WATER SAMPLE STORAGE AND PRESERVATION

TASK TEAM REPORT

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Contents

INTRODUCTION

The task team addressed the following problems:

- Ambiguous definition of preservation requirements for trace metals analysis
- Sample storage and preservation
- Sample preparation and analysis

Refer to Appendix I for a complete list of the task teams.

The topics covered in this report will also have an impact on the following problems: sample collection practices to meet analysis requirements, sample transportation, and sample receiving.

Every effort should be made to achieve the shortest possible interval between sample collection and analysis. If there must be a delay and it is long enough to produce significant changes in the sample, preservation measures are required. At best, preservation techniques can only retard the chemical and biological changes that inevitably continue after the sample is removed from the parent source. Metal cations may precipitate as hydroxides or form complexes with other constituents. Metal cations, such as iron and lead, may also absorb into surfaces (glass, plastic, quartz, etc.).[1] Water samples to be analyzed for gross alpha, gross beta, and specific radionuclides should also be preserved.

Since the water samples submitted to both Health, Safety & Environment Laboratories (HS&EL) and the General Labs are not always analyzed right away, preservation practices must be employed.

There are groundwater-monitoring requirements imposed upon hazardous waste management facilities which have achieved interim status in accordance with Section 3005 (e) of the Resource Conservation and Recovery Act (RCRA). The DOE Order 5480.2 states that all DOE facilities must adopt the technical requirements of all EPA's RCRA regulations. One of the requirements states that specific preservatives, container types, and holding times, as described in the selected analytical procedures, should be used to maintain sample integrity.[3]

This report describes each sampling location and presents a table with the task team's recommended preservation requirements. The preservation requirements were taken from Standard Methods for the Examination of Water and Wastewater, 15th edition, APHA-AWWA-WPCF, 1980, and Manual for the Interim Certifications of Laboratories Involved in Analyzing Public Drinking Water Supplies, EPA 600/8-78-008, May 1978. The alternative actions which were considered are listed along with the pros and cons of each. The task team recommends the first alternative listed.

Appendix II contains a flowchart depicting the proposed sample flow.

SAMPLE LOCATIONS

Water Treatment Plant Raw Water

The purpose of the requested analyses is for the accumulation of baseline data for process control and a background information measure of performance versus control guides. Present collection and transportation of samples is accomplished by personnel in HS&EL.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 1.

Table 1. Water Treatment Plant Raw Water Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Weekly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Weekly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Monthly composite	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Monthly composite	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly composite	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Monthly grab	1,500 pCi/ℓ	123	No preservation
TDS	250 mℓ	Monthly grab	--	881	No preservation
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
TS	250 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.

Water Treatment Plant Treated Water

The purpose of the requested analyses is compliance with Colorado Primary Drinking Water Regulations for which the limits are shown. When control guides are exceeded, data reliability and contaminant source(s) are investigated.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 2.

Table 2. Water Treatment Plant Treated Water Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Weekly	15 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Weekly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
pH	100 mℓ	Daily	6.5-8.5 SU	881	No preservation
Free Cl	200 mℓ	Daily	0.02 mg/ℓ	123	No preservation
Turbidity	50 mℓ	Daily	1.0 NTU	881	No preservation
Total bacteria	500 mℓ	4 days/wk	--	123	No preservation
Total coliform	500 mℓ	4 days/wk	--	123	No preservation
Fecal coliform	500 mℓ	4 days/wk	1-4/100 mℓ	123	No preservation
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
Alkalinity	100 mℓ	Quarterly	--	881	No preservation
Hardness	100 mℓ	Quarterly	--	881	Add HNO_3 to pH <2
NH_3	50 mℓ	Quarterly	--	881	H_2SO_4 to pH <2, refrigerate
Ra-226	100 mℓ	Annually	3.0 pCi/ℓ	881	HCl or HNO_3 to pH <2
Ra-226 & Ra-228	100 mℓ	Annually	5.0 pCi/ℓ	881	HCl or HNO_3 to pH <2
Sr-90	100 mℓ	Annually	8.0 pCi/ℓ	881	Con. HCl or HNO_3 to pH <2

Table 2. Water Treatment Plant Treated Water Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Color	500 mℓ	Annually	15 units	881	Refrigerate
Cl^-	200 mℓ	Annually	250 mg/ℓ	881	No preservation
Ag	100 mℓ	Quarterly	0.05 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
As	100 mℓ	Quarterly	0.05 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Ba	100 mℓ	Quarterly	1.0 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Cd	100 mℓ	Quarterly	0.01 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Cr	100 mℓ	Quarterly	0.05 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Cu	100 mℓ	Quarterly	1.0 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Hg	100 mℓ	Quarterly	0.002 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Pb	100 mℓ	Quarterly	0.05 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Se	100 mℓ	Quarterly	0.01 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
Zn	100 mℓ	Quarterly	5.0 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
CN^-	100 mℓ	Annually	0.005 mg/ℓ	881	5 mℓ con. HNO_3/ℓ
F^-	300 mℓ	Annually	1.4-2.4 mg/ℓ	881	No preservation
SO_4^{-2}	100 mℓ	Annually	250 mg/ℓ	881	Refrigerate
MBAS	--	Annually	0.5 mg/ℓ	881	No preservation
NO_3^- (as N)	100 mℓ	Annually	10.0 mg/ℓ	881	Add H_2SO_4 to pH <2, refrigerate
TDS	200 mℓ	Annually	500 mg/ℓ	881	No preservation
Endrin	1 ℓ**	Annually	0.0002 mg/ℓ	881	Refrigerate
Lindane	1 ℓ**	Annually	0.004	881	Refrigerate
Methoxychlor	1 ℓ**	Annually	0.1 mg/ℓ	881	Refrigerate
Toxaphene	1 ℓ**	Annually	0.005 mg/ℓ	881	Refrigerate
2,4-D	1 ℓ**	Annually	0.1 mg/ℓ	881	Refrigerate
2,4,5-Tp-Silvex	1 ℓ**	Annually	0.1 mg/ℓ	881	Refrigerate
TS	250 mℓ	Quarterly	--	881	No preservation

* Filter sample before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.
** Must be collected in clean glass bottles.

Sewage Treatment Plant Influent

The purpose of the requested analyses is the control of sewage release operations. When control guides are exceeded, data reliability and contaminant source(s) are investigated.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 3.

Table 3. Sewage Treatment Plant Influent Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Daily	40 pCi/ℓ	881	5 mℓ con. HNO^3/ℓ
^3H	100 mℓ	Daily	1,500 pCi/ℓ	123	No preservation
pH	100 mℓ	Daily	6.0-9.0 SU	881	No preservation
COD	150 mℓ	Daily	--	881	No preservation

Sewage Treatment Plant Effluent

The purpose of the requested analysis is for operational control of the sewage treatment plant. When control guides are exceeded, data reliability, sewage plant operation, and contaminant source(s) are investigated.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are started in Table 4.

Table 4. Sewage Treatment Plant Effluent Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Daily	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Daily	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1ℓ	Daily	Above background	881	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Monthly	2.0 pCi/ℓ	123	25 mℓ con.HNO_3/ℓ
U	1 ℓ	Monthly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly	1.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
NO_3 (as N)	100 mℓ	Daily	10.0 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Daily	6.0-9.0	881	No preservation
Free residual Cl	500 mℓ	Daily	0.5 mg/ℓ	123	No preservation
SS	250 mℓ	Daily	15/25 mg/ℓ*	881	No preservation
COD	150 mℓ	Daily	50 mg/ℓ	881	No preservation
Total coliform	500 mℓ	3 days/wk	--	123	No preservation

Table 4. Sewage Treatment Plant Effluent Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Fecal coliform	500 mℓ	3 days/wk	200/100 mℓ	123	No preservation
Dissolved oxygen	250 mℓ[3]**	3 days/wk	4/2 mg/ℓ***	881	No preservation
TOC	10 mℓ	3 days/wk	--	881	Refrigerate
Total chromium	250 mℓ	Weekly	0.5 mg/ℓ	881	5 mℓ con. HNO_3/ℓ

* Daily average/daily maximum
** 250-mℓ BOD bottle - specially sealed
*** Daily average/daily minimum

Reverse Osmosis Building

The Reverse Osmosis Plant treats sanitary wastewater from Building 995.

The purpose of the requested analyses is compliance with the NPDES permit. The data is reported to the EPA and in the monthly and annual Environmental Monitoring Report.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 5.

Table 5. Reverse Osmosis Building Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
SS	250 mℓ	Monthly* Weekly**	15 mg/ℓ	881	No preservation
TOC	50 mℓ	Monthly* Weekly**	22 mg/ℓ	881	Refrigerate and add H_2SO_4 to pH <2
Total phosphorus	100 mℓ	Monthly* Monthly**	8 mg/ℓ	881	Refrigerate
Nitrate (as N)	100 mℓ	Monthly* Weekly**	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
Total chromium	100 mℓ	Monthly* Monthly**	0.05 mg/ℓ	881	5 mℓ con. HNO_3/ℓ***
Total residual Cl	500 mℓ	Monthly* Daily**	0.5 mg/ℓ	123	No preservation
Fecal coliform	500 mℓ	Monthly* Daily**	200 /100 mℓ	123	No preservation
pH	100 mℓ	Monthly* Daily**	6.0-9.0 SU	123	No preservation

* NPDES permit requirement to collect baseline operational data.
** NPDES permit requirement when discharging offsite.
*** Filter before adding HNO_3 to for dissolved metals. EPA recommends filtration be done immediately after collection.

Pond A-1 Bypass

The A-1 Bypass diverts water around Ponds A-1 and A-2 along North Walnut Creek.

The purpose of the requested analyses is for the detection of abnormal conditions. When control guides are exceeded, data reliability and contaminant source(s) are investigated. Also, water can be diverted to Ponds A-1 and A-2.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 6.

Table 6. Pond A-1 Bypass Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Daily	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Daily	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Daily	1,500 pCi/ℓ	123	No preservation
NO_3 (as N)	100 mℓ	Daily	20 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Daily	6.0-9.0 SU	881	No preservation
Flow reading	--	Daily	--		

Pond A-2

Until 1979, Pond A-2 was used to store Rocky Flats laundry water and water from one Plant cooling tower. The pond is now used to store only surface runoff from North Walnut Creek. When the pond is full, the water is sprayed on the pond to enhance evaporation.

The pond is sampled on a special request basis only. The purpose of the requested analyses is operational control of evaporative spraying.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 7.

Table 7. Pond A-2 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	As requested	40 pCi/ℓ	881	5 mℓ con HNO_3/ℓ
Gross beta	50 mℓ	As requested	50 pCi/ℓ	881	5 mℓ con HNO_3/ℓ
^3H	100 mℓ	As requested	1,500 pCi/ℓ	123	No preservation
NO_3 (as N)	100 mℓ	As requested	20 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	As requested	6.0-9.0 SU	881	No preservation

Pond A-3

Pond A-3 is located on North Walnut Creek and is used to impound surface runoff.

The purpose of the requested analyses is for operational control during pond discharge and compliance with the NPDES reporting requirements.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 8.

Table 8. Pond A-3 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Before discharge	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Before discharge	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1 ℓ	Before discharge	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	During discharge	1.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	During discharge	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	100 mℓ	During discharge	0.5 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Before and during discharge	1,500 pCi/ℓ	123	No preservation
NO_3^-	100 mℓ	Before and during discharge	10.0 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Before and during discharge	6.0-9.0	881	No preservation

Pond A-4

Pond A-4 is located on North Walnut Creek downstream from Pond A-3.

The purpose of the requested analyses is for operational control and compliance with NPDES permit reporting requirements. When control guides for discharge are exceeded, the discharge will not be authorized. When the remaining control guides are exceeded, the data reliability is checked, and if appropriate, an investigation for the contaminant source is conducted.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 9.

Table 9. Pond A-4 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Before discharge	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Before discharge	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1 ℓ	Before discharge	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Before discharge	0.1 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Before discharge	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Before discharge	0.1 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Before discharge	1,500 pCi/ℓ	123	No preservation
NO_3 (as N)	100 mℓ	Before and after discharge	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Before and after discharge	6.0-9.0 SU	881	No preservation

Table 9. Pond A-4 Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
NVSS	200 mℓ	Before and after discharge	100 mg/ℓ	881	No preservation
13 metals	300 mℓ	Quarterly	Drinking water limits	881	5 mℓ con. HNO_3/3ℓ*
TS	250 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.

Pond B-3

The water flowing into B-3 is treated sewage and comes from Building 995. The water from B-3 may be discharged into offsite receiving waters.

The purpose of the requested analyses is for the accumulation of baseline data for background information with respect to the control guides and to meet the NPDES permit requirements.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 10.

Table 10. Pond B-3 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	As requested	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	As requested	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1 ℓ	As requested	Above background	123	5 mℓ con. HNO_3/ℓ
^3H	100 mℓ	As requested	1,500 pCi/ℓ	123	No preservation
pH	100 mℓ	As requested	6.0-9.0	881	No preservation
BOD_5	250 mℓ	As requested	25 mg/ℓ	881	No preservation
SS	200 mℓ	As requested	30 mg/ℓ	881	No preservation
Fecal coliform	100 mℓ	As requested	200/100 mℓ	123	No preservation
Nitrate (as N)	100 mℓ	As requested	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
Total phosphorus	100 mℓ	As requested	8 mg/ℓ	881	Filter immediately and refrigerate
Total residual Cl	500 mℓ	As requested	0.5 mg/ℓ	123	No preservation
Oil and grease	100 mℓ	As requested	No visible sheen	881	No preservation
Total chromium	100 mℓ	As requested	0.05 ms/ℓ	881	5 mℓ con. HNO_3/ℓ

Pond B-4

Pond B-4 is located on South Walnut Creek and receives storm water runoff from the central portion of the Plant. The water flows from Pond B-4 to Pond B-5 where it is impounded for analysis prior to discharge.

The purpose of the requested analyses are operational control and release estimates for Pu, U, Am, and ^{3}H.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 11.

Table 11. Pond B-4 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Daily	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Daily	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitting isotopes	1 ℓ	Weekly	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Monthly	2.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Monthly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly	1.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^{3}H	100 mℓ	Weekly	1,500 pCi/ℓ	123	No preservation
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*

Table 11. Pond B-4 Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Bromacil	1 ℓ**	In season	--	881	Refrigerate
2,4-D	1 ℓ**	In season	0.1 mg/ℓ	881	Refrigerate
TS	250 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 to for dissolved metals. EPA recommends filtration be done immediately after collection.
** Must be collected in clean glass bottles.

Pond B-5

Pond B-5 is located on South Walnut Creek and is a discharge location included in the NPDES permit.

The purpose of the requested analyses is operational control and compliance with NPDES permit reporting requirements.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 12.

Table 12. Pond B-5 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Before discharge	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Before discharge	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma-emitting isotopes	1 ℓ	Before discharge	Above background	123	No preservation
Pu	1 ℓ	During discharge	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	During discharge	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	During discharge	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Before and during discharge	1,500 pCi/ℓ	123	No preservation
NO_3^- (as N)	100 mℓ	Before and during discharge	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Before and during discharge	6.0-9.0 SU	881	No preservation

Table 12. Pond B-5 Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
NVSS	250 mℓ	Before and during discharge	100 mg/ℓ	881	No preservation
13 metals	500 mℓ	Quarterly**	Drinking water limits	881	5 mℓ con. HNO_3/ℓ*
TS	250 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 to for dissolved metals. EPA recommends filtration be done immediately after collection.
** Special request.

Walnut Creek and Indiana Street Gaging Station

This location is the last sampling point before water flowing from North Walnut Creek and Walnut Creek leaves the Plant boundary and enters Great Western Reservoir.

The purpose of the requested analyses is Plant impact release of Pu, U, Am, and ^{3}H, and detection of abnormal conditions. The data is reported in the monthly and annual Environmental Monitoring Report. Copies of these reports are distributed to the DOE, Colorado Department of Health (CDH), EPA, and other governmental agencies.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 13.

Table 13. Walnut Creek Indiana Street Gaging Station Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Daily	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Daily	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma-emitting isotopes	1 ℓ	Weekly	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Weekly	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Weekly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Weekly	1.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^{3}H	100 mℓ	Daily	1,000 pCi/ℓ	123	No preservation

Table 13. Walnut Creek Indiana Street Gaging Station Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
NO_3 (as N)	100 mℓ	Daily	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Daily	6.0-9.0 SU	881	No preservation
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
Bromacil**	1 ℓ	In season	--	881	Refrigerate
2,4-D**	1 ℓ	In season	0.1 mg/ℓ	881	Refrigerate
PCB's**	1 ℓ	Monthly	<MDA	881	Refrigerate: H_2SO_4 to pH <2
TS	250 ℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 to for dissolved metals. EPA recommends filtration be done immediately after collection.
** Must be collected in clean glass bottles.

Pond C-1

Pond C-1 is used as a monitoring point for Woman Creek.

The purpose of the requested analyses is for compliance with the NPDES permit and detection of abnormal conditions. When control guides are exceeded, data reliability and contaminant source(s) are investigated. EPA is notified of NPDES violations.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 14.

Table 14. Pond C-1 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Daily	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Weekly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitter	1 ℓ	Weekly	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Weekly	1.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Weekly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Weekly	0.5 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Weekly	1,500 pCi/ℓ	123	No preservation
pH	100 mℓ	Special request	6.0-9.0 SU	881	No preservation
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
Total Cl residue	500 mℓ	Special request	--	123	No preservation
Bromacil**	1 ℓ	In season	--	881	Refrigerate

Table 14. Pond C-1 Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
2,4-D**	1 ℓ	In season	0.1 mg/ℓ	881	Refrigerate
TS	200 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.
** Must be collected in clean glass bottles.

Pond C-2

Pond C-2 impounds runoff from an interceptor ditch on the south side of the Plant.

The purpose of the requested analysis is for operational control during pond water discharge and compliance with the NPDES reporting requirements.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 15.

Table 15. Pond C-2 Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Before discharge	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Before discharge	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1 ℓ	Before discharge	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Before discharge	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Before discharge	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Before discharge	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Before discharge	1,500 pCi/ℓ	123	No preservation
NO_3^- (as N)	100 mℓ	Before and during discharge	10 mg/ℓ	881	H_2SO_4 pH <2, refrigerate
pH	100 mℓ	Before and during discharge	6.0-9.0	881	No preservation

Table 15. Pond C-2 Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
NVSS	250 mℓ	Before and during discharge	100 mg/ℓ	881	No preservation
13 metals	300 mℓ	Quarterly by special request	Drinking water limits	881	5 mℓ con. HNO_3/ℓ*
TS	250 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.

Woman Creek

Woman Creek flows east from Rocky Flats into Standley Lake, a water supply for the city of Westminster. The sample locations (often times dry) are located at the west Plant boundary and Indiana Avenue.

The purpose of the requested analyses are detection of abnormal conditions, monitoring potential plant impact, and the collection of historical data.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 16.

Table 16. Woman Creek Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Pu	1 ℓ	Monthly	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Monthly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Monthly	1,500 pCi/ℓ	123	No preservation
NO_3^- (as N)	100 mℓ	Monthly	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Monthly	6.0-9.0 SU	881	No preservation

Intermittent Plantsite Streams

The intermittent plantsite streams are located at Upper Church Ditch and McKay Ditch.

The purpose of the requested analyses is the detection of abnormal conditions, monitoring potential plant impact, and the collection of historical data.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 17.

Table 17. Intermittent Plant Site Streams Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Pu	1 ℓ	Special request	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Special request	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Special request	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Special request	1,500 pCi/ℓ	123	No preservation
NO_3^- (as N)	100 mℓ	Special request	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Special request	6.0-9.0	881	No preservation

Footing Drains and Building Sumps

The footing drains and building sumps are located in and around the major buildings at the Plant.

The purpose of the requested analyses is for the detection of abnormal conditions. When control guides are exceeded, data reliability and contaminant source(s) are investigated.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 18.

Table 18. Footing Drains and Building Sumps Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Quarterly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Quarterly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1 ℓ	Quarterly	Above background	123	5 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Quarterly	1,500 pCi/ℓ	123	No preservation
NO_3^- (as N)	100 mℓ	Quarterly	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Quarterly	6.0-9.0	881	No preservation
Conductivity	100 mℓ	Quarterly	1,000 µmho	881	Refrigerate
TDS	250 mℓ	Quarterly	1,000 mg/ℓ	881	Refrigerate

Holding Tank Monitoring Wells

The holding rank monitoring wells monitor potential seepage or leaks from the process waste holding tanks.

The purpose of the requested analyses is to monitor for possible leaks in the holding tanks and to collect historical data.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 19.

Table 19. Holding Tank Monitoring Wells Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Quarterly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Quarterly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
pH	100 mℓ	Quarterly	6.0-9.0	881	No preservation
NO_3^-	100 mℓ	Quarterly	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
Conductivity	200 mℓ	Quarterly	1,000 µmho/cm	881	Refrigerate
TDS	250 mℓ	Quarterly	1,000 mg/ℓ	881	Refrigerate

Monitoring Wells

The purpose of the requested analyses is for the early detection of abnormal groundwater conditions, monitoring of onsite process liquid waste storage ponds, monitoring solid waste burial sites, and historical data collection. Monitoring of groundwater down gradient from the waste storage ponds is required by RCRA regulations. Current collection, transportation, and distribution of samples are performed by personnel in the HS&EL.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 20.

Table 20. Monitoring Wells Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Quarterly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Quarterly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1 ℓ	Quarterly	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Quarterly	0.1 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Quarterly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Quarterly	0.1 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Quarterly	1,500 pCi/ℓ	123	No preservation
TDS	250 mℓ	Quarterly	1,000 mg/ℓ	881	Refrigerate
Conductivity	200 mℓ	Quarterly	1,000 µmho/cm	881	Refrigerate
Alkalinity	200 mℓ	Quarterly	--	881	Refrigerate
Hardness	100 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ
pH	100 mℓ	Quarterly	6.0-9.0	881	No preservation
Cl^-	200 mℓ	Annually	--	881	No preservation

Table 20. Monitoring Wells Sampling Plan (contd.)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
F^-	300 mℓ	Quarterly	--	881	No preservation
SO_4^-	100 mℓ	Annually	--	881	Refrigerate
NO_3^-	100 mℓ	Quarterly	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
TOC**	50 mℓ	Semiannually	--	881	H_2SO_4 to pH <2, refrigerate
TOX**	1 ℓ	Semiannually	--	Contract	
Radium	--	Quarterly	5 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Phenols**	500 mℓ	Annually	--	881	H_2SO_4 to pH <2, refrigerate

* Filter sample before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.
** Must be collected in clean glass bottles.

Solar Evaporation Pond 207-A

Solar Pond 207-A stores process liquid waste water prior to treatment.

The purpose of the requested analyses is an estimate of plant impact and historical data collection.

Present collection and transportation of the samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 21.

Table 21. Pond 207-A Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ
Pu	1ℓ	Quarterly	--	123	25 mℓ con.HNO_3/ℓ
U	1ℓ	Quarterly	--	123	25 mℓ con. HNO_3/ℓ
Am	1ℓ	Quarterly	--	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Quarterly	--	123	No preservation
NO_3^- (as N)	100 mℓ	Quarterly	--	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Quarterly	--	881	No preservation
Be	100 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
CN^-	500 mℓ	Quarterly	--	881	NaOH to pH 12, refrigerate
TDS	200 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 to for dissolved metals. EPA recommends filtration be done immediately after collection.

Solar Evaporation Ponds 207-B North and Center

Pond 207-B North contains water pumped from the nitrate sump located west of Pond A-1. Pond 207-B Center contains Building 995 effluent. When these ponds become full, the water is spray irrigated west of the Plant.

The purpose of the requested analyses is to ensure the water meets the criteria for spray irrigation.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 22.

Table 22. Solar Evaporation Ponds 207-B North and Center Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Weekly	To be determined	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Weekly	To be determined	881	5 mℓ con. HNO_3/ℓ
Gamma-emitting isotopes	1 ℓ	Weekly	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Monthly	15 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Monthly	10,000 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly	15 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Weekly	20,000 pCi/ℓ	123	No preservation
NO_3 (as N)	100 mℓ	Weekly	--	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Weekly	6.0-9.0 SU	881	No preservation
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
TS	250 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.

Solar Evaporation Pond 207-C

Solar Pond 207-C stores process wastewater prior to treatment.

The purpose of the requested analyses is to estimate plant impact and for historical data collection.

Present collection and transportation of the samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 23.

Table 23. Solar Evaporation Pond 207-C Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Quarterly	--	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Quarterly	--	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Quarterly	--	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Quarterly	--	123	No preservation
TDS	250 mℓ	Quarterly	--	881	No preservation
pH	100 mℓ	Quarterly	--	881	No preservation
NO_3 (as N)	100 mℓ	Quarterly	--	881	H_2SO_4 to pH <2, refrigerate

Building 774 Pond

The purpose of the requested analyses is the detection of abnormal conditions. The water in the pond is derived from the footing drains and other sources under Building 774 and is known to contain excessive amounts of tritium and nitrate. The appearance of other pollutants could indicate additional sources.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 24.

Table 24. Building 774 Pond Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Quarterly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Quarterly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitters	1 ℓ	Quarterly	Above background	123	5 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Quarterly	1,500 pCi/ℓ	123	No preservation
NO_3^- (as N)	100 mℓ	Quarterly	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate

Landfill Pond and Bypasses

The Landfill Pond was built to impound drainage from the landfill for monitoring. The landfill bypasses divert surface runoff around the landfill.

The purpose of the requested analyses is control of landfill operations, control of landfill pond spraying, and detection of abnormal conditions.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 25.

Table 25. Landfill Pond and Bypasses Sampling Plan

LANDFILL POND

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Weekly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Weekly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma-emitting isotopes	1 ℓ	Weekly	Above background	123	5 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Monthly	1,500 pCi/ℓ	123	No preservation
Sr-90	1 ℓ		--	881	HCl or HNO_3 to pH <2
NO_3 (as N)	100 mℓ	Monthly	20 mg/ℓ	881	H_2SO_4 to pH <2 refrigerate
pH	100 mℓ	Monthly	6.0-9.0 SU	881	No preservation
31 elements	500 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ*

Table 25. Landfill Pond and Bypasses Sampling Plan (contd.)

LANDFILL POND

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Be	100 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ*
Cd	100 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ*
Hg	100 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ*
PCB's**	1 ℓ	Monthly	--	881	
Phenol**	1 ℓ	Monthly	--	881	H_2SO_4 to pH <2 refrigerate
TDS	200 mℓ	Monthly	--	881	No preservation
COD	100 mℓ	Monthly	--	881	H_2SO_4 to pH <2
TOC**	50 mℓ	Monthly	--	881	H_2SO_4 to pH <2
Na	100 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ*
Ca	100 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ
Mg	100 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ
Conductivity	200 mℓ	Monthly	--	881	5 mℓ con. HNO_3/ℓ
TS	250 mℓ	Quarterly	--	881	Refrigerate

LANDFILL BYPASSES (North and South)

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Monthly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
^3H	50 mℓ	Monthly	1,500 pCi/ℓ	123	No preservation
NO_3 (as N)	100 mℓ	Monthly	10 mg/ℓ	881	H_2SO_4 to pH <2 refrigerate

* Filter before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.
** Must be collected in clean glass bottles.

Building 374 Product Water

The Building 374 product water consists of utility condensate which has been through the waste treatment process.

The purpose of the requested analyses is for the operational control and detection of abnormal conditions. When control guides are exceeded, operations may be curtailed and/or product water may be diverted to onsite storage ponds.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 26.

Table 26. Building 374 Product Water Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Weekly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Weekly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitter	1 ℓ	Weekly	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Monthly	1.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Monthly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly	0.5 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Weekly	10,000 pCi/ℓ	123	No preservation
NO_3 (as N)	100 mℓ	Weekly	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Weekly	6.0-9.0 SU	881	No preservation

Steam Condensate (Buildings 443, 707, 771, 881)

The purpose of the requested analyses is for the operational control and the collection of historical data.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 27.

Table 27. Steam Condensate (Buildings 443, 707, 771, 881) Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Gross alpha	50 mℓ	Quarterly	40 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gross beta	50 mℓ	Quarterly	50 pCi/ℓ	881	5 mℓ con. HNO_3/ℓ
Gamma emitter	1 ℓ	Quarterly	Above background	123	5 mℓ con. HNO_3/ℓ
Pu	1 ℓ	Quarterly	1.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Quarterly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Quarterly	0.5 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Quarterly	10,000 pCi/ℓ	123	No preservation
NO_3 (as N)	100 mℓ	Quarterly	10 mg/ℓ	881	H_2SO_4 to pH <2, refrigerate
pH	100 mℓ	Quarterly	6.0-9.0 SU	881	No preservation

Great Western Reservoir and Standley Lake

Great Western Reservoir is a water supply for the city of Broomfield. Standley Lake is a water supply for the city of Westminster.

The purpose of the requested analyses is for verification and comparison of data from historical and other sources and estimation of Plant impact.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 28.

Table 28. Great Western Reservoir and Standley Lake Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Pu	1 ℓ	Monthly	0.02 pCi/ℓ	123	5 mℓ con. HNO_3/ℓ
U	1 ℓ	Monthly	5.0 pCi/ℓ	123	5 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly	0.02 pCi/ℓ	123	5 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Weekly	1,500 pCi/ℓ	123	No preservation
NO_3^-	100 mℓ	Weekly	2.0 mg/ℓ	881	Refrigerate
31 elements	500 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
12 elements	300 mℓ	Quarterly	--	881	5 mℓ con. HNO_3/ℓ*
TS	200 mℓ	Quarterly	--	881	No preservation

* Filter before adding HNO_3 for dissolved metals. EPA recommends filtration be done immediately after collection.

Community Tapwater

The community tapwater samples are reported monthly and annually to the CDH in the Environmental Monitoring Report.

The purpose of the requested analyses is verification and comparison of data.

Present collection and transportation of samples are accomplished by personnel in the HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are included in Table 29.

Table 29. Community Tapwater Sampling Plan

BROOMFIELD, BOULDER, AND WESTMINSTER

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Pu	1 ℓ	Monthly*	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Monthly*	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Monthly*	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Monthly	1,500 pCi/ℓ	123	No preservation

* Weekly grab samples are collected and composited in the laboratory for monthly analyses.

Table 29. Community Tapwater Sampling Plan (contd.)

ARVADA, DENVER, GOLDEN, LAFAYETTE, LOUISVILLE, AND THORNTON

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Pu	1 ℓ	Quarterly	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Quarterly	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Quarterly	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Quarterly	1,500 pCi/ℓ	123	No preservation

Four Remote Offsite Waters

The four remote offsite waters are located at Ralston Reservoir, South Boulder Diversion Canal, Dillon Reservoir, and Boulder Reservoir.

The purpose of the requested analyses is the collection of background data.

Present collection and transportation of samples are accomplished by personnel in HS&EL. The samples are currently not preserved for any of the parameters. Recommended preservation conditions are stated in Table 30.

Table 30. Four Remote Offsite Waters Sampling Plan

Parameter	Vol.	Analytical Frequency	Control Guide	Lab	Preservation
Pu	1 ℓ	Annually	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
U	1 ℓ	Annually	5.0 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
Am	1 ℓ	Annually	0.02 pCi/ℓ	123	25 mℓ con. HNO_3/ℓ
^3H	100 mℓ	Annually	1,500 pCi/ℓ	123	No preservation

CURRENT PROBLEMS

Preservation has never been done for the following reasons:

1) The need for preservation was not recognized.

2) Necessary manpower was not available.

3) Coordination problems between several diverse groups made timely preservation efforts difficult.

4) Transportation and distribution of sample aliquots to various locations complicates preservation activities.

Preservation techniques recommended by the EPA and USGS have not been followed. The validity of analytical results can, therefore, be questioned.

ALTERNATIVE ACTIONS

1) Creation of a group whose primary function is to collect, preserve, split, and distribute all samples. The group would be responsible for collecting the samples and transporting the samples back to one laboratory, where the samples are split and preserved. Then the group would distribute the samples to the appropriate laboratory for analysis.

2) Preservation of samples by HS&E laboratories personnel.

3) Delivery of samples to respective laboratories and preservation performed by those laboratories.

4) Preservation of only those samples where results are reported to outside agencies.

5) Continue current practices with no preservation.

IMPACT OF ACTIONS

1) PRO: The first alternative will provide timeliness, consistency, and improved reliability in collection and preservation of samples.

   CON: Will require additional manpower.

2) PRO: The samples would get preserved and improve reliability of analytical results.

   CON: Will require additional manpower. The current manpower level is barely adequate for collection and distribution of samples.

3) PRO: There will be improved reliability of analytical results.

   CON: Timeliness and consistency of preservation procedures cannot be guaranteed because of the number of people handling the samples.

4) PRO: Less manpower required than Alternative 1 and improved validity of data on critical samples.

   CON: The unpreserved sample results can be questioned. Possible noncomparable sample results between locations.

5) PRO: No additional manpower required.

   CON: Without preservation of the sample, the analytical results are not as reliable and there is noncompliance with EPA and USGS recommended practices.

RECOMMENDED ACTION AND CONSEQUENCES

Action 1 is recommended because the samples will get preserved in the most efficient, timely, and consistent manner, but will require more resources.

The recommended action demands labor, equipment, and materials beyond those needed for the present system. A discussion follows.

Man-hours

The recommended action will result in a necessary increase of man-hours. It will take additional time and man-hours to split and preserve the samples. Table 31 lists the approximate man-hours presently needed to collect and distribute samples and the man-hours required for the proposed sample collection and preservation practices.

Table 31. Man-hours Required for Present vs. Proposed Sample Collection Program

Task	MAN-HOURS	
	Present	Proposed
Precollection (per day M, T, W, F)	2	3
Collection (per day M, T, W, F)	6	6
Distribution (per day M, T, W, F)	2	3
Splitting & Preservation (per day M, T, W, F)	0	4
Filtering (wells) (per day M, T, W, F)	0.5	1.5
Total for M, T, W, F	10.5/day	17.5/day
Thursdays	8	8+1+1+4=14
TOTAL MAN-HOURS/WEEK	(10.5X4)+8=50	(17.5X4)+14=84

The precollection involves preparing the bottles and loading the jeep. The man-hours required for precollection will increase slightly because more volume will be required, but actual collection of samples should not change with the proposed preservation practices. It is estimated that the distribution of samples to the laboratories will increase slightly since a special trip to the General Laboratory will be required following preservation. It is estimated that splitting and preservation will take an additional 4 man-hours per day. The time spent on filtering well samples require about 0.5 man-hours per day (converting the quarterly collection time to a daily basis). This is estimated to increase by about 1 man-hour because of increased volume. Thursday's community sample collection currently requires 8 man-hours. With preservation it will require 14 man-hours. The estimated additional man-hours required for splitting and preservation is 34 man-hours per week.

Refrigeration

The recommended action assumes the temperature of the samples will not be controlled during transportation of the samples. Once the samples are delivered to the HS&E laboratory and split, only a portion of the samples will require refrigeration. The following parameters require refrigeration: nitrate (100 mℓ), TOC (50 mℓ), total phosphorus (100 mℓ), PCB's (1 ℓ), 2,4-D (1 ℓ), conductivity (100 mℓ), TDS (200 mℓ), alkalinity (200 mℓ), sulfate (100 mℓ), phenols (500 mℓ), and cyanide (500 mℓ). It is estimated that in any 1 week no more than one hundred 100-mℓ bottles would require refrigeration. Therefore, two standard 21-ft^2 refrigerators would be sufficient, one for each of the laboratories.

Acid Preservation

For trace metals, the task team is recommending Ultrex nitric acid be used for preservation because impurities in reagent grade may affect the analyses. Reagent grade is recommended for all other samples requiring nitric acid as a preservative.

REFERENCES

1. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1979.

2. Manual for the Interim Certification of Laboratories Involved in Analyzing Public Drinking Water Supplies, Criteria and Procedures, EPA 600/8-78-008, May 1978.

3. Groundwater Monitoring Guidance for Owners and Operators of Interim Status Facilities, PB83-209445, March 1983.

APPENDIX 1

Internal Letter

Rockwell International

Date .October 8, 1982

No.

TO (Name, Organization, Internal Address)
·Those Listed
·
·

FROM (Name, Organization, Internal Address, Phone)
·K. J. Grossaint
·General Laboratory
·Bldg. 881
·2438

Subject .TASK TEAMS - INTERDEPARTMENT PROBLEMS

Task Teams have been selected to work on interdepartment problems. The make-up of the teams was decided by Evain Ruby, Weldon Williams, and Daryl Hornbacher, to ensure imputs from each of the affected departments.

The leader of each team is responsible for the following:

1. Assemble the team and decide on the approach to be taken to arrive at recommendations for solutions.

2. Have the team arrive at a complete scope or definition of the problem, including a statement of the activity, and the impact on each department, as well as impact on plant policies and objectives.

3. Direct the team in information collection, and assemble or compile the information in a report format.

4. Determine the team's proposed approach to resolving the problem, and a list of alternatives or options considered by the team.

5. Prepare a final report for distribution and approval by the Managers of the three departments. If the magnitude of the problem requires extended study, monthly interim reports are to be prepared.

The problems to be addressed will be those identified in earlier meetings and discussions. The problems and assigned tasks are:

	Problem	Task Team	
A.	Trace organic sample collection in improper.	Pat Hyman (Leader)	4289
		Mary Jameson	2729
		Ron Henry	4368
		Judy Palcis (Alternate)	4289

Those Listed
October 8, 1982
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	Problem	Task Team	
B.	Ambiguous definition of preservation requirements for trace metals and radioactive elements. (Check with Dale Bokowski for some prior data)	Jack Long (Leader) Chuck Illsley Nancy Hoffman Conrad Trice	2920 7079 4158 2490
C.	Sample collection practices to meet analysis requirements.	Mary Jameson (Leader) Lynley Nichol Jeff Petersell Ron Henry	2729 2437 4471 4368
D.	Sample transportation.	Mary Jameson (Leader) Jeff Petersell Paul Castillo	2729 4471 4472
E.	Sample receiving.	Jeff Petersell (Leader) Mary Jameson Ron Henry Nancy Hoffman Lynley Nichol	4471 2729 4368 4158 2437
F.	Sample storage and preservation.	Jeff Petersell (Leader) Mary Jameson Jack Long Chuck Illsley Nancy Hoffman	4471 2729 2920 7079 4158
G.	Sample preparation and analysis. (Check Dale Bokowski for important comments)	Jeff Petersell (Leader) Chuck Illsley Nancy Hoffman Jack Long (Alternate) Doug Kinnison (Alternate)	4471 7079 4158 2920 4471
H.	Sample reporting. (See Dale Bokowski for input, also)	Jeff Petersell (Leader) Chris Oertel Carol Gies (Alternate) Ron Henry Nancy Hoffman	4471 7380 7381 4380 4158

Those Listed
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	Problem	Task Team	
I.	Resource needs projection.	Daryl Hornbacher (Leader)	2354
		Evain Ruby	2522
		Weldon Williams	4119
J.	Lab certification and EPA requirements.	Ron Henry (Leader)	4368
		Jeff Petersell	4471
K.	Oil samples for gamma analysis (e.g., John Hayden)	Chuck Illsley (Leader)	7079
		Chris Oertel	7380

Where sufficient overlap of problems appears to justify combining the effort, Leaders should consider doing so. Leaders should also prioritize problem areas and denote first efforts to solving most pressing problems, where several problem areas have been assigned to an individual.

With your cooperative effort, some areas which have been of concern can be improved. Thank you for your contribution to help solve common problems.

K J Grossaint

K. J. Grossaint
Manager, Chemistry

Distribution:

Dale Bokowski
Paul Castillo
Carol Gies
Ron Henry
Nancy Hoffman
Daryl Hornbacher
Pat Hyman
Chuck Illsley
Jack Long
Mary Jameson
Doug Kinnison
Lynley Nichol
Chris Oertel
Judy Palcic
Jeff Petersell
Evain Ruby
Conrad Trice
Weldon Williams

APPENDIX II PROPOSED WATER SAMPLE FLOW