VARIANCE / FIELD CHANGE NOTICE (FCN)	V 01-001
WBS NO.: PROJECT/DOCUMENT 98SC000001 WPRAP Sampling and Analysis Plan for Environmental Media, Rev 0	Page 1 of 1
PROJECT TITLE: Waste Pits Remedial Action Project	Date: 1/10/01

VARIANCE / FIELD CHANGE NOTICE (Include justification): 3512

Change:

1. Table 2.1: Change "nickel, chromium, copper" to "and metals (Ni, Cr, Cu) as needed"
2. Table 2.15: Last note, change "Nickel, Chromium, and Copper (all by XRF)" to "Nickel, Chromium and Copper (as needed for process control)"
3. Table 2.16: Last note, change "Nickel, Chromium, and Copper (all by XRF)" to "Nickel, Chromium and Copper (as needed for process control)"
4. Table 2.17: Last note, change "Nickel, Chromium, and Copper (all by XRF)" to "Nickel, Chromium and Copper (as needed for process control)"
5. Section 2.4.1: Add sentence to the end of last paragraph "Analysis for Ni, Cr and Cu as part of the process control sampling will be performed during the Start Up phase. Curtailment of routine analysis for Ni, Cr, and Cu will be determined by agreement between the IT Operations Manager and FF Sampling and Analysis Coordinator."
6. Section 2.4.4: Second Bullet - Delete "...X-Ray Fluorescence (XRF) for..."

Justification:

1. – 5. The first year of full operations has shown that concentrations of Ni, Cr, and Cu have not exceeded the discharge criteria. Metals precipitation performed in the WTS effectively reduces the concentrations of the metals that are present. As uranium is present in concentrations ~ 1,000 higher than other metals, continued monitoring of uranium concentrations will provide process information on the effectiveness of metals precipitation in the WTS.

6. X-Ray fluorescence is not being used for metals analysis.

REQUESTED BY: Doug Taylor , IT Corp DATE: 1/10/01

CHECK IF REQD	VARIANCE/ FCN APPROVAL	DATE	CHECK IF REQD	VARIANCE/ FCN APPROVAL	DATE
✓	IT Lab Manager	010110	✓	FDF RDQ	1/12/01
✓	IT QA Manager	1-11-01	✓	FDF WPRAP Environmental Compliance w/comment	1-17-01
✓	FDF WPRAP Sampling/ Analysis Coordinator w/comment	18 JAN 01			
✓	FDF WPRAP QA Manager	1-17-01			

VARIANCE/FCN APPROVED [ ]YES [ ]NO

REVISION REQUIRED: [ ]YES [ ]NO

Distribution:

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FDF RDQ
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Finally, the sampling and analysis program needs to be such that assurance is provided prior to discharge from WPRAP to the BSL, that the waters (e.g., the wastewater, excavation water and contact stormwater) meet these criteria.

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2.4 Wastewater, Excavation Water and Contact Stormwater Characterization Strategy

As identified in Section 2.3, there is a defined list of constituents, and, in some cases, established discharge limits for some of those constituents, which form the basis of this sampling and analysis program. Therefore, the only part of the strategy to be developed is where and when the sampling will be performed. An obvious means of performing this sampling would be to sample these waters after treatment, and then discharging them after assuring that the waters meet the discharge requirements. The main problem with this approach, however, is that it would require a significant holding capacity to implement. Another approach, which is the one chosen by WPRAP, is to treat the wastewater such that the discharges will be expected to meet the discharge requirements, with final sampling serving to provide verification data. This approach, which is discussed in Section 2.4.1, and uses process sampling to guide the treatment, has been agreed to by the ARWWP, as satisfying its requirements.

2.4.1 Process -vs- End-Of-Pipe Sampling

As indicated above, the key to the proposed sampling and analysis strategy for wastewater, excavation water, and contact stormwater discharges through the WTS to the BSL, is the control of treatment of these waters in the WTS. To accomplish this task, WPRAP and ARWWP have agreed to the performance of process control sampling in the Clearwell, the WTS influent tank, the WTS clarifier influent, the WTS clarifier effluent, the WTS sand filter effluent, the WTS ion exchange (IX) effluent, and at the WTS effluent tank. This process control sampling is designed to provide information which will be evaluated to guide the types and levels of treatment to be performed in the WTS, with the intent that the effluent from the WTS will then be well below the BSL discharge criteria.

The effluent from the WTS to the BSL will then be sampled for the criteria identified in Section 2.3, with the intent of providing analytical data which verifies that the BSL influent criteria has been met. Analysis for Ni, Cr and Cu as part of the process control sampling will be performed during the Start Up phase, (see Table 2.15). Curtailment of routine analysis for Ni, Cr, and Cu will be determined by agreement between the IT Operations Manager and FF Sampling and Analysis Coordinator.

2.4.2 Selection of Appropriate Analytical Parameters

As noted in Section 2.3, the WPRAP remediation contract provides specific analytical parameters which are to be sampled for relative to the effluent to the BSL. In addition, as agreed to by WPRAP and ARWWP, two additional parameters, iron and total organic carbon, have been added to the analyte list. In addition to sampling the WTS effluent, the Clearwell and the WTS influent tank will also be sampled for this same group of analytical parameters to assess changes in the characteristics of the WTS influent.

For the process samples, the focus will be on a smaller list of analytes for which quick analyses can be run, so as to aid in the operation of the WTS. Specifically, process samples will be analyzed for the following constituents: total uranium; total suspended solids (TSS); pH; turbidity; nickel; chromium; and copper. This information will be used to adjust WTS operational parameters to ensure that proper treatment is being applied to the wastewater, excavation water, and contact stormwater such that the WTS effluent will meet the BSL criteria following treatment. Table 2.1 provides a summarization of these analytical parameters, as well as those for the BSL influent criteria characterization.

In addition to these analytical parameters, system operators will make routine observations of the components of the WTS. These observations will include checking that all equipment is functioning, instrumentation is properly calibrated, and tank water levels are within normal operating ranges. Routine field observations will also include visual inspection of the flash tank, flocculation tank, and inclined plate clarifier to confirm proper floc formation, discharge water clarity, and the absence of floating material (e.g., oil and grease). Additional on-site process sampling may be performed based on operator observations.

2.4.3 Selection of Appropriate Sampling Frequency

Sampling of effluent from the WTS to the BSL will be performed initially at a frequency of three per week, but will be reduced to once per week after the startup period (see below), to provide verification of continued performance of the WTS. The remainder of the sampling for this waste stream, including process sampling will be done at varying frequencies throughout the operation of the WTS. Specifically, WPRAP has identified the following three operational periods, each of which will have sampling frequencies reflective of operational conditions during that period: 1) Start-up period; 2) Intermediate period; and 3) Long-term period.

The start-up period, which will be over the first month of WTS operation, will have the highest frequency of sampling. Data from this initial sampling will be used to confirm the initial operation of the WTS per the BSL influent criteria. An objective during the startup period is to identify contaminant concentration ranges for the WTS influent, prepare correlations between the off-site laboratory analytical results and the IT on-site laboratory analytical results (i.e., ensure that on-site analytical techniques will be adequate to monitor operation of the WTS), and establish the relationship between the suspended solids content, turbidity, and the heavy metal and uranium concentrations. This will enable the in-line turbidimeter in the WTS effluent line to serve as the primary indicator of proper operation of the WTS. The relationship between turbidity and uranium/heavy metal concentrations will be established during the startup period and further refined during the intermediate period of operation. After this relationship is established, high-turbidity alarms will result in the WTS operator collecting a grab sample of the effluent water and providing on-site analyses for total uranium and heavy metals to ensure that concentrations do not exceed the BSL WAC. During this period, process control samples will also be collected on a daily basis for several sample locations (i.e., the influent tank, clarifier effluent, and sand filter effluent) to aid in the operation of the WTS process.

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The intermediate period of operation of the WTS consists of 5 months following the initial startup period. It is expected that normal effluent sampling frequencies (one per week) will be used during this period. Laboratory and field analytical work (process control sampling) will continue to be correlated to confirm the relationship of turbidity to other analytical parameters and to ensure that the field analytical methods yield results similar to the laboratory methods. Process control samples will continue to be collected and analyzed to aid in the operation of the WTS. The sample frequency and analytical parameters may be modified during this period based on the results obtained during the initial startup period.

The long-term operations period follows the intermediate period. During this period effluent sampling is expected to be once per week. This operating mode continues until the excavation activities change significantly (i.e., excavation in a new waste pit begins). When excavation activities begin in a new waste pit, the frequency of the process control sampling of the Clearwell and the influent tank will be increased to once a day for a period of approximately one month. The sample frequency and analytical parameters may be modified during the period based on the results obtained during the previous operating periods.

2.4.4 Selection of Appropriate Laboratories

WTS operators will follow a sampling and analysis protocol to monitor WTS removal efficiency and verify that WTS discharge is in compliance with the BSL influent criteria. The protocol will consist of three distinct types of analytical means:

- Samples collected and analyzed in an off-site laboratory will serve as the primary data used for reporting purposes (see Section 9.0) and will act as quality control for site analytical work.

- Process control samples will be collected and analyzed in IT's on-site laboratory for process evaluation. These analyses consist of pH, TSS, bench top Uranium analysis (similar to that performed at the AWWT), and key heavy metals (i.e., chromium, copper, and nickel). DCN-92 11/01 Variance VO1-0

- In-line analytical instrumentation including pH probes and a turbidimeter located in the effluent line will be used for real time monitoring and process trending.

2.5 Process Description

The flow of wastewater, excavation water, and contaminated stormwater is best summarized in Section 2.8 of the Description of Operation and Processes, and in Process Flow Diagram D-90-10-001, both contained in Volume 1 of 3 of the RD Package. In simple terms, the process is shown in Figure 2.1.

Basically, almost all of the wastewater, and all of the excavation water and contact stormwater is collected in the Clearwell. During the waste pit remediation process, the Clearwell will serve as an integral part of the WPRAP wastewater/stormwater treatment process. The Clearwell will be

used as a surge point for water streams entering the WTS, with the exception of the blowdown stream from the Gas Cleaning System (GCS) pretreatment system, which is discharged directly to the WTS (i.e., does not go through the Clearwell). The Clearwell will also act as a primary settling point for suspended solids in these streams, thus reducing the load on the WTS.

From the Clearwell, this water will be transferred to the WTS, where it will be treated, as necessary, to meet the BSL influent criteria. In addition to the waters from the Clearwell, the WTS will also receive the GCS blowdown stream for processing. The WTS is designed for approximately 250 gpm, and has unit operations which include metals precipitation, clarification, filtration, ion exchange, and pH adjustment. After treatment, the effluent from the WTS will be pumped to the BSL, for eventual transfer to the AWWT for final treatment. If necessary, the WTS has the capability to recycle the WTS effluent to the Clearwell.

As discussed in Section 2.1, the control of water treatment is essential to ensure that waters transferred from the WTS to the BSL can be adequately handled. Based on historical operating data from the AWWT, proper operation of the clarifier and multi-media filters at the AWWT results in substantial reduction of uranium concentration (to the parts per billion range) in the water from the BSL. Based on this data, it is estimated that proper operation of the clarifier and sand filters in the WTS will result in heavy metal and uranium concentrations well below the BSL influent criteria. For this reason, emphasis will be placed on optimum operation of the clarifier and sand filters in the WTS.

2.6 Analytical Requirements

As discussed in Sections 2.4.2 and 2.4.3, the number and type of analyses specified relative to the wastewater, excavation water, and contact stormwater are designed to ensure that upon discharge to the BSL, this water will not adversely affect the operation of the BSL and/or the AWWT. As discussed in Section 2.4.4, the samples to be taken for this waste stream will be analyzed in either IT's on-site laboratory, or an off-site laboratory, depending on the purpose of the sampling. Table 2.2 provides summary information on the sampling requirements associated with these samples, while Tables 2.3 and 2.4 provide information on the proposed chemical and radiological analytical methodologies. Tables 2.5 through 2.14 present the QC checks and method performance criteria for the general chemistry and physical parameters to be measured. Deviations from the Sitewide CERCLA Quality Assurance Project Plan (SCQ) are incorporated, as appropriate, in the aforementioned tables.

2.7 Sample Collection Approach

The effluent from the WTS to the BSL will be monitored for the compounds noted in Table 2.1. During normal operation, an automatic composite sampling device will be used to collect weekly WTS effluent samples. These samples will be used to confirm the operation of the WTS per the BSL influent requirements. During the first month of WTS operation (i.e., the Start-up period) the normal sampling frequency will be increased to 3 samples collected per week with analytical turnaround of 2 to 3 days.

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The Clearwell will be monitored for the compounds listed in Table 2.1. Grab samples will be taken periodically to aid in the operation of the WTS. Sample frequency is anticipated to be initially once per week and may be adjusted based on Clearwell water quality. Sampling will also be performed when a significant change to excavation activities occurs which could influence water quality in the Clearwell (i.e., start of excavations in a new pit).

In addition to these samples, as discussed in Section 2.4.3, various process control samples will be taken for several sample locations to aid in the operation of the WTS process. The frequency of this sampling will also change over time.

Tables 2.15, 2.16, and 2.17 provide a summary of the sampling frequency and analytical parameters, by location, for all wastewater, excavation water, and contact stormwater sampling to be performed for each of the operational periods identified by WPRAP (i.e., Start-up Period, Intermediate Period, and Long-Term Period).

Table 2.1 Wastewater, Excavation Water, and Contact Stormwater Sampling Parameters

Location	Matrix	Type Sample	Analytical Parameter	Purpose of Samples	ASL
WTS Process Control Sampling	water	grab	Total Uranium, pH, Turbidity, TSS. Process control testing for Ni, Cr, Cu will be determined by the IT Operations Manger and FF Sampling and Analysis Coordinator (see Table 2.15)	Process Control	B
Clearwell	water	grab	Arsenic, Cadmium, Chromium, Copper, Cyanide, Nickel, Silver, Ra226, Th230, Th232, Total Uranium, Chloride, Nitrates, 1,1,1-Trichloroethane, Tetrachloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Chloroethane, pH, TSS, Iron, TOC	Characterize for Discharge to BSL	B
WTS effluent	water	composite	Arsenic, Cadmium, Chromium, Copper, Cyanide, Nickel, Silver, Ra226, Th230, Th232, Total Uranium, Chloride, Nitrates, 1,1,1-Trichloroethane, Tetrachloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Chloroethane, pH, TSS, Iron, TOC	Discharge Monitoring to BSL	B

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Table 2.15 Wastewater, Excavation Water, and Contact Stormwater Sampling - Start-Up Period

		REPORTING		PROCESS		OBSERVATIONS	
Sample Point	Type	Frequency	Analysis	Frequency	Analysis	Frequency	Analysis
Clearwell or Influent Tank	Grab	1/week	lab suite	1/day	on-site set	1/day	clarity
Clarifier Influent	In-line monitor	NA	NA	continuous	pH	4/day	operation of unit
Clarifier Effluent	Grab	NA	NA	1/day	on-site set	4/day	clarity
Sand Filter Effluent	Grab	NA	NA	1/day	on-site set	4/day	clarity
IX Effluent	In-line monitor	NA	NA	continuous	pH, turbidity	4/day	operation of units
Effluent Tank	Grab	NA	NA	1/day	on-site set	4/day	clarity
Effluent to BSL	24-Hr Composite	3/week	lab suite	NA	NA	4/day	operation of unit

Notes:

Samples will not be collected when Water Treatment System is inoperative.

Metals precipitation system will run @ pH=10 in clarifier and sand filter. Tests will also be performed at normal pH.

Control room alarms on High/Low pH and High turbidity

Off-Site Lab Suite: Arsenic, Cadmium, Chromium, Copper, Nickel, Silver, Cyanide, Radium-226, Thorium-230, Thorium-232, Total Uranium, Chloride, Nitrates, 1,1,1-Trichloroethane, Tetrachloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Chloroethane, pH, Total Suspended Solids, Iron, Total Organic Carbon.

On-Site IT Lab Set: Total Uranium; Total Suspended Solids; pH; Turbidity. Process control testing for Nickel, Chromium, and Copper will be determined by the IT Operations Manager and the FF Sampling and Analysis Coordinator.

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		REPORTING		PROCESS		OBSERVATIONS	
Sample Point	Type	Frequency	Analysis	Frequency	Analysis	Frequency	Analysis
Clearwell or Influent Tank	Grab	2/month	lab suite	1/week	on-site set	1/day	clarity
Clarifier Influent	In-line monitor	NA	NA	continuous	pH	4/day	operation of unit
Clarifier Effluent	Grab	NA	NA	1/week	on-site set	4/day	clarity
Sand Filter Effluent	Grab	NA	NA	as needed	on-site set	4/day	clarity
IX Effluent	In-line monitor	NA	NA	continuous	pH, turbidity	4/day	operation of unit
Effluent Tank	Grab	NA	NA	1/day	on-site set	4/day	clarity
Effluent to BSL	24-Hr Composite	1/week	lab suite	NA	NA	4/day	operation of unit

Notes:

Samples will not be collected when Water Treatment System is inoperative.

Above is anticipated sampling frequency based on satisfactory results from start-up period.

Control room alarms on High/Low pH and High turbidity

Off-Site Lab Suite: Arsenic, Cadmium, Chromium, Copper, Nickel, Silver, Cyanide, Radium-226, Thorium-230, Thorium-232, Total Uranium, Chloride, Nitrates, 1,1,1-Trichloroethane, Tetrachloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Chloroethane, pH, Total Suspended Solids, Iron, Total Organic Carbon.

On-Site IT Lab Set: Total Uranium; Total Suspended Solids; pH; Turbidity. Process control testing for Nickel, Chromium, and Copper will be determined by the IT Operations Manager and the FF Sampling and Analysis Coordinator.

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Table 2.17 Wastewater, Excavation Water, and Contact Stormwater Sampling - Long-Term Period

		REPORTING		PROCESS		OBSERVATIONS	
Sample Point	Type	Frequency	Analysis	Frequency	Analysis	Frequency	Analysis
Clearwell or Influent Tank	Grab	1/quarter	lab suite	1/week	on-site set	1/day	clarity
Clarifier Influent	In-line monitor	NA	NA	continuous	pH	4/day	operation of unit
Clarifier Effluent	Grab	NA	NA	1/week	on-site set	4/day	clarity
Sand Filter Effluent	Grab	NA	NA	as needed	on-site set	4/day	clarity
IX Effluent	In-line monitor	NA	NA	continuous	pH, turbidity	4/day	operation of unit
Effluent Tank	Grab	NA	NA	1/day	on-site set	4/day	clarity
Effluent to BSL	24-Hr Composite	1/week	lab suite	NA	NA	4/day	operation of unit

Notes:

Samples will not be collected when Water Treatment System is inoperative.

Above is anticipated sampling frequency based on satisfactory results from start-up and intermediate periods.

Control room alarms on High/Low pH and High turbidity

Off-Site Lab Suite: Arsenic, Cadmium, Chromium, Copper, Nickel, Silver, Cyanide, Radium-226, Thorium-230, Thorium-232, Total Uranium, Chloride, Nitrates, 1,1,1-Trichloroethane, Tetrachloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Chloroethane, pH, Total Suspended Solids, Iron, Total Organic Carbon.

On-Site IT Lab Set: Total Uranium; Total Suspended Solids; pH; Turbidity. Process control testing for Nickel, Chromium, and Copper will be determined by the IT Operations Manager and the FF Sampling and Analysis Coordinator.

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FLUOR GLOBAL SERVICES

Memorandum

To:	Distribution List	Date:	February 23, 2001
Location:	Various	Reference:	N/A
From:	Tim Arnold, MS52-1	Fernald #:	M:WPRAP:2001-0008
Location:	Fernald	Client:	DOE DE-AC24-01OH20115
Extension:	648-5774	Subject:	**VARIANCES TO THE WPRAP SAMPLING AND ANALYSIS PLANS**

c: AR Coordinator – MS78
File Record Subject - Variances
Project Number - 10500-1.5
WPRAP Project File – (2)

The attached variances to the Waste Pits Remedial Action Project (WPRAP) Sampling and Analysis Plan for Waste Pit Materials and Sampling and Analysis Plan for Environmental Media have been approved. Please include a copy of the variances in your Sampling and Analysis Plans, as appropriate. If you have any questions, please contact me at (513) 648-5774.

TA:sel
Attachments

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