Washington State University

Nuclear Radiation Center

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Friday, February 28, 2003
Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ref: Docket 50-27

Dear Sir:

This letter is a response to a U.S. Nuclear Regulatory Commission request for additional information dated January 9, 2003.

The first item asked the following:

1. According to your request to change the Technical Specifications (Amendment No. 18) the new criterion to replace the "absolute filter" will be based purely in the performance of the filter. The pressure drop caused by the "absolute filter" will be the only indicator to ensure that the filter performance is acceptable. Figures 9-1 and 9-2 of the Safety Analysis Report are inconsistent on where the Pressure Elements (PE) are installed with respect to the "absolute filter." Please provide a detailed diagram of the installation of the two pressure elements used to calculate the pressure drop caused by the "absolute filter." This diagram should illustrate the section of the HVAC system that is used in the "dilute mode." The following detailed information should be included with this illustration:

(a) duct dimensions where the "absolute filter", the first pressure element, and second pressure element are installed, and
(b) the distances between the two pressure elements and the "absolute filter."

Response to first item:

Attached is a more detailed diagram entitled, "Pressure Sensor Positions Relative to the 'Absolute Filter'". On this diagram one can see the position of the pressure sensor on the pool side of the absolute filter. In the dilute mode, 300 CFM is being drawn from the pool room. It then passes the first pressure sensor located 37 ½" upstream of the absolute filter. The filter consists of two side by side box shaped objects of dimension 23 ½" x 23 ½" x 11 ½" oriented as shown. The second pressure sensor in the diagram is located 29 ½" downstream of the absolute filter in the duct leading to the main ventilation system exhaust. In the dilute mode, 300 CFM of pool room air is passed through the HEPA filter and then mixed with 1700 CFM of "outside air" to produce a "dilution" factor of 6.67 when the filter is new. If the HEPA filter becomes slightly obstructed

A 001

through use, the dilution factor would become larger and therefore the radioactive air release rate would become more conservative. After dilution, the mixed air passes through damper D-6 and enters fan F-3 which draws the air into the main ventilation duct where the "Exhaust Gas Monitor" measures the Argon-41 release. The total distance between the two pressure sensors is 78.5".

The second item asked the following:

2. Please provide information on how you are planning to calculate the flow across the absolute filter to ensure that the filter is performing between the limits of pressure drop and volumetric flow specified by the TSs. Please provide an original-copy of the performance chart of the "absolute filter" provided by the manufacturer.

Response to the second item:

It was not our intension to re-calculate the flow across the absolute filter. Measurements of flow rates were made when the system was installed to validate the design. We could arrange to have the flow rates verified again but only if the US NRC considers it to be essential. We do not consider it relevant because if the "absolute filter" became more obstructed with use, the flow through it would be slightly reduced. A flow reduction through this filter would increase the dilution factor, making its performance more conservative than the less obstructed "new" filter.

Please find attached a FAX sent to us by the manufacturer of the "absolute filter" designated YY-F. It is the third row from the top in the CFM Capacities and Dimensions table.

The third item asked the following:

3. According to the SAR and the TSs, the HVAC system will change to emergency-mode if there is a reactor scram. Does the air monitoring system have the capacity to shut down the reactor and change to emergency-mode in case of an excessive airborne radioactive release? Please provide set-points of the air monitoring system used by the HVAC control system to change from dilute-mode to emergency-mode.

Response to the third item:

There are three important monitors relevant to the radioactivity in the pool room; namely a Continuous Air Monitor (CAM) close to the pool water just above the reactor, a GM detector on the reactor bridge, and an Exhaust Gas Monitor (EGM). The first two detectors are the most important while the third provides an additional element of safety.

When the CAM reaches 3.13×10^3 counts/minute a warning alarm sounds. Usually this happens if the diffusion pump is inadvertently off. The operator would then switch the diffusion pump back on and continue operations. When the CAM reaches 3.13×10^4 counts/minute the HVAC automatically switches to the "dilute mode" and the operator, in response, is required to "shutdown" the reactor by switching a reactor control to "rundown". The rundown following a high CAM alarm is intended to avoid "shock" to any leaking fuel element, should that be the cause for the alarm.

If the GM detector mounted on the bridge of the reactor reaches 200 mrem/hour it automatically initiates a reactor SCRAM which causes the HVAC system to switch to the "isolate" mode.

If the EGM reaches a count rate of 96.8 counts/minute (which is less than the DAC) an alarm sounds at the console and the operator is required to switch the HVAC system into "isolate" mode and to investigate the cause of the alarm.

The fourth item asked the following:

4. Please provide more information regarding the second change you are proposing in the requested amendment of the TSs, and explain why these two items are redundant. Include information on the control and instrumentation system activated by the access gate mentioned in the items 10.c and 10.d of Section 3.15 of the TSs.

Response to the fourth item:

Please note the circuit diagrams enclosed (entitled "BNCT/RX bridge movement panel" and "Beam Room Scram Chain") which should help to understand how the system operates.

10.c states that upon opening the BNC room's access gate the reactor scrams and the bridge moves to the retracted position.

This action was accomplished by placing a spring loaded micro-switch on the inside door frame of the access gate (which is actually a solid door). The micro-switch is Normally Closed (NC) when the switch is compress by a plate attached to the access gate (see switch 28SW6-A on the drawing "Beam Room Scram Chain"). The switch is NC when the gate is closed by this plate attached to the gate. If the access gate is opened a few millimeters, the micro-switch 28SW6-A changes to the "Open" state. This switch is part of the Beam Room scram chain. If any element in this scram chain opens, the reactor automatically scrams and the bridge automatically retracts. This micro-switch is actually the switch referred to in 10.d that describes it as "the bridge retraction switch on the access gate".

That means that "opening the access gate" in 10.c and "opening the bridge retraction switch" in 10.d are one and the same action; hence the redundancy.

If you have any questions, please contact Dr. Gerald Tripard, Facility Director (509) 335-0172

Sincerely,

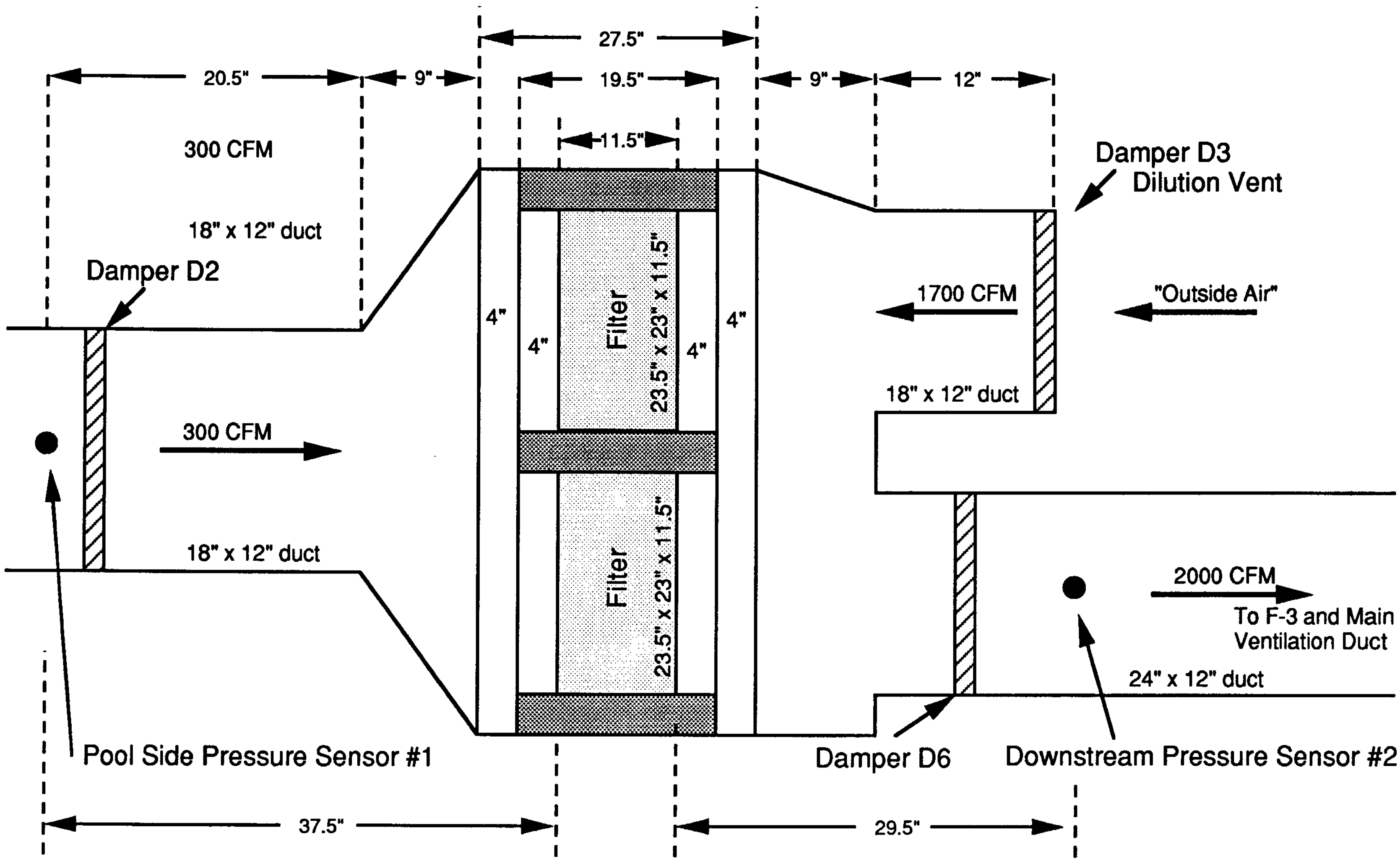
GE Tripard

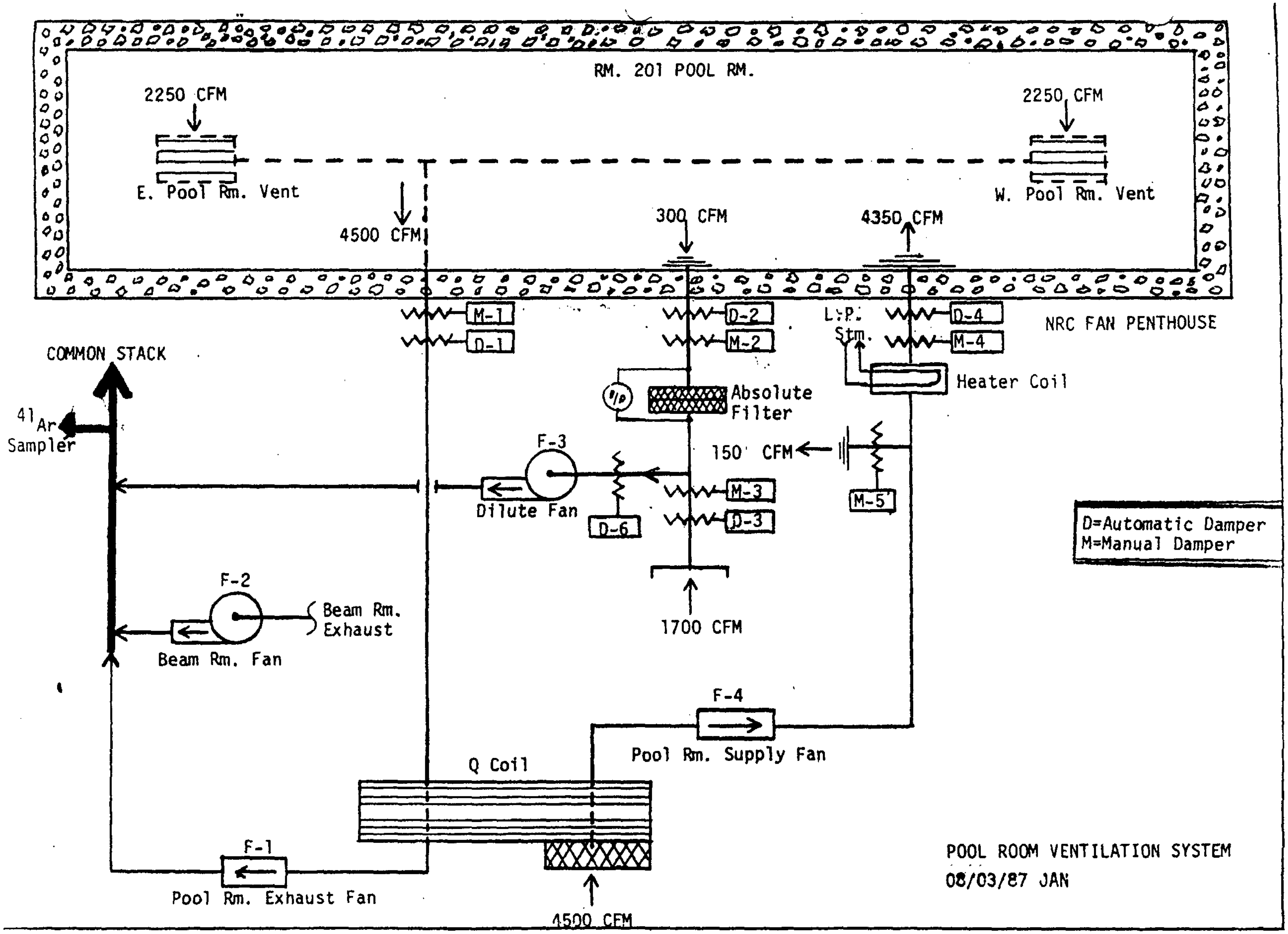
Gerald E. Tripard
Director

Enclosures: Figure: Pressure Sensor Postions Relative to the "Absolute Filter"
Figure 9-1 Pool Room Ventilation System
Fax of manufacturer's transmittal sheet and table for relevant filters
Figures: "BNCT/RX bridge movement panel" and "Beam Room Scram Chain"

cc: US NRC Headquarters Office

Figure: Pressure Sensor Positions
Relative to the "Absolute Filter"





RM. 201 POOL RM.
2250 CFM
2250 CFM
E. Pool Rm. Vent
W. Pool Rm. Vent
4500 CFM
300 CFM
4350 CFM
M-1
D-1
D-2
M-2
L.P. Stm.
D-4
M-4
NRC FAN PENTHOUSE
COMMON STACK
41Ar Sampler
Absolute Filter
Heater Coil
F-3
150 CFM
Dilute Fan
D-6
M-3
D-3
M-5
D=Automatic Damper
M=Manual Damper
F-2
Beam Rm. Exhaust
Beam Rm. Fan
1700 CFM
F-4
Pool Rm. Supply Fan
Q Coil
F-1
Pool Rm. Exhaust Fan
4500 CFM
POOL ROOM VENTILATION SYSTEM
08/03/87 JAN

Figure 9-1

Airpure® Filter Sales & Service

18425 - 72nd. Ave. S. Kent, WA 98032
Phone: 425-251-8766 Fax: 425-251-8767

FAX TRANSMITTAL SHEET

DATE:

FAX NUMBER: 509 335 4433

TO: Kent

COMPANY: W.S.U

FROM: Gary Favro

COMPANY: Airpure Filter Sales

1 **PAGE(S) TO FOLLOW**

COMMENTS:

These two are white on right side

Small amount of gray on upper left side

Alpha Cell HEPA Filter Dimensions and Capacities

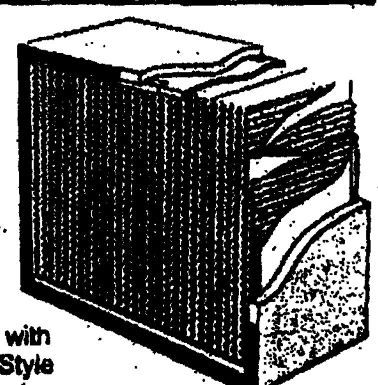
CFM CAPACITIES AND DIMENSIONS

Frame Depth (Inches)	Filter Size & Frame Depth Designator	Actual Face Size (Inches)	Cfm Capacity at Clean Pressure Drop, Inches w.g. .65	1.0	1.35	Weight (Lb.)
11-1/2	GG-F	24 x 24	650	1000	1300	38
	GC-F	24 x 12	300	455	590	26
	YY-F	23-3/8 x 23-3/8	615	945	1235	37
	YU-F	23-3/8 x11-3/8	275	425	550	25
	GN-F	24 x 30	830	1275	1655	45
	CC-F	12 x 12	135	205	265	14
5-7/8	GG-D	24 X 24	325	500	650	20
	GC-D	24 X 12	145	225	295	12
	BB-D	8 X8	25	35	45	6
	CC-D	12 X12	70	105	135	9
	YY-D	23-3/8 X 23-3/8	305	470	610	18
	YU-D	23-3/8 X 11-3/8	270	415	540	23
	GN-D	24 X 30	410	635	825	26
	GP-D	24 X 36	505	775	1010	33
	GQ-D	24 X48	680	1045	1360	39
	GR-D	24 X 60	860	1320	1715	32
	GS-D	24 X 72	1035	1590	2065	46
	NN-D	30 X 30	525	810	1055	26
	NP-D	30 X 36	640	985	1280	30
	NQ-D	30 X 48	865	1330	1730	37
	NR-D	30 X 60	1090	1680	2185	44
	NS-D	30 X 72	1315	2025	2630	52
	PP-D	36 X36	790	1215	1580	33
	PQ-D	36 X 48	1050	1620	2105	41
	RR-D	36 X 60	1315	2025	2630	49
	PS-D	36 X 72	1580	2430	3160	59

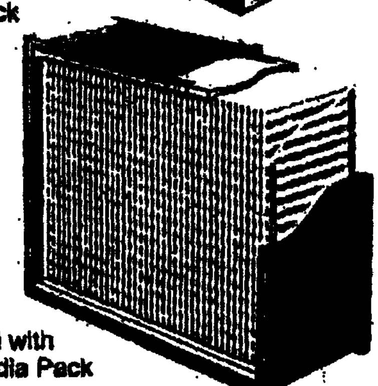
Flanders Presicionaire manufactures both conventional Separator Style and Pureform Separatorless HEPA Filters. To make a Separator Style filter, the media is folded over corrugated aluminum separators with hemmed edges to separate the pleats in the filter pack. Flanders Precisionaire manufactures its own filter media, enabling it to develop a unique manufacturing process for the production of Pureform Separatorless HEPA Filters. In one manufacturing operation, Flanders PrecisionAire produces a self-supporting and self-separating Pureform Media Pack.

The Pureform Filter offers many advantages over conventional Separator Style HEPA Filters:

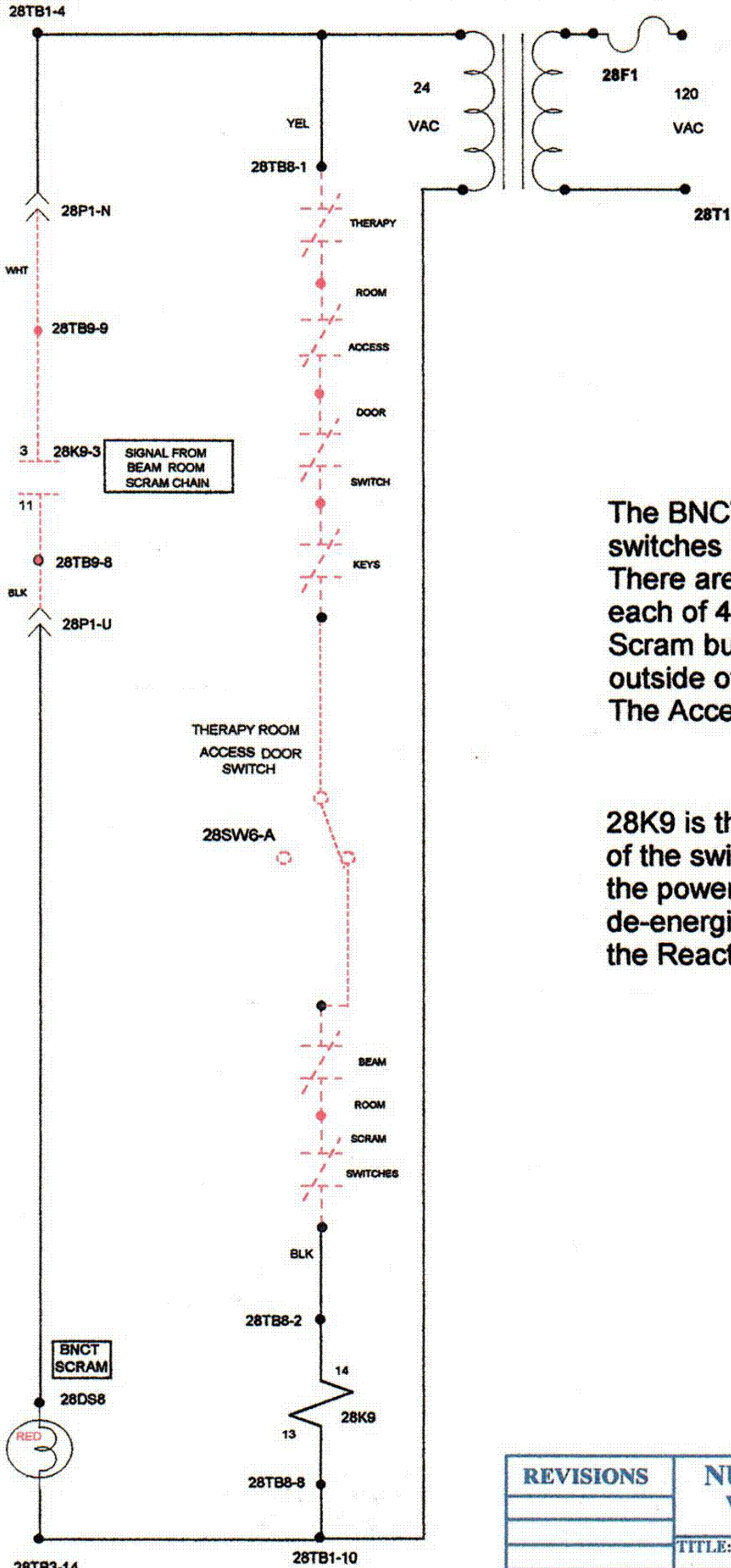
- *More usable media area for longer service life because of higher dust holding capacity*
- *Reduced cost of ownership because of longer service life*
- *Maximum utilization of the media*
- *Can handle some harsh environments which may attack aluminum separators*
- *Media pack can be incinerated*
- *Media is 26 mils thick, which is significantly thicker than conventional 15 mil media used in Separator Style HEPA Filters*



Alpha Cell with Seperator Style Media Pack



Alpha Cell with Pureform Media Pack



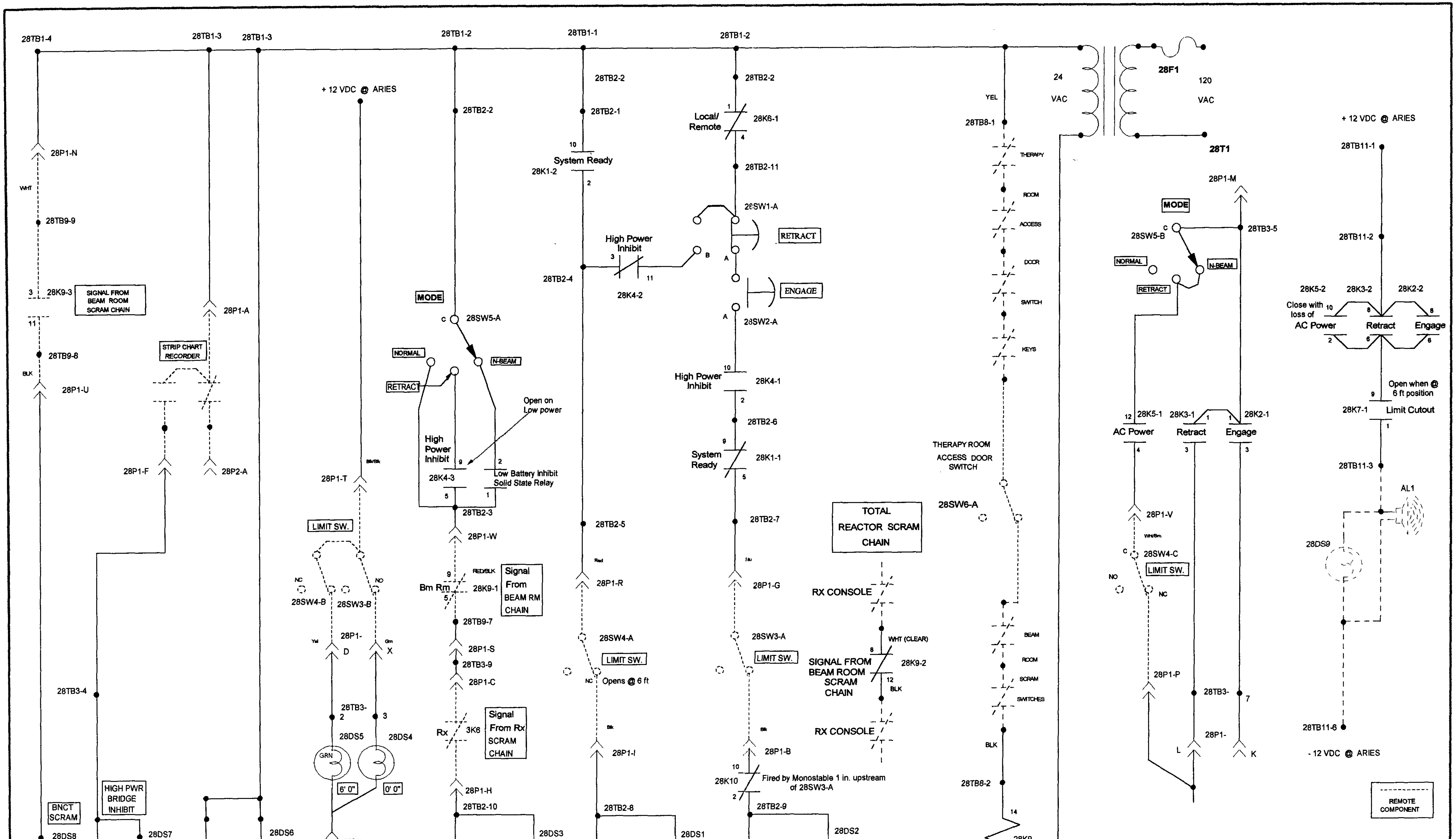
The BNCT Scram Chain consists of 7 switches in the beam room area. There are 4 switches associated with each of 4 access keys. There are 2 Scram buttons, one inside and one outside of the treatment room. The Access Door has the 7th switch.

28K9 is the BNCT Scram Relay. If any of the switches in this chain open or the power to this relay fails, this relay de-energizes and opens a contact in the Reactor's Main Scram Chain.

REMOTE COMPONENT

REVISIONS	NUCLEAR RADIATION CENTER WASHINGTON STATE UNIVERSITY PULLMAN, WASHINGTON		
	TITLE: BEAM ROOM SCRAM CHAIN		
	SCALE: N.A.	DWG BY: G.E.T.	FILE NO: 5
	DATE: 07/30/2001	CHK BY: G.E.T.	

C-01



REVISIONS	NUCLEAR RADIATION CENTER WASHINGTON STATE UNIVERSITY PULLMAN, WASHINGTON		
05/21/2000 03/28/2001			
05/29/2000			
06/07/2000	TITLE: BNCT/RX BRIDGE MOVEMENT PANEL		
06/27/2000	SCALE: N.A.	DWG BY: J.A.N.	FILE NO: 1 of 2
10/11/2000	DATE: 05/08/1999	CHK BY: J.A.N.	