REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8411190491 DOC.DATE: 84/11/14 NOTARIZED: YES DOCKET #
FACIL:50-410 Nine Mile Point Nuclear Station, Unit 2, Niagara Moha 05000410
AUTH.NAME AUTHOR AFFILIATION
LEMPGES,T.E. Niagara Mohawk Power Corp.
RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards revised response to SER Open Item 54, "Loose Parts Monitoring Sys.". Suybmittal will be included in Amend 16 to FSAR..

DISTRIBUTION CODE: B001D COPIES RECEIVED:LTR __ ENCL __ SIZE: 11
TITLE: Licensing Submittal: PSAR/FSAR Amdts & Related Correspondence

NOTES:PNL 1cy FSAR'S & AMDTS ONLY. 05000410

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL
	NRR/DL/ADL		1	0	NRR LB2 BC		1	0
	NRR LB2 LA		1	0	HAUGHEY,M	01	1	1
INTERNAL:	ACRS	41	6	6	ADM/LFMB		1	0
	ELD/HDS3		1	0	IE FILE		1	1
	IE/DEPER/EPB	36	1	1	IE/DEPER/IRB	35	1	1
	IE/DQASIP/QAB	21	1	1	NRR ROE,M,L		1	1
	NRR/DE/AEAB		1	0	NRR/DE/CEB	11	1	1
	NRR/DE/EHEB		1	1	NRR/DE/EQB	13	2	2
	NRR/DE/GB	28	2	2	NRR/DE/MEB	18	1	1
	NRR/DE/MTEB	17	1	1	NRR/DE/SAB	24	1	1
	NRR/DE/SGEB	25	1	1	NRR/DHFS/HFEB	40	1	1
	NRR/DHFS/LQB	32	1	1	NRR/DHFS/PSRB		1	1
	NRR/DL/SSPB		1	0	NRR/DSI/AEB	26	1	1
	NRR/DSI/ASB		1	1	NRR/DSI/CPB	10	1	1
	NRR/DSI/CSB	09	1	1	NRR/DSI/ICSB	16	1	1
	NRR/DSI/METB	12	1	1	NRR/DSI/PSB	19	1	1
	NRR/DSI/RAB	22	1	1	NRR/DSI/RSB	23	1	1
	REG FILE	04	1	1	RGN1		3	3
	RM/DDAMI/MIB		1	0				
EXTERNAL:	BNL(AMDTS ONLY)		1	1	DMB/DSS (AMDTS)		1	1
	FEMA-REP DIV	39	1	1	LPDR	03	1	1
	NRC PDR	02	1	1	NSIC	05	1	1
	NTIS		1	1				
NOTES:			1	1				

TOTAL NUMBER OF COPIES REQUIRED: LTTR 54 ENCL 46

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

November 14, 1984
(NMP2L 0240)

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Schwencer:

Re: Nine Mile Point Unit 2
Docket No: 50-410

Enclosed for your use and information is the revised response for Safety Evaluation Report open item 54, "Loose Parts Monitoring System."

This submittal will be included in Final Safety Analysis Report Amendment 16.

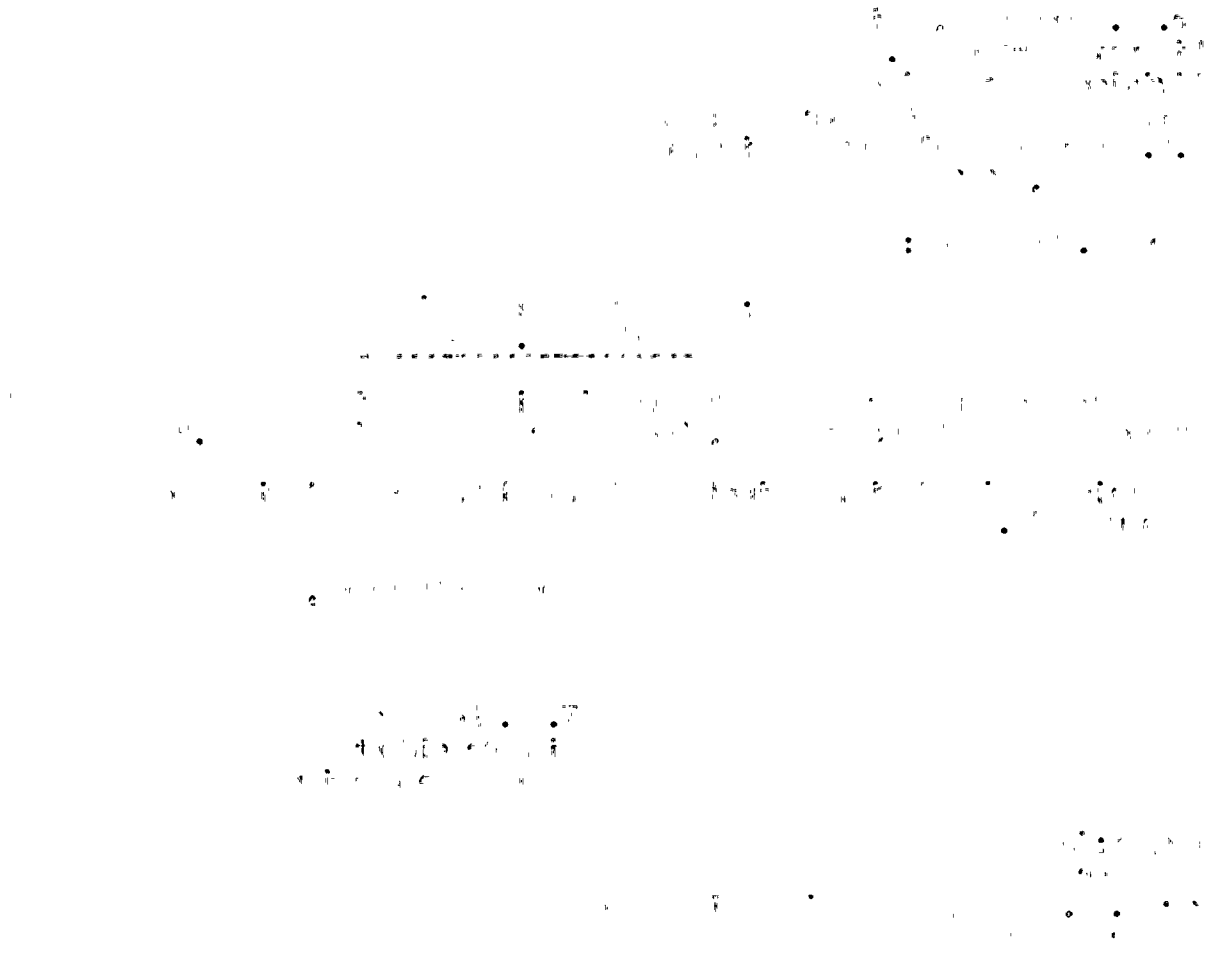
Very truly yours,

T. E. Lempges
Vice President
Nuclear Generation

TEL/DS:ja
Enclosure
xc: R. A. Gramm, NRC Resident Inspector
Project File (2)

B001
1/1

8411190491 841114
PDR ADOCK 05000410
E PDR



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Niagara Mohawk Power Corporation	)	Docket No. 50-410
	)	
(Nine Mile Point Unit 2)	)	

AFFIDAVIT

T. E. Lempges, being duly sworn, states that he is Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

Thomas E. Lempges

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 14 day of November, 1984.

Janis M. Macro
Notary Public in and for
Onondaga County, New York

My Commission expires:
JANIS M. MACRO
Notary Public in the State of New York
Qualified in Onondaga County No. 4784555
My Commission Expires March 30, 1985...

4.4.6.1 Loose-Parts Monitoring System (LPMS)

4.4.6.1.1 Design Basis

a. The LPMS is designed to detect loose parts in the reactor coolant systems.

b. The LPMS is designed to reduce the effects of variations in background noise on system capabilities for the detection of loose parts.

c. The LPMS is designed to meet the intent of Revision 1 (May 1981) of Regulatory Guide 1.133.

4.4.6.1.2 System Description

The function of this system is to detect and alarm for loose parts in the reactor coolant system. Loose parts are those metallic objects that can be physically moved by the reactor flow. A secondary function of the system for the Nine Mile Point Unit 2 is to assist the plant personnel in locating the detected loose parts as accurately and quickly as possible.

The sensing devices mounted within containment are designed to withstand the OBE and are redundant (ten sensors located on opposite sides of the reactor at five elevations) as described in Table 4.4-8. Separation is maintained between redundant monitoring channel circuits up to and including the main relay room monitors (which contain the alarm circuits). While these precautions have been taken, the system is not considered safety-related.

The system has been designed to discriminate between regular noise and signals caused by a loose part.

A primary consideration in the design of the LPMS is the power spectrum density (PSD) plot shown in Figure 4.4-10, which illustrates the normal background energy content over a specific band of frequencies of an operating power reactor, as detected by a piezoelectric transducer. The overall energy content and shape of the plot varies with plant conditions and between different sensor locations. Salient features demonstrated by the PSD are:

a. Low-frequency energy is related to the NSSS structure and machinery vibration.

b. High-frequency energy is related to flow associated noises.

c. Relatively rapid attenuation of the higher-frequency noises occurs because of the filtering effect of the acoustic path through the NSSS components. The LPMS incorporates tuned bandpass filters to concentrate on the portion of the noise spectrum that has a low background level, generally in the 1 KHz to 10 KHz frequency range. Because metal-to-metal impacts result in a relatively flat frequency response in the 1-10 KHz range and because certain portions of the background noise in that portion of the frequency spectrum are of relatively low level, the signal-to-noise ratio is improved, thereby enhancing detection capability while reducing the occurrence of false alarms.

The LPMS sensors are mounted on the exterior of the reactor vessel primary coolant system located at strategic natural collection points. These sensors monitor lower vessel tubes, recirculation pump, recirculation inlet lines, feedwater lines and instrument nozzles in the upper vessel region. The sensors are strapped or clamped to the measuring region in accordance with Table 4.4-8.

Special low noise coaxial cables conduct the accelerometer signals to remote-mounted preamplifiers. The preamplifiers condition the signals for transmission over the relatively long distances to the detector modules located in the main relay room on the (LPM) loose part monitoring panel.

The main relay room is a low radiation area during normal and transient conditions. During accidents, this area is served by the control room special filter train. Most surveillance and maintenance can be performed in this area which minimizes radiation exposure. Maintenance inside the drywell will be controlled in accordance with plant radiation protection procedures to minimize exposure.

At the loose part monitoring panel, the signals from the loose parts channels are compared with preset levels to generate alarms. An alarm is generated when a signal exceeds the preset level for a specified period of time. The alarm signal activates an indicating light, causes the multichannel cassette recorder to start recording four specific channels in accordance with Table 4.4-9 and activates the printer which produces a hard copy of the event. The following considerations will be addressed to establish the alert level:

1. The alert level will consider signals such as normal hydraulic, mechanical and electric noise due to normal and transient conditions.

2. The alert level will consider varying alarm setpoints from sensor to sensor to aid in compensating for specific transducer location noise.

3. Alert levels will be evaluated as part of the startup test program to ensure as low as practical of a false alarm rate over normal and transient operating conditions.

Each channel is connected to a selector switch for indication on a digital panel meter and on auxiliary readout equipment, such as a spectrum analyzer or audio output. The spectrum analyzer is for on-line signature analysis. The system includes also a loose parts locator. The loose part locator uses a microprocessor to calculate the location of a loose part by determining the impact energy at the sensors and the arrival time. The amplitude is used to characterize the energy of the impact, while the arrival time is converted to distance for part location. The result is printed out for a hard copy record and is of great assistance in determining the location of the loose part.

The locator will also indicate the occurrence of a spurious alarm by printout out a spurious alarm message. All electronic equipment within the system has provision for self testing and calibration.

The systems online sensitivity for detecting a loose part is a loose parts impact energy of 0.5 ft. - lbs. within three feet of a sensor.

The system is designed to operate continuously without operator supervision, except for routine system testing.

4.4.6.1.3 Safety Evaluation

The LPMS is intended to be used for information purposes only and is not a safety-related system. The system meets the intent of Regulatory Guide 1.133. The plant plant personnel use the LPMS to assist in the detection of anomalous loose parts. They also use it to assist in determining the location of any anomalous loose parts. The operators do not rely solely on this system or information provided by this system for the performance of any safety-related action. Any evaluations or actions taken to confirm the presence of a loose part will be handled on a case-by-case basis. Guidance for evaluation is provided in Figures 4.4-7, 4.4-8 and 4.4-9.

4.4.6.1.4 LPMS Training and Calibration

4.4.6.1.4.1 LPMS Training

The scope of training for the onsite LPMS will cover the theory and operation of the LPMS system including hands-on training. Emphasis will be placed on detection and characterization of loose parts and implementation of diagnostic concepts.

4.4.6.1.4.2 LPMS Calibration

The LPMS calibration is in accordance with Regulatory Guide 1.133. The calibration is performed at cold shutdown or refueling outages. Calibrated impact hammers are used. Data are taken at various impact levels at various locations relative to each sensor. The development and schedule of surveillance procedures is in Section 13.5. The data obtained provide information to determine the following system characteristics to be used as baseline for plant operations:

a. Channel sensitivity or minimum loose part impact to cause alarm (Alert Level)

b. Time and frequency responses to impact.

c. Impact energy versus channel output amplitude.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

TABLE 4.4-8

SENSOR LOCATION AND MOUNTING INFORMATION

Channel	Instrument Tag No.	Sensor Location	Mounting	Tube/Pipe Diameter - in Inches
1	2LPM-NBE1A	CRD stub tube	Strap	5.99 od
2	2LPM-NBE1B		Strap	Tube
3	2LPM-NBE2A	Recirculation pumps	Strap	24 (nom)
4	2LPM-NBE2B		Strap	Pipe
5	2LPM-NBE3A	Vessel recircu-	Strap	12.75
6	2LPM-NBE3B	lation inlet lines (180 deg apart)	Strap	Pipe
7	2LPM-NBE4A	Feedwater lines	Strap	12
8	2LPM-NBE4B	(180 deg apart; 90 deg from recirculation line sensors)	Strap	Pipe
9	2LPM-NBE5A	Instrument nozzles	Clamp	2
10	2LPM-NBE5B	upper vessel region	Clamp	Pipe

9

TABLE 4.4-9

TAPE RECORDER ALARM RECORDING SEQUENCE

First Alarmed Channel	Tape Recorder Channel A	B	C	D
1	1	2	3	4
2	2	1	3	4
3	3	4	1	5
4	4	3	2	6
5	5	6	1	3
6	6	5	2	4
7	7	5	8	9
8	8	6	7	10
9	9	7	8	10
10	10	7	8	9

9

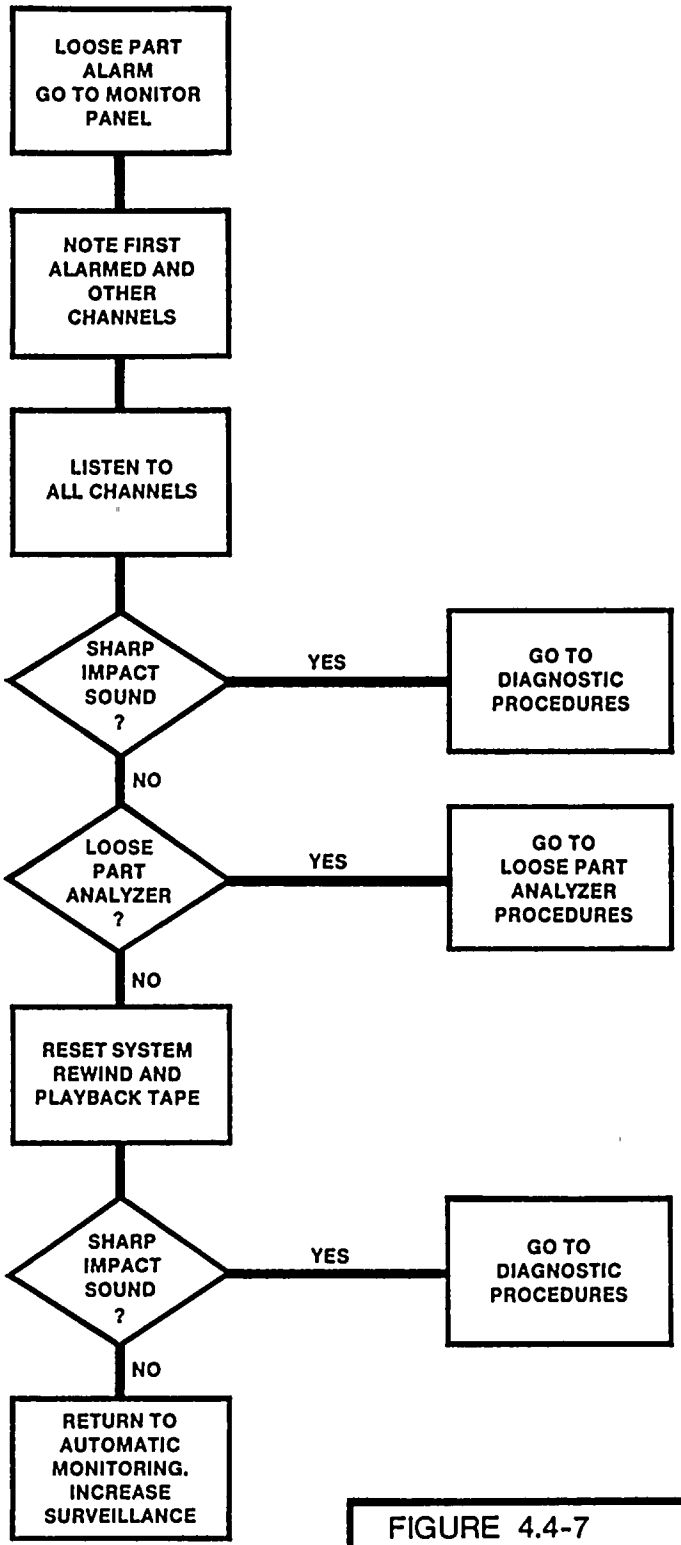


FIGURE 4.4-7

LOOSE PART ALARM LOGIC

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
FINAL SAFETY ANALYSIS REPORT

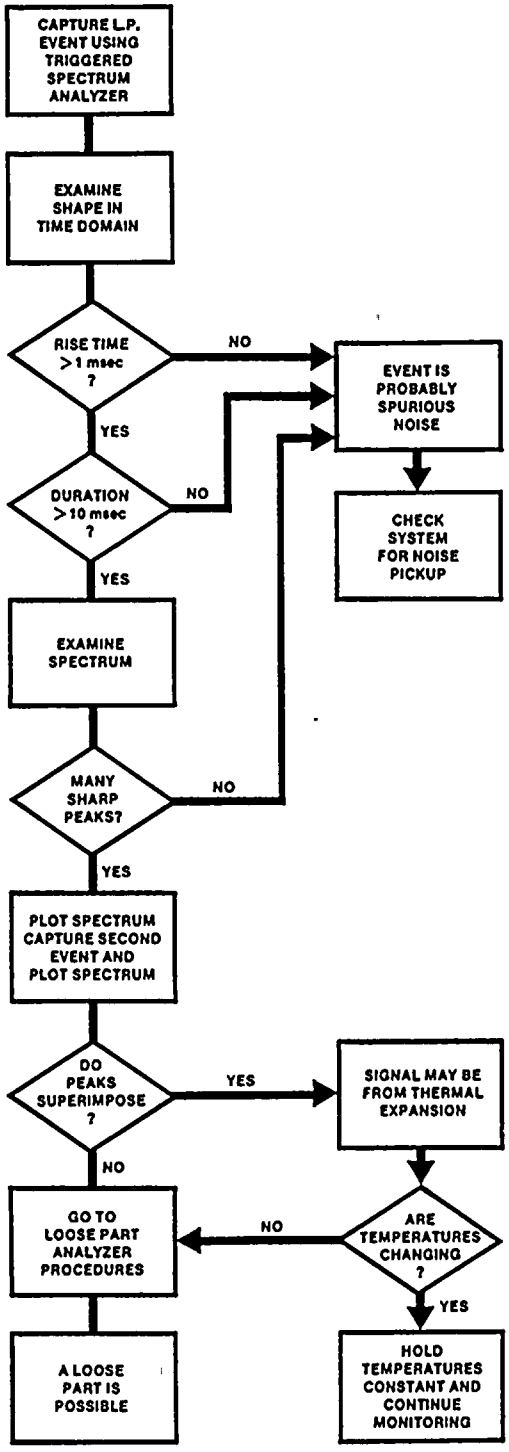


FIGURE 4.4-8

DIAGNOSTIC PROCEDURES LOGIC

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
FINAL SAFETY ANALYSIS REPORT

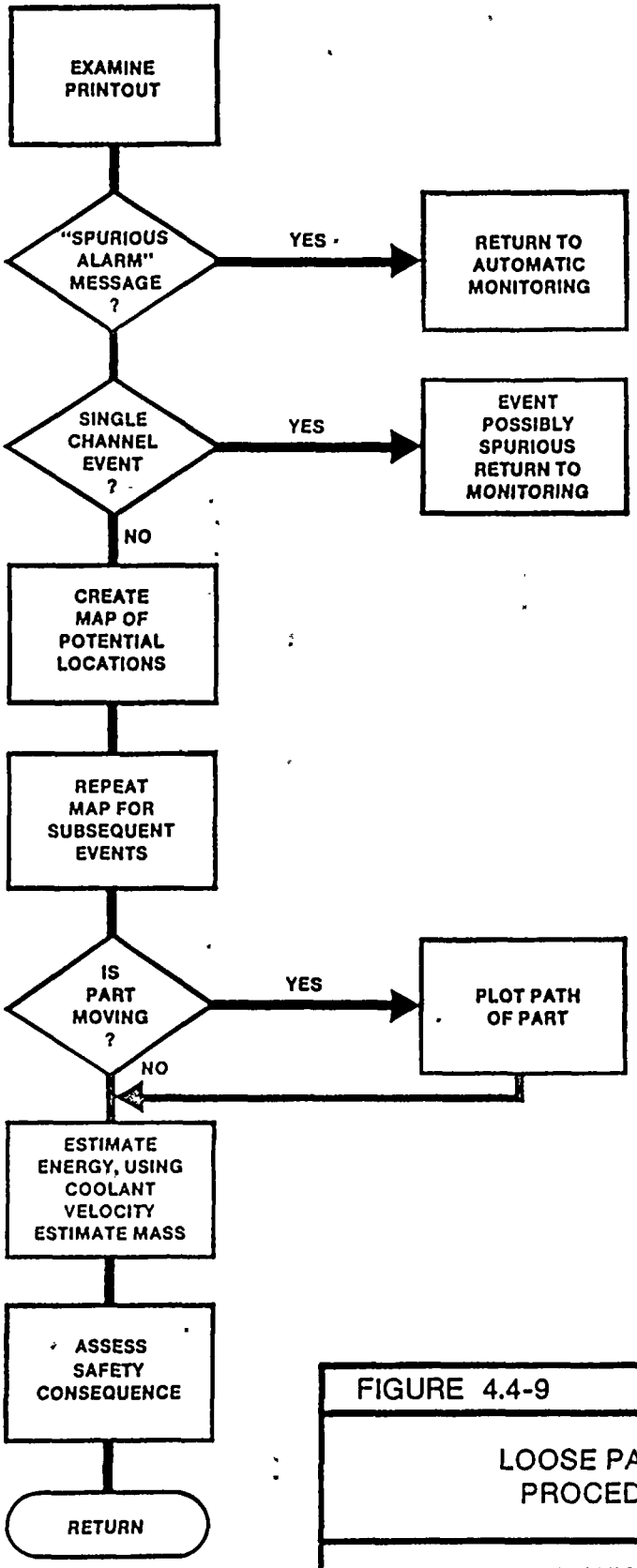


FIGURE 4.4-9

LOOSE PART ANALYZER PROCEDURES LOGIC

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
FINAL SAFETY ANALYSIS REPORT

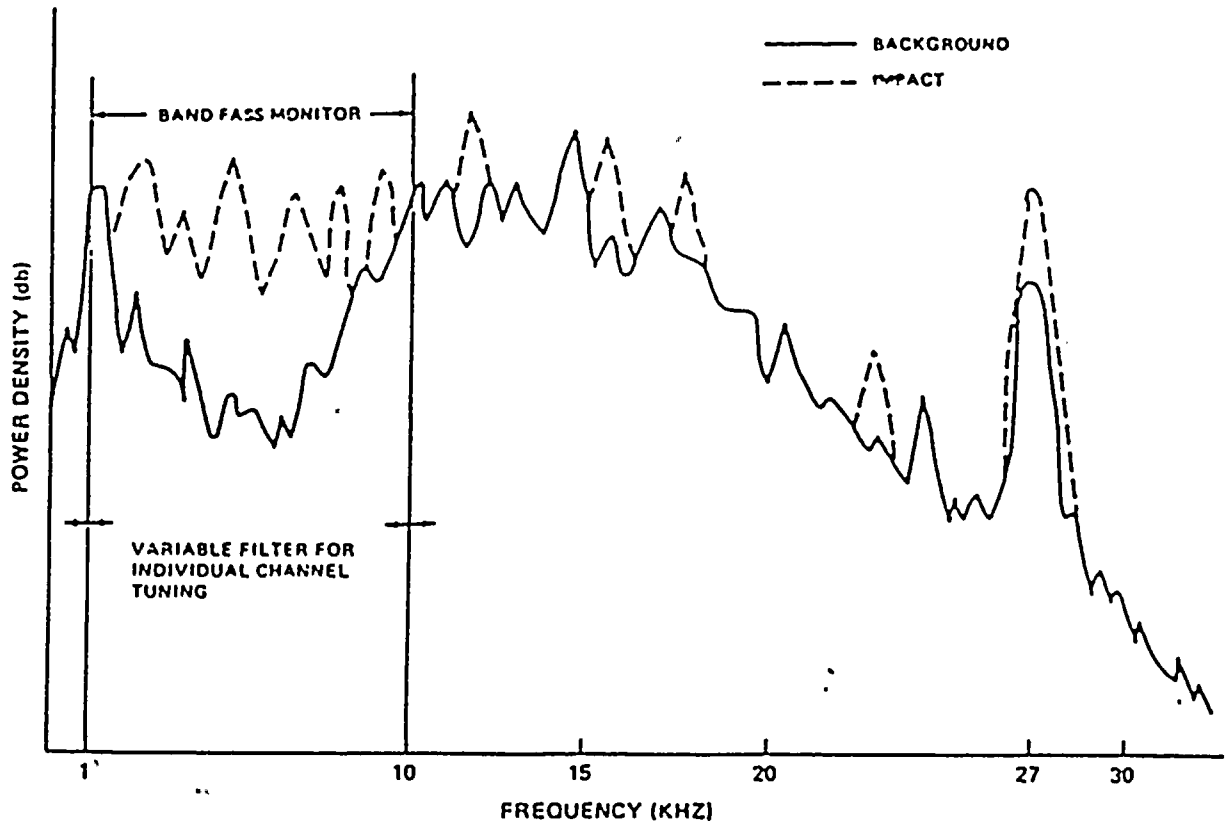


FIGURE 4.4-10

POWER SPECTRUM DENSITY (PSD)

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
FINAL SAFETY ANALYSIS REPORT