

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-397/86-35

Docket No. 50-397

License No. NPF-21

Licensee: Washington Public Power Supply System
P. O. Box 968
Richland, Washington 99352

Facility Name: WNP-2

Inspection at: Hanford Site

Inspection Conducted: October 20-23 and November 13-14, 1986

Inspectors: G. Hamada 12/11/86
G. Hamada, Radiation Laboratory Specialist Date Signed

W. Ten Brook 12/11/86
W. Ten Brook, Radiation Specialist Date Signed

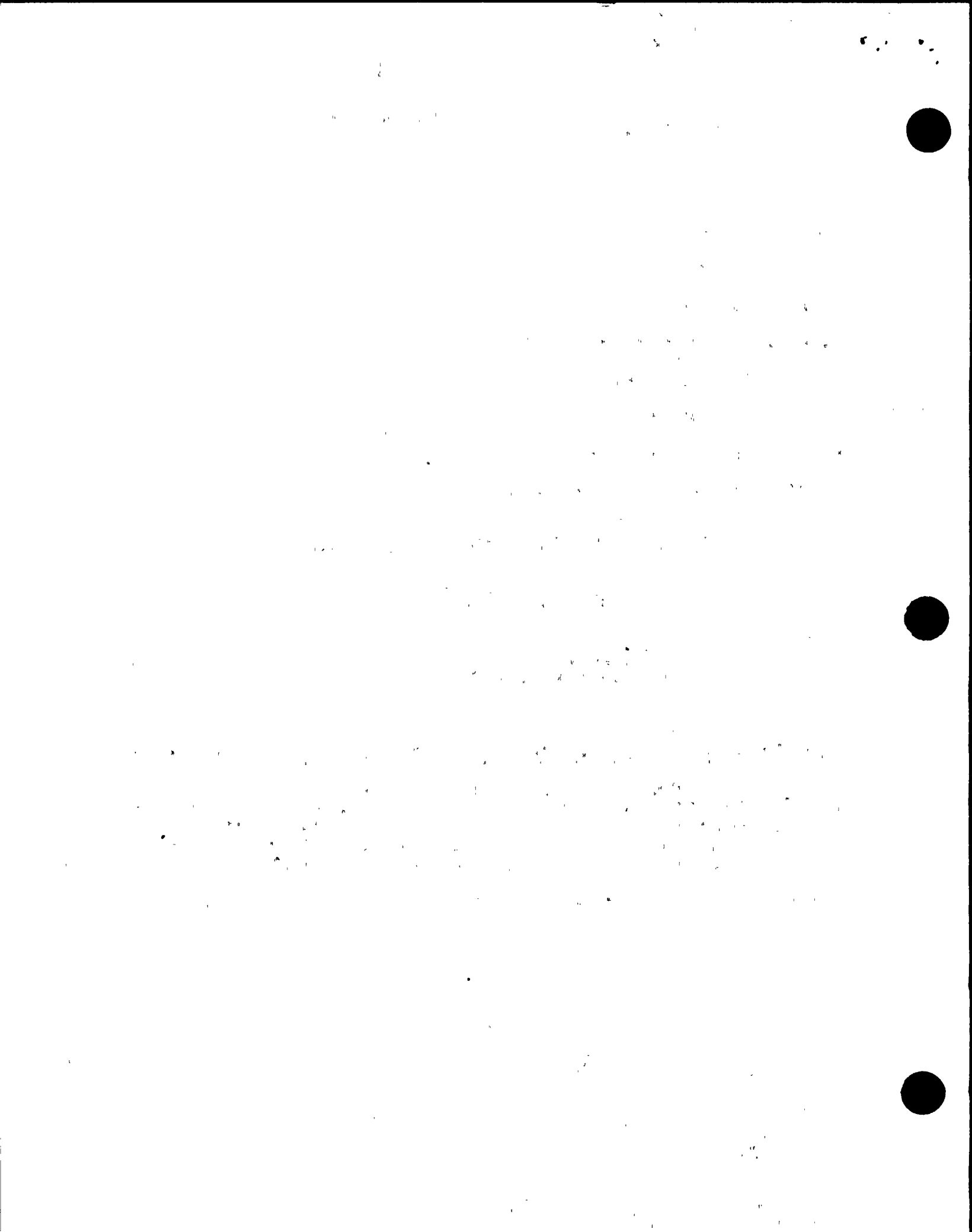
Approved By: G. Vukas 12/12/86
G. Vukas, Chief Date Signed
Facilities Radiological Protection Section

Summary:

Inspection of October 20-23 and November 13-14, 1986 (Report No. 50-397/86-35)

Areas Inspected: Radioactivity measurements performed by the licensee were checked against NRC measurements for the various sample categories for which radioactivity analysis is required. Laboratory capability to perform the necessary chemical analyses to maintain good water chemistry was reviewed. This inspection involved inspection procedures 84725 and 79701.

Results: No items of noncompliance were identified in the areas examined.



Details

1. Persons Contacted

- *J. W. Baker, Assistant Plant Manager
- *R. Graybeal, Health Physics and Chemistry Manager
- *W. Milbrot, Bonneville Power Administration
- *L. Morrison, Chemistry Supervisor
- *C. Powers, Plant Manager

*Indicates personnel present at exit interview.

2. Discussion

The Region V mobile laboratory was brought onsite to perform confirmatory radioactivity measurements. The sample categories tested included liquid, gas, filter paper and charcoal cartridge. These cross check measurements were made to assess the adequacy of radioactivity data from the standpoints of accuracy and sensitivity. The results of these tests are summarized below.

Table 1

Reactor Coolant

<u>Nuclide</u>	<u>WNP2</u> <u>uCi/ml</u>	<u>NRC</u> <u>uCi/ml</u>	<u>Ratio</u> <u>WNP2/NRC</u>	<u>*Agreement</u> <u>Range</u>
Na-24	1.91 E-3	1.89 E-3	1.01	0.75-1.33
Mn-56	9.59 E-3	9.58 E-3	1.00	0.75-1.33
Co-58	2.06 E-4	2.25 E-4	0.92	0.60-1.66
Co-60	7.27 E-5	8.38 E-5	0.87	0.50-2.00
Cu-64	1.93 E-1	1.80 E-1	1.07	0.75-1.33
Zn-65	4.69 E-4	5.39 E-4	0.87	0.60-1.66
Zn-69M	2.14 E-4	1.54 E-4	1.39	0.50-2.00
SR-92	3.89 E-4	4.20 E-4	0.93	0.60-1.66
Tc-99M	9.86 E-3	1.02 E-2	0.97	0.85-1.18
I-132	5.76 E-4	5.05 E-4	1.14	0.75-1.33
I-133	1.85 E-4	1.60 E-4	1.16	0.60-1.66
I-134	1.18 E-3	1.06 E-3	1.11	0.80-1.25

* See enclosure for explanation.

Table 1 shows the results for a reactor coolant sample. The data indicate good agreement for this sample category.



Table 2

Charcoal Cartridge

<u>Nuclide</u>	<u>WNP2</u> <u>uCi/ml</u>	<u>NRC</u> <u>uCi/ml</u>	<u>Ratio</u> <u>WNP2/NRC</u>	<u>*Agreement</u> <u>Range</u>
Br-82	7.76 E-12	8.47 E-12	0.92	0.60-1.66
I-131	1.49 E-12	1.65 E-12	0.90	0.75-1.33
I-133	3.02 E-12	3.27 E-12	0.92	0.75-1.33

Table 3

Filter Paper

<u>Nuclide</u>	<u>WNP2</u> <u>uCi/ml</u>	<u>NRC</u> <u>uCi/ml</u>	<u>Ratio</u> <u>WNP2/NRC</u>	<u>*Agreement</u> <u>Range</u>
Na-24	5.19 E-12	8.65 E-12	0.60	0.50-2.00
Co-58	1.27 E-12	7.82 E-13	1.62	0.40-2.50
Tc-99M	4.90 E-12	6.98 E-12	0.70	0.60-1.66

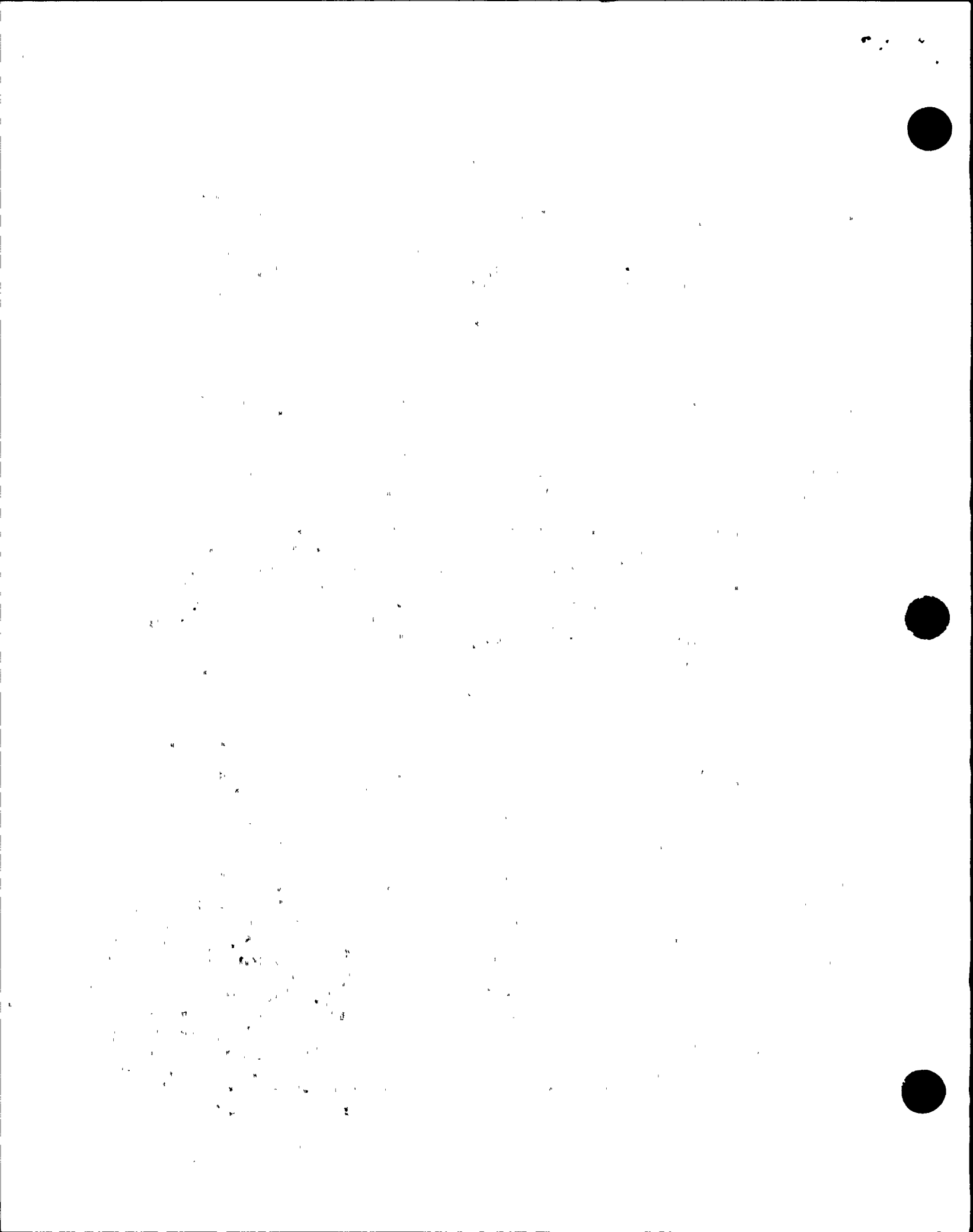
Tables 2 and 3 summarize the data for charcoal cartridge and filter paper sample categories. The results indicate adequate agreement. It should be mentioned that the activity level for both these categories was relatively low and as a consequence good counting statistics could not be readily obtained. A number of other samples for which cross check measurements were performed have not been included in this discussion because no detectable activity (statistically significant activity) was observed in these samples.

Table 4

Gas

<u>Nuclide</u>	<u>WNP2</u> <u>uCi/cc</u>	<u>NRC</u> <u>uCi/cc</u>	<u>Ratio</u> <u>WNP2/NRC</u>	<u>*Agreement</u> <u>Range</u>
Kr-85M	1.43 E-4	1.66 E-4	0.86	0.50-2.00
Kr-87	1.09 E-3	1.12 E-3	0.97	0.60-1.66
Kr-88	4.97 E-4	5.31 E-4	0.94	0.40-2.50
Xe-135	4.65 E-4	4.86 E-4	0.96	0.60-1.66
Xe-135M	3.30 E-3	3.54 E-3	0.93	0.75-1.33
Xe-137	5.37 E-2	4.04 E-2	1.33	0.60-1.66
Xe-138	1.32 E-2	1.37 E-2	0.96	0.75-1.33
N-13	5.24 E-1	6.08 E-1	0.86	0.85-1.18

Table 4 summarizes the results obtained for steam jet air ejector gas sample splits. For this sample, the most dominant activity by far was the 511 Kev annihilation radiation peak. Because of contributions from a number of different sources, this peak is not usually used for quantifying activity. There are, however, a number of activation product radionuclides which require examination of the 511 Kev peak for their quantification. Both N-13 ($t_{1/2} = 9.97$ min.) and F-18 ($t_{1/2} = 110$ min.) are



positron emitters with essentially no gamma mode of decay other than the 511 Kev line. Repeat measurements of the sample to observe the decay of the 511 Kev peak gave a half life of about 10 minutes, indicating that virtually all of the activity was due to N-13.

During this inspection, it was learned that because of excessive alarm frequency of the containment particulate filter monitor, the alarm set point was readjusted to decrease its sensitivity. It was surmised that activity spikes on the filter were due to intermittent coolant leakage which flashed into the containment volume. Calculations based on knowledge of certain key nuclide concentrations (e.g. Na-24) in reactor coolant indicated that the equivalent coolant leak rate was on the order of 10^{-4} gallons per minute. While an effort was being made to determine the source, a leak of this magnitude is difficult to detect and as of this inspection period was of unknown origin. It has since been determined that a recirculation pump was the cause of the leak. When a recirculation pump that was experiencing vibration problems was shut off, the spiking phenomenon on the particulate filter ceased.

The inductively coupled plasma (ICP) spectroscopy system is now routinely used for performing trace cation analysis. In general, its sensitivity is about equivalent to that of the atomic absorption furnace system. The ion chromatograph (IC) system is currently used mainly for anion analysis. The laboratory continues to maintain good capabilities for performing the required measurements.

WNP2 endorses the hydrogen water chemistry guideline (April 1, 1984) and expects to implement this program in the near future.

3. Exit Interview

Inspection findings were discussed with licensee personnel indicated in paragraph 1. Licensee management was informed of the agreement achieved for all sample categories tested. It was also agreed that WNP2 would analyze a spiked liquid sample provided by the NRC as a further check on the analysis of beta emitters and soft x-ray emitters (50-397/86-35-01).

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100



Enclosure

Criteria for Accepting the Licensee's Measurements

<u>Resolution</u>	<u>Ratio</u>
<4	0.4 - 2.5
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
200	0.85 - 1.18

Comparison

1. Divide each NRC result by its associated uncertainty to obtain the resolution. (Note: For purposes of this procedure, the uncertainty is defined as the relative standard deviation, one sigma, of the NRC result as calculated from counting statistics.)
2. Divide each licensee result by the corresponding NRC result to obtain the ratio (licensee result/NRC).
3. The licensee's measurement is in agreement if the value of the ratio falls within the limits shown in the preceding table for the corresponding resolution.