SYMBOLS

SIZE
CLASS
SERVICE
6"-HBD-20
LINE IDENTIFICATION

PROCESS MAIN LINE

PROCESS AUX. LINE

BURIED PIPE

BOILER CODE PIPING

N N
PIPING REQUIRING STAMPING PER SECT III EXTENSION OF CLASS B VESSEL

INSIDE OUTSIDE
CONTAINMENT PENETRATION (NOT SLEEVED)

CONTAINMENT PENETRATION (SLEEVED)

PENETRATION NUMBER

EJECTOR OR EDUCTOR

INCREASER, REDUCER

WELD CAP

SCREWED CAP

HOSE CONNECTION (H.C.)

BLIND FLANGE (B.F.)

EXHAUST HEAD

OPEN VENT TO ATMOSPHERE

FLEXIBLE CONNECTION

CLOSED DRAIN

OPEN DRAIN FUNNEL

AV
T
AIR VENT

AT
T
AIR TRAP

ST
T
STEAM TRAP

DT
T
DRAIN TRAP, DRAINER

SEISMIC CLASS I PIPING
FUNCTIONAL SEISMIC CLASS I BREAK (CAUTION: SEE NOTE 4)

SEISMIC ADEQUATE
FUNCTIONAL SEISMIC ADEQUATE

SYMBOLS

XJ
EXPANSION JOINT

IF
INSULATING FLANGE

SPECTACLE FLANGE

BS
SINGLE BASKET STRAINER

BS
MULTIPLE BASKET STRAINER

YS
Y-TYPE STRAINER (FLANGED)

FIRE HYDRANT

FHS
FIRE HOSE STATION

SX
SAMPLE TEST POINT

RE
RADIATION DETECTOR

SC
SAMPLE COOLER

FO
MULTIPLE ORIFICE

INSULATED COUPLING OR UNION

SN
SAMPLE NOZZLE

ES
ELECTRIC (POWER) SUPPLY

SUS
START UP STRAINER

CHANGE OF PIPE SPECIFICATION
CS

FURNISHED BY BECHTEL TO THIS POINT.
FURNISHED BY VENDOR AFTER THE POINT
VENDOR'S INITIALS
B

T
TRACE HEATING

* - FURNISHED WITH ASSOCIATED EQUIPMENT
(*) - FURNISHED BY APED
(4) - CONNECTION NUMBER ON EQUIPM. DWG.
- DRAWING REFERENCE
- DRAWING REFERENCE
(D-5) - DRAWING COORDINATES
N/A - APED CONNECTION NUMBER

VALVES
(NOTE 5)

GATE (NORMALLY OPEN)

GATE (NORMALLY CLOSED)

GLOBE

BALL

MANUAL REMOTE OPERATED

CHECK

BUTTERFLY DAMPER OR VALVE

PLUG

EQUALIZING VALVE

NEEDLE

3WAY PLUG
(NORMALLY CLOSED LEG SHADED)
(DOT INDICATES CLOSED LEG WHEN VALVE IS IN SECONDARY POSITION)

FCV
FLOW CONTROL

BTV
BLEEDER TRIP

GLOBE STOP CHECK

WAFER CHECK

STOP CHECK

SAUNDER DIAPHRAGM

XFV
EXCESS FLOW CHECK

MISCELLANEOUS ABBREVIATIONS

APED	- ATOMIC POWER EQUIPM. DEPT. OF G.E. CO.
N	- MEETS APED REQ'TS FOR NUCLEAR SERVICE
CRW	- EQUIPMENT (CLOSED) RADWASTE
ORW	- FLOOR (OPEN) RADWASTE
AW	- ACID WASTE (CORROSIVE, CAUSTIC)
NW	- NORMAL WASTE (CONVENTIONAL)
OW	- OILY WATER WASTE
SW	- SANITARY WASTE
LO	- LOCKED OPEN
LC	- LOCKED CLOSED
AL	- AIR LOCK
SP	- SET POINT (CONTROL)
PPS	- PLANT PROTECTION SYSTEM
D	- INDICATES DOUBLE PACKED STEM
NC	- NORMALLY CLOSED
NO	- NORMALLY OPEN
NE	- NORMALLY ENERGIZED
ND	- NORMALLY DE-ENERGIZED
CRD	- CONTROL ROD DRIVE
CRDHS	- CONTROL ROD DRIVE HYDRAULIC SYSTEM
HCU	- HYDRAULIC CONTROL UNIT
RBCCWS	- REACTOR BUILDING CLOSED COOLING WATER SYSTEM
TBCCWS	- TURBINE BUILDING CLOSED COOLING WATER SYSTEM
HPCI	- HIGH PRESSURE COOLANT INJECTION
RHR	- RESIDUAL HEAT REMOVAL
RCIC	- REACTOR CORE ISOLATION COOLING
LT	- LOCKED THROTTLED
NT	- NORMALLY THROTTLED
FAI	- FAILS AS IS
FO	- FAILS OPEN
FC	- FAILS CLOSED
LN	- LOCKED IN NEUTRAL

PIPING AND INSTRUMENT DIAGRAMS

BECH-M100	P.&I.D. PIPING SYMBOLS
BECH-M101	P.&I.D. INSTRUMENT SYMBOLS
BECH-M102	P.&I.D. INSTRUMENT IDENTIFICATIONS
BECH-M103(1)	P.&I.D. MAIN STEAM, TURBINE STOP AND CONTROL VALVES
BECH-M103(2)	P.&I.D. MAIN STEAM, HIGH AND LOW PRESSURE TURBINES
BECH-M103(3)	P.&I.D. MAIN STEAM, MOISTURE SEPARATOR & REHEATERS
BECH-M104(1)	P.&I.D. TURBINE STEAM SEALS
BECH-M104(2)	P.&I.D. FEEDWATER HEATERS 1E003A, 4A, 5A AND 6A
BECH-M104(3)	P.&I.D. FEEDWATER HEATERS 1E001A, 2A AND MAIN CONDENSER 1E007A
BECH-M105(1)	P.&I.D. STEAM AIR EJECTOR
BECH-M105(2)	P.&I.D. FEEDWATER HEATERS 1E001B, 2B AND MAIN CONDENSER 1E007B
BECH-M105(3)	P.&I.D. FEEDWATER HEATERS 1E003B, 4B, 5B AND 6B
BECH-M106	P.&I.D. COND/FEEDWATER
BECH-M107	P.&I.D. COND/FEEDWATER
BECH-M108	P.&I.D. COND/DEMIN SYSTEM
BECH-M109	P.&I.D. COND/DEMIN SYSTEM
BECH-M110	P.&I.D. MAKEUP DEMINERALIZER SYSTEM
BECH-M111	P.&I.D. GENERAL SERVICE WATER SYSTEM
BECH-M112	P.&I.D. REACTOR BLDG COOL WATER SYSTEM
BECH-M113	P.&I.D. RHR SERVICE WATER AND EMERG. SERVICE WATER
BECH-M114	P.&I.D. NUCLEAR BOILER SYSTEM
BECH-M115	P.&I.D. REACTOR VESSEL INSTRUMENTATION
BECH-M116	P.&I.D. REACTOR RECIRCULATION SYSTEM
BECH-M117	P.&I.D. CONTROL ROD DRIVE HYDRAULIC SYSTEM
BECH-M118	P.&I.D. CONTROL ROD DRIVE HYDRAULIC SYSTEM
BECH-M119	P.&I.D. RESIDUAL HEAT REMOVAL SYSTEM
BECH-M120	P.&I.D. RESIDUAL HEAT REMOVAL SYSTEM
BECH-M121	P.&I.D. CORE SPRAY SYSTEM
BECH-M122	P.&I.D. HPCI SYSTEM STEAM SIDE
BECH-M123	P.&I.D. HPCI SYSTEM WATER SIDE
BECH-M124	P.&I.D. RCIC SYSTEM STEAM SIDE
BECH-M125	P.&I.D. RCIC SYSTEM WATER SIDE
BECH-M126	P.&I.D. STANDBY LIQUID CONTROL SYSTEM
BECH-M127	P.&I.D. REACTOR WATER CLEANUP SYSTEM
BECH-M128	P.&I.D. REACTOR WATER FILTER DEMIN
BECH-M129	P.&I.D. RIVER WATER SUPPLY INTAKE STRUCTURE
BECH-M130(01)	P.&I.D. INSTRUMENT AND SERVICE AIR COMPRESSORS 1K090A, B AND C COOLING SYSTEM
BECH-M130(02)	P.&I.D. INSTRUMENT AND SERVICE AIR COMPRESSORS 1K090A, B AND C
BECH-M130(03)	P.&I.D. INSTRUMENT AND SERVICE AIR COMPRESSORS 1K001A, B AND C
BECH-M130(04)	P.&I.D. INSTRUMENT AIR DRYERS, TURBINE BLDG. BASEMENT
BECH-M130(05)	P.&I.D. INSTRUMENT AIR SYSTEM, TURBINE BLDG. AND OFFGAS AREAS
BECH-M130(06)	P.&I.D. INSTRUMENT AIR SYSTEM, TURBINE BLDG. HEATER BAY AREA, PUMP HOUSE AREA
BECH-M130(07)	P.&I.D. INSTRUMENT AIR SYSTEM, REACTOR BLDG. TORUS ROOM, RADWASTE BLDG. HPCI, RCIC AREAS
BECH-M130(08)	P.&I.D. INSTRUMENT AIR SYSTEM, REACTOR BLDG. REFUEL FLOOR HVAC CONTROLS, KAMANS
BECH-M130(09)	P.&I.D. SERVICE AIR SYSTEM
BECH-M130(10)	P.&I.D. BREATHING AIR COMPRESSORS 1K028A, B AND SUPPLY
BECH-M131	P.&I.D. TURBINE LUBE OIL SYSTEM
BECH-M132(1)	P.&I.D. DIESEL GENERATOR SYSTEM
BECH-M132(2)	P.&I.D. 1G001 STANDBY DIESEL GENERATOR
BECH-M132(3)	P.&I.D. 1G002 STANDBY DIESEL GENERATOR
BECH-M133(1)	P.&I.D. FIRE PROTECTION
BECH-M133(2)	P.&I.D. FIRE PROTECTION
BECH-M133(3)	P.&I.D. FIRE PROTECTION HOSE STATIONS
BECH-M133(4)	P.&I.D. FIRE PROTECTION DELUGE SYSTEMS
BECH-M133(5)	P.&I.D. FIRE PROTECTION SPRINKLER SYSTEMS
BECH-M134	P.&I.D. FUEL POOL COOLING AND CLEANUP SYSTEM
BECH-M135	P.&I.D. FUEL POOL FILTER DEMIN. SYSTEM
BECH-M136	P.&I.D. SERVICE CONDENSATE SYSTEM
BECH-M137(1)	P.&I.D. RADWASTE SUMP SYSTEM
BECH-M137(2)	P.&I.D. RADWASTE SUMP SYSTEM
BECH-M138(1)	P.&I.D. EQUIPMENT RADWASTE SYSTEM (CLOSED)
BECH-M138(2)	P.&I.D. EQUIPMENT RADWASTE SYSTEM (CLOSED)
BECH-M139	P.&I.D. FLOOR DRAIN RADWASTE SYSTEM, OPEN
BECH-M140	P.&I.D. RADWASTE SOLIDS HANDLE SYSTEM
BECH-M141	P.&I.D. OFF GAS SYSTEM
BECH-M142	P.&I.D. CIRCULATING WATER SYSTEM
BECH-M143(1)	P.&I.D. CONTAINMENT ATMOSPHERE CONTROL SYSTEM
BECH-M143(2)	P.&I.D. CONTAINMENT ATMOSPHERE CONTROL SYSTEM
BECH-M143(3)	P.&I.D. CONTAINMENT ATMOSPHERE CONTROL SYSTEM
BECH-M143(4)	P.&I.D. CONTAINMENT ATMOSPHERE CONTROL SYSTEM
BECH-M144(1)	P.&I.D. COOLING WATER SYSTEM
BECH-M144(2)	P.&I.D. COOLING WATER SYSTEM
BECH-M145(1)	P.&I.D. ELECTRO HYDRAULIC FLUID POWER UNIT
BECH-M145(2)	P.&I.D. STATOR WINDING COOLING WATER SYSTEM
BECH-M145(3)	P.&I.D. GAS CONTROL PIPING SYSTEM
BECH-M145(4)	P.&I.D. HYDROGEN SEAL OIL SUPPLY SYSTEM
BECH-M146	P.&I.D. SERVICE WATER SYSTEM PUMPHOUSE
BECH-M147	P.&I.D. TURBINE BUILDING SAMPLE SYSTEM
BECH-M148	P.&I.D. AREA RADIATION MONITOR SYSTEM
BECH-M149	P.&I.D. OFFGAS RECOMBINER
BECH-M150	P.&I.D. PLANT AIR FLOW DIAGRAM
BECH-M151	P.&I.D. CONTROL BLDG. AND TSC AIR FLOW DIAGRAM
BECH-M152	P.&I.D. REACTOR BLDG. AIR FLOW DIAGRAM
BECH-M153	P.&I.D. TURBINE BLDG. AIR FLOW DIAGRAM
BECH-M154	P.&I.D. HVAC RADWASTE BLDG. AIR FLOW DIAGRAM
BECH-M155	P.&I.D. ADMIN. BLDG. AIR FLOW DIAGRAM
BECH-M156	P.&I.D. DRYWELL AIR FLOW DIAGRAM
BECH-M157(1)	P.&I.D. DRYWELL COOLING WATER SYSTEM
BECH-M157(2)	P.&I.D. DRYWELL COOLING WATER SYSTEM
BECH-M158	P.&I.D. HVAC AIR FLOW DIAGRAM STANDBY GAS TREATMENT SYSTEM
BECH-M159	P.&I.D. VENT SYSTEM TURBINE BLDG.
BECH-M160(1)	P.&I.D. AUXILIARY HEATING SYSTEM MAIN LOOP
BECH-M160(2)	P.&I.D. AUXILIARY HEATING SYSTEM BOILER
BECH-M161	P.&I.D. AIR CONDITIONING SYSTEM CONTROL BLDG.
BECH-M162	P.&I.D. AUXILIARY HEATING SYS. REACTOR BLDG.
BECH-M163	P.&I.D. AUXILIARY HEATING SYS. TURBINE BLDG.
BECH-M164	P.&I.D. VENT SYSTEM RADWASTE BLDG.
BECH-M165	P.&I.D. MAIN PLANT AIR INTAKE AND MG ROOM
BECH-M166	P.&I.D. COOLING AND HEATING SYSTEM PLANT AIR SUPPLY
BECH-M167	P.&I.D. ADMIN. BLDG. HEATING AND COOLING SYSTEM
BECH-M168	P.&I.D. ADMIN. BLDG. HEATING AND COOLING SYSTEM
BECH-M169(1)	P.&I.D. CONTROL BLDG. HEATING SYSTEM
BECH-M169(2)	P.&I.D. CONTROL BLDG. COOLING-CHILLED WATER SYSTEM
BECH-M169(3)	P.&I.D. CONTROL BLDG. CHILLERS 1VCH001A AND 1VCH001B
BECH-M170	P.&I.D. HVAC MISC. CONTROL SYSTEM
BECH-M171	P.&I.D. REACTOR BLDG. HVAC COOLING SYSTEM
BECH-M172	P.&I.D. AIR FLOW DIAGRAM HEATING AND COOLING SYSTEM MACHINE SHOP/OFFGAS RETENTION BLDG.
BECH-M173	P.&I.D. AIR FLOW DIAGRAM STANDBY FILTER
BECH-M174	P.&I.D. DRYWELL HVAC FAN SYSTEM
BECH-M175	P.&I.D. AIR FLOW DIAGRAM PUMPHOUSE
BECH-M176(1)	P.&I.D. REACTOR BLDG. EXHAUST PLENUM AND OFFGAS STACK
BECH-M176(2)	P.&I.D. REACTOR BLDG. VENTILATION SYSTEM
BECH-M177	P.&I.D. INTAKE STRUCTURE AND TSC CONTROL DIAGRAM
BECH-M179	P.&I.D. HVAC SYMBOLS AND ABBREVIATION
BECH-M180	P.&I.D. CHLORINATION AND ACID FEED SYSTEM
BECH-M181	P.&I.D. CONTAINMENT ATMOSPHERE MONITOR SYSTEM
BECH-M182	P.&I.D. RADWASTE EVAPORATOR SYSTEM
BECH-M183	P.&I.D. RADWASTE SAMPLE SYSTEM
BECH-M184	P.&I.D. MAIN STEAM ISOLATION VALVE LEAK CONTROL MSIV
BECH-M185	P.&I.D. CARDOX SYSTEM
BECH-M186	P.&I.D. RADWASTE AND STORAGE HANDLING SYSTEM
BECH-M187	P.&I.D. POST ACCIDENT SAMPLING SYSTEM
BECH-M188(1)	P.&I.D. LOW LEVEL RADWASTE HVAC SYSTEM
BECH-M188(2)	P.&I.D. LOW LEVEL RADWASTE HVAC SYSTEM
BECH-M188(3)	P.&I.D. AIR FLOW DIAGRAM LLRPSF
BECH-M188(4)	P.&I.D. AIR FLOW DIAGRAM LLRPSF
BECH-M189(1)	P.&I.D. HYDROGEN WATER CHEMISTRY SYSTEM
BECH-M189(2)	P.&I.D. HYDROGEN WATER CHEMISTRY SYSTEM-CAVS
BECH-M189(3)	P.&I.D. ZINC INJECTION SYSTEM

NOTES:

1. THE SYMBOLS SHOWN HERE ARE FOR USE WITH P.&I.D.'S BECH-M103 THROUGH M149 & M180 THROUGH M183 ONLY. REFER TO BECH-M179 FOR SYMBOLS AND ABBREVIATIONS USED ON THE HV/AC P.&I.D.'S M150 THROUGH M178.
2. FOR MECH., ELECT. AND HVAC DWGS. OF THE DATA ACQUISITION CENTER SEE VENDOR PRINTS A059-001 SERIES.
3. SEISMIC ADEQUATE FLAG INCORPORATED PER DCP-1554.
4. PIPING STRUCTURAL RESTRAINTS OUTSIDE THIS SEISMIC CLASS I BREAK MAY BE PART OF THE SEISMIC CLASS I STRUCTURAL BOUNDARY.
5. MANUAL VALVES IN PROCESS AUXILIARY LINES (SECONDARY LINES) CAN BE SHOWN USING THE GATE VALVE SYMBOL, UNLESS THE VALVE TYPE IS IMPORTANT TO THE PROCESS.

D-002

NO.	DATE	REVISION	DRFTR.	CHK'D	ENGR.	VER.
22	6/23/98	REVISED PER DDC-3639	DA	TAK	RLB	TWS
21	3/11/98	REVISED PER DDC-3515	DA	JAH	TWS	GH
20	2/13/97	REVISED & REDRAWN PER DDC-3245	MS	TAK	TP	DE
19	10/26/95	REVISED PER DCP-1554	MS	TAK	TH	CEZ
24	5/14/00	REVISED PER DDC-3940	JAH	TAK	SD	TWS
23	7/8/98	REVISED PER DDC-3647	JAH	TAK	SD	RLB

BECHTEL
SAN FRANCISCO

DUANE ARNOLD ENERGY CENTER-UNIT NO 1
IOWA ELECTRIC LIGHT AND POWER COMPANY
CEDAR RAPIDS, IOWA

P.&I.D.
PIPING SYMBOLS

DRAWING NO. BECH-M100
REV. 24