UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 27, 1990

Docket Nos. 50-213
50-245
50-336
50-423

Mr. Edward L. Annino
Northeast Utilities
Post Office Box 270
Hartford, CT 06141-0270

Dear Mr. Annino:

I would like to take this opportunity to thank Northeast Utilities for volunteering to participate in the Emergency Response Data System (ERDS). I am sure that the implementation of ERDS will prove to be beneficial both to the NRC and to Northeast Utilities.

Enclosed you will find a survey designed to provide the hardware, communications, data point and administrative information necessary for our contractor to design the ERDS system interface and data base for your plants. Please note that one copy of the Data Point Library Reference File form (Enclosure 2) will be needed for each ERDS data point. This reference file will be used to provide physical significance to the numerical data transmitted over ERDS for members of the NRC emergency response organization. Each reactor unit is treated as an individual plant by ERDS, therefore, a separate data feed is required for each of your units.

Please complete the enclosed survey and Data Point Library Reference File for each of your reactor units and return them to me with a copy to Tony LaRosa, the ERDS project manager at NUS/EI Division, at the following addresses:

John R. Jolicoeur
U.S. Nuclear Regulatory Commission
Mail Stop MNBB-3206
Washington, DC 20555

Tony P. LaRosa
NUS Corporation
EI Division
545 Shoup Ave.
P.O. Box 50736
Idaho Falls, Idaho 83405

This request is covered by Office of Management and Budget Clearance Number 3150-0150 which expires March 31, 1992. The estimated average burden hours is 32 person hours per licensee response, including staff and management review and preparation of the requested response. These estimated average burden hours pertain only to those identified response-related matters and do not include the time for any follow on implementation. Send comments regarding this burden estimate or any other aspect of this collection of information,

A001

including suggestions for reducing this burden, to the Records and Reports Management Branch, Division of Information Support Services, Office of Information Resources Management, U.S. Nuclear Regulatory Commission, Washington, DC 20555; and to the Paperwork Reduction Project (3150-0150), Office of Management and Budget, Washington, DC 20503.

I am looking forward to working with you to ensure a smooth implementation of ERDS at your plants. If you have any questions, please contact Tony LaRosa at (208) 524-9227 or me at (301) 492-4155. Again thank you for your continued support of the ERDS program.

Sincerely,

Original signed by:

John R. Jolicoeur
Incident Response Branch
Division of Operational Assessment
Office for Analysis and Evaluation

Enclosures:
1. ERDS Communications Descriptions and Survey Questionnaire
2. Data Point Library Reference File
3. Data Point Library Reference File Definitions
4B. Critical Safety Function Parameters for BWRs
4P. Critical Safety Function Parameters for PWRs
5. Engineering Units Coding Scheme
6. Zero Reference Coding Scheme
7. Coding Scheme for Unit Name and Unit ID
8. Computer Point Selection

cc w/encl:
T. LaRosa
See next page

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ERDS COMMUNICATIONS DESCRIPTION AND SURVEY QUESTIONNAIRE

The following is a questionnaire pertaining to the Nuclear Regulatory Commission's (NRC) Emergency Response Data System (ERDS). It consists of a series of questions concerning plant I/O points, software protocols, data formats, transmission frequencies, and other plant computer specific information to be used in the ERDS computer database files. Also, included here are descriptions and examples of data streams that the NRC is expecting to see transmitted over the communication line.

The purpose of collecting the data is to develop a plant-specific database that will be retrieved into the ERDS once the system is activated by a utility. It will also be used to design and implement ERDS software that can receive the utility's data transmission. In essence, this information will provide the basis for building a profile of the plant in the ERDS database.

In some cases, the I/O point data may be distributed over several computers. The ERDS considers this situation a multi-feeder site and Section IV must be filled out for each feeder.

I. CONTACTS

Note: Please provide name, title, mailing address, and phone number.

A. Survey Coordinator (i.e., contact for later clarification of questionnaire answers):

B. Computer Hardware Specialist(s):

C. Systems Software Specialist(s):

D. Application-level Software Specialist(s):

E. Telephone Systems Specialist(s):

II. ERDS COMMUNICATIONS DESCRIPTION

A. Hardware

The following hardware will be supplied:

- for a single-feeder site:
  Codex 2234 modem - V.22 2400 bps, asynchronous, auto-dialing, auto-answer, error-correcting, using the AT command set

- for a multiple-feeder site:
  Codex 6015 multiplexer,
  Codex 2260 modem - V.32 9600 bps, asynchronous, auto-dialing, auto-answer, error-correcting, using the AT command set

The modems are intended to be operated in the auto-reliable link mode (referred to as MNP in the modem manuals) with speed conversion and flow control enabled. Speed conversion allows the computer to communicate with the modem at a baud rate which is independent of the baud rate the modem is using to communicate with the remote modem. This feature is important because the modems have the ability to adjust their transmission rate downward if the remote modem is operating at a lower speed. However, in order to use speed conversion, the site computer must support some form of flow control. Three types of flow control are supported by the modems: XON/XOFF, RTS/CTS, and DTR/CTS. All of the above features are discussed in the modem manuals.

B. Software

i. Data Transmission

All transmissions, from both the site and the ERDS, will be terminated with a carriage return (<CR>).

a. Site will initiate a link request in ASCII using:

- the three-character site designator,
- the word LINK,
- local site time and date in the format MM/DD/YY/HH:MM:SS, and
- a <CR>.

If the site does not receive a response from the ERDS within one minute, it should send another link request message and continue sending them at one-minute intervals. If more than five minutes elapses without a response, site personnel should notify the NRC before disconnecting the line.

b. ERDS will respond in ASCII with:

- the three-character site designator,
- the word ACCEPTED or DENIED, and
- a <CR>.

If the ERDS responds with the denied message, the site should wait one minute and then send a link request message and continue sending them at one-minute intervals. If more than five minutes elapses without a response, site personnel should notify the NRC before disconnecting the line.

c. When the ERDS is ready to receive data, it will send an initiate message in ASCII using:

- the three-character site designator,
- the word INITIATE, and
- a <CR>.

If the ERDS does not send an initiate message within one minute of the accept message, the site should send the link request message (described in Section II.3.i.a.).

d. Upon receipt of the initiate message, the plant begins transmission of data at a 15-second rate. The data string consists of:

- a header containing the three-character site designator and date and time in the format MM/DD/YY/HH:MM:SS,
- the data packet sequenced with point identifier, value, and quality tag,
- a trailer containing the checksum value of the data packet, and
- a <CR>.

e. When the site or ERDS wishes to terminate the connection, an ASCII message will be sent containing:

- the three-character site designator,
- the word TERMINATE, and
- a <CR>.

f. If a site is inadvertently terminated (due to loss of communications or receipt of terminate message) and the incident is still underway, the site should reconnect with the ERDS by redialing and using the reconnect link request message. This message is in ASCII and will

contain:

- the three-character site designator,
- the word RECONNECT,
- local site time and date in the format MM/DD/YY/HH:MM:SS, and
- a <CR>.

Upon receipt of this message, the ERDS will respond with the accept and initiate messages as described in Sections II.B.i.b and II.B.i.c. If the ERDS responds with a link deny message (described in Section II.B.i.b), the site should stop trying to reconnect and send a link request message (described in Section II.B.i.a). If the ERDS does not respond to the site's reconnect request within one minute, the site should send another reconnect request and continue sending reconnect requests once a minute. If more than five minutes elapses without a response, site personnel should notify the NRC before disconnecting the line. It is the responsibility of the site to monitor the outgoing line for loss of communications.

i). Data Format

The following three delimiters have been identified:

(1) field delimiter (*),
(2) data set delimiter (\), and
(3) carriage return (<CR>).

Note: The length of the messages sent by the ERDS (e.g., ACCEPTED, DENIED, INITIATE, TERMINATE) are variable and it is recommended that the site software use the data set delimiter as the message delimiter for messages received from the ERDS.

a. Link requests will be in ASCII as described in II.B.i.a. with each field separated by a field delimiter and the request terminated with a data set delimiter. For example, PA1*LINK*01/12/89/11:48:50\<CR>.

b. The ERDS response will be in ASCII as described in II.B.i.b. with each field separated by a field delimiter and the response terminated with a data set delimiter. For example, PA1*ACCEPTED\<CR>.

c. When the ERDS is ready to receive data it will respond in ASCII as described in II.B.i.c with each field separated by a field delimiter and the response terminated with a data set delimiter. For example, PA1*INITIATE\<CR>.

d. Data streams will be in ASCII and will consist of three parts (header, data, and trailer) as described in II.B.i.d. with each field separated by a field delimiter and each of the three parts separated by a data set delimiter. For example,

Header: PA1*01/12/89/11:50:30\
Data: B21CP004*-0.1234E+00*3*.....(for each parameter)\
Trailer: 0000056000\<CR>

e. The point identifier may be up to 12 characters in length.

f. The value may be up to 20 characters in length.

g. The following quality tags will be accepted by the ERDS:

Good	= 0	Value is within range tolerance for discreet points or input points are within tolerance for composed points.
Off-scan	= 1	Point is currently out-of-service.
Suspect	= 2	Value is not bad yet should not be considered good. This quality will occur primarily on composed values when enough good inputs are present to allow the calculation to be made yet a bad quality on other inputs may make the result questionable.
Bad	= 3	Value is not within tolerance for discreet points or calculation of a composed point may not be made due to the qualities of its inputs.
Unknown	= 4	No quality indicator available.
Operator Entered	= 5	Value has been manually entered, overriding the discreet or composed value.

High Alarm	= 6	Value is in high alarm.
Low Alarm	= 7	Value is in low alarm.

h. The checksum which accompanies each update set will be an integer value calculated by summing each of the bytes of the transmission, up to and including the dataset delimiter following the body of the update set (the body of the update set being the portion containing the parameter, value, and quality indications). This integer checksum value will then be encoded into the update set as a 10-digit value, left-padded with zeros as required to fill the 10-digit field. The checksum is the sum of the transmitted bytes.

i. The reconnect link request message will be in ASCII as described in Section II.B.i.f with each field separated by a field delimiter and the request terminated with a data set delimiter. For example, PA1*RECONNECT*01/12/89/11:48:50\<CR>.

iii. Protocol

a. ERDS will use XON/XOFF to stop, resume, or suspend data transmission for the site.

b. Communication parameters:

- eight data bits
- 1 stop bit
- parity = none

iv. Exceptions

Please note any exceptions which must be taken to Section II and explain why.

III. SELECTION OF DATA FEEDERS

A. How many data feeders are there (six maximum)?

B. Identify the selected data feeders and provide the following for each:

(1) a short description of the categories of data points it will provide (e.g., met, rad, or plant data points, by unit) and

(2) the rationale for selecting it if another system can also provide its categories of data points.

C. Which data feeder is the site time determining feeder? This should be the feeder which is providing the majority of the data points.

IV. DATA FEEDER INFORMATION

Note: A new Section IV must be filled out for each feeder system selected.

A. General Questions

i. Identification of Data Feeder

a. What is the name in local parlance given to this data feeder (e.g., Emergency Response Information System)? Please give both the acronym and the words forming it.

b. Is this the site time determining feeder?

c. What is the update frequency of this feeder (in seconds)?

ii. Hardware/Software Environment

a. Identify the manufacturer and model number of the data feeder hardware.

b. Identify the operating system.

c. What method of timekeeping is implemented on this feeder system (Daylight Savings, Standard, Greenwich)?

d. In what time zone is this feeder located?

iii. Data Communication Details

a. Can this data feeder provide asynchronous serial data communication (RS-232-C) with full-modem control?

b. Will this feeder transmit in ASCII or EBCDIC?

c. Can this feeder transmit at a serial baud rate of 2400 bps? If not, at what baud rate can it transmit?

d. Does the operating system support XON/XOFF flow control?

1. Are any problems foreseen with the NRC using XON/XOFF to control the transmission of data?

e. If it is not feasible to reconfigure a serial port for the ERDS linkup (i.e., change the baud rate, parity, etc.), please explain why.

f. Can the serial port dedicated to the ERDS be configured so that the NRC need not emulate a specific brand of terminal (i.e., can it be configured to be a "vanilla" terminal)?

g. Do any ports currently exist for the ERDS linkup?

1. If not, is it possible to add additional ports?

2. If yes, will the port be used solely by the ERDS or shared with other nonemergency-time users? Give details.

iv. Data Feeder Physical Environment and Management

a. Where is the data feeder located in terms of the TSC, EOF, and control room?

b. Is the data feeder protected from loss of supply of electricity?

c. Is there a human operator for this data feeder?

1. If so, how many hours a day is the feeder attended?

DATA POINT LIBRARY

The Data Point Library is a site-specific database residing on the ERDS computer which expands upon the basic information in a typical data point dictionary. The data being displayed at the NRC's Operations Center for the ERDS parameter will be the same as the plant's Emergency Response Team's data. That is, it will have the same value, timestamp, and be in the same engineering units. This requires that the Operations Center personnel adjust their thinking to accommodate the plant, functioning in terms of the plant's unique design and communicating with the plant's Response Team in the latter's unique engineering and operational "language". In order to do this, the Operations Center personnel need information which relates the data both to the plant's design and to the manner in which the plant's team utilizes and reacts to the data.

The types of information contained in the Data Point Library are the data point identifier, description, engineering units, range, alarms and/or technical specification limits and engineering system data. There will be one record in the plant's Data Point Library for each data point the plant will be sending to the ERDS.

Because the points selected for transmission to the ERDS are indicative of plant "health" and are associated with Critical Safety Functions, they are the indicators the plant's Response Team uses to determine the proper actions to take to mitigate an incident. Where required and useful, the Data Point Library will present textual information to the Operations Center user to provide information supplementing the point's value which will be useful in understanding how the plant team interprets the data. For instance, associated with a transmitted data point representing the reactor vessel level, the Data Point Library should contain the physical zero reference point, conversion factor for the height above the top of active fuel, type of detectors, effects of running reactor coolant pumps, effects of cold calibration, effects of elevated containment temperature, etc. Associated with a reactor water storage tank level transmitted as a percentage should be the capacity of that tank in gallons, number of reactor quality water storage tanks at the plant site, zero reference point conversion factor from percent to gallons, etc.

The Data Point Library will be particularly useful to the Operations Center user when evaluating the plant's action in predicting off-site radioactive releases. Associated with an effluent gaseous release data point expressed in CPM, the Data Point Library Reference Sheet should indicate the assumptions regarding isotopic mix, the current calibration factors of detectors, the discharge point or points for monitored releases, expected stack flow rates under various fan combinations, and any default values used by the plant team in their calculations.

Two examples of typical Data Point Library entries are included. The first is an example for a BWR and the second is an example for a PWR.

BWR DATA POINT LIBRARY REFERENCE FILE

DATE:	06/05/89
REACTOR UNIT:	XYZ
DATA FEEDER:	N/A
NRC ERDS PARAMETER:	CST LEVEL
POINT ID:	C345Z04
PLANT SPEC POINT DESC.:	CS TNK 1A LVL
GENERIC/COND DESC.:	Condensate Storage Tank A Level
ANALOG/DIGITAL:	A
ENGR UNITS/DIG STATES:	%
ENGR UNITS CONVERSION:	Each 1% = 1692 Gallons
MINIMUM INSTR RANGE:	0
MAXIMUM INSTR RANGE:	100
ZERO POINT REFERENCE:	SEALEV
REFERENCE POINT NOTES:	At 0% 245,000 Gals Remain In Tank
PROC OR SENS:	P
NUMBER OF SENSORS:	2
HOW PROCESSED:	Average
SENSOR LOCATIONS:	245,000 Gal Above Tank Bottom
ALARM/TRIP SET POINTS:	Low Level At 12%
NI DETECTOR POWER SUPPLY CUT-OFF POWER LEVEL:	N/A
NI DETECTOR POWER SUPPLY TURN-ON POWER LEVEL:	N/A
INSTRUMENT FAILURE MODE:	Low

TEMPERATURE COMPENSATION
FOR DP TRANSMITTERS: N/A

LEVEL REFERENCE LEG: N/A

UNIQUE SYSTEM DESC.: This averaged sensor reading is for the normally used volume of the tank. The remaining 245,000 gallons are monitored by two discrete alarms at 150,000 and 50,000 gallons total remaining tank contents. Total tank volume is 414,200 gallons.

NOTE: A second identical tank normally dedicated to XYZ Unit 1 is available for cross-connecting to this tank at the bottom (ECCS) suction line.

PWR DATA POINT LIBRARY REFERENCE FILE

DATE: 06/05/89

REACTOR UNIT: ABC

DATA FEEDER: ERIS

NRC ERDS PARAMETER: AX FD FL 1/A

POINT ID: AF105A

PLANT SPEC POINT DESC.: AFW Flow SG 11 MTR

GENERIC/COND DESC.: AFW Flow SG 11 Frm Elec AFW Pump

ANALOG/DIGITAL: A

ENGR UNITS/DIG STATES: GPM

ENGR UNITS CONVERSION: N/A

MINIMUM INSTR RANGE: 0

MAXIMUM INSTR RANGE: 500

ZERO POINT REFERENCE: N/A

REFERENCE POINT NOTES: N/A

PROC OR SENS: S

NUMBER OF SENSORS: 1

HOW PROCESSED: N/A

SENSOR LOCATIONS: On Line To SG 11 Outside Containment

ALARM/TRIP SET POINTS: High Flow At 500 GPM

NI DETECTOR POWER SUPPLY CUT-OFF POWER LEVEL: N/A

NI DETECTOR POWER SUPPLY TURN-ON POWER LEVEL: N/A

INSTRUMENT FAILURE MODE: Low

TEMPERATURE COMPENSATION
FOR DP TRANSMITTERS: N/A

LEVEL REFERENCE LEG: N/A

UNIQUE SYSTEM DESC.: There are one electric and two turbine-driven AFW pumps. The electric pump has dedicated discharge lines to each SG. The flow element for this point represents the last sensor prior to the line entering containment. The two turbine-driven pumps use separate piping to the SGs. Maximum rated flow for this pump is 450 GPM. Shutoff head is 1200 PSIG.

PWR DATA POINT LIBRARY REFERENCE FILE

DATE: ___/___/___

REACTOR UNIT: _____

DATA FEEDER: _____

NRC ERDS PARAMETER: _____

POINT ID: _____

PLANT SPEC POINT DESC.: _____

GENERIC/COND DESC.: _____

ANALOG/DIGITAL: _____

ENGR UNITS/DIG STATES: _____

ENGR UNITS CONVERSION: _____

MINIMUM INSTR RANGE: _____

MAXIMUM INSTR RANGE: _____

ZERO POINT REFERENCE: _____

REFERENCE POINT NOTES: _____

PROC OR SENS: _____

NUMBER OF SENSORS: _____

HOW PROCESSED: _____

SENSOR LOCATIONS: _____

ALARM/TRIP SET POINTS: _____

NI DETECTOR POWER SUPPLY CUT-OFF POWER LEVEL: _____

NI DETECTOR POWER SUPPLY TURN-ON POWER LEVEL: _____

INSTRUMENT FAILURE MODE: _____

TEMPERATURE COMPENSATION
FOR DP TRANSMITTERS: _____

LEVEL REFERENCE LEG: _____

UNIQUE SYSTEM DESC.: _____

DATA POINT LIBRARY
REFERENCE FILE DEFINITIONS

DATE:	The date that this form is filled out or modified. (Eight characters)
REACTOR UNIT:	The nuclear power plant name and abbreviation from the enclosed list of sites. (Three characters)
DATA FEEDER:	If there is more than one data feeder for your system, enter the acronym for the data feeder from which the point comes. If there is only one data feeder, enter "N/A" in this field. (Ten characters)
NRC ERDS PARAMETER:	One of the parameters from the enclosed BWR or PWR parameter list. A single value should be transmitted for each parameter for each loop. If not on the list, insert "Not Listed" or "NL". (Twelve characters)
POINT ID:	Alphanumeric point description used to label the point during transmission. (Twelve characters)
PLANT-SPECIFIC POINT DESCRIPTION:	Licensee computer point description for the transmitted point. (Forty characters)
GENERIC OR CONDENSED DESCRIPTION:	Parameter description from the enclosed list of points for a BWR or PWR. If not on the list, condense the plant-specific point description. (Thirty-two characters)
ANALOG/DIGITAL:	"A" if the signal is analog or numerical or "D" if the signal is off/on. (One character)
ENGINEERING UNITS OR DIGITAL STATES:	Engineering units used by the licensee for display on licensee output devices. Use the engineering units abbreviations from the enclosed list when possible. When specifying pressure, use "PSIA" or "PSIG" rather than "PSI". For digital signals, give the "OFF" and "ON" state descriptors. (Twelve characters)
ENGINEERING UNITS CONVERSION:	Notes about any special features of the A/D conversion and scaling. (Forty characters)
MINIMUM INSTRUMENT RANGE:	Engineering units value below which data cannot go (bottom-of-scale value). (Ten characters)
MAXIMUM INSTRUMENT RANGE:	Engineering units value above which data cannot go (top-of-scale value). (Ten characters)

ZERO REFERENCE POINT:	Zero-point of engineering units scale, used primarily for levels or heights. Use the zero reference point abbreviations from the enclosed list when possible. (Six characters)
REFERENCE POINT NOTES:	Notes about the reference point or other important and special features of the parameter. (Forty characters)
PROC OR SENS:	Is the point formed by processing more than one signal, or is the source a single sensor ("P" or "S")? (One character)
NUMBER OF SENSORS:	The number of signals processed in a full calculation assuming no bypassed or inoperative sensors. (Three characters)
HOW PROCESSED:	The processing algorithm (sum, average, weighted average, highest, lowest, or a short description). (Forty characters)
SENSOR LOCATIONS:	Description of the location(s) of the instrument(s) used. (Forty characters)
ALARM OR TRIP SETPOINTS:	The most important setpoints for the parameter. State whether the limit is high or low. (Forty characters)
NI DETECTOR POWER SUPPLY CUT-OFF POWER LEVEL:	The power level at which the power supply for the NI detector switches off. (Fifteen characters)
NI DETECTOR POWER SUPPLY TURN-ON POWER LEVEL:	The power level at which the power supply for the NI detector switches on. (Fifteen characters)
INSTRUMENT FAILURE MODE:	The mode in which this instrument fails. Possible answers are HIGH, MEDIUM, or LOW. If available, provide the numeric value at which the instrument fails. (Thirty characters)
TEMPERATURE COMPENSATION FOR DP TRANSMITTERS:	This question pertains to differential pressure transmitters. Possible answers are "YES" or "NO" ("Y" or "N"). If the answer is "NO", please attach a copy of the correction curve. (One character)
LEVEL REFERENCE LEG:	The type of level measurement (dry or wet) used on the level reference leg. (Three characters)
UNIQUE SYSTEM DESCRIPTION:	Additional important information which will assist the NRC Operations Center personnel in understanding how the plant team interprets the data. (600 characters)

CRITICAL SAFETY FUNCTION PARAMETERS FOR BOILING WATER REACTORS

REACTIVITY CONTROL	PARAMETER DESCRIPTION	TYPICAL UNITS
NI POWER RNG	Nuclear Instruments, Power Range	%
NI INTER RNG	Nuclear Instruments, Intermediate Range	AMP
NI SOURC RNG	Nuclear Instruments, Source Range	C/SEC
CORE COOLING		
REAC VES LEV	Reactor Vessel Water Level	IN
MAIN FD FLOW	Feedwater Flow into the Reactor System	%
RCIC FLOW	Reactor Core Isolation Cooling Flow	GPM
RCS INTEGRITY		
RCS PRESSURE	Reactor Coolant System Pressure	PSIG
HPCI FLOW	High Pressure Coolant Injection Flow	GPM
LPCI FLOW	Low Pressure Coolant Injection Flow	GPM
CR SPRAY FL	Core Spray Cooling System Flow	GPM
DW FD SMP LV	Drywell Floor Drain Sump Level	IN
RADIOACTIVITY CONTROL		
EFF GAS RAD	Radioactivity of Released Gasses	MCI/HR
EFF LIQ RAD	Radioactivity of Released Liquids	MCI/HR
CND A/E RAD	Condenser Air Ejector Radioactivity	C/MIN
DW RAD	Radiation Level in the Drywell	R/HR
MN STEAM RAD	Radiation Level of the Main Steam Line	MR/HR
CONTAINMENT CONDITIONS		
DW PRESS	Drywell Pressure	PSIG
DW TEMP	Drywell Temperature	F
SP TEMP	Suppression Pool Temperature	F
SP LEVEL	Suppression Pool Water Level	IN
H2 CONC	Drywell or Torus Hydrogen Concentration	%
O2 CONC	Drywell or Torus Oxygen Concentration	%
MISCELLANEOUS PARAMETERS		
CST LEVEL	Condensate Storage Tank Level	%
WIND SPEED	Wind Speed at the Reactor Site	MPH
WIND DIR	Wind Direction at the Reactor Site	DEG
STAB CLASS	Air Stability at the Reactor Site	

CRITICAL SAFETY FUNCTION PARAMETERS FOR PRESSURIZED WATER REACTORS

REACTIVITY CONTROL	PARAMETER DESCRIPTION	TYPICAL UNITS
NI POWER RNG	Nuclear Instruments, Power Range	%
NI INTER RNG	Nuclear Instruments, Intermediate Range	AMP
NI SOURC RNG	Nuclear Instruments, Source Range	C/SEC
CORE COOLING		
REAC VES LEV	Reactor Vessel Water Level	IN
TEMP CORE EX	Highest Temperature at the Core Exit	F
SUB MARGIN	Saturation Temperature - Highest CET	F
CORE FLOW	Total Reactor Coolant Flow	MLB/HR
STEAM GENERATORS		
SG LEVEL 1/A	Steam Generator 1 (or A) Water Level	%
SG LEVEL 2/B	Steam Generator 2 (or B) Water Level	%
SG LEVEL 3/C	Steam Generator 3 (or C) Water Level	%
SG LEVEL 4/D	Steam Generator 4 (or D) Water Level	%
SG PRESS 1/A	Steam Generator 1 (or A) Pressure	%
SG PRESS 2/B	Steam Generator 2 (or B) Pressure	%
SG PRESS 3/C	Steam Generator 3 (or C) Pressure	%
SG PRESS 4/D	Steam Generator 4 (or D) Pressure	%
MN FD FL 1/A	Stm Gen 1 (or A) Main Feedwater Flow	LBM/HR
MN FD FL 2/B	Stm Gen 2 (or B) Main Feedwater Flow	LBM/HR
MN FD FL 3/C	Stm Gen 3 (or C) Main Feedwater Flow	LBM/HR
MN FD FL 4/D	Stm Gen 4 (or D) Main Feedwater Flow	LBM/HR
AX FD FL 1/A	Stm Gen 1 (or A) Auxiliary FW Flow	GPM
AX FD FL 2/B	Stm Gen 2 (or B) Auxilia y FW Flow	GPM
AX FD FL 3/C	Stm Gen 3 (or C) Auxiliary FW Flow	GPM
AX FD FL 4/D	Stm Gen 4 (or D) Auxiliary FW Flow	GPM
HL TEMP 1/A	Stm Gen 1 (or A) Inlet Temperature	F
HL TEMP 2/B	Stm Gen 2 (or B) Inlet Temperature	F
HL TEMP 3/C	Stm Gen 3 (or C) Inlet Temperature	F
HL TEMP 4/D	Stm Gen 4 (or D) Inlet Temperature	F
CL TEMP 1/A	Stm Gen 1 (or A) Outlet Temperature	F
CL TEMP 2/B	Stm Gen 2 (or B) Outlet Temperature	F
CL TEMP 3/C	Stm Gen 3 (or C) Outlet Temperature	F
CL TEMP 4/D	Stm Gen 4 (or D) Outlet Temperature	F

REACTIVITY CONTROL	PARAMETER DESCRIPTION	TYPICAL UNITS
RCS INTEGRITY		
RCS PRESSURE	Reactor Coolant System Pressure	PSIG
PRZR LEVEL	Primary System Pressurizer Level	%
RCS CHG/MU	Primary System Charging or Makeup Flow	GPM
HP SI FLOW	High Pressure Safety Injection Flow	GPM
LP SI FLOW	Low Pressure Safety Injection Flow	GPM
CTMNT SMP NR	Containment Sump Narrow Range Level	IN
CTMNT SMP WR	Containment Sump Wide Range Level	IN
RADIOACTIVITY CONTROL		
EFF GAS RAD	Radioactivity of Released Gasses	MCI/HR
EFF LIQ RAD	Radioactivity of Released Liquids	MCI/HR
COND A/E RAD	Condenser Air Ejector Radioactivity	C/MIN
CNTMNT RAD	Radiation Level in the Containment	R/HR
RCS LTDN RAD	Rad Level of the RCS Letdown Line	C/SEC
MAIN SL 1/A	Stm Gen 1 (or A) Steam Line Rad Level	MR/HR
MAIN SL 2/B	Stm Gen 2 (or B) Steam Line Rad Level	MR/HR
MAIN SL 3/C	Stm Gen 3 (or C) Steam Line Rad Level	MR/HR
MAIN SL 4/D	Stm Gen 4 (or D) Steam Line Rad Level	MR/HR
SG BD RAD 1A	Stm Gen 1 (or A) Blowdown Rad Level	MR/HR
SG BD RAD 2B	Stm Gen 2 (or B) Blowdown Rad Level	MR/HR
SG BD RAD 3C	Stm Gen 3 (or C) Blowdown Rad Level	MR/HR
SG BD RAD 4D	Stm Gen 4 (or D) Blowdown Rad Level	MR/HR
CONTAINMENT CONDITIONS		
CTMNT PRESS	Containment Pressure	PSIG
CTMNT TEMP	Containment Temperature	F
H2 CONC	Containment Hydrogen Concentration	%
MISCELLANEOUS PARAMETERS		
BWST LEVEL	Borated Water Storage Tank Level	%
WIND SPEED	Wind Speed at the Reactor Site	MPH
WIND DIR	Wind Direction at the Reactor Site	DEG
STAB CLASS	Air Stability at the Reactor Site	

ENGINEERING UNITS CODING SCHEME

PSIG	=	Pounds per square inch gauge
PSIA	=	Pounds per square inch absolute
INH_2O	=	Inches of Water Pressure
%	=	Percent
INCHES		
FEET		
FT&IN	=	Feet and inches
FTDEC	=	Feet and decimal feet
GAL	=	Gallons
LB	=	Pounds or pounds mass
GPM	=	Gallons per minute
KGPM	=	Thousands of gallons per minute
LB/HR	=	Pounds per hour
KLB/HR	=	Thousands of pounds per hour
MLB/HR	=	Millions of pounds per hour
CPM	=	Counts per minute
CPS	=	Counts per second
AMPS		
MAMPS	=	Milliamps
μAMPS	=	Microamps
DEGF	=	Degrees Fahrenheit
DEGC	=	Degrees Centigrade
MR/HR	=	Millirem per hour
R/HR	=	Rem per hour
CI/CC	=	Curies per CC
CI/ML	=	Curies per ML
μCI/CC	=	Microcuries per CC
μCI/ML	=	Microcuries per ML
CI/S	=	Curies per second
μCI/S	=	Microcuries per second
DEGFR	=	Degrees true (for wind direction from)
DEGTO	=	Degrees true (for wind direction to)
DF/FT	=	Degrees Fahrenheit per foot
DC/M	=	Degrees Centigrade per meter
DC/HM	=	Degrees Centigrade per 100 meters
DF/HFT	=	Degrees Fahrenheit per 100 feet
STABA	=	Stability class in form of A - G
STABI	=	Stability class in form of integer, where A = 1, B = 2
MPH	=	Miles per hour
M/S	=	Meters per second

ZERO REFERENCE CODING SCHEME

This field applies to levels and heights only. Leave it blank for temperatures, pressure, and flows. Give the physical point represented by the number zero for the parameter from the choices below.

TAF	=	Top of active fuel
UPHEAD	=	Upper head
LWHEAD	=	Lower head
MSSKRT	=	Moisture separator skirt
TOPHTR	=	Top of pressurizer heater bank
SURGE	=	Surge line penetration
SPRAY	=	At the spray nozzle
UTUBES	=	Top of S/GU tubes
TUBSHT	=	At S/G tube sheet
TNKBOT	=	Bottom of tank sump (e.g., CST)
COMPLX	=	Reference too complex for database entry
CNTFLR	=	Containment floor
SEALEV	=	Mean sea level

CODING SCHEME
FOR UNIT NAME AND UNIT ID

ARKANSAS NUCLEAR ONE-1	AN1
ARKANSAS NUCLEAR ONE-1	AN2
BEAVER VALLEY-1	BV1
BEAVER VALLEY-2	BV2
BELLEFONTE-1	BE1
BELLEFONTE-2	BE2
BIG ROCK POINT	RP1
BRAIDWOOD-1	BR1
BRAIDWOOD-2	BR2
BROWNS FERRY-1	BF1
BROWNS FERRY-2	BF2
BROWNS FERRY-3	BF3
BRUNSWICK-1	BK1
BRUNSWICK-2	BK2
BYRON-1	BY1
BYRON-2	BY2
CALLOWAY-1	CW1
CALVERT CLIFFS-1	CC1
CALVERT CLIFFS-2	CC2
CATAWBA-1	CT1
CATAWBA-2	CT2
CLINTON-1	CL1
COMANCHE PEAK-1	CP1
COMANCHE PEAK-2	CP2
CONNECTICUT YANKEE	HN1
COOK-1	CK1
COOK-2	CK2
COOPER	CO1
CRYSTAL RIVER-3	CR3
DAVIS BESSE-1	DB1
DIABLO CANYON-1	DC1
DIABLO CANYON-2	DC2
DRESDEN-2	DN2
DRESDEN-3	DN3
DUANE ARNOLD	DA1
FARLEY-1	FA1
FARLEY-2	FA2
FERMI-2	FE2
FORT CALHOUN-1	FC1
FORT ST. VRAIN-1	FV1
GINNA	GI1
GRAND GULF-1	GG1
HATCH-1	HT1
HATCH-2	HT2
HOPE CREEK-1	HC1
INDIAN POINT-2	IP2
INDIAN POINT-3	IP3
JAMES A FITZPATRICK	FZ1
KEWAUNEE	KW1
LA CROSSE (GENOA-2)	LC1
LASALLE COUNTY-1	LS1
LASALLE COUNTY-2	LS2
LIMERICK-1	LM1
LIMERICK-2	LM2
MAINE YANKEE	MY1
MCGUIRE-1	MC1
MCGUIRE-2	MC2
MILLSTONE-1	MS1
MILLSTONE-2	MS2
MILLSTONE-3	MS3
MONTICELLO	MO1
NINE MILE POINT-1	NM1
NINE MILE POINT-2	NM2
NORTH ANNA-1	NA1
NORTH ANNA-2	NA2
OCONEE-1	OC1
OCONEE-2	OC2
OCONEE-3	OC3
OYSTER CREEK	OY1
PALISADES	PA1
PALO VERDE-1	PV1
PALO VERDE-2	PV2
PALO VERDE-3	PV3
PEACH BOTTOM-2	PE2
PEACH BOTTOM-3	PE3
PERRY-1	PY1
PERRY-2	PY2
PILGRIM-1	PG1
POINT BEACH-1	PB1
POINT BEACH-2	PB2
PRAIRIE ISLAND-1	PI1
PRAIRIE ISLAND-2	PI2
QUAD CITIES-1	QC1
QUAD CITIES-2	QC2
RANCHO SECO-1	RS1
RIVER BEND-1	RB1
ROBINSON-2	RO2
SALEM-1	SA1
SALEM-2	SA2
SAN ONOFRE-1	SO1
SAN ONOFRE-2	SO2
SAN ONOFRE-3	SO3
SEABROOK-1	SB1
SEQUOYAH-1	SE1
SEQUOYAH-2	SE2
SHEARON HARRIS-1	HR1
SHOREHAM	SH1
SOUTH TEXAS PROJECT-1	ST1
SOUTH TEXAS PROJECT-2	ST2
ST. LUCIE-1	SL1
ST. LUCIE-2	SL2
SURRY-1	SU1
SURRY-2	SU2
SUSQUEHANNA-1	SQ1
SUSQUEHANNA-2	SQ2
THREE MILE ISLAND-1	TM1
THREE MILE ISLAND-2	TM2
TROJAN	TR1
TURKEY POINT-3	TP3
TURKEY POINT-4	TP4
V. C. SUMMER	VS1
VERMONT YANKEE	VY1
VOGTLE-1	VO1
VOGTLE-2	VO2
WATERFORD-3	WF3
WATTS BAR-1	WB1
WATTS BAR-2	WB2
WNP-2	WP2
WOLF CREEK	WC1
YANKEE-ROWE	YR1
ZION-1	ZN1
ZION-2	ZN2

ENCLOSURE 8

COMPUTER POINT SELECTION

The main theme of the computer point selection process is to identify the minimum set of computer points, available on the fewest (preferably one) number of feeders from a site, which fully describe each of the parameters on the ERDS Parameter List.

When multiple computer points exist to describe a certain parameter, there is usually one point or a small subset of points which meet the following desirability criteria:

- For fluids systems (e.g., HPCI, Building Ventilation, Main Feedwater, etc.) the points representing the farthest location downstream in the system are most desirable. Examples:

  - If the ventilation system exhausts from all buildings in the power block converge and ascend up a single plant vent stack, then only the effluent process radiation monitors on the plant stack need be described under "gaseous effluent" versus describing the individual effluent monitors which may exist for each of the exhaust lines which converge.

  - If an injection or feedwater system has a set of points available which include flows measured at the pump discharges, at a combined header and at the point in the system just prior to injection into the loops or steam generators then the points which should be selected as potential ERDS feeds are the furthest downstream points (flow measured just prior to injection into loops or steam generators).

- Computer points which have undergone the maximum amount of range checking and other data point validation schemes should be selected. We are aware that many utilities are in the process of upgrading computer system validation techniques and that what exists now may be replaced at some future date.

- Computer points representing the widest expected range of the parameter should be selected. For example: If there is a choice of computer points for "Containment Pressure" with one representing the range -5 to +5 PSIG and another representing the range -5 to +100 PSIG, the wide-range -5 to +100 PSIG computer point should be selected; even though its accuracy may not be as great near the normally expected pressure of -1 to +1 PSIG.

The point composed of the maximum number of inputs should be used. The desirable point may be composed (processed) within the feeder computer or may be composed by a separate microprocessor outside the feeder as in the case of PWR Reactor Vessel Level Indication (RVLIS), Subcooling Margin Monitors (SMM) and meteorological tower systems. The philosophy of selecting the most composed points should not be applied in the case of parameters associated with PWR coolant loops (e.g., T-hot, T-cold, S/G Pressure, S/G Level, Main Feedwater Flow, ect.) to the extent of selecting points such as "Average T-hot", because loop-specific parameters are preferable for use in coolant-loop-specific accidents such as Steam Generator Tube Breaks. Composed points such as "Average T-hot Loop 1", "Average T-hot Loop 2", etc. should be selected.