NRC Research and Technical Assistance Report

LETTER REPORT

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Responsible NRC Individual and NRC Office or Division

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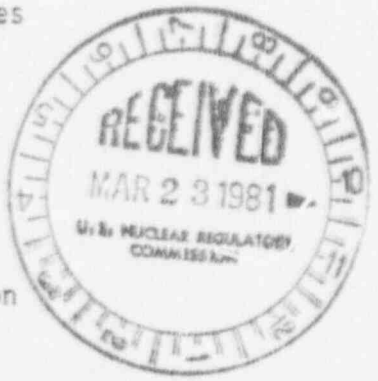

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LETTER REPORT

NRC Research and Technical Assistance Report

Date: March 2, 1981

NRC Research and Technical Assistance Report

To: G. S. Lewis
Systems Performance Branch
Safeguards, Fuel Cycle and Environmental Branch
U. S. Nuclear Regulatory Commission

From: D. E. Robertson
Physical Sciences Department
Battelle, Pacific Northwest Laboratories

Subject: Progress Report for January and February, 1981

Characterization of Radionuclide Contamination Throughout Light Water Reactor Power Stations

Spending Schedule

This program was funded at $100K for FY 1979, $260K for FY 1980 and $280K for FY 1981 for a total funding to date of $640K. Portions of the FY 1979 and FY 1980 funding were carried over to the following fiscal years. As of February 22, 1981 expenditures have amounted to $379K and $261K remain. We are significantly below a linear spending rate for the program (see chart), but this is due to delays in the program in gaining access to the Indian Point Unit 1, which was to be our second reactor to be studied following the Pathfinder work. This spring and summer will be a very busy time and we should get caught up with much of the sampling and measurements program. As a result, the spending rate will also increase proportionally.

Project Management

Because of the untimely delay in gaining access to the Indian Point Unit 1, it has become necessary for us to revise the reactor measurements program and initiate further contacts with other utilities to seek permission to conduct our study at their generating units. This revision has been accomplished and incorporates the suggestions of the NRC Decommissioning Research Review Group and comments from members of PNL's Health Physics Appraisal Program being conducted for NRC.

Based on discussions with utilities and subsequent site visits we have obtained tentative approval to study the following plants:

Plant	Utility	Location	Type	MWe	Startup Date
Humbolt Bay Power Plant-Unit 3	Pacific Gas & Electric Co.	Eureka, CA.	BWR	65	1963
San Onofre Nuclear Generating Station-Unit 11	Southern California Edison	San Clemente, CA.	PWR	436	1967
Monticello Nuclear Generating Plant	Northern States Power Company	Monticello, MI.	BWR	545	1971
Turkey Point Station--Units 3 & 4	Florida Power and Light Co.	25 Mi. S. of Miami, FL	PWR	693	1972

We are tentatively scheduled to conduct our first sampling and measurements program at Humbolt Bay during the second week in April, 1981. At this time we will subsample cut-out sections of piping and hardware stored on-site, sample piping from systems not in use and conduct concrete coring. Then following a major outage at the Units 1 and 2 (oil and gas fired units) we will return in June or July, 1981 to finish sampling the systems requiring more of their personnel manpower.

We tentatively scheduled a visit to Monticello around the last of April, 1981 during a [illegible] when they will be removing part of the reactor water purification lines. At this time we will subsample sections of cut-out piping that is available and perform concrete coring. Then in October, 1981 we will return to Monticello during a maintenance outage in which more piping will be replaced to subsample it and obtain any other samples of opportunity.

The San Onofre Nuclear Generating Station is currently in the process of resleeving their steam generators. During this operation a number of useful samples will be available. Mr. William Allen, an H. P. consultant hired by SCE for the resleeving project has been very helpful and cooperative in assisting us in obtaining contaminated samples during the resleeving project. Following the completion of the resleeving project we hope to return to San Onofre to conduct concrete core sampling and obtain any other samples of opportunity from other systems and components.

We have just received a positive reply from Florida Power and Light Company to conduct our study at their Turkey Point Station, Units 3 and 4. These units will be undergoing replacement of their steam generators this fall, and this will undoubtedly result in much piping and hardware becoming available for us to subsample. I will be continuing my communication with FP&L and perhaps schedule a visit to Turkey Point on my next trip east. I anticipate the sampling and measurements work at Turkey Point would be conducted sometime between October, 1981 and April, 1982.

Both the Monticello and San Onofre operating plants have been classified by PNL's Health Physics Appraisal Program as being average in housekeeping practices and are not particularly "dirty" plants. Based on discussions with Leo Faust and his appraisal team we have selected the reactors shown in Table I for consideration in conducting our sampling and measurements program. The reactors are classified into "Poor Housekeeping" plants which exhibit considerable contamination, and "Good Housekeeping" plants which have been operated in a meticulously clean manner. The plants are listed in a priority based on how they stack up according to Faust and his people. Another important selection criteria, which will be determined in the next month, is whether or not the plants will be undergoing any major maintenance during which piping and hardware samples will become available. It has been our experience thus far that operating plants simply will not consider opening-up or cutting into existing piping or other operational systems to provide us with samples. However, a judicious selection of one "dirty" and one "clean" plant from the list in Table I, which are undergoing sufficient replumbing to supply us with adequate samples should be feasible.

With the inclusion of Turkey Point Station and two other operating plants to be selected, the total number of power plants to be studied during this project has been increased from five to eight. I believe that this increase can be accommodated in our revised plan because it appears that we will be much more limited in the number and types of samples that will be available from the operating plants. Since we will not be able to conduct the more comprehensive sampling in the operating plants as originally planned, I would recommend that we collect and analyze the samples of opportunity that become available from the five operating plants to be studied (Monticello, San Onofre, Turkey Point and two others). I would be happy to hear NRC's feelings concerning this recommendation.

Task 1 -- Literature Review

The initial literature review has been completed and produced a dearth of information on residual radionuclide contamination in nuclear power plants. Many of the utilities undoubtedly have in their archives some information in this regard, but it is generally unavailable and it would be beyond the scope of this task to try to compile data from utility files. We are continuing to update our literature file when we run on to new reports being issued. Presently, the data are so scarce that to summarize and document it would appear nonprofitable.

Task 2 -- Measurement Plan

Detailed measurement plans for Pathfinder and Indian Point Unit 1 have been constructed, as well as a generic plan to use in discussions with the utilities. Tentative measurement plans for Humbolt Bay, Monticello and San Onofre have been developed and are enclosed in the accompanying letters to the appropriate utilities. This task is an ongoing portion of the program, since detailed plans are developed for each reactor to be examined.

Task 3 -- Sample Acquisition and Analysis

The Pathfinder samples are in their final stages of analysis and should be completed by mid-April. An inventory and disposition list of the Pathfinder samples is enclosed.

Task 4 -- Site Specific Data Assessment

A trip was made in January to the Pathfinder reactor to accumulate their operating reports and engineering blueprints of the contaminated systems of the plant. This information will allow us to construct an assessment of the radionuclide inventory in the plant and evaluate the operations of the plant. This task has already begun and should be finished in mid-April to supply the data for a topical report on Pathfinder to be issued the first of May.

Task 5 -- Predictive Model Development

This task has not yet begun, but will be initiated as more reactors are examined and further data become available. Dick Smith will be a major contributor in this task.

TABLE I

Nuclear Power Plants for Consideration in Conducting Residual Radionuclide Measurements

"Poor Housekeeping" Plants

Plant	Utility	Location	Type	MWe	Startup Date
1. Arkansas Nuclear One Unit 1	Arkansas Power & Light Company	Russellville, AR	PWR	850	1974
2. Dresden Nuclear Power Station--Units 2 & 3	Commonwealth Edison	Morris, IL	BWR	794	1970
3. Edwin I. Hatch Nuclear Plant--Unit 1	Georgia Power Company	Baxley, GA	BWR	777	1974
4. Crystal River Plant--Unit 3	Florida Power Corporation	Crystal River, FL	PWR	825	1977

"Good Housekeeping" Plants

1. Rancho Seco Nuclear Generating Station	Sacramento Municipal Utility District	Herald, CA	PWR	918	1974
2. Point Beach Nuclear Plant--Unit 1	Wisconsin Electric Power Co.	Manitowoc, WI	PWR	497	1970
3. Fort Calhoun Station--Unit 1	Omaha Public Power District	Omaha, NB	PWR	457	1973
4. Kewaunee Nuclear Power Plant--Unit 1	Wisconsin Public Service Corp.	27 Mi. E. of Greenbay, WI	PWR	535	1974

PNL Schedule/Progress of Deliverables -- FY 81

Task 1. Literature Review

A.	Initial literature review	Percent complete 100
B.	Updating of initial review	Percent complete 50

Task 2. Measurement Plan

A.	Initial Generic Plan	Percent complete 100
B.	Pathfinder Plan	Percent complete 100
C.	Indian Point Plan Submit final plan by June, 1981	Percent complete 80
D.	Humbolt Bay Plan Submit final plan by June, 1981	Percent complete 80
E.	San Onofre Plan Submit final plan by June, 1981	Percent complete 50
F.	Monticello Plan Submit final plan by October, 1981	Percent complete 50
G.	Operating plant to be selected Submit initial plan by June, 1981	Percent complete 20
H.	Operating plant to be selected Submit initial plan by June, 1981	Percent complete 20
I.	Turkey Point Plan Submit initial plan by June, 1981	Percent complete 20

Task 3. Sample Acquisition and Analysis

A.	Pathfinder Sampling completed in July, 1980 Analysis of samples completed in April, 1980	Percent complete 80
B.	Humbolt Bay Site visit in February, 1981 Initial sampling and measurements in April, 1981 Complete measurements by December, 1981	Percent complete <5
C.	Monticello Site visit in February, 1981 Initial sampling and measurements in April-May, 1981 Complete measurements by February, 1982	Percent complete <5
D.	San Onofre Site visit in February, 1981 Samples being collected during March-June, 1981 Follow-up sampling and measurements in summer or fall of FY 1981	Percent complete 20
E.	Indian Point Site visits in FY 1979 and FY 1980 Initial sampling and measurements in summer or fall of FY 1981 Measurements completed by April, 1982	Percent complete <5
F.	Operating plant to be selected Site visits, sampling and measurements in FY 1982 Measurements completed by July, 1982	Percent complete <5
G.	Operating plant to be selected Site visits, sampling and measurements in FY 1982 Measurements completed by July, 1982	Percent complete <5
H.	Turkey Point Initial sampling and measurements between October, 1981 and April, 1982	Percent complete <5

Task 4. Site-Specific Data Assessment

A.	Pathfinder Topical report to be submitted in May, 1981	Percent complete	50
B.	Humbolt Bay Topical report to be submitted by January, 1982	Percent complete	<5
C.	San Onofre Topical report to be submitted in April, 1982	Percent complete	<5
D.	Monticello Topical report to be submitted in March, 1982	Percent complete	<5
E.	Indian Point Topical report to be submitted in June, 1982	Percent complete	<5
F.	Operating plant to be selected Topical report to be submitted by August, 1982	Percent complete	<5
G.	Operating plant to be selected Topical report to be submitted by August, 1982	Percent complete	<5
H.	Turkey Point Topical report to be submitted by August, 1982	Percent complete	<5

Task 5. Predictive Model Development

A.	Compilation of all data Complete by September, 1982	Percent complete	15
B.	Model development Complete by September, 1982	Percent complete	<5
C.	Final report Due September, 1982	Percent complete	<5

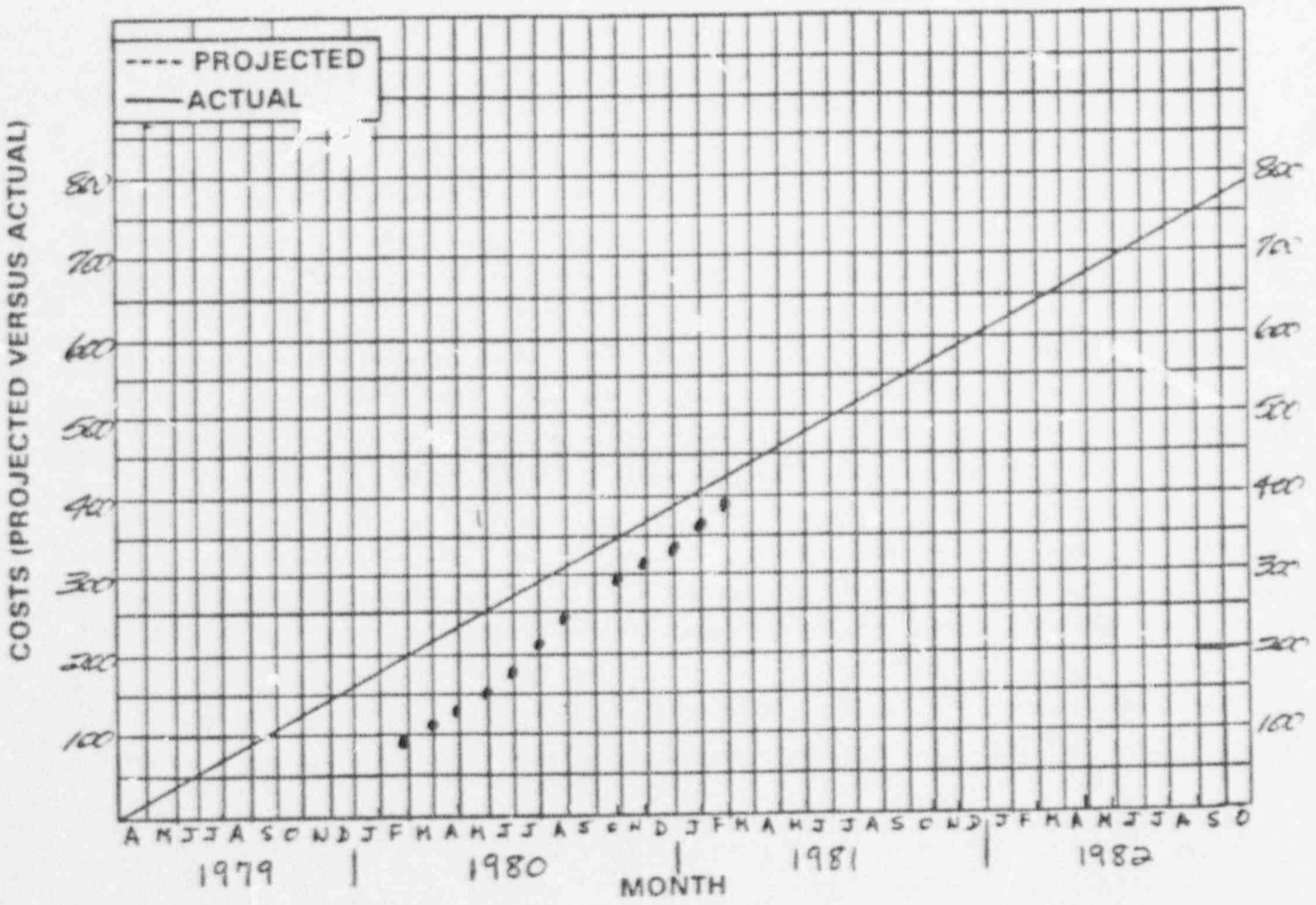
MONTHLY PROGRESS/VARIANCE REPORT

DATE PREPARED: January 5, 1981
SPONSOR: NRC-SAFER
PROJECT FUNDING: $790K
PROJECT MANAGER: D. E. Robertson
PROJECT TITLE: Char. Radionuclide Contam.
PROJECT START DATE: April 1, 1979
PROJECT COMPL. DATE: September 30, 1982
LEAD LINE MANAGER: J. S. Fruchter

1. MAJOR OBJECTIVES

Measure inventory and distribution of long-lived radioactivity in nuclear power plants to provide information for formulating policies and guidelines for decontamination and decommissioning.

2. PROJECT COSTS



Pathfinder Sample Inventory and Disposition - Sampled July, 1980

Sample Number	ID Number	Sample Description	Exterior Surface Activity (GM-d/m)	Disposition
1	WP-76 300-A	3 1/2" dia. SS pip. from reactor water purification line--end with 1" pipe welded in at 90°--pipe stored in reactor building	8,500 thru pipe 40,000 at open end of pipe	Cut into following pieces 300A-2 300A-1 300A-4 300A-3
2	WP-76 300-B	Same as No. 1--next 6" long piece of straight pipe	40,000 at open end of pipe	Given to J. R. Ivine
3	WP-76 300-C	Same as No. 1--next 6" long piece of straight pipe	45,000 at open end of pipe	Archive sample
4	WP-42 No. 11	1 3/4" dia. hole saw plug from 8" dia. pipe from carbon steel reactor feedwater pump suction--pipe stored in reactor building	<200 outside surface	Directly counted on Ge(Li)--leached for radiochemistry
5	WP-74 301-A	2" dia. hole saw plug from 8" dia. pipe from carbon steel reactor feedwater line--pipe stored in reactor building	30,000 at inner surface of pipe 25 through pipe	Directly counted on Ge(Li)- leached for radiochemistry
6	WP-74 301-B	Same as No. 6	50,000 at inner surface of pipe	Directly counted on Ge(Li)--sent to J. R. Divine
7	Concrete Core No. 1	see accompanying listing		
8	Concrete Core No. 2			
9	MSB-A	2" dia. hole saw plug from 6" dia. carbon steel pipe from main steam bypass line sampled at second level of steam chase 5' above grating--reactor building	--	Directly counted on Ge(Li)--leached for radiochemistry
10	MSB-B	Same as No. 9	17,000 at inner surface of pipe	Directly counted on Ge,Li)
11	MSB-C	Same as No. 9	15,000 at inner surface of pipe	Directly counted on Ge(Li)--sent to J. R. Divine

Sample Number	ID Number	Sample Description	Exterior Surface Activity (GM-d/m)	Disposition
12	RFW-A	2" dia. hole saw plug from 8" dia. reactor feedwater line--sampled from 3rd level of steam chase 3' above [illegible] ting in reactor building	45,000 on inside surface of plug	Directly counted on Ge(Li)--leached for radiochemistry
13	RFW-B	Same as No. 12	55,000 on inside surface of plug	Counted directly on Ge(Li)--sent to J. R. Divine
14	SPC-A	2" dia. hole saw plug from 6" dia. shield pool cleanup line--sampled at Y near hot spot on 3rd level of steam chase in reactor building--heavy corrosion film red on top and yellow on bottom	55,000 on inside surface of plug	Directly counted on Ge(Li)--leached for radiochemistry
15	SPC-B	Same as No. 14	25,000 on inside surface of plug	Directly counted on Ge(Li)--sent to J. R. Divine
16	RLL-A	5" long section of 2 3/8" dia. pipe from reactor liquid level column (lower leg)--from reactor building	100,000; 61 m rad; 1 mR at end of pipe	Not cut up--leached for radiochemistry
17	RLL-B	Same as No. 16	Same as No. 16	Sent to J. R. Divine
18	TR-A	Strip of SS cut from tool rack on south side of bottom of shield pool--reactor building	100 c/m thru plastic bag	Sent to J. R. Divine
19	TR-B	Same as No. 18	1,900 c/m thru plastic bag	One piece 12" long x 3" wide x 1/4" thick cut into four pieces 3" long--also two 3/4" SS nuts and washers labeled TRB-NW
20	SPD-A	End of ~4" dia. SS drain pipe from bottom of shield pool (NE side of shield pool)--reactor building	1,400 c/m thru plastic bag	
21	SPD-B	Same as No. 20	1,500 c/m thru plastic bag	Sent to J. R. Divine
22	FHR-A	2 1/2" dia. SS pipe section from fuel shoot support strut at bottom of shield pool--reactor building	300 c/m thru plastic bag	14" long piece cut into 3 pieces 4" long piece sent to J. R. Divine 4" long piece for leaching for radiochemistry 4" long piece for archives
23	SPC-A	3 1/2" dia. SS pipe from fuel storage pool cleanup line- sampled at basement of fuel handling building--line from bottom of fuel storage basin to filter--demin. cleanup in FHB basement	80,000	Cut into two pieces 2-3" long for leaching for radiochemistry

Sample Number	ID Number	Sample Description	Exterior Surface Activity (GM-d/m)	Disposition
24	SPC-B	Same as No. 23	80,000	Sent to J. R. Divine
25	PWC-A	2" dia. carbon steel from pool water cleanup pump--discharge to Series 11--pool water for storage basin and shield pool to inlet of No. 11 prefilter--sampled from fuel handling building basement	20,000	Sent to J. R. Divine
26	PWC-B	Same as No. 25	20,000	4" long piece--not cut up--leach as is for radiochemistry
27	PDD-A (no B taken)	2 3/8" dia. SS pipe from inlet to demin. for water from storage and shield pools--sampled from fuel handling building basement	2,000	Cut into three pieces 5" long piece for archive 3 1/2" long piece sent to J. R. Divine 3 1/2" long piece for leaching
28	PDI-A (no B taken)	2" dia. SS pipe from inlet to demin. for storage and shield pools--sampled in SE corner of basement of fuel handling building	15,000	Cut into three pieces 4" long piece for archive 3" long piece sent to J. R. Divine 4" long piece cut into two 2" long pieces for leaching
29	SPCB-A (no B taken)	3 1/2" dia. carbon steel pipe from shield pool coolant bypass-water from shield pool to filter demin.--sampled in SE corner of basement of fuel handling building	2,500	Cut into two pieces 3" long piece sent to J. R. Divine 4" long piece for leaching
30	CWTD-A	2" dia. SS pipe from concentrated waste tank discharge line--sampled from basement of fuel handling building	--	4" long piece--not cut up--leach as is
31	CWTD-B	Same as No. 30	--	Sent to J. R. Divine
32	SRTD	1 3/8" dia. x 7" long SS pipe from spent resin tank discharge line--sampled from basement of fuel handling building	--	Cut in half 3 1/2" long piece sent to J. R. Divine 3 1/2" long piece for leaching
33	HSHT	2" dia. SS elbow pipe from high solids holdup tank--just upstream of suction pump--includes resin and black crud trapped in bend--sampled from basement of fuel handling building	--	Cut into two pieces 3" long straight piece sent to J. R. Divine 4" long elbow for leaching--crud removed from elbow and bagged
34	IFDP	3 1/2" dia. x 12" long SS pipe from inlet line to filter--demin. purification system--sampled from basement of fuel handling building	--	Cut into three pieces 3" long piece sent to J. R. Divine 3" long piece for archives 4" long piece for leaching

Sample Number	ID Number	Sample Description	Exterior Surface Activity (GM-d/m)	Disposition
35	VRM	Brass valve in PVC pipe from high solids manifold line to radiation monitor--sampled from mezzanine level of fuel handling building	>100,000 c/m 45 mRem/hr 25 mR/hr at contact	Opened brass valve and found very coarse gravel-like particles plugging the valve and 1" PVC line--removed particles and bagged--discarded valve and PVC pipe which contained little activity
36	RS-A and B	1 7/8" dia. SS line to reactor sump pump--sampled at bottom of reactor sump chase--horizontal section before going to filter and pump	1,000 at end of pipe	A. 8" long piece cut into (3) 2 1/2" long pieces for leaching B. 8" long piece sent to J. R. Divine
37	RSE	Black iron elbow connecting 1 7/8" SS pipe to line going to filter and pump of reactor sump--sampled at bottom of reactor sump chase just downstream from RS-A and B	30,000 at end of pipe	Cut off black iron elbow from 4" long piece of SS 1 1/2" dia. pipe--saved pipe and labeled RSE-PIPE
38	WGPT	2 1/2" dia. hole saw plug from 1/2" thick carbon steel waste gas pressurizer tank (large steel tank)--sampled from mezzanine level of fuel handling building where tank stored	<1,000 dpm on inside surface of plug	Leached for radiochemistry
39	RAVD	8 1/2" x 12" section of 1/16" thick galvanized iron reactor air vent duct--sampled from mezzanine level of fuel handling building where ducts stored	<1,000 dpm on inside surface of duct	Cut up for leaching
40	SHFBS-A	1" dia. SS tube from cluster used for storing superheater fuel elements--sampled from bundle No. 1 in fuel storage basin	3,000	Cut into three pieces 3-4' long for leaching
41	SHFBS-B	Same as No. 40	3,000	Sent to J. R. Divine
42	SHFBS-C	Same as No. 40, except taken from bundle No. 2	15,000	Cut into six pieces 2-3" long for leaching
43	MSL-A	2 5/8" dia. hole saw plug from main steam line--6' long piece stored in fuel storage basin	70,000	Counted directly on Ge(Li) and then leached for radiochemistry
44	MSL-B	Same as No. 43	70,000	Sent to J. R. Divine
45	FRSB-A	Piece of SS fuel rack from fuel storage basin--top piece 2" dia. x 5" long piece from east end of rack	250,000	Cut into two 2" long pieces for leaching

Sample Number	ID Number	Sample Description	Exterior Surface Activity (GM-d/m)	Disposition
46	FRSB-B	Same as No. 45	300,000	Sent to J. R. Divine
47	FRSB-C	Same as No. 45, except cut from west end of rack	45,000	Cut into two 2" long pieces for leaching
48	FRSB-D	Same as No. 47	80,000	Sent to J. R. Divine
49	FTC	Piece of fuel transfer chute--4" x 5" SS piece cut from chute near joining ear--sampled from fuel storage basin	15,000	Cut in half - half sent to J. R. Divine - cut other half in two 2" long pieces for leaching
50	FTTR	Fuel transfer tube roller wheel removed from fuel transfer tube reactor sampled from fuel storage basin	0.5 mR/hr 75 mR/hr	Not cut--leach as is
51	FSBTT	2" dia. x 8" long piece of SS cut from fuel storage basin transfer tube for fuel elements--sampled from fuel storage basin	15,000	Cut in half - half sent to J. R. Divine - other half cut into two 2" long pieces for leaching
52	SCDL	1 3/4" dia. steel line draining main steam line of condensate when reactor was down --colleced from storage drum in cage on basement floor of turbine building--some torch cutting on piece	10,000	Cut off "hot" 4" and then cut that into two 2" long pieces for leaching

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February 24, 1981

Mr. James Shiffer
Pacific Gas and Electric Co.
77 Beale Street
San Francisco, California 94106

Dear Jim:

In behalf of John Evans and myself we would like to thank you for conducting our visit to the Humboldt Bay Power Plant, and for your cooperation in considering Unit 3 at Humbolt Bay as a site for our NRC sponsored research project to examine residual radioactivity in nuclear power plants. We also appreciate the time and efforts extended to us by Ed Weeks, Terry Nelson, and Randy Parker, during our visit.

As a result of our discussions and tour of Unit 3, I would like to suggest the following plan:

1. During the week of April 6, 1981, our sampling and measurements team would come to Humbolt Bay Unit 3 to collect the following samples. The collection of this suite of samples should require a minimal amount of PG&E time and manpower.

   A. Concrete Cores from the reactor building, turbine-condenser building, refueling building and rad-waste handling building. We have our own portable coring apparatus and this operation should not require any PG&E manpower, other than possible supervision. These cores would be 4 inch diameter by 4-6 inches deep. We would fill in the holes with concrete and finish the surface.

   B. Cut a 1-2' sample of the 2" diameter pipe comprizing the old regenerative heat exchangers which are no longer in use. We have our own portable band saw and have had a lot of experience in cutting reactor piping with it. So this again should not require PG&E manpower. We could make the cut on the exposed open end.

   C. Samples of sludge stored in 50-gallon drums located at the −66' level of the reactor building. We would need enough to give us several samples having a dose rate of about 2-10 mr/hr at contact.

D. Samples of piping from the 2" diameter reactor water cleanup line coming from the bottom of the reactor, which was earlier replaced and stored on site. We could cut 6-12" subsamples of this piping with our portable band saw. Randy and Terry mentioned that they would look into retrieving this piping sample from storage.

E. We would like to subsample any other significant piping or hardware samples which have been removed from service and stored on site. Again, Randy and Terry mentioned that they would look into the availability of such specimens.

F. We would like to obtain scrapings of the inside surfaces of the exhaust stack and contaminated tubing near the gaseous radwaste discharge into the stack. We talked about gaining access to this area by removing a ground-level concrete plug to allow access to the filter housing area. This task would require the use of a forklift and some PG&E personnel to gain this access.

I believe we could accomplish the above tasks, A-F, during the week of April 6-10, by working the normal eight hour day shift, thus not requiring any overtime supervision by PG&E personnel.

2. Following the April 20-June 15 outage we would like to return to Unit 3 to obtain some additional important samples which would require a little more PG&E time and manpower to obtain. I would propose the week of July 13-17, as a possible time. These would include the following:

A. Scrapings of the corrosion film on the inside surface of the main steam line. We would use plastic scrapers which would not damage the pipe surface. We discussed gaining access to this sampling point by removing the shield plug and opening the main steam line. This task would require significant PG&E manpower to accomplish.

B. We would like to obtain small pieces of mildly neutron activated concrete near the bottom of the reactor vessel. We discussed gaining access to the drywell area through the man-way at the −66' elev. level. We would chip small pieces of concrete using a small portable, mechanical chipping drill. In no way would we affect the structural integrity of the concrete areas we would sample.

C. If it is possible to gain access to the condenser, we would like to obtain samples of the corrosion film on the inside surface and obtain samples of any sludge or corrosion products which may be deposited on the bottom of the condenser.

D. We would like to obtain small samples of any excess stainless steel or carbon steel hardware samples that have been stored in the fuel storage basin to give us some indication of the radioactivity levels on the surfaces exposed to the basin water. Also, if any bottom deposits of sludge or corrosion products could be obtained, we would like to sample them.

Again, I believe we could accomplish these tasks during the normal eight hour day shift. We will be prepared to supply our own anti-contamination clothing and air masks, and perform our own radiation monitoring during these operations. We will also be prepared to package and ship all of the samples which we collect. We will be bringing a portable intrinsic germanium gamma-ray spectrometer and beta counter which would require a small amount of space in a low background area of the plant.

This sampling and measurements program at Humbolt Bay Unit 3 will supply much valuable information to the NRC in characterizing the residual radionuclide inventory and distribution in nuclear power plants. In addition, it will supply PG&E with much of the information they need to evaluate the future status of Unit 3. Therefore, if there are other areas or systems of the plant that you feel are important in establishing a radionuclide inventory at Unit 3 we would be most happy to cooperate with you in a sampling and measurements program to perform a more comprehensive analysis.

As I mentioned to you, we recognize the rather sensitive nature of this work and want to assure you that we would not openly present or publish any of the information that is obtained without first supplying you with this information and allowing you the opportunity to constructively criticize and comment on it.

Thank you again for your cooperation and willingness to conduct this work at Humbolt Bay Unit 3. We anticipate a mutually beneficial study, and look forward to visiting Unit 3 in April with our sampling and measurements team. If there is any other information you need to implement this program, please feel free to call me at any time.

Our sampling and measurements team is composed of the following people:

David Robertson - Project Manager - Radiochemist
John Evans - Co-Project Manager - Scientist
Keith Abel - Scientist
Elwood Lepel - Radiochemist
Manford Leale - Health physics and radiation protection specialist

Sincerely,

David E. Robertson
Senior Research Scientist
Chemical Methods and
Kinetics Section
PHYSICAL SCIENCES DEPT.

DER/kf

cc: E. D. Weeks
Terry Nelson
Randy Parker
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February 23, 1981

Mr. William D. Allen
Resleeving Project
San Onofre Nuclear Generating
Station - Unit 1
Southern California Edison Company
P.O. Box 128
San Clemente, California 92672

Dear Bill:

It was a pleasure to visit with you and observe the resleeving project at the San Onofre Unit 1. I would like to thank you for your cooperation and willingness in helping us obtain various kinds of contaminated hardware and other samples which may become available during the resleeving project. As I mentioned, we would be analyzing these samples for a wide spectrum of radionuclides in an effort to determine the amount of radioactivity per unit of surface area. These data would be used as part of our NRC sponsored program for estimating the inventory and distribution of radionuclides associated with various reactor components and structures.

Based on our discussions, I've listed the following samples as ones I hope we could obtain:

(1) A sample of the Magnetite slurry used for decontaminating the steam generators. If the magnetite slurries were kept separate for each steam generator, it would be desirable to obtain a sample of each. Otherwise, a well-homogenized sample which would be representative of the whole mix would be alright. We would like enough sample to give a dose rate of about 1-10 mr/hr on contact. Hopefully, that would be something like 1-10 liters. Also, if you could estimate the total amount of magnetite which was used in the entire decontamination project we may be able to estimate the total amount of radioactivity removed from the steam generators.

(2) A sample of the honing filters used for filtering out the corrosion film which was honed (brushed) out of the steam generator tubes. Again, we would like to obtain a representative sample which might be related back to the total amount of corrosion film removed by the honing. A sample reading about 1-10 mr/hr on contact would be desirable.

(3) A sample of the steam generator tubes that will be pulled. Hopefully, these would be "virgin" tubes which were not decontaminated. If possible, it would be convenient if these tubes could be cut into lengths of 8-12 inches. We would like enough tubing to give a total dose rate of about 1-10 mr/hr at contact. If tubes will be pulled from each steam generator it would be desirable to obtain tubing from each one.

(4) If possible, we would like to obtain samples of steam generator tubing which was pulled earlier and are now at Westinghouse's R&D lab in Pittsburgh. You mentioned that you would check on the availability of these specimens. If you can make the initial contacts I could follow up on the packaging and shipping details. Again, we would like enough tubing to give a dose rate of about 1-10 mr/hr at contact and hopefully cut into 8-10 inch lengths.

(5) We would like to obtain some scrapings of the corrosion film deposited inside the steam generators. We could supply you with plastic scrapers which would not damage the stainless steel surface, but would scrape off the loose film. Hopefully, one of the resleeving technicians could take a few seconds to scrape about 100 cm of undisturbed surface, while inside the steam generator doing their repair work. Again, we would like to estimate the radioactivity per unit of surface area and it would be important for the technician to estimate as accurately as possible the area of the surface he scraped.

(6) A sample(s) of the sump and tank sludge would be desirable. You indicated that the sludge might be up to several feet deep. Perhaps a good way to collect the sludge to obtain a good historical sample would be to core it with a 1/2" or 1" diameter thin walled tube which could be inserted into the sludge and then stoppered on the free end. The tube could then be withdrawn with the sludge core inside. I don't know how radioactive the sludge is. If it's too "hot" for coring then just a small grab sample would be the next best thing. Hopefully, samples reading about 1-50 mr/hr at contact could be obtained.

(7) While the containment building is open and accessible we would like to obtain smear samples of contaminated structures such as I-beam, cable trays, walls, etc. You could use your own judgement as to what to sample to give us some idea of the contamination levels per unit of surface area on various structural surfaces. Hopefully, some quantitative way of smearing an area could be devised, such as using damp filter paper and multiple wipes.

I realize we are asking quite a bit from you, especially during this very busy time. But, this is such a unique opportunity to obtain these important samples that I would like to make the most of this situation. As I mentioned, the data that is obtained will all be made available to you and SCE as soon as possible. The turn around time on the direct gamma-ray spectrometry would be rapid, i.e., several weeks. The beta, X-ray and alpha emitter analyses would require several months to complete.

If you could start accumulating these samples we could come down near the end of the resleeving project around May to arrange the packaging and shipping to Richland. Also, if there is anytime between now and the end of the resleeving project that you would need me and our health physics specialists to assist you in obtaining the samples, we would be most happy to catch the next flight down to Los Angeles, to be of assistance.

Please let me know if you have any questions or comments. I will keep in touch with you by phone to see how things are going.

I sincerely appreciate all of the help that you have been thus far, and look forward to working with you in the future to obtain these valuable samples.

Thank you.

Sincerely,

David E. Robertson
Senior Research Scientist
Earth and Planetary
Chemistry Section
PHYSICAL SCIENCES DEPT.

DER/kf

cc: Mr. Blaine Curtis
Resleeving Project

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 376-5664
Telex 15-2874

February 10, 1981

Mr. Patrick Thurman
Northern States Power Company
Monticello Nuclear Generating Plant
Monticello, Minnesota 55362

Dear Pat:

I would like to thank you for taking the time to talk with me about our NRC program and giving me a tour of the Monticello plant last Thursday. We appreciate the cooperation that you and Larry Nolan have extended in assisting us in procuring small samples of contaminated reactor piping for residual radionuclide measurements.

As I mentioned during my visit, we would like to obtain samples of piping and hardware from as many systems at Monticello that would become available during your maintenance work in April and October. I would suggest that I and two other persons from our laboratory (an HP specialist and a technician) come to Monticello in April and October, at your convenience, to cut and package small subsamples of the piping for shipment to our laboratory in Richland. During our site visits we would also like to obtain eight to ten four inch diameter by six inch deep concrete core samples from contaminated floors. We have a portable coring system which we have used in similar work at other reactors so this should not require any appreciable NSP personnel time.

Also, if any other types of contaminated piping and hardware become available between now and October, and it is not too inconvenient to store them until our site visits we would appreciate your keeping them until we could subsample them.

Thank you very much for your help and cooperation. I will keep in touch with you to coordinate our sampling at Monticello. Please let me know if you need anything else from us to allow us to make our visits to Monticello in April and October.

Sincerely,

David E. Robertson
Senior Research Scientist
Earth and Planetary Chemistry Section
Physical Sciences Department

DER/cms

FLORIDA POWER & LIGHT COMPANY

February 25, 1981
PRN-HP-81-15
File: 11,500 TP

Mr. D. E. Robertson
Senior Research Scientist
Physical Sciences Department
Battelle Pacific Northwest Laboratories
P. O. Box 999
Richland, WA 99352

Dear Mr. Robertson:

We have reviewed your request of January 21, 1981, and the accompanying Preliminary Generic Measurements Plan. We feel that a significant number of your measurements would be beneficial to FPL during the Steam Generator Repair and for future reference.

We need to know what facilities you plan to bring on site and what support you will require in terms of electrical and other service connections.

Please direct future correspondence and planning information to Mr. Jack Hays, our Plant Manager. Mr. Pat Hughes, our Health Physics Supervisor, will assist you in planning and scheduling Sampling and Monitoring Activities.

Sincerely,

A. D. Schmidt
Vice President
Power Resources

ADS/HFS/bc

Attachment

Mr. J. K. Hays
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Turkey Point Plant
P. O. Box 529100
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(305) 245-2910/ext. 355

Mr. P. W. Hughes
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