Operator Training Program.

## **Configuration Management**

NU's Simulator Configuration Management System (CMS) provides control over simulator configuration and design data bases, thereby ensuring that each simulator can effectively support the training curriculum with which it is to be used. CMS was designed with the following objectives in mind:

- o Establish and maintain a reference plant data base for each simulator.
- o Identify, track, resolve, and document differences between each simulator and its reference plant.
- o Provide the documentation required for certification and maintenance of each simulator.

The following subsections provide an overview of the four major components of NU's Simulator Configuration Management System: The Design Data Base, Documentation, Modification Control and Expansion of the Scope of Simulation.

### **Simulator Design Data Base**

Specific reference plant data which forms the basis for the current Simulator Hardware Configuration and Software Models was identified, collected, and validated. The data is stored in specific locations, dependent upon its type, and responsibility for its maintenance and access is assigned to specific individuals. Existing NU documentation programs are used wherever possible to interface with the data.

## Simulator Documentation

This section deals with simulator-specific documentation which is needed for certification and maintenance of the simulators. This documentation is controlled and updated, but it is not considered to be part of the design data base.

The documentation scope is represented by:

- Simulator System Documentation Manuals - These manuals provide design details for each simulated system model and are maintained by way of vendor support software and the Simulator System Documentation Standards.
- Software - The simulation models are considered to be documentation and are updated and detailed in accordance with the Software Documentation Standards.
- Simulator Test Results - This category includes the completed construction Acceptance Test Procedure (ATP), along with the In-service Performance and Operability Tests.
- Closed Simulator Design Changes (SDCs) - Following update of the Design Data Base, closed SDCs will be maintained in a historical file.

### Modification Control

NU has in place a process that provides effective control over simulator configuration and fully complies with NRC regulations and industry standards.

Components of the process are:

- o Implementation of a set of procedures which establishes control over the coordination, resolution, and documentation of identified differences between the simulator and the reference plant; and maintains the integrity of simulator software, hardware, and design data base.
- o A Simulator Configuration Control Committee (SCCC) which is responsible for overall simulator design control and management of NTD resources involved with the simulator modification effort. The SCCC is comprised of representatives from both the Operator Training Branch (OTB) and the Simulator Technical Support Branch (STSB) and is chaired by the Director, Nuclear Training.
- o A computer-based Simulator Design Change (SDC) report is used to track the status of all identified simulator discrepancies. The SDC report contains updated, pertinent information that is used by OTB and STSB in the conduct of all simulator modification activities.

### Expansion of the Scope of Simulation

Outside events which have the capability for affecting the training programs and/or simulator configuration are periodically monitored. These include:

- o New reference plant performance data
- o Student feedback
- o Curriculum testing
- o New simulator training guides
- o Major plant design changes (project assignments)
- o Licensing Event Reports (LERs)
- o Significant Operating Event Reports (SOERs)
- o Plant Design Change Reports (PDCRs)

Refer to Volume 3 for more specific details on this facet of the certification program.

## NSEM Overview

To ensure consistent application of the certification process, NU has put in place a manual to contain all of the procedures necessary for the development and implementation of the certification program. The manual is entitled Nuclear Simulator Engineering Manual (NSEM) and is a controlled document. The complete NSEM is contained in Volume 2.

### NSEM Format

Section 1 contains those procedures which provide administrative guidelines, including:

- o Branch Responsibilities & Program Overview
- o Maintenance of the NSEM

Section 2 contains those procedures which define the Scope of Simulation for Certification, including:

- o Scope of Hardware Certification
- o Scope of Software Certification
- o Scope of Functions (Remotes, Malfunctions, etc.)  
to be certified

Section 3 contains those procedures which deal with the Simulator Design Data Base and Documentation, including:

- o Documentation Standards
- o Generic Data Base Content
- o Unit-Specific Data Indexes
- o Designated Locations for Data/Documents

Section 4 contains those procedures which deal with Simulator Performance Testing and Verification (i.e., validation of the defined Scope of Simulation).

- o System Testing
- o Malfunction Testing
- o Remote Function Testing
- o Simulator Operability Testing
- o Normal Operations Testing
- o Instructor Station Interface Testing
- o Real-Time Simulation Testing
- o Simulator Operating Limits
- o Plant-referenced Physical Fidelity
- o Initial Conditions

Section 5 contains those procedures dealing with Simulator Configuration Management, including:

- o Simulator Modification Control
- o Design Data Base Update
- o Performance Test Update
- o Retest Requirements for Simulator Design Changes

Section 6 contains those procedures which address the "outside events" which affect the Training Program and/or Trainer Configuration, including:

- o Collection and review of new reference plant performance data
- o Student Feedback
- o Curriculum Testing
- o Development of new Simulator Training Guides
- o Major plant design changes

REFERENCE PLANT NAMEPLATE DATA

Owner: Northeast Utilities

Operator: Northeast Nuclear Energy Company

Location: Millstone Nuclear Generating Station  
Waterford, Connecticut

Manufacturer: General Electric (NSSS)  
Ebasco (AE)

MW Output: 690 MWe

NSSS: BWR

Commercial  
Operation: December 1970



## SIMULATOR NAMEPLATE DATA

Owner: Prudential Insurance Company of America

Operator: Northeast Utilitles Service Company

Location: Lelan F. Sillin Jr. Nuclear Training Center  
Waterford, Connecticut 06385-0128

Manufacturer: Link Simulation Systems Division (LSSD)

Ready for  
Training: 06/12/86

## Computer Configuration

GOULD/SEL 8780      Dual 32 Bit Processors  
                         SEL BUS  
                         MP BUS  
                         w/ 4MB 75NS Main Memory  
                         32K Cache Memory  
                         High Speed Data Interfaces (HSDs)

GOULD/SEL 8705      Single 32 Bit Processor  
                         SEL BUS  
                         MP BUS  
                         w/ 4 MB 75NS Main Memory  
                         16KB Cache Memory  
                         HSDs

GOULD, SEL MS2      2MB Shared Memory (1)  
                         DEC/VAX 8600

- (1)      The 8780 and 8705 machines are linked together through shared memory.
- (2)      Stimulated plant process computer receives process data via HSD from the GOULD/SEL 8780.

## DEFINED SCOPE OF SIMULATION

Appendix A provides a general description of the Simulator Control Room layout.

Appendix B contains Simulation System Diagrams which provide functional representations of the simulator models for each of the following reference plant systems:

Automatic Pressure Relief	(AP)	Nuclear Instrumentation	(NI)
Component Cooling	(CC)	Off Gas	(OG)
Containment/HVAC	(CH)	RBCCW	(RC)
Reactor Core	(CR)	Rod Drive	(RD)
Core Spray	(CS)	Radiation Monitoring	(R)
Cleanup	(CU)	Reactor Recirculation	(RR)
Circulating Water	(CW)	Reactor Protection	(RP)
Electrical Distribution	(ED)	Shutdown Cooling	(SD)
Electrical Generation	(EG)	Service Water	(SW)
Feedwater	(FW)	Standby Liquid	(SL)
Instrument Air	(IA)	SCCW	(SC)
Low Pressure Coolant		Turbine Control	(TC)
Injection	(LP)	Turbine	(TU)
Main Steam	(MS)	Waste Disposal	(WD)

## SIMULATOR CONTROL CAPABILITIES

### Initial Condition (IC) Reset

Training sessions can be started from the Instructor Station by using any certified Initial Condition (IC) as the starting point for the training exercise. The simulator is capable of storing up to 58 ICs; with an IC 59 reserved for snapshot, and IC 60 for backtrack features. Another feature, Switch Check, alerts the instructor to any switches, potentiometers, etc., that are misaligned for the particular IC.

### Freeze

The "Freeze" condition can be invoked at any time by activation of the "Freeze" pushbutton located on the Instructor Station. When "Freeze" is activated, the progression of all dynamic simulation will stop and remain static. When "Freeze" is deactivated, the simulation continues from the point where stopped, provided that neither the instructor nor the students have changed any parameters during the "Freeze" period.

### Snapshot

The "Snapshot" function is activated from the Instructor Station and allows the instructor to record the present status of the simulator for use as a future IC.

### Backtrack

The instructor has the capability, through the Instructor Station, to backtrack to a previously stored plant condition. Once the desired "Backtrack" record (point of time) is selected, the instructor can start the trainer from that point or just review the simulator status of that condition. This capability is very useful in that it allows an operator to go back in exercise time to repeat a troublesome or difficult procedure.

### **Time Controls**

Normally, simulation is performed in real time, i.e., the modeled physical plant phenomena will generate observable control board indications in a time frame compatible with the actual plant. The instructor has the capability to select "fast time" operation for certain system parameters: Xenon transients, condenser air evacuation, Turbine metal temperatures heatup and cooldown, chest metal temperature heatup and cooldown, containment air evacuation and off gas system. The instructor can also select "slow time" simulation. This gives the appearance of operation slower than that of real time, permitting the observation of fast transient conditions with all plant systems operating in slow time. A third option, "step time," allows the instructor to step through the exercise frame by frame.

### **Malfunctions**

The instructor can demonstrate various abnormal/emergency operational conditions by inserting malfunctions during a simulation run. Volume 4 of this submittal contains a list of all malfunctions on the MP1 simulator. Some malfunctions are generic in nature and can be applied to a number of similar plant components.

## **Remote Functions**

The instructor can "control" certain equipment and systems external to the control room which have been deemed to be essential to the training curriculum. There are three major groups of Remote Functions:

- o Local Operator Actions - Valves, breakers, etc.
  
- o Environmental Effects - Outside air temperature, sea water temperature
  
- o Reactor/Turbine Protection Override

Volume 3 of this submittal contains listings of "certified" Remote Functions.

## **I/O Override**

The instructor has the ability to override any control room panel I/O device of any computer input or output (i.e., all Digital Inputs, Digital Outputs, Analog Inputs and Analog Outputs). This will override the corresponding pump, valve, breaker, switch, status lamp, annunciator, meter or recorder.

### **Monitored Parameters**

At any one time, the instructor can monitor a maximum of 42 analog parameters (20 numerics, 6 CRT plots, 16 Gould recorder points). Panel Instrumentation is referenced by the plant tag number associated with each instrument. The following two modes are available:

- (1) Numeric value display (available on both of the instructor station CRTs) allows the display of the current value of 20 analog parameters.
- (2) Analog plots (available on one instructor station CRT and the Gould recorders) allows the construction of an XY plot of the current values of up to 22 analog parameters vs. time. Features are provided to allow control of the time scale.

### **Recording Parameters**

The instructor can monitor the value of up to 40 analog points through the Recording Parameters program. Up to 99 minutes of data at variable sampling intervals of as often as .25 sec. can be collected and stored in a disc file. The data can be printed out in digital format or downloaded to a PC for plotting. This program is used extensively for certification testing.

### **Instrument Noise Disable**

The instructor has the ability through the Instructor Station to impress white noise on the control room panel analog outputs thereby simulating actual plant conditions.

### **Instructor Notepad**

Instructors can construct, for later recall, up to 32 pages of Instructor Data Book CRT displays. The contents of these pages are entirely discretionary and they are used by instructors to communicate with each other across training sessions.

### **Simulator Operating Limits Override**

The instructor has the ability, under certain circumstances, to override the "Freeze" condition imposed by exceeding a preset simulator operating limit. This will allow the simulator to return to the "Run" mode near, at, or beyond the preset limit.



## EXCEPTIONS TO ANSI/ANS-3.5, 1985

None. In taking no exceptions to ANSI/ANS-3.5, 1985 and Reg. Guide 1.149, 1987, NU takes the following positions:

- (1) Modes of operation specifically prohibited by the Millstone 1 Plant design or by Technical Specifications, need not be certified.

NU's order of precedence in those situations where the standard conflicts with the plant design or operating philosophy, shall favor the Millstone 1 plant design and/or Technical Specifications. NU has taken this position to ensure that the conduct of simulator operations is in accordance with approved plant procedures and the Technical Specifications.

- (2) Acceptance criteria and satisfactory performance are predicted on the ability of the operator to discern differences between simulator response and reference performance data and the affects these differences may have on his subsequent actions and diagnostic abilities.
- (3) With respect to the "Performance Testing Plan Change" section on Form 474, it should be recognized that NU's Performance Test Plan is an integral part of the Nuclear Simulator Engineering Manual. Changes to that manual will not be forwarded to the NRC unless they significantly alter the intent of the test program.
- (4) Analog and digital process computer points not required for the conduct of training or examinations need not be tested.
- (5) Testing of surveillances on redundant equipment or flowpaths is not required if the primary piece of equipment or flowpath is tested. See Volume 3, Section 1, Normal Operations Testing, for an example of this application.

(6) It is acceptable to test the simulator's capability of performing a reactor trip followed by recovery to rated (full) power (ANS 3.5, Section 3.1.1, Item 4) by testing:

- o a power ascension from startup to 100%, followed by
- o the reactor trip, then
- o a startup to 15% power

Performing a complete power ascension twice during the conduct of this test was deemed unnecessary.

(7) When applying the Steady State Operation Performance Criteria of ANS 3.5, Section 4.1:

- o when Instrument error is given as a percentage, it applies to the percentage of full scale, not the indicated value.
- o conservatively, the allowed tolerance of critical and non-critical parameters applies to the reference plant indicated value above the minimum scale value. See Volume 3, Section 1, Steady Stat. Testing, for an example of this application.

(8) In the case where the comparison between simulator response and reference plant response results in a discrepancy, that discrepancy is resolved via the Deficiency Report process and an appropriate retest conducted. Replotting of the transient is not required until the next scheduled yearly testing of the transient.

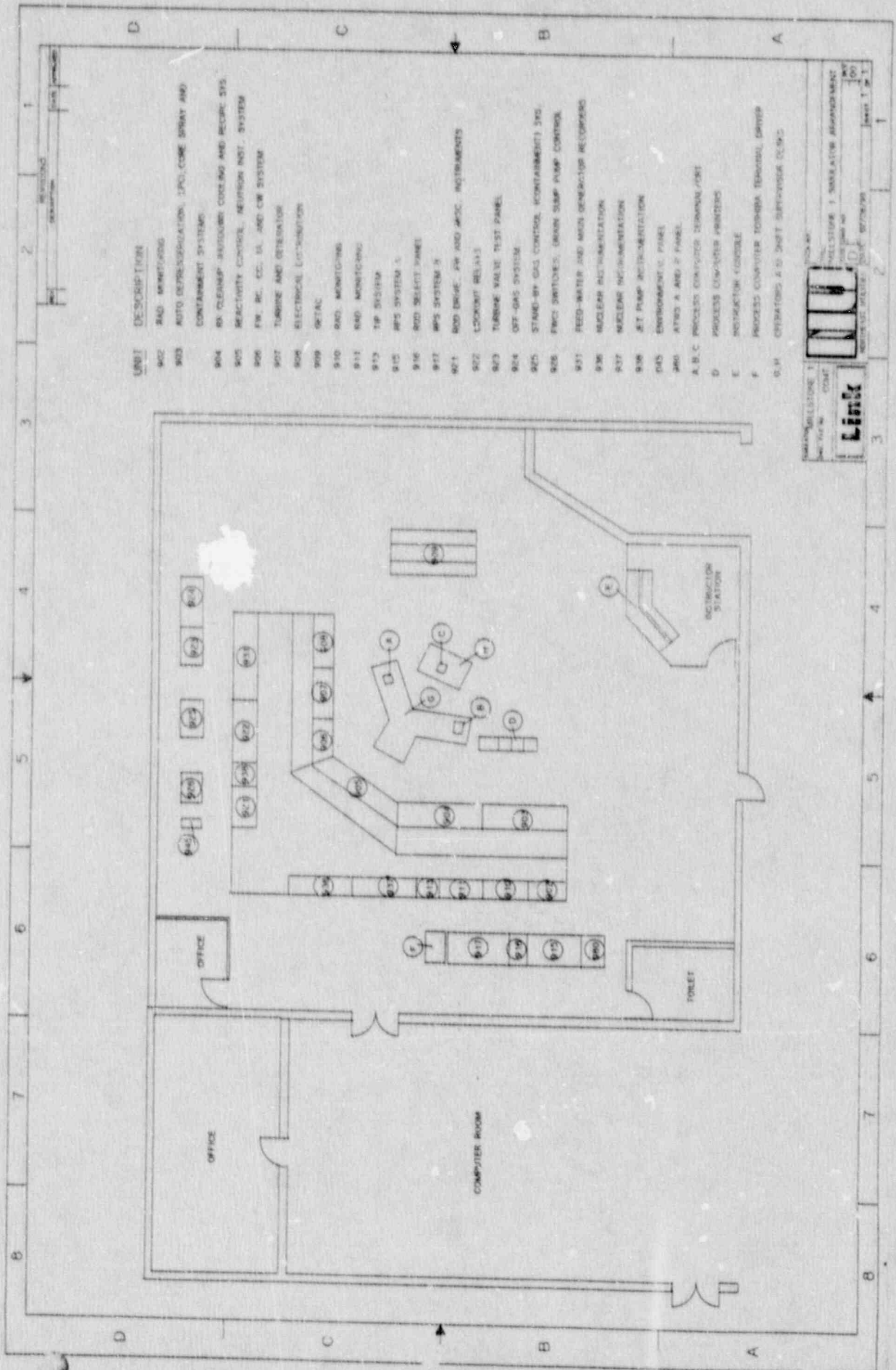
(9) Testing of all Input/Output (I/O) override capabilities is not required during testing of the Instructor Station. Testing a sample of I/O overrides is sufficient to demonstrate the simulator's capabilities. Specific I/O override points are to be tested, as required, during curriculum testing.

**Summary of Revision**

This is the initial report. An updated report shall be generated every four years:

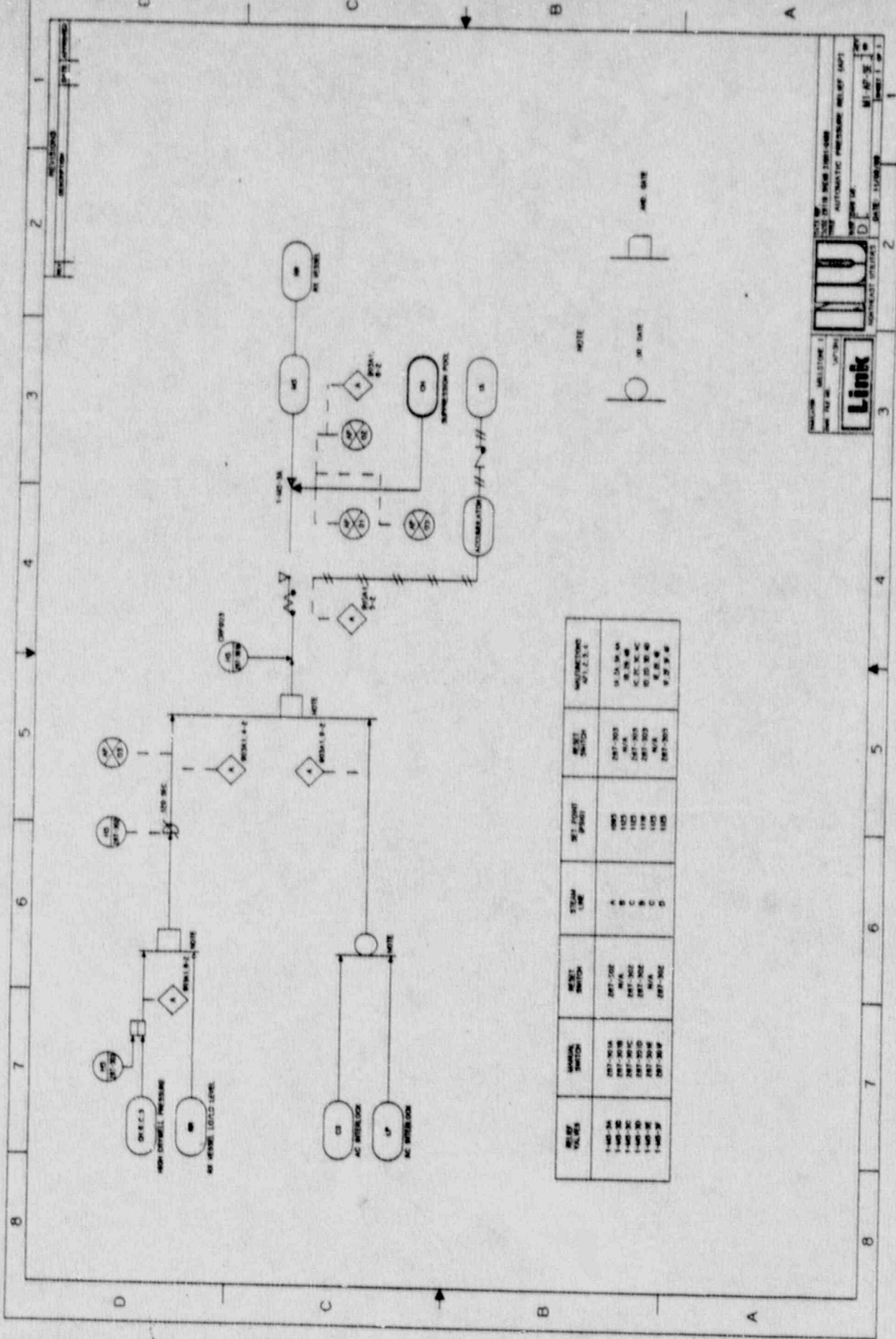
Initial Report - July 1990

1st Quadrennial Update Due - June 1994

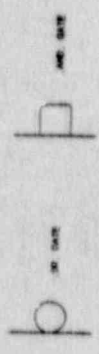


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- 902 RAD MONITORING
  - 903 AUTO DECONTAMINATION, UPD, COME URSAV AND CONTAMINANT SYSTEMS
  - 904 IX CLEANUP HISTORY CORRENG AND RECOR SPS
  - 905 REACTIVITY CONTROL, NEUTRON INST. SYSTEM
  - 906 FW, RC, CC, SL, AND CW SYSTEM
  - 907 TURBINE AND DETRIATOR
  - 908 ELECTRICAL DISTRIBUTION
  - 909 9RTAC
  - 910 RAD MONITORING
  - 911 RAD MONITORING
  - 912 TP SYSTEM
  - 913 WPS SYSTEM A
  - 914 WPS SELECT PANEL
  - 915 WPS SYSTEM B
  - 916 WPS DRIVE, PW AND WPC, INSTRUMENTS
  - 922 LOCKOUT RELAYS
  - 923 TURBINE VALVE TEST PANEL
  - 924 OBT GAS SYSTEM
  - 925 STAND-BY GAS CONTROL, (CONTAMINANT) SYS.
  - 926 FWC SWITCHES, DRUM SUMP PUMP CONTROL
  - 931 FEED-WATER AND WMS GENERATOR RECOVERERS
  - 936 MODULAR AUTOMATION
  - 937 MODULAR AUTOMATION
  - 938 JET PUMP AUTOMATION
  - 945 ENVIRONMENT C. PANEL
  - 946 ATTRY A AND B PANEL
  - A, B, C PROCESS COMPUTER TERMINAL / CRT
  - D PROCESS COMPUTER MONITOR
  - E INSTRUCTOR CONSOLE
  - F PROCESS COMPUTER TERMINAL, TERMINAL, DRIVER
  - 0, 14 OPERATORS A TO SHIFT SUPERVISOR CCMS

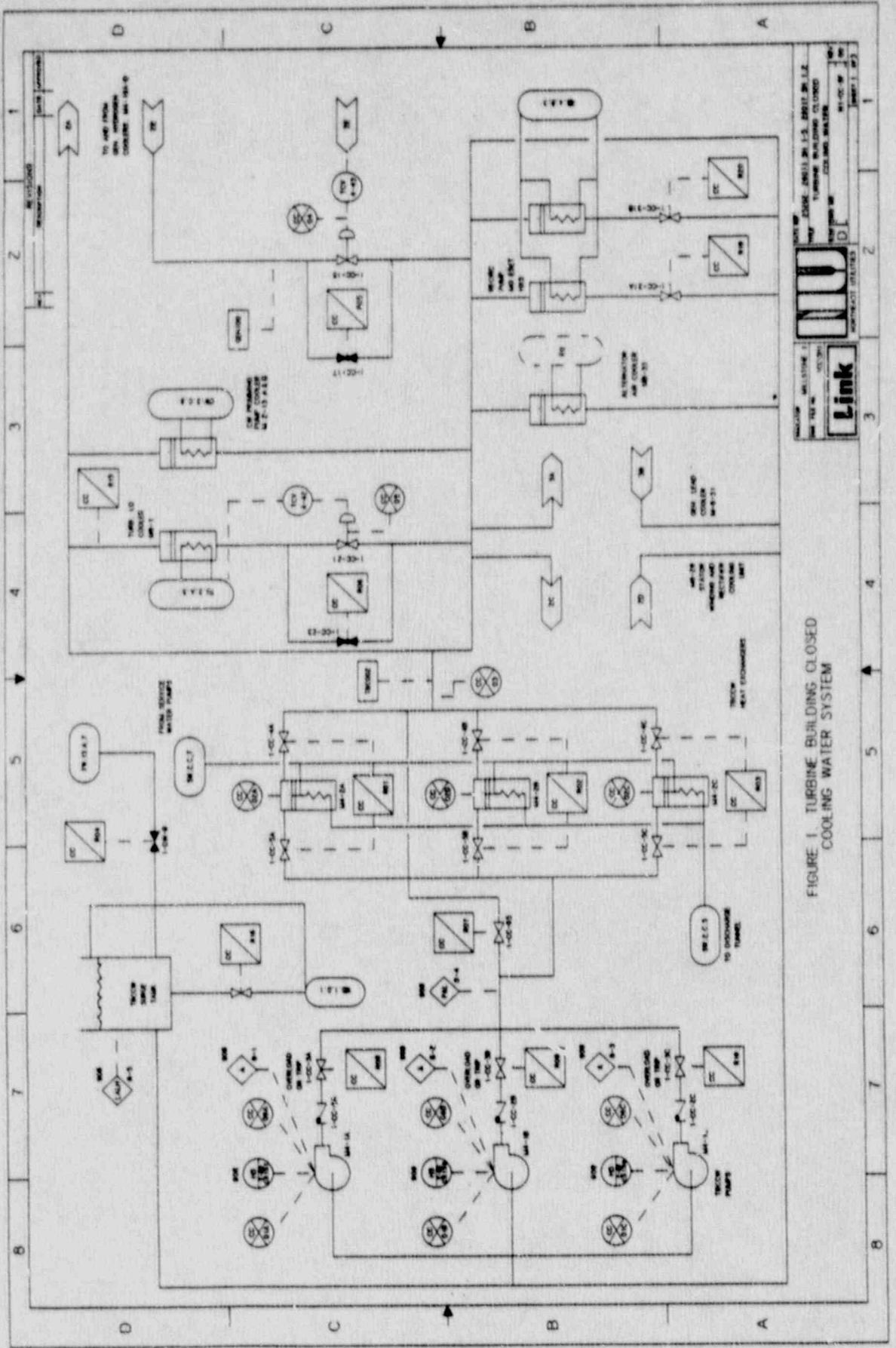
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1-400-28	287-101E	287-102		1400	N/A	10, 20, 30, 40
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MILLSTONE 1  
 UNIT 2  
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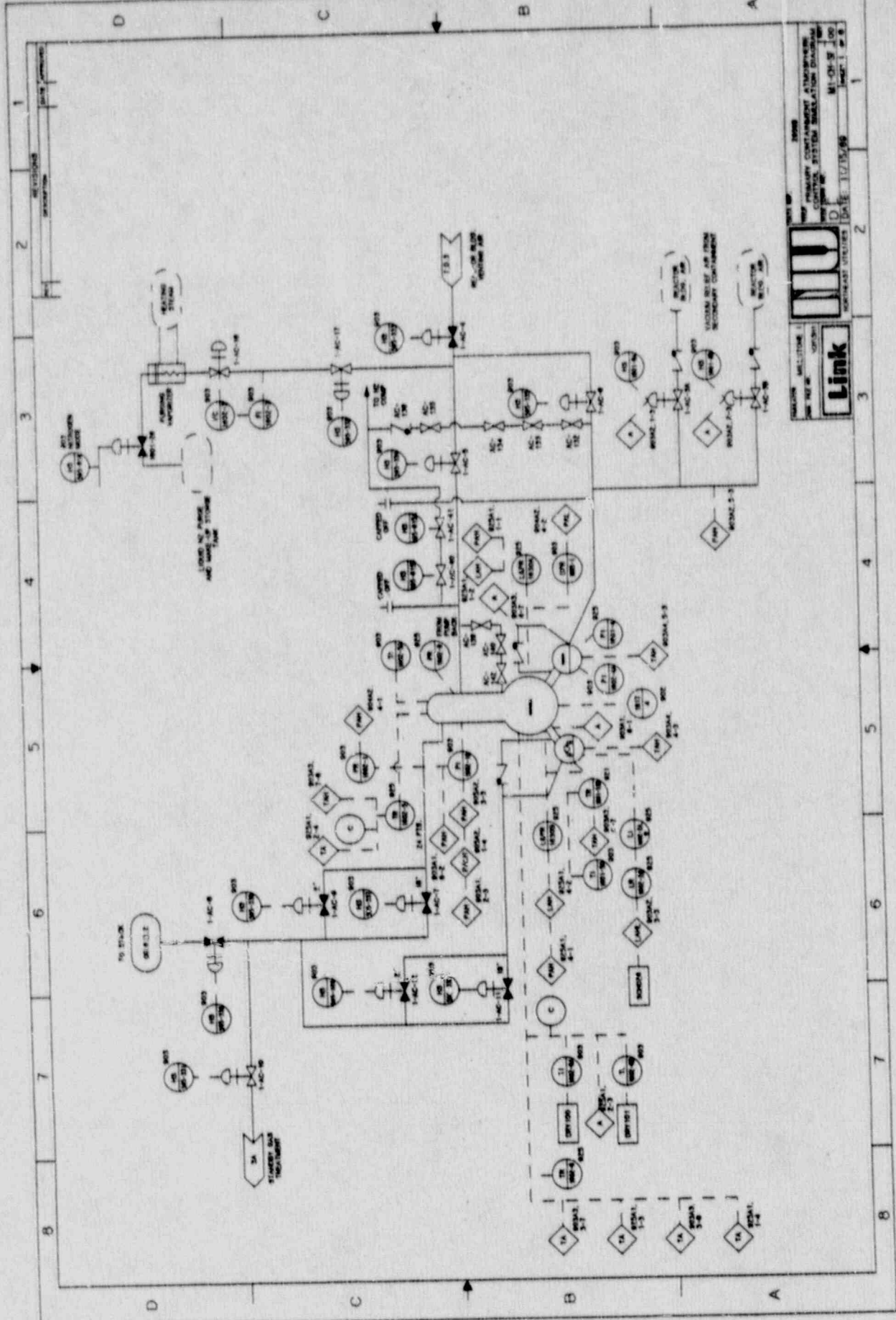
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 APPROVED BY J. L. BROWN  
 TITLE TURBINE BUILDING CLOSED COOLING WATER SYSTEM  
 PROJECT NO. 100112-1  
 SHEET NO. 100112-1  
 DATE 10/1/53

FIGURE 1. TURBINE BUILDING CLOSED COOLING WATER SYSTEM

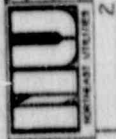




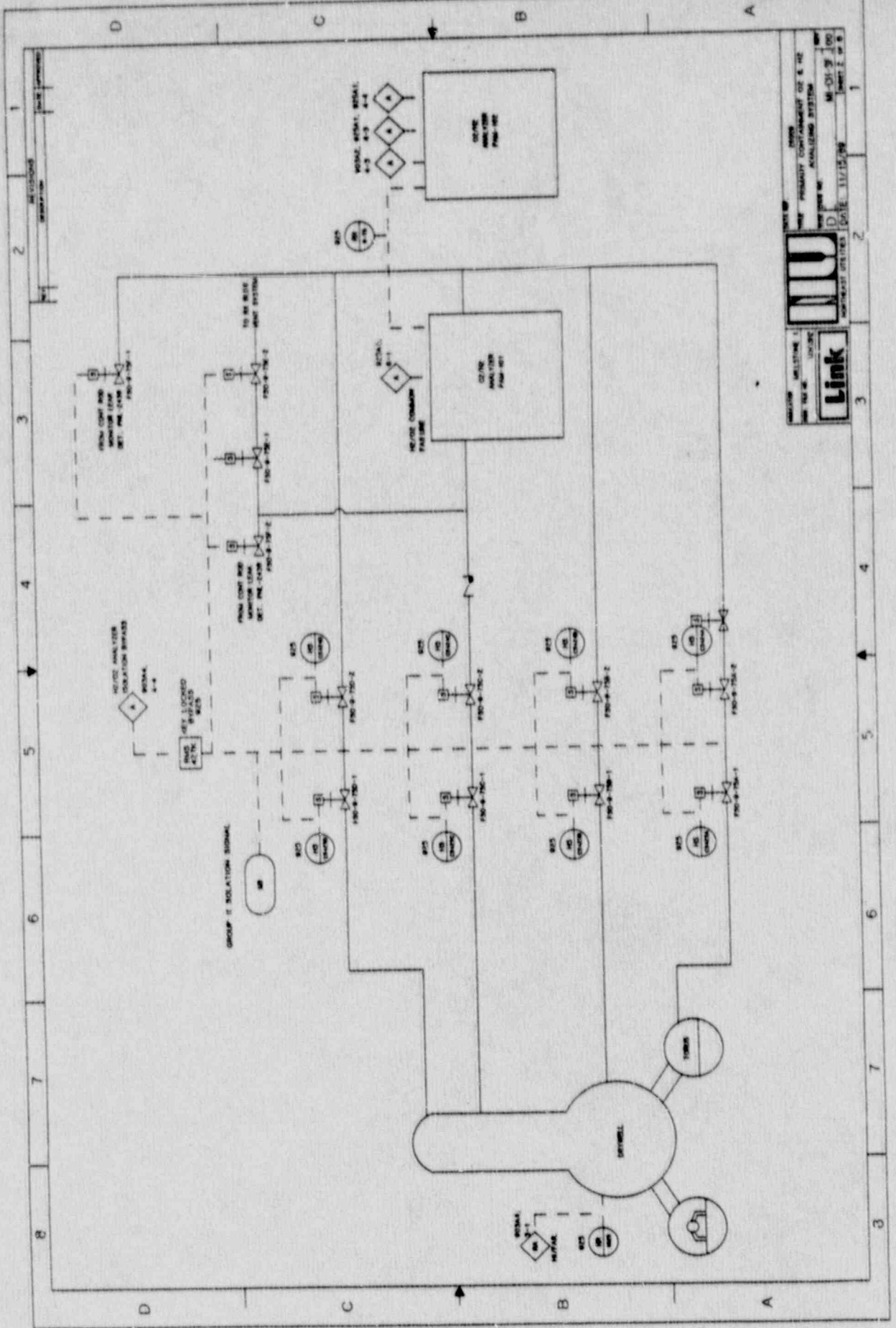




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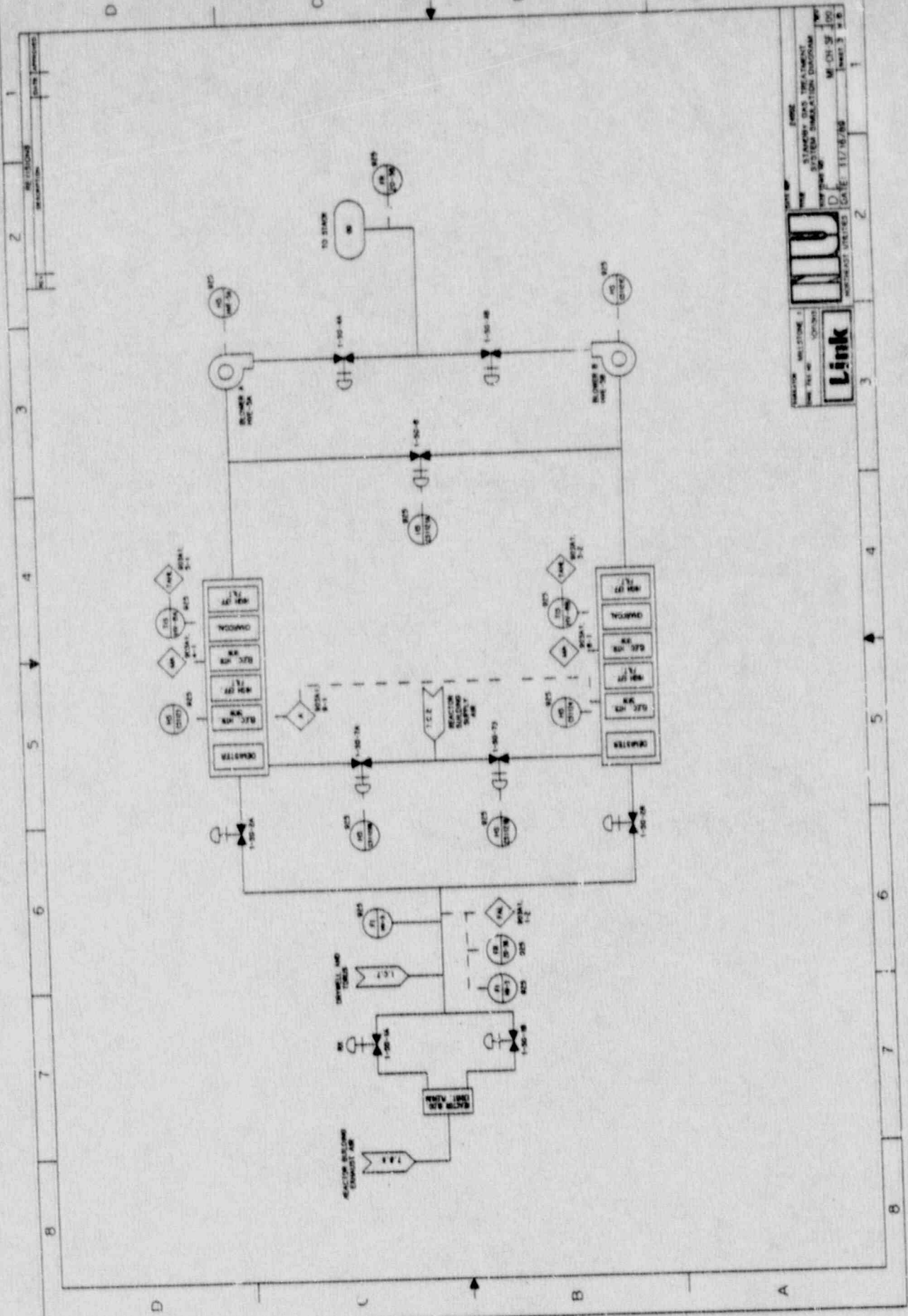


Link  
 NORTHWEST UTILITIES



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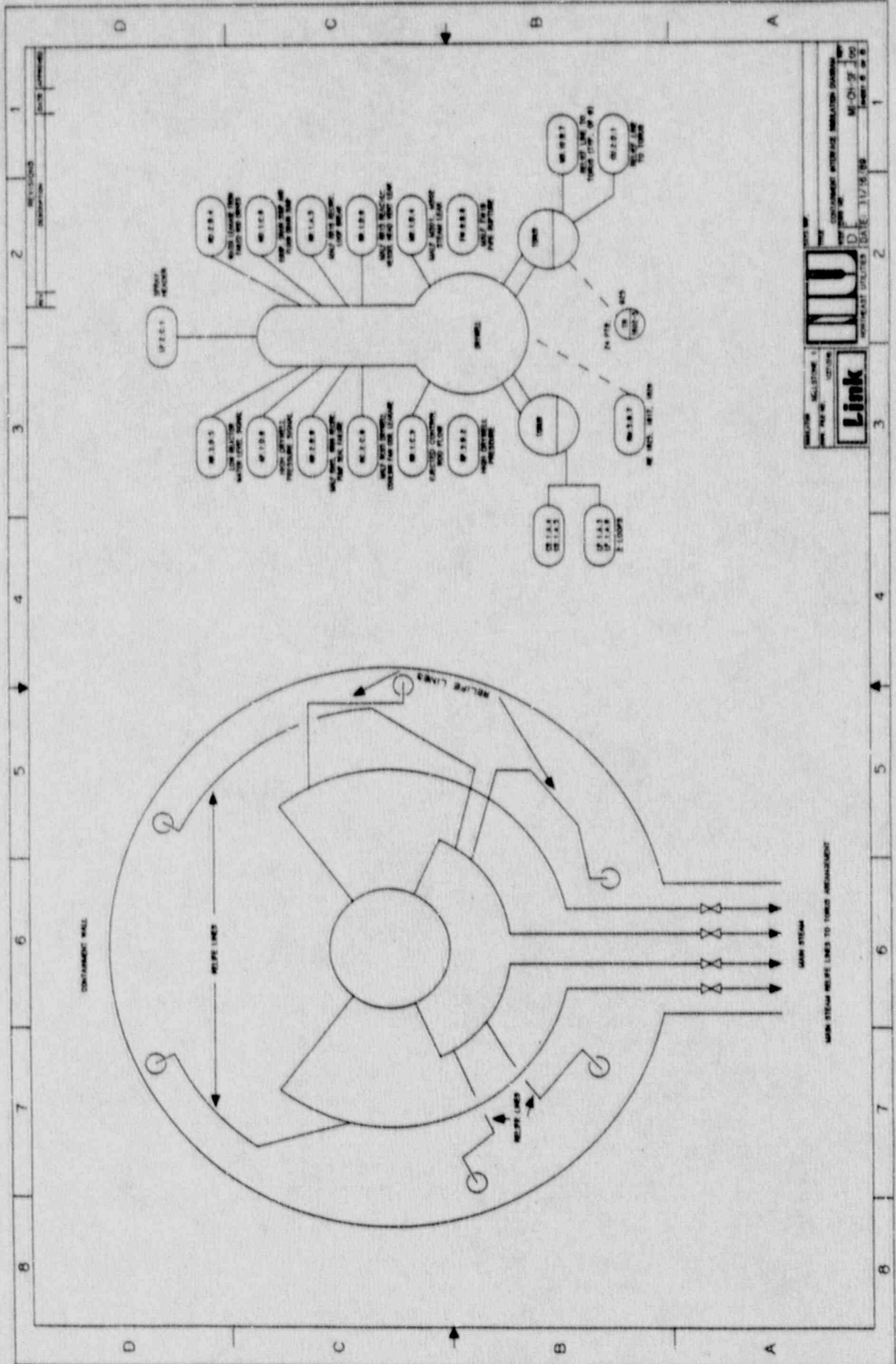


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 NORTHWEST UTILITIES





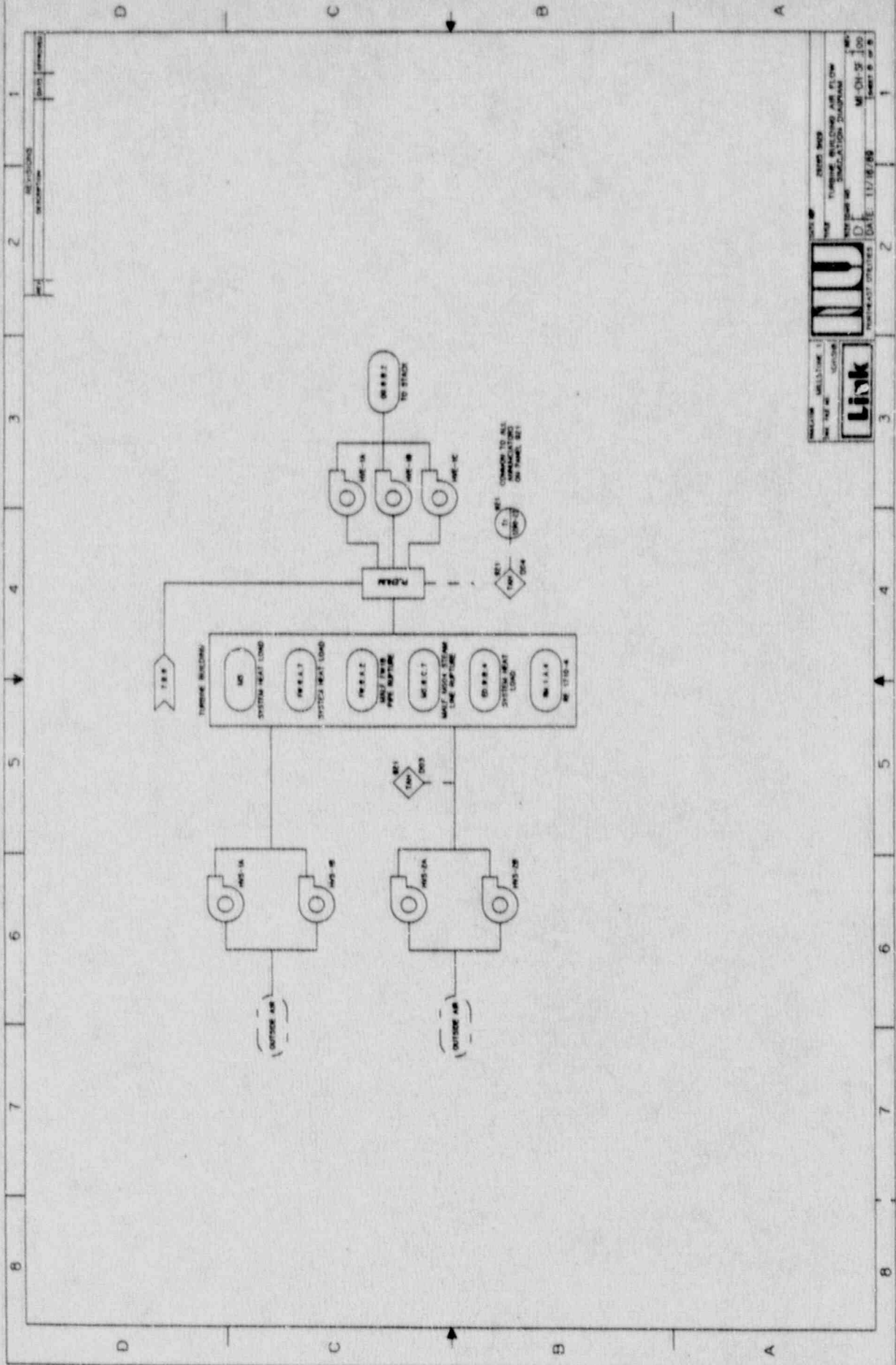


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 ME-01-37-100  
 SHEET 6 OF 6



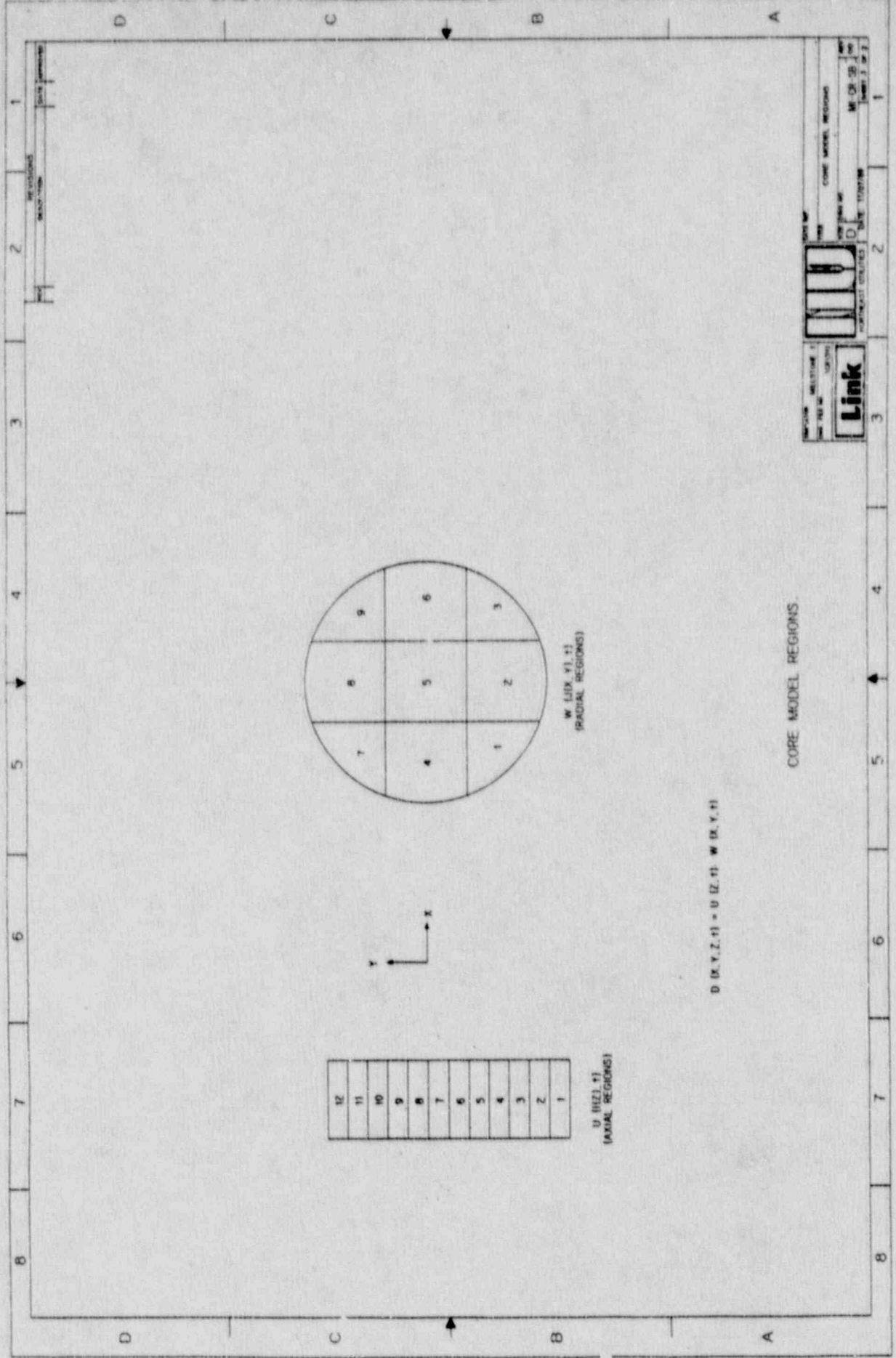
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 SHEET NO. 6 OF 6





12
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U (12Z, 1)  
(AXIAL REGIONS)

W (12X, 1)  
(RADIAL REGIONS)

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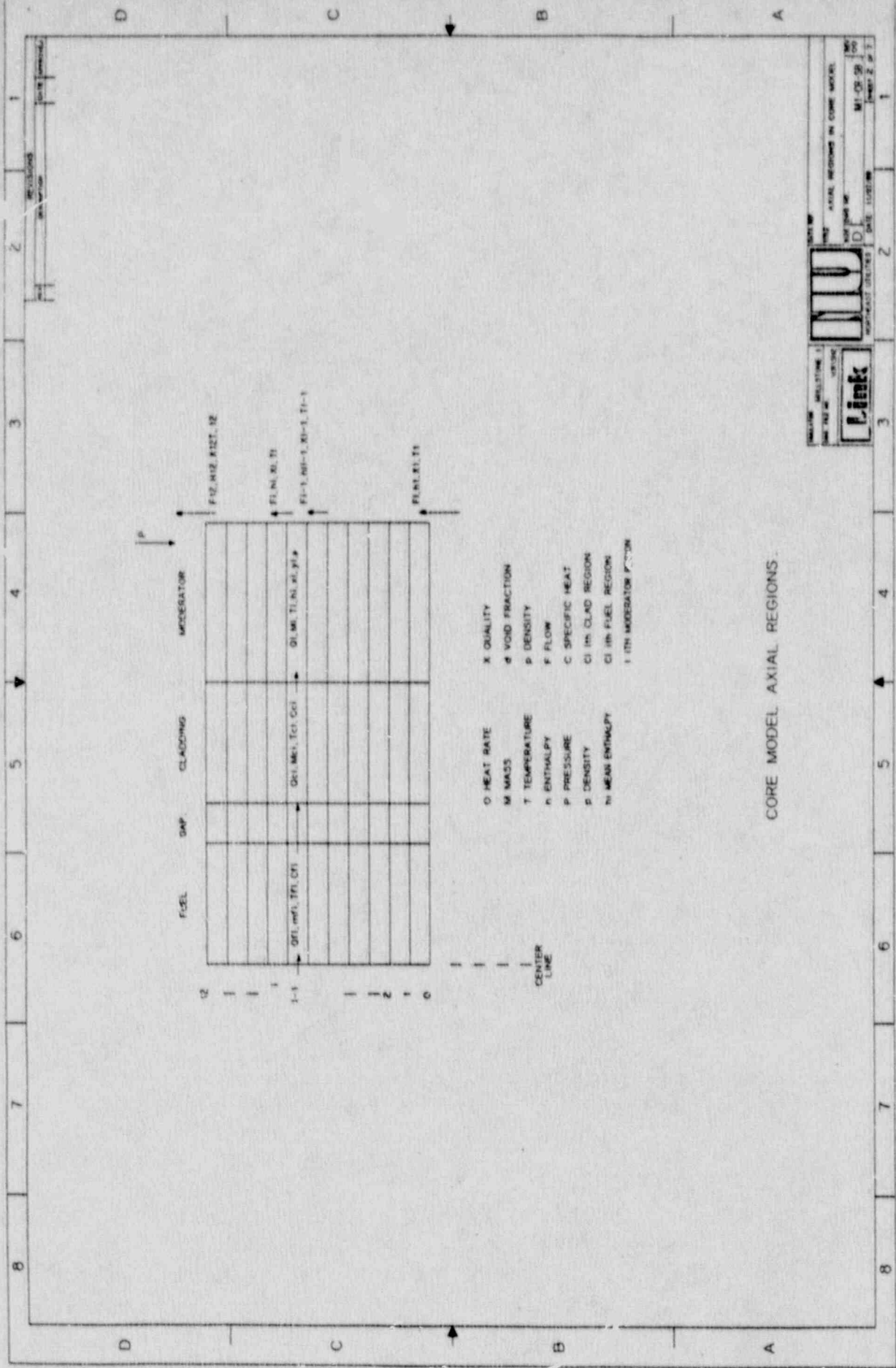
CORE MODEL REGIONS

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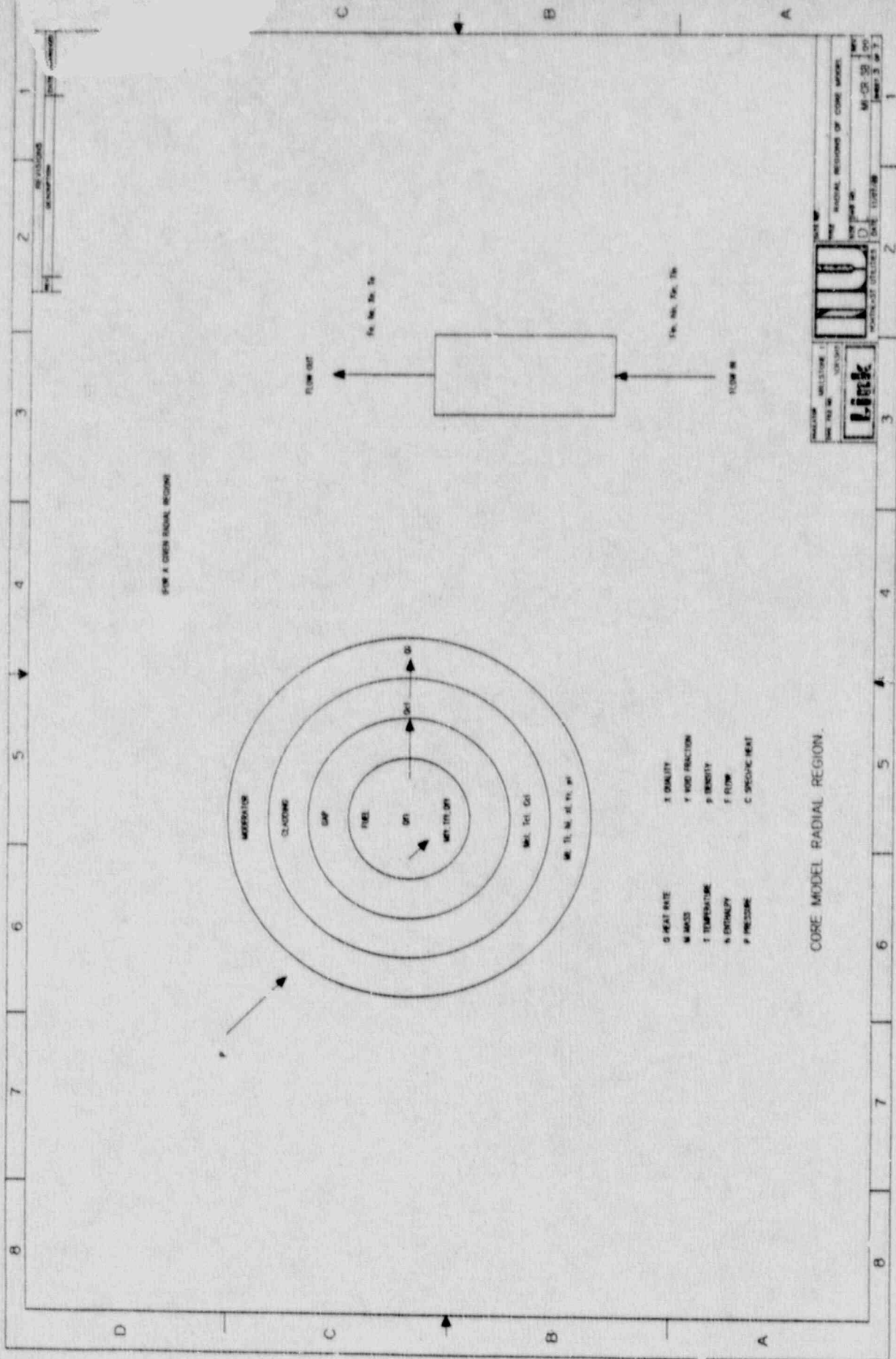
CORE MODEL REGIONS

CORE MODEL REGIONS

M-01-18



CORE MODEL AXIAL REGIONS



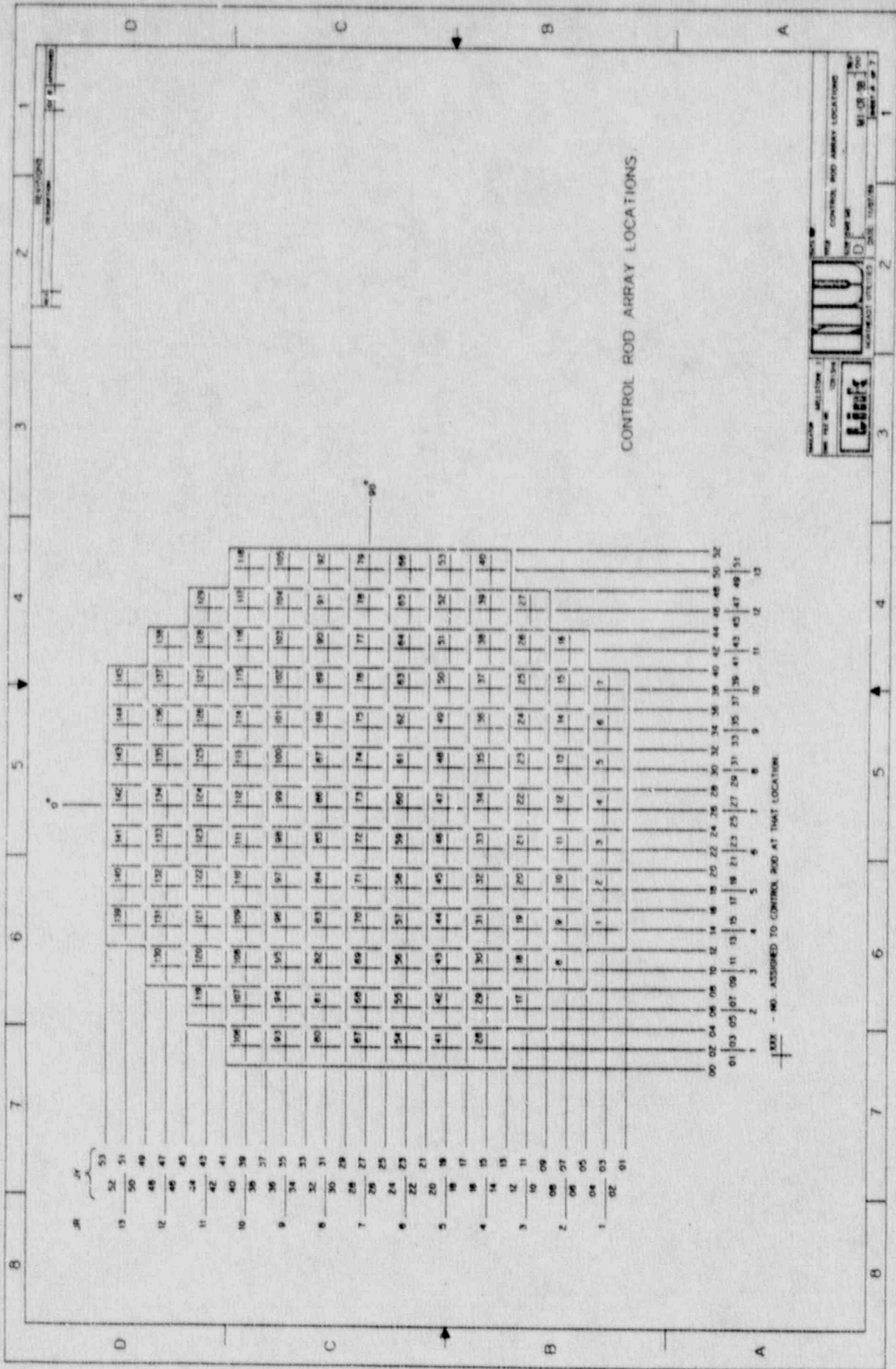
FOR A GIVEN RADIAL REGION

CORE MODEL RADIAL REGION.

- G HEAT RATE
- M MASS
- T TEMPERATURE
- N DENSITY
- P PRESSURE
- X QUALITY
- Y VOID FRACTION
- S VELOCITY
- F FLOW
- C SPECIFIC HEAT

Link

NATIONAL REGION OF CORE MODEL	0
NEW YORK OR	M-CR-58
DATE	1977-08
START	1
END	3

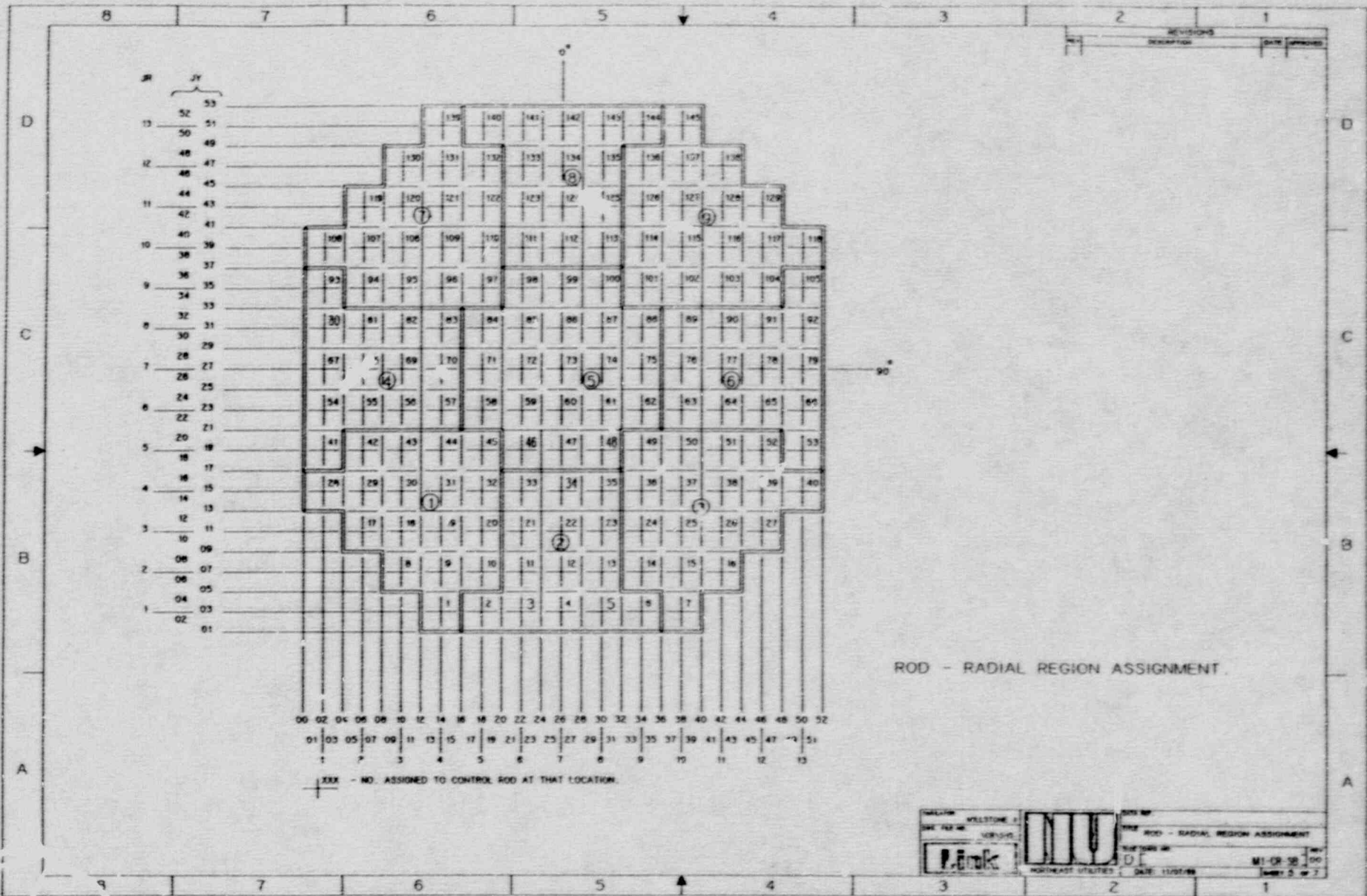


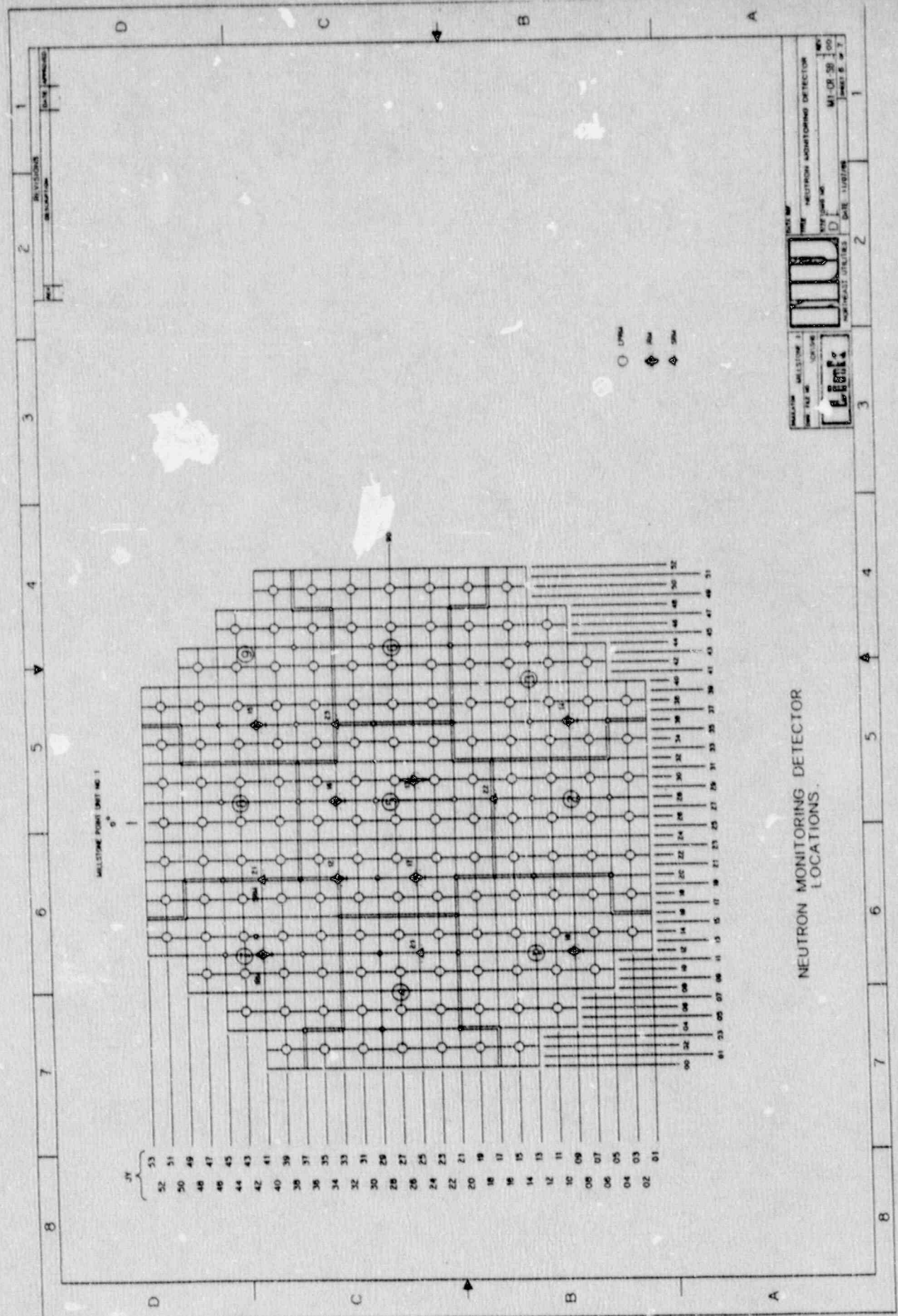
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06 05  
04 03  
02 01

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970	981	1031	1032	1037
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52	53			

XXX - NO. ASSIGNED TO CONTROL ROD AT THAT LOCATION.

PROJECT NO. \_\_\_\_\_  
 SHEET NO. \_\_\_\_\_  
 DATE \_\_\_\_\_  
 DRAWN BY \_\_\_\_\_  
 CHECKED BY \_\_\_\_\_  
 APPROVED BY \_\_\_\_\_  
 TITLE CONTROL ROD ARRAY LOCATIONS  
 SHEET 1 OF 10  
 PROJECT NO. \_\_\_\_\_  
 SHEET NO. \_\_\_\_\_  
 DATE \_\_\_\_\_  
 DRAWN BY \_\_\_\_\_  
 CHECKED BY \_\_\_\_\_  
 APPROVED BY \_\_\_\_\_





- LINE
- ◇ AIR
- △ SWA

NEUTRON MONITORING DETECTOR LOCATIONS.

PROJECT	MILLSTONE 1
DATE	10/1/78
SCALE	AS SHOWN
BY	DL
CHECKED BY	DL
DATE	11/1/78
PROJECT NO.	M-02-30-00
REV.	0
DATE	8/7

REVISIONS  
DATE APPROVED

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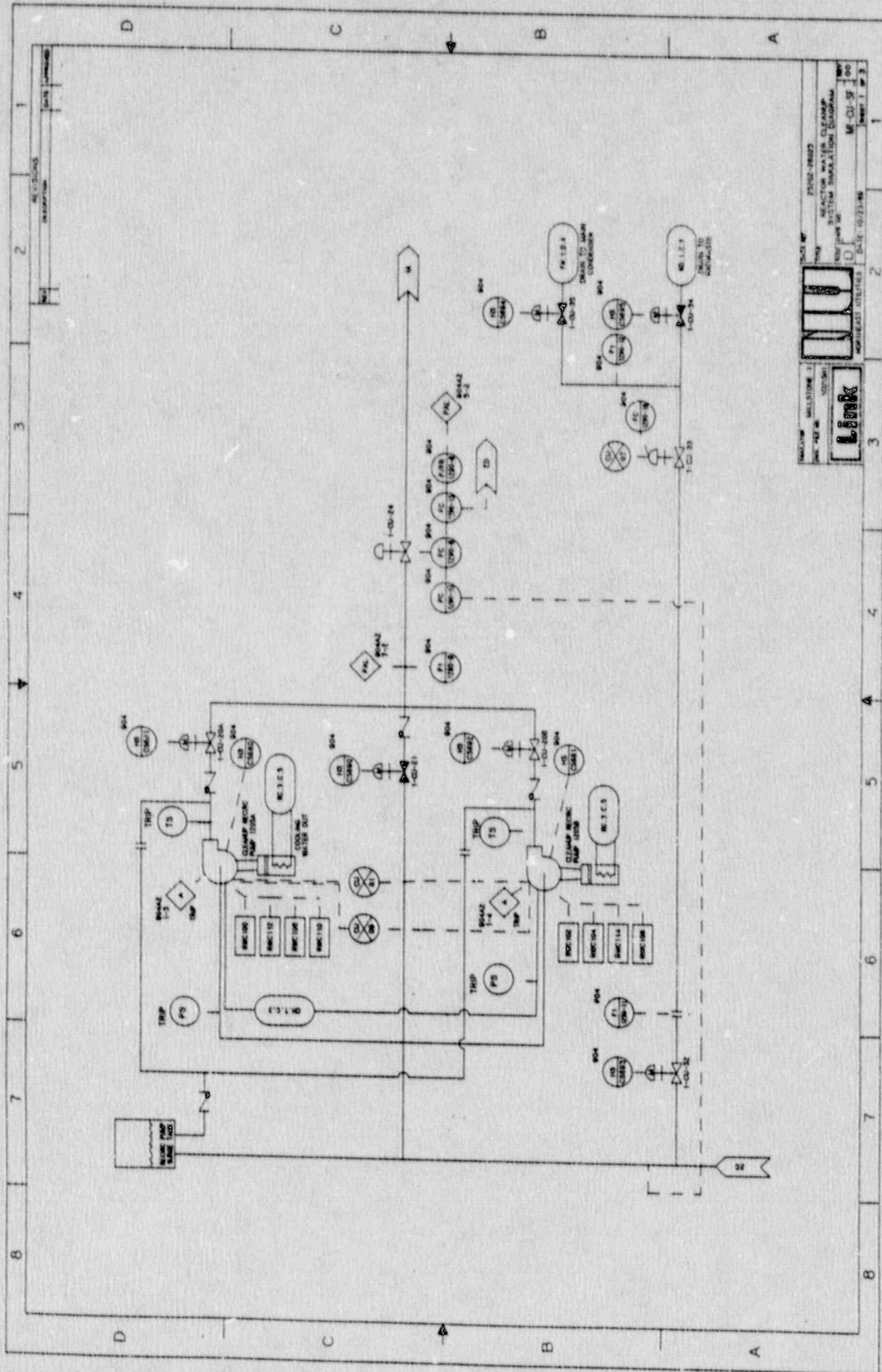
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04 03  
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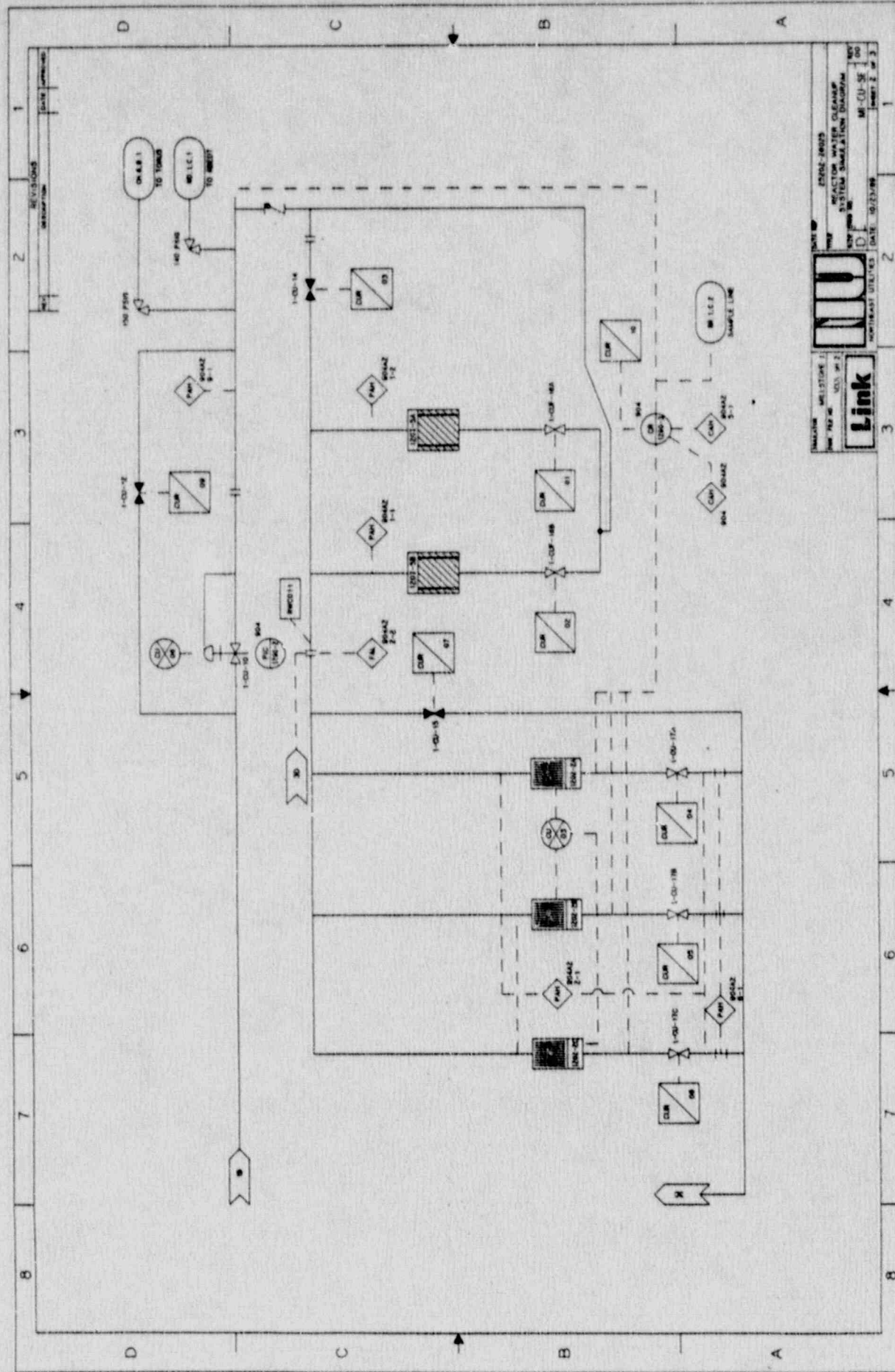









PROJECT NO.	27102-1002
DATE	10/1/58
DESIGNER	LINK
CHECKED	LINK
APPROVED	LINK
SCALE	AS SHOWN
PROJECT	27102-1002 CLEANING SYSTEM
SYSTEM	CLEANING SYSTEM
DATE	10/1/58
BY	M-CU-SF
NO.	00
SHEET	1 OF 3

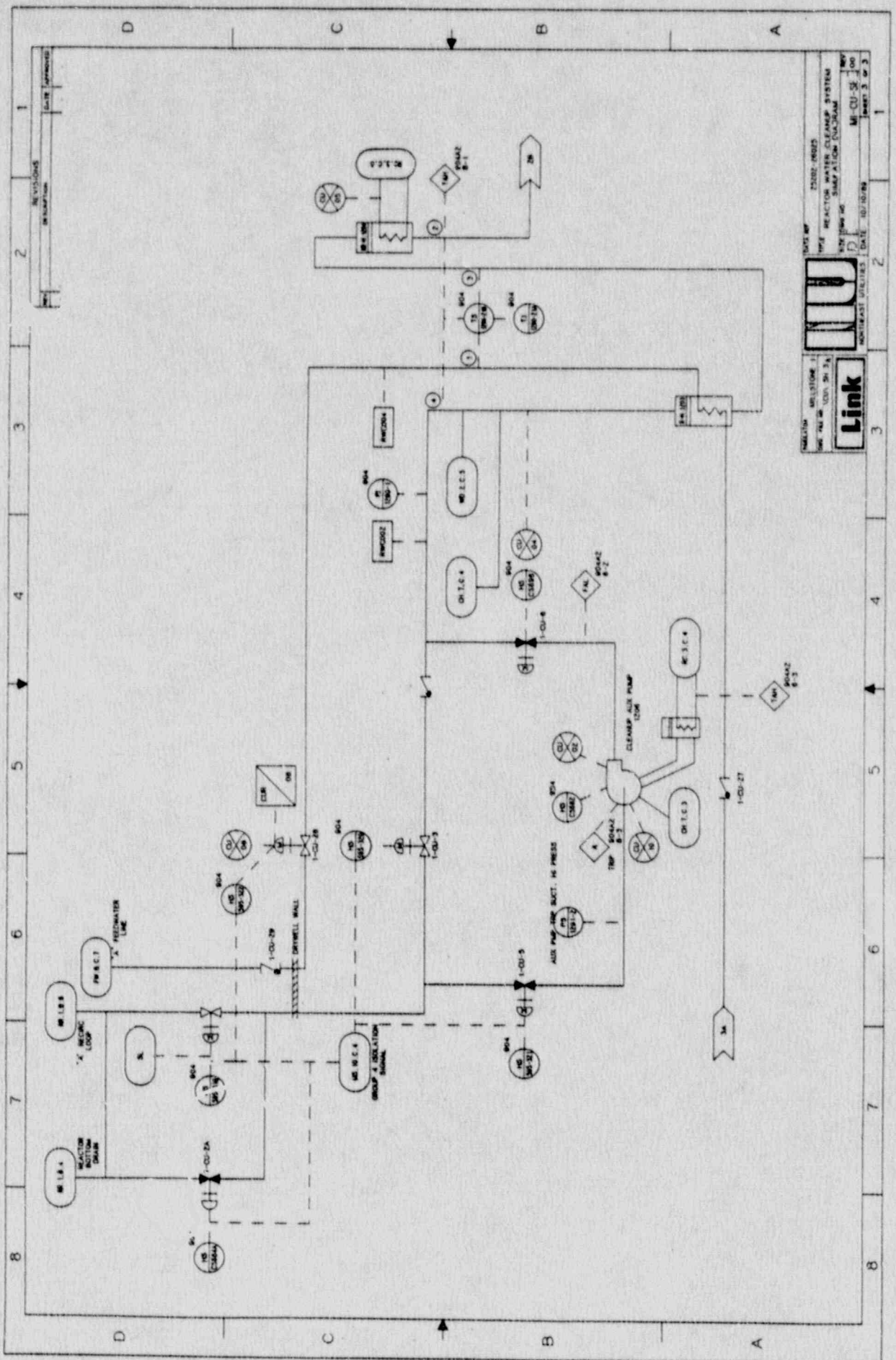


REVISIONS  
DATE

PROJECT: ENR-2005  
 REACTOR WATER CLEANUP  
 SYSTEM SIMULATION DIAGRAM  
 DATE: 10/23/98  
 SHEET 2 OF 3



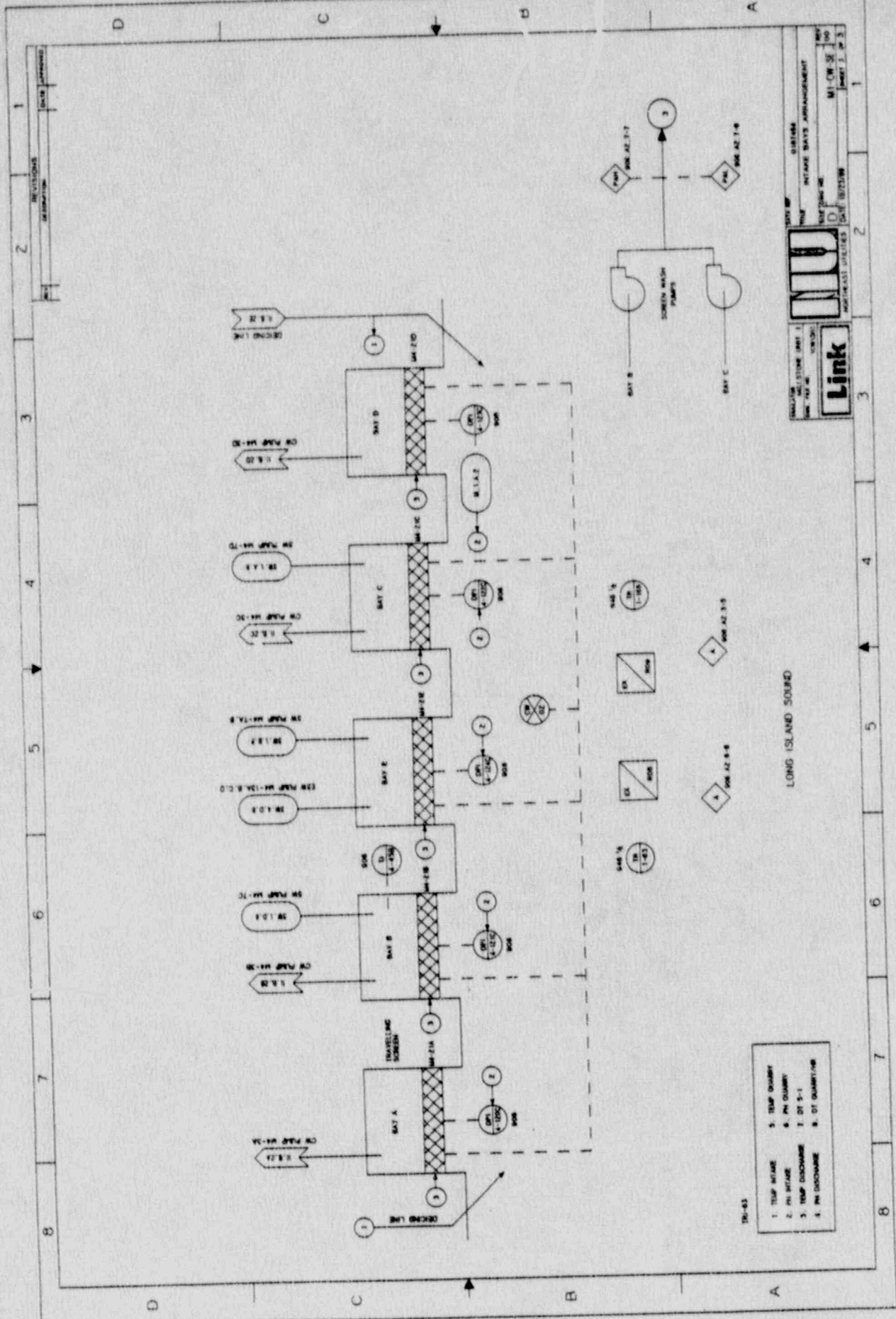
MILLER  
 WELLS  
 INC.



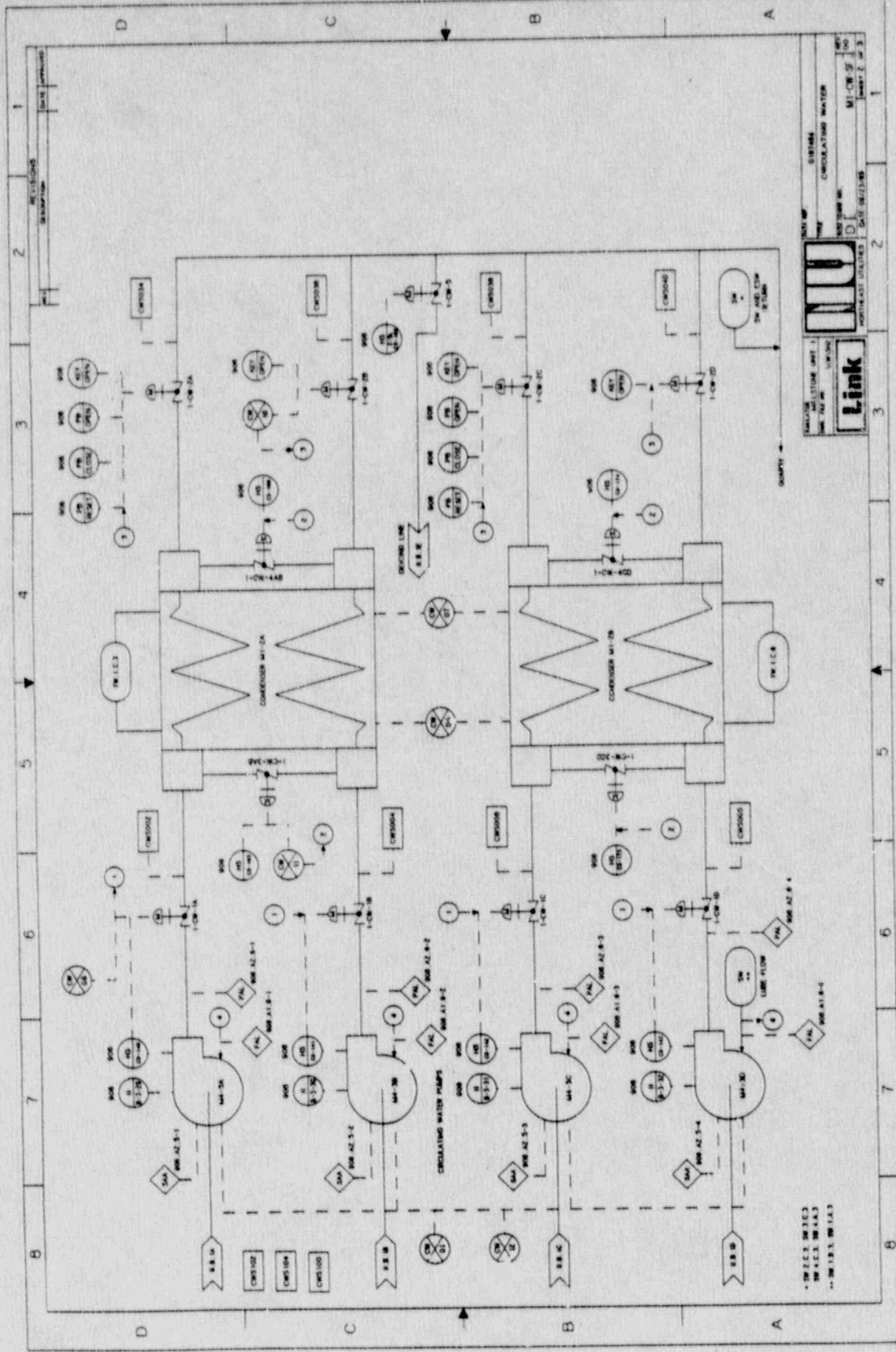
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 TITLE: REACTOR WATER CLEANUP SYSTEM  
 SHEET: RWCS SIBY ATOM DIAGRAM  
 DATE: 10/10/88  
 DRAWN BY: M. C. S. 100  
 CHECKED BY: M. C. S. 100  
 APPROVED BY: M. C. S. 100



REVISIONS  
 DATE APPROVED



100-63



DISTRICT NO. 0181684  
 PROJECT NO. 0181684  
 SHEET NO. M-1-2-3  
 DATE 04/23/60  
 SHEET 2 OF 3



HALLS  
 M-1-2-3  
 M-1-2-3  
 M-1-2-3

CONDENSING WATER  
 M-1-2-3

QUANTITY  
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 1-CH-2B  
 1-CH-2C  
 1-CH-2D

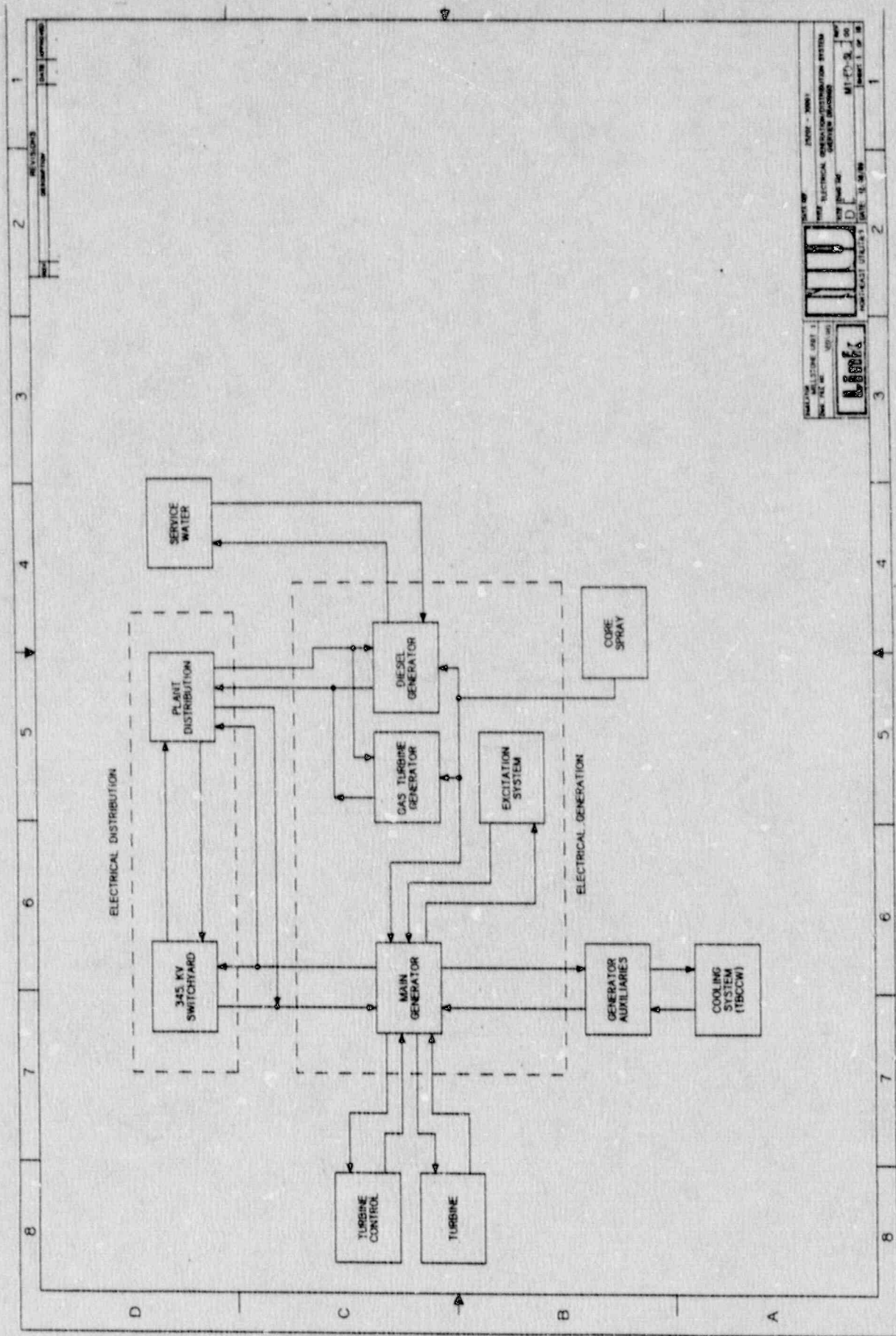
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 CONDENSER M-1-2B

M-2A  
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 M-2D

M-1-2A  
 M-1-2B

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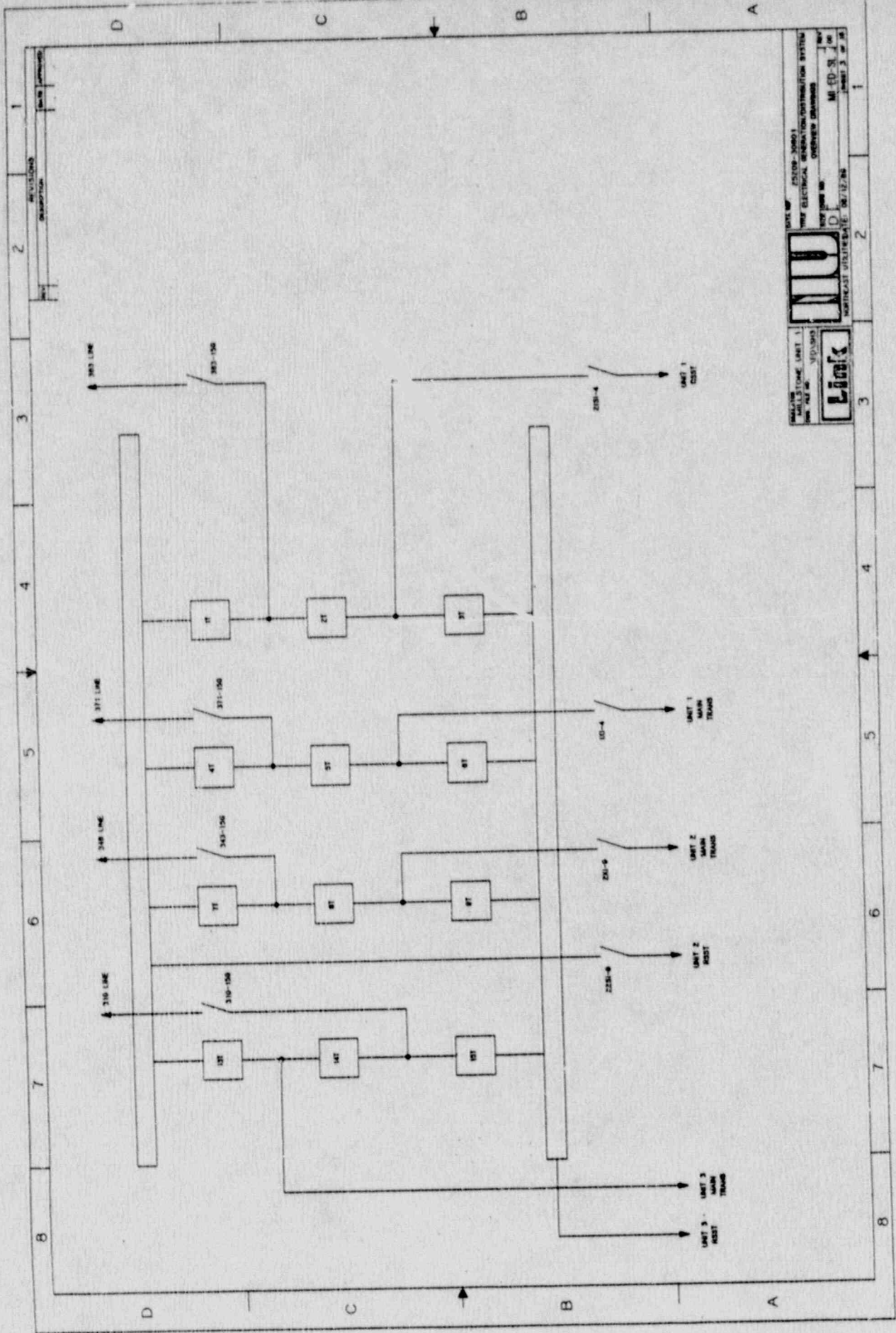




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239	8/15/74	W. J. B.
240	9/15/74	W. J. B.
241	10/15/74	W. J. B.
242	11/15/74	W. J. B.
243	12/15/74	W. J. B.
244	1/15/75	W. J. B.
245	2/15/75	W. J. B.
246	3/15/75	W. J. B.
247	4/15/75	W. J. B.
248	5/15/75	W. J. B.
249	6/15/75	W. J. B.
250	7/15/75	W. J. B.
251	8/15/75	W. J. B.
252	9/15/75	W. J. B.
253	10/15/75	W. J. B.
254	11/15/75	W. J. B.
255	12/15/75	W. J. B.
256	1/15/76	W. J. B.
257	2/15/76	W. J. B.
258	3/15/76	W. J. B.
259	4/15/76	W. J. B.
260	5/15/76	W. J. B.
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262	7/15/76	W. J. B.
263	8/15/76	W. J. B.
264	9/15/76	W. J. B.
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266	11/15/76	W. J. B.
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277	10/15/77	W. J. B.
278	11/15/77	W. J. B.
279	12/15/77	W. J. B.
280	1/15/78	W. J. B.
281	2/15/78	W. J. B.
282	3/15/78	W. J. B.
283	4/15/78	W. J. B.
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290	11/15/78	W. J. B.
291	12/15/78	W. J. B.
292	1/15/79	W. J. B.
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294	3/15/79	W. J. B.
295	4/15/79	W. J. B.



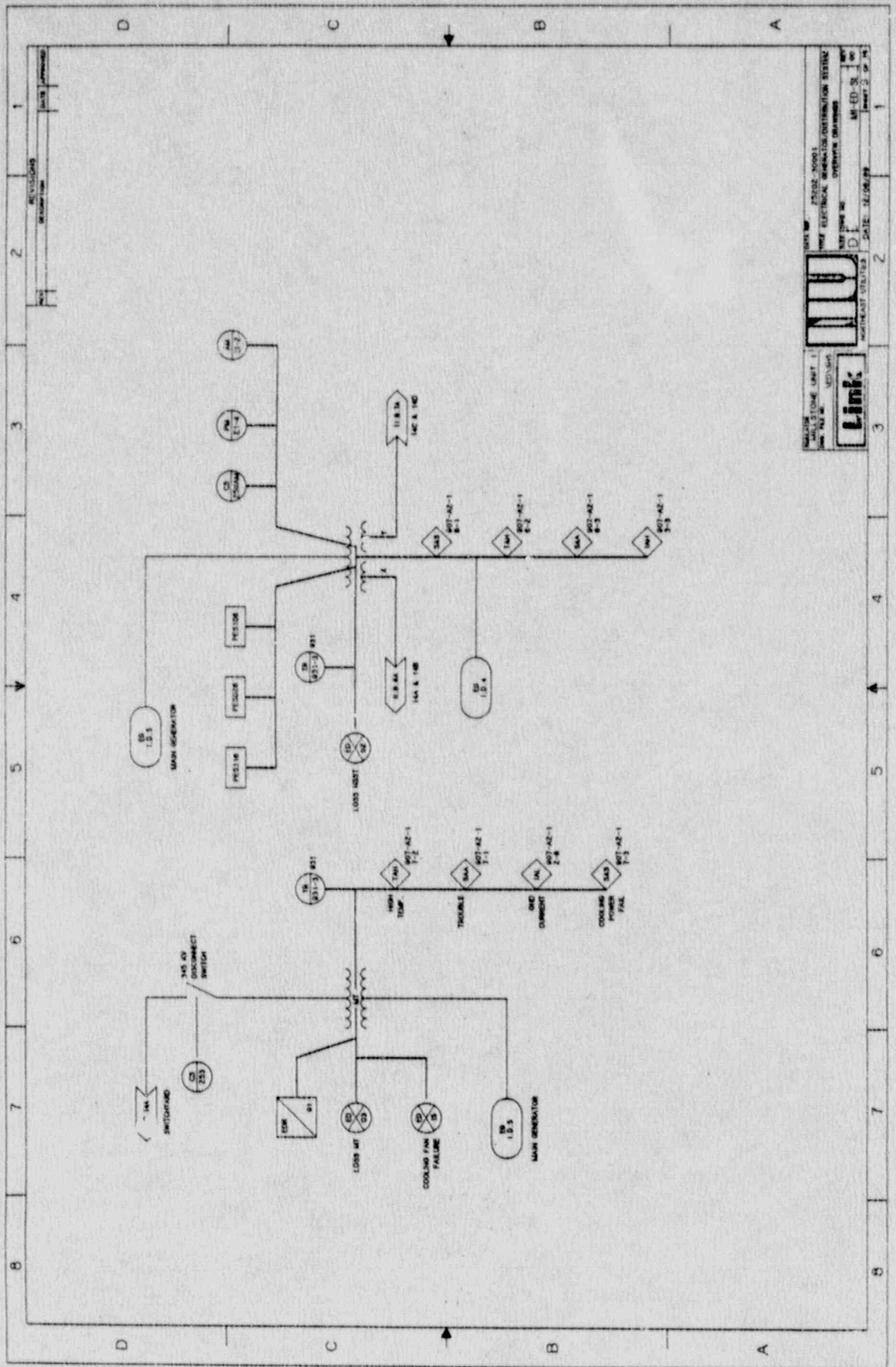




PROJECT NO. 22209-30001  
 NEW ELECTRICAL WIRING/DISTRIBUTION SYSTEM  
 OVERVIEW DRAWING  
 DATE 08/12/84  
 DRAWN BY M. ED-3  
 CHECKED BY  
 PROJECT 3 OF 3

**Link**  
 ELECTRIC SERVICE UNIT 1  
 UNIT 2  
 UNIT 3

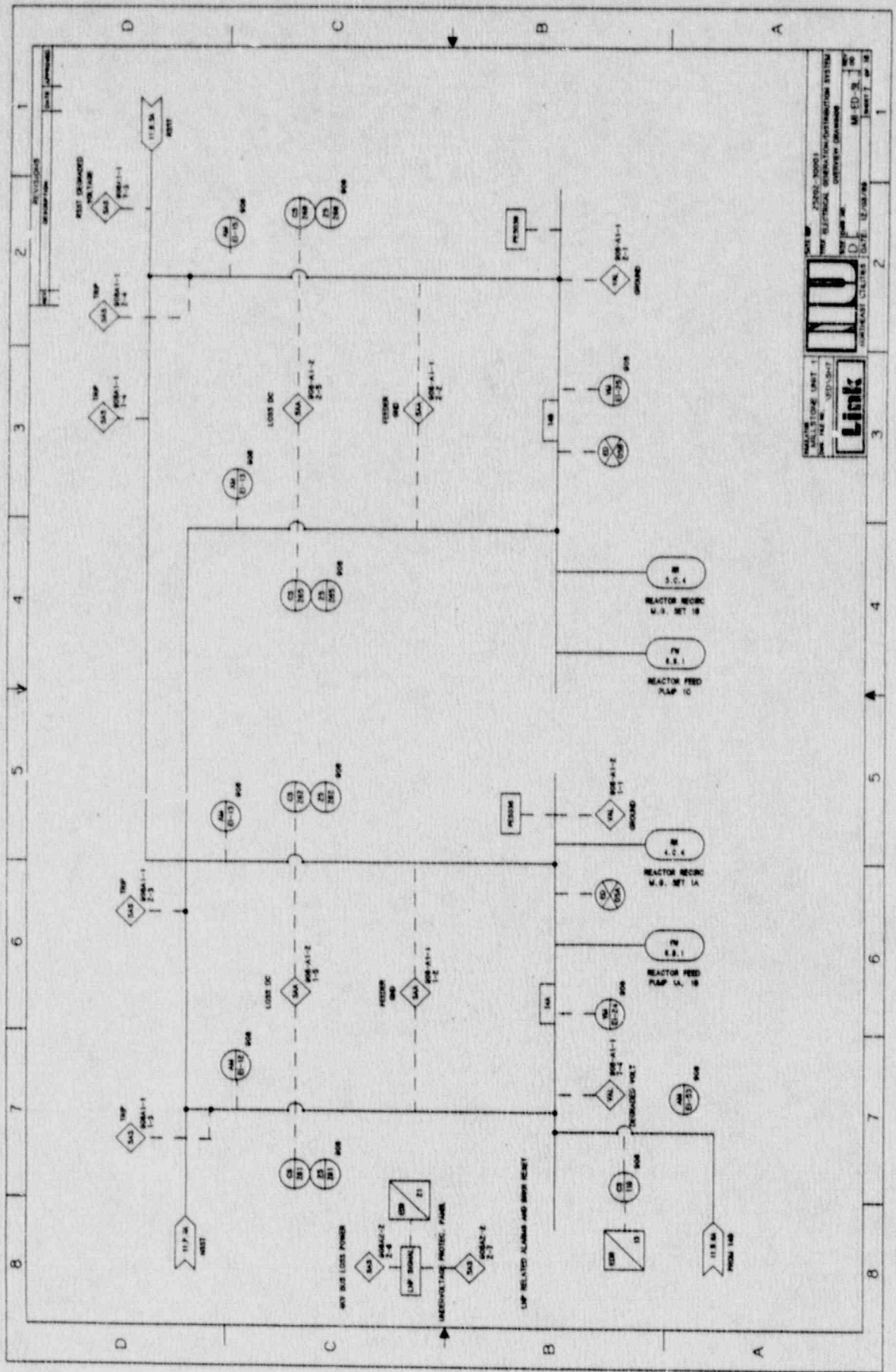




DRAWING TITLE: UNIT 1  
 UNIT ELECTRICAL DISTRIBUTION SYSTEM  
 SHEET NO. 1  
 DATE: 12/06/89  
 PROJECT: 12/06/89

**Link**  
 UNIT ELECTRICAL DISTRIBUTION SYSTEM  
 SHEET NO. 1  
 DATE: 12/06/89

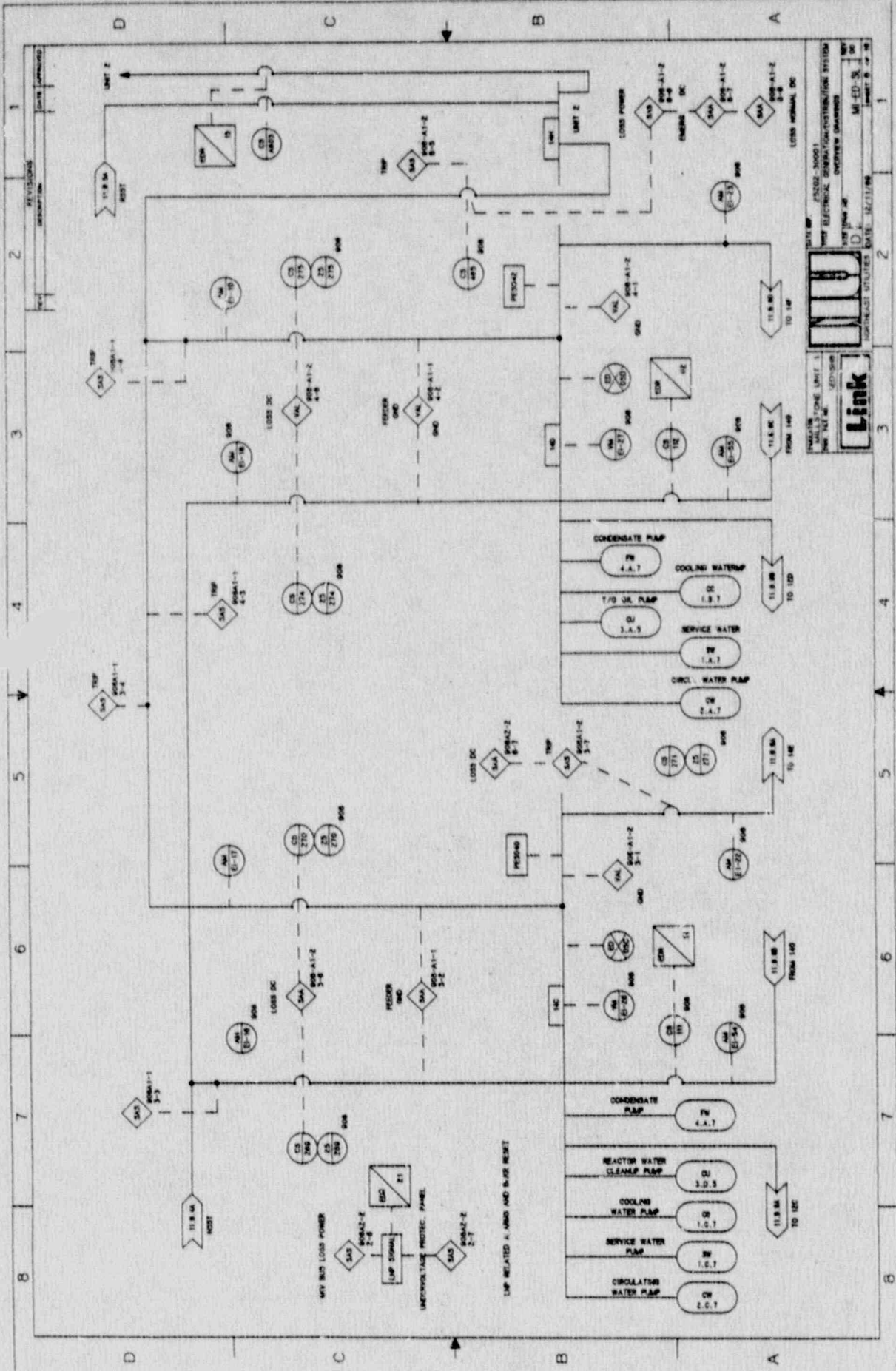




REVISIONS	NO. 1	DATE	DESCRIPTION

NUCLEAR UNIT SULLYSTONE UNIT UNIT NO. 100-107	72002-100001 REACTOR OPERATIONAL PERFORMANCE SYSTEM ELECTRICAL OPERATIONAL PERFORMANCE SYSTEM ELECTRICAL OPERATIONAL PERFORMANCE SYSTEM ELECTRICAL OPERATIONAL PERFORMANCE SYSTEM
PROJECT NO. 100-107	SHEET NO. 100-107-100
CONTRACT NO. 100-107-100	DATE 12/10/68



PROJECT: 7502-30001  
 TITLE: ELECTRICAL GENERATION/CONTROL SYSTEM  
 SHEET NO: 11.8 kV  
 DATE: 12/11/94  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]



11.8 kV  
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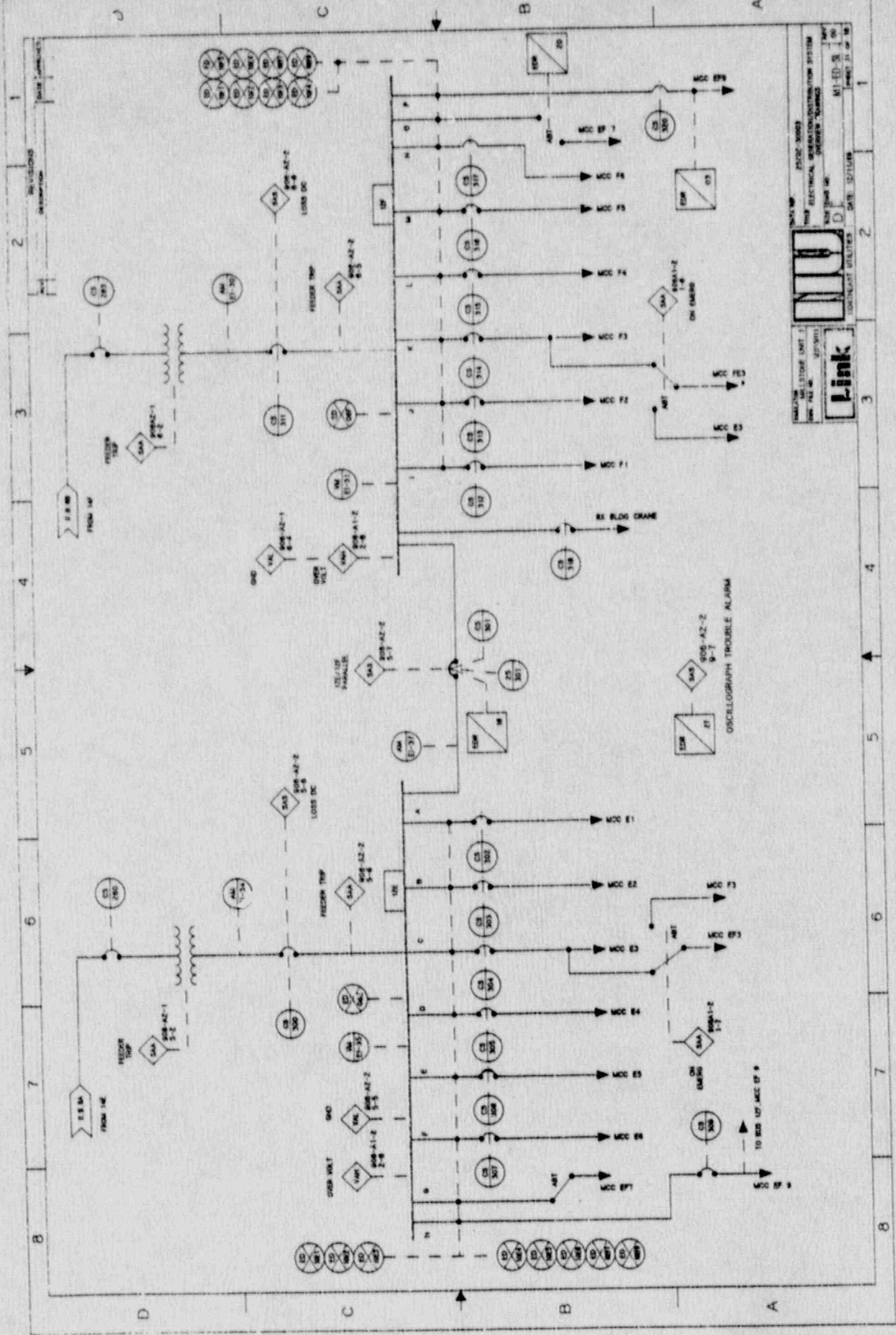
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 FROM 140  
 TO 140

11.8 kV  
 FROM 140  
 TO 140









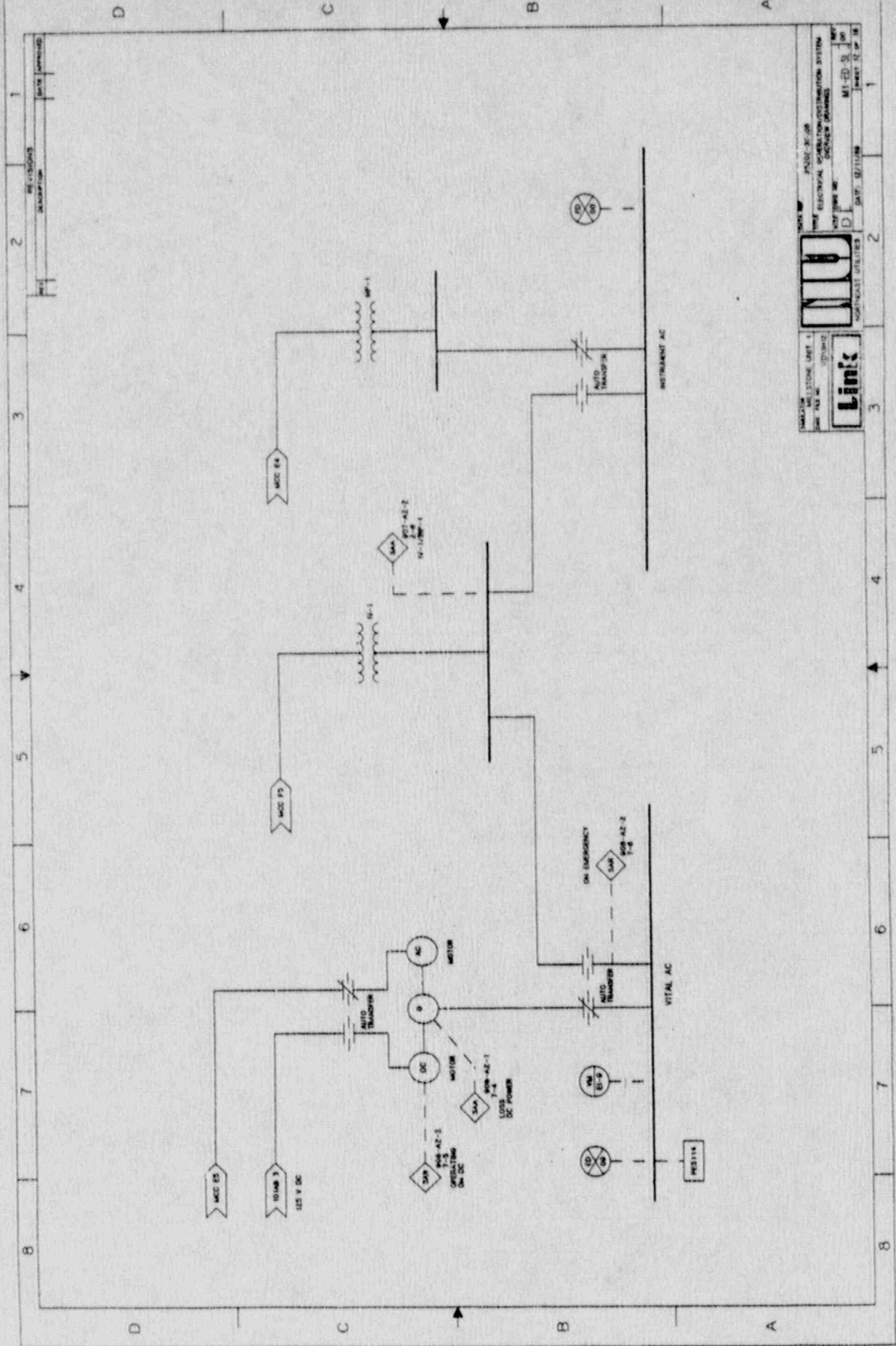
PROJECT NO. 2002-0003  
 THE ELECTRICAL GENERATION/DISTRIBUTION SYSTEM  
 INTERMEDIATE SYSTEM "MCCB"  
 DATE 01/01/01  
 SHEET NO. 11 OF 18



CONTRACT UTILITIES  
 DATE 01/01/01

OSCILLOGRAPH TROUBLE ALARM

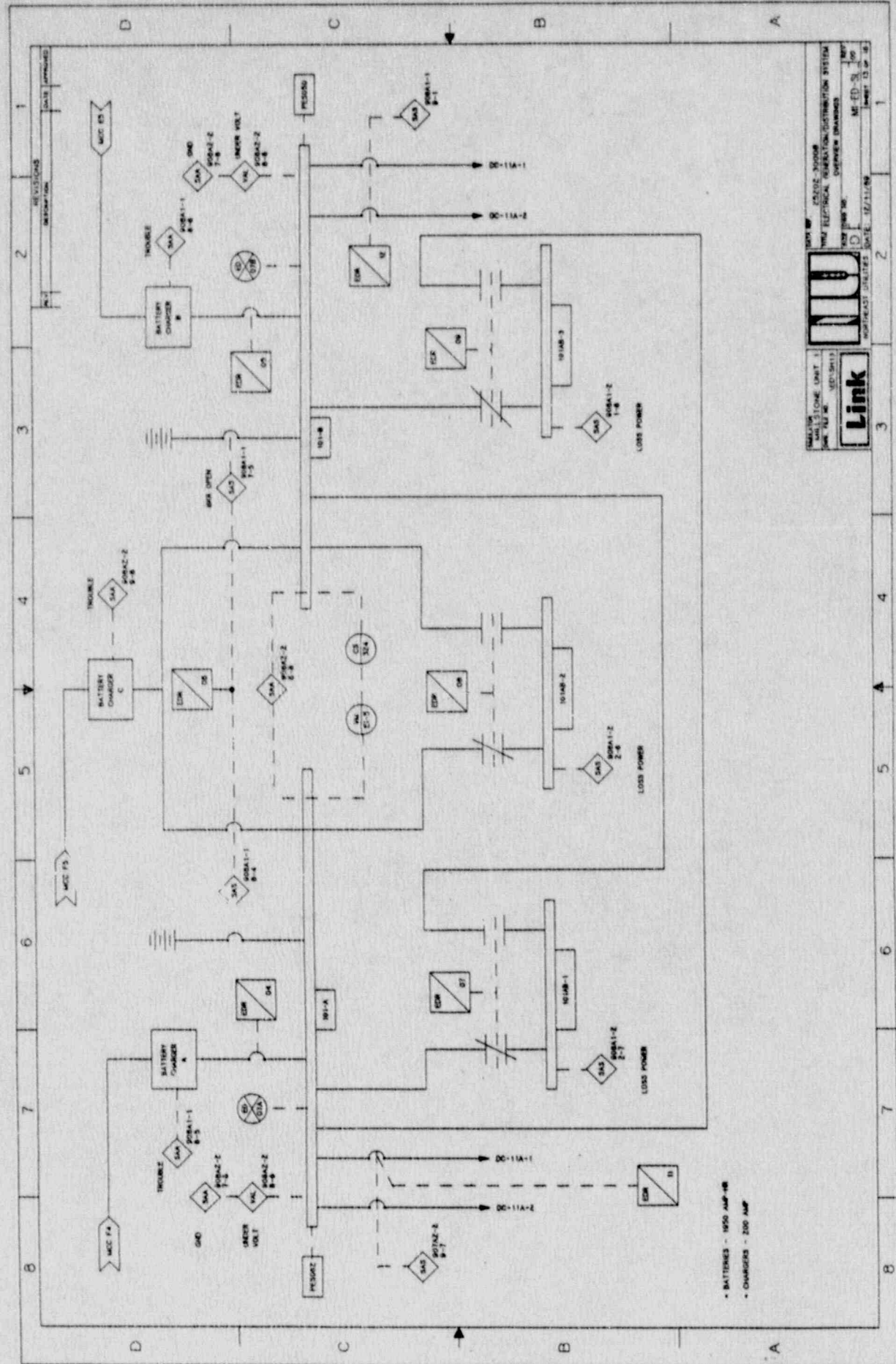
TO BUS 147, MCC OF #



PROJECT: M-1000  
 SHEET: 1 OF 1  
 DATE: 11/1/58  
 DRAWN BY: J. B. BROWN  
 CHECKED BY: J. B. BROWN  
 APPROVED BY: J. B. BROWN  
 TITLE: ELECTRICAL CONTROL/DISTRIBUTION SYSTEM  
 UNIT: M-1000  
 DRAWING NO.: M-1000-1  
 SHEET NO.: 1 OF 1



MILLSTONE UNIT 1  
 ELECTRICAL CONTROL/DISTRIBUTION SYSTEM  
 SHEET 1 OF 1

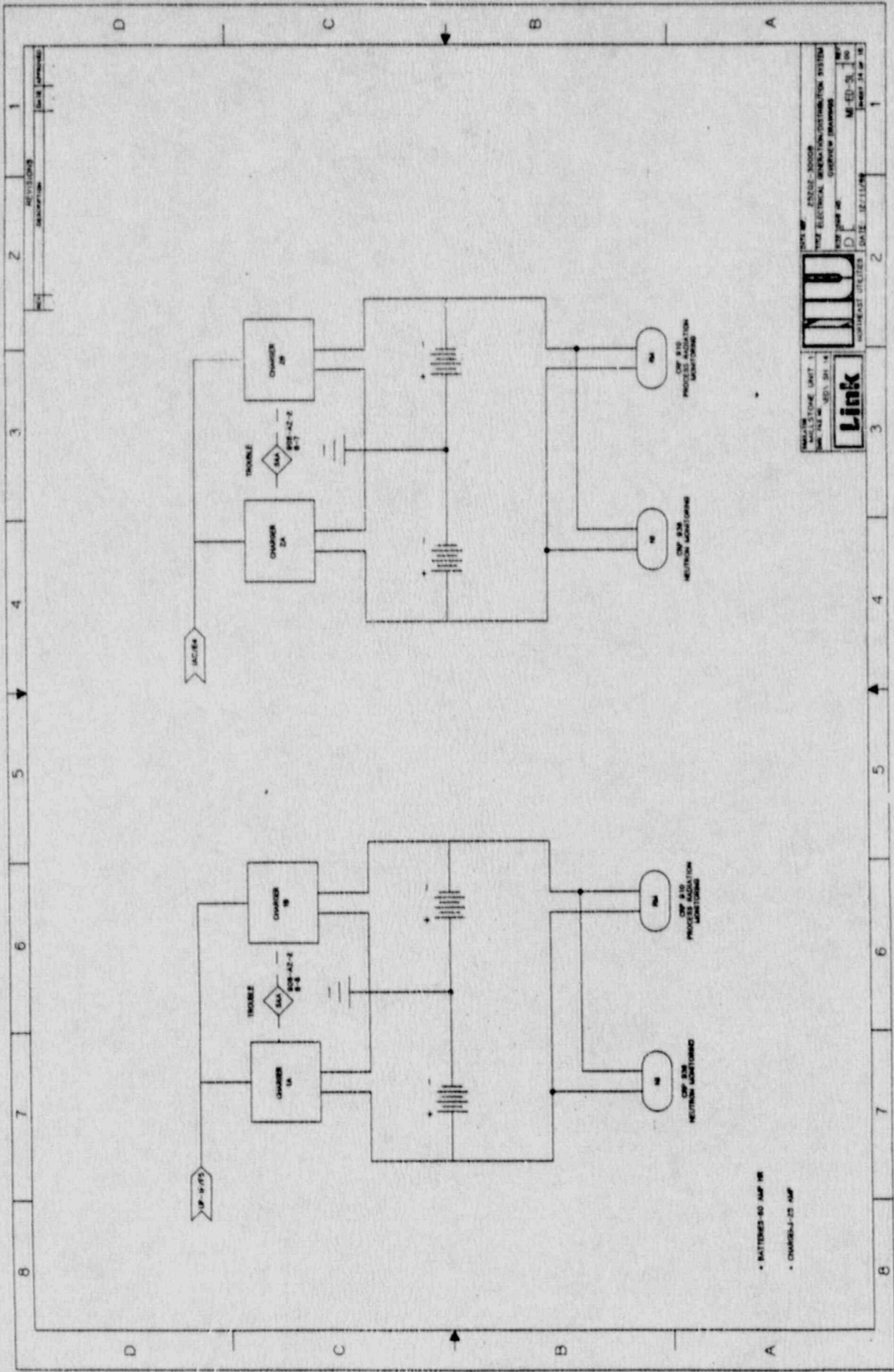


WALLSTONE UNIT 1  
 3000W VME ELECTRICAL REDUNDANCY-DISTRIBUTION SYSTEM  
 100% REDUNDANT  
 12/11/89  
 M. ED. ST. 107  
 100%



Link  
 NORTHWEST DISTRICTS DATE: 12/11/89

• BATTERIES - 1950 AMP-HR  
 • CHARGERS - 200 AMP



\* BATTERIES 60 AMP HR  
 \* CHARGERS 15 AMP

LINK  
 MILLSTONE UNIT 1  
 TYPE ELECTRICAL GENERATION/DISTRIBUTION SYSTEM  
 DRAWING NO. 100-100-100-100  
 DATE 12/14/18

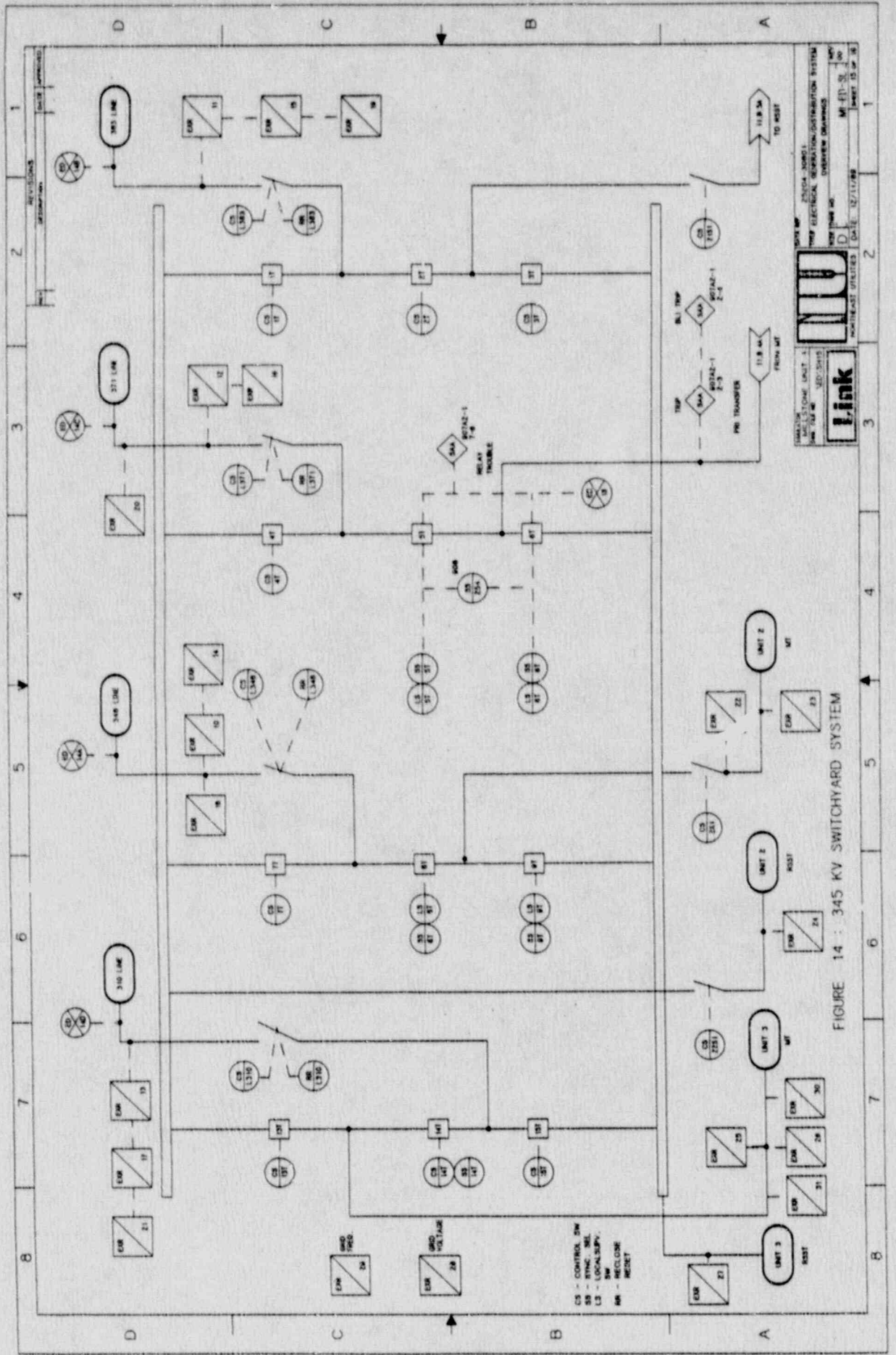
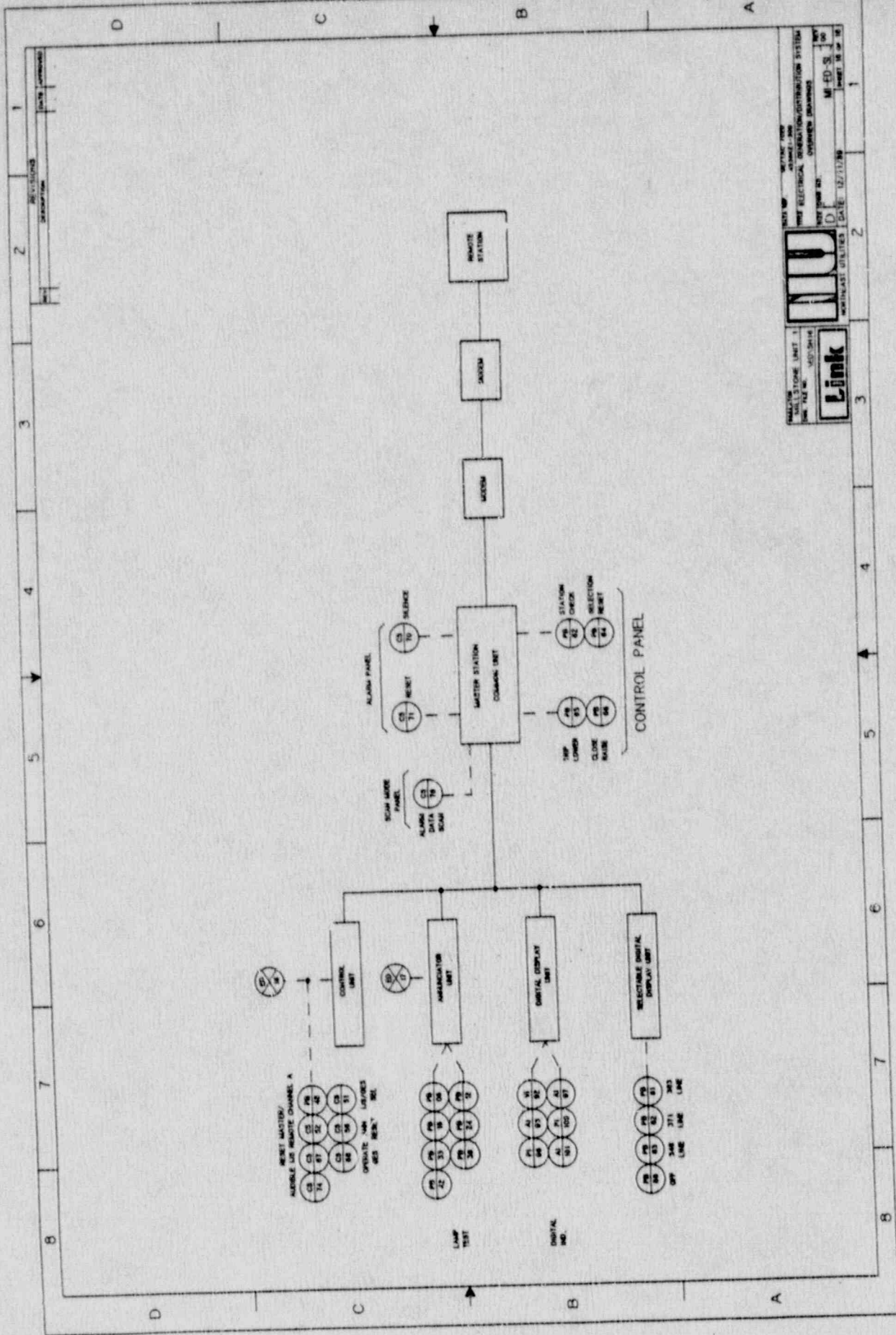
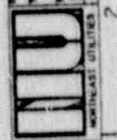


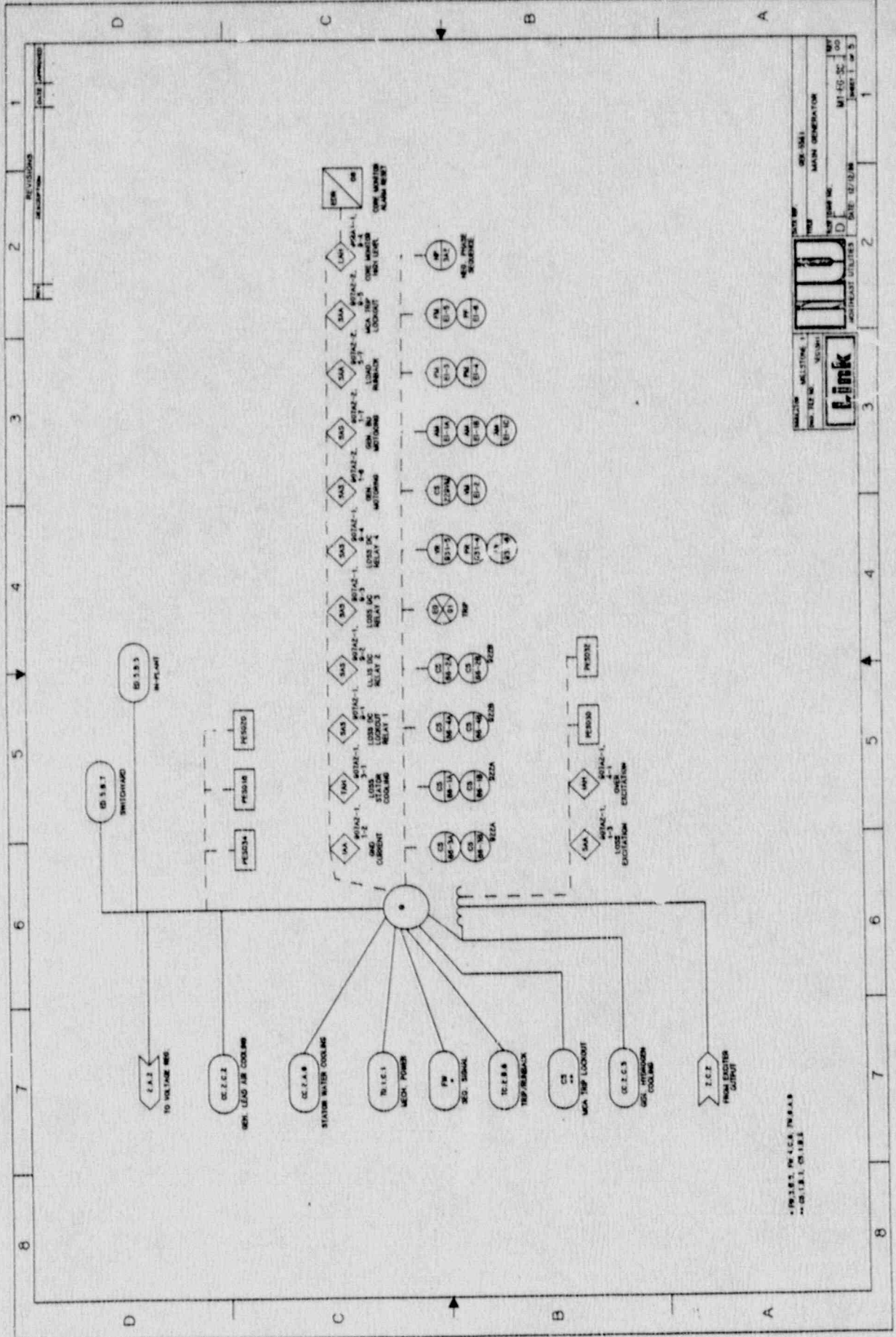
FIGURE 14 : 345 KV SWITCHYARD SYSTEM



PROJECT NO. 1000  
 SHEET NO. 1  
 TITLE: REMOTE STATION CONTROL UNIT  
 DATE: 12/17/78  
 DRAWN BY: M. ED. S.  
 CHECKED BY: D.  
 APPROVED BY: D.  
 SHEET 18 OF 18



1 2 3 4 5 6 7 8  
 A B C D



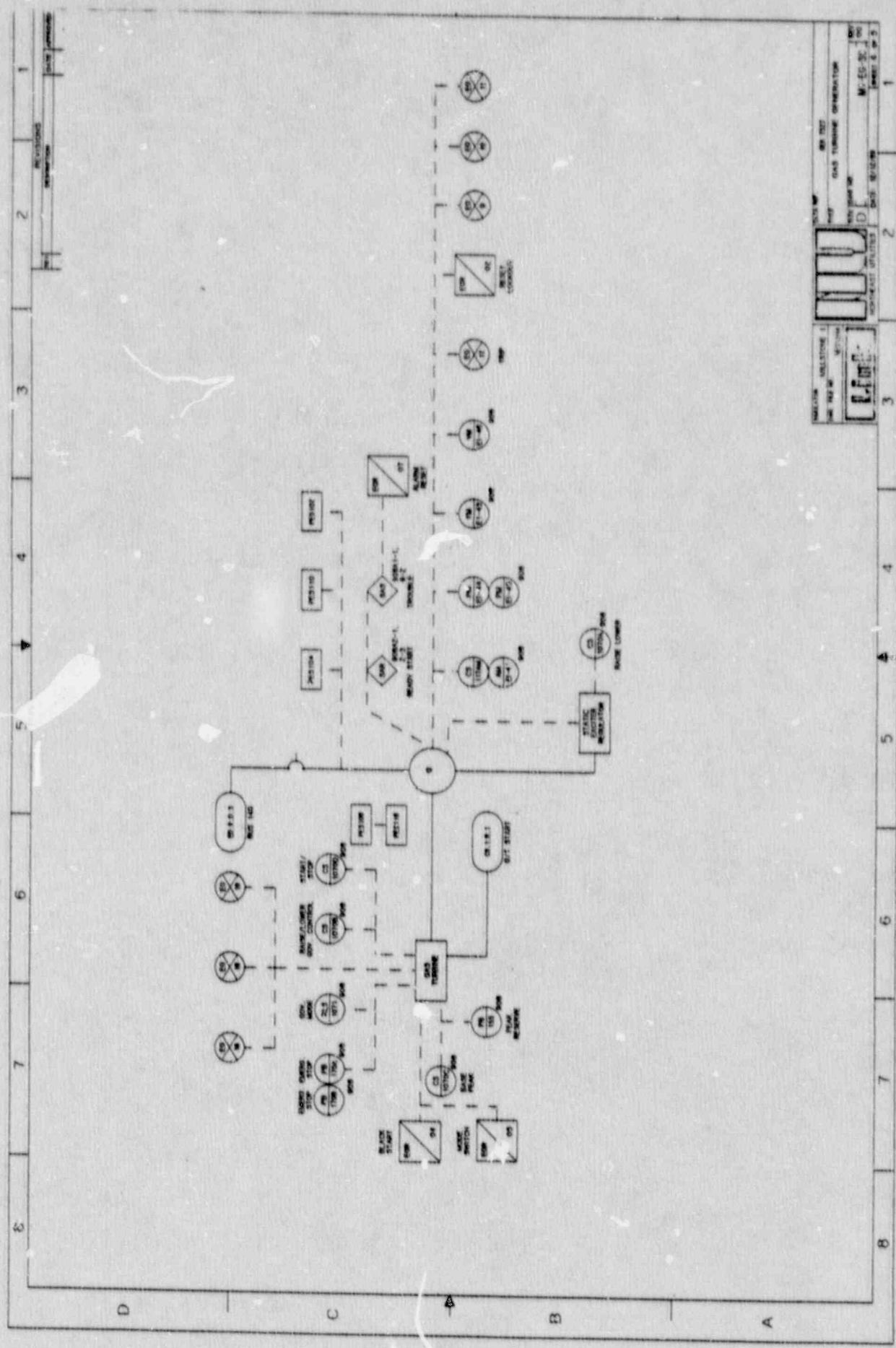
-P5.1.1 P5.1.1 P5.1.1  
-- G5.1.1 G5.1.1

PROJECT: MOUNTAIN VIEW  
 SHEET NO.: 101-101  
 DATE: 12/10/88  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 PROJECT ENGINEER: [Signature]  
 PROJECT MANAGER: [Signature]  
 PROJECT NO.: MT-101-101  
 SHEET 1 OF 5

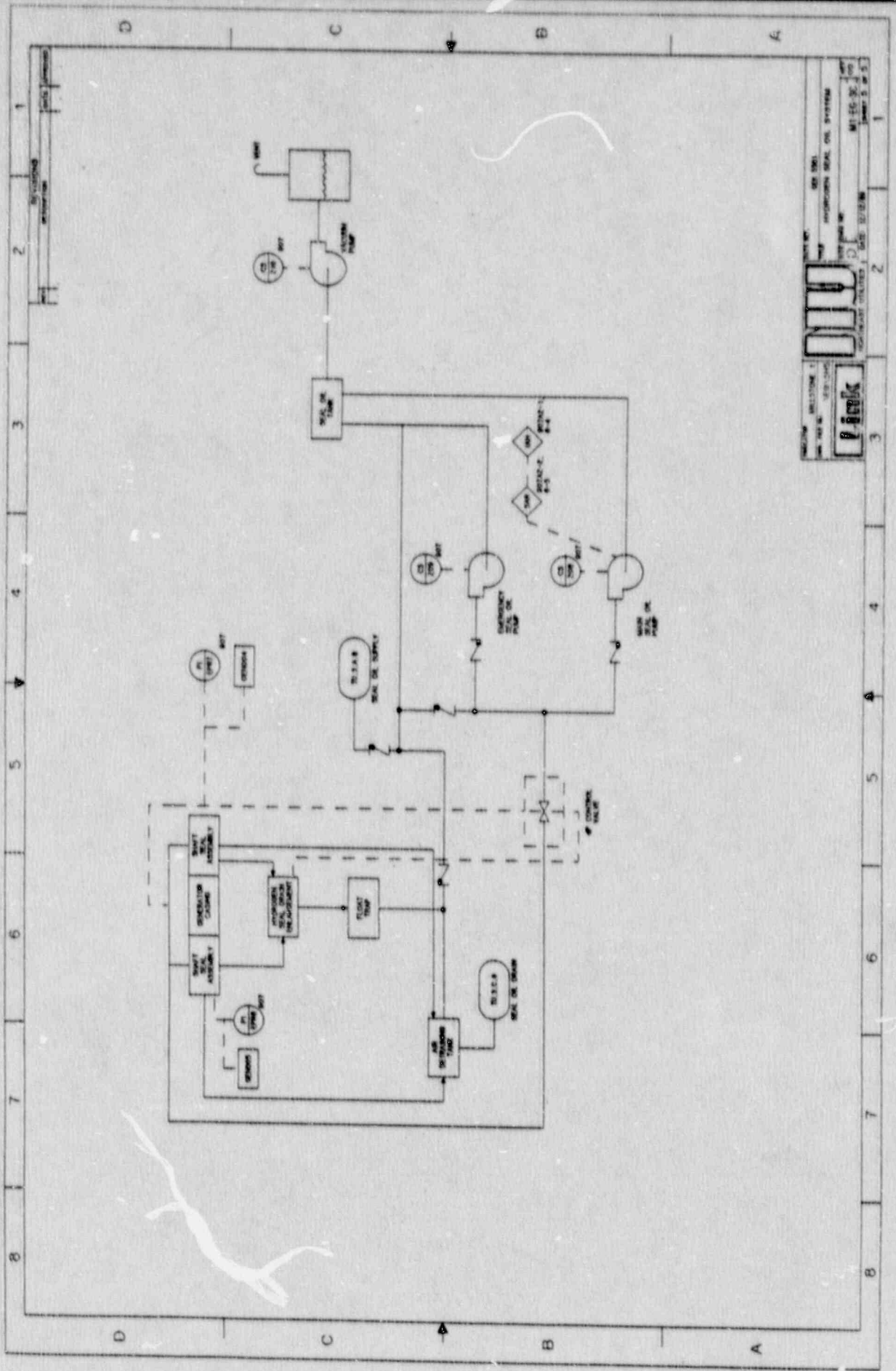


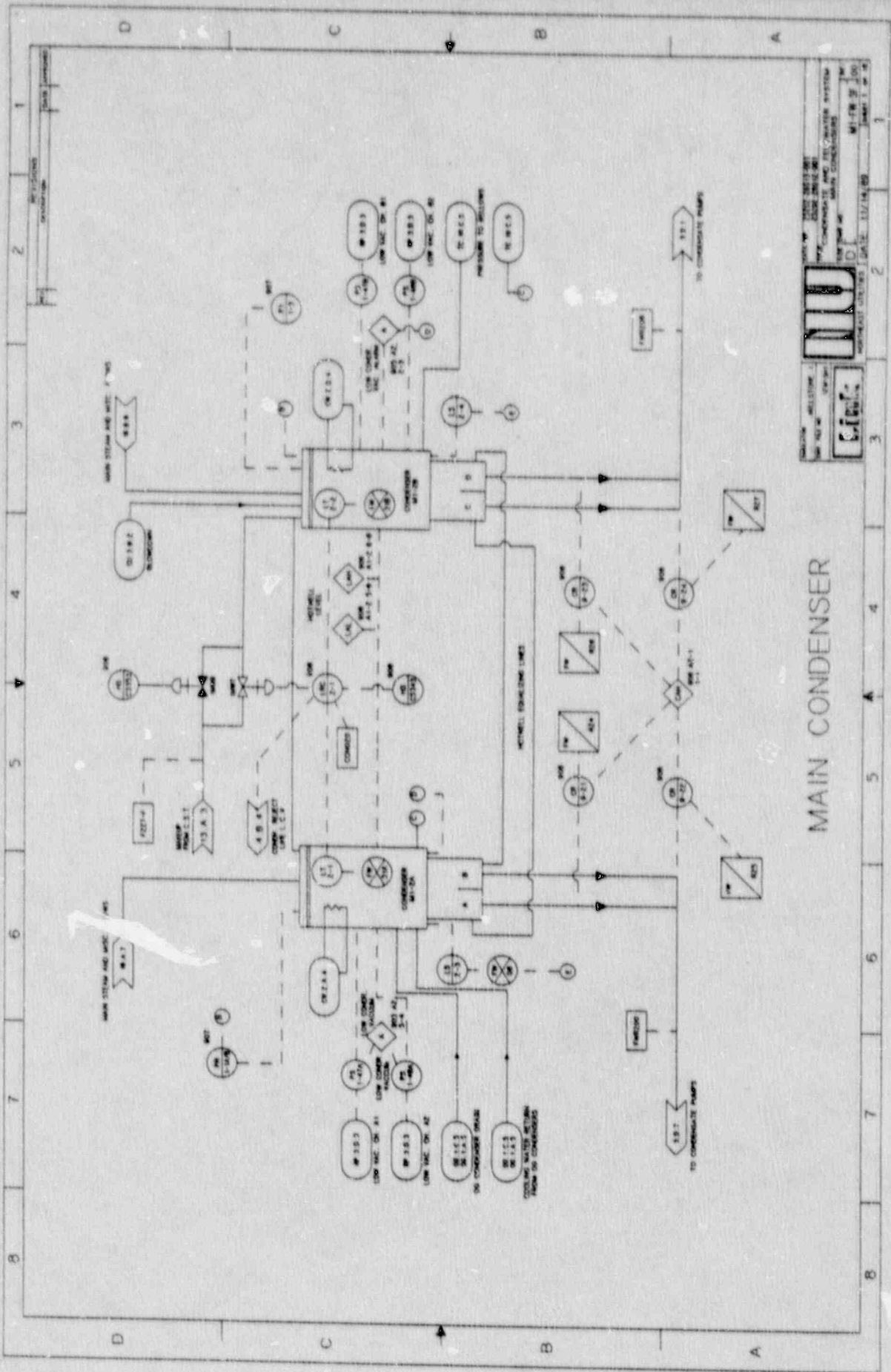






PROJECT	DATE	BY	NO.
REVISION	DATE	BY	NO.
APPROVED	DATE	BY	NO.
CHECKED	DATE	BY	NO.
DRAWN	DATE	BY	NO.
SCALE	DATE	BY	NO.
TITLE	DATE	BY	NO.
GAS TURBINE OPERATOR			
M. E. S.			





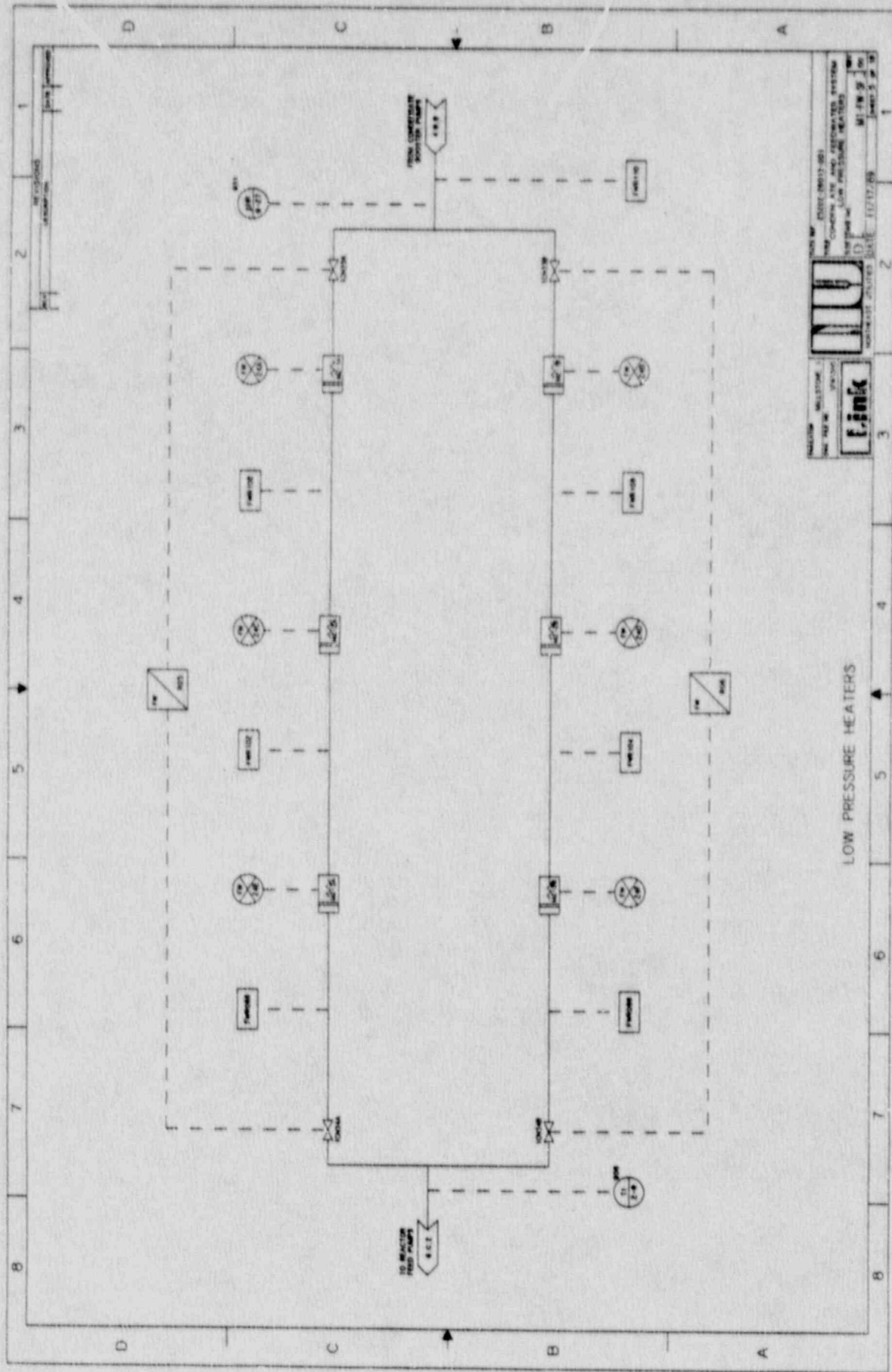
MAIN CONDENSER

PROJECT NO. 1000-2000-001  
 DATE 08/14/83  
 DRAWING NO. 1000-2000-001-001  
 SHEET NO. 1 OF 1









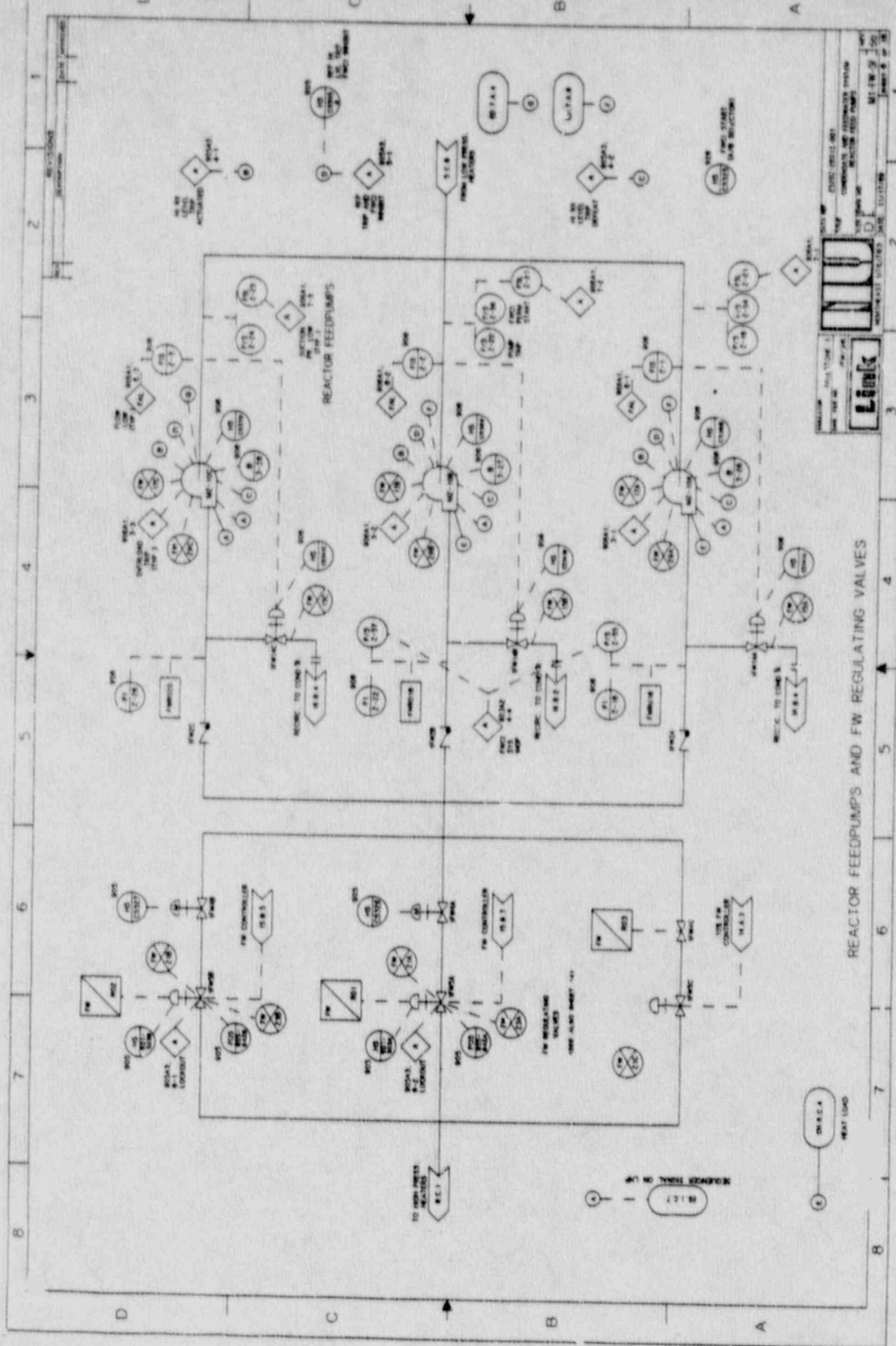
LOW PRESSURE HEATERS

DRAWN BY: EUSE (0017-02)  
 THE CONDENSATE AND ASSOCIATED SYSTEM  
 LOW PRESSURE HEATERS  
 PROJECT NO: M1 20 2  
 SHEET NO: 11/17/88

**NU**  
 NUCLEAR UNIVERSITY

WILSONVILLE, OREGON  
 503-545-1000  
**Frank**  
 INSTRUMENTATION





REACTOR FEEDPUMPS AND FW REGULATING VALVES

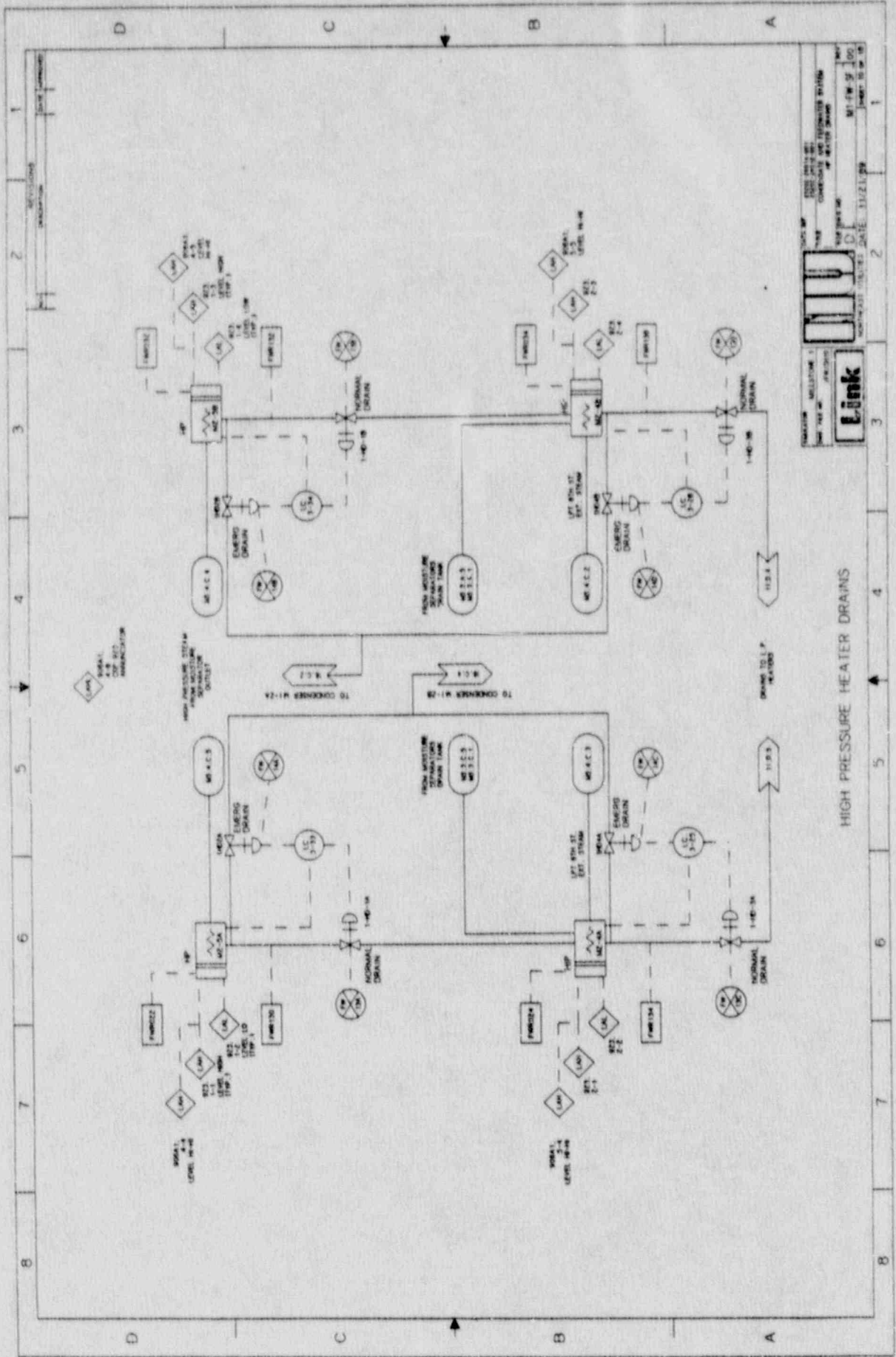


DRAWING NO. 15.1.1  
 PROJECT: REACTOR FEEDPUMPS AND FW REGULATING VALVES  
 SHEET NO. 1  
 DATE: 10/10/68  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]



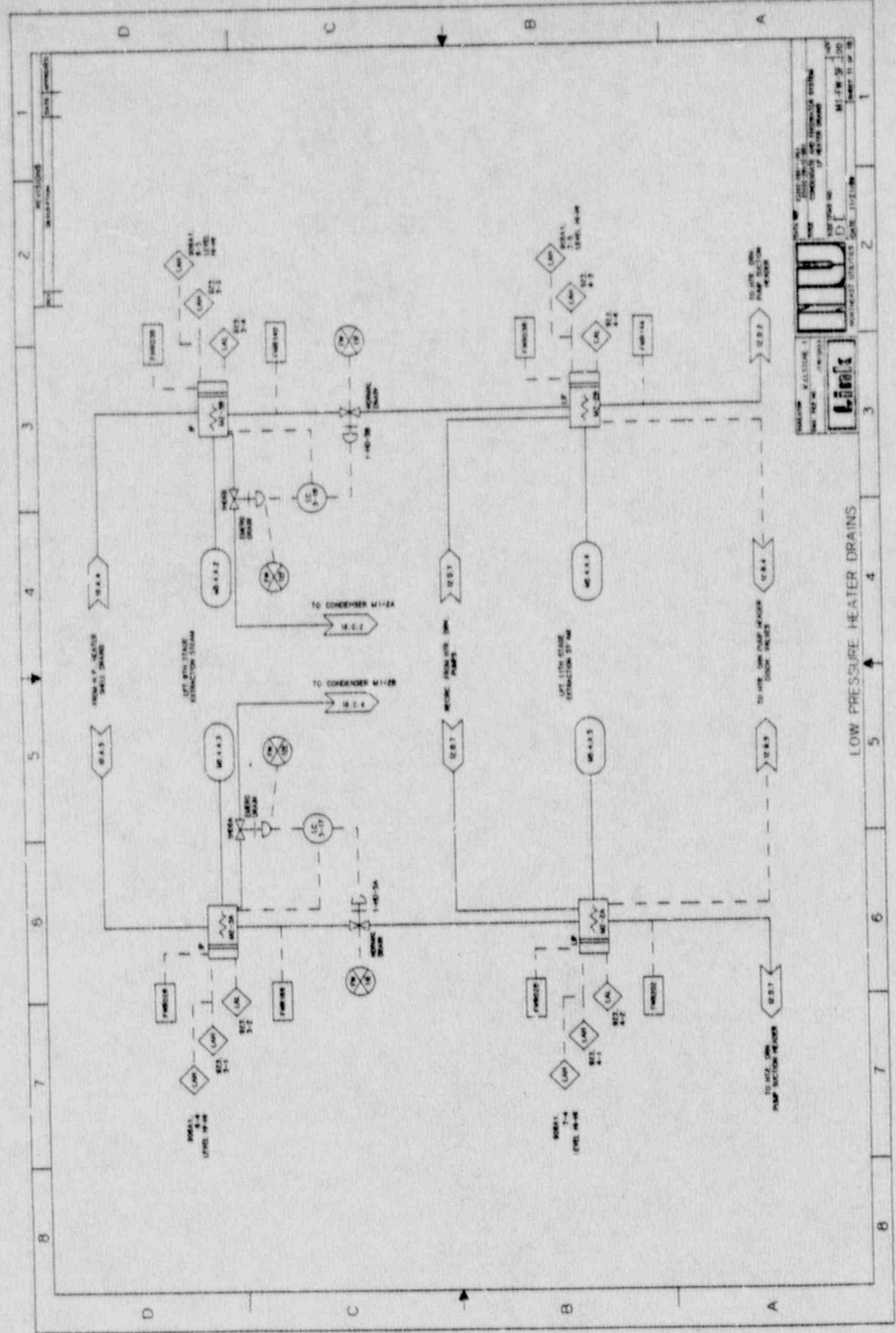






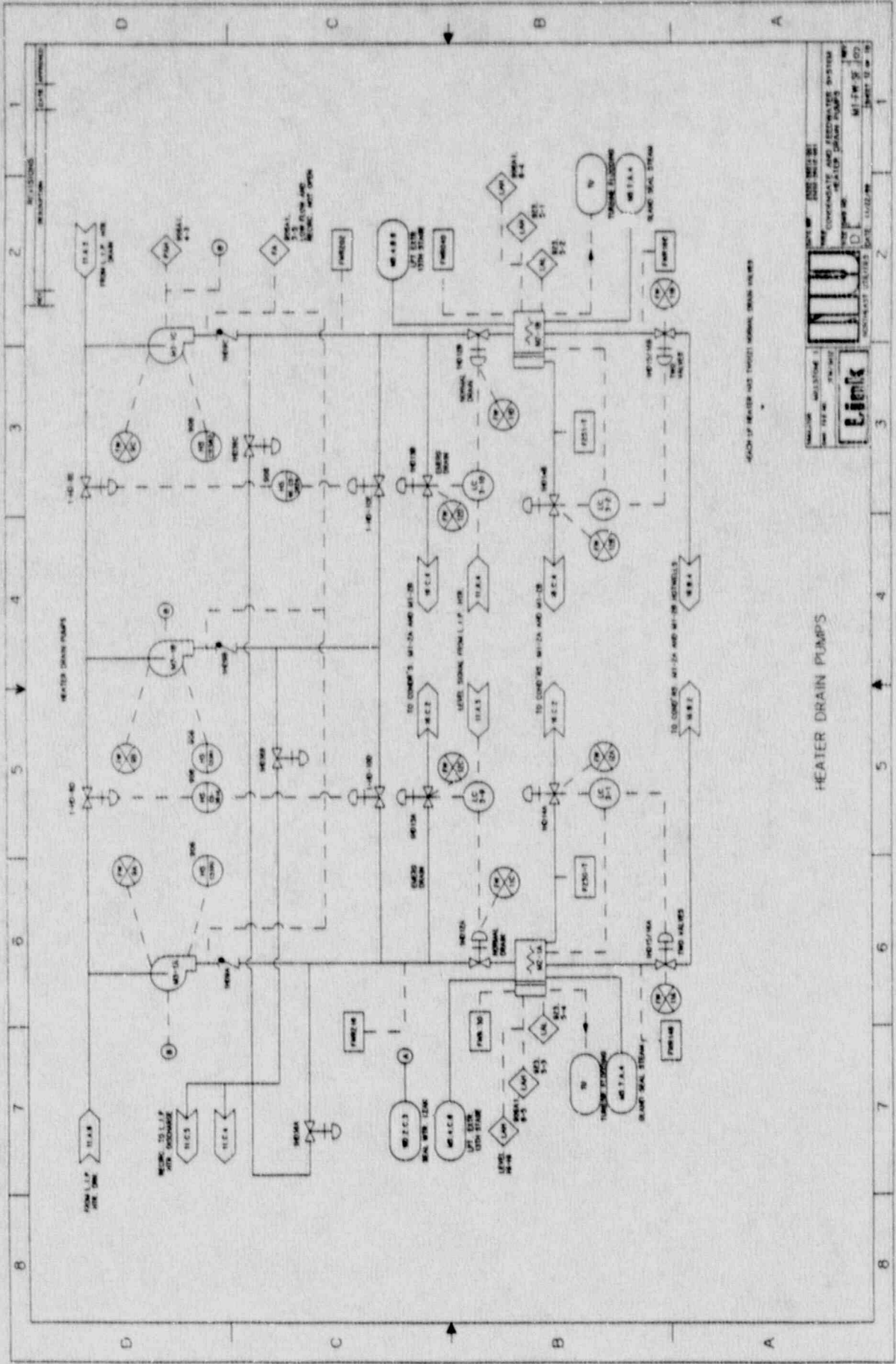
PROJECT: MILLSTONE  
 SHEET NO. 1000-1012-01  
 DATE: 11/2/2009  
 DRAWN BY: J. J. J. J.  
 CHECKED BY: J. J. J. J.  
 APPROVED BY: J. J. J. J.  
 TITLE: HIGH PRESSURE HEATER DRAINS  
 SHEET NO. 1000-1012-01  
 DATE: 11/2/2009

HIGH PRESSURE HEATER DRAINS



LOW PRESSURE HEATER DRAINS

PROJECT: MALLINUM 1  
 SHEET NO: M1-1M-39  
 SHEET 11 OF 19  
 DATE: 11/11/88  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]  
 TITLE: CONDENSATE AND DEWATER SYSTEM  
 UNIT: M1-1M-39

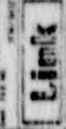


HECK UP HEATER DRAIN TRIPPIST MANUAL DRAIN VALVES

HEATER DRAIN PUMPS

PROJECT NO.	1000 1000 001
DATE	10/10/50
DESIGNED BY	W. J. H. H.
CHECKED BY	W. J. H. H.
APPROVED BY	W. J. H. H.
PROJECT TITLE	CONDENSATE AND REHEATER SYSTEM
SHEET NO.	101
TOTAL SHEETS	107

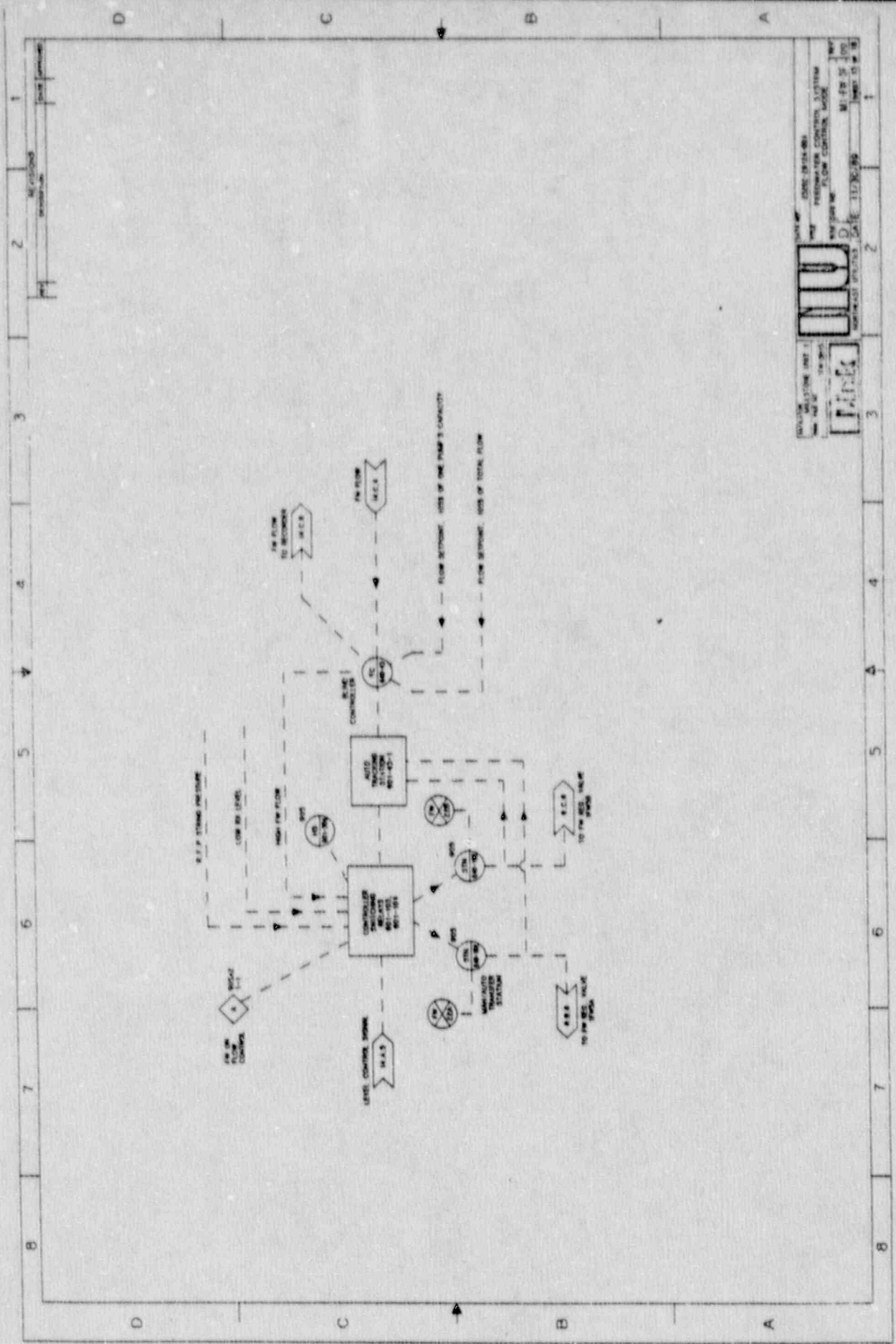
CONDENSATE COLLECTOR DATE 10/10/50



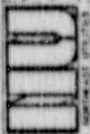








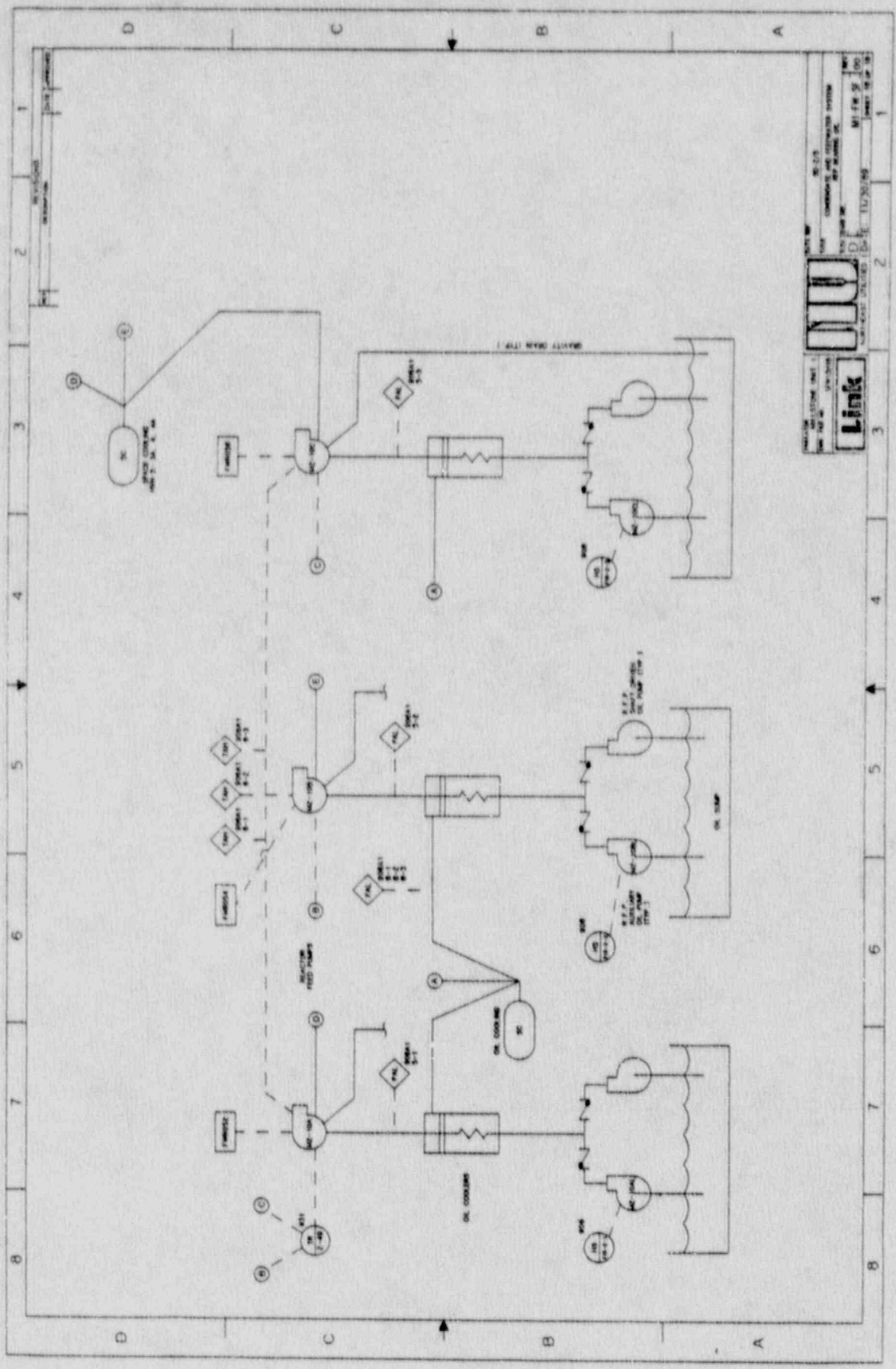
PROJECT NO.	11730-36
DATE	11/30/55
REVISED DATE	
REVISED BY	
DESIGNED BY	
CHECKED BY	
APPROVED BY	
DATE	
BY	
NO.	
PROJECT NO.	11730-36
DATE	11/30/55
REVISED DATE	
REVISED BY	
DESIGNED BY	
CHECKED BY	
APPROVED BY	
DATE	
BY	
NO.	



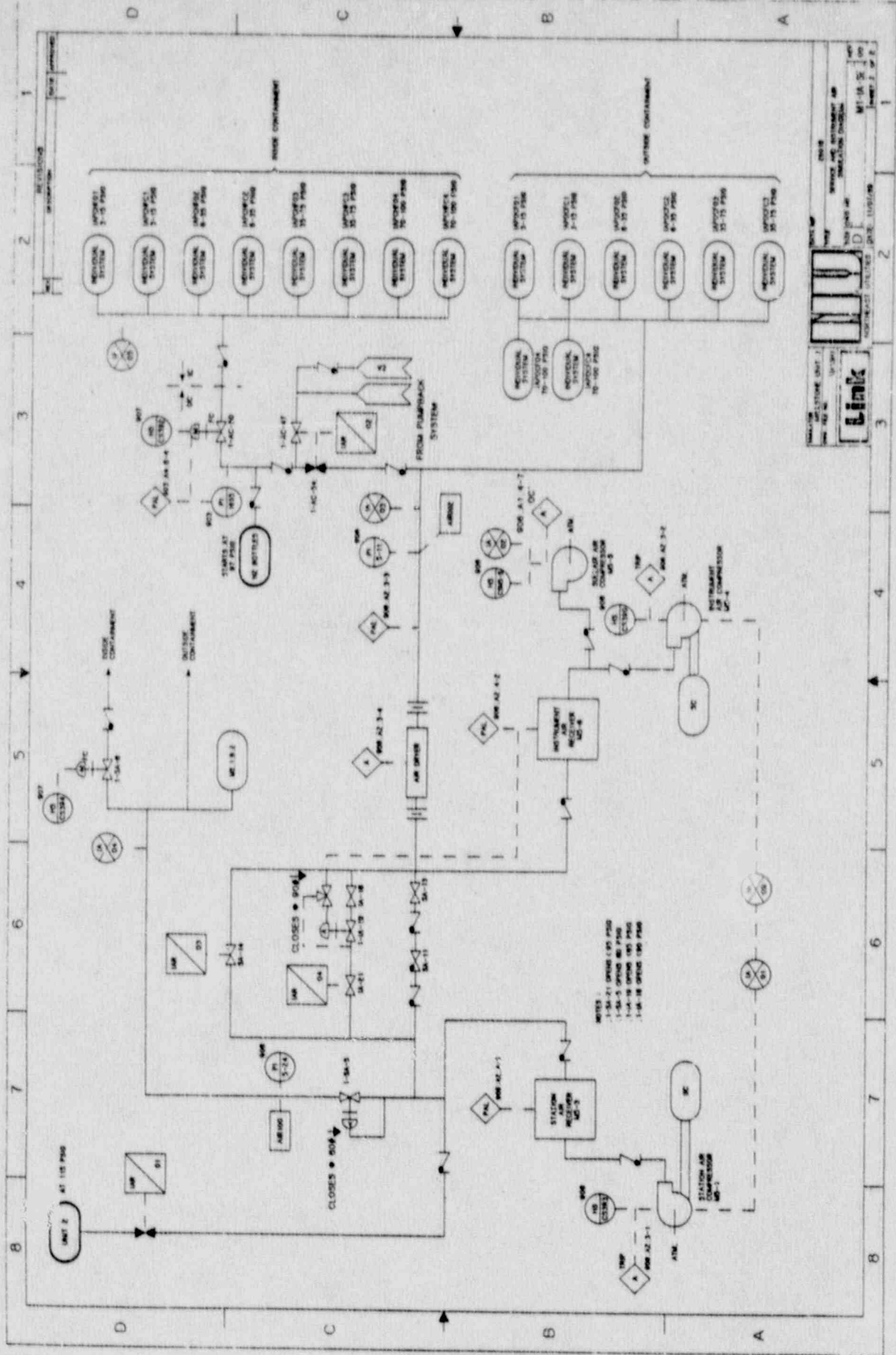
MIL-LOG  
 MILITARY LOGGING  
 11730-36







Link  
 CHEMICALS AND EQUIPMENT SYSTEM  
 100 YEARS OF SERVICE  
 1917-2017  
 100 YEARS OF SERVICE  
 1917-2017



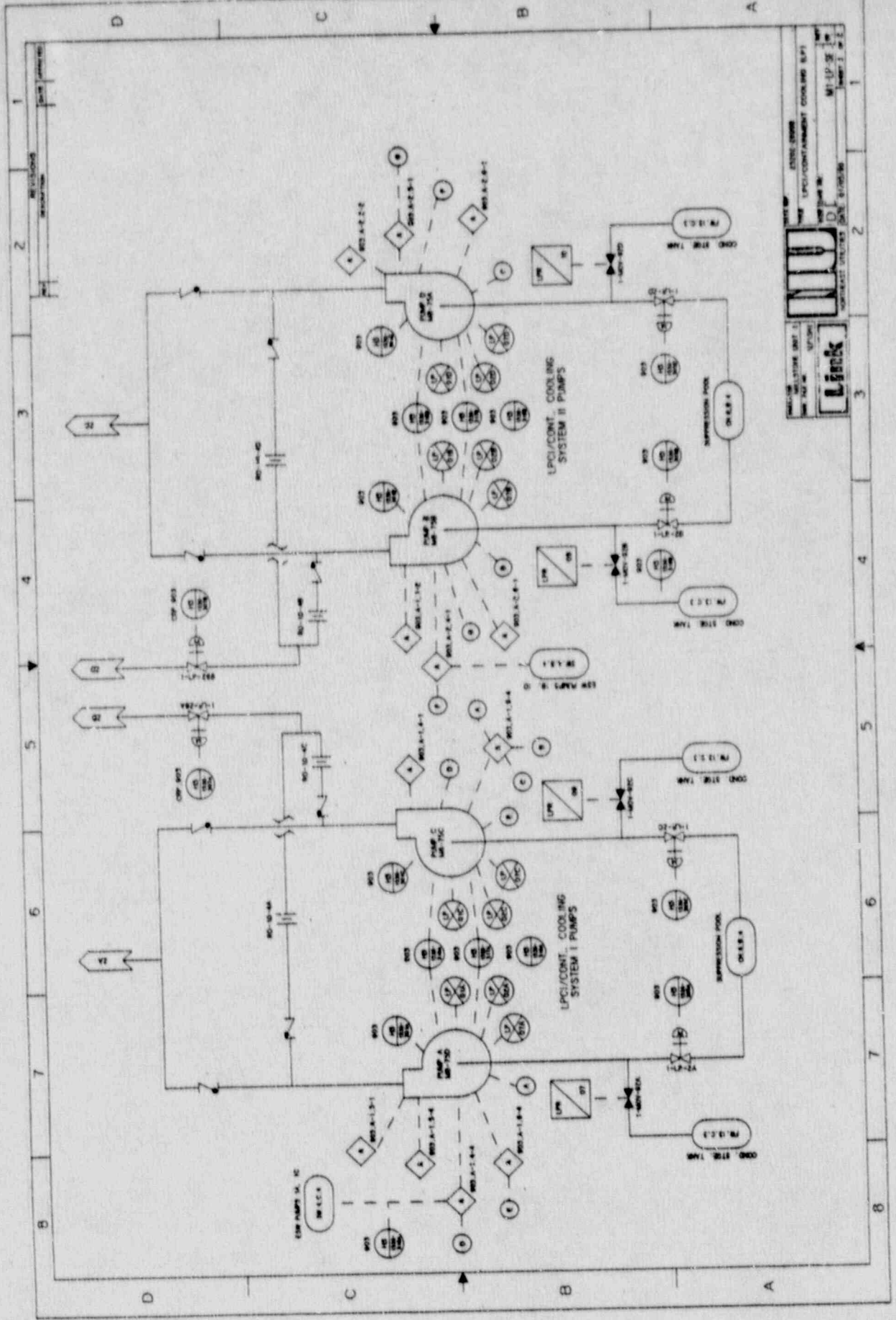
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 1-1A-5 OPENED 1-15 PMSO  
 1-1A-18 OPENED 1-15 PMSO  
 1-1A-18 OPENED 1-15 PMSO

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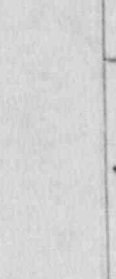


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TITLE: LFCU/CONT. COOLING SYSTEM I PUMPS  
 LFCU/CONT. COOLING SYSTEM II PUMPS  
 SHEET NO. 1 OF 2  
 DATE: 11/10/88  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]

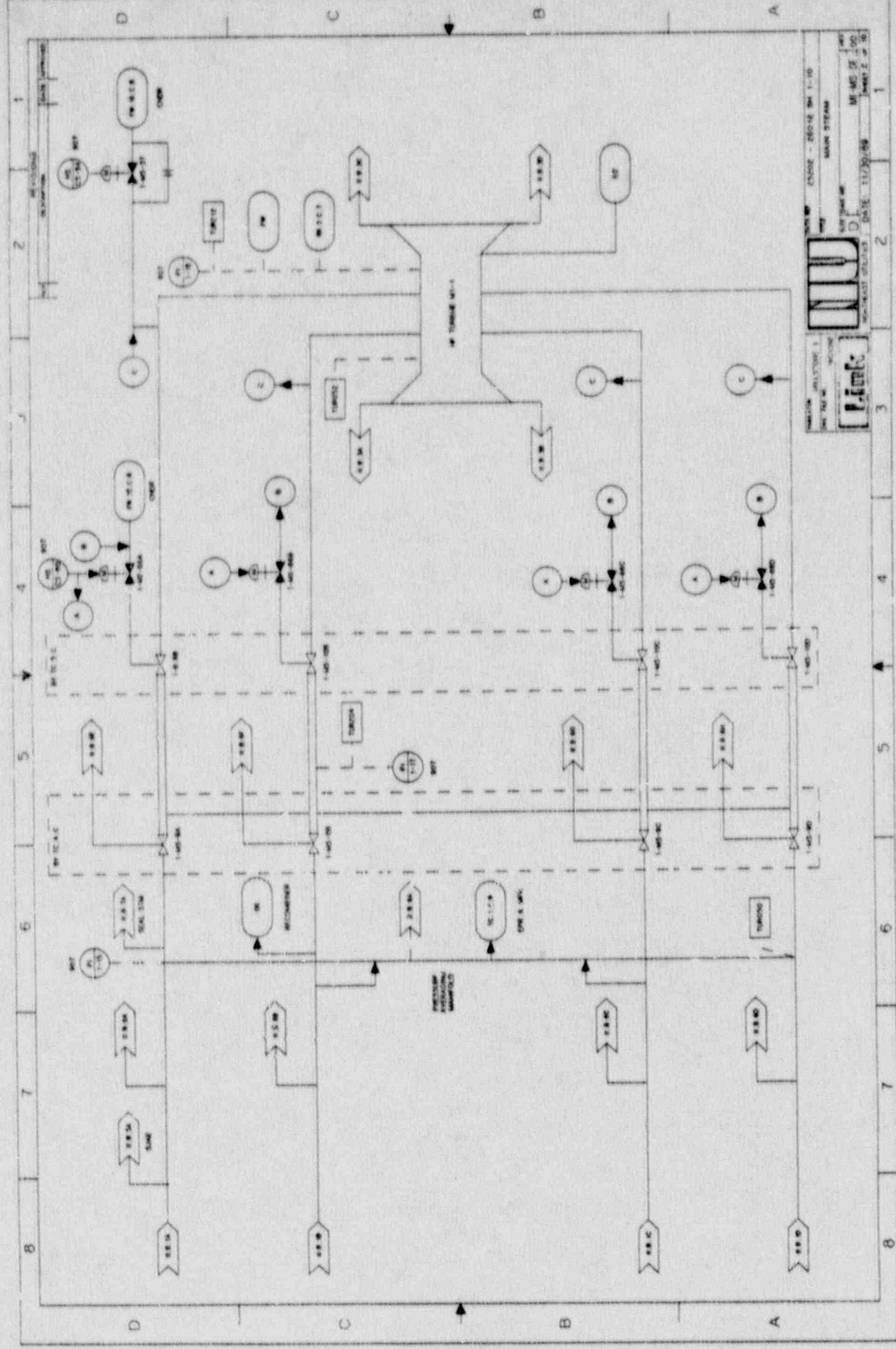


CONTRACT NO. 11-88-00000  
 UNIT 11  
 SYSTEM 11.1

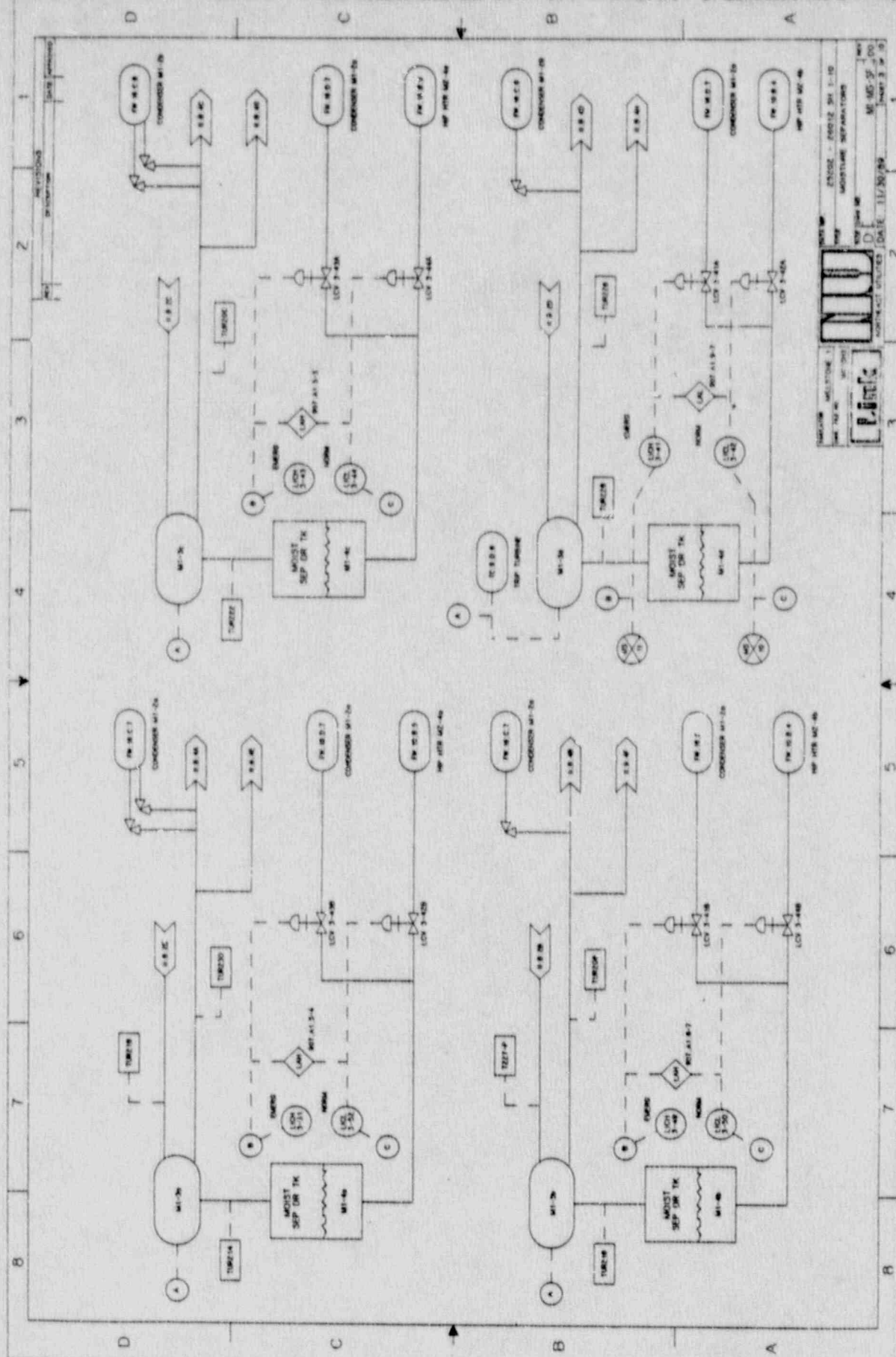






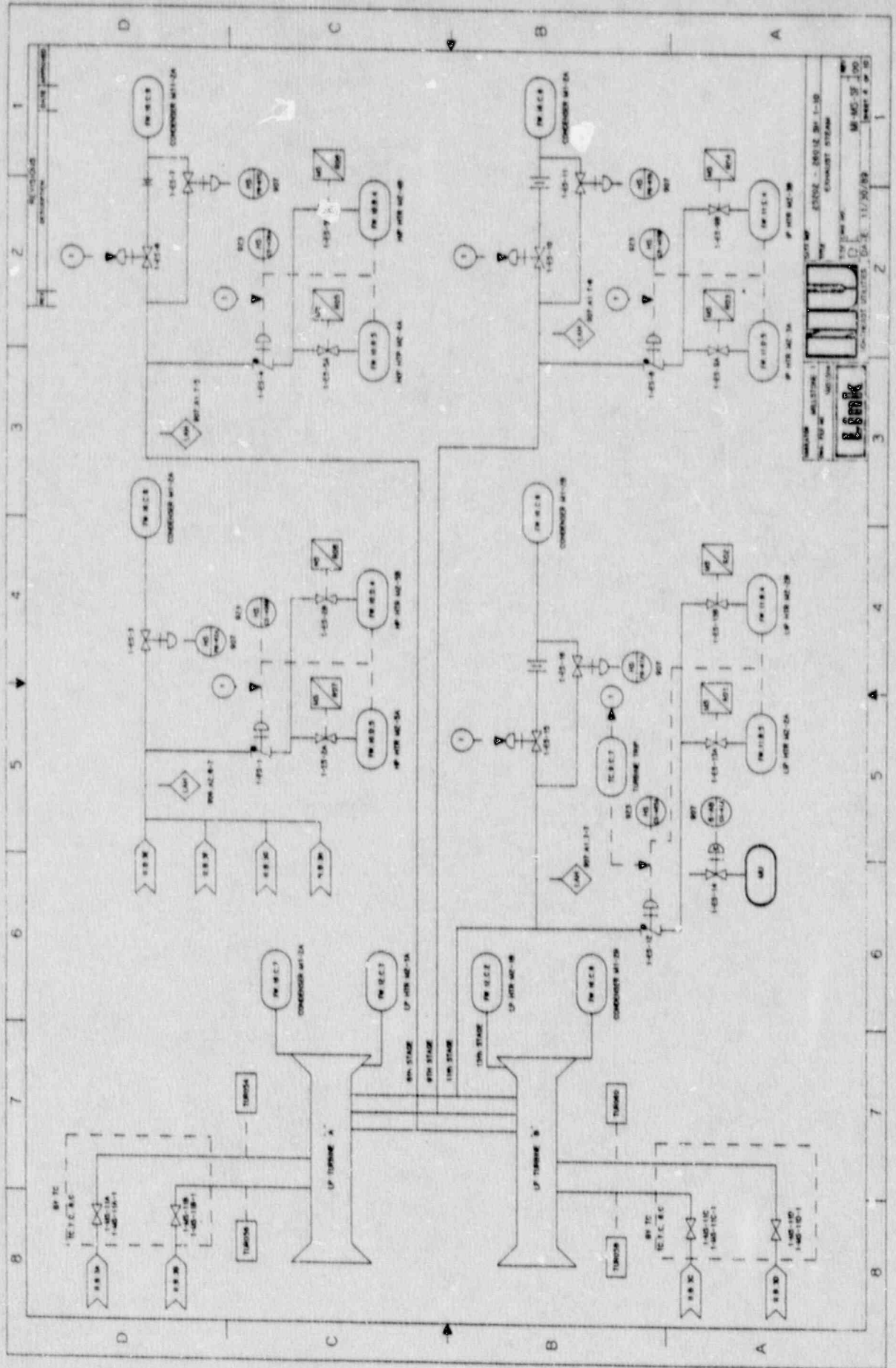


PROJECT: 28012 SH 1-10  
 SHEET: 2 OF 10  
 DATE: 11/30/68  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]

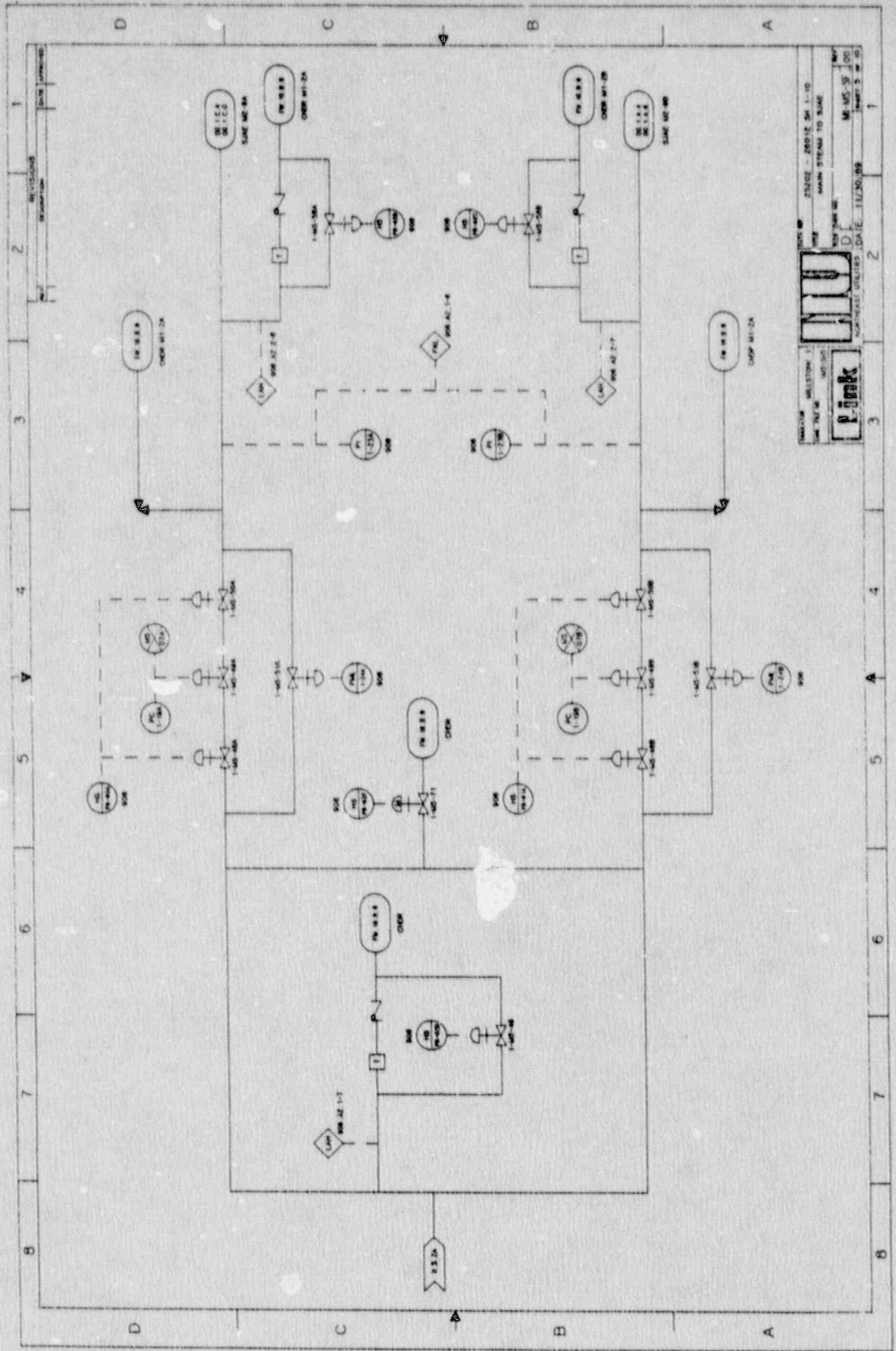


PROJECT NO. 20012-201-1-10  
 INDUSTRIAL SEPARATORS  
 DATE 11/30/99  
 M. M. S. CO.  
 CONTRACT UNITED STATES

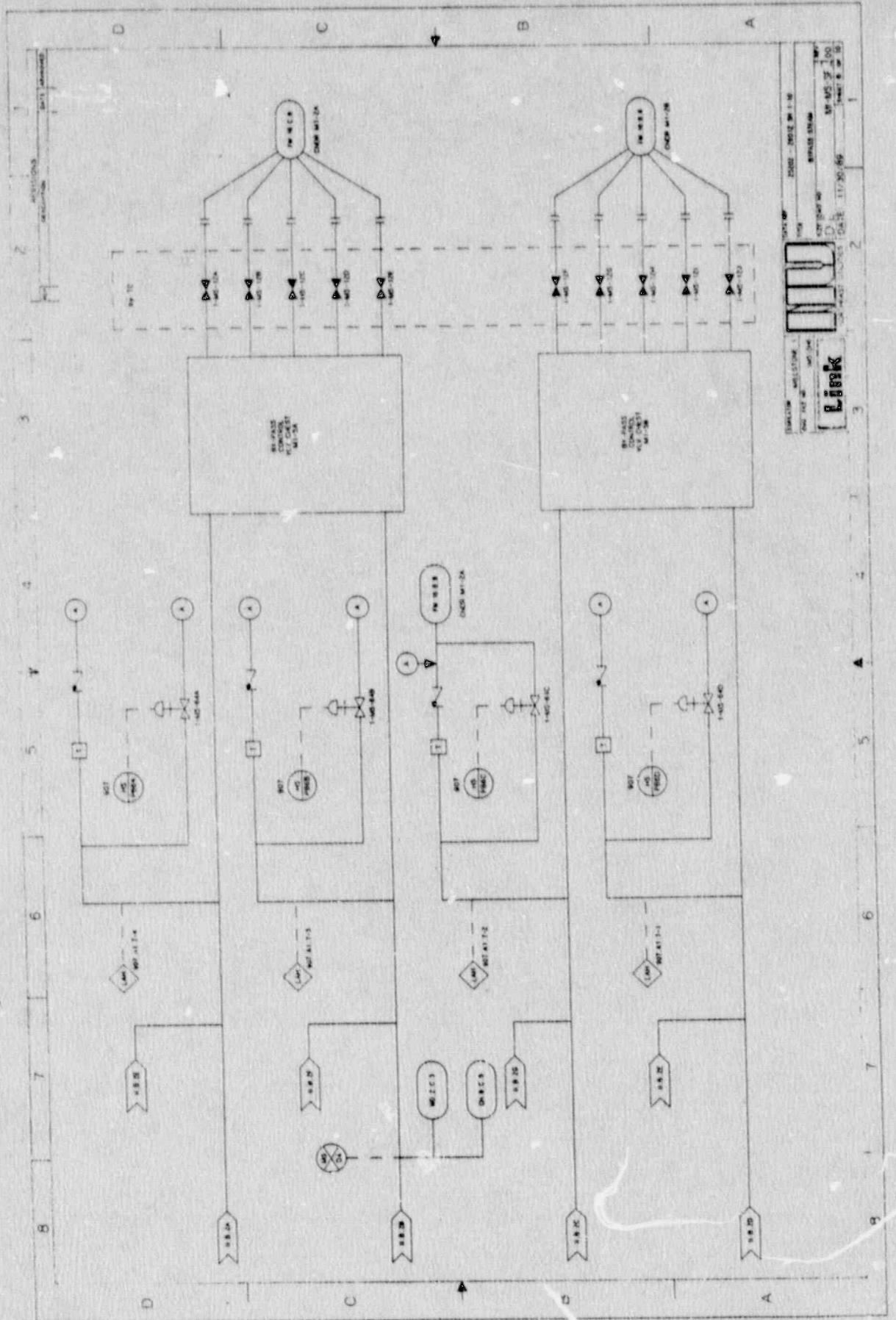
CONTRACT UNITED STATES  
 DATE 11/30/99  
 M. M. S. CO.  
 CONTRACT UNITED STATES



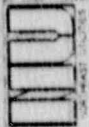
SHEET NO. 1  
 PROJECT NO. 22002 - 20012, 201, 1-10  
 EVALUATOR STEAM  
 DATE 11/30/89  
 SHEET 2 OF 10



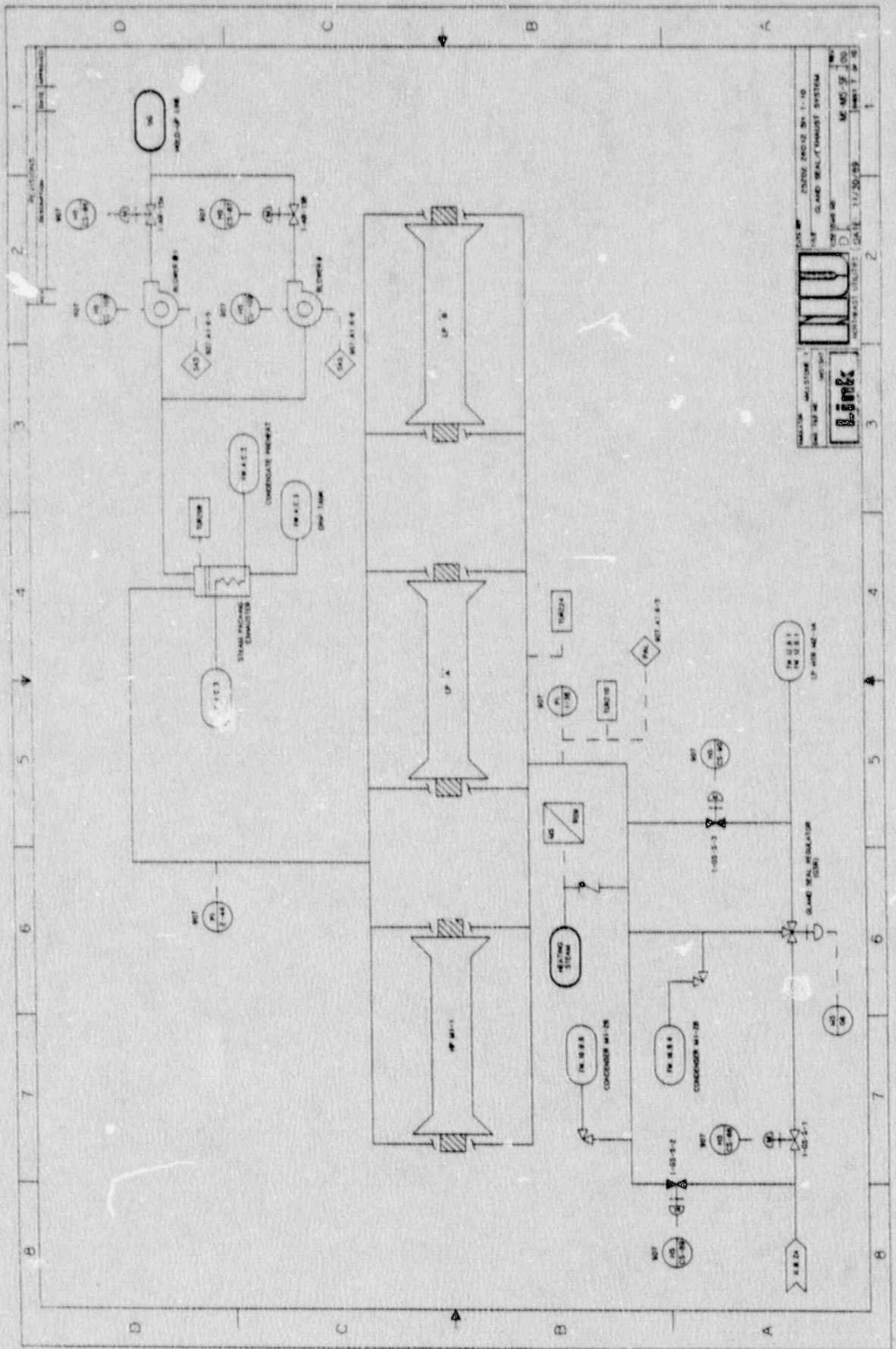
PROJECT: MILLSTEAM 1  
 SHEET NO: 11-10  
 DATE: 11/20/08  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]  
 TITLE: MAIN STEAM TO BAKE  
 MISC: 5-100  
 SHEET 5 OF 10  
**Link**  
 SOFTWARE UTILITIES DATE: 11/20/08



DRAWING NO. 2500 - 2072 20 1 10  
 REVISED BY: [Signature]  
 REVISED DATE: 11/30/66  
 SHEET NO. 1 OF 1  
 PROJECT: [Blank]  
 DRAWN BY: [Blank]



**Link**

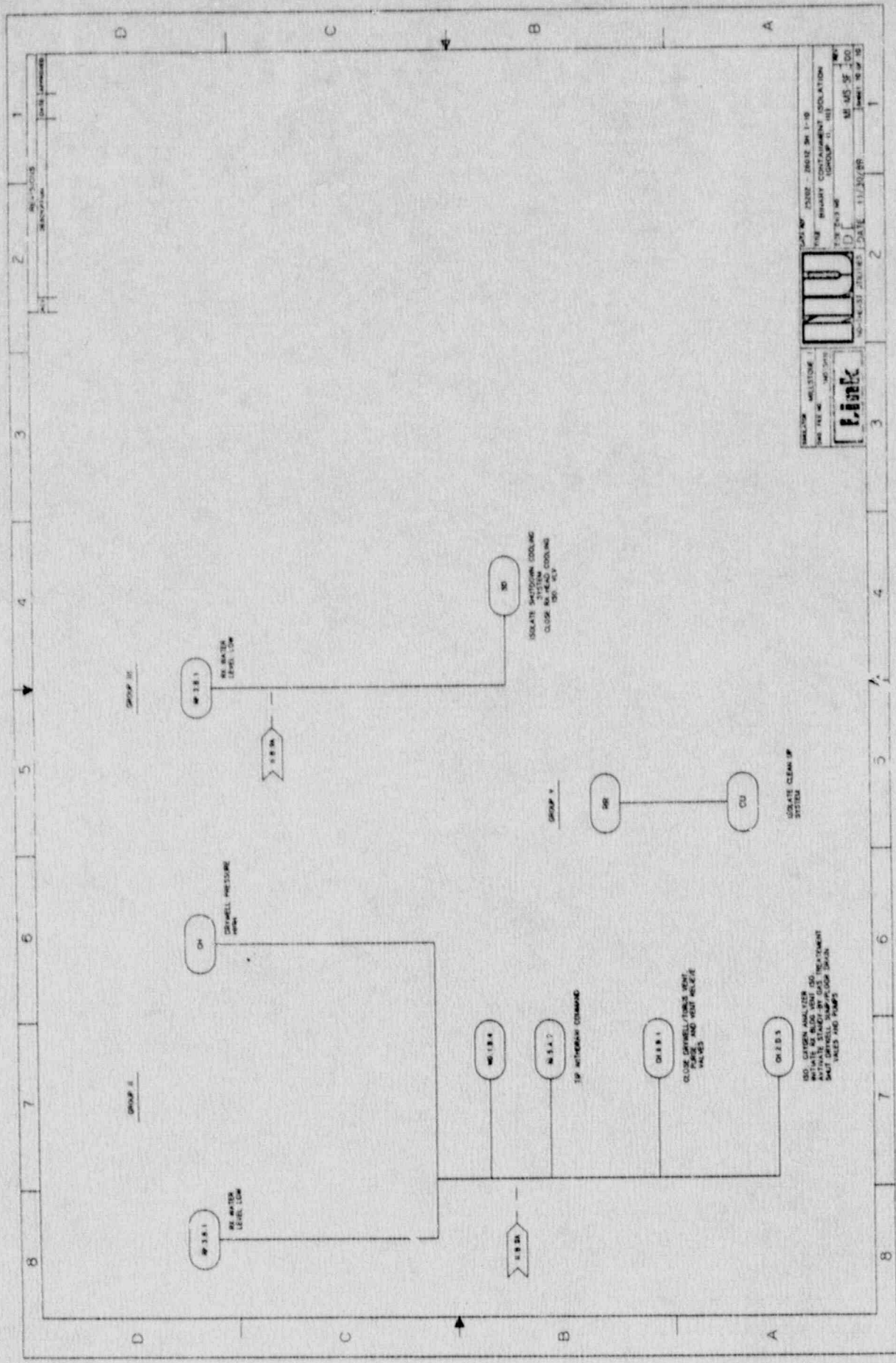


PROJECT: STEAM SEAL/CONDENSATE SYSTEM  
 DRAWING NO.: M-45-5-10  
 SHEET NO.: 10  
 DATE: 11/20/59  
 PROJECT DELIVERED: 11/20/59

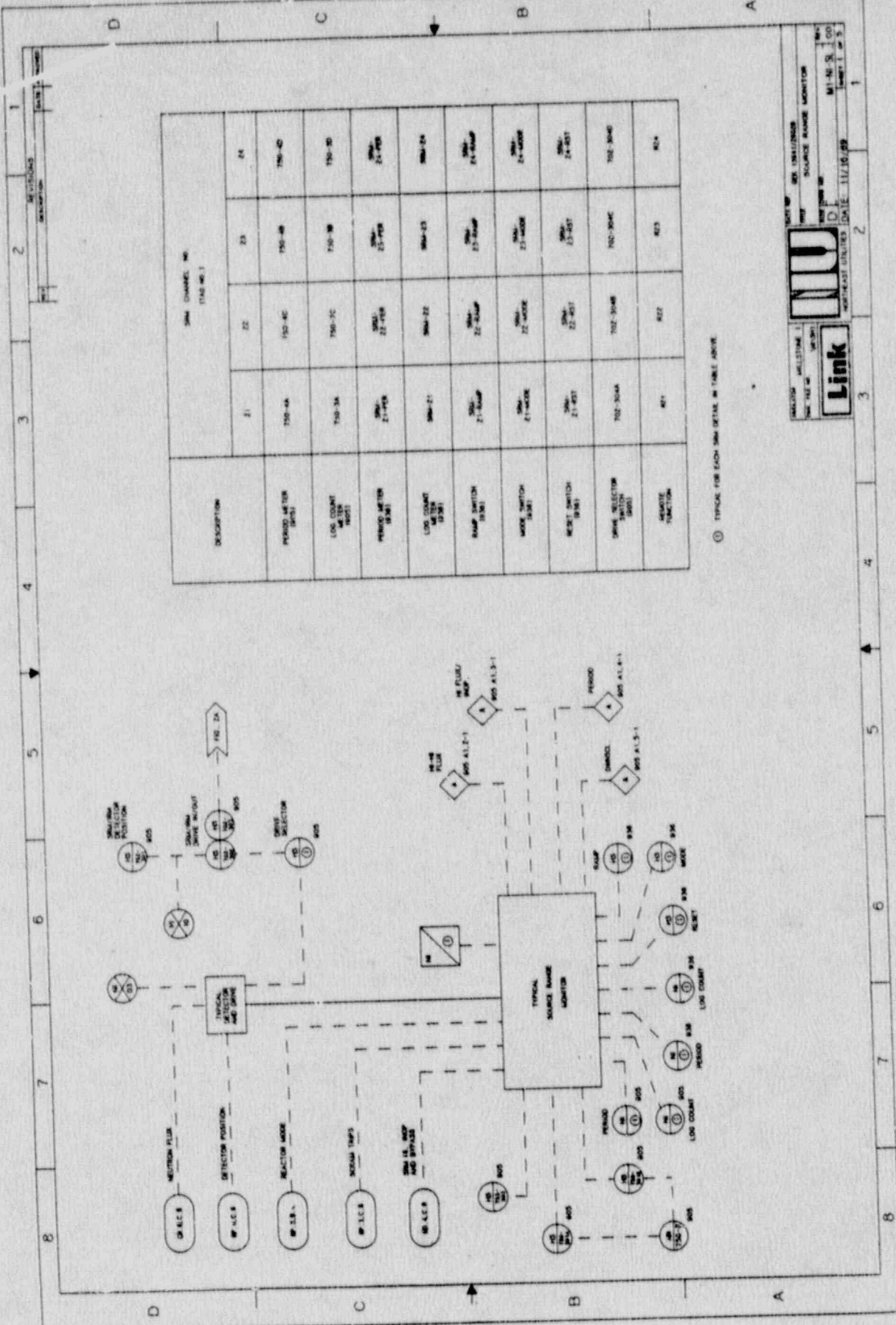








PROJECT: WELLSVILLE  
 SHEET NO: 100-1001  
 DATE: 11/13/88  
 DRAWN BY: J. J. BROWN  
 CHECKED BY: M. J. BROWN  
 PROJECT NO: 100-1001  
 SHEET NO: 100-1001  
 DATE: 11/13/88

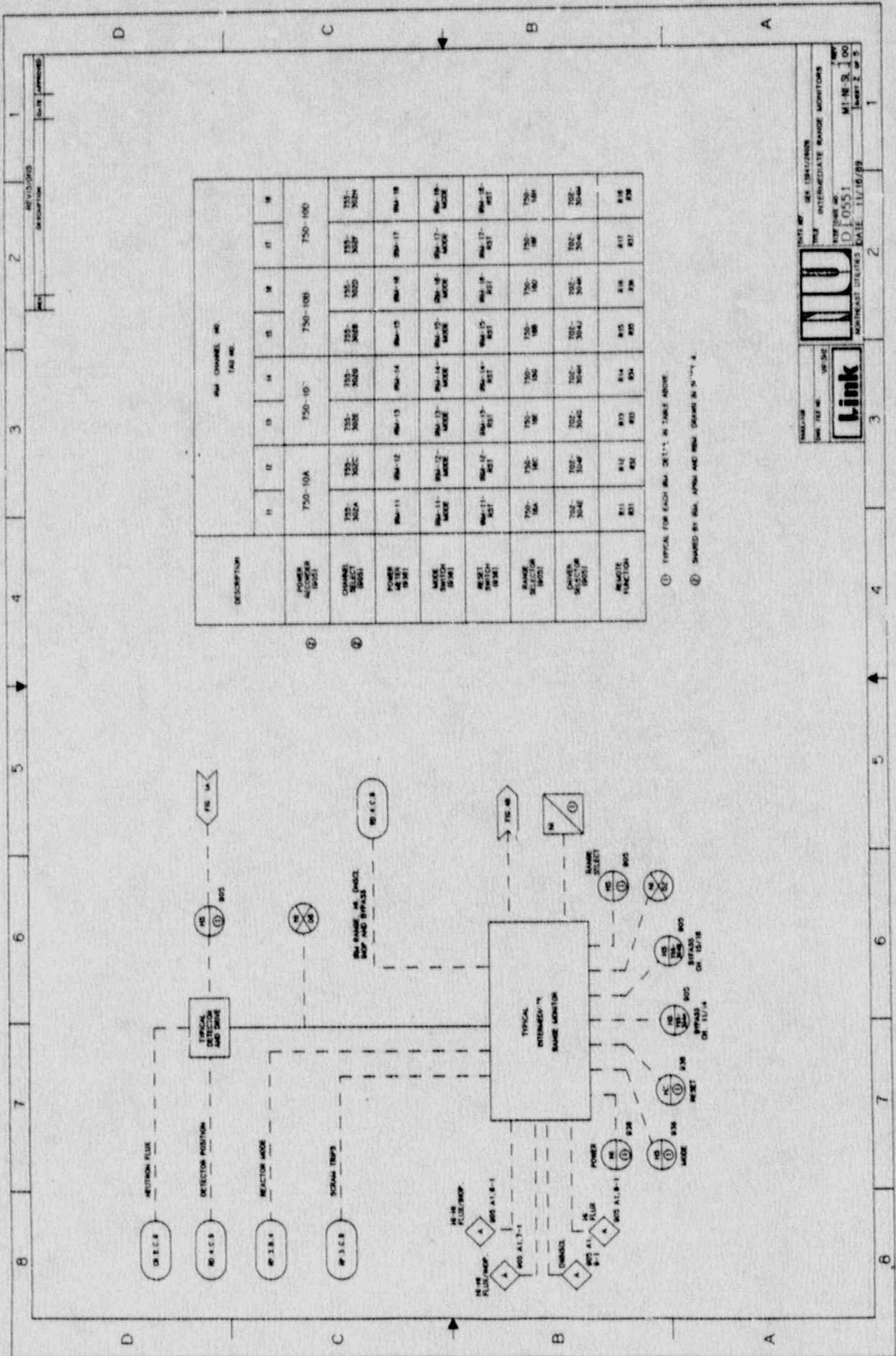


SMA CHANNEL NO  
(1400 NO. 1)

DESCRIPTION	21	22	23	24
PERIOD METER (1000)	750-4A	750-4C	750-4B	750-4D
LOG COUNT METER (1000)	750-3A	750-3C	750-3B	750-3D
PERIOD METER (1000)	SMU-21 21-1000	SMU-22 22-1000	SMU-23 23-1000	SMU-24 24-1000
LOG COUNT METER (1000)	SMU-21	SMU-22	SMU-23	SMU-24
RAMP SWITCH (1000)	SMU-21 21-RAMP	SMU-22 22-RAMP	SMU-23 23-RAMP	SMU-24 24-RAMP
MODE SWITCH (1000)	SMU-21 21-MODE	SMU-22 22-MODE	SMU-23 23-MODE	SMU-24 24-MODE
RESET SWITCH (1000)	SMU-21 21-RES	SMU-22 22-RES	SMU-23 23-RES	SMU-24 24-RES
SMR SELECTOR SWITCH (1000)	702-30A	702-30B	702-30C	702-30D
REMOTE FUNCTION	RT1	RT2	RT3	RT4

① TYPICAL FOR EACH SMA DETAIL IN TABLE ABOVE.

PROJECT: **Link**  
 SHEET NO: **11/16/89**  
 DRAWN BY: **Link**  
 CHECKED BY: **Link**  
 DATE: **11/16/89**  
 SCALE: **1" = 5'**  
 SHEET: **1** OF **5**

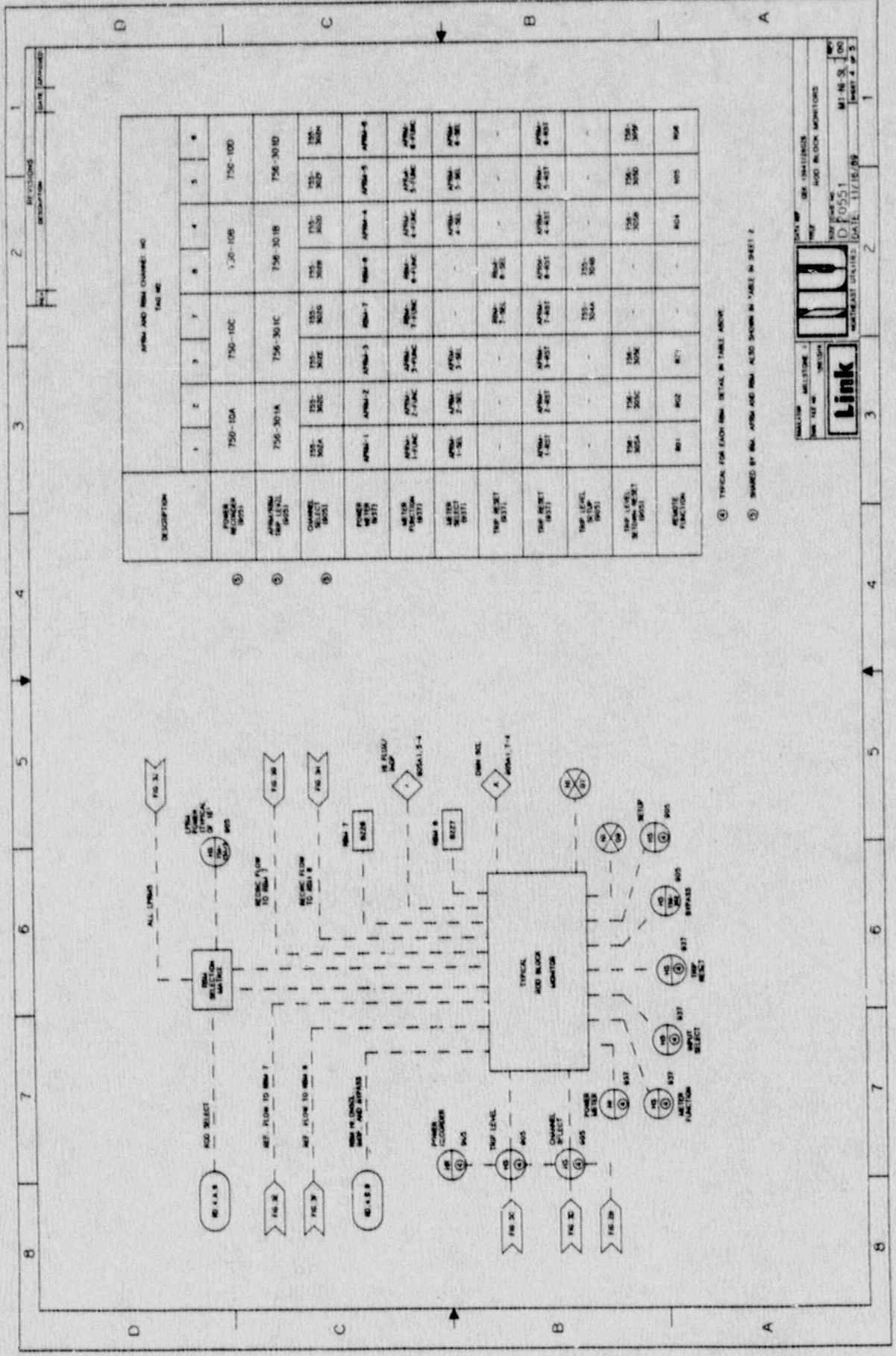


DESCRIPTION	RD CHANNEL NO. TAG NO.									
	11	12	13	14	15	16	17	18	19	20
POWER MONITOR (905)	750-10A									
	750-10A	750-10A	750-10A	750-10A	750-10A	750-10A	750-10A	750-10A	750-10A	750-10A
CHARGE SELECTOR (905)	750-10B									
	750-10B	750-10B	750-10B	750-10B	750-10B	750-10B	750-10B	750-10B	750-10B	750-10B
POWER SELECT (905)	750-10C									
	750-10C	750-10C	750-10C	750-10C	750-10C	750-10C	750-10C	750-10C	750-10C	750-10C
MODE SWITCH (905)	750-10D									
	750-10D	750-10D	750-10D	750-10D	750-10D	750-10D	750-10D	750-10D	750-10D	750-10D
RANGE SELECTOR (905)	750-10E									
	750-10E	750-10E	750-10E	750-10E	750-10E	750-10E	750-10E	750-10E	750-10E	750-10E
CHARGE SELECTOR (905)	750-10F									
	750-10F	750-10F	750-10F	750-10F	750-10F	750-10F	750-10F	750-10F	750-10F	750-10F
RANGE FUNCTION (905)	750-10G									
	750-10G	750-10G	750-10G	750-10G	750-10G	750-10G	750-10G	750-10G	750-10G	750-10G

- ① TYPICAL FOR EACH RD CHANNEL IN TABLE ABOVE
- ② SHARED BY RD CHANNEL AND RD CHANNEL IN TABLE ABOVE

DRAWING NO. **Link**  
 DATE 11/16/89  
 PROJECT DESIGNER  
 CHECKED BY  
 APPROVED BY  
 SCALE  
 SHEET NO. 1 OF 2

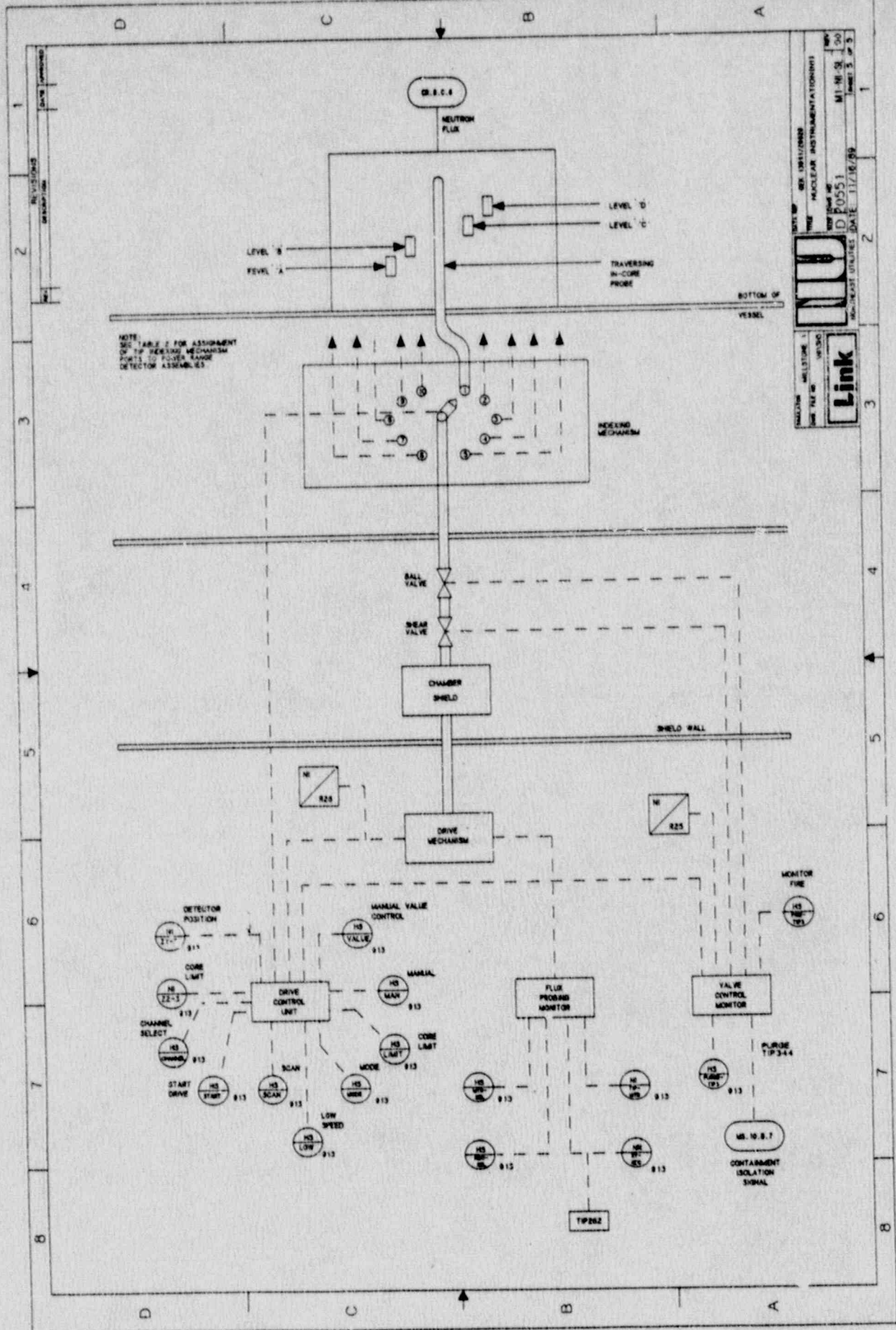




DESCRIPTION	APFM AND INM CHANNEL NO									
	1	2	3	4	5	6	7	8	9	10
POWER MONITOR (937)	750-10A	750-10C	750-10B	750-10D	750-10E	750-10F	750-10G	750-10H	750-10I	750-10J
CHANNEL SELECT (937)	756-301A	756-301C	756-301B	756-301D	756-301E	756-301F	756-301G	756-301H	756-301I	756-301J
TEMP MONITOR (937)	APFM-1	APFM-2	APFM-3	APFM-4	APFM-5	APFM-6	APFM-7	APFM-8	APFM-9	APFM-10
TEMP LEVEL SETPOINT (937)	APFM-1	APFM-2	APFM-3	APFM-4	APFM-5	APFM-6	APFM-7	APFM-8	APFM-9	APFM-10
TEMP LEVEL BYPASS (937)	APFM-1	APFM-2	APFM-3	APFM-4	APFM-5	APFM-6	APFM-7	APFM-8	APFM-9	APFM-10
TEMP LEVEL SELECTOR (937)	APFM-1	APFM-2	APFM-3	APFM-4	APFM-5	APFM-6	APFM-7	APFM-8	APFM-9	APFM-10
TEMP LEVEL SETPOINT (937)	APFM-1	APFM-2	APFM-3	APFM-4	APFM-5	APFM-6	APFM-7	APFM-8	APFM-9	APFM-10
TEMP LEVEL BYPASS (937)	APFM-1	APFM-2	APFM-3	APFM-4	APFM-5	APFM-6	APFM-7	APFM-8	APFM-9	APFM-10
TEMP LEVEL SELECTOR (937)	APFM-1	APFM-2	APFM-3	APFM-4	APFM-5	APFM-6	APFM-7	APFM-8	APFM-9	APFM-10

④ TYPICAL FOR EACH INM DETAIL IN TABLE ABOVE.  
 ⑤ SHARED BY INM, APFM AND INM, ALSO SHOWN IN TABLE IN SHEET 2.

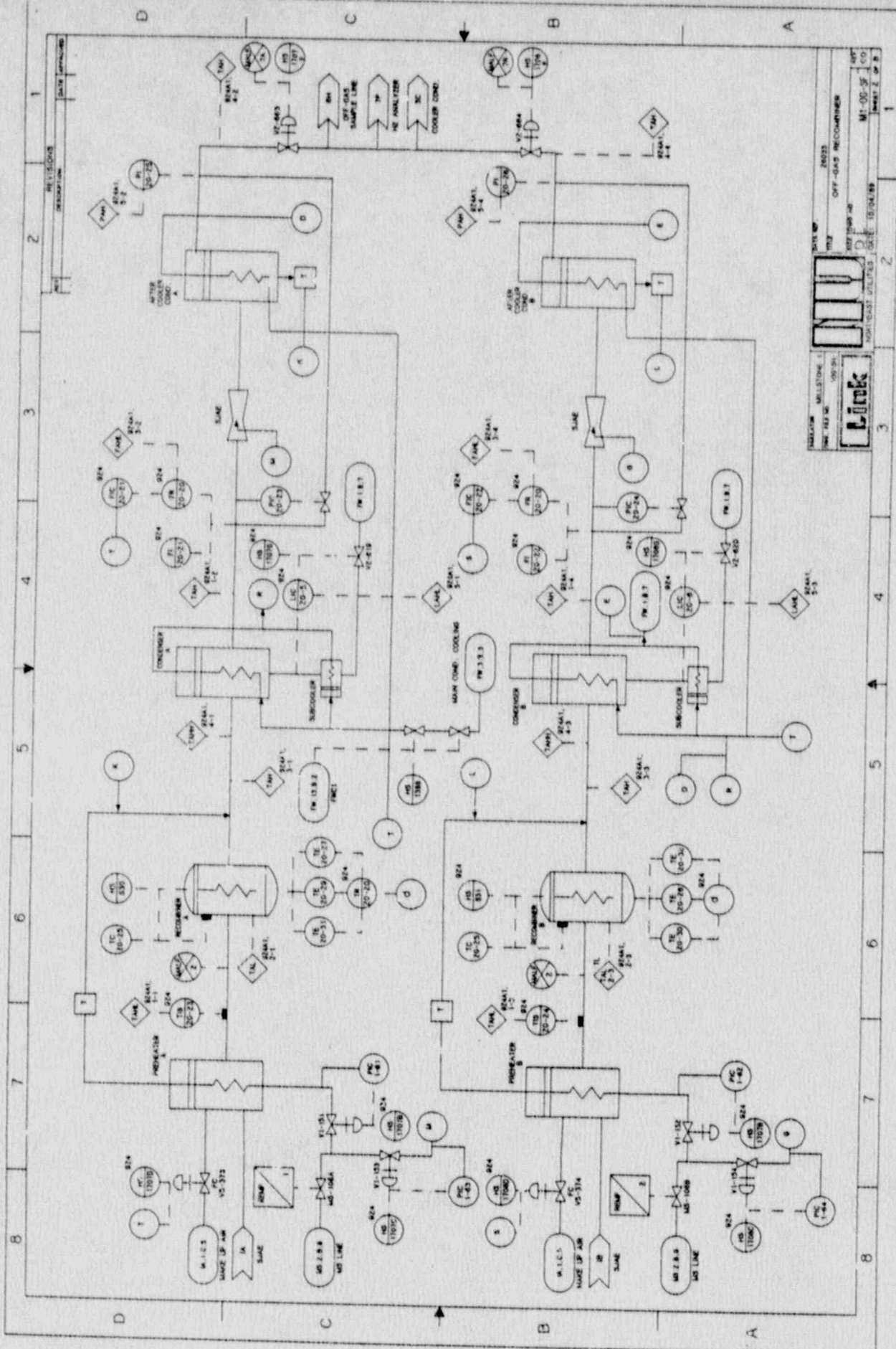
PROJECT: MELLSTONE  
 DRAWING NO: D-10551  
 DATE: 11/18/99  
 SHEET: 4 OF 3  
 DESIGNED BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]



LINK  
 MODEL NO. 100-100  
 SERIAL NO. 100-100  
 DATE 11/18/99  
 M1-NI-9-00  
 REV. 3 OF 3





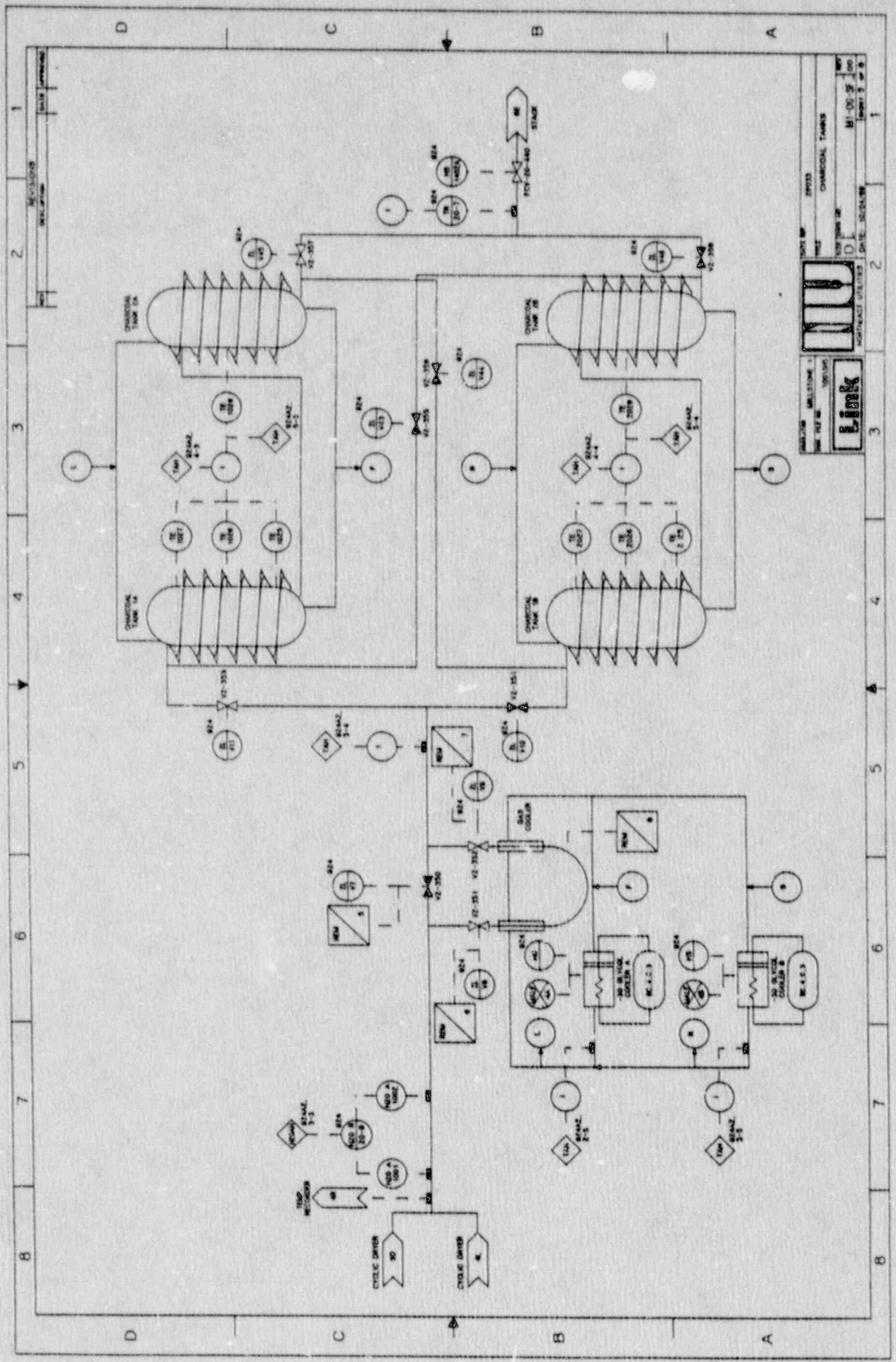


2  
3  
4  
5  
6  
7  
8

MILLSTONE 1  
 UNIT 2  
 OFF-GAS RECOMBINER  
 M1-00-05  
 2007-08-08  
 NORTH EAST UTILITIES  
 SHEET 2 OF 8

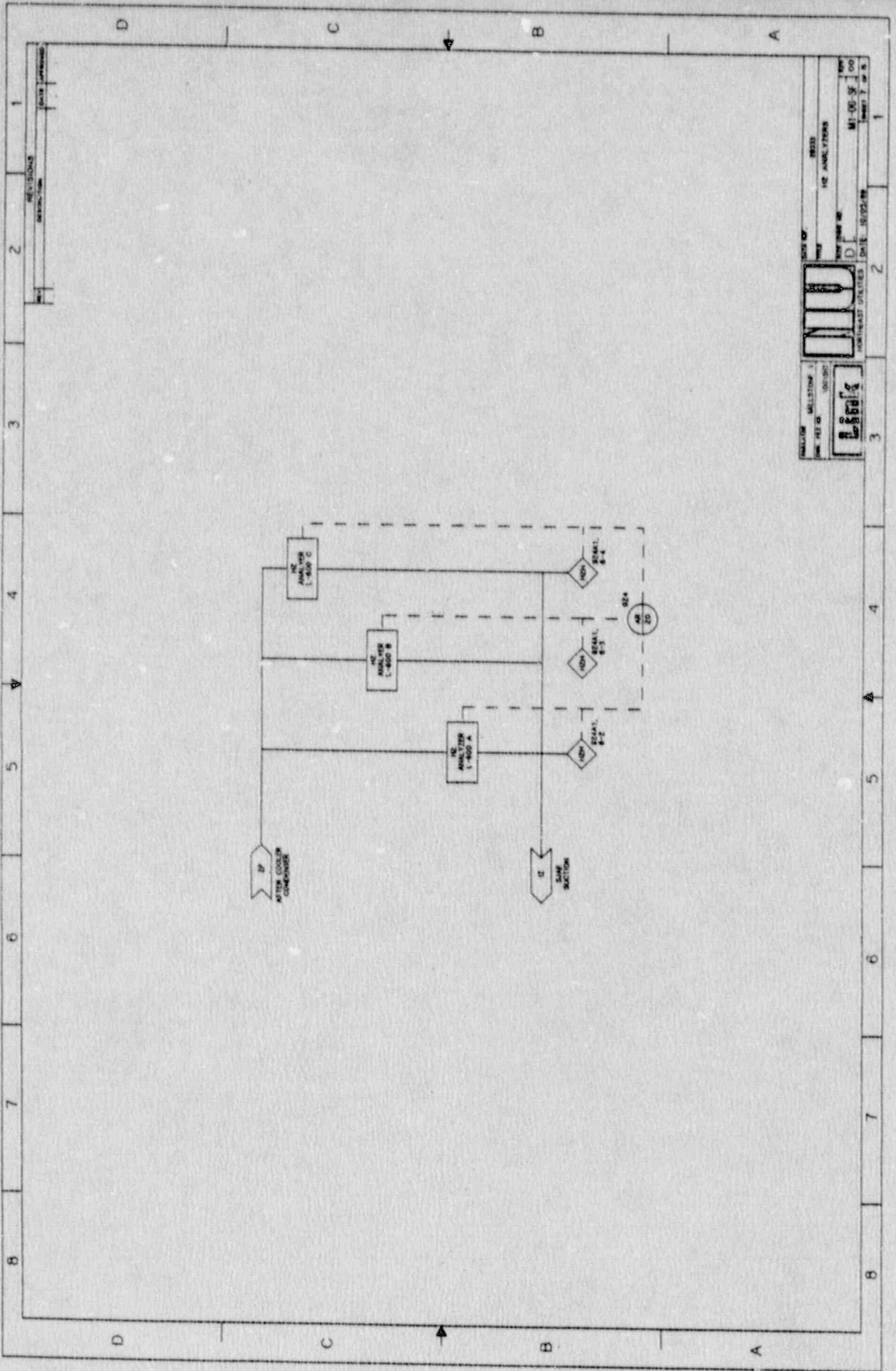






PROJECT: MILLSTONE  
 SHEET NO: 100100  
 TITLE: CHEMICAL TANKS  
 DATE: 10/24/88  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]



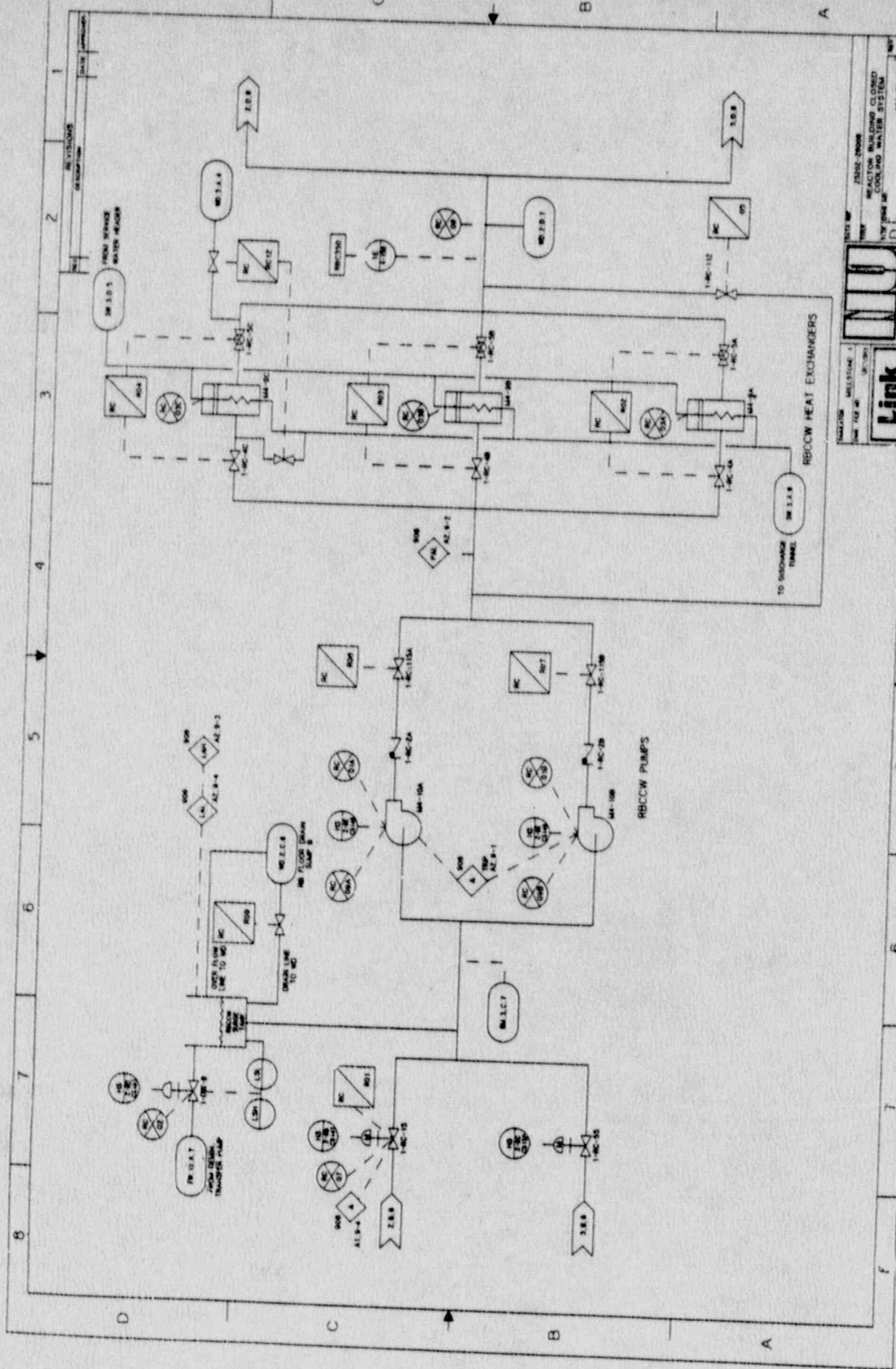


ANALYZER	MELTING	NO. OF	NO. OF
NO. 1	NO. 1	NO. 1	NO. 1
NO. 2	NO. 2	NO. 2	NO. 2
NO. 3	NO. 3	NO. 3	NO. 3
NO. 4	NO. 4	NO. 4	NO. 4
NO. 5	NO. 5	NO. 5	NO. 5
NO. 6	NO. 6	NO. 6	NO. 6
NO. 7	NO. 7	NO. 7	NO. 7
NO. 8	NO. 8	NO. 8	NO. 8
NO. 9	NO. 9	NO. 9	NO. 9
NO. 10	NO. 10	NO. 10	NO. 10
NO. 11	NO. 11	NO. 11	NO. 11
NO. 12	NO. 12	NO. 12	NO. 12
NO. 13	NO. 13	NO. 13	NO. 13
NO. 14	NO. 14	NO. 14	NO. 14
NO. 15	NO. 15	NO. 15	NO. 15
NO. 16	NO. 16	NO. 16	NO. 16
NO. 17	NO. 17	NO. 17	NO. 17
NO. 18	NO. 18	NO. 18	NO. 18
NO. 19	NO. 19	NO. 19	NO. 19
NO. 20	NO. 20	NO. 20	NO. 20

DATE: 10/15/58  
 TIME: 10:00 AM  
 BY: J. J. [Signature]  
 CHECKED BY: [Signature]



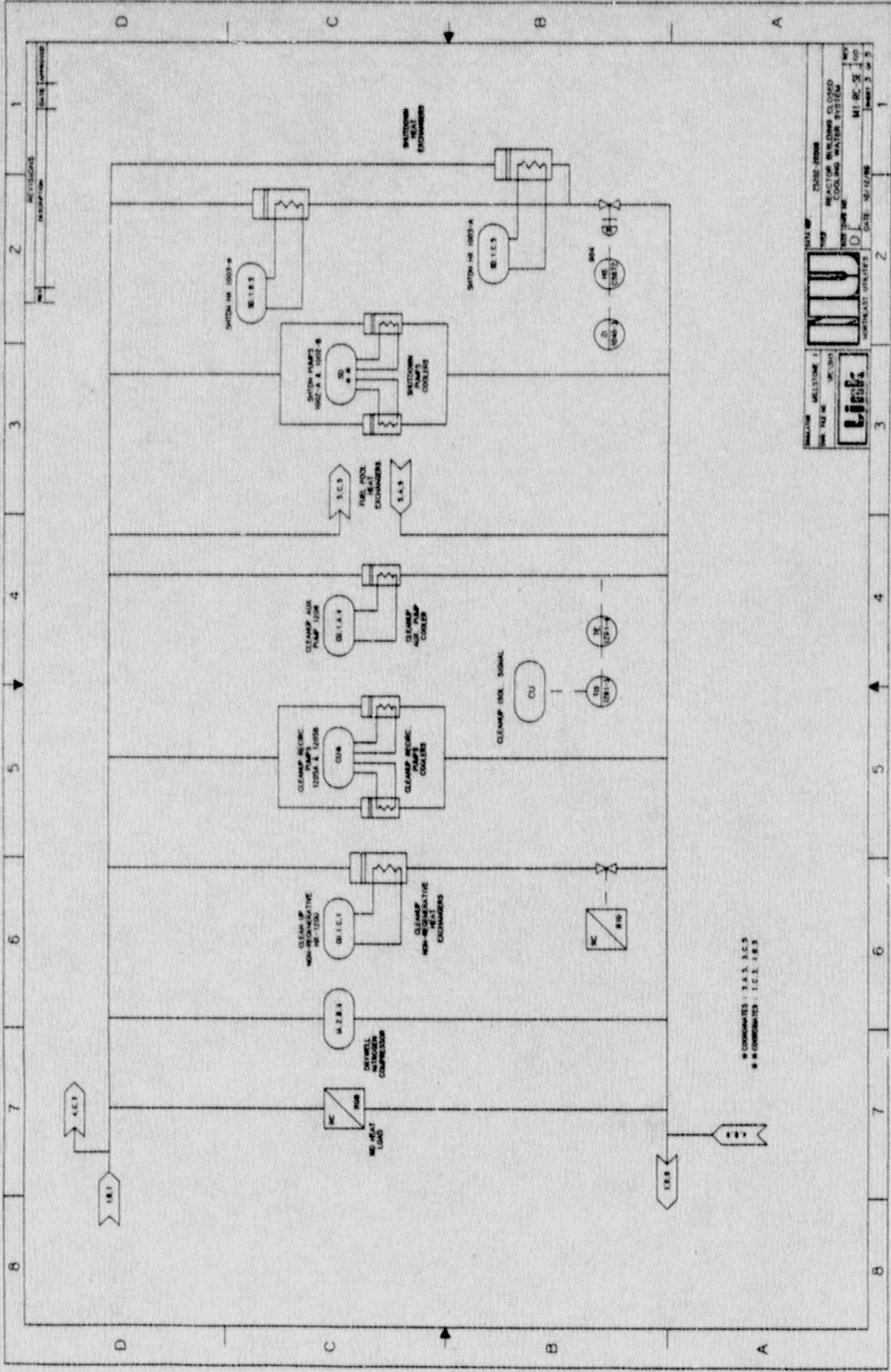




PROJECT NO. 2302-2008  
 REACTION AREA CLOSING  
 COOLING WATER SYSTEM  
 DATE: 07/05/09  
 SHEET 1 OF 5

**Link**  
 PROJECT NO. 2302-2008  
 REACTION AREA CLOSING  
 COOLING WATER SYSTEM  
 DATE: 07/05/09  
 SHEET 1 OF 5



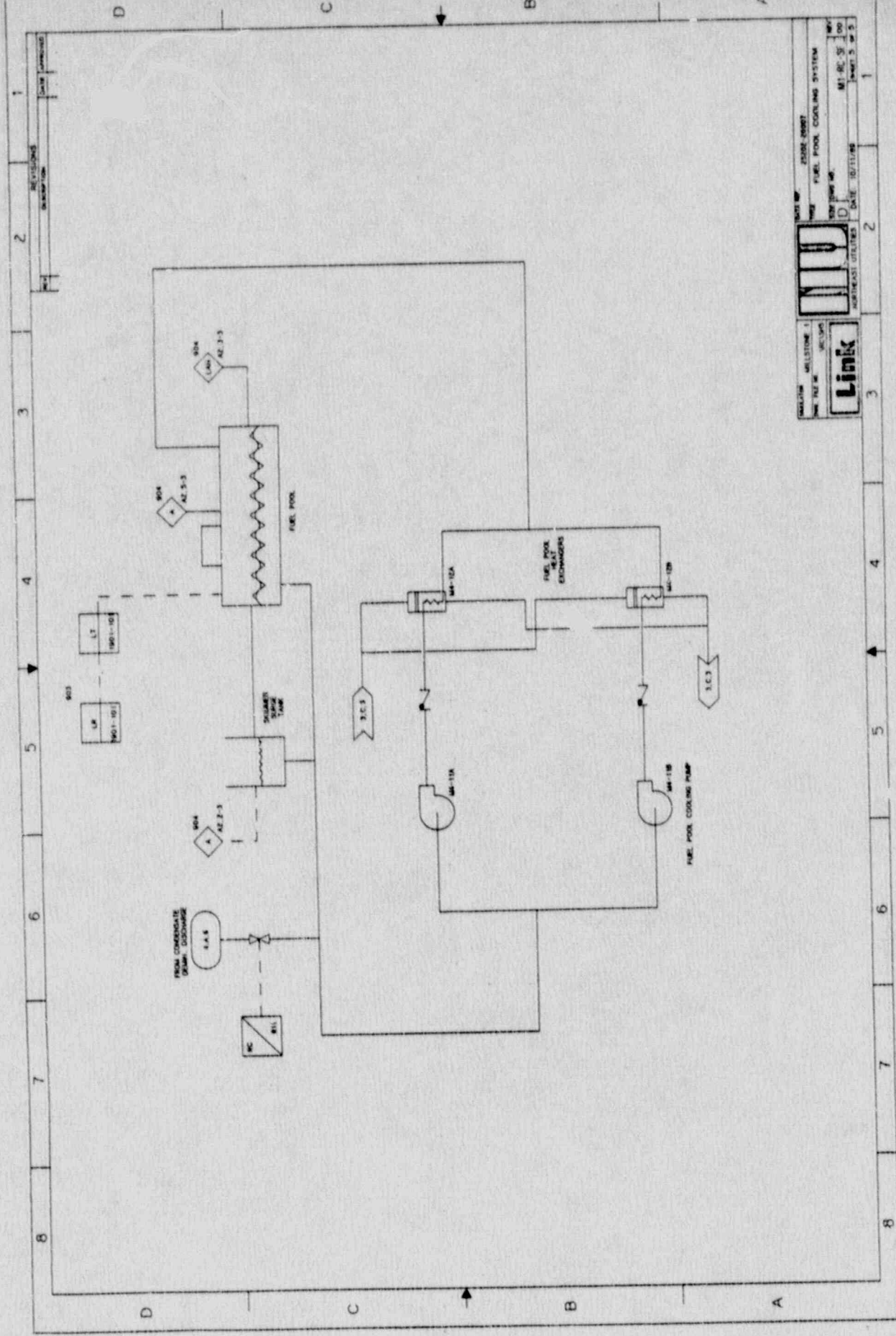


\* COORDINATES : 3.A.5, 3.C.3  
 # COORDINATES : 1.C.1, 1.B.3

PROJECT: WELLSVILLE 1  
 DRAWING NO: 2000-00000  
 TITLE: REACTOR CLEANUP COOLING WATER SYSTEM  
 DATE: 05/12/68  
 SHEET 3 OF 5

NORTH EAST OPTICS  
 Link  
 NORTH EAST OPTICS



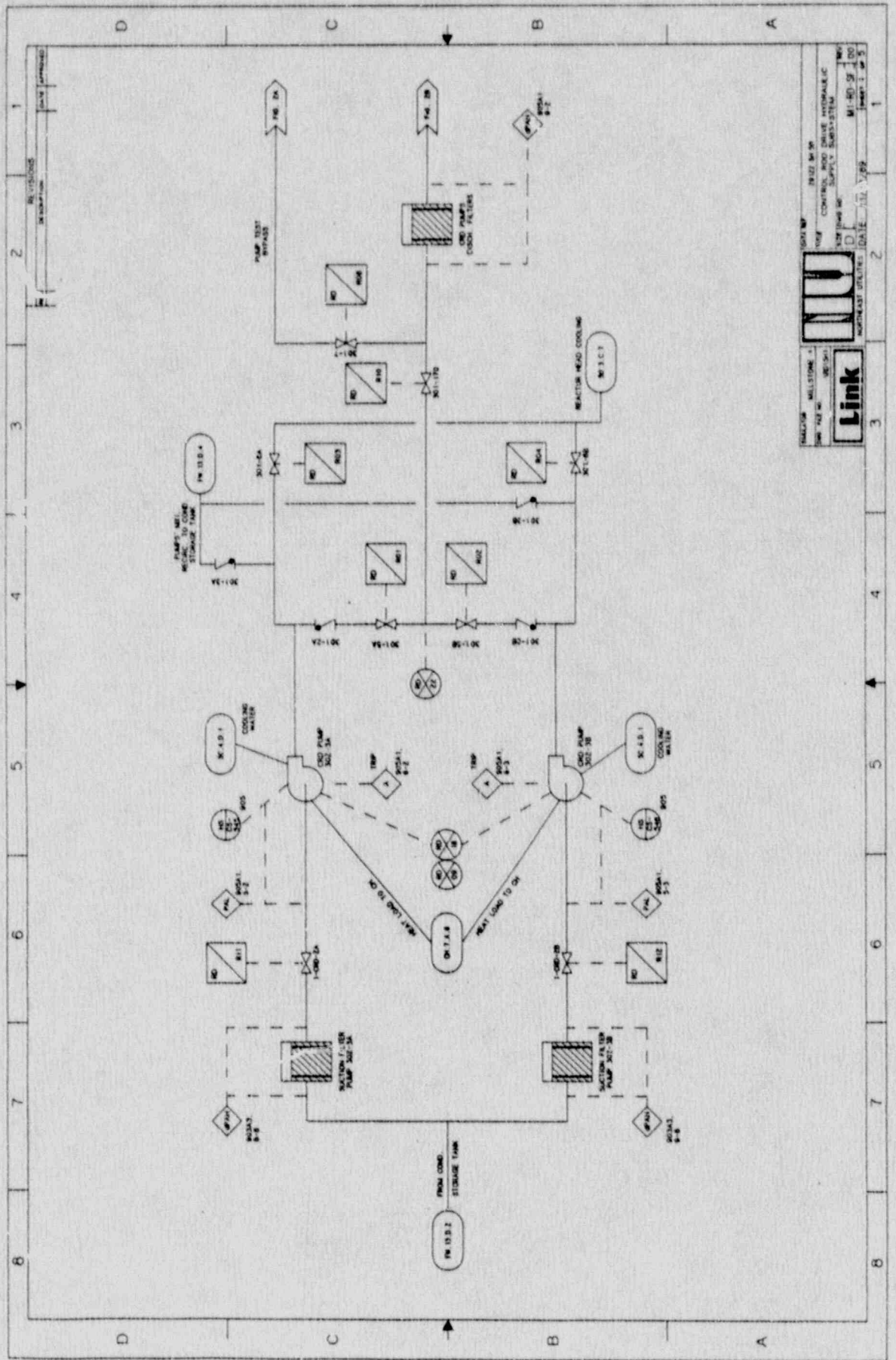


REVISIONS

NO.	DESCRIPTION	DATE
1		
2		

DRAWING NO. 22382-20007  
 TITLE FUEL POOL COOLING SYSTEM  
 PROJECT NO. 01-00-35  
 DATE 10/11/68  
 SHEET 3 OF 5

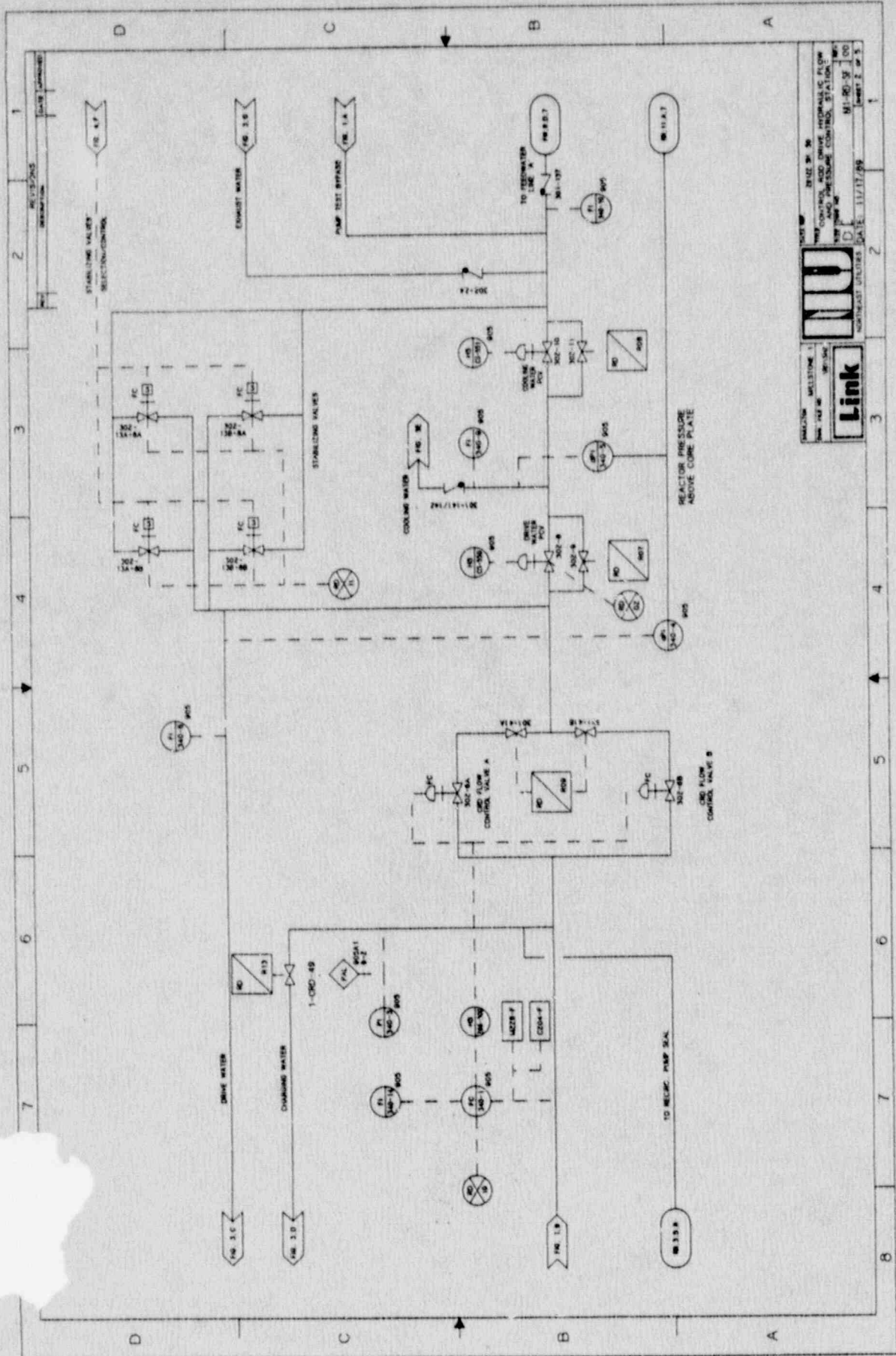
HELIXONE I  
 LINK  
 ADDRESS: 10111 1/2  
 2



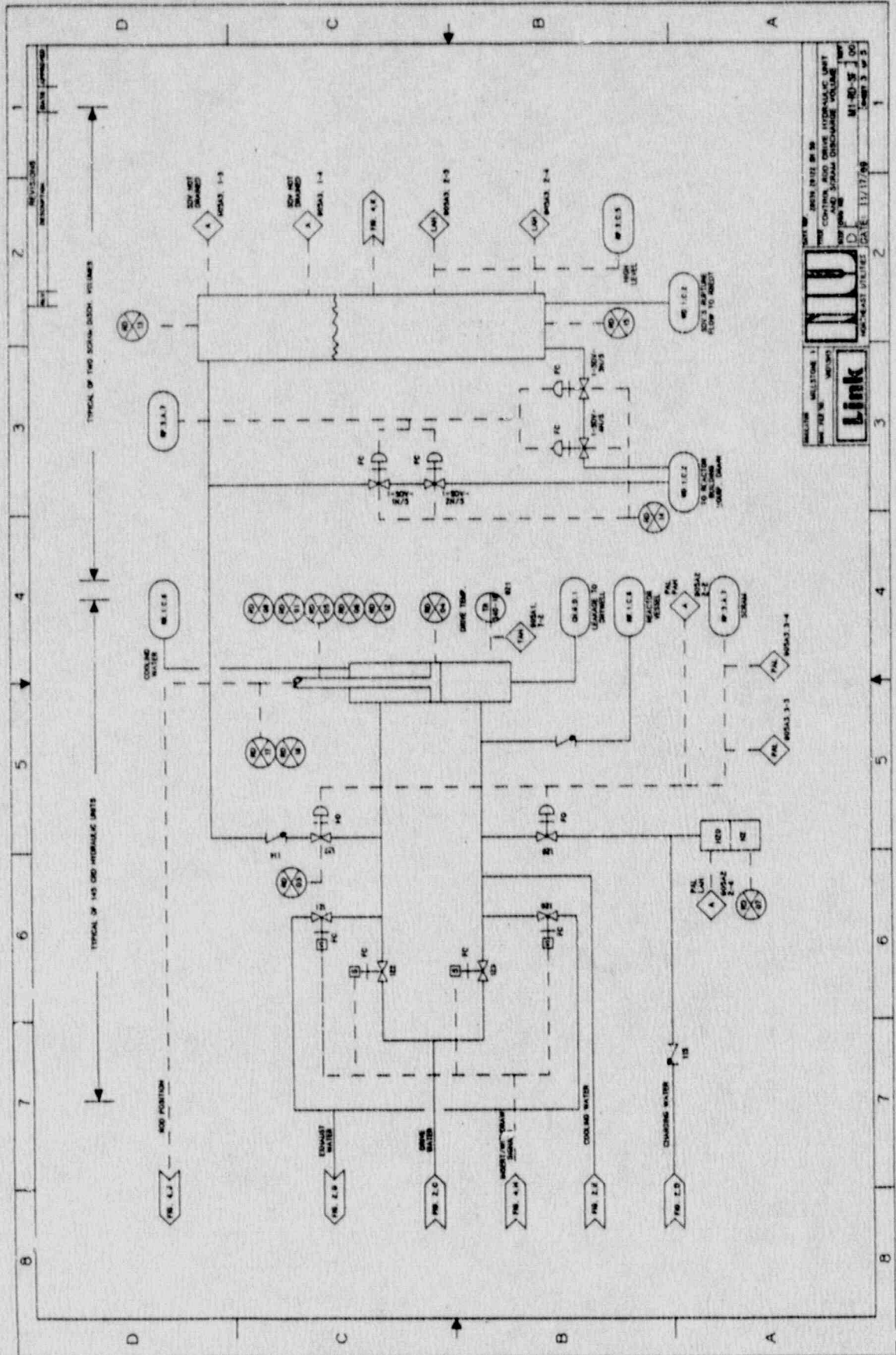
MILLSTONE 1  
 UNIT 2  
 CONTROL ROOM DRIVE HYDRAULIC  
 NEW YORK SUPPLY SYSTEM  
 M-10-51-00  
 SHEET 1 OF 5

**Link**  
 NORTH EAST UTILITIES DATE: 11.7.99

78122 34 59  
 CONTROL ROOM DRIVE HYDRAULIC  
 NEW YORK SUPPLY SYSTEM  
 M-10-51-00  
 SHEET 1 OF 5



PROJECT NO. 1112 30 30  
 THIS CONTROL AND DRIVE HYDRAULIC FLUID  
 AND PRESSURE CONTROL STATION  
 WAS DESIGNED BY  
 DATE 11/17/59  
 SHEET 2 OF 5



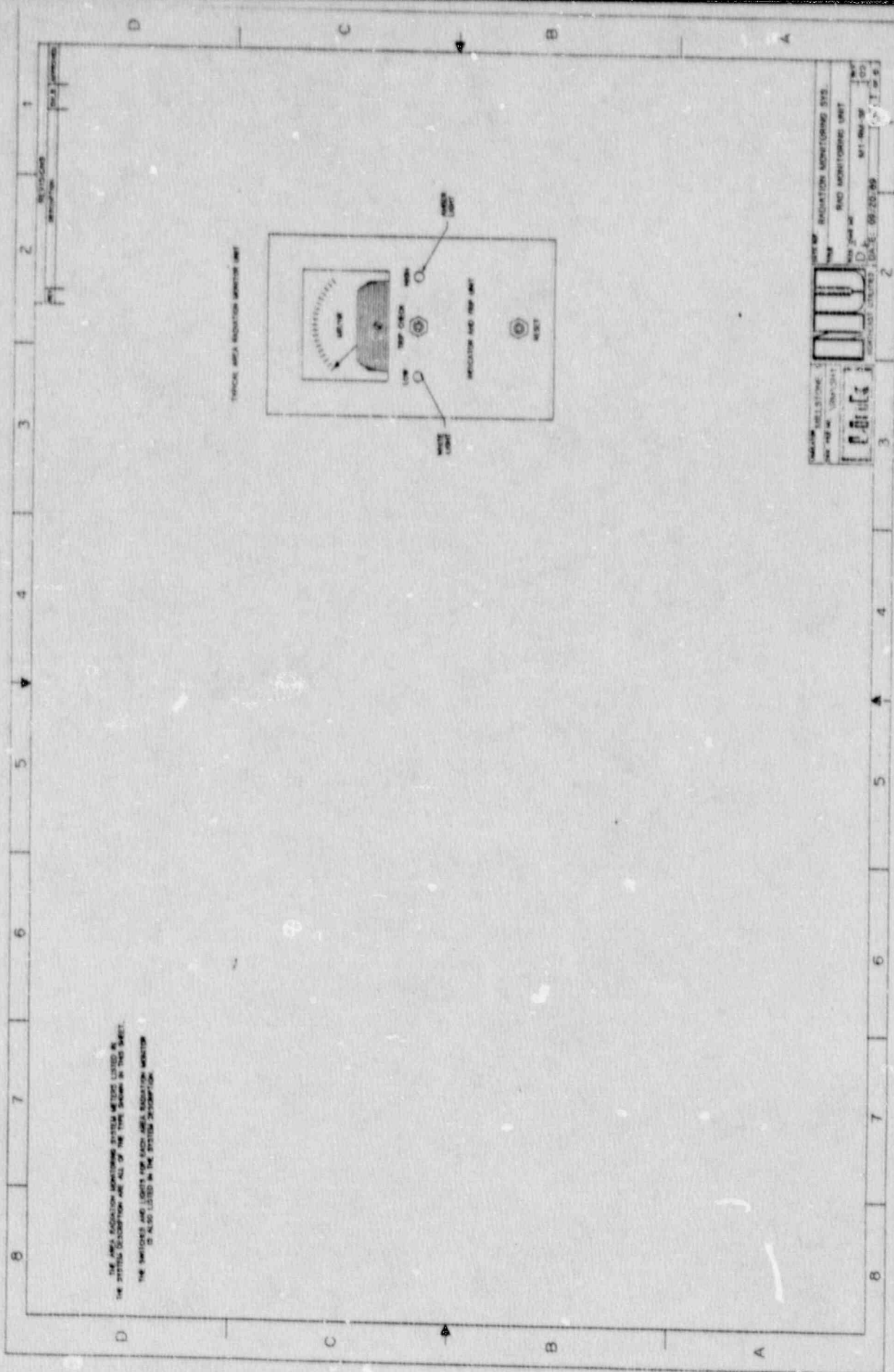
DRAWING NO. 11-17-79  
 DATE 11/17/79  
 SHEET 3 OF 5  
 PROJECT NO. 11-17-79  
 CONTRACT NO. 11-17-79  
 DRAWING TITLE: TYPICAL OF TWO COOLING WATER VOLUMES  
 DRAWING NO. 11-17-79  
 DATE 11/17/79  
 SHEET 3 OF 5





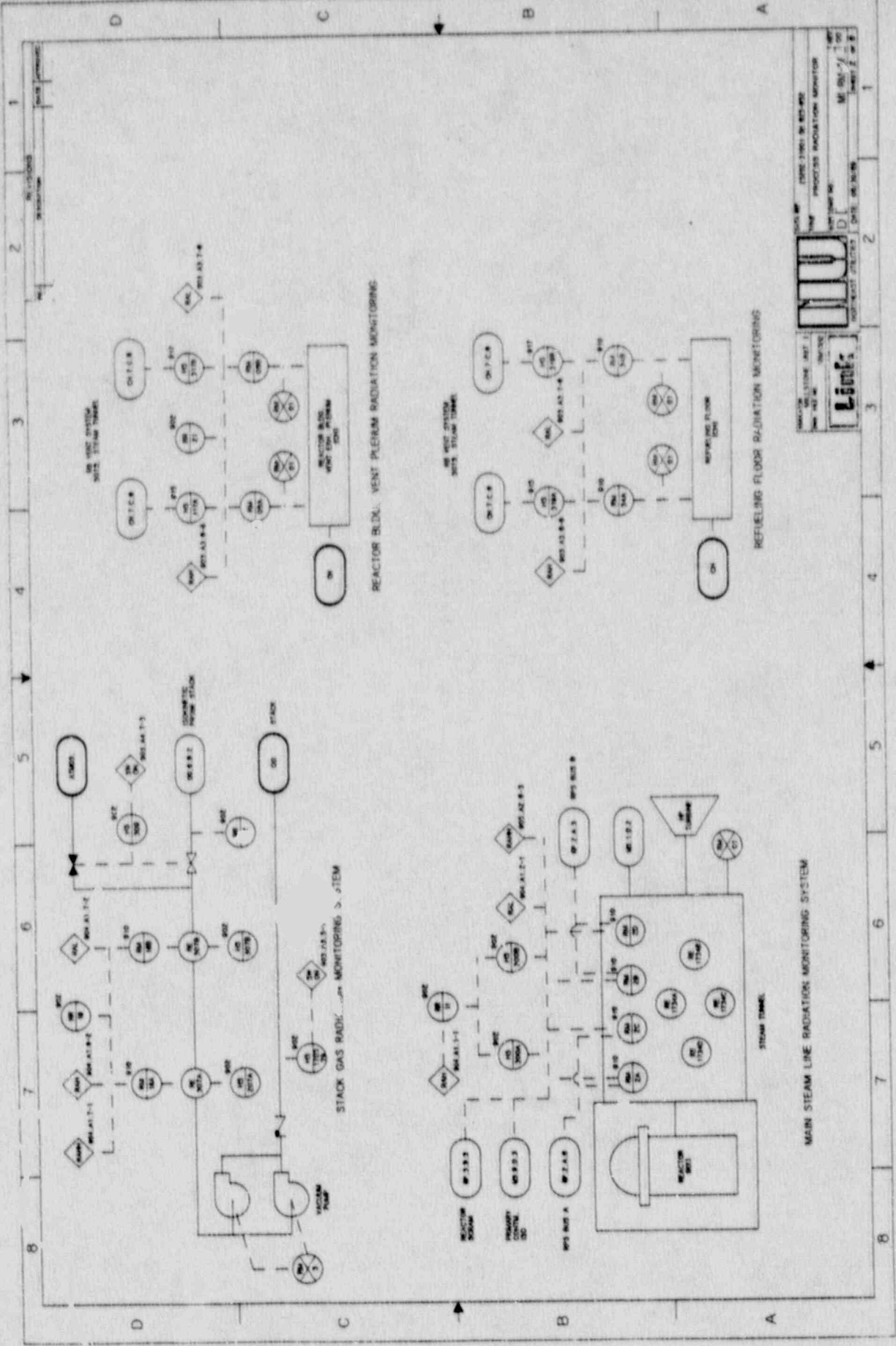






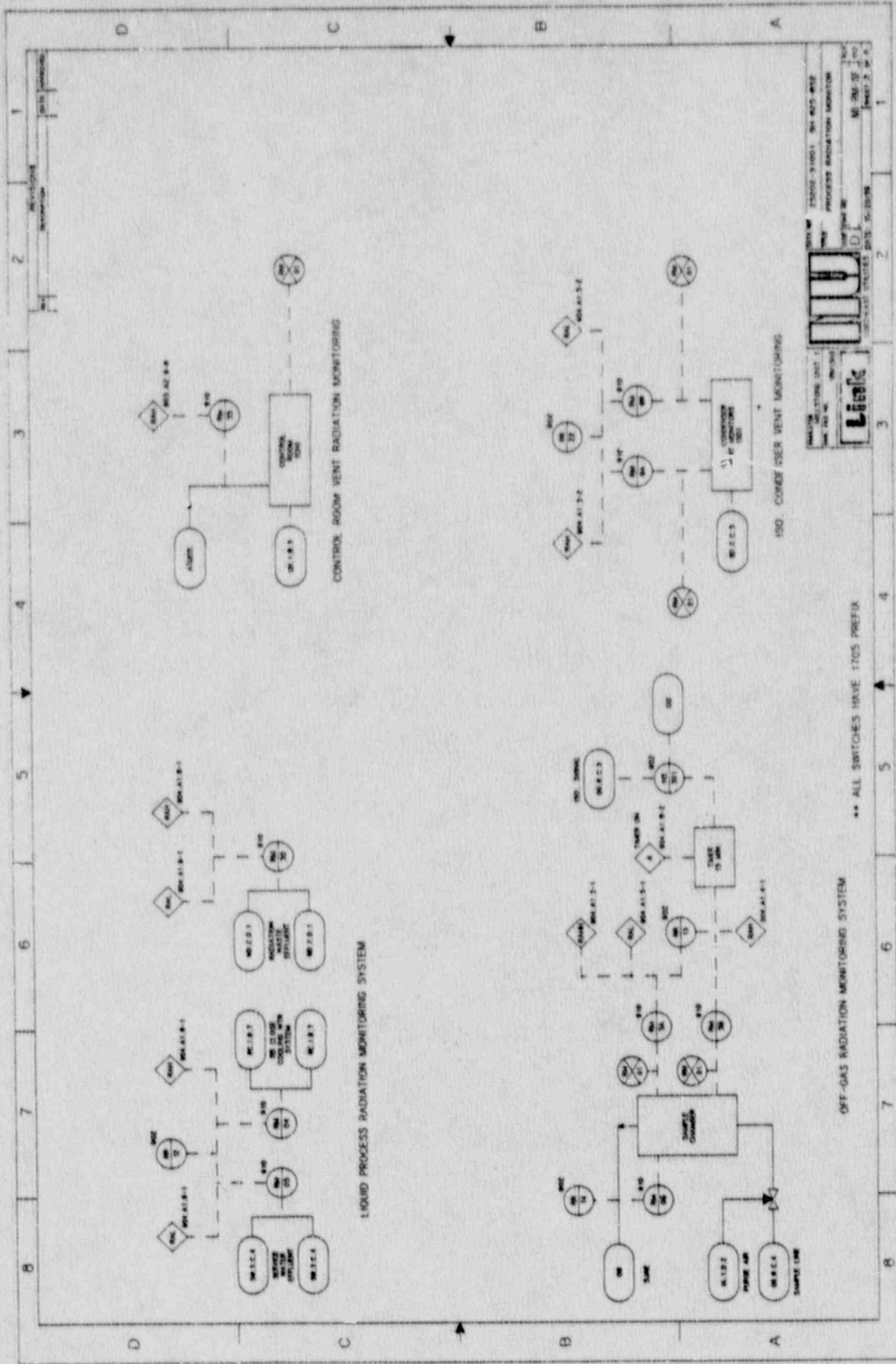
THE LABEL RADIATION MONITORING SYSTEM MODELS LISTED IN THE SYSTEM DESCRIPTION ARE ALL OF THE TYPE SHOWN IN THIS SHEET. THE SWITCHES AND LIGHTS FOR EACH LABEL RADIATION MONITORING IS ALSO LISTED IN THE SYSTEM DESCRIPTION.

MODEL NO. 1000-1000 SERIAL NO. 1000-1000 DATE 08-20-68	RADIATION MONITORING SYS. RAD MONITORED UNIT 811-804-00 1000-1000



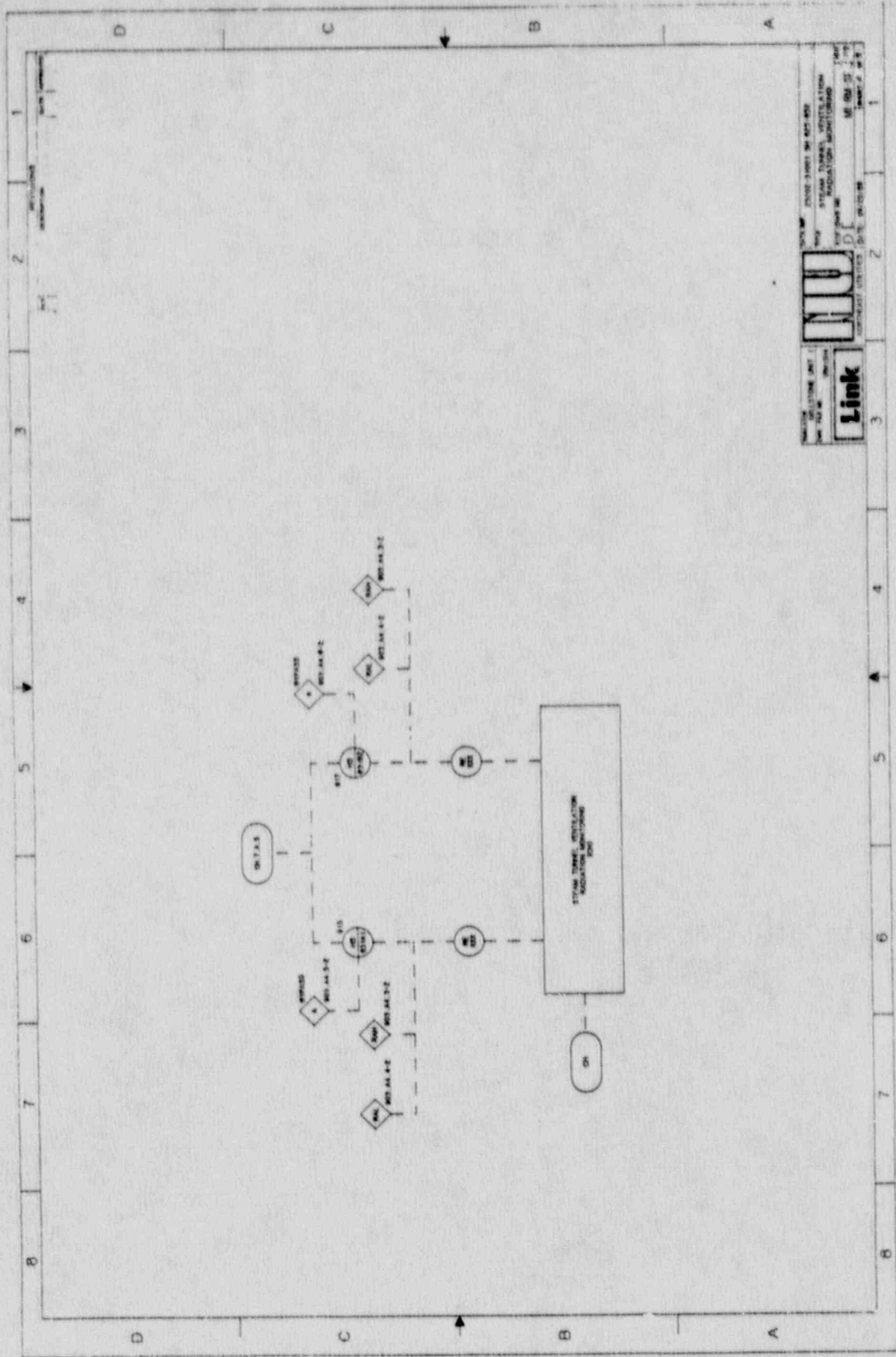
PROJECT: **NU**  
 TITLE: **REACTOR BLD. VENT PLENUM RADIATION MONITORING**  
 DATE: **10/1/68**  
 DRAWN BY: **M. G. W.**  
 CHECKED BY: **D. J. W.**  
 SCALE: **AS SHOWN**  
 SHEET NO. **1** OF **1**

REACTOR BLD. VENT PLENUM RADIATION MONITORING  
 REFUELING FLOOR RADIATION MONITORING  
 STACK GAS RADIC. MONITORING SYSTEM  
 MAIN STEAM LINE RADIATION MONITORING SYSTEM



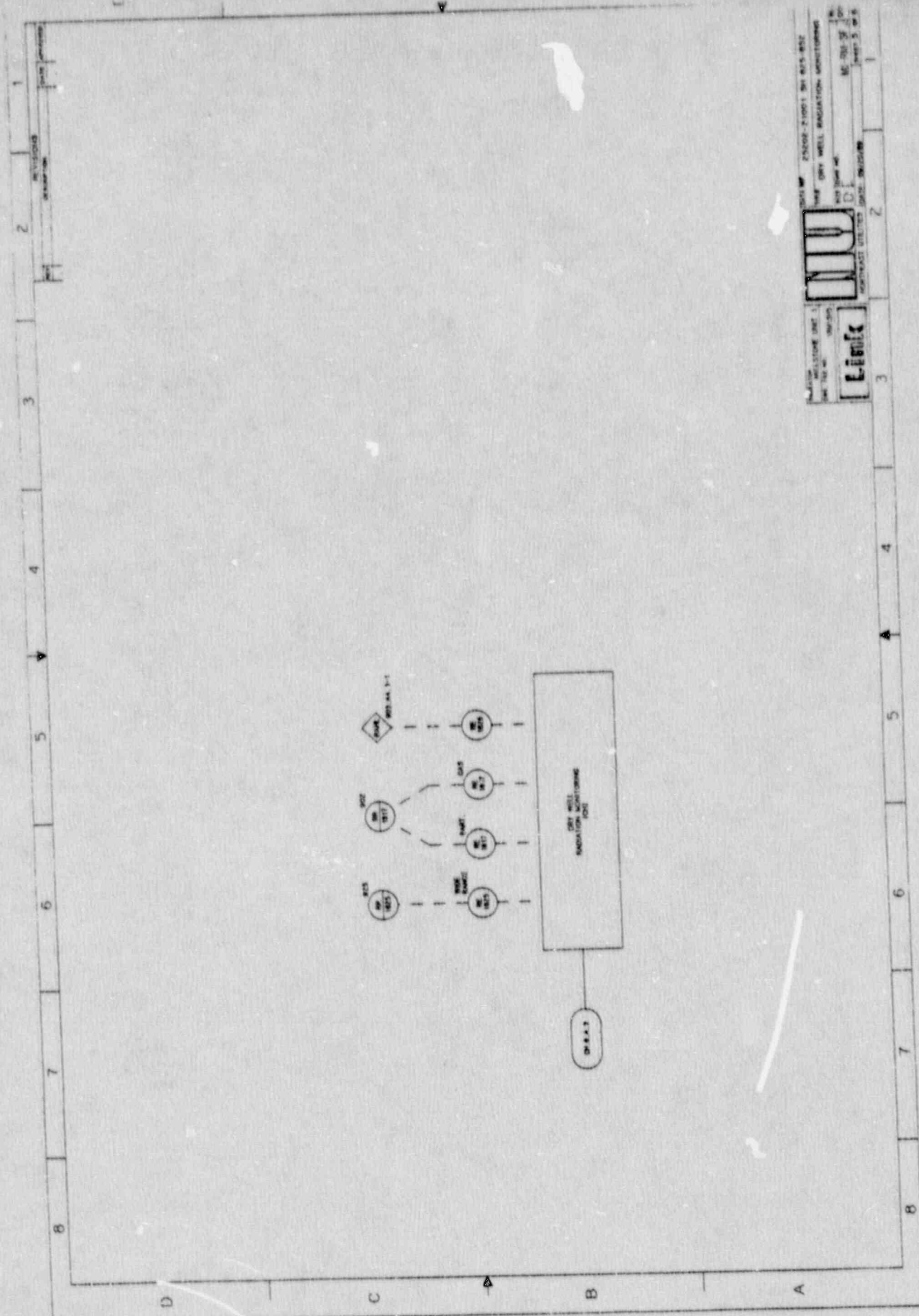
PROJECT NO. 22002-31001, 301-4025-4032  
 PROJECT RADIATION MONITOR  
 DATE 10/1/78  
 DRAWN BY M. J. J. J.  
 CHECKED BY J. J. J.  
 APPROVED BY J. J. J.  
 DATE 10/1/78

\*\* ALL SWITCHES HAVE 1705 PREFIX



TITLE: SYSTEM TUNNEL RADIATION MONITORING  
 PROJECT: SYSTEM TUNNEL RADIATION MONITORING  
 DRAWING NO.: 100-100-100  
 DATE: 10/10/10  
 DRAWN BY: J. J. J.  
 CHECKED BY: J. J. J.  
 APPROVED BY: J. J. J.

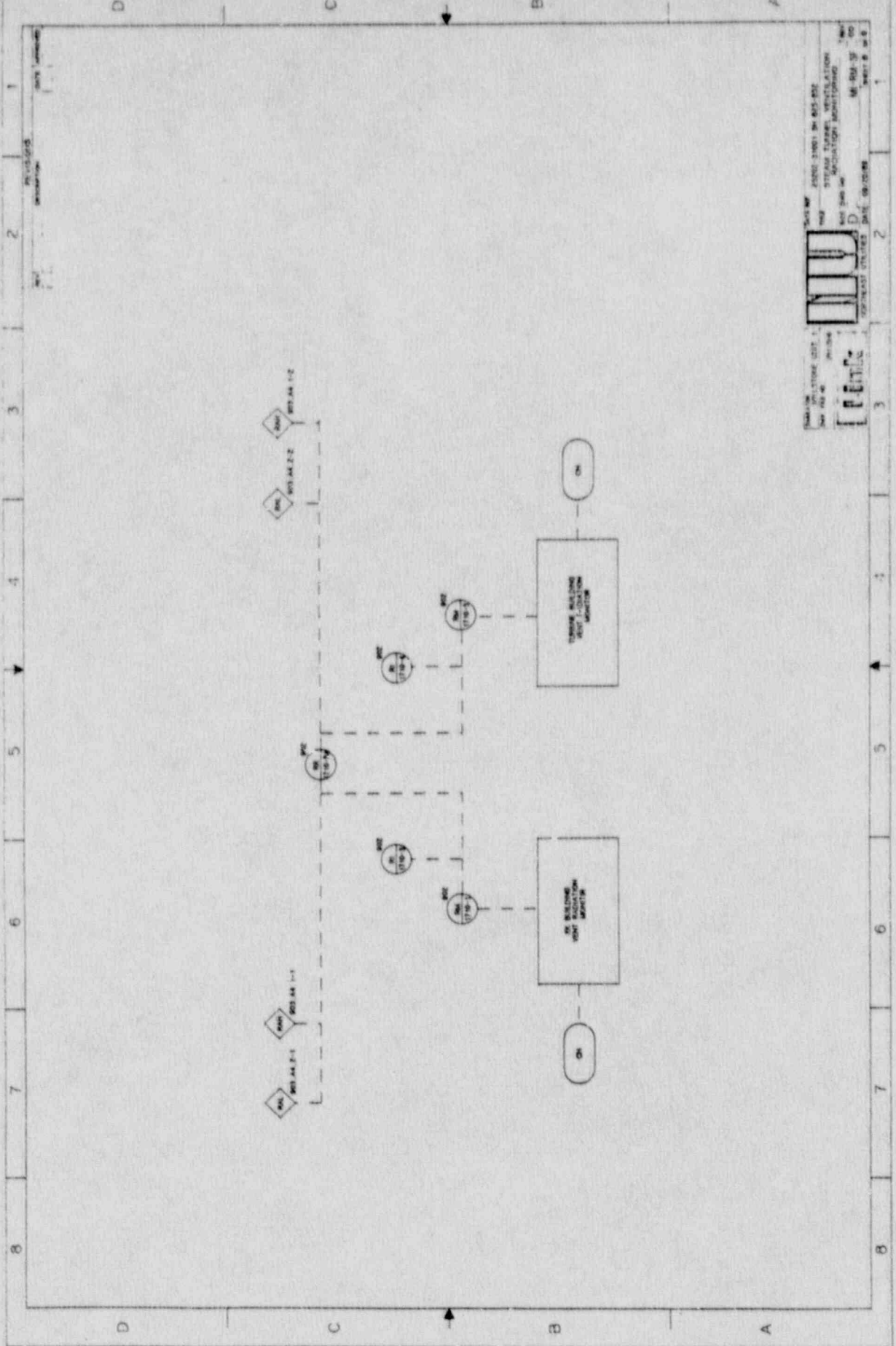
**Link**  
 COMMERCIAL OFFICES: 2010 10/10/10



PROJECT: 25000-21001-001-001-001-001  
 SHEET: DRY WELL RADIATION MONITORING POINT  
 DATE: 01/15/00  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 SCALE: AS SHOWN  
 SHEET NO. 2 OF 2

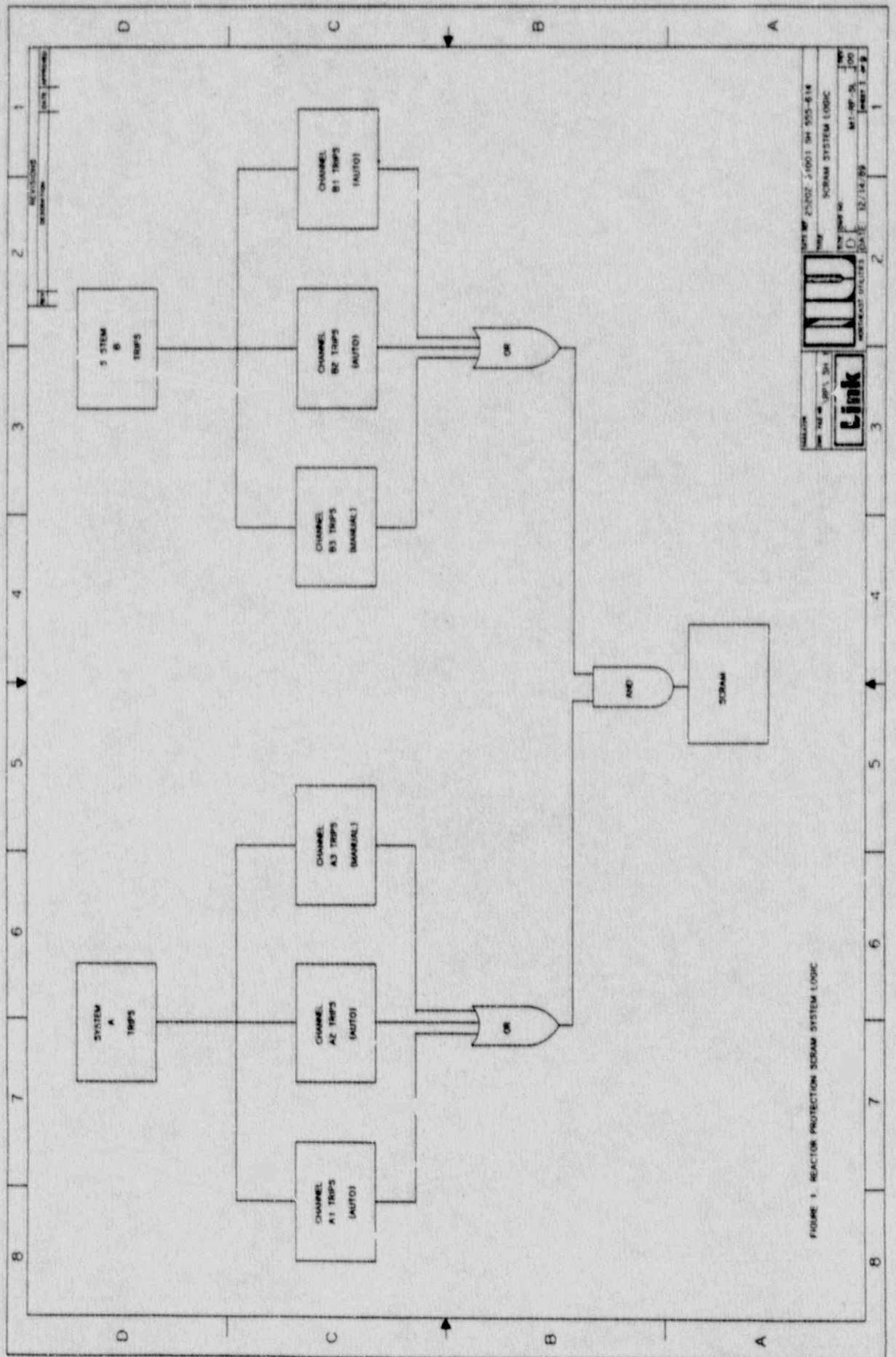


LITHIUM  
 LITHIUM



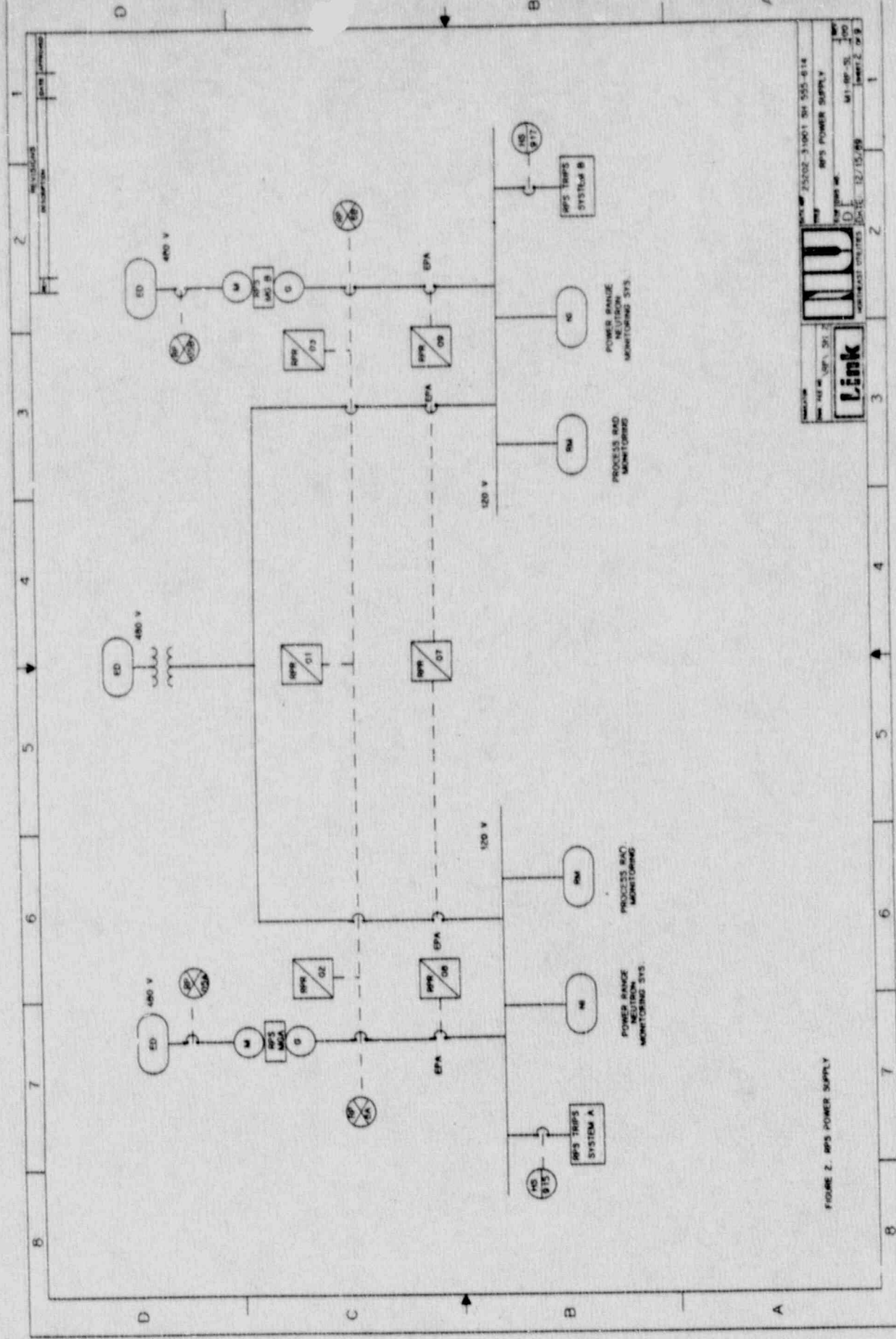
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 SHEET NO. 1000-2000-00-000-000  
 PROJECT NO. 1000-2000-00-000-000  
 DATE 08/19/88  
 DRAWN BY 1000-2000-00-000-000  
 CHECKED BY 1000-2000-00-000-000  
 APPROVED BY 1000-2000-00-000-000





TITLE: REACTOR PROTECTION SCSAM SYSTEM LOGIC  
 NUMBER: 25002-1001 SH 555-614  
 DATE: 12/14/89  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]  
 PROJECT: [Signature]

FIGURE 1. REACTOR PROTECTION SCSAM SYSTEM LOGIC



**Link**  
 23202-31001 SH 555-814  
 BPS POWER SUPPLY  
 M1-407-25  
 12/15/89  
 SHEET 2 OF 8

FIGURE 2. BPS POWER SUPPLY

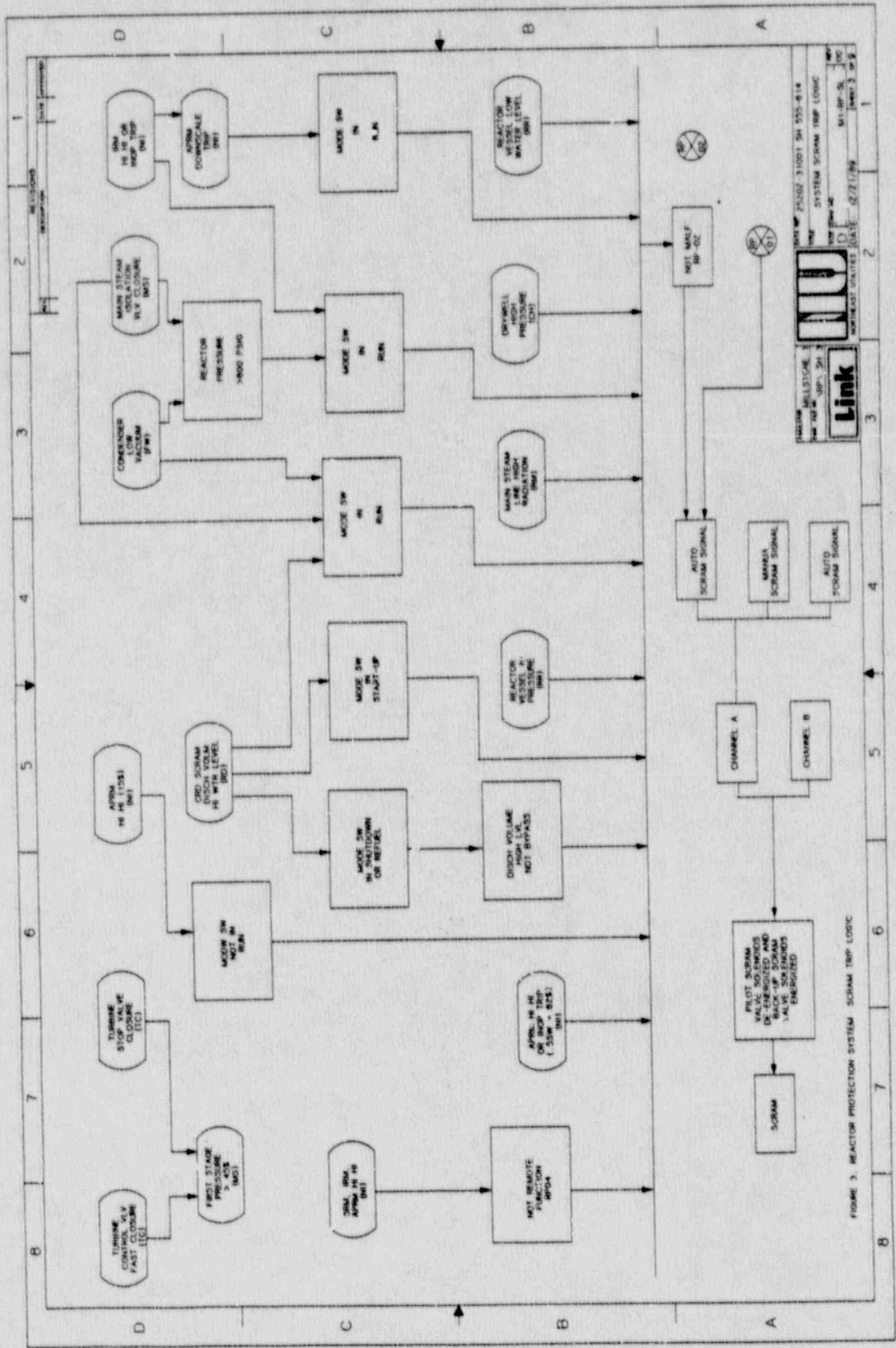


FIGURE 3. REACTOR PROTECTION SYSTEM SCRAM TRIP LOGIC

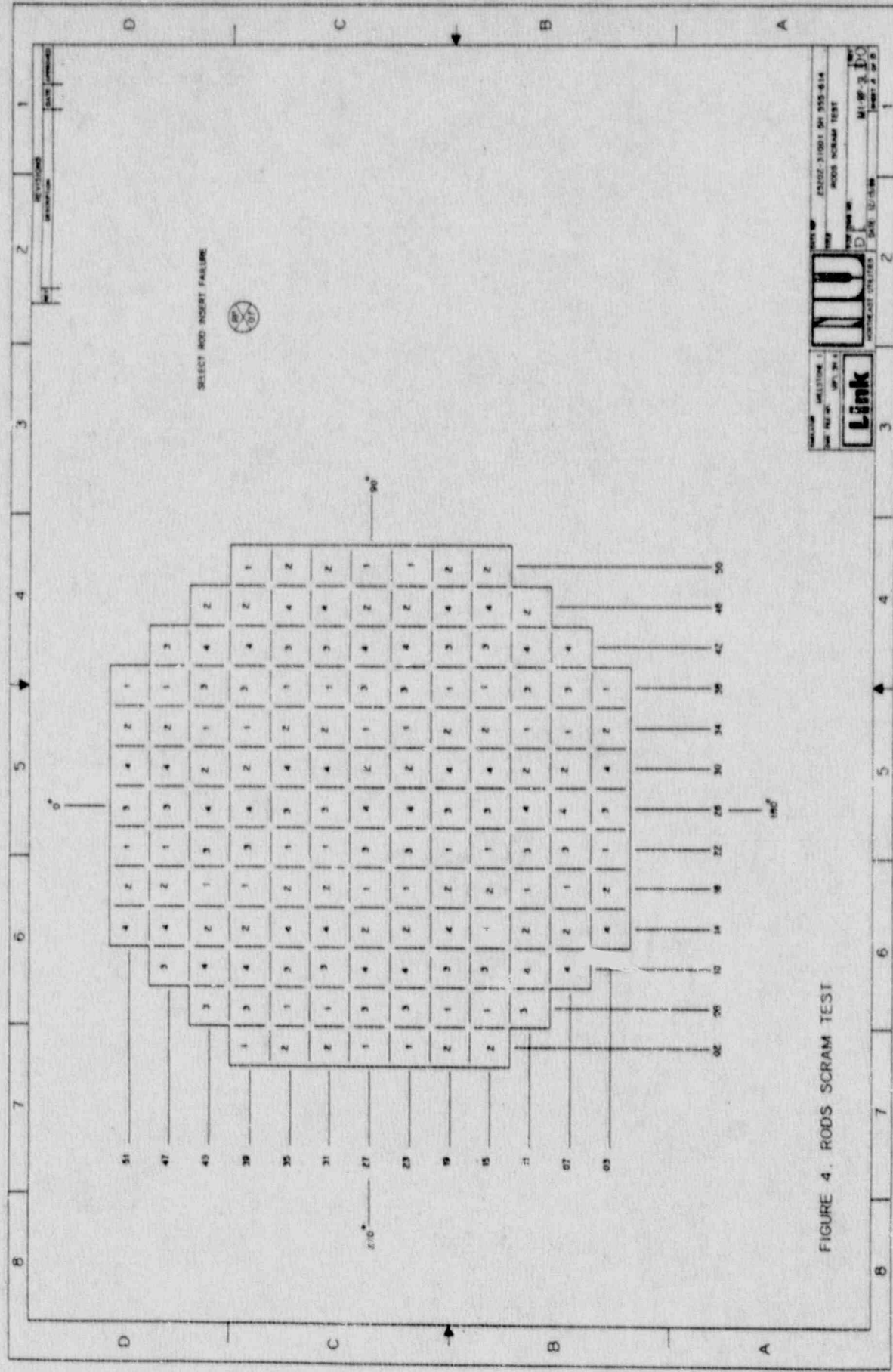


FIGURE 4. RODS SCRAM TEST

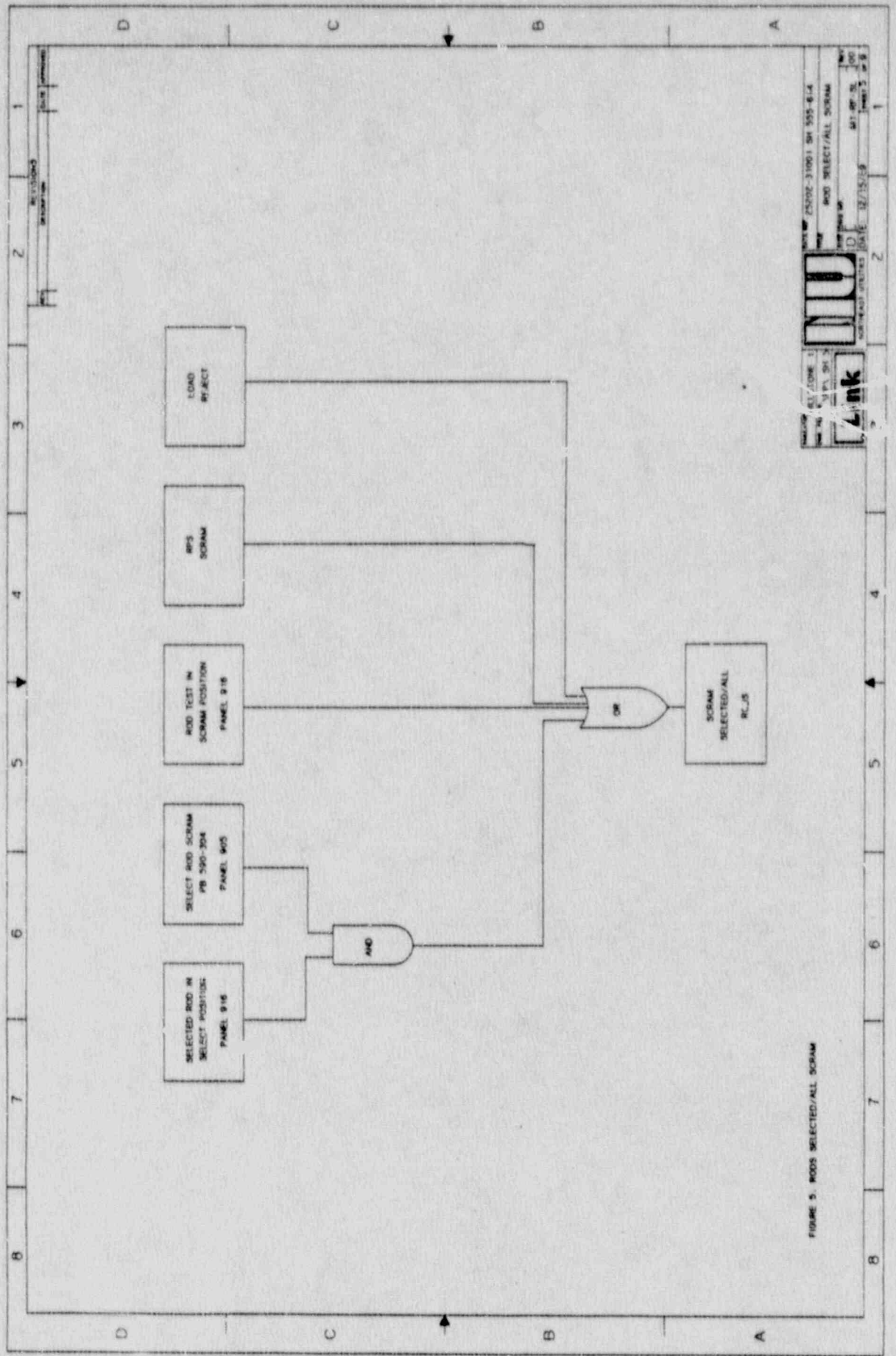


FIGURE 5. RODS SELECTED/ALL SCRAM

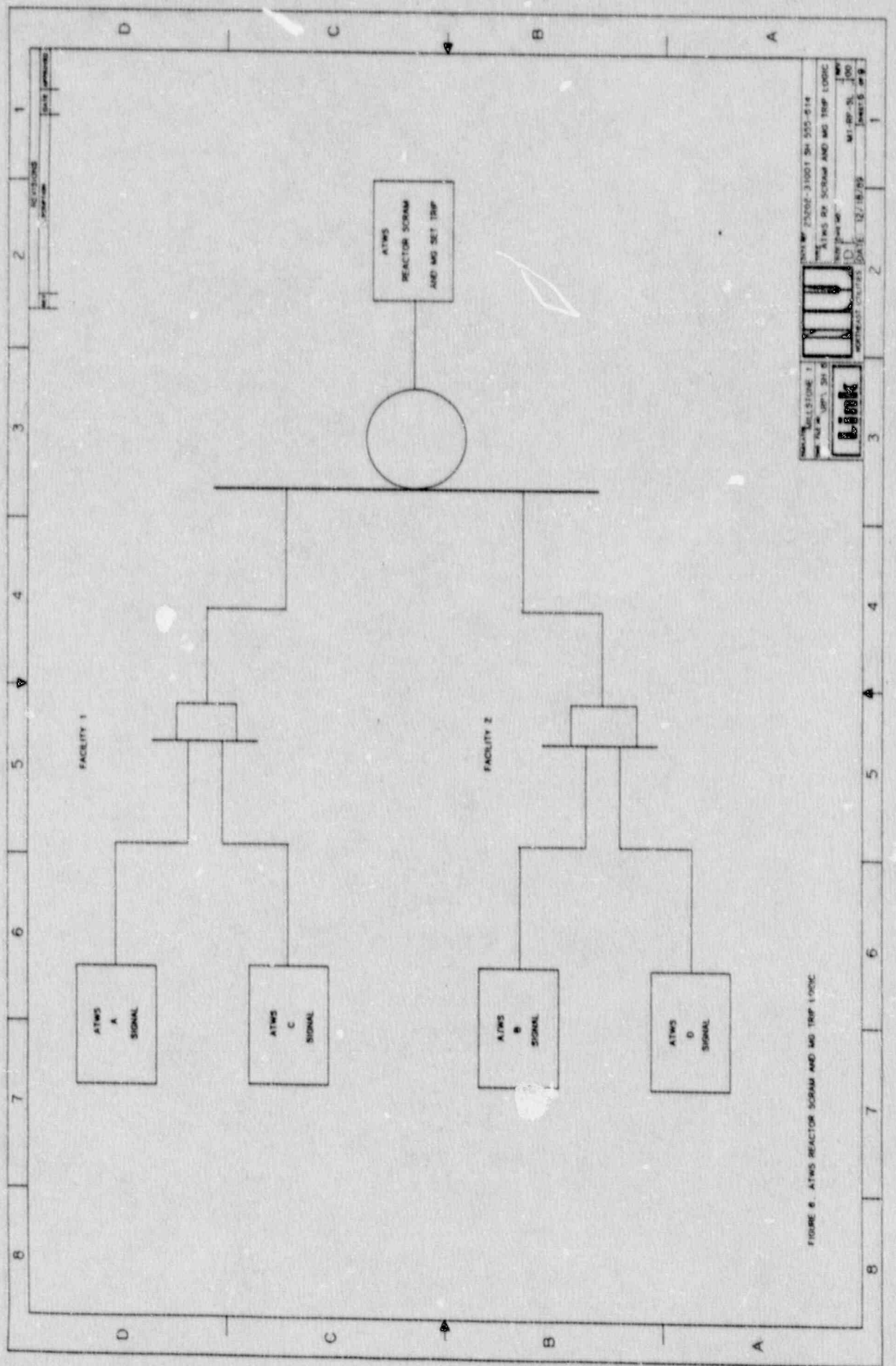
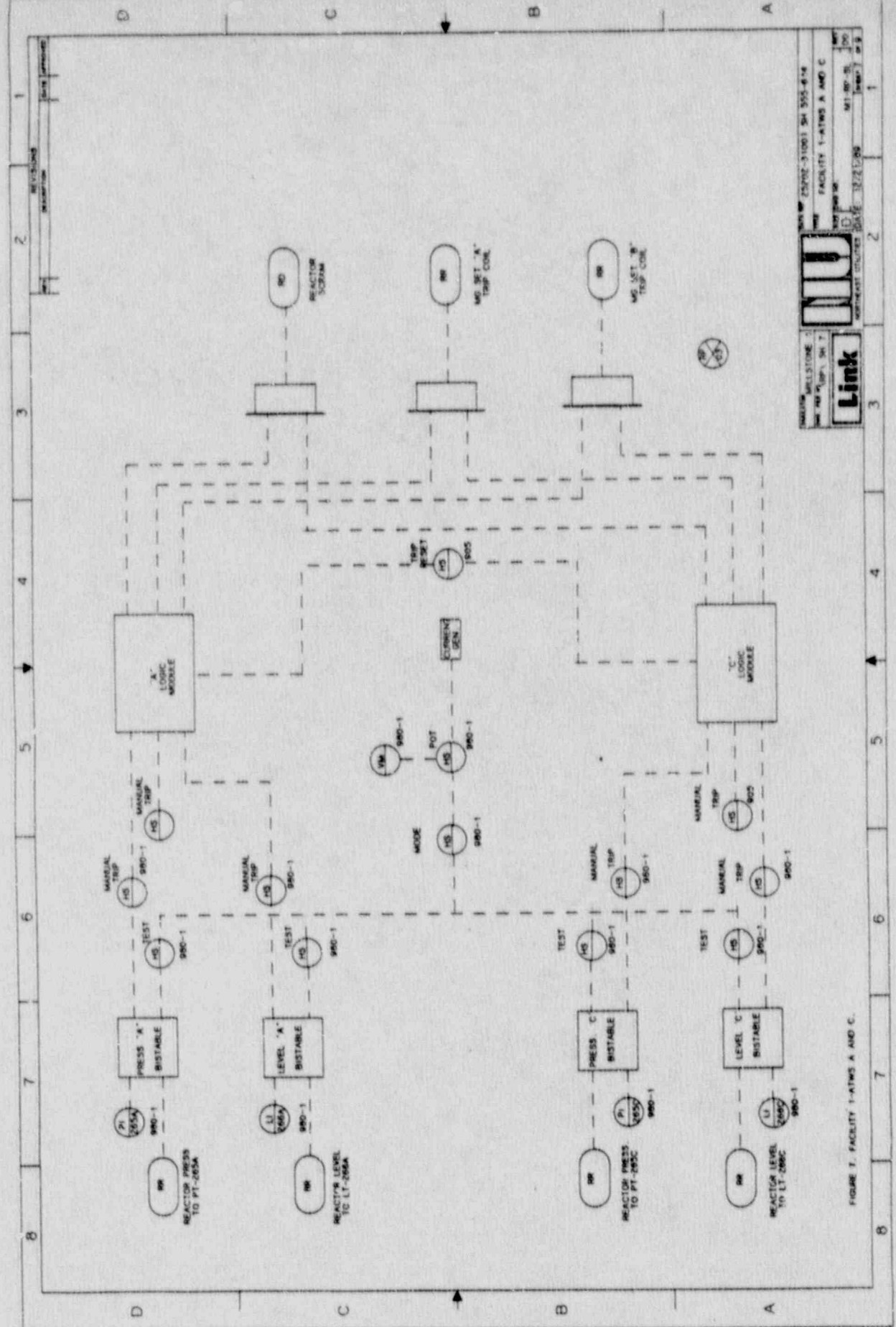


FIGURE 8. ATWS REACTOR SCRAM AND MG TRIP LOGIC



MILLSTONE 25002-31001 SH 305-614  
 FACILITY 1-ATWS A AND C  
 Link  
 CONTRACT NUMBER 25002-31001 SH 305-614  
 M1 90-15  
 200

FIGURE 7. FACILITY 1-ATWS A AND C.

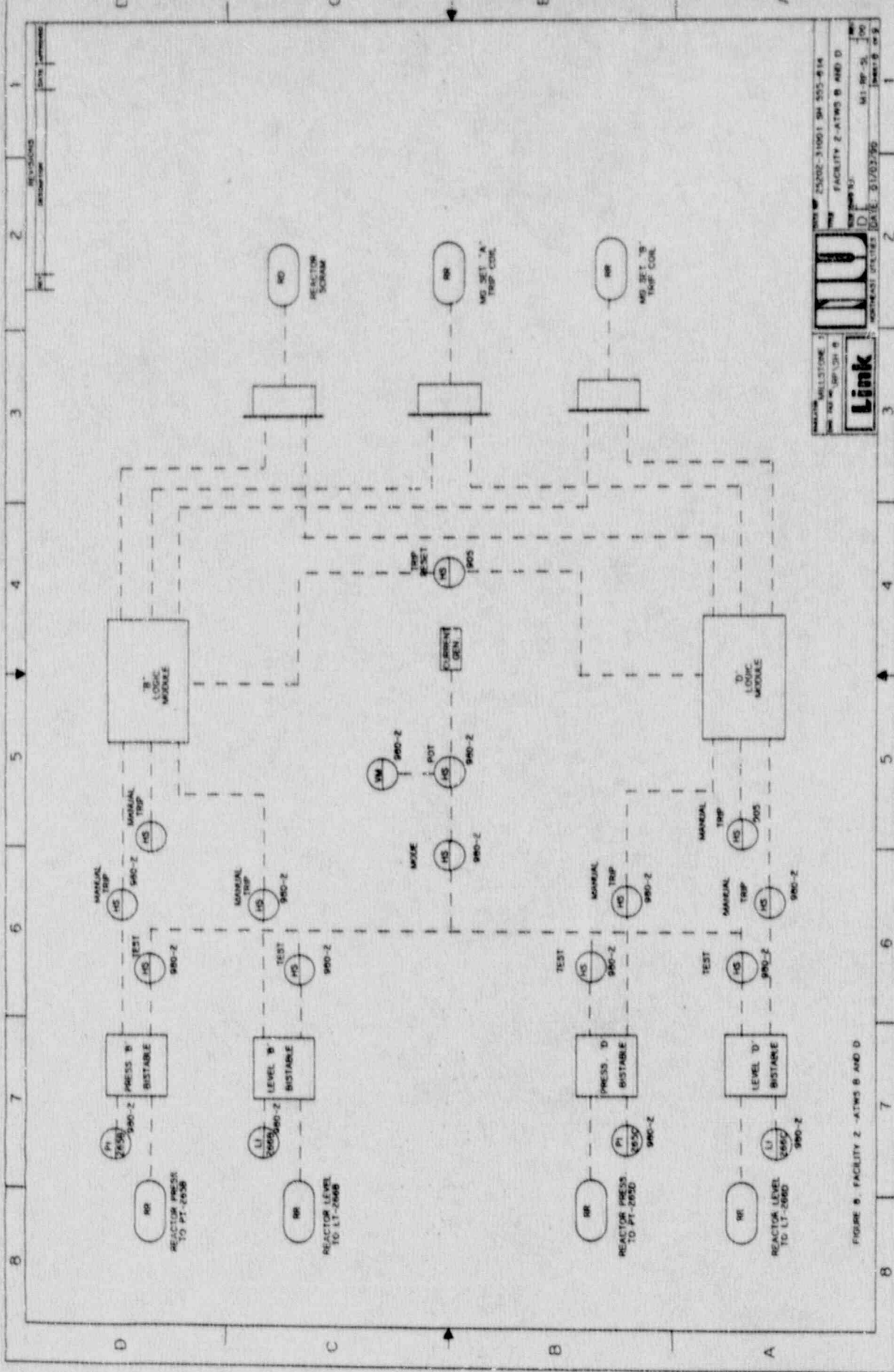
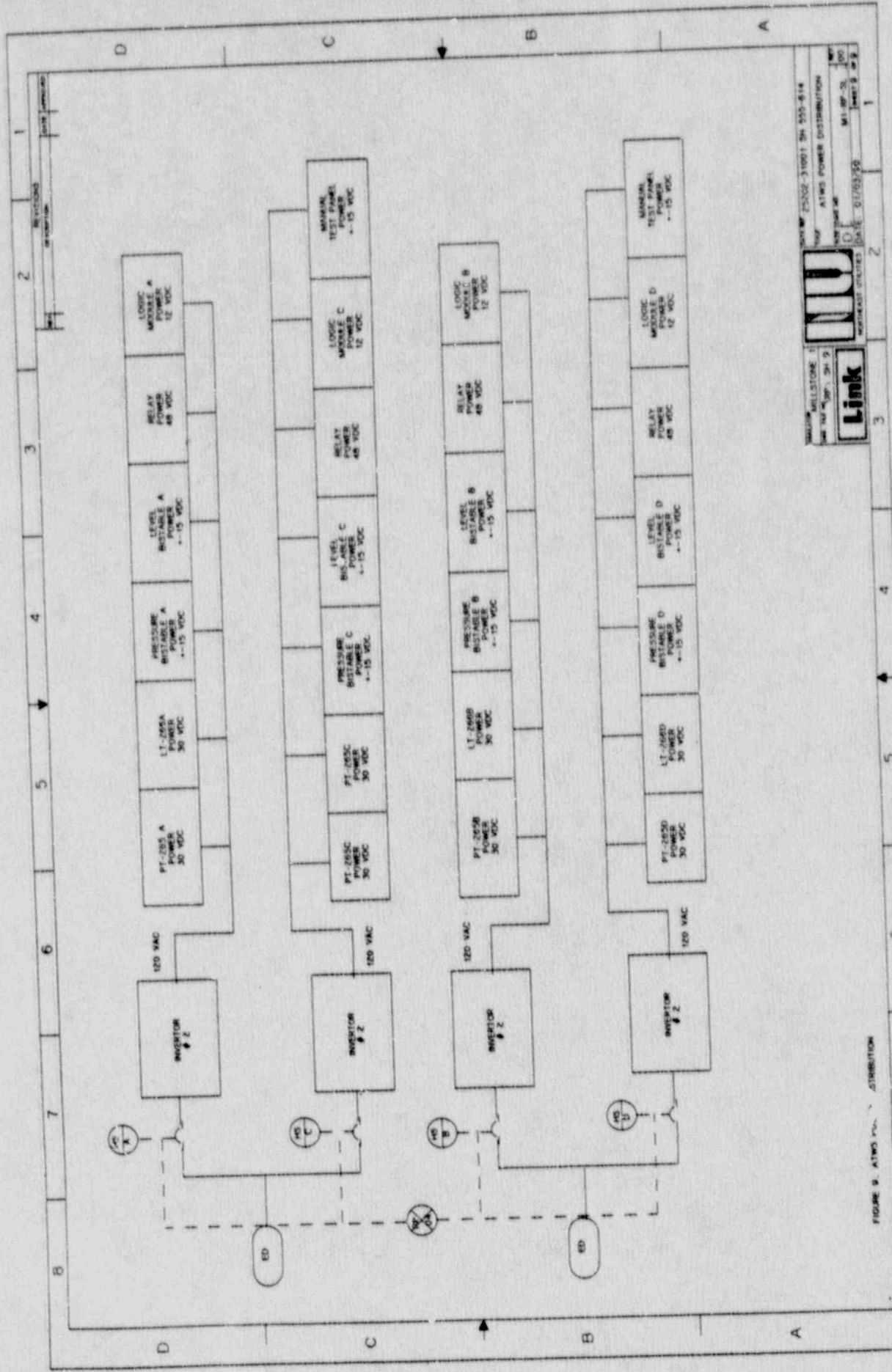


FIGURE 8. FACILITY 2 - ATWS B AND D

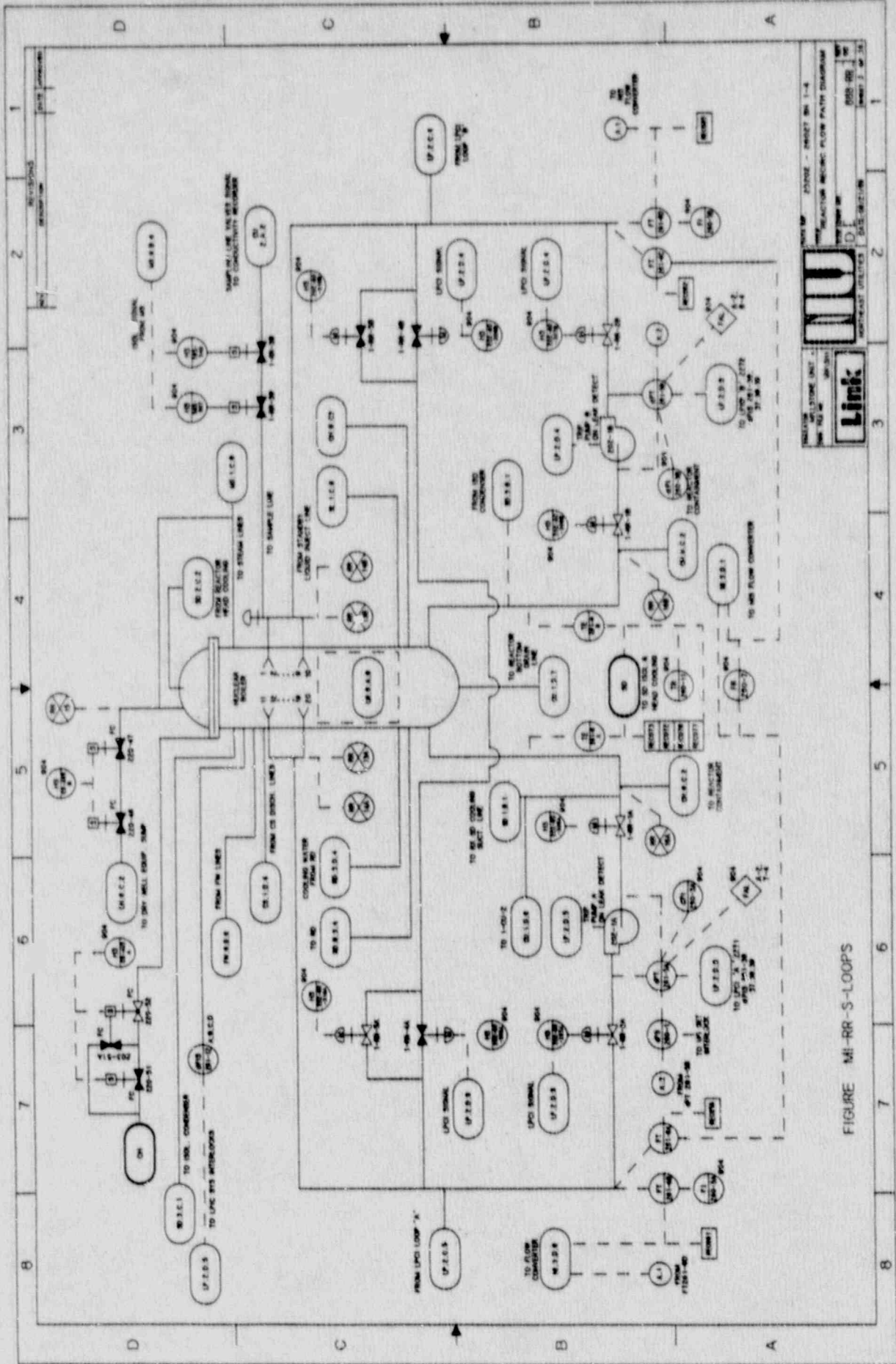
PROJECT: MILLSTONE 3  
 REV: 01/10/01  
 FACILITY 2-ATWS B AND D  
 SHEET NO. 11  
 DATE: 01/03/99  
 SHEET 8 OF 9





Link  
 MILITARY  
 ATWS POWER DISTRIBUTION  
 25302-31001 SH 555-614  
 DATE 01/03/99  
 SHEET 5 OF 5

FIGURE 9. ATWS POWER DISTRIBUTION



PROJECT: MI-RR-S-LOOPS  
 SHEET NO: 1-4  
 DATE: 10/1/77  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 APPROVED BY: [Name]  
 REVISIONS: [Table]  
 Link  
 NORTHWEST UTILITIES DISTRICT

FIGURE MI-RR-S-LOOPS

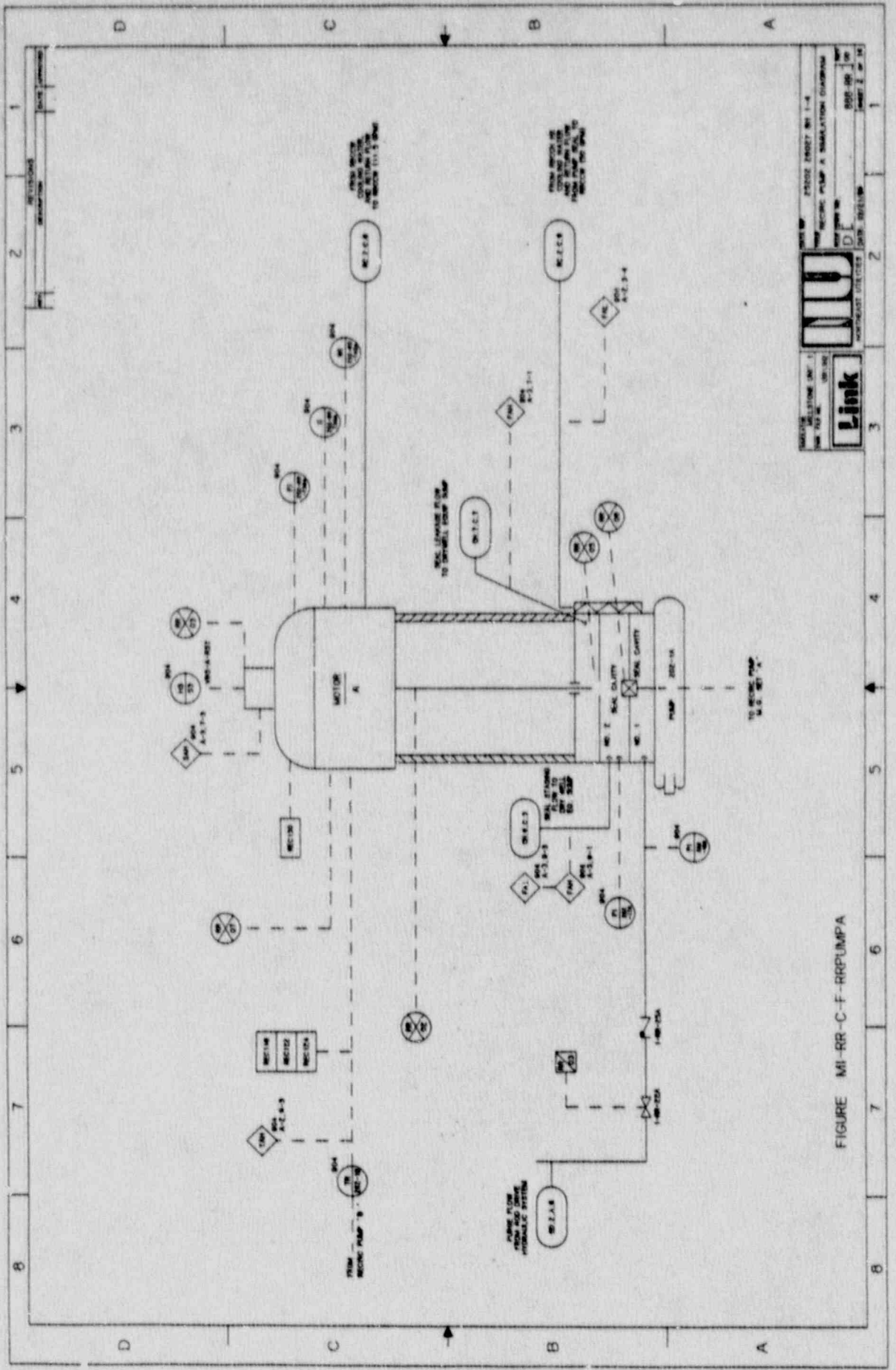
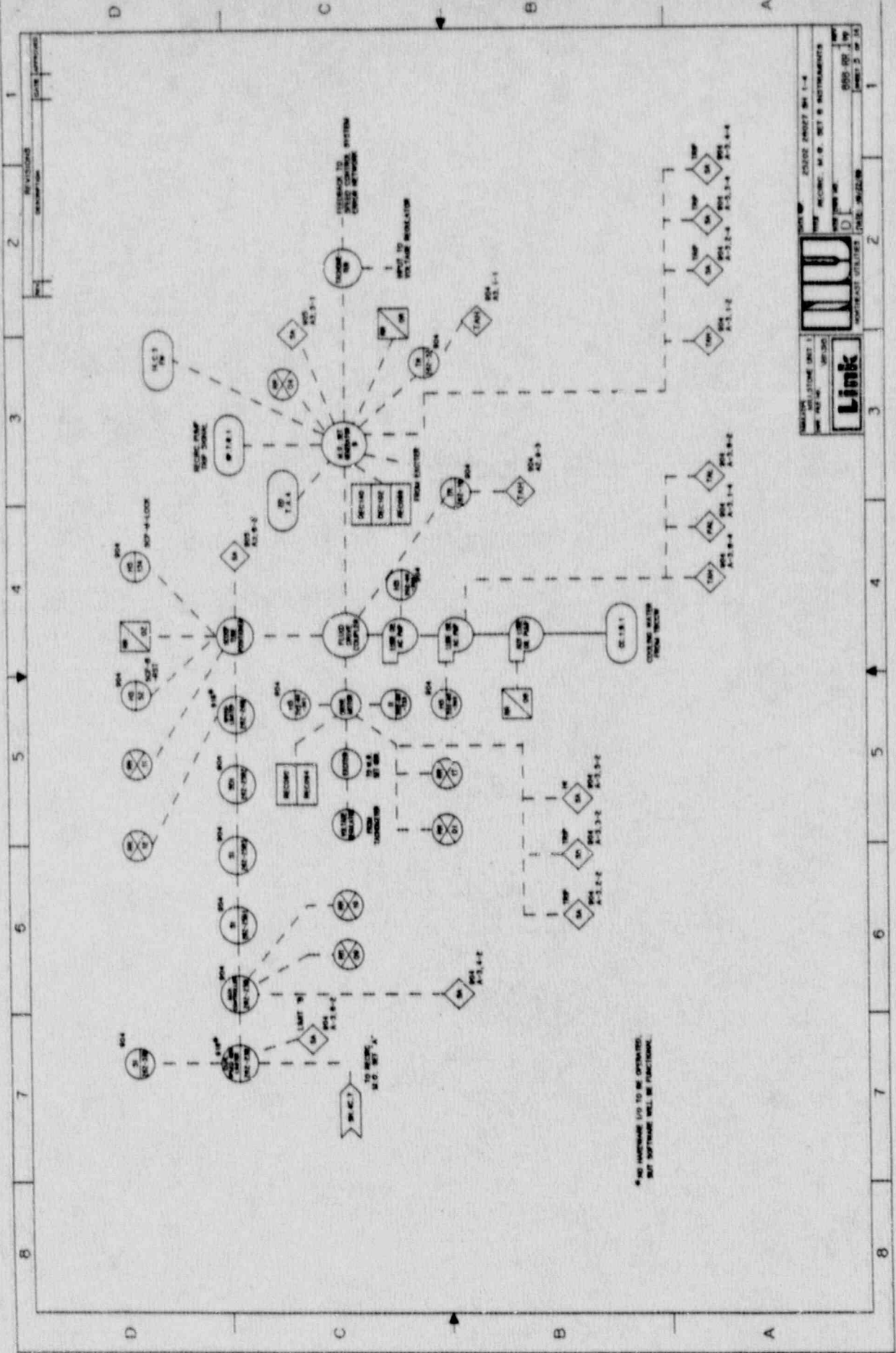


FIGURE MI-RR-C-F-RRPUMPA







NO HARDWARE IS TO BE OPERATED.  
ALL SOFTWARE WILL BE FUNCTIONAL.



WATER TREATMENT SYSTEM  
DESIGN PROJECT NO. 1-4  
REVISION: M. B. SET 8 INSTRUMENTS  
DATE: 10/1/88  
SHEET NO. 10  
SHEET 3 OF 10

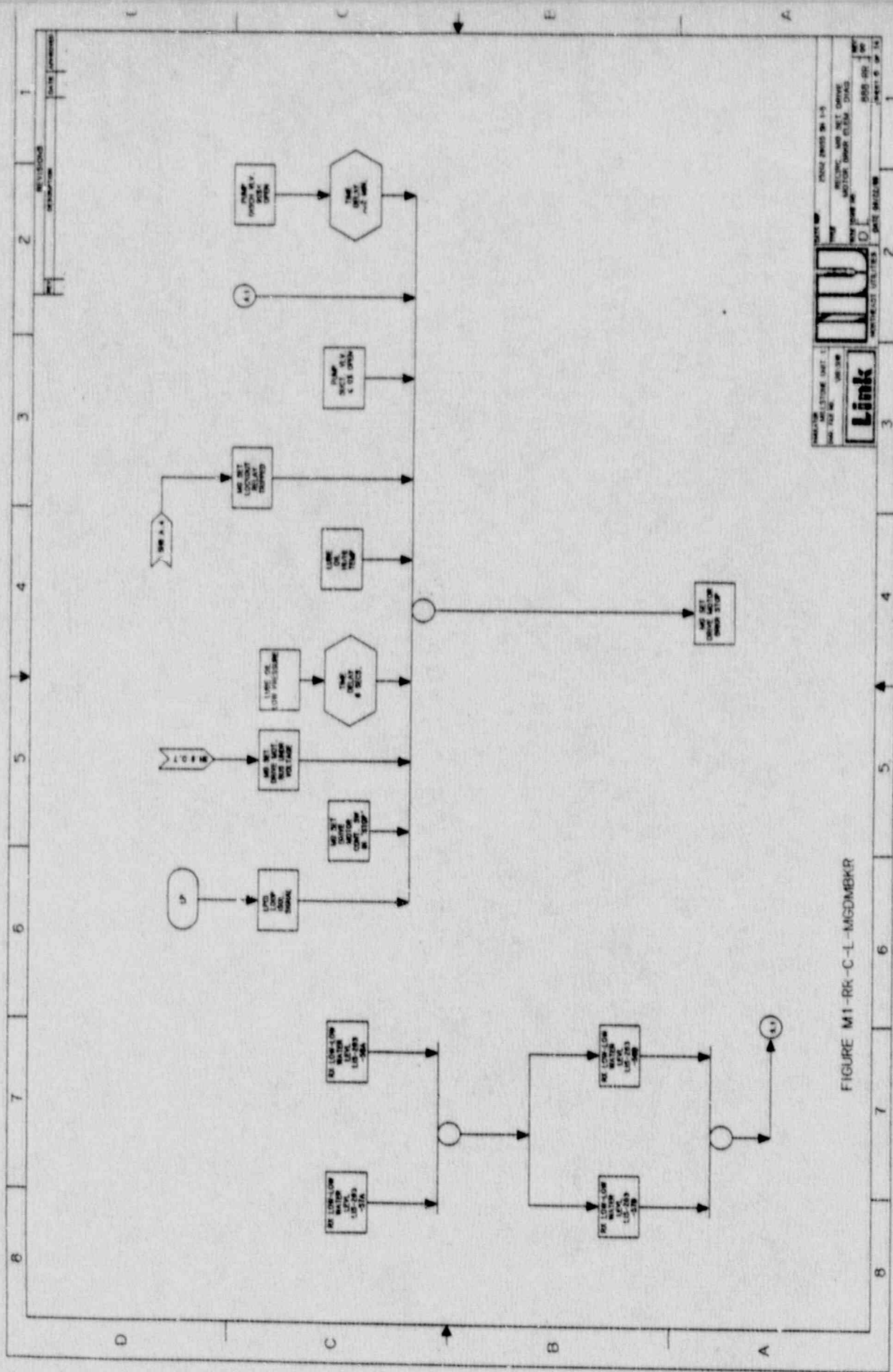


FIGURE M1-RK-C-L-MGDMBKR

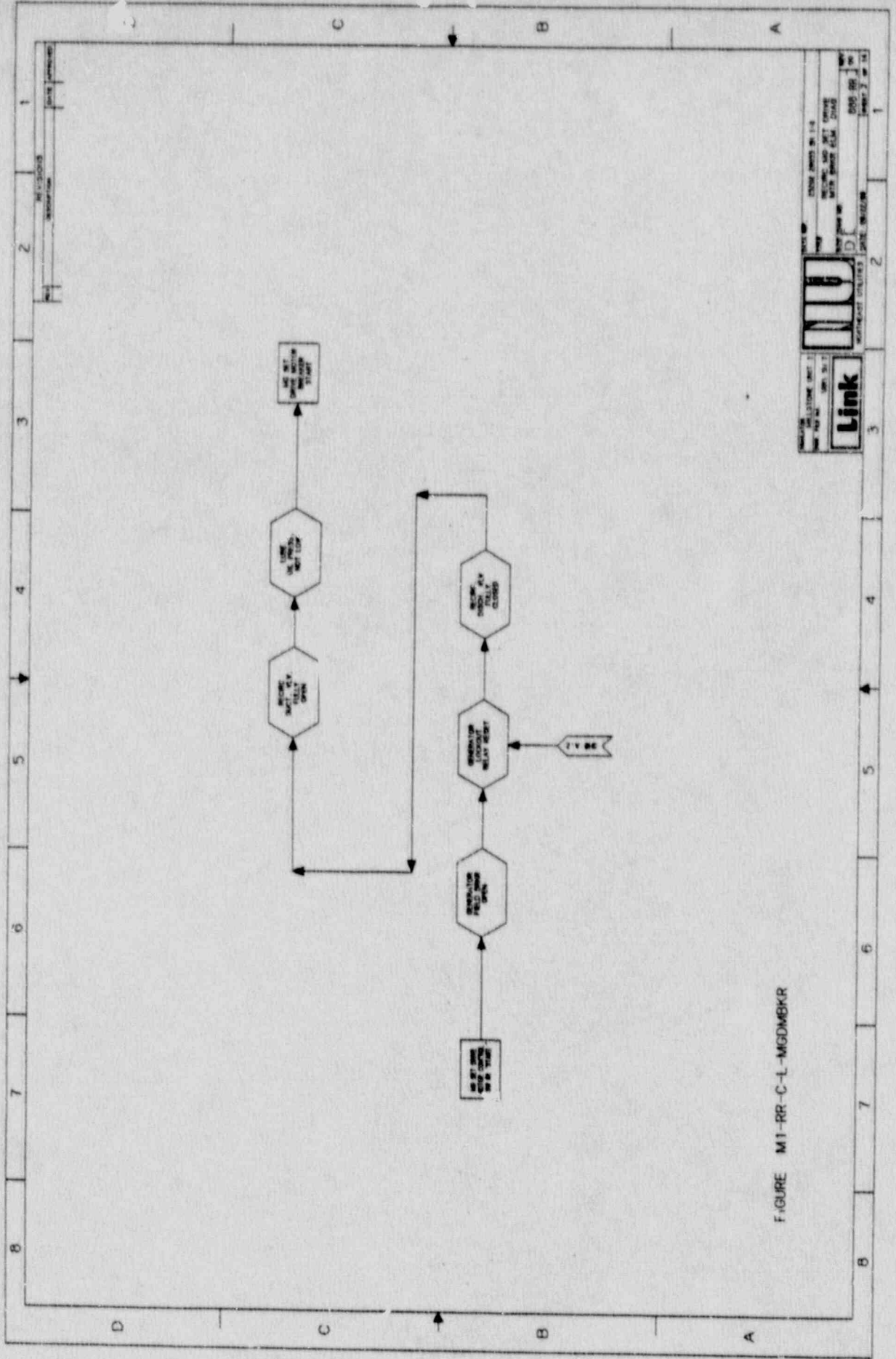


FIGURE M1-RR-C-L-MGDMBKR

**Link**  
 CONTROL SYSTEMS  
 12000 BROADWAY, SUITE 100  
 BOSTON, MASSACHUSETTS 02108  
 TEL: (617) 552-1100  
 FAX: (617) 552-1101  
 WWW: WWW.LINK-INC.COM



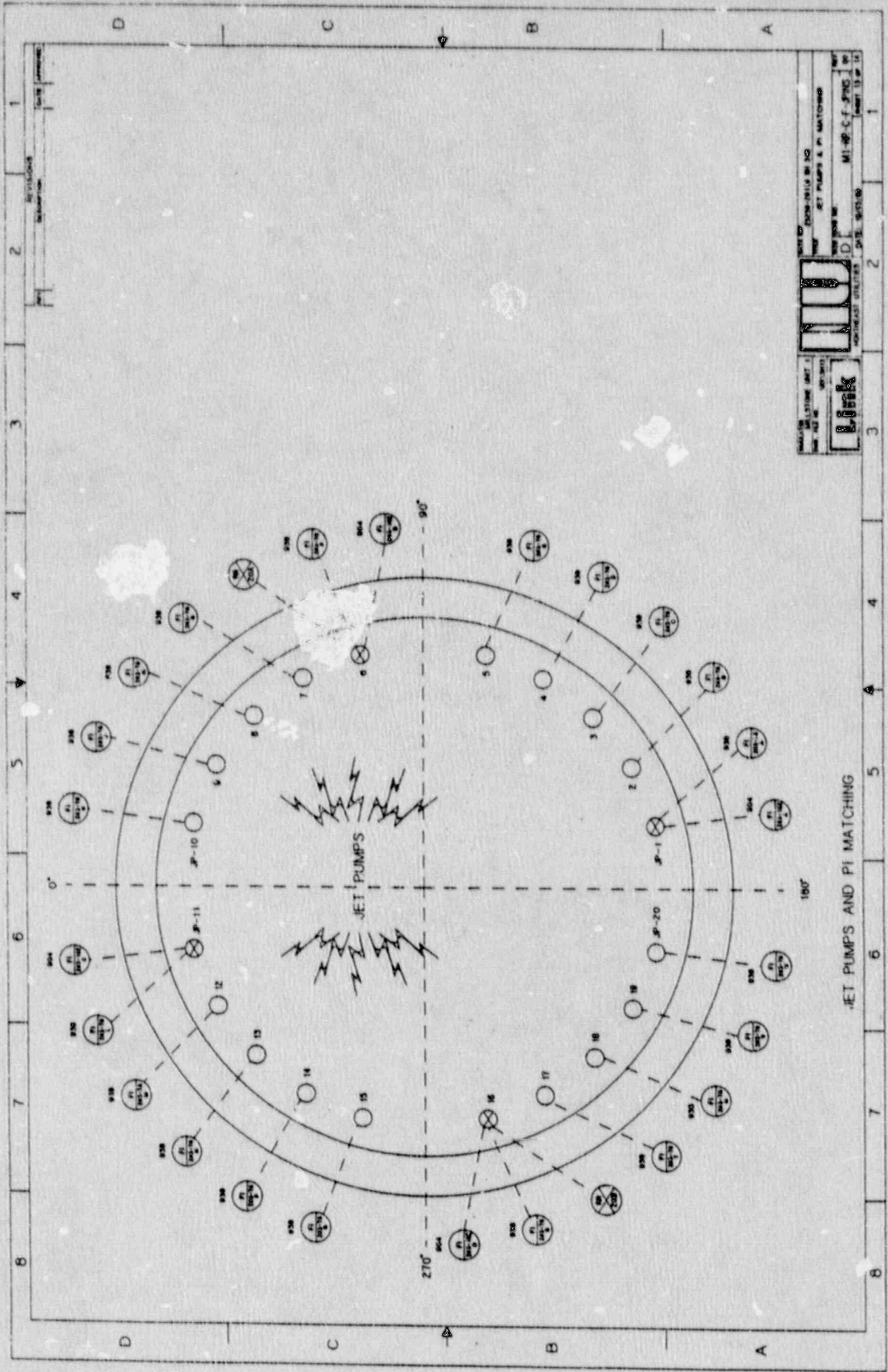






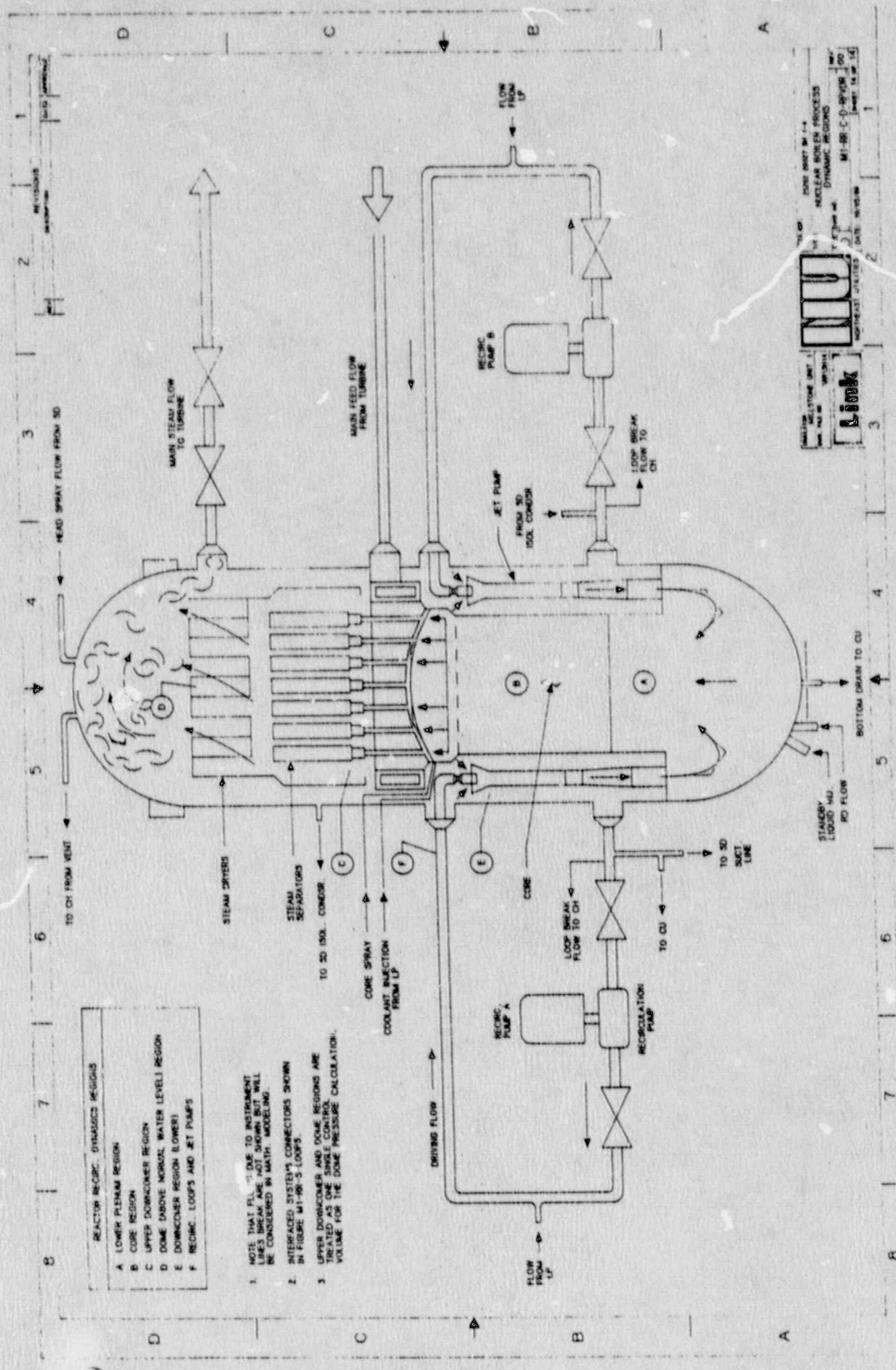






JET PUMPS AND PI MATCHING

MILITARY UNIT 101st AIRBORNE DIVISION 101st AIRBORNE DIVISION 101st AIRBORNE DIVISION 101st AIRBORNE DIVISION	CONSTRUCTION CONSTRUCTION CONSTRUCTION CONSTRUCTION
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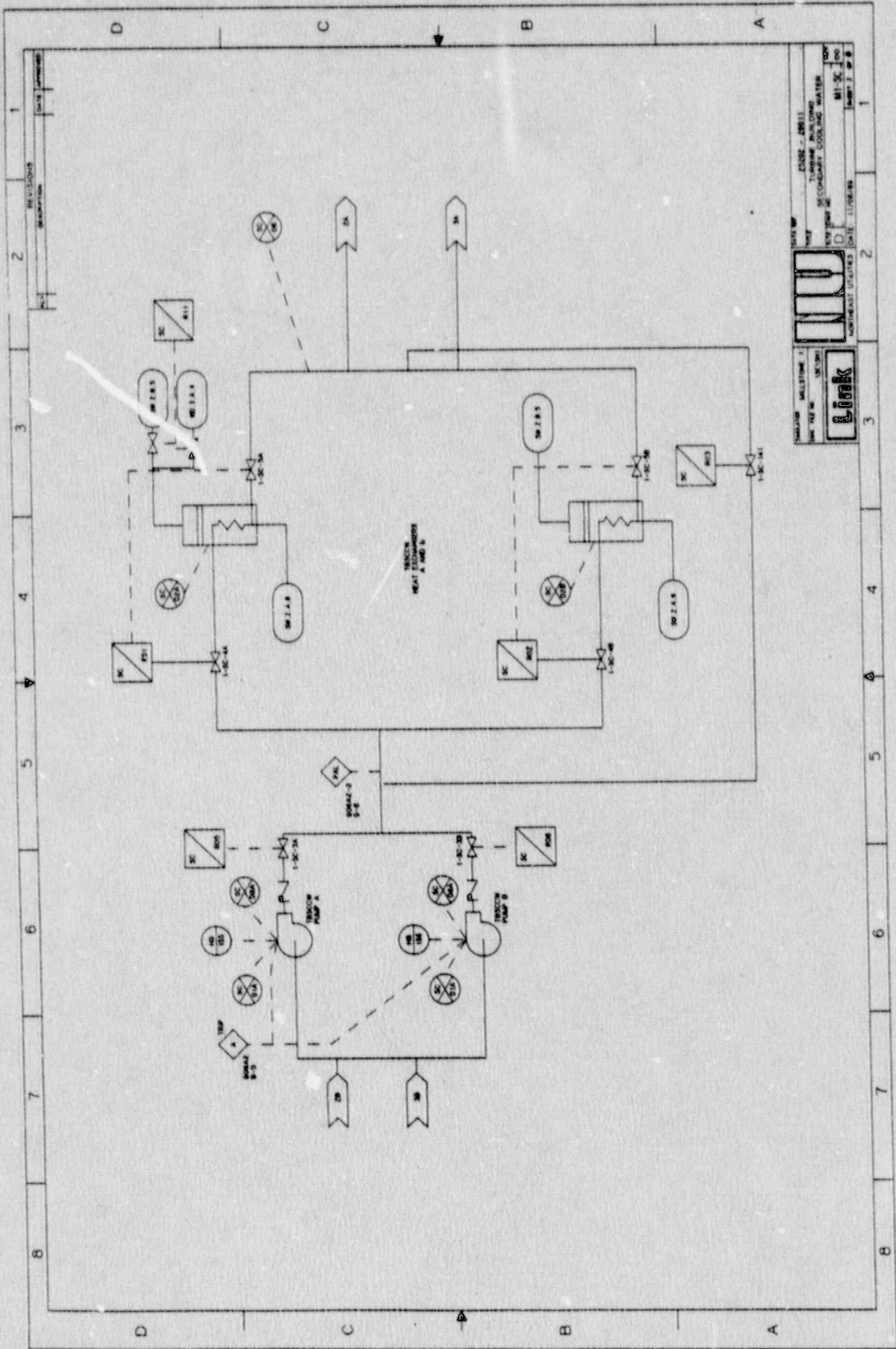


REACTOR RECIRC. DYNAMIC REGIONS	
A	LOWER PLENARIUM REGION
B	CORE REGION
C	UPPER DOWNCOMER REGION
D	UPPER DOME ABOVE NORMAL WATER LEVEL REGION
E	DOWNCOMER REGION (LOWER)
F	RECIRC. LOOPS AND JET PUMPS

- NOTE THAT FL. ... DUE TO INSTANTANEOUS BREAKS ... BUT WILL BE CONSIDERED IN MATH. MODELING.
- INTERFACED SYSTEM'S CONNECTORS SHOWN IN FIGURE M1-RR-5 LOOPS.
- UPPER DOWNCOMER AND DOME REGIONS ARE TREATED AS ONE MASS CONTROL VOLUME FOR THE DOME PRESSURE CALCULATION.

DRAW NO. M1-RR-5  
 REACTOR RECIRC. DYNAMIC REGIONS  
 M1-RR-C-0-00-00  
 DATE: 10/14/64  
 BY: [Signature]  
 CHECKED: [Signature]

TO CH FROM VENT  
 HEAD SPRAY FLOW FROM SD  
 MAIN STEAM FLOW TO TURBINE  
 MAIN FEED FLOW FROM TURBINE  
 RECIRC. PUMP B  
 JET PUMP FROM SD ISOL. CONDENS.  
 LOOP BREAK FLOW TO CH  
 TO CU FROM VENT  
 CORE SPRAY COOLANT INJECTION FROM LP  
 RECIRC. PUMP A  
 REGENERATION PUMP  
 LOOP BREAK FLOW TO CH  
 TO CU  
 TO SD SUCT. LINE  
 BOTTOM DRAIN TO CU  
 STANDBY LIQUID HD. NO FLOW



DATE: 11/19/88

PROJECT: 25000 - 20811

TRUCKER HEAT EXCHANGER

SECONDARY COOLING WATER

SCALE: M1-5C (10)

DATE: 11/19/88

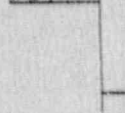
PROJECT: 25000 - 20811

TRUCKER HEAT EXCHANGER

SECONDARY COOLING WATER

SCALE: M1-5C (10)

DATE: 11/19/88



TRUCKER

TRUCKER

TRUCKER

TRUCKER

TRUCKER

TRUCKER

TRUCKER

TRUCKER

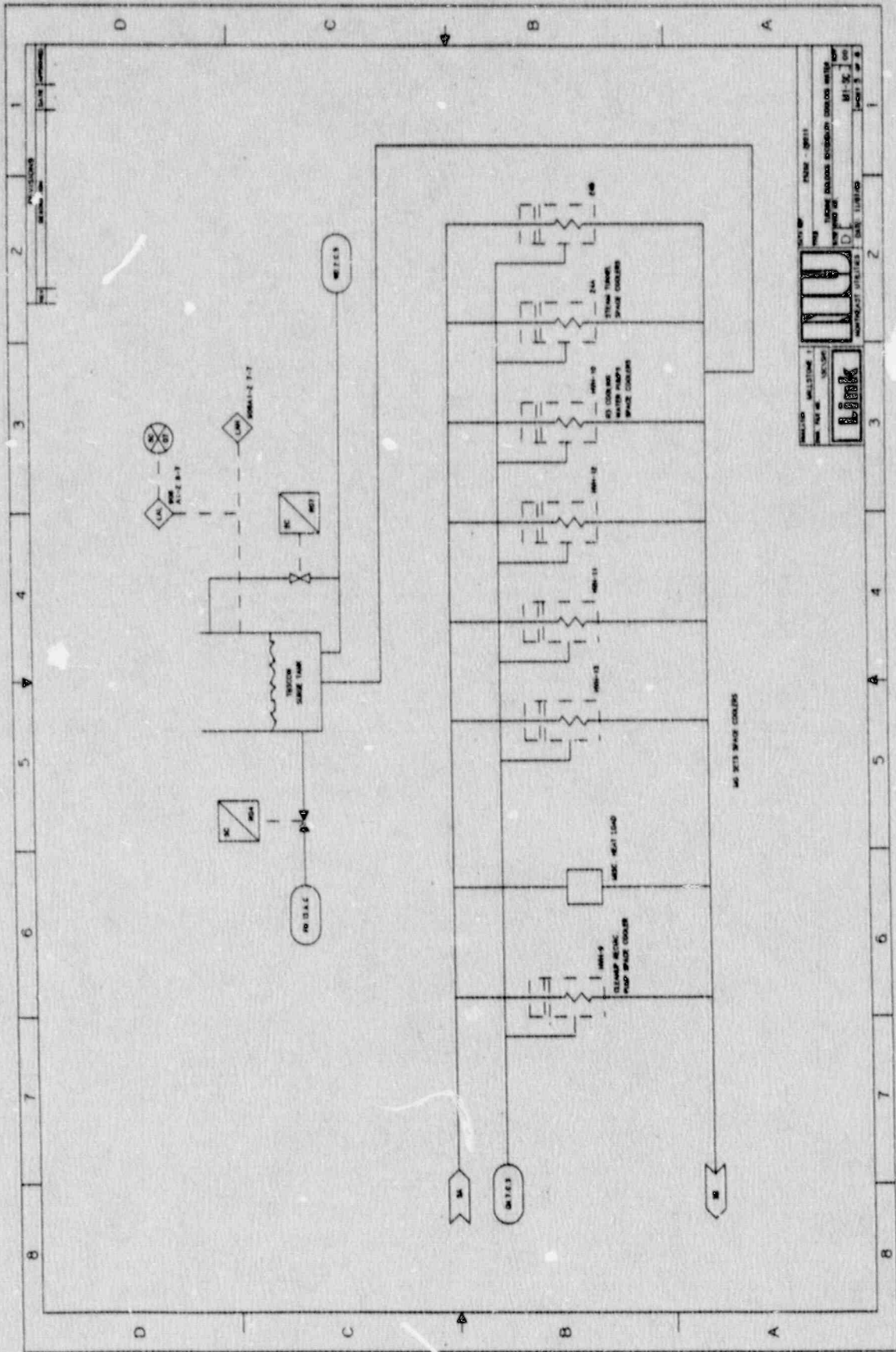
TRUCKER

TRUCKER



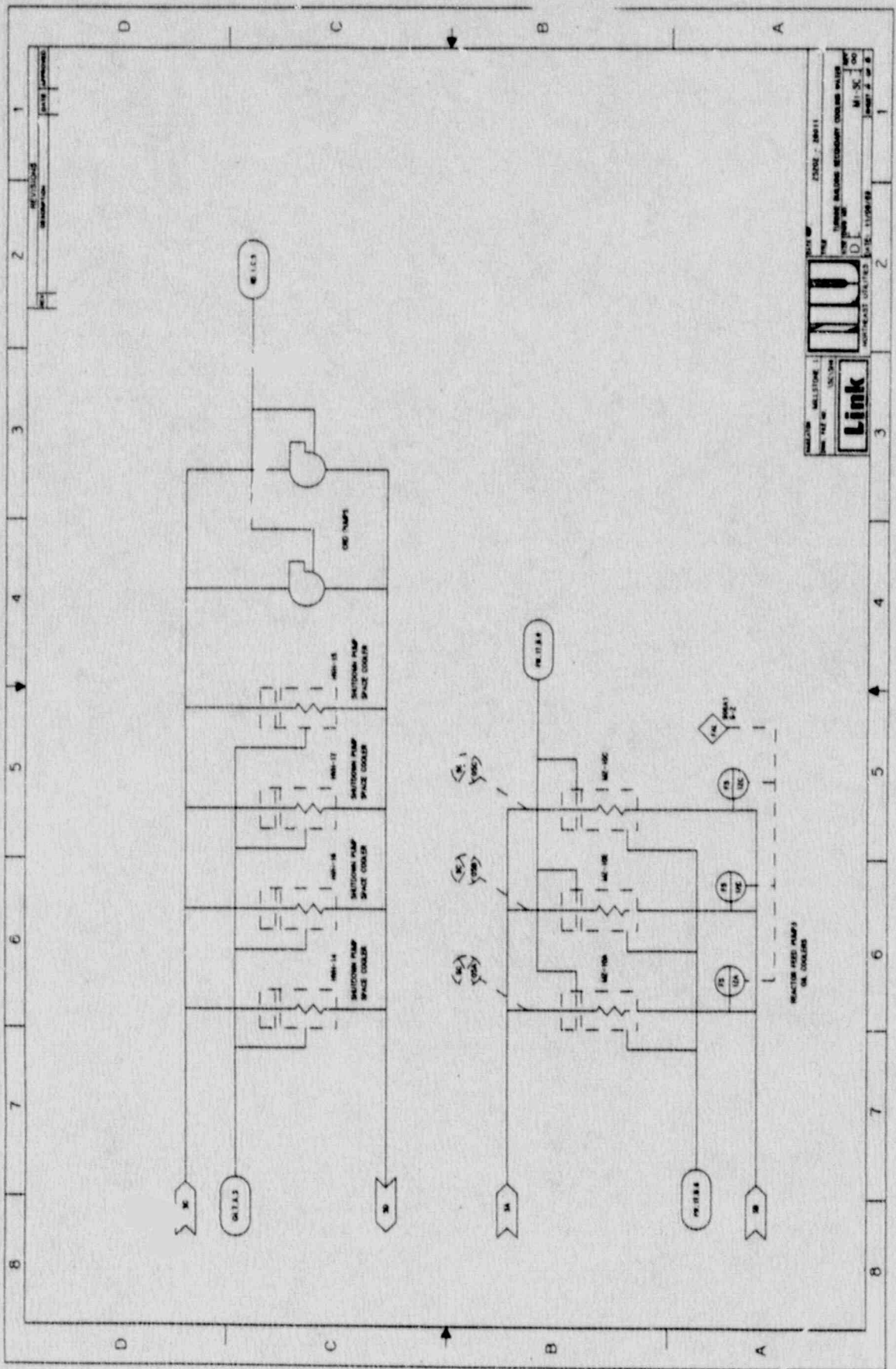






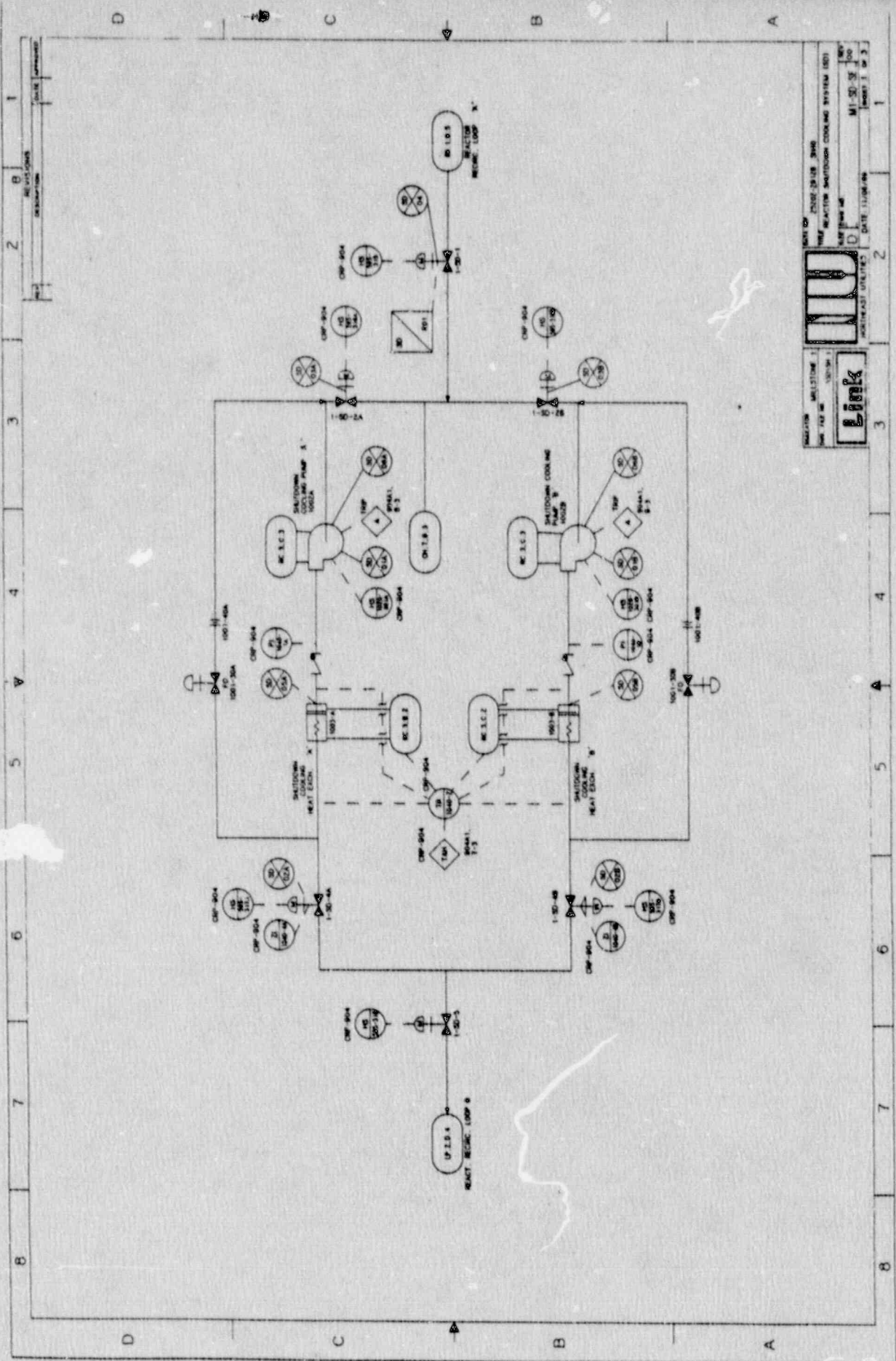
SHEET NO. 1  
 PROJECT NO. 1000  
 DATE 10/1/58  
 DRAWN BY [Signature]  
 CHECKED BY [Signature]  
 APPROVED BY [Signature]  
 TITLE: WATER SUPPLY SYSTEM

Link



MILLSTONE 1  
 UNIT 2  
 LINK  
 PROJECT NO. 2302.7.00011  
 TITLE: REACTOR FEED PUMPS OR COOLERS  
 DATE: 11/09/99  
 SHEET NO. 11-SC-00  
 OF 11

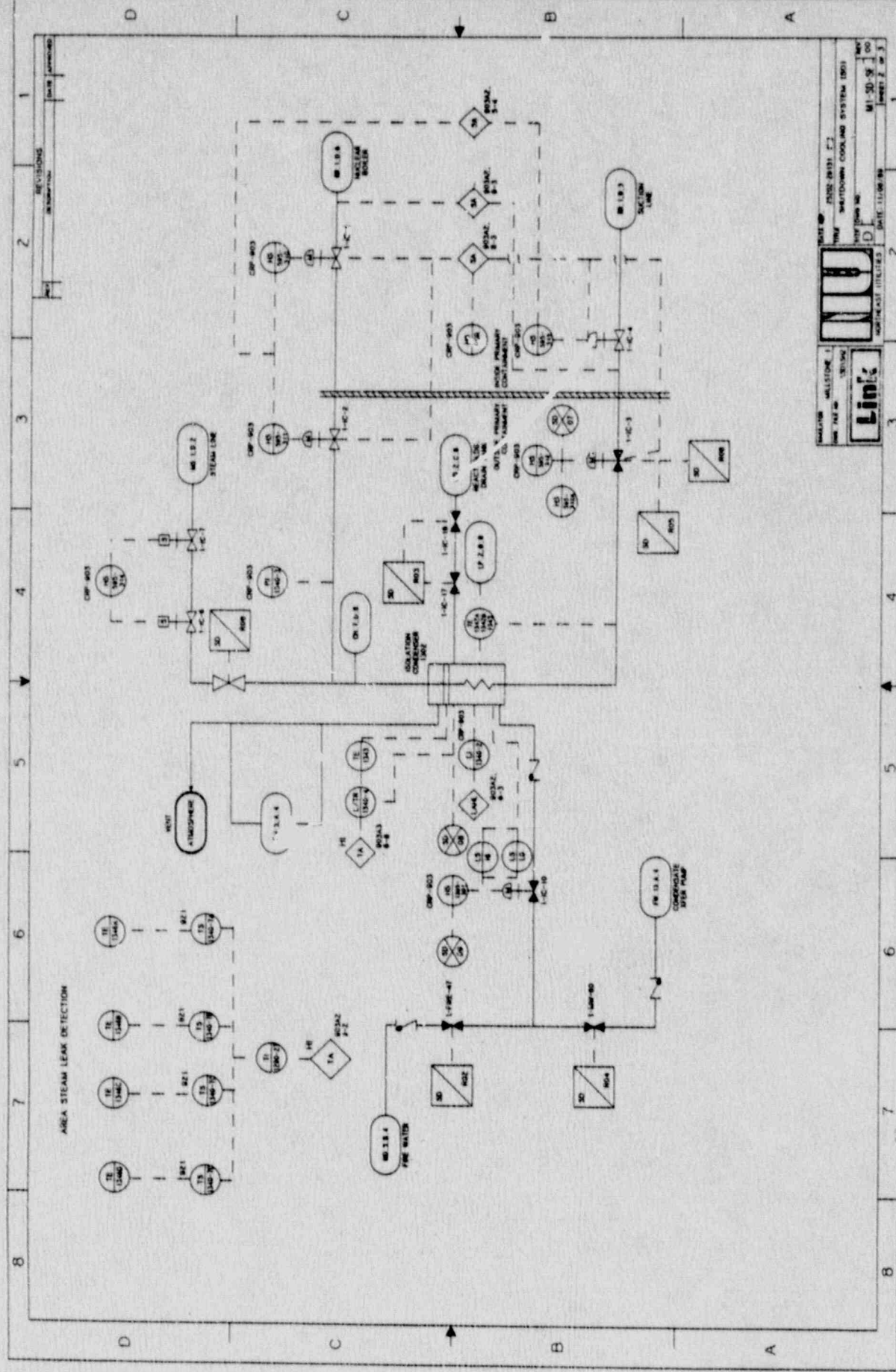




SHEET NO. 2100-2108-3000  
 TITLE REACTOR SHUTDOWN COOLING SYSTEM (RSCS)  
 PROJECT MI-50-38  
 DATE 11/20/66  
 SHEET 1 OF 3



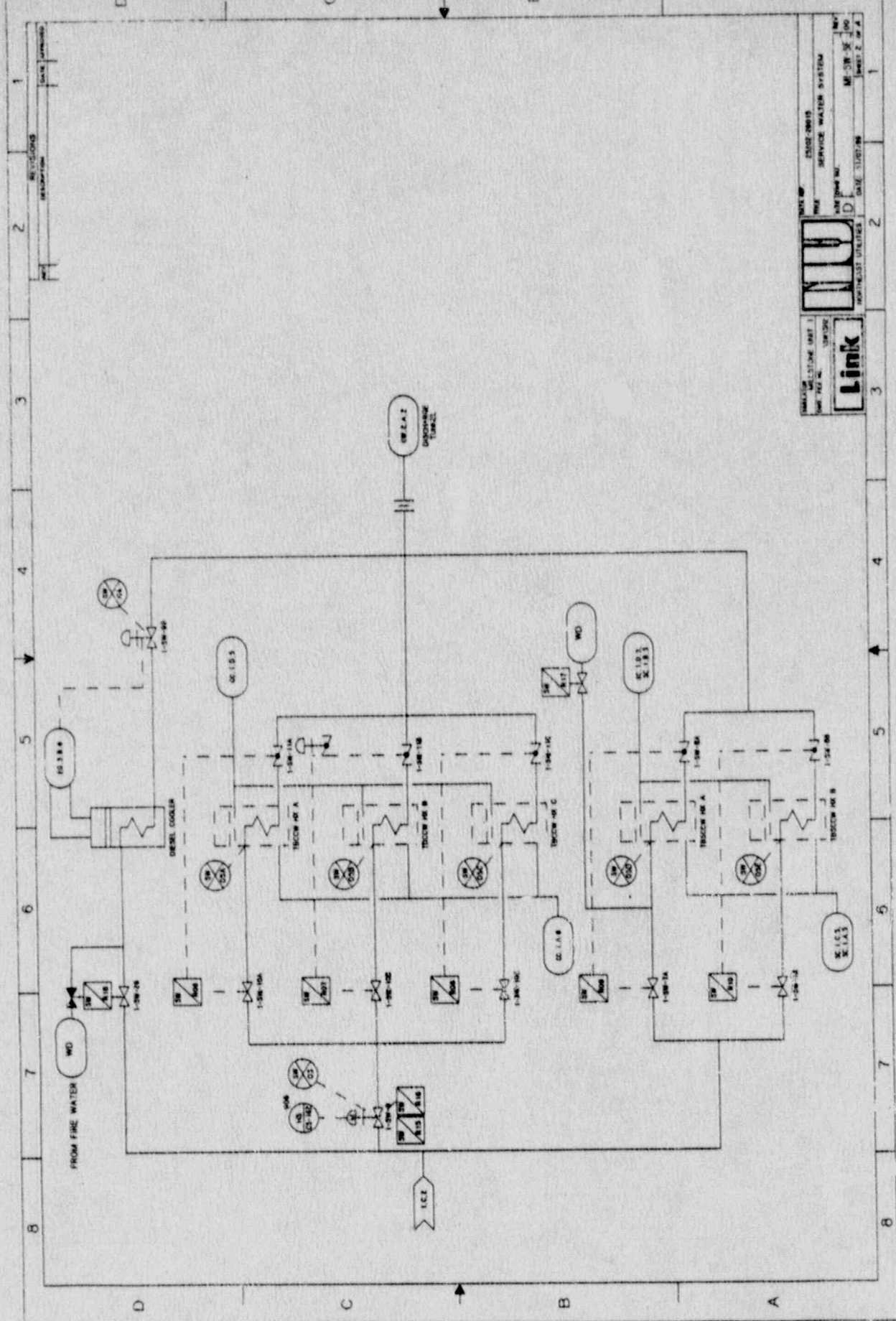
REVISIONS  
 1  
 2  
 3  
 4  
 5  
 6  
 7  
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PROJECT: MILLSTONE 1  
 SHEET NO: 1001  
 DATE: 11/08/98  
 SHEET 2 OF 3

**Linco**  
 INDUSTRIAL UTILITIES

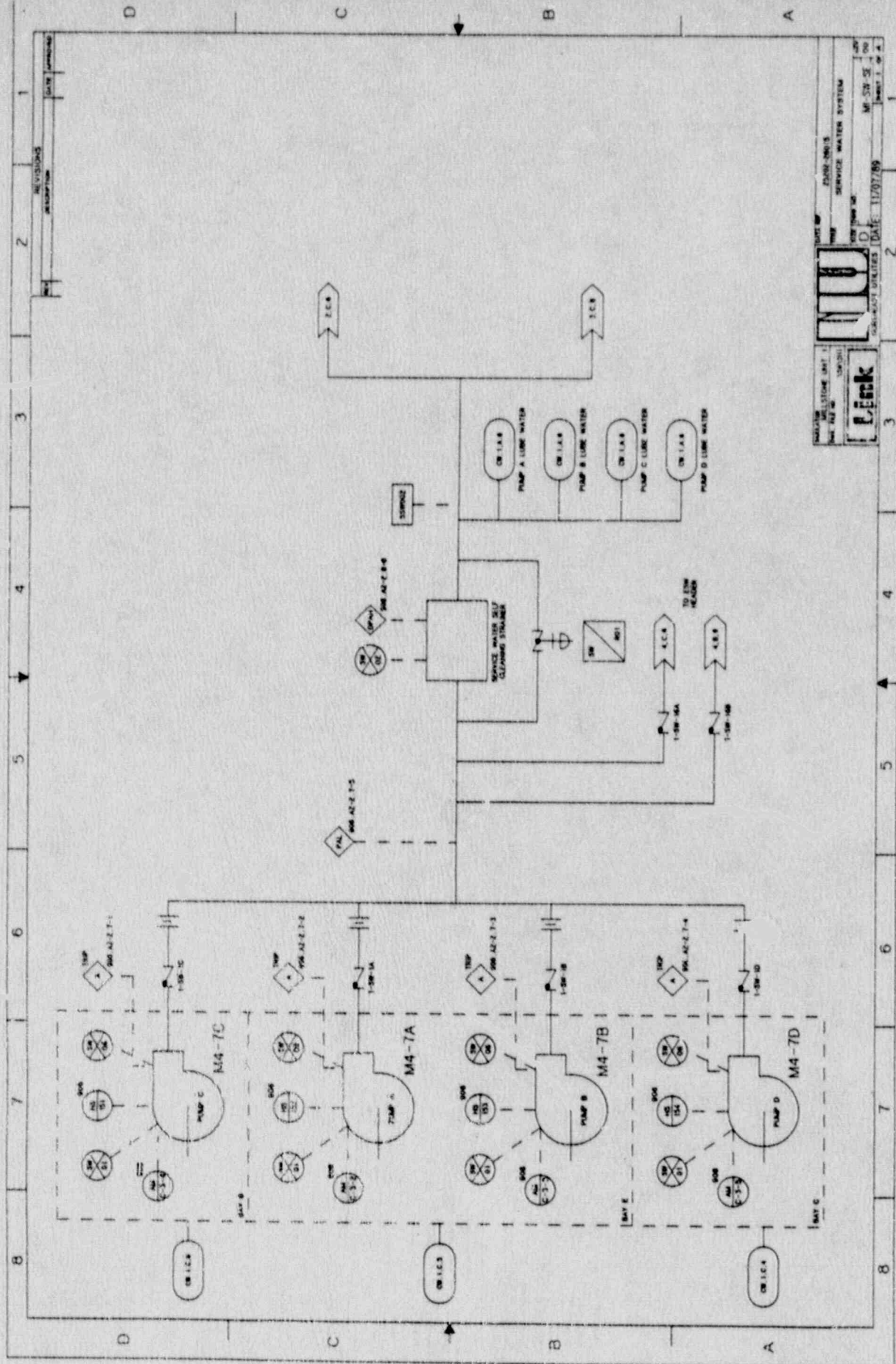
TITLE: AREA STEAM LEAK DETECTION  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: 11/08/98  
 SHEET 2 OF 3



DRAWING NO. 100-1000  
 PROJECT NO. 100-1000  
 SHEET NO. 100-1000  
 DATE 11/27/88  
 PROJECT 100-1000  
 SHEET 2 OF 4

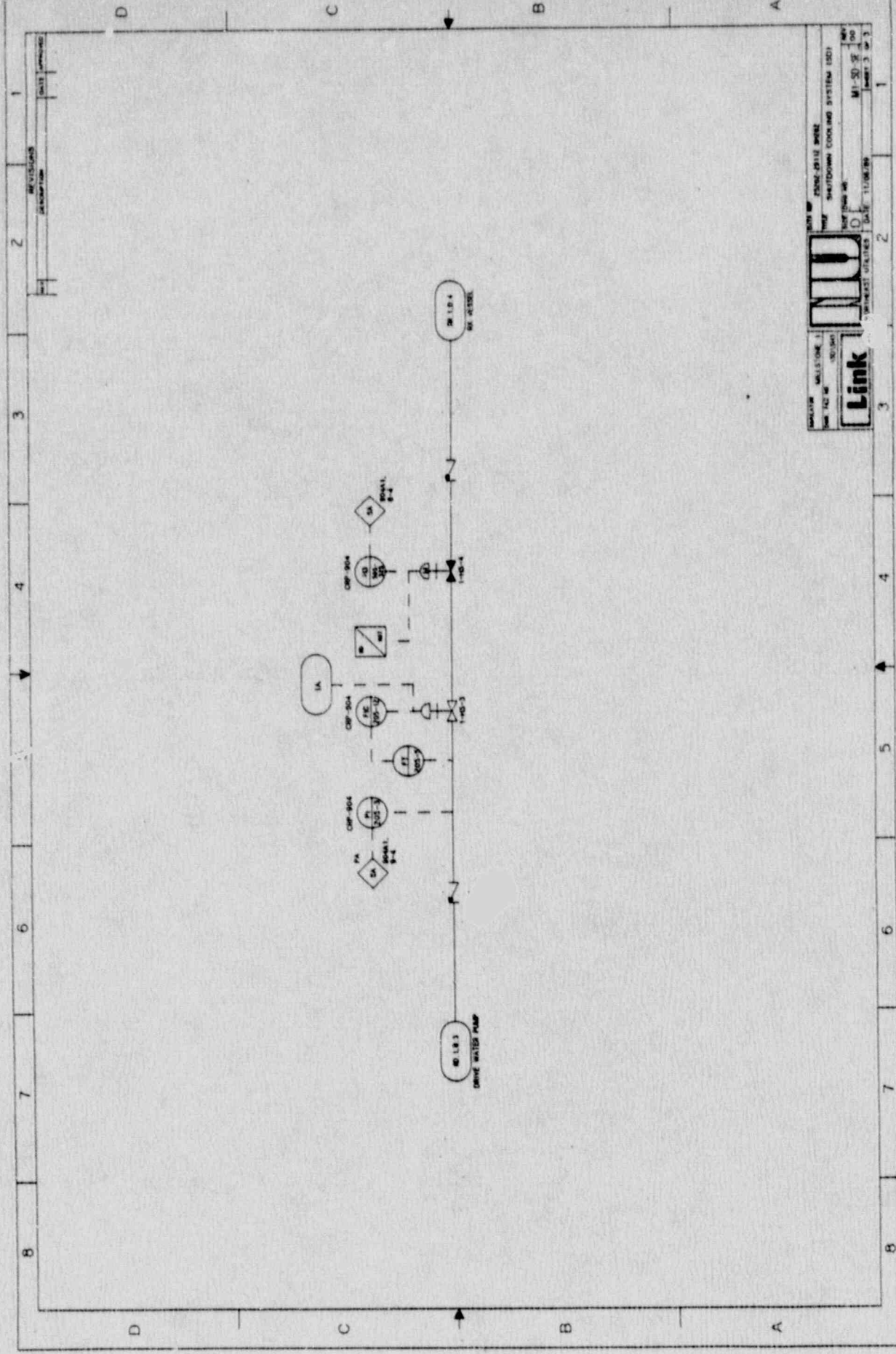
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 100-1000  
 100-1000  
 100-1000  
 100-1000





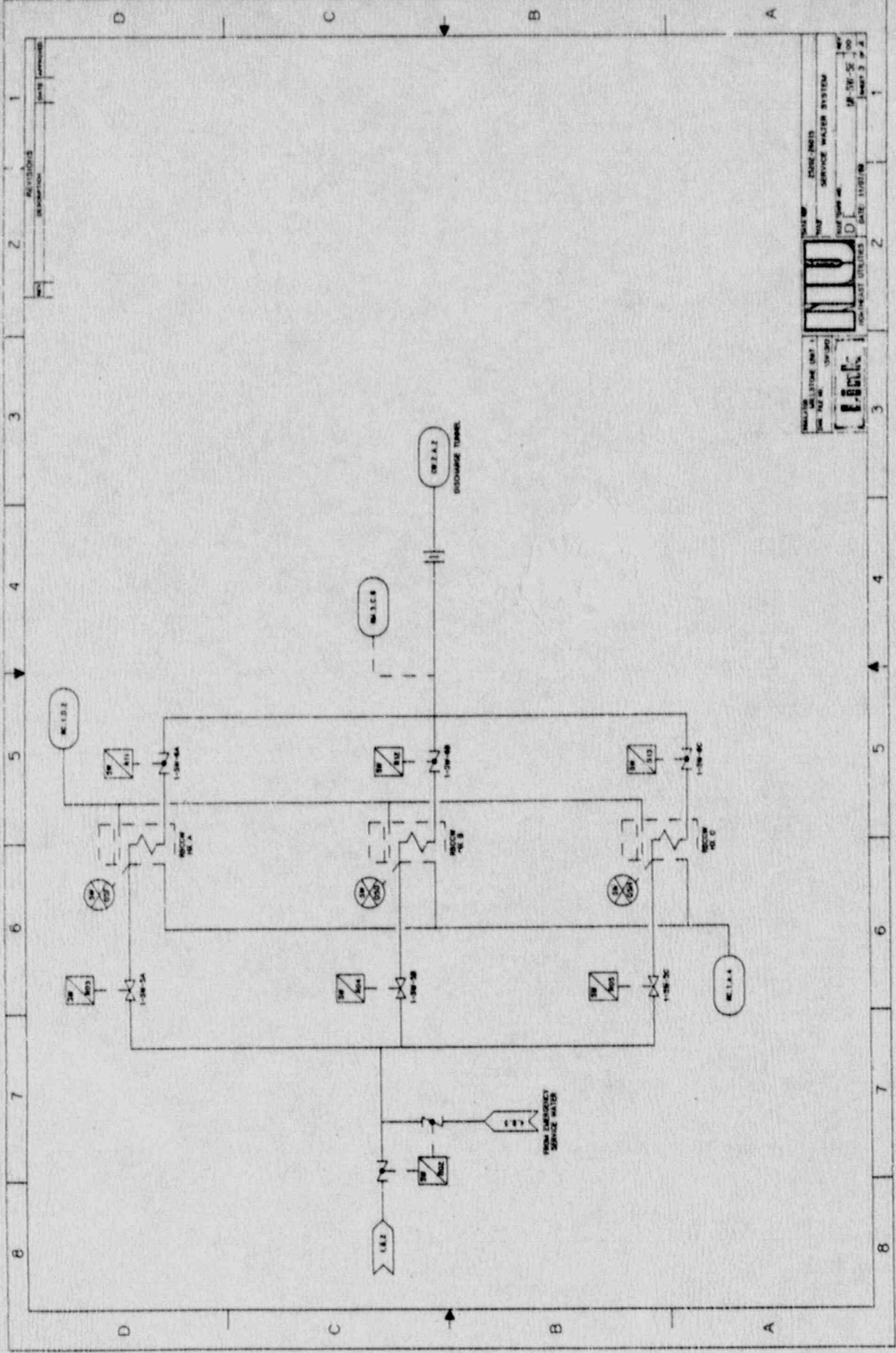
PROJECT NO. 2200-0013  
 SERVICE WATER SYSTEM  
 DATE 11/27/89  
 DRAWN BY [Signature]  
 CHECKED BY [Signature]  
 PROJECT NO. 2200-0013  
 SERVICE WATER SYSTEM  
 DATE 11/27/89  
 DRAWN BY [Signature]  
 CHECKED BY [Signature]



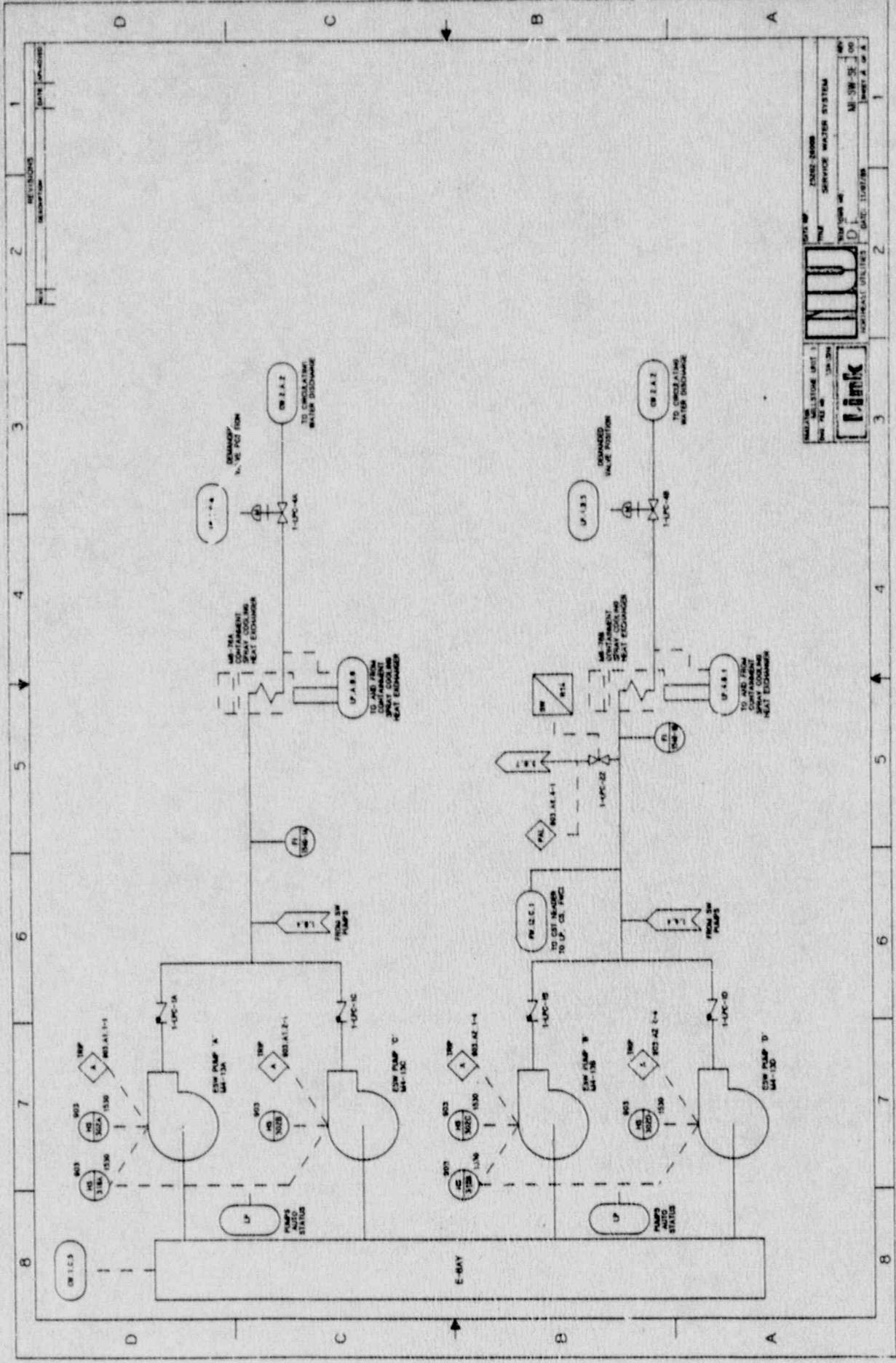


REVISED  
 DATE: 11/06/99  
 DRAWN BY: [illegible]

**Link**  
 PROJECT: MALLONE  
 DATE: 11/06/99  
 DRAWING NO: M1-20-3  
 SHEET NO: 3 OF 3  
 PROJECT: [illegible]  
 SYSTEM: [illegible]  
 DATE: 11/06/99  
 DRAWN BY: [illegible]



PROJECT NO.	100-100-100
DATE	11/01/88
DESIGNED BY	D. J. ...
CHECKED BY	D. J. ...
SCALE	AS SHOWN
<b>DU</b>	
DUNN SERVICE WATER SYSTEM	
SHEET 3 OF 3	



PROJECT: SERVICE WATER SYSTEM SHEET: SW-25 DATE: 10/07/95 DRAWN BY: [Name] CHECKED BY: [Name]	PROJECT: SERVICE WATER SYSTEM SHEET: SW-25 DATE: 10/07/95 DRAWN BY: [Name] CHECKED BY: [Name]

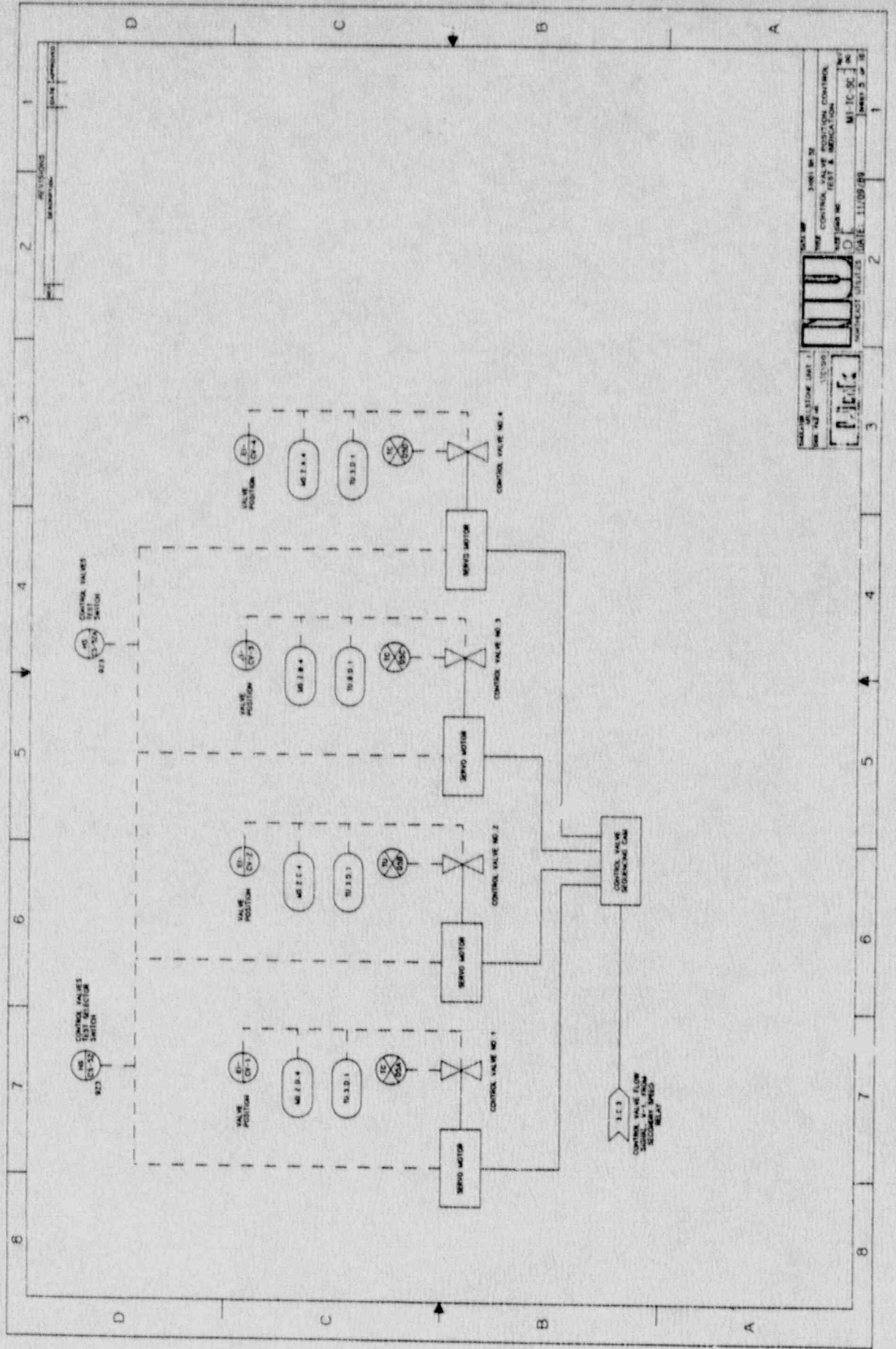






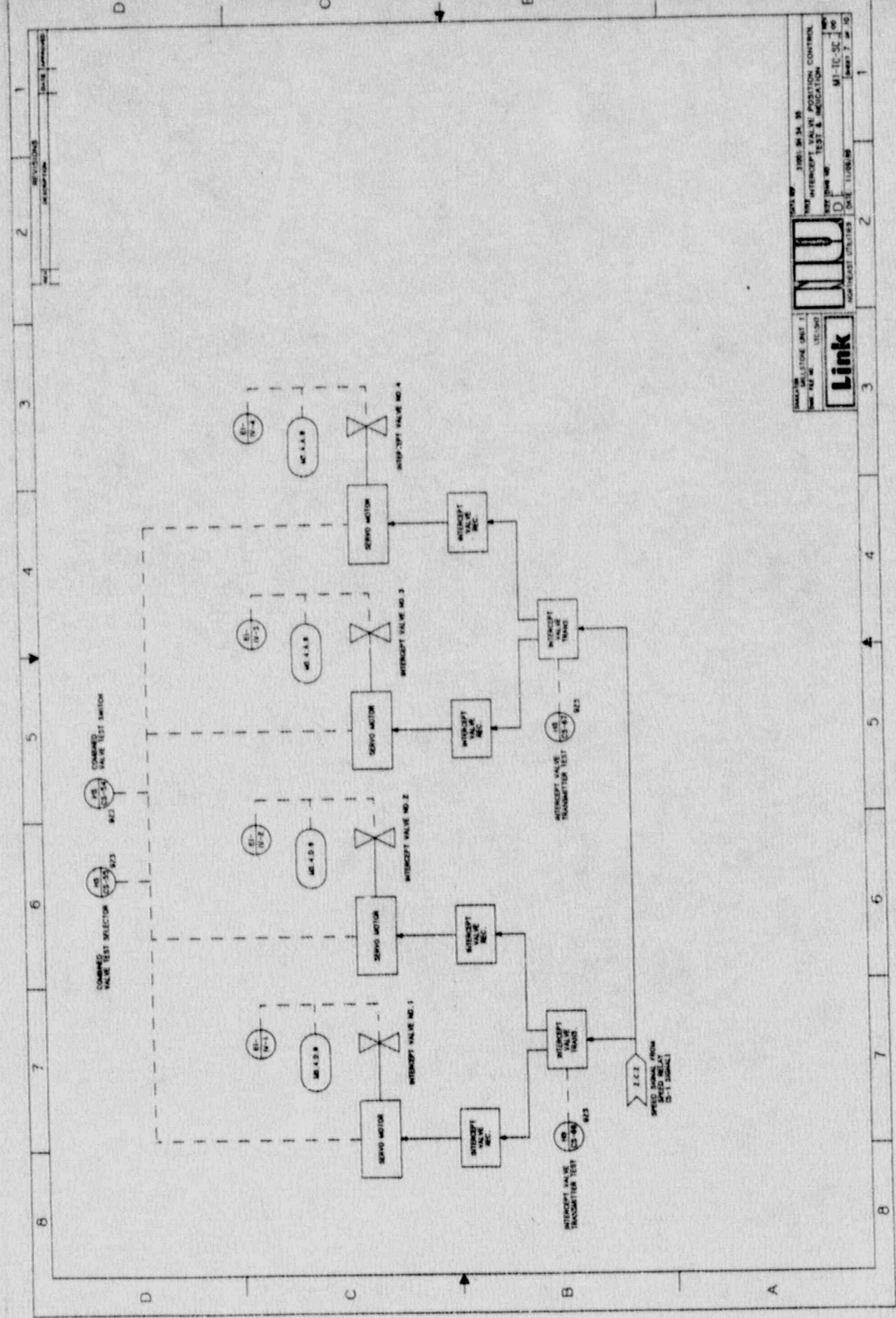






TITLE: CONTROL VALVE SELECTOR  
 DRAWN BY: J. H. B. 10/29/58  
 CHECKED BY: J. H. B. 10/29/58  
 DATE: 11/09/58  
 SHEET 5 OF 16

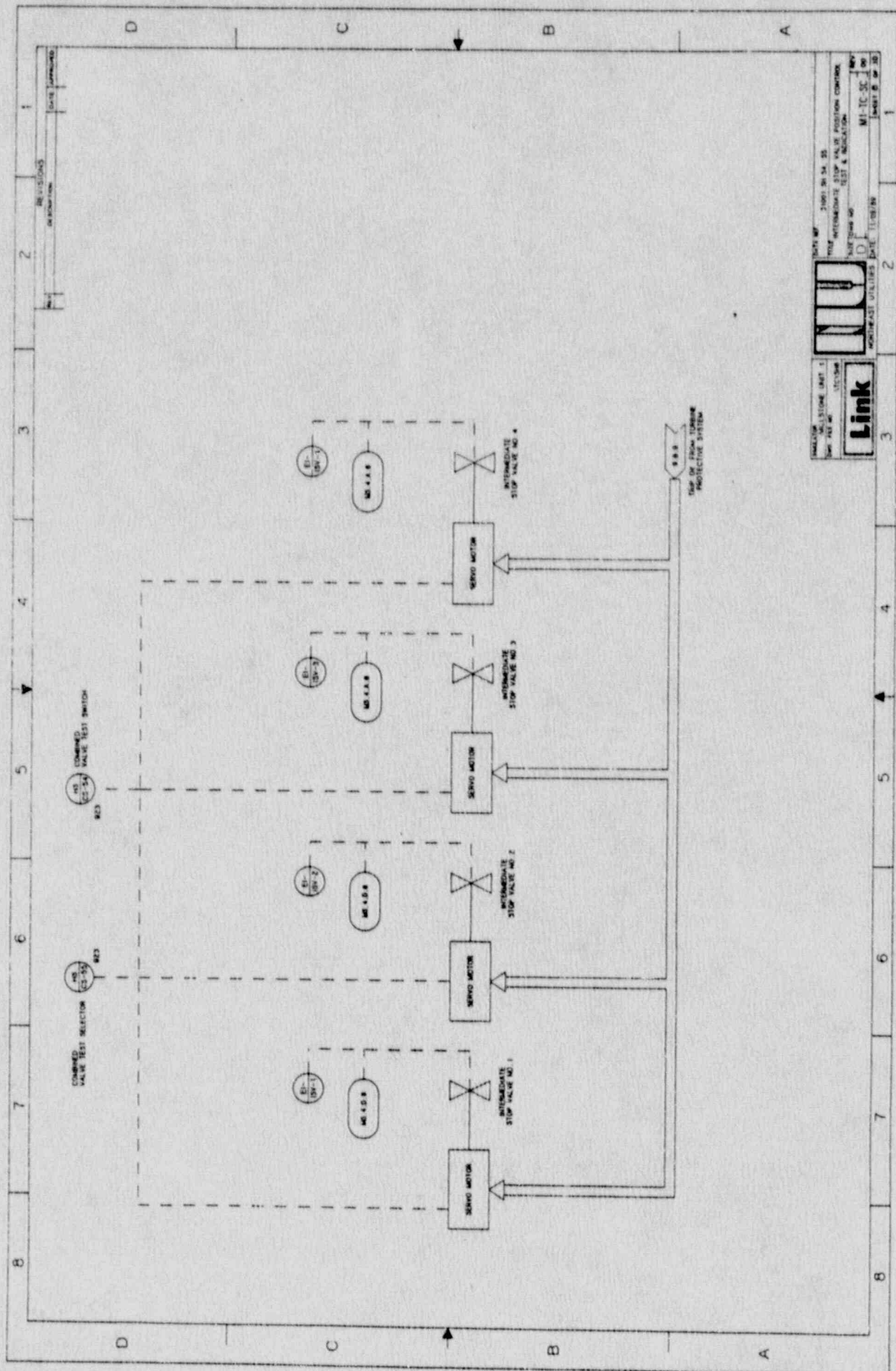




MILLSTONE UNIT 1  
 UNIT NO. 1000  
 INTERCEPT TRANSMITTER CONTROL  
 TEST & INDICATION  
 UNIT NO. 1000  
 DATE 11/26/55  
 M-F-TC-DC  
 SHEET 7 OF 10



1  
 2  
 3  
 4  
 5  
 6  
 7  
 8  
 A  
 B  
 C  
 D

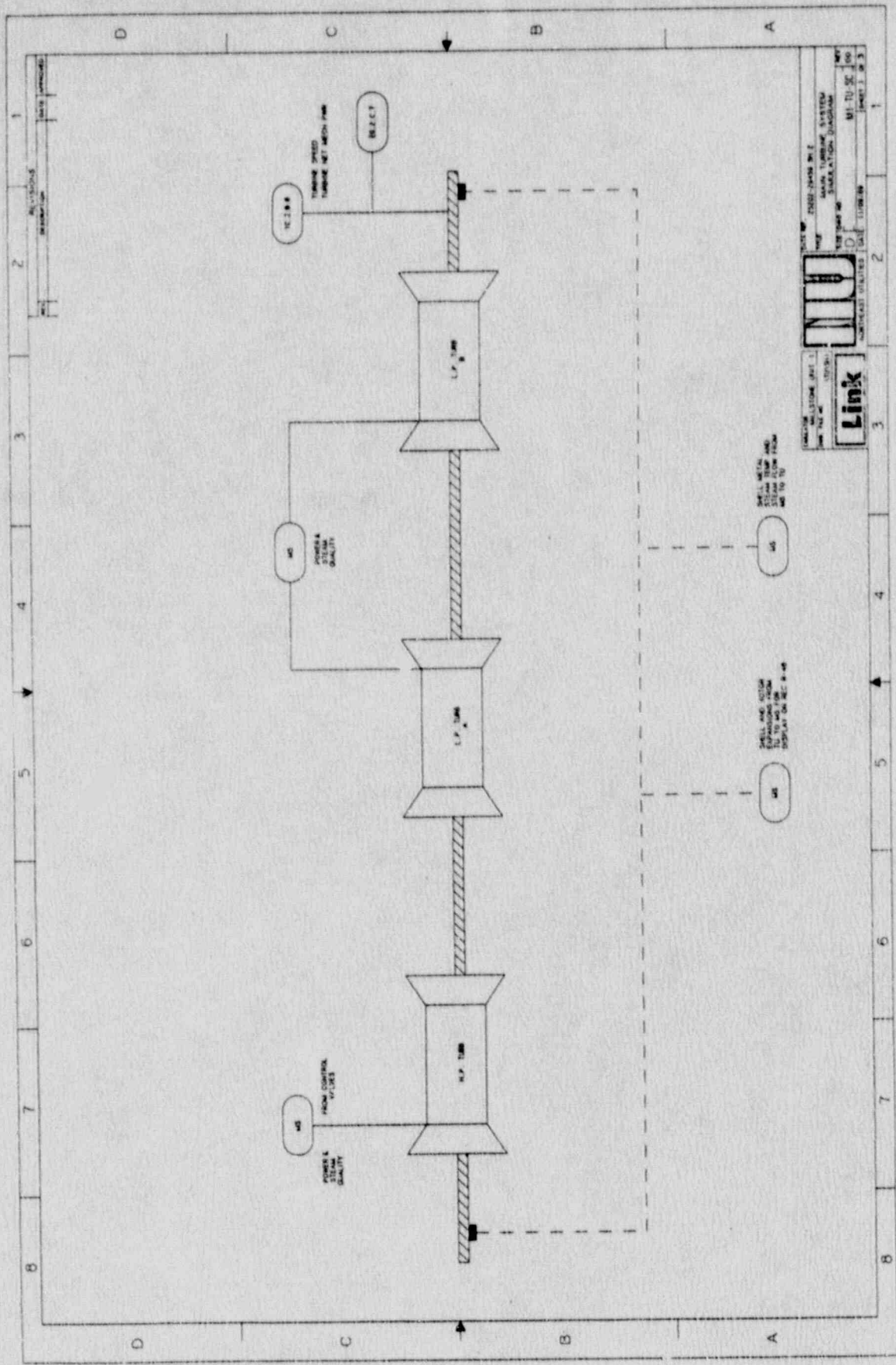


DRAWING NO. 21001 26 24 35  
 TITLE INTERMEDIATE STOP VALVE POSITION CONTROL  
 TEST & ISOLATION  
 DATE 11/18/79  
 SHEET 6 OF 10

**Link**  
 NORTHWEST UTILITIES DATE 11/18/79



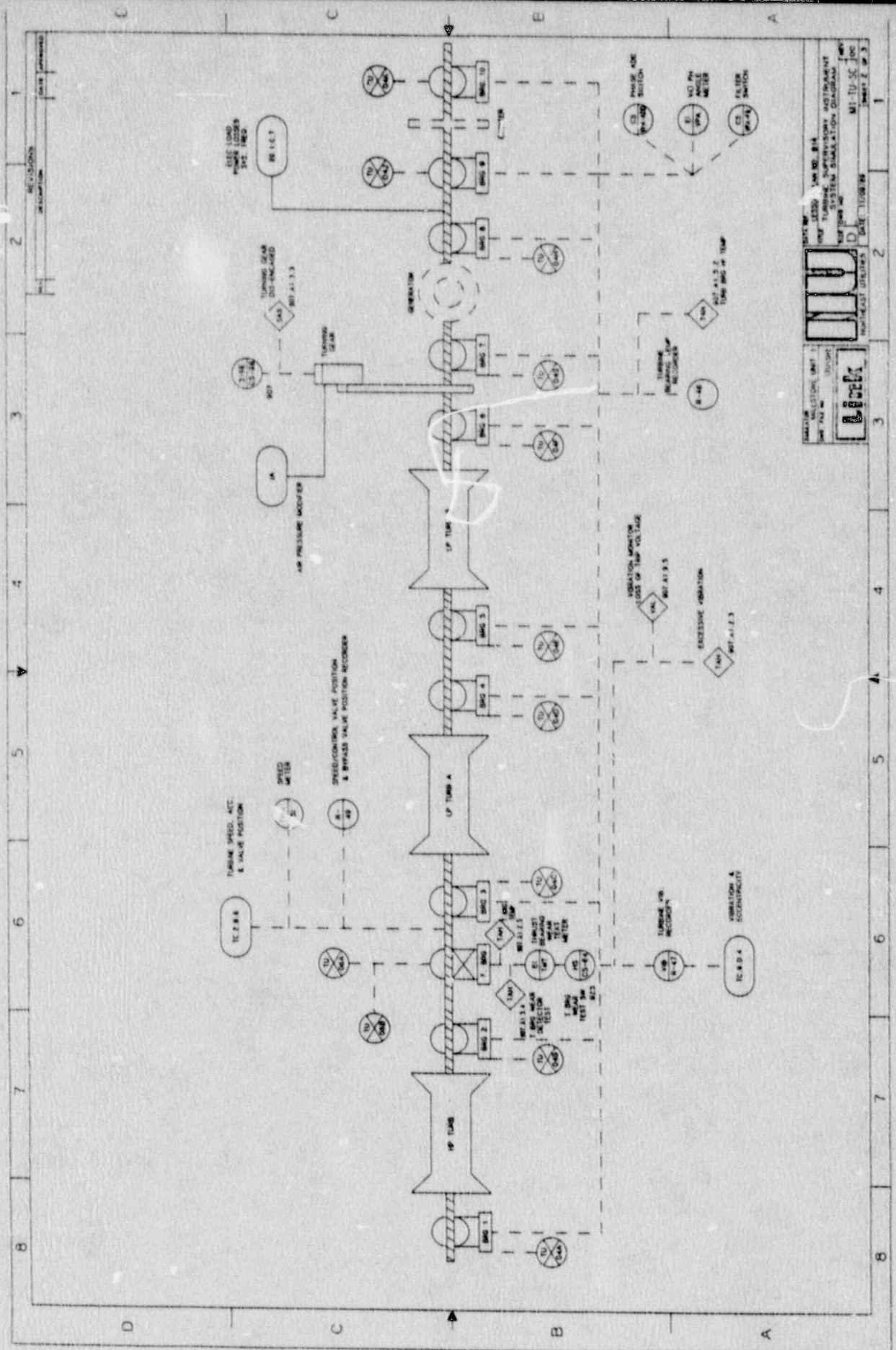




DRAWING NO. 2500-1000-01-E  
 REV. 1  
 DATE 10/1/50  
 DESIGNED BY  
 CHECKED BY  
 APPROVED BY  
 PROJECT NO. MI-TU-SC-00  
 SHEET 1 OF 3

**Link**  
 LINK-BELT CORPORATION  
 1000 W. 10th St.  
 Grand Rapids, Michigan





PROJECT NO. 100-100-100  
 SHEET NO. 100-100-100  
 TITLE: TURBINE SUPERVISORY INSTRUMENT SYSTEM SIMULATION DIAGRAM  
 DATE: 11/28/68  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]

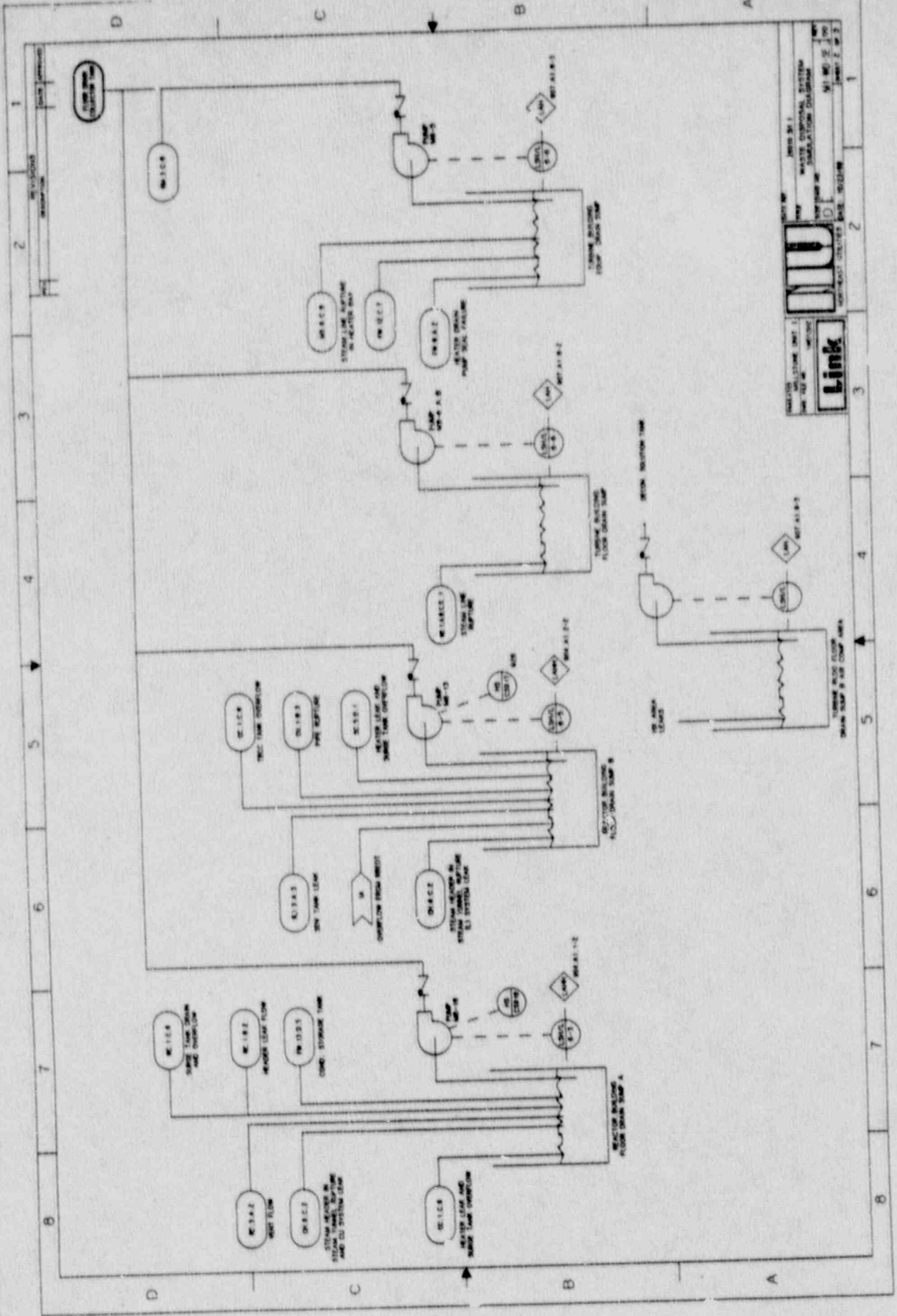
INSTRUMENT SYMBOLS  
 REFERENCE: IEC 60617  
 (Detailed list of instrument symbols and their meanings)

LEGEND  
 (Detailed legend for the diagram symbols)

REVISIONS  
 NO. 1: [Description of revision]  
 NO. 2: [Description of revision]  
 NO. 3: [Description of revision]







UNIT NO. 1  
 WASTE DISPOSAL SYSTEM  
 SIMULATION DIAGRAM  
 UNIT NO. 1  
 UNIT NO. 2  
 UNIT NO. 3

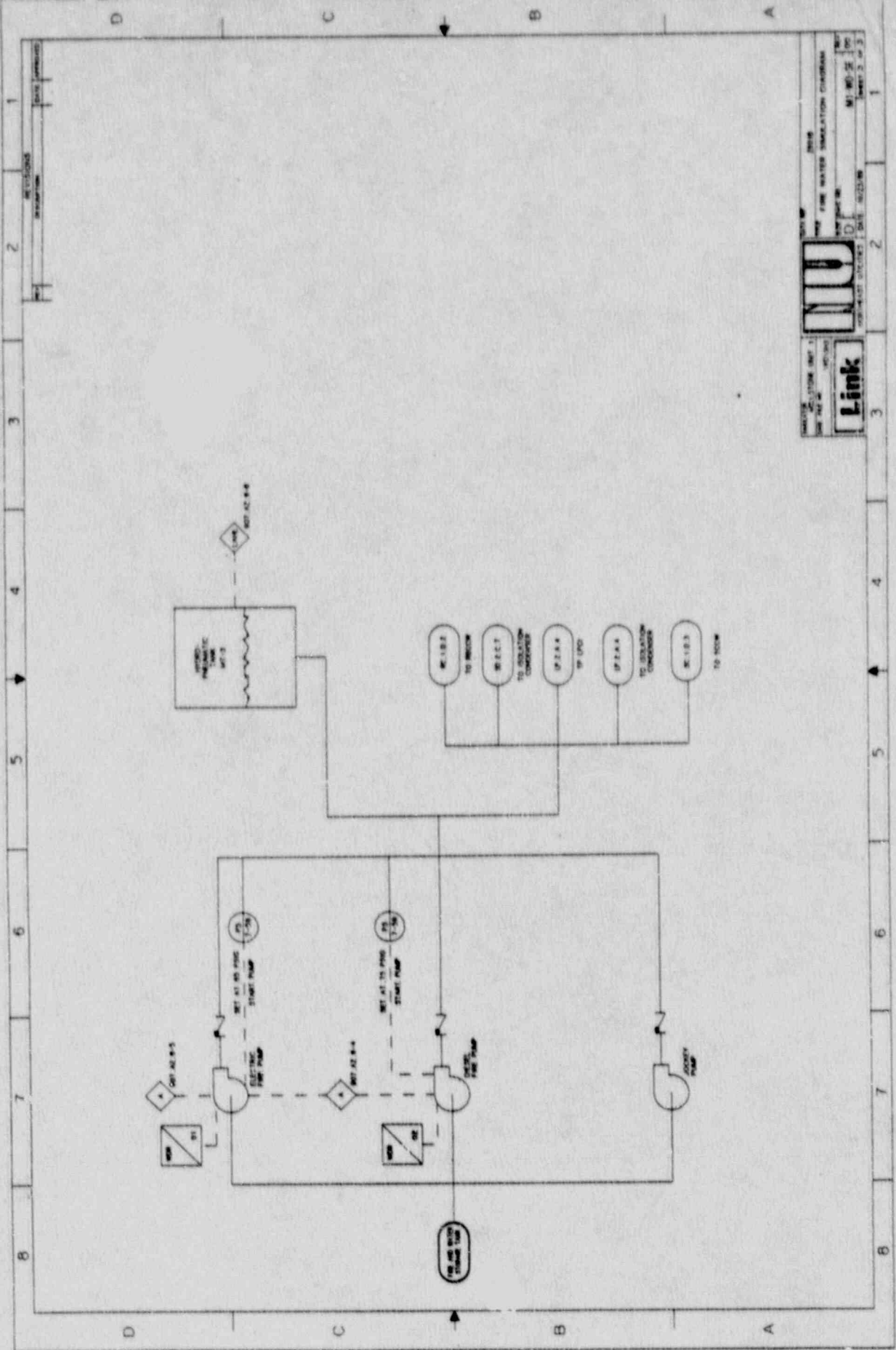
Link

UNIT NO. 1  
 UNIT NO. 2  
 UNIT NO. 3

UNIT NO. 1  
 UNIT NO. 2  
 UNIT NO. 3

UNIT NO. 1  
 UNIT NO. 2  
 UNIT NO. 3

UNIT NO. 1  
 UNIT NO. 2  
 UNIT NO. 3



**Link**  
 PROJECT: FIRE WATER SIMULATION CHURNING  
 SHEET NO: M1-100-25  
 SHEET 2 OF 3  
 DATE: 02/23/00