REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8308300634 DOC.DATE: 83/08/19 NOTARIZED: NO DOCKET #
FACIL:50-397 WPPSS Nuclear Project, Unit 2, Washington Public Powe 05000397
AUTH.NAME AUTHOR AFFILIATION
SORENSEN,G.C. Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards radwaste bldg ventilation exhaust flow measurement description in response to questions during radiological effluent Tech Spec discussions.

DISTRIBUTION CODE: B001S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 7
TITLE: Licensing Submittal: PSAR/FSAR Amdts & Related Correspondence

NOTES:

	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	AULUCK,R.	01	1	1
INTERNAL:	ELD/HDS2		1	0	IE FILE		1	1
	IE/DEPER/EPB	36	3	3	IE/DEPER/IRB	35	1	1
	IE/DEQA/QAB	21	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
	RGN5		3	3	RM/DDAMI/MIB		1	0
EXTERNAL:	ACRS	41	6	6	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

TOTAL NUMBER OF COPIES REQUIRED: LTTR 53 ENCL 46

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: [illegible] DOC.DATE: [illegible] NOTARIZED: [illegible] DOCKET #
FACIL:50-397 WPPSS Nuclear Project, Unit 2, Washington Public Powe 05000397
AUTH.NAME AUTHOR AFFILIATION
[illegible] Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION
[illegible] Licensing Branch 2

SUBJECT: Forwards radwaste bldg ventilation exhaust flow measurement description in response to questions during radiological effluent Tech Spec discussions.

DISTRIBUTION CODE: B001S COPIES RECEIVED:LTR __ ENCL __ SIZE:__________
TITLE: Licensing Submittal: PSAR/FSAR Amdts & Related Correspondence

NOTES:

	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	AULUCK,R. 01	1	1
INTERNAL:	ELD/HDS3	1	0	IE FILE	1	1
	IE/DEPER/EPB 36	3	3	IE/DEPER/IRB 35	1	1
	IE/DQASIP/QAB 21	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/HFEB40	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
	RGN5	3	3	RM/DDAMI/MIB	1	0
EXTERNAL:	ACRS 41	6	6	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

TOTAL NUMBER OF COPIES REQUIRED: LTTR [illegible] ENCL [illegible]

Washington Public Power Supply System
P.O. Box 968 3000 George Washington Way Richland, Washington 99352 (509) 372-5000

August 19, 1983
G02-83-748

Docket No. 50-397

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT NO. 2
RADWASTE BUILDING VENTILATION
EXHAUST FLOW MEASUREMENT

As requested during a telephone conversation between Mr. R. Auluck, Mr. C. Miller (NRC) and Mr. P. Powell (SS) August 9, 1983, the attached description of the Radwaste Building Ventilation Exhaust Flow Measurement is provided. This submittal satisfactorily responds to questions raised on this measurement during discussions with the staff on the WNP-2 Radiological Effluent Technical Specifications.

Should you have any further questions, please contact Mr. P. L. Powell, Acting Manager, WNP-2 Licensing.

Very truly yours,

G. C. Sorensen, Acting Manager
Nuclear Safety and Regulatory Programs

PLP/tmh
Enclosure

cc: R Auluck - NRC
WS Chin - BPA
D Hoffman - NRC
C Miller - NRC
A Toth - NRC Site

B001
1/1

RADWASTE BUILDING VENTILATION EXHAUST FLOW MEASUREMENT

Background

The primary design objectives of the Radwaste Building ventilation system are to maintain building habitability while limiting radioactive effluents to as low as reasonably achievable. It accomplishes these objectives by collecting potentially contaminated air from nearly every room and cubicle in the building. Exhaust flow is channeled through roughing and HEPA filters before discharging to the outside environment.

Motive power for the exhaust system is provided by operation of two of the three installed centrifugal blowers. Control is by variable blower inlet vanes that operate to maintain a set negative pressure at the most remote location, the east pump room.

System instrumentation includes differential pressure indication and alarms on each of the roughing and HEPA filter banks and indication of the differential pressure between the east pump room and outside atmospheric pressure. Flow indication is not included in the system design nor is it necessary to meet the primary design objectives. A walkdown of the system shows that the general arrangement of ducting and components is less than ideal for installation of accurate flow monitoring instrumentation.

Flow Measuring Requirements

Measurement of exhaust flow is of interest only with respect to environmental effluents and the potential resultant doses. Three federal regulations are applicable. They are 10CFR20.106, 10CFR50.34a, and 40CFR190.10..

The first regulation, 10CFR20.106 specifies radionuclide concentrations which cannot be exceeded in effluents to the unrestricted area. The installed monitoring system measures effluent content directly in units of concentration. Flow measurement is not necessary for compliance with 10CFR20.106..

The two remaining regulations establish maximum radiation doses to which members of the public may be exposed as a result of the individual power plant effluents and as a result of the total uranium fuel cycle, respectively. Because these regulations are stated in terms of dose, it is necessary to know the total quantity (i.e.: concentration X volume) discharged. System flow measurement, or at least conservative (high) estimation of total flow is, therefore, required.

Alternatives

The ultimate, from a regulatory compliance demonstration standpoint, would be installation of flow conditioning, flow measurement and integration instrumentation along with monitor/sampler proportional flow control as is provided for the Reactor Building elevated release duct.

The exhaust system configuration does not lend itself to such an installation, however, nor is the cost of such control instrumentation justified by the expected releases. Application of the cost benefit criteria of 10CFR50 ($1,000/man-Rem) in fact justifies only minimal expense. The projected doses from all plant gaseous releases considering normal operation and anticipated operational occurrences total only 1.6 man-Rem per year (reference 1). Only a small fraction of that (<1 percent) is attributable to the Radwaste Building ventilation exhaust (reference 2).

A second alternative is to monitor the motive power required to induce flow in the exhaust system. The general relationship between power requirement and system flow for centrifugal fans is given in the following formula from reference 3.

$$BHP = \frac{CFM \times TP}{6356 \times ME}$$

where:

BHP = Brake Horsepower of the fan motor
CFM = System Flow Rate in cubic feet per minute
TP = Total Pressure (fan outlet pressure--fan inlet pressure)
ME = Mechanical Efficiency of fan (0.5-0.65)

As noted earlier, system flow is controlled by variable inlet vanes to maintain negative building pressure. As the vanes are opened, the flow rate and total pressure are increased, placing additional load on the fan motor. The fan performance curve, attachment 1, illustrates the flow, pressure, and horse power relationship for the specific fans installed in the Radwaste Building. Blower load is monitored by watt transducers in the motor circuitry with outputs to the process computer.

The installed relationship between motor load and system flow will be established as part of the pre-operational test program. Any reduction in efficiency by equipment wear, fan blade erosion and plugging or other system changes will cause the relationship to err in the conservative direction.

The possible exception would be a breakthrough of one or more HEPA filters. The decreased flow resistance would decrease the fan total pressure allowing a reduction in motor load for a given flow rate. That event, however, would be immediately identified through the HEPA filter differential pressure alarms and indication. Lack of HEPA filter integrity would also be detected by the installed particulate monitors should it occur while any significant radionuclide concentration existed in the system.

Conclusion

Flow measurement in the Radwaste Building ventilation exhaust is necessary only for quantification and reporting of radioactive effluents. It is not necessary to the system's primary design objectives and significant expenditures for system modifications are not justified by cost benefit analysis.

A sound technical basis exists for monitoring system flow by measurement of ventilation motive power. Flow monitoring by this method may, in fact, be superior to installation of conventional flow measurement devices when system configuration is considered.

The system design includes watt transducers in the fan motor circuitry. Their output to the process computer can be directly correlated to system flow. Differential pressure indication and alarms are provided to warn of HEPA filter disintegration which would alter the correlation between motor load and system flow.

No additional instrumentation should be necessary.

References

1. Environmental Report-OL, WNP-2, Table 5.2-15.

2. NUREG 0812, Draft Environmental Statement, WNP-2, Table L.1.

3. Industrial Ventilation, 16th Edition, American Conference of Governmental Industrial Hygienists.

NO #7029-ML
20.73.1-11

RECEIVED
DEC 28 1973

RADWASTE BLDG. EXHAUST FAN

L-55012

Buffalo

Buffalo Forge Co — PERFORMANCE CURVES — Buffalo, N.Y.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM-WPPSS NUCLEAR
PROJECT NO.2 - CONTRACT NO.1B. TAG NO'S WFA-FN-1A, 1B & 1C.

Size 540(2) Model Type BLA 1780 70 • 29.92 .075 lb/cu ft

NOTE: THIS CURVE INCLUDES VARIABLE INLET VANE LOSSES.

WPPSS

PD PD-8948
Dwg. No. A-8-48
Date 9/23/75
By JF

SP Static Pressure
TP Total Pressure
HP Horsepower
SE Static Efficiency
TE Total Efficiency

SP
EFF
HP
STATIC EFFICIENCY PERCENT