Public Service
16805 WCR 19 1/2; Platteville, Colorado 80651

Public Service
Company of Colorado

July 14, 1992
Fort St. Vrain
Unit No. 1
P-92247

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
D. C. 20555

ATT /mour H. Weiss, Director
ower Reactor, Decommissioning and
nmental Project Directorate

0-267

SUBJECT: **SUMMARY OF JUNE 17, 1992 MEETING WITH STATE OF COLORADO REGARDING EFFLUENT RELEASES DURING DECOMMISSIONING**

REFERENCE: PSC Letter, Warembourg to Director of NRR, dated April 30, 1992 (P-92181)

Dear Dr. Weiss:

Attached for your information is a summary of a meeting held on June 17, 1992, between Public Service Company of Colorado (PSC) and representatives of the Colorado Department of Health (CDH) Water Quality Control Division and Radiation Control Division.

This meeting was held to familiarize representatives of the CDH with PSC's plans to decommission Fort St. Vrain (FSV), with particular emphasis on the release of tritium in liquid effluents. The CDH Radiation Control Division has been involved in previous discussions involving FSV decommissioning plans, and has regularly received copies of related correspondence with the NRC. The CDH Water Quality Control Division is currently in the process of renewing the FSV wastewater discharge permit.

IE25
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The attached meeting summary is provided in support of the FSV Environmental Report Supplement for Decommissioning, previously submitted via the referenced letter. The CDH administers Environmental Protection Agency (EPA) programs and is responsible for surface water quality. PSC described its plans to release tritium into downstream surface waters, where both the State standard and the EPA Safe Drinking Water Standard (40 CFR 141) limit tritium concentration to 20,000 pCi/l. PSC discussed its procedural controls and enhanced monitoring program for FSV decommissioning to ensure compliance with all applicable regulations. Several items that were identified for further investigation will be resolved as part of the discharge permit renewal process, which is currently scheduled to be complete prior to flooding the PCRV with shield water.

The CDH participants in this meeting were provided with a copy of the attached meeting summary for review. The Water Quality Control Division agreed with the summary as written and indicated that additional clarification may be requested from PSC on several issues. If you have any questions regarding the attached information, please contact Mr. M. H. Holmes at (303) 620-1701.

Sincerely,

Donald W. Warembourg
Manager, Nuclear Operations

DWW/SWC

cc: Regional Administrator, Region IV

Mr. J. B. Baird
Senior Resident Inspector
Fort St. Vrain

Mr. Robert M. Quillin, Director
Radiation Control Division
Colorado Department of Health

Ms. Pat Nelson
Industrial Unit Chief
Permits & Enforcement Division
Colorado Department of Health

MEETING SUMMARY

This is a summary of the meeting held on June 17, 1992 between Public Service Company of Colorado (PSC) and representatives of the Colorado Department of Health (CDH), Water Quality Control Divsion (WQCD) and Radiation Control Division (RCD).

Attendees were as follows:

*	Pat Nelson	CDH, WQCD, Industrial Unit Chief
*	Don Holmer	CDH, WQCD
*	Ken Weaver	CDH, RCD
	Mike Niehoff	PSC, Engineering Manager
*	Mike Holmes	PSC, Nuclear Licensing Manager
	Ted Borst	PSC, Radiation Protection Manager
	Marty Deniston	PSC, Operations Manager
	Terry Staley	PSC, Nuclear Engineering
*	Peter Cohlmia	PSC, Unit Manager, Environmental Programs
	Dave Fetterolf	PSC, Applied Sciences
	Jesse Brungardt	PSC, Environmental Services
	Ed Parsons	Westinghouse Scientific Ecology Group
*	Jim Johnson	Colorado State University
*	Sam Chesnutt	PSC, Nuclear Licensing

* Denotes those present for tour of effluent release path

A copy of the meeting handouts/slides is attached.

Background

The purpose of the meeting was to familiarize representatives of the Colorado Department of Health with PSC's plans to decommission Fort St. Vrain, with particular emphasis on the release of radioactive liquid effluents. Don Holmer and Pat Nelson of the CDH, WQCD are in the process of renewing the wastewater discharge permit for Fort St. Vrain. The renewal of this permit is being managed by PSC's Environmental Services organization, under Pete Cohlmia. Ken Weaver of the CDH, RCD has historically been one of the State contacts for nuclear issues, and his office receives copies of all PSC correspondence with the NRC.

Meeting Overview

PSC described their plans for dismantlement and decontamination of the FSV Prestressed Concrete Reactor Vessel (PCRV). These plans include filling the internal cavity of the PCRV with shield water to provide shielding for decommissioning workers and reduce airborne contamination. Shield water will leach tritium from graphite reflector blocks, and this tritiated water will be released into the environment as liquid effluent.

PSC also described the liquid effluent release pathway and its commitment to ensure that releases are within the following limits:

- Effluent concentrations in unrestricted areas will be within 10 CFR 20 Maximum Permissible Concentrations (MPCs),

- Doses to individual members of the public will be within the limits of 10 CFR 50, Appendix I, and

- Concentrations of tritium in downstream surface waters and in ground water will be within the limits of the EPA Safe Drinking Water Standard in 40 CFR 141.

PSC indicated that its best estimate is that 500 curies of tritium will be released into the shield water. This estimate is based on an activation analysis of internal core components and on graphite leach testing conducted by the British. PSC also stated that if the tritium released into the shield water is greater than this best estimate, they have established that up to 8000 curies of tritium could be released as liquid effluent over a period of about two years, within the above limitations.

PSC described the analyses performed to assess the impacts on the general public from various potential radiological exposure pathways. These analyses are documented in the Environmental Report Supplement for Decommissioning and they demonstrate that PSC's plans are in compliance with the above limitations. PSC also discussed an enhanced monitoring program to demonstrate that downstream surface water tritium concentrations are within the EPA Safe Drinking Water Standard (20,000 pCi/l) and several possible sampling locations were discussed.

PSC described that the Offsite Dose Calculation Manual (ODCM) is the primary administrative control over effluent releases. The ODCM is currently being revised to reflect decommissioning requirements. PSC committed to ensure that the ODCM and the implementing procedures for the ODCM include: (1) these release concentration limits, (2) methods of calculating dilution flow requirements, (3) methods to account for river flow rates and upstream tritium concentrations to ensure that the downstream tritium concentration will be within the 20,000 pCi/l limitation, and (4) river sampling requirements, as needed to ensure and document compliance with each of the above limitations.

Discussion

Much of the discussion centered around the methods of assuring that tritium concentrations in downstream surface water would be maintained below the EPA Safe Drinking Water Standard. PSC described its plans to base effluent release rates on river flows, so that the calculated concentration of tritium in the river would be [illegible] than 20,000 pCi/l, and to then perform downstream sampling to monitor for compliance. The CDH indicated that their normal practice is to assign a maximum release rate based on a 3-year minimum stream flow. The Environmental Report Supplement discussed typical release rates that would be possible with nominal (or average) river flow rates. PSC agreed to provide the CDH with calculations that supported the discussions in the ER Supplement.

PSC conducted a tour of the liquid effluent release path, from the point where diluted liquid effluent enters the Goosequill Ditch in the unrestricted area, along the Goosequill Ditch for about 8700 feet to the farm pond, and to the outlet of the farm pond. The tour also included the downstream sampling location that has been normally used during the FSV Radiological Environmental Monitoring Program. This location is readily accessible at a public bridge 5 miles downstream of the point where the farm pond outlet discharge enters the S. Platte River. This location has access to power for a continuous sampler. The tour attendees were also shown alternate sample locations closer to the plant. These offer varying degrees of accessibility on a year round basis and various levels of mixing flows from the S. Platte River and St. Vrain Creek; however, they do not have good access to power. Dr. Johnson from CSU indicated that tritium does not plate out of the stream or deposit in river bottom sediments, so the 5-mile downstream sample location would provide representative, well-mixed river water samples. It was agreed that a continuous sampler would be better than taking grab samples. Both PSC and the CDH agreed to consider the relative merits and considerations involved with the various monitoring locations.

The CDH was also interested in other radionuclides that would be discharged as liquid effluent. They indicated that in addition to the NRC's authority for regulating radioactive effluent releases, there are State Standards on three radionuclides (these limits were later determined to be 20,000 pCi/l tritium, 30 pCi/l Cs-134, and 8 pCi/l Sr-90). PSC indicated that they only expect to see Co-60, Cs-137, and Fe-55, in addition to tritium. The shield water system demineralizers will remove all radionuclides except tritium, to average concentration levels that are less than approximately 1 percent of the 10 CFR 20 Maximum Permissible Concentrations. PSC also discussed the ion exchange effect of clay sediments in the bottom of the ditches and the farm pond, that will further remove these radionuclides to negligible amounts. PSC agreed to provide estimates to the CDH of the range of concentrations of Co-60, Cs-137, and Fe-55 that are expected to be in the liquid waste holdup tanks prior to release. Noting that the concentrations in the liquid waste holdup tanks are prior to onsite dilution and would not be released to unrestricted

areas, PSC stated that these radionuclide concentration estimates should not be evaluated against drinking water standards. PSC also agreed to provide the distribution coefficient that describes the ion exchange phenomenon in clay ditch sediments.

The CDH indicated that the renewal of the FSV discharge permit was a priority project, and that a draft permit should be posted for comment by the fourth quarter of 1992. This would be followed by a 30-day public comment period. The CDH also noted that the regulatory climate has changed since the last FSV permit was written. There is greater general interest in water discharge permits, and PSC should not be surprised if outside comments are received.

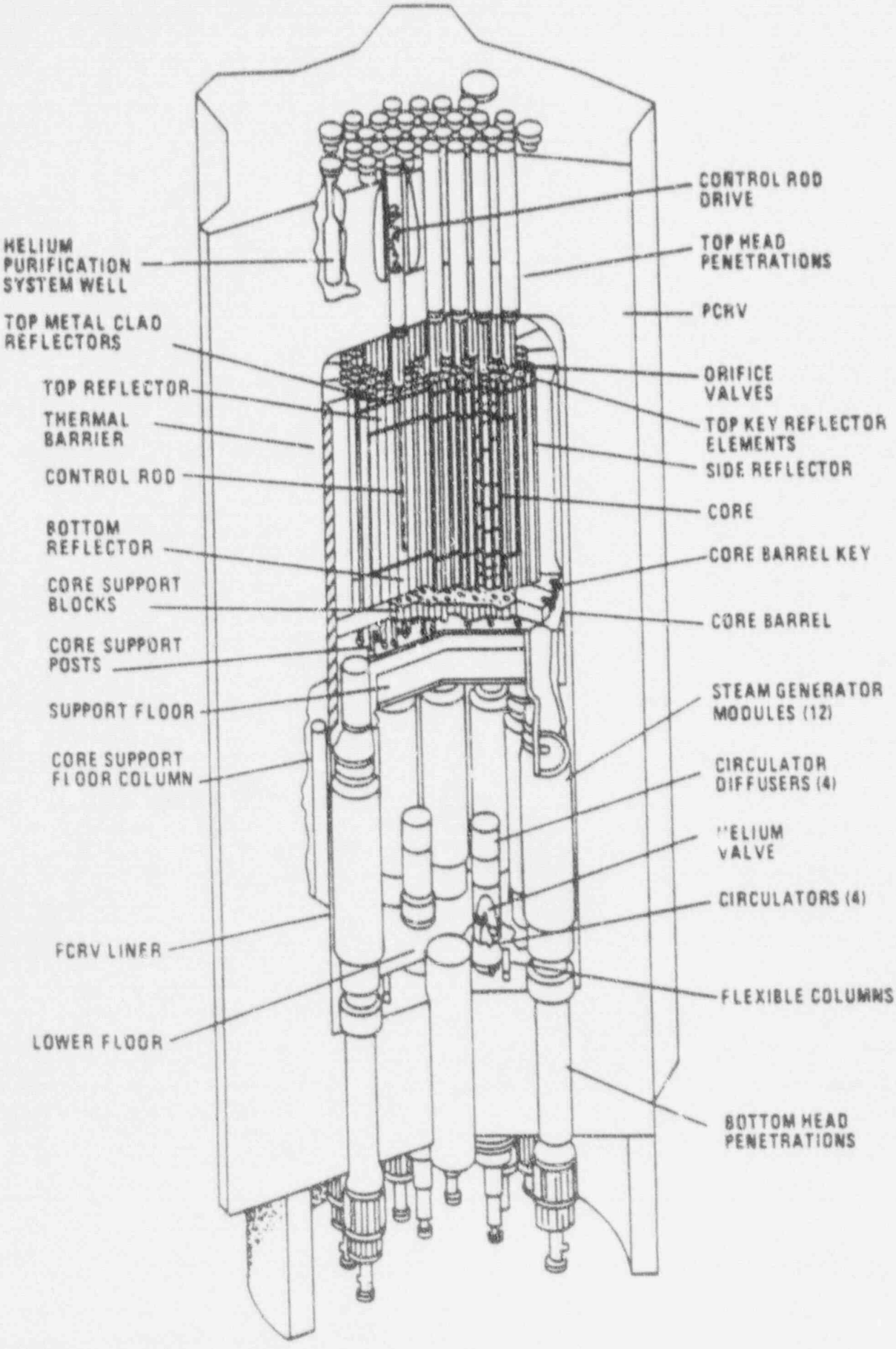
PSC indicated that certain chemical treatment processes would be used in the shield water, as biocides and corrosion inhibitors. PSC agreed to discuss these chemicals and the amounts expected to be used during decommissioning in a separate letter.

Several other topics discussed included storm water discharge permits and sampling for PCBs. PSC stated that PCBs are not a problem at FSV and agreed to provide a one-time analysis of liquid effluent to confirm this fact.

At the conclusion of the meeting, PSC stated that they would prepare a set of minutes to document the meeting and that these minutes would be provided to the NRC. Ken Weaver agreed to contact Pete Erickson of the NRC and discuss the CDH review of FSV decommissioning plans.

PRESTRESSED CONCRETE REACTOR VESSEL DISMANTLEMENT

MIKE NIEHOFF



PICTORIAL OF THE PCRV AND ITS INTERNALS

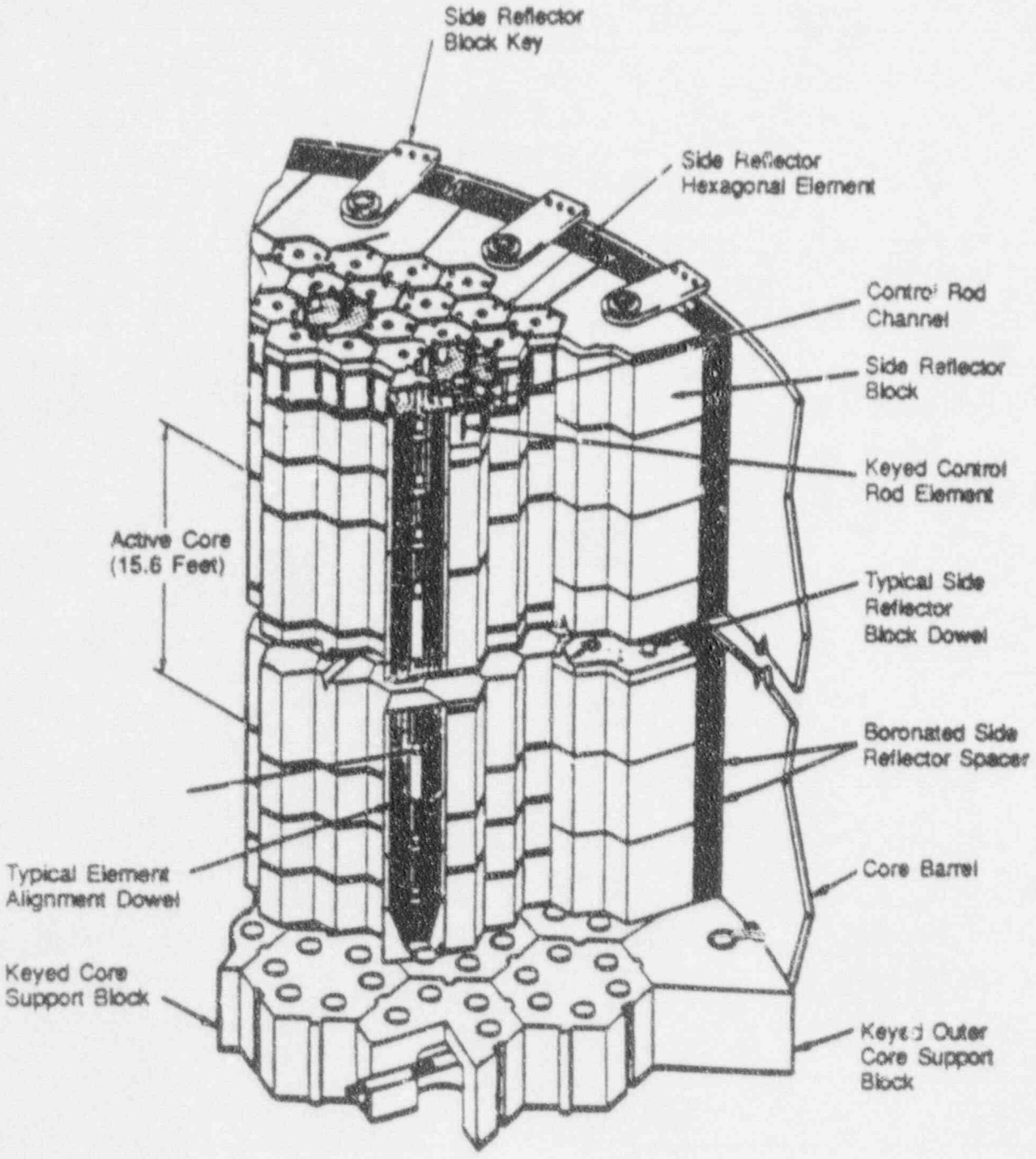


Figure 6-13 Reactor Core - Internal Arrangement

TRITIUM RELEASE ESTIMATE

THEORETICAL MAXIMUM

- ASSUMES MAXIMUM SPECIFICATION LIMIT FOR LITHIUM
- ASSUMES ALL LITHIUM IS ACTIVATED AND BECOMES TRITIUM
- JUNE, 1989 ENGINEERING ANALYSIS CALCULATED THEORETICAL MAXIMUM OF 100,000 ci

VERIFICATION ACTIVITIES

- ACTIVATION STUDY CONCLUDED THAT NEUTRON FLUX ASSUMPTIONS WERE CONSERVATIVE
- SAMPLING OF "SPARE" GRAPHITE BLOCKS INDICATED THAT GRAPHITE CONTAINED ONLY 50% OF SPEC LIMIT
- AUGUST, 1990 ENGINEERING ANALYSIS DETERMINED THAT 50,000 ci WAS A MORE REALISTIC MAXIMUM LIMIT

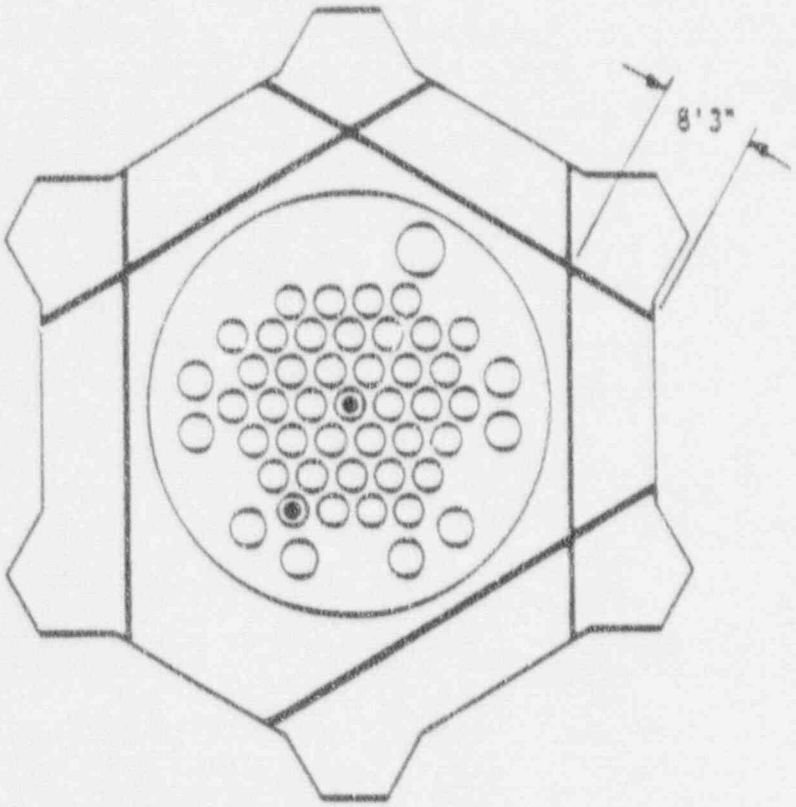
DECOMMISSIONING PLAN ESTIMATE

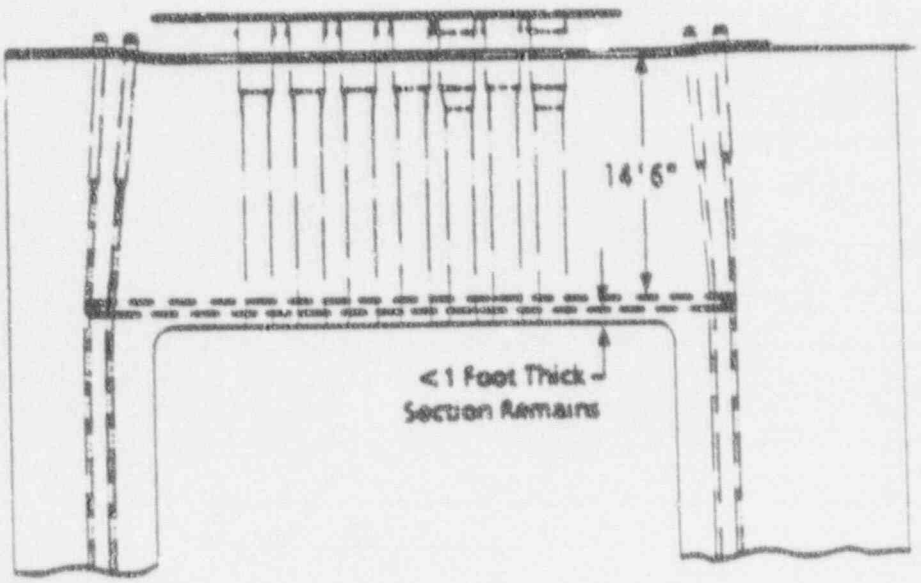
- CONSERVATIVELY BASED ON 100,000 ci THEORETICAL MAXIMUM
- UTILIZED LEACH RATES FROM BRITISH TESTS OF IRRADIATED GRAPHITE (0.5%)
- 500 ci OF TRITIUM CALCULATED TO LEACH INTO PCRV SHIELD WATER

TOP HEAD REMOVAL - 1

PCRV TOP HEAD REMOVAL

The head will be horizontally core drilled five times to form an intersecting network.

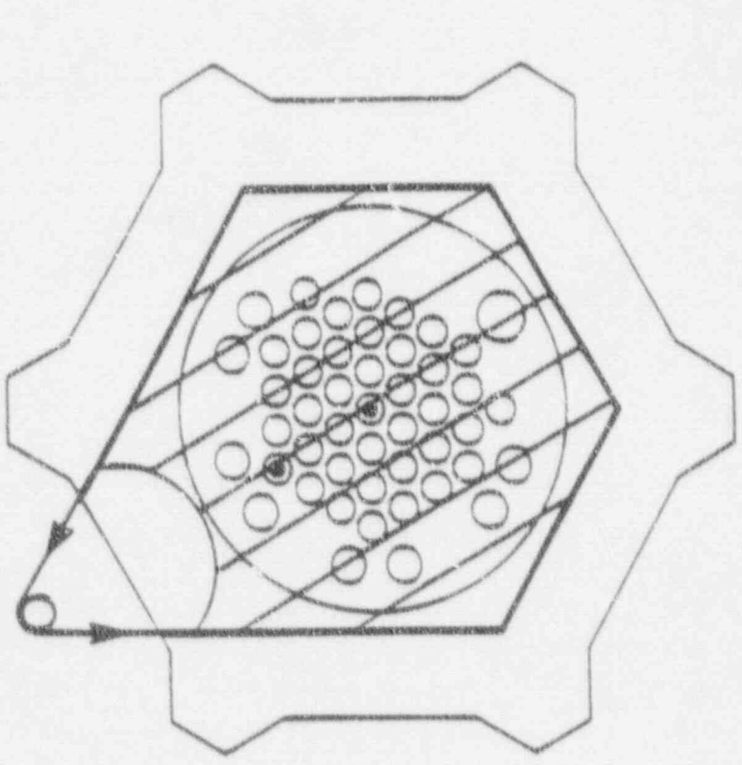


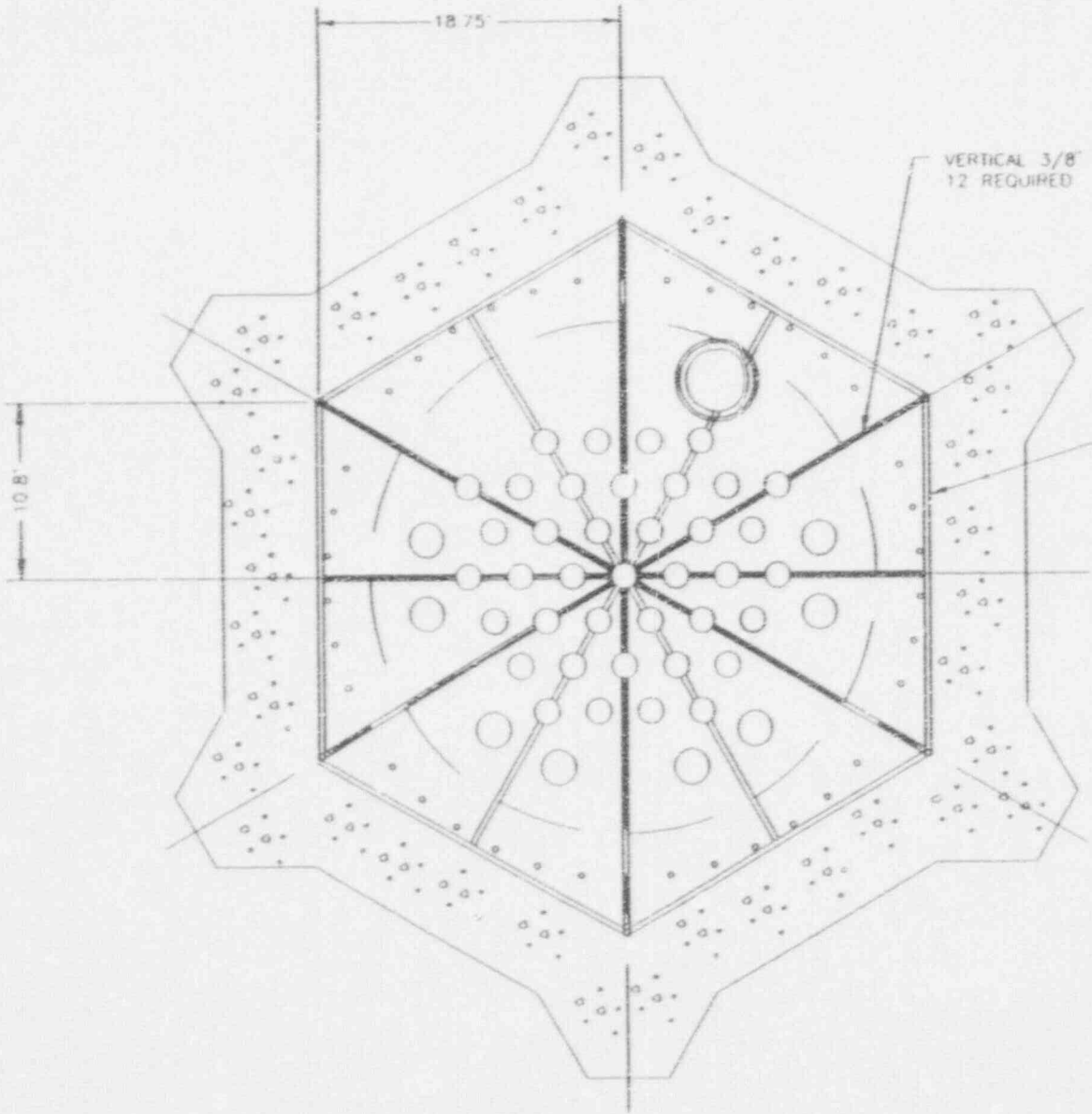


TOP HEAD REMOVAL - 2

PCRV TOP HEAD
REMOVAL

The diamond wire saw will be threaded through the horizontal bores and the area shown will be removed.





PCRV PLAN VIEW
VERTICAL CUTS

NOTE:
1. 3 LAYERS OF 12 BLOCKS, TOTAL OF 36 BLOCKS.

REV	DATE	ECN	DESCRIPTION	BY	CHKD	SUPT RVW	APP'D
A	11/4/91		GENERAL REVISION				
P	6/28/91	X	ORIGINAL RELEASE				

ALL MACHINED SURFACES TO BE FINISHED TO 125 RMS MICRO-INCH U.N.O.

TOLERANCES

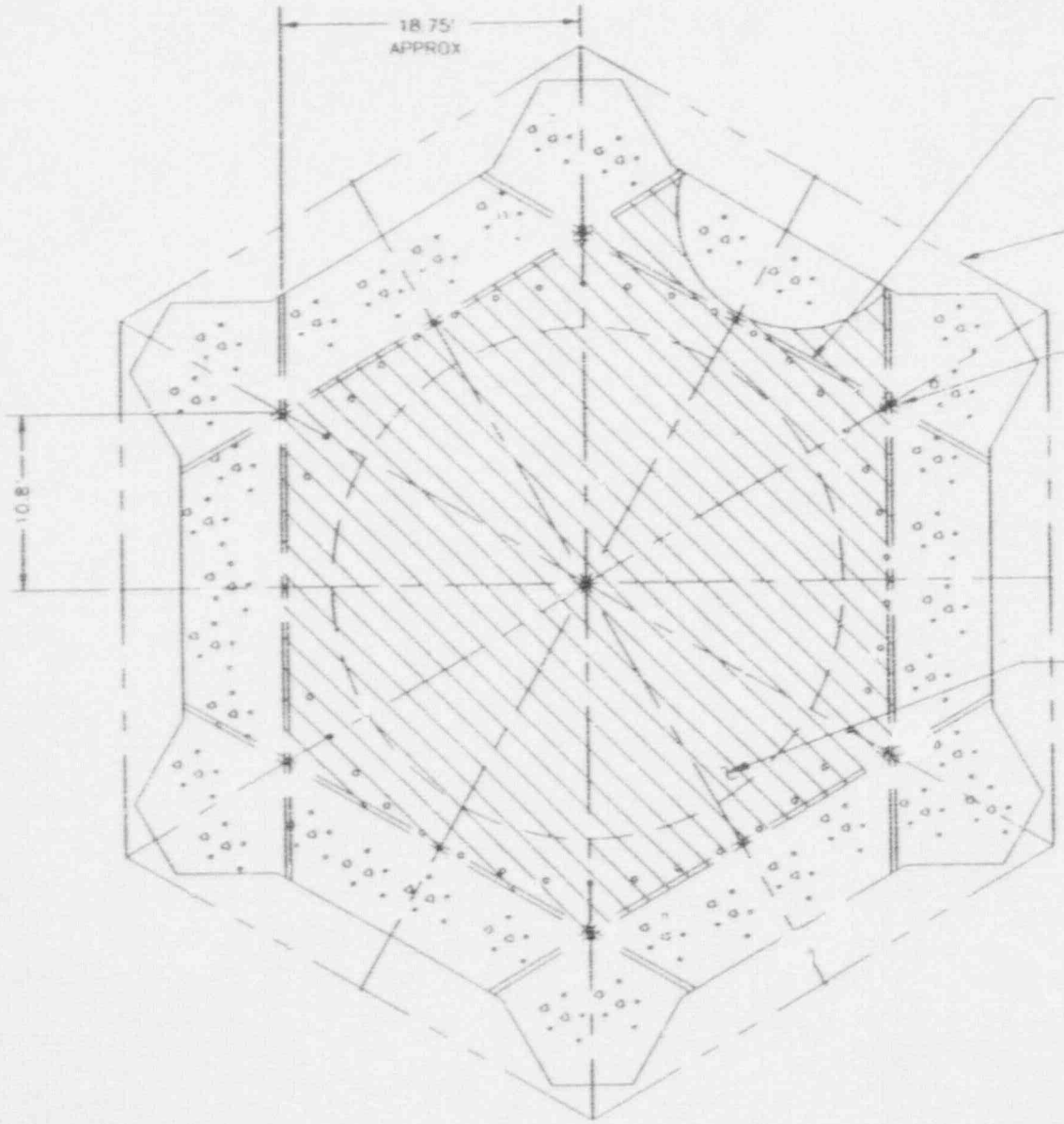
MACHINE	FABRICATE
X ± .1"	.X = ± 1/16"
XX ± .05"	.XX = ± 1/32"
XXX ± .010"	
ANGULAR ± 1°	
CONCENTRICITY .030"	
SCALE NTS	
DWG SIZE - 17 X 22	

Trentec
CINCINNATI, OHIO

WK-FERGUSON COMPANY
FORT ST VRAIN DECOMMISSIONING

PCRV HEAD CUTS
VERTICAL CUTS

CONTRACT NO. E0104 DWG NO. E0104-2



PCRV PLAN VIEW
CORE HOLE PLAN/HORIZONTAL CUT

REV	DATE	ECN	DESCRIPTION	BY	CHK'D	QA/C RVW	APP'D
A1	10/6/94		GENERAL REVISION				
P	6/30/94	X	ORIGINAL RELEASE				

ALL MACHINED SURFACES TO BE FINISHED TO 125 RMS MICRO-INCH U.N.O.

TOLERANCES

MACHINE	FABRICATE
X ± .1"	4'-0" PT 1/16
XX ± .03"	OVER PT 1/16
XXX ± .010"	
ANGULAR ± 1°	
CONCENTRICITY .010"	

SCALE:

DWG. SIZE - 17 X 22

Trentec
CINCINNATI, OHIO

WK-FERGUSON COMPANY
FORT ST VRAIN DECOMMISSIONING

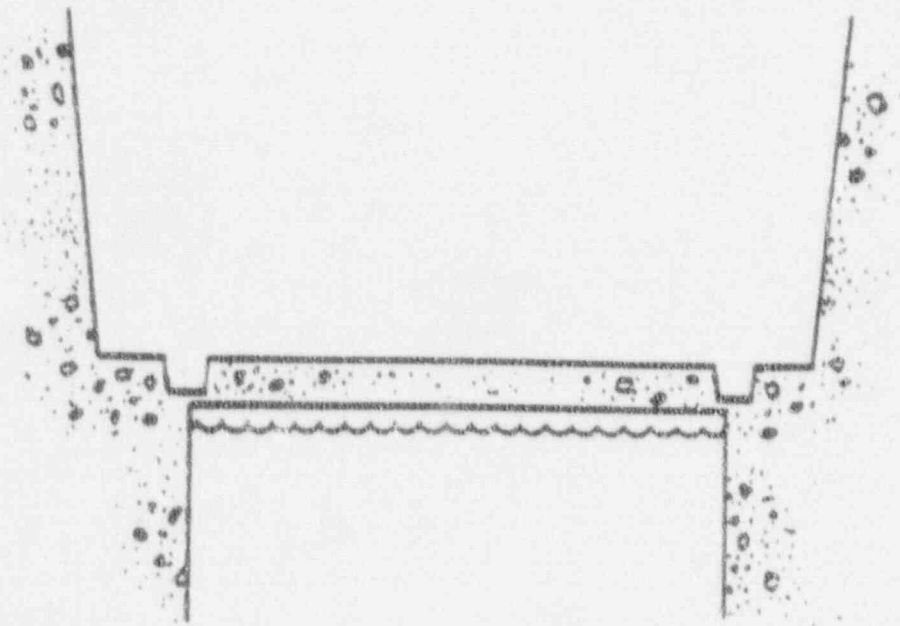
PCRV HEADOUTS
CORE HOLE PLAN/HORIZONTAL CUTS

CONTRACT NO. E0104 DWG NO. E0104-1

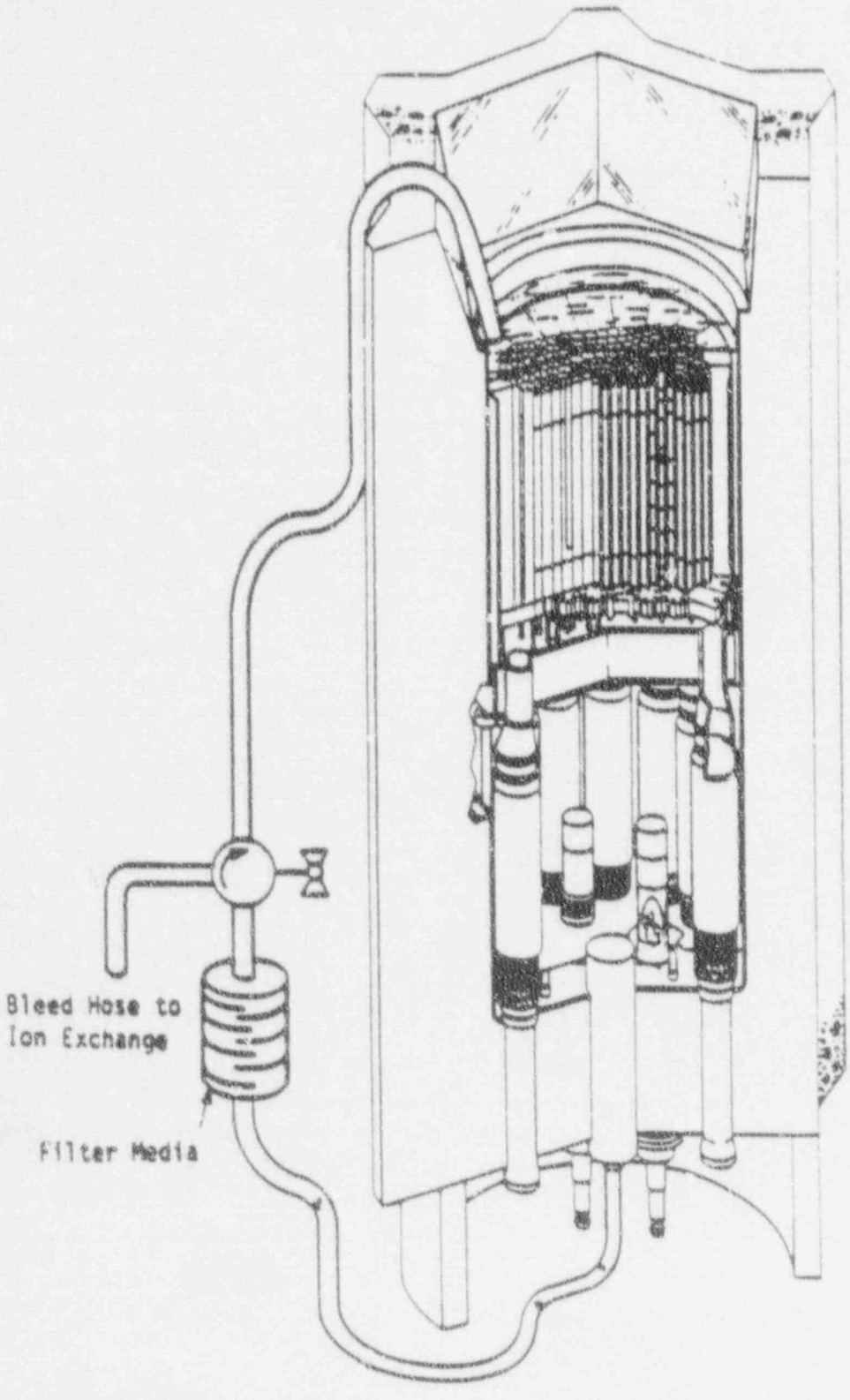
TOP HEAD REMOVAL - 4

PCRV TOP HEAD
REMOVAL

the concrete saw and the ram-hoe equipped mini-max will be used to prepare the final top head section for removal.



PCRV DISMANTLEMENT - 1



PCRV SHIELD WATER SYSTEM

DESIGN FUNCTIONS:

* Shielding for Personnel Protection
* Initial fill of the PCRV with demineralized water
* Feed and Bleed Make-up water
* Maintain water clarity
* Maintain Water Chemistry
  - Corrosion Protection
  - Minimize Biological Fouling
* Provide a controlled means of discharge
  - Discharge Control Manifold
  - Processed through existing liquid waste receivers

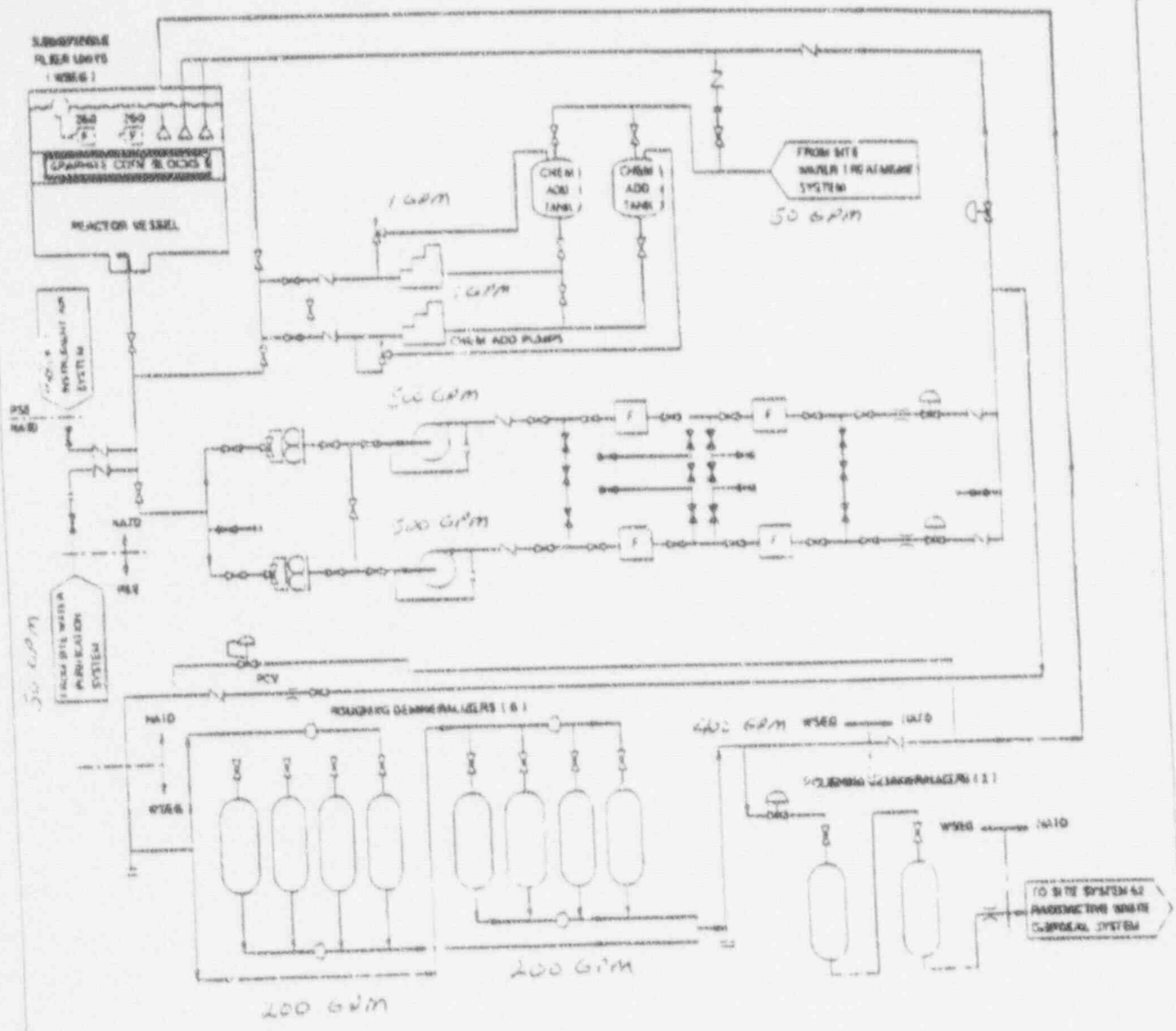
PCRV SHIELD WATER SYSTEM

GENERAL SYSTEM DESCRIPTION:

* Two Main Clarifying Loops
* Two Submersible filter Units
* Roughing Demineralizer System
* Polishing Demineralizer System
* Resin Sluicing & Refill System
* Chemical Injection System
* Central Control Board

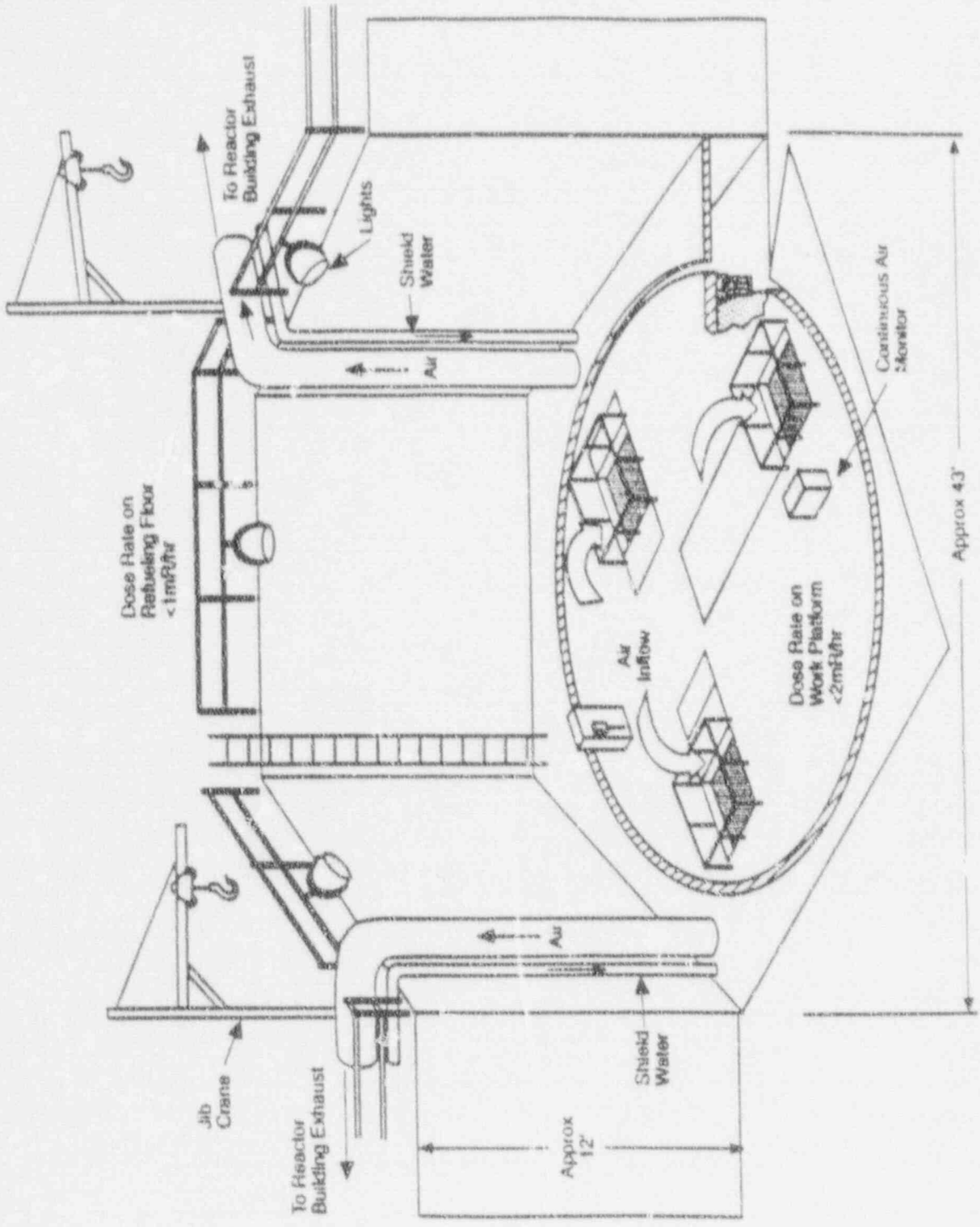
FIGURE 1

FORT ST. VRAIN SHIELD WATER PURIFICATION SYSTEM



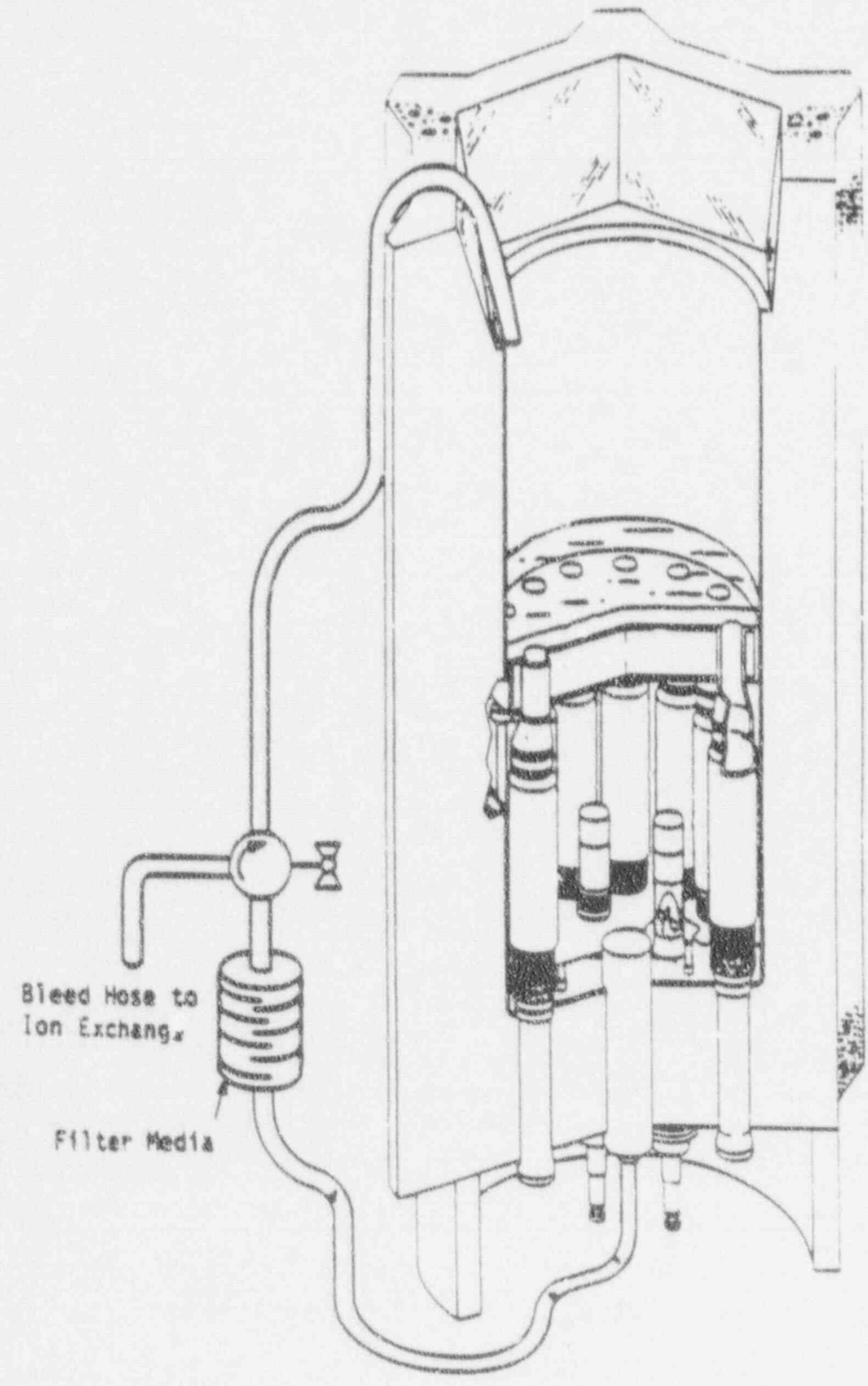
REV NO.	REV DATE	AUTHOR	DATE	CHK'D. BY	DATE	VERIFIED BY	DATE

WESTINGHOUSE FORM 68213H (3/88)

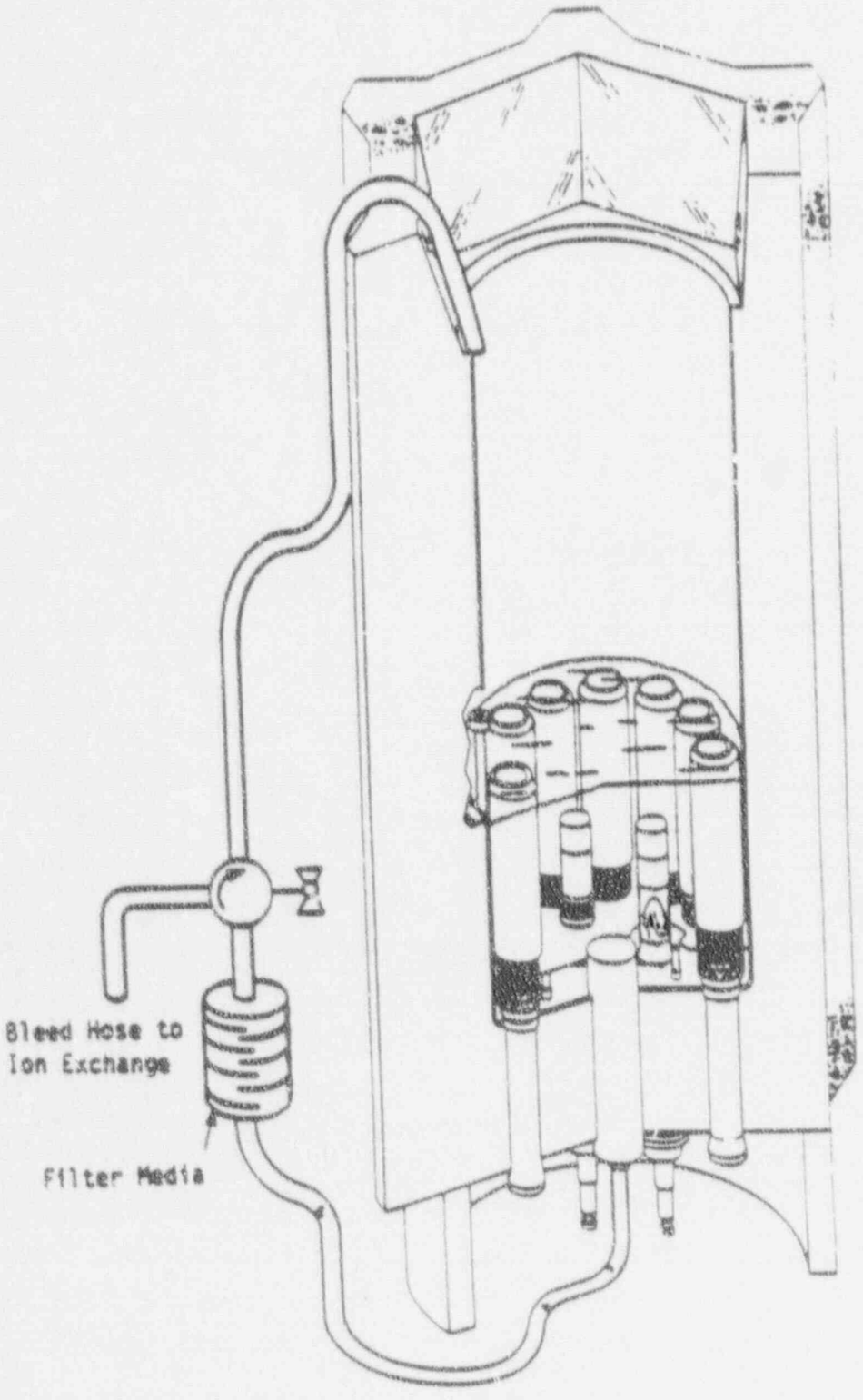


Rotary Work Platform Over PCRV

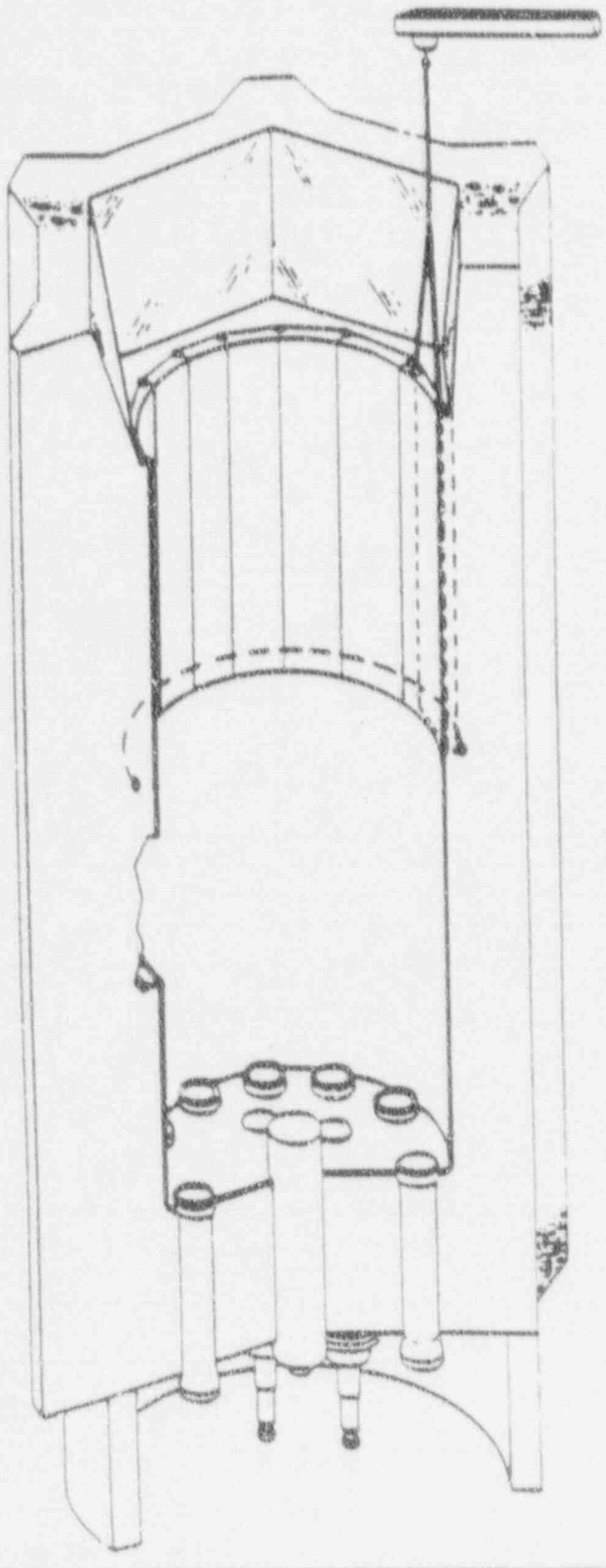
PCRV DISMANTLEMENT - 4



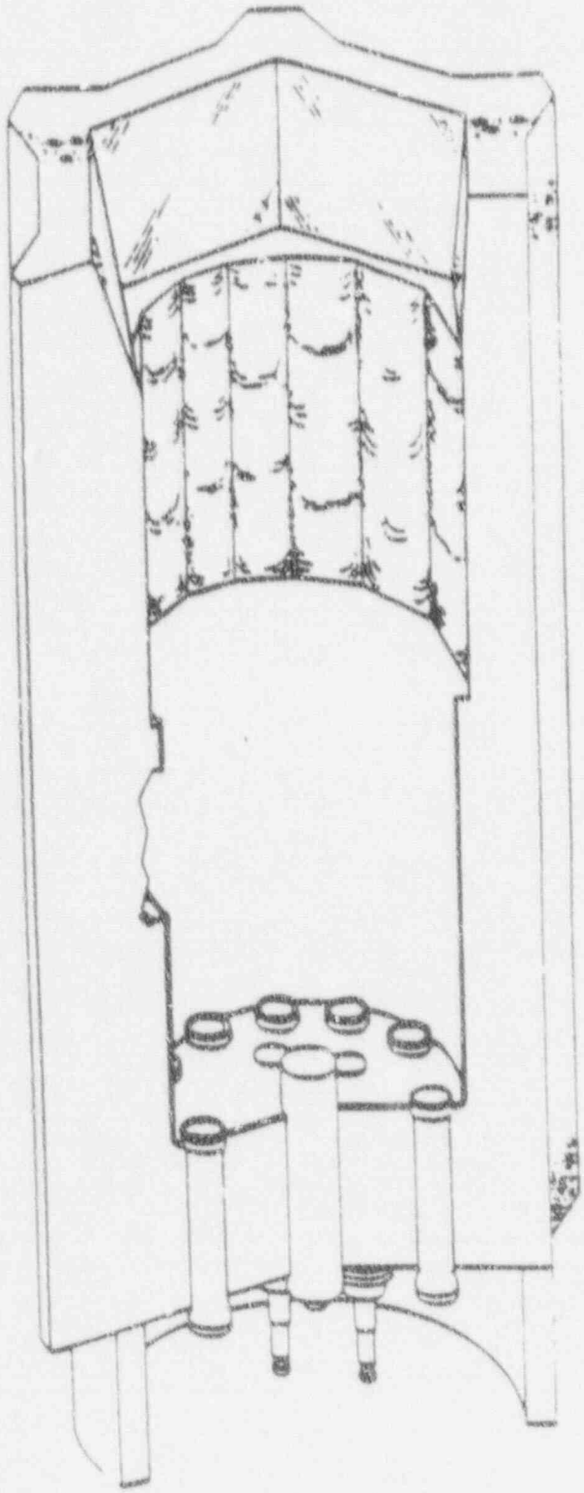
PCRV DISMANTLEMENT - 5



PCRV DISMANTLEMENT - 6



PCRV DISMANTLEMENT - 7



EFFLUENT RELEASE PLANS

FSV DECOMMISSIONING

EFFLUENT RELEASE REGULATIONS

Liquid Effluent Will Be Released In Accordance With Regulations

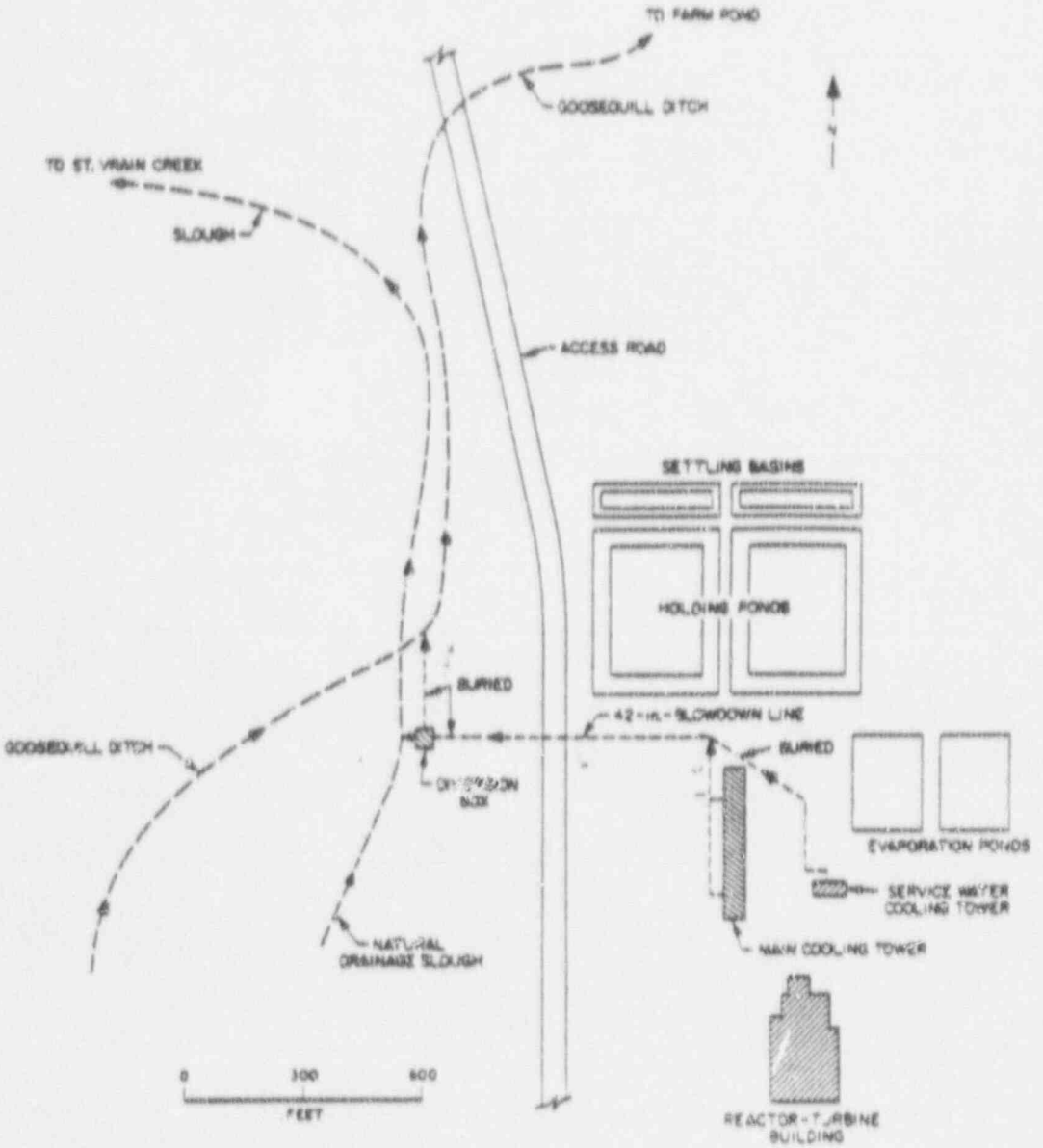
- 10 CFR 20 Maximum Permissible Concentration (MPC) in Goosequill Ditch
  (3 E-3 μCi/ml; 3 E-6 Ci/l; 3 E+6 pCi/l)

- 10 CFR 50 Appendix I dose limits for members of the public
  (3 mrem/year; 1.5 mrem/qtr)

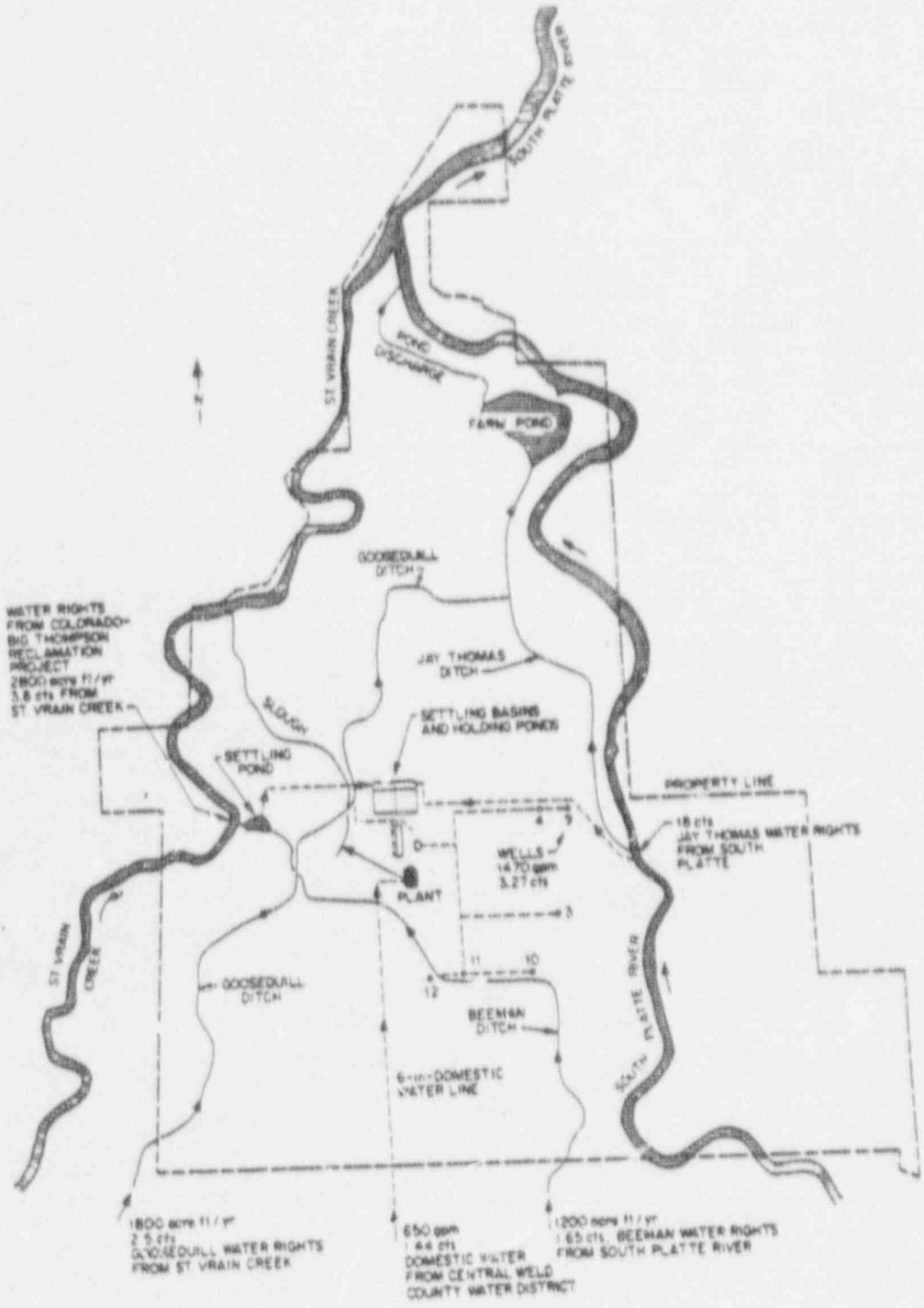
- EPA Safe Drinking Water Standards (40 CFR 141) in downstream surface water
  (20,000 pCi/l; 2 E-5 μCi/ml)

EFFLUENT RELEASE PLANS

- PSC Plans to Release 500 Curies of Tritium Over About 200 Days, Based on Activation Analysis and British Test Data
- In Event Actual Tritium in Shield Water Is Greater, PSC Could Release Up To 8000 Curies of Tritium In Accordance With Above Regulations, Over About a 2 Year Period
- Release Will Be via Normal Effluent Release Pathway
- Release Will Be Monitored By Enhanced Sampling and Analysis Program



DRAINAGE PATHS FOR BLOWDOWN FROM COOLING TOWERS



IRRIGATION DITCHES AROUND FORT ST. VRAIN
NUCLEAR GENERATING STATION

LIQUID EFFLUENT FLOWPATH

- Liquid Effluent Is Released at Approximately 1.4 to 10 gpm

- This Release Water is Diluted By 1100 to 2000 gpm Blowdown Flow, To Less Than 10 CFR 20 MPC (3 E-3 μCi/ml). This Is Concentration In Goosequill Ditch and Farm Pond, to S. Platte River Release Point.

- To Reduce Farm Pond Outlet Water to 20,000 pCi/l (2 E-5 μCi/ml) in Surface Water, a Dilution Factor of 150 is Required.

- Nominal River Flow Downstream of Confluence of St. Vrain and S. Platte is 283,000 gpm. To Achieve Dilution Factor of 150, 1880 gpm Can Be Released via the Goosequill Ditch

- Effluent is Further Diluted in Ground Water (Gilcrest Town Water Supply). CSU Calculations Indicate Tritium Concentrations Of Approximately 1000 pCi/l (1 E-6 μCi/ml).

EXPOSURE PATHWAYS

- Drinking Water From Gilcrest Town Water Supply at 1000 pCi/l
- Ingesting Garden Vegetables Irrigated With River Water at 20,000 pCi/l
- Ingesting Meat or Milk From Cows or Goats Pastured in Fields Irrigated With River Water at 20,000 pCi/l
- Ingesting Waterfowl From River Water at 20,000 pCi/l
- Ingesting Fish in River Water at 20,000 pCi/l

DOSE CONSEQUENCES OF RELEASES

- Maximally Exposed Individual Would Receive:

  0.54 mrem over 200 days of 500 Curie Release
  0.99 mrem/year for 8000 Curie Release

- Integrated Dose to Population Within 50 Miles:

  1.2 person-rem over 200 days of 500 Curie Release
  2.8 person-rem/year for 8000 Curie Release

- Doses Are Within Regulatory Limits (3 mrem/year, 1.5 mrem/qtr)

- Doses Are Less Than 9 person-rem/year Originally Evaluated in the Final Environmental Statement for Plant Operation

ADMINISTRATIVE CONTROLS ON RELEASES

- Releases Will Be Made In Accordance With Off-Site Dose Calculation Manual (ODCM)

- ODCM is Required By Plant Technical Specifications

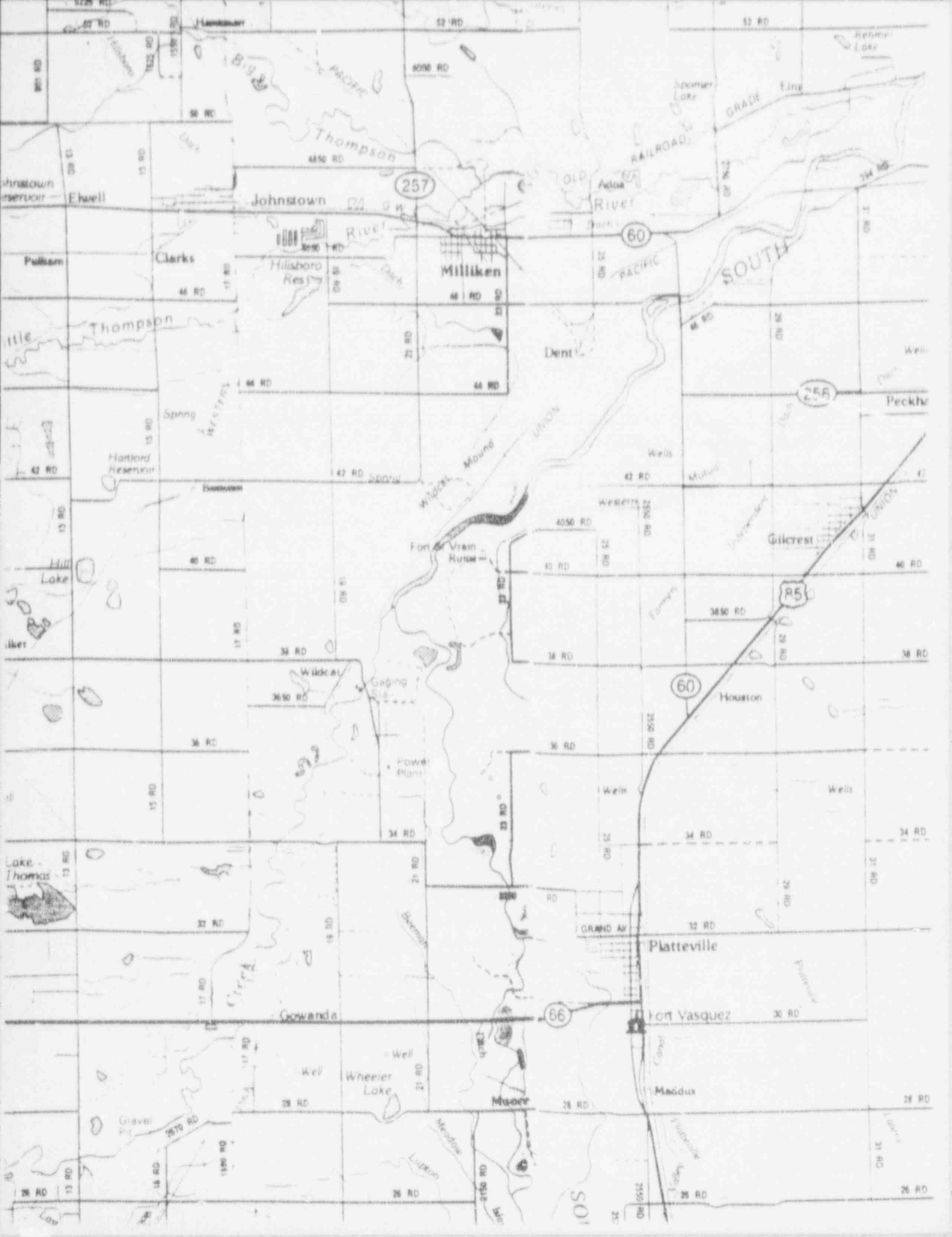
- ODCM Will Require Calculation of Allowable Release Rate Based on:

    - Tritium Concentration in Release Water
    - Dilution Flow in Goosequill Ditch
    - River Flow in S. Platte River
    - Upstream Tritium Concentration in S. Platte River

ENHANCED MONITORING PROGRAM

During Tritium Releases, PSC/CSU Will Perform:

- Weekly Monitoring of Continuous Sampler on Farm Pond
- Weekly Monitoring of Groundwater in Adjacent Farm Wells and In Gilcrest Water Supply
- Daily Monitoring of Surface Water in S. Platte River, Downstream and Upstream For First 3 Months, Weekly Thereafter
- Increased Goosequill Ditch Surveillance to Clear Moss and Debris



52 RD
Big
Thompson
PACIFIC
Spanner Lake
GRADE
RAILROAD
OLD
4850 RD
257
Johnstown
Elwell
Johnstown Reservoir
River
Aduu
60
Clarks
Hillsboro Res
Milliken
SOUTH
Little Thompson
46 RD
Dent
44 RD
256
Peckham
Spring
Hartford Reservoir
Wildcat Mound
UNION
42 RD
Wells
Western
4050 RD
Fort St Vrain Ruins
Gilcrest
Hill Lake
40 RD
85
3850 RD
38 RD
Wildcat
Gaging Sta
3650 RD
Houston
36 RD
Power Plant
34 RD
Lake Thomas
32 RD
GRAND AV
Platteville
Gowanda
66
Fort Vasquez
30 RD
Well
Wheeler Lake
Maddux
Moore
28 RD
Gravel Pit
2670 RD
Meadow
26 RD