ROCKY FLATS *Environmental* MASTER FILE 317-2

PRODUCT AND HEALTH PHYSICS RESEARCH
SERVICE REPORT

Report No: 317-73-134

Title: Well Sampling at Rocky Flats (Including a Summary of Data Collected during 1972)

Requested by: Keith Nelson - Technical Writing

Date Requested: June 26, 1973

Work Performed by: Health and Environmental Assay Labs

Date Started: 1960

Date Completed: Continuing program

Date This Report: July 11, 1973

Written by: M. R. Boss

Distribution:

R. W. Bistline
K. Nelson
G. J. Werkema
IRF (Record)
Thru: M. A. Thompson
RF Environmental Master File

KWIC Index:

Environment
Plutonium
Well Water

1/8

INTRODUCTION

For several years, the Health Physics Department has maintained a routine program to monitor the subsurface waters at the site location. The purpose of this surveillance program was to detect the possible movement of various chemicals and radioactive constituents, of plant origin, into the water strata underlying the site. The results obtained from this well sampling program during 1972 are included.

DISCUSSION

The sampling program was originated to fulfill several requirements, the monitoring of radioactive and chemical concentrations in the underground waters being of paramount concern. The ground water levels in these wells is also of interest.

The well locations routinely monitored are shown in Figures 1 and 2.

1. "DP" Series - drilled in 1966, are 150 feet deep, steel cased, and surface cemented. These three wells provide background information for the sampling program.

2. "60" Series - drilled in 1960 to check the movement of leakage from the solar evaporation ponds. These wells are relatively shallow (approximately 20 feet) and are steel cased.

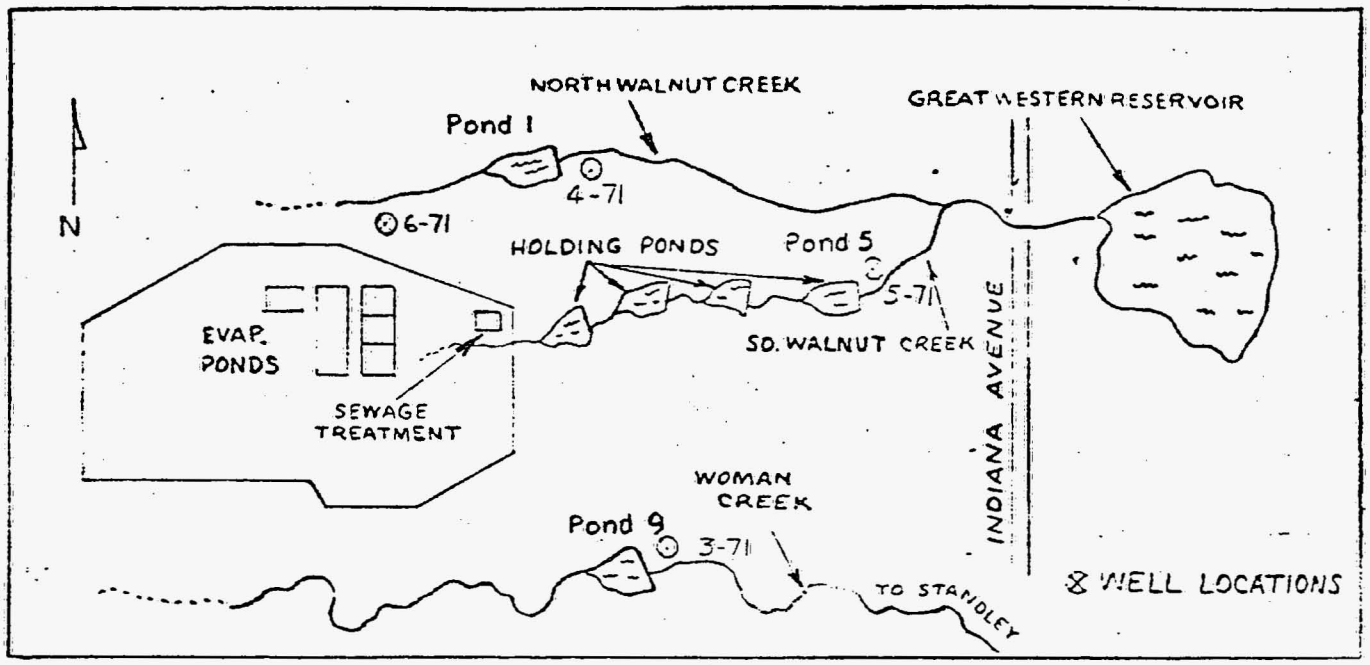

FIGURE 1

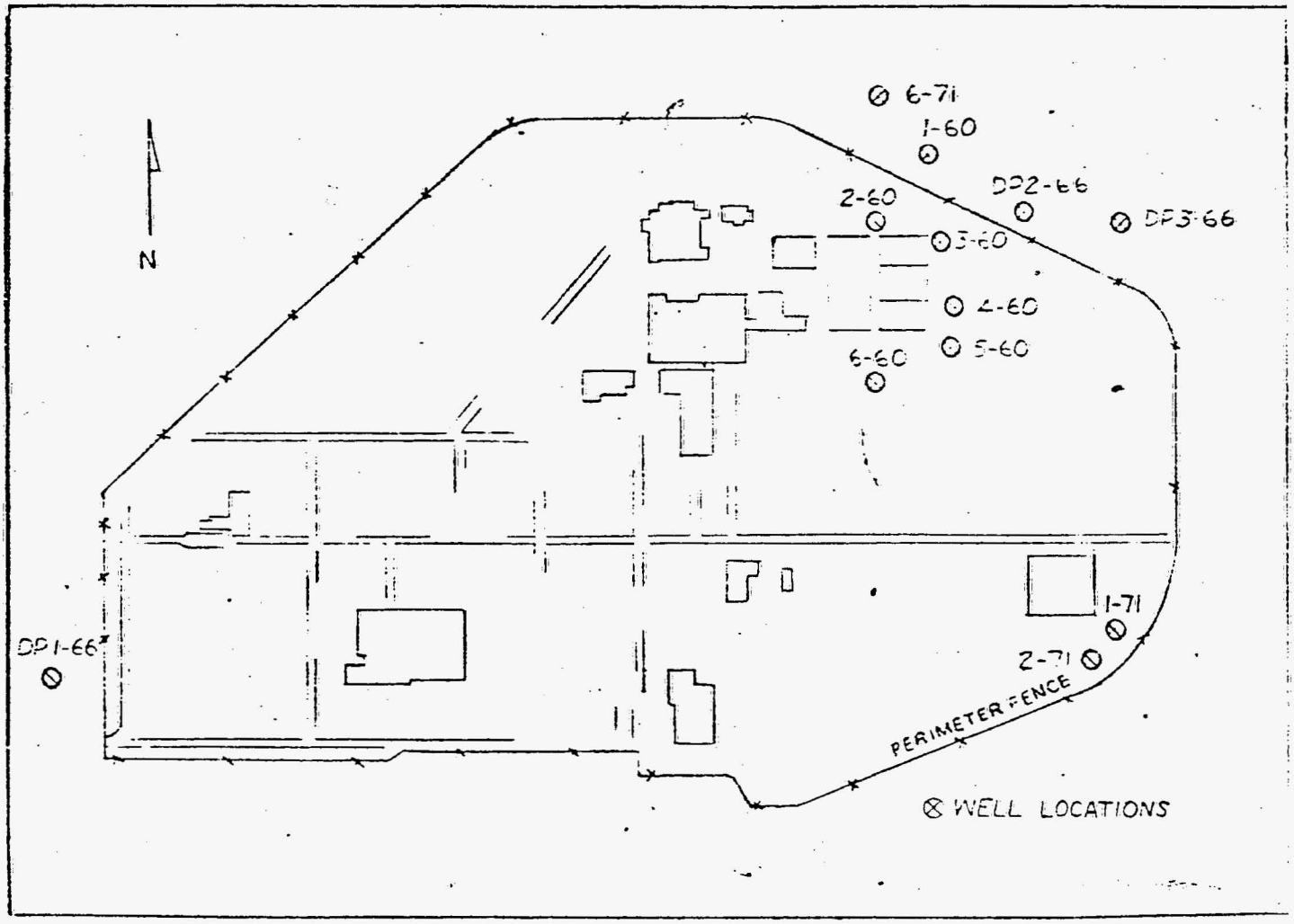

FIGURE 2

3. "71" Series - drilled in 1971 to determine if significant leakage of radioactivity was occurring through the holding ponds. These shallow (approximately 30 feet) wells are cased with black iron pipe. Two wells (1-71, 2-71) are located in the drainage field below the asphalt pad to determine if plutonium activity is being carried from this area by surface and subsurface waters. (Additionally, there are four wells located in the corners of the asphalt pad. These wells are routinely inspected for the presence of water. These inspections have never revealed the presence of any ground waters.)

All of the above wells are grab sampled monthly. A crude measurement of the ground water table is also taken at this time. The resultant samples are analyzed for the constituents shown in Tables I and II. The chemical constituents are analyzed in accordance with standard methods.[1] Radioactive contaminants are determined using the routine methods employed by the Health and Environmental Assay Laboratories at Rocky Flats.[2] In addition to those constituents shown, orthophosphate ion (PO_4^{-3}) concentration is also measured. The specific gravity of these samples has been determined in the past.

CONCLUSIONS

The data shown in Tables I and II indicate that no significant leakage of radioactivity is occurring through the solar

TABLE I

Radioactive Concentrations in
On-Site Sampling Wells (1972)

Well Designation*	Well Depth (ft)	Concentration (pCi/l) U + Pu	Pu
DP-1-66	150	1.35	0.37
DP-2-66	"	3.95	0.36
DP-3-66	"	3.84	0.66
1-60	20	10.36	0.31
2-60	"	7.82	0.48
3-60	"	8.28	0.47
4-60	"	15.14	1.02
5-60	"	3.29	0.31
6-60	"	2.99	0.38
6-71	"	18.42	0.54
1-71	30	1.48	0.24
2-71	"	1.56	0.31
3-71	"	4.09	0.67
4-71	"	2.18	0.30
5-71	"	2.25	0.59

* Well locations are shown in Figures 1 and 2.

TABLE II

Concentration* of Various Constituents in
On-Site Sampling Wells (1972)

Well Designation	Total Solids	pH (Range)	Nitrate Ion	Fluoride Ion
DP-1-66	174	6.6-7.9	13	1.5
DP-2-66	252	7.6-8.1	23	0.8
DP-3-66	595	7.3-8.1	7	1.8
1-60	6146	6.6-7.9	3267	0.8
2-60	17631	7.0-7.8	9108	0.9
3-60	1305	7.4-8.2	573	1.2
4-60	6289	7.4-8.0	2034	1.1
5-60	412	6.9-8.2	41	1.0
6-60	647	7.2-7.8	22	0.8
6 ~~1~~-71	2610	7.1-7.9	1285	0.6
1-71	406	6.4-8.0	32	0.7
2-71	200	6.8-8.1	21	0.8
3-71	804	7.2-8.8	4	1.6
4-71	378	7.9-9.0	4	0.7
5-71	251	7.6-8.6	11	1.0

* The concentrations shown are mg/l (except pH).

evaporation on holding ponds. Large quantities of nitrate ion, however, are finding their way into subsurface waters in the wells surrounding the solar evaporation ponds. These nitrate concentrations appear to be increasing from those of several years ago.[3] With the exception of the nitrate concentrations found in the "60" series wells all constituents monitored are well within the established guidelines.

RECOMMENDATIONS

From the samples collected during 1972, over 1100 separate analyses were performed in which nothing new or surprising was learned. The well sampling frequency should be reduced from monthly to twice yearly for plutonium analysis. The only chemicals that appear worthy of monitoring are pH (it's easy) and NO_3^- (it's useful). Both should be measured in situ. In addition, yearly samples from these wells should be submitted for emission spec analysis. (Emission spec analysis has never been performed on these waters.)

It is further recommended that a sampling well be placed in the drainage below the sanitary landfill. Future wells should not be cased with black iron pipe due to the scaling, but should be cased with steel pipe and surface cemented to preclude the entry of ground water.

REFERENCES

1. Standard Methods for the Examination of Water and Wastewater, 13th Edition, American Public Health Association, New York, 1971.

2. Standard Laboratory Procedures for the Determination of Radioactivity and Chemical Concentrations in Environmental and Bioassay Samples, D. L. Bokowski (ed.), USAEC RFP-2039, in preparation.

3. Nitrate Concentration in Subsurface Waters at Rocky Flats, M. R. Boss, in preparation.