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241-C Tank Farm – Tank Removal Study

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EXECUTIVE SUMMARY

This engineering study provides a scoping level evaluation for the demolition and removal of the 241-C tank farm tanks, ancillary equipment, and soils following waste retrieval from the tanks. Previous tank and equipment removal studies have been completed that focused on other tank farms or on all tank farms together. Previous tank removal studies are summarized and used as a starting point for the 241-C farm evaluation. The objective of this study was to develop a conceptual approach for tank removal along with estimates for select decision criteria in the event that tank removal is selected as the preferred option for closing the 241-C tank farm.

The overall concept developed for tank and ancillary equipment removal involves construction of large temporary buildings or enclosures over the tanks and equipment followed by demolition and excavation of soil, rubble, and debris using heavy commercial equipment modified for remote operation. All rubble, debris, and soil from the excavation would be placed into waste boxes suited to the material type and estimated contamination levels. For the purpose of this study all containerized waste was assumed to be transported to the Environmental Restoration Disposal Facility for disposal.

A number of enclosure facilities would be required to support tank removal. Two large buildings combined with vertical shoring walls would be used to support removal of the 100-series tanks and excavation to a depth of 42 feet below ground surface. Additional large enclosures would be required for ancillary equipment removal and to provide support functions. Additionally, a number of smaller temporary enclosures would be required to support installation of the shoring walls and removal of contaminated soils within the tank farm fence line.

With the depth water table at the C tank farm approximately 255 feet below ground surface at the C tank farm[1] and the removal concept exhuming the top 42 feet, approximately 210 feet of soil will remain in place. It is expected that a large percentage of the non-mobile contaminants present in the vadose zone that drive worker exposure (i.e., Cs-137) will be encountered during tank removal. Conversely, the mobile contaminants from past leaks and spills are distributed throughout the vadose zone and removal of the top 42 feet would only capture a small percentage of the mobile contaminant inventory associated with past leaks and spills. A C tank farm performance assessment is planned that will provide a quantitative assessment of the risks from past leaks and spills, tank residuals, and ancillary equipment.

This scoping level study identifies and evaluates the major steps and key issues associated with tank removal. If tank removal were selected for implementation, detail development of equipment and plans would result in additional requirements and/or constraints that would have to be addressed through engineered features or administrative controls. Additionally, there are a number of unknowns associated with the condition of the tanks, ancillary equipment, and facilities; and with contamination levels that would have to be resolved prior to beginning actual field work to remove tanks. Performing additional work (e.g., characterization, engineering development, work planning) to resolve these unknowns would be expected to increase the cost and schedule required for tank removal. Within this study a number of assumptions were made

[1] RPP-35484, 2008, *Field Investigation Report of Waste Management Areas C and A-AX*, Revision 1, CH2M HILL Hanford Group, Inc., Richland, Washington.

to address the unknowns and there is a potential for significant increases in cost, schedule. and worker exposure if these assumptions are not valid.

Based on the tank removal concept developed in this report, implementation of tank and soil removal would involve:

- Disposal of approximately 796,000 cubic yards of soil and debris at the Environmental Restoration Disposal Facility. This would occupy approximately 6/10ths the volume of one Environmental Restoration Disposal Facility disposal cell.
- Schedule duration of approximately 13 years following completion of waste retrieval.
- Cost of approximately $780,000,000 dollars.
- Reduction of approximately 30 percent of the mobile contaminant inventory in the tank farm.

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

LIST OF TERMS

Abbreviations and Acronyms

241-C tank farm	C tank farm
CDF	controlled density fill
DOE	U.S. Department of Energy
ERDF	Environmental Restoration Disposal Facility
HEPA	high-efficiency particulate air
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
HVAC	heating, ventilation, and air conditioning
LDR	land disposal restriction
PPF	pre-processing facility
RCRA	*Resource Conservation and Recovery Act of 1976*
RI/FS	remedial investigation/feasibility study
RO/RO	roll-on/roll-off
ROD	Record of Decision
SST	single-shell tank
UPR	unplanned release
WMA	waste management area
WTP	Waste Treatment and Immobilization Plant

Units

Ci	curie
Ci/ft^3	curries per cubic feet
Cs-137	cesium-137
ft	feet
H	height
in.	inch
L	length
mrem	millirem
mrem/yr	millirem per year
pCi/g	picocuries per gram
scfm	standard cubic feet per minute
W	width

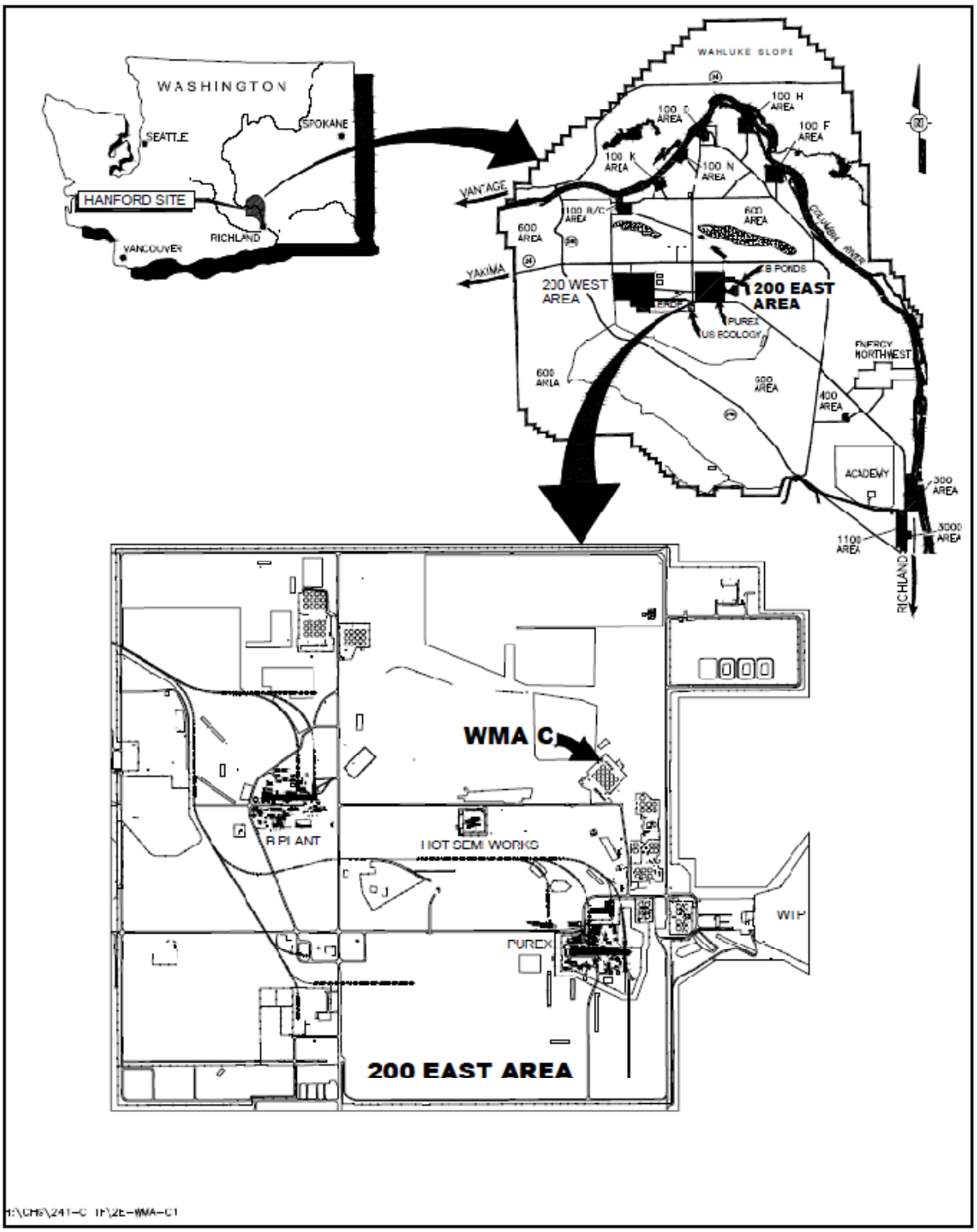
1.0 INTRODUCTION

This report supports the *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989) Milestone M-45-80, for a tank removal study for the C tank farm. The C tank farm is located in the 200 East Area (Figure 1-1) and is the focus of ongoing waste retrieval efforts. The C tank farm will be the first tank farm available for closure with waste retrieval activities scheduled for completion by 2014. The objective of this task is to evaluate tank, ancillary equipment, and soil removal from the 241-C tank farm. Past tank removal studies were used as a starting point for the 241-C farm removal evaluation and are summarized in Section 3.0. Impacts to the current tank closure baseline can be evaluated using the cost and schedule estimates for tank removal. The results and recommendations from this study will be used to evaluate closure decisions for the 241-C tank farm (C tank farm) by the U.S. Department of Energy (DOE), regulators and stake holders. This tank removal study provides the following information for the C tank farm.

- Summary of the cost, schedule and scope for tank and soil removal.
- Estimated waste volumes associated removal and the potential disposal pathways.
- Estimated risk to workers if waste is removed and estimated risk to the environment and public if farm is landfill closed and waste remains in place.
- Information on the difficulty and complexity of tank removal as an option for closure.
- This task updates and utilizes previous studies for other tanks tank farms and develops concepts and estimates specific to tank removal in waste management area (WMA) C.

This scoping level study identifies and evaluates the major steps and key issues associated with tank removal. If tank removal were selected for implementation, detail development of equipment and plans would result in additional requirements and/or constraints that would have to be addressed through engineered features or administrative controls. Additionally, there are a number of unknowns associated with the condition of the tanks, ancillary equipment, and facilities; and with contamination levels that would have to be resolved prior to beginning actual field work to remove tanks. Performing additional work (e.g., characterization, engineering development, work planning) to resolve these unknowns would be expected to increase the cost and schedule required for tank removal. Within this study a number of assumptions were made to address the unknowns and there is a potential for significant increases in cost, schedule, and worker exposure if these assumptions are not valid.

Figure 1-1. Waste Management Area C (C Tank Farm) Location.



2.0 PURPOSE AND SCOPE

2.1 PURPOSE

The purpose of this tank removal study is to evaluate removal of the 241-C farm tanks, ancillary equipment, and contaminated soils. This evaluation will also summarize past tank removal studies as a starting point for the 241-C tank farm removal evaluation. The 241-C tank farm is the first single-shell tank (SST) farm planned to be closed.

The *Waste Management Area C Closure Demonstration Project Plan* (RPP-PLAN-46484) identifies the need for a tank removal evaluation, focused on the 100-series tanks to provide information to support the WMA C Closure Plan.

The following excerpt is taken from the WMA C Closure Demonstration Plan:

> *For closure of a tank system, WAC-173-303-640 (8)(a) requires that " the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste, and manage them as dangerous waste" unless ORP demonstrates in accordance with WAC-173-303-640 (8)(b) that such removal or decontamination cannot be practicably achieved. Upon successfully demonstrating that removal or decontamination pursuant to WAC-173-303-640(8)(b) cannot be achieved, ORP will be required to "close the tank system and perform post-closure care in accordance with the closure and post-closure care requirements that apply to landfills (see WAC 173-303-665(6))."*
>
> *As part of the demonstration for determining that removal or decontamination can or cannot be achieved at WMA C, a feasibility evaluation will be developed that evaluates the ability to remove 100-Series tanks in WMA C after retrieval in compliance with HFFACO Milestone M-045-00. Information used in support of the development of the TC&WM EIS will be used as an initial basis for this feasibility evaluation. The feasibility evaluation will also review related documents produced as part of the Hanford Tank Initiative in the late 1990s to determine whether these documents, along with the information developed for the TC&WM EIS, adequately evaluate the issues associated with tank removal or whether additional evaluation is needed. This evaluation will be a part of a ORP closure plan application that will be submitted to Ecology for making a decision on landfill closure at WMA C. The closure plan application may include other evaluations such as an evaluation of the ability to remove all contaminated soil in WMA C.*
>
> *If the demonstration finds that any portion of contaminated soil or any portion of the tank system cannot be practically removed, WMA C will be closed as a landfill in accordance with the SST System permit conditions. Evaluation of removal of discrete areas of soil or portions of the tank system that are deemed to be required for further protection of human health and the environment will occur as part of the RCRA Corrective Measures Study and component closure plan applications, respectively, should landfill closure be determined.*

DOE/EIS-0391, *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (hereafter referred as the Draft EIS) includes alternatives for removal of SSTs and contaminated soils following waste retrieval. Conversely, the National Academy of Sciences has recognized that it is prohibitive in terms of worker risk and economic cost to remove the tanks or removal all of the wastes in the tanks (NAP 2006, *Tank Waste Retrieval, Processing, and On-site Disposal at Three Department of Energy Sites: Final Report*).

2.2 SCOPE

The scope of the tank removal study includes the demolition, removal, and disposal of the following materials, equipment, and structures:

- Near Surface Soils – are defined as soils between the existing grade and the top of the tanks and/or ancillary equipment. Contamination is expected in these soils at relatively low levels with the exception of areas impacted by surface leaks and spills. Near-surface soils will be excavated using loaders and excavators and placed into roll-on/roll-off (RO/RO) containers for transport to the Environmental Restoration Disposal Facility (ERDF).
- Piping – includes both direct buried pipe and piping constructed within concrete pipe trenches.
- Miscellaneous – buried utilities associated with power distribution, instrumentation, cathodic protection, raw water supply, etc. are routed throughout the tank farm. These items will be treated as incidental waste materials and are assumed to be not contaminated from the standpoint of containing or conveying tank waste.
- Vaults and Diversion Boxes – there are seven diversion boxes and one vault (CR vault) that will be removed. Each of these reinforced concrete structures has multiple transfer lines routed in to and out of the boxes. The CR vault is the most complex of the ancillary structure in terms of size and equipment used for waste processing.
- Catch tank C-301 – 20-foot (ft) diameter catch tank with an operating capacity of 36,000 gallons. Details on this tank can be found in RPP-RPT-45723, *Catch Tank 241-C-301 Retrieval Feasibility Study*. Catch tank C-301 currently contains approximately 10,500 gallons of waste material; approximately 9,000 of this total are solids. It is assumed that most of this material will be retrieved prior to closure of the tank farm.
- Lateral soils between the tanks.
- C-200-series tanks – there are four 200-series tanks 20 ft in diameter. The bottom of the C-200-series tanks is approximately 39 ft below ground surface.
- C-100-series tanks – there are twelve 100-series tanks 75 ft in diameter. The bottom of the C-100-series tanks is approximately 38 ft below ground surface.
- Soils beneath tank bases – following removal of the tanks, an additional 5 ft of soil will be removed. It is assumed that this soil depth would result in removal of most of the non-mobile contaminants associated with tank leaks.

3.0 PAST TANK REMOVAL STUDIES

3.1 EIS TECHNICAL DATA PACKAGE - TANK REMOVAL AND DEEP SOIL EXCAVATION

A technical data package was prepared in 2003 to support the Tank Closure and Waste Management Environmental Impact Statement (DOE 2003, *Tank Removal and Deep Soil Excavation*). The data package addressed the demolition and removal of tank farm facilities including ancillary equipment, piping, and SSTs. Additionally, contaminated soils surrounding the tanks and below the tanks were assumed to be removed from the tank farm.

The scope of the tank removal and deep soil excavation study involved the complete removal of SSTs and ancillary equipment; excavation of all soil in the tank farms down to 10 ft below the base of the tanks; deep soil removal of soils contaminated by past leaks and spills to a depth where there is no longer evidence of contamination (this could be as deep as the soil/ groundwater interface); and disposal of the debris and soil. Based on expected variations in soil contamination levels, it was assumed that some removed debris and soil would be directly disposed of as is, while some could require preprocessing in order to meet *Washington Administrative Code* disposal requirements (WAC-173-303, "Dangerous Waste Regulations"). Following removal of the tanks and soil, the resulting excavations were assumed to be backfilled with clean soil obtained onsite.

The principal assumptions used in DOE (2003) for tank and deep soil removal included:

- All SSTs, ancillary equipment, and contaminated soils within the areal extent of a tank farm would be removed to a depth 10 ft below the tank bases.
- Removal of 10 ft of additional soil from beneath the tank bases would be sufficient to remove contamination from retrieval leakage. The depth and extent of contamination from potential retrieval leakage is uncertain.
- Localized soil contamination (contaminant plumes) would be excavated to depth consistent with some "action-level" of contamination.
- Large enclosures spanning the width of a tank farm would be required.
- Routine work away from the dig face could be performed under the enclosure without respiratory protection. If supplied air is required, the numbers of workers involved and total exposure to radiation and industrial hazards would increase because most work activities would require greater time to perform.
- All material and soil removed from the tank farm will be disposed directly, or with preprocessing, at an onsite disposal facility. Removed material and soil not requiring treatment at the preprocessing facility is assumed to be directly disposable without further treatment.

The overall concept, depicted in Figures 3-1 and 3-2, involves constructing a confinement building over the tank farm and then completing removal of the ancillary equipment, tanks, and contaminated soil down to a depth of 65 ft below ground surface.

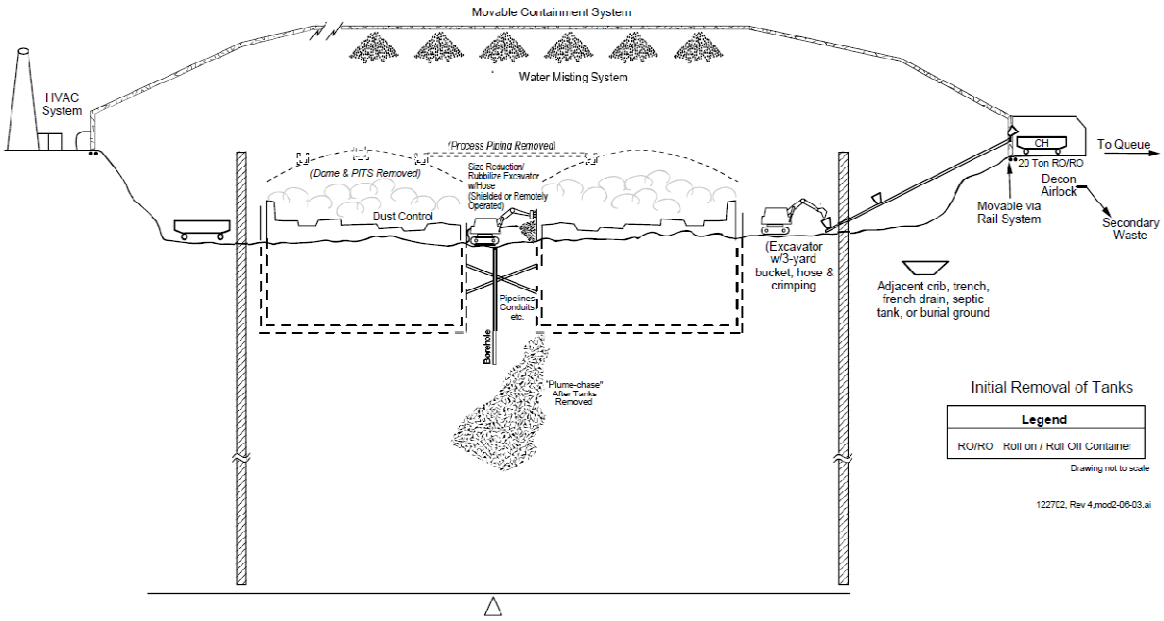
Additional, localized excavations would be performed to remove contaminated soils to a depth where there is no longer evidence of contamination from past spills and leaks. Currently available data and information on contaminated soils in the B tank farm is documented in RPP-10098, *Field Investigation Report for Waste Management Area B-BX-BY*. Based on the data presented in RPP-10098, localized excavation to a depth of 255 ft below ground surface, or approximately to the depth of the water table, would be required in the B tank farm. Currently available data and information on contaminated soils in the T tank farm is documented in RPP-7578, *Site-Specific SST Phase 1 RFI/CMS Work Plan Addendum for WMAs T and TX-TY* and RPP-7123, *Subsurface Conditions for the T and TX-TY Waste Management Areas*. Based on the data in presented in RPP-7578 and RPP-7123, the localized deep soil excavation in the T tank farm would extend to a depth of approximately 165 ft below ground surface.

This technology concept would require that an overarching confinement structure (or "bubble") be placed over the tank farm before tank or soil removal. The exhaust from this structure would be filtered and have at least two zones of negative pressure, each with personnel and equipment airlocks. The structure would be used to keep fugitive dusts containing hazardous or radioactive particles from escaping to the environment. Shielded cab excavation and size reduction equipment would be used under the structure.

Technical data provided in DOE (2003) was used in developing the tank and soil removal technology discussion in the Draft EIS (DOE/EIS-0391). Section E.1.2.5.3 of the Draft EIS addresses tank and soil removal concept analyzed in the Draft EIS. The tank and soil removal concept described is consistent with the supporting technical data package (DOE 2003). Differences between the tank and soil removal concept as described in the Draft EIS and the concept developed in this report for the C tank farm include the following:

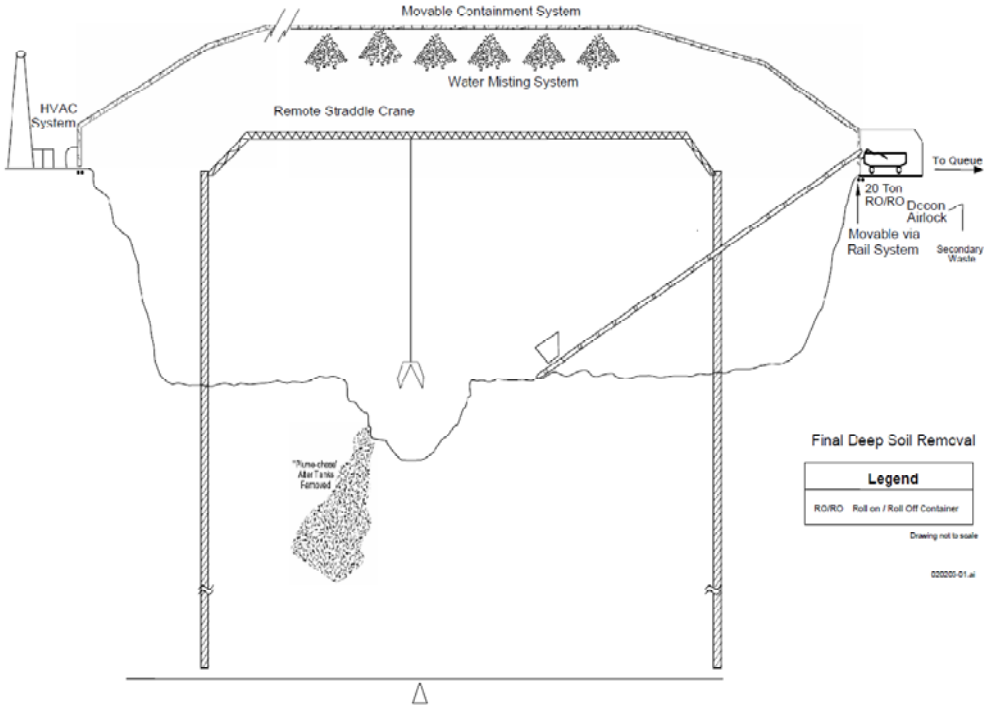
- Deep soil removal – after removing the tanks, contaminated soil from past tank leaks would be excavated. This would include excavation to the water table if necessary.
- A pre-processing facility (PPF) was assumed to be required in the Draft EIS to decontaminate tank base slabs and some fraction of the contaminated soils. This PPF would use strong acid wash for equipment and a weak acid wash for contaminated soils. The contaminated liquid waste stream generated at the PPF would be immobilized by vitrification as either low-level waste or was sent to the Waste Treatment and Immobilization Plant (WTP) as a feed stream to the high-level waste plant.
- Tank removal was conceptualized with residual waste inventories associated with 99.9 percent retrieval from each of the tanks instead of 99 percent and with an assumed 4,000-gallon leak during waste retrieval operations.
- Onsite disposal of contaminated debris and soils associated with tank removal were assumed to be disposed of in a River Protection Project Disposal Facility, which was conceptualized as being similar to ERDF but physically located between the 200 East and 200 West Areas.

Figure 3-1. Concept Sketch for Tank Removal Developed for Tank Closure EIS.



Source: DOE (2003).

Figure 3-2. Concept Sketch for Deep Soil Excavation Developed for the Tank Closure EIS.



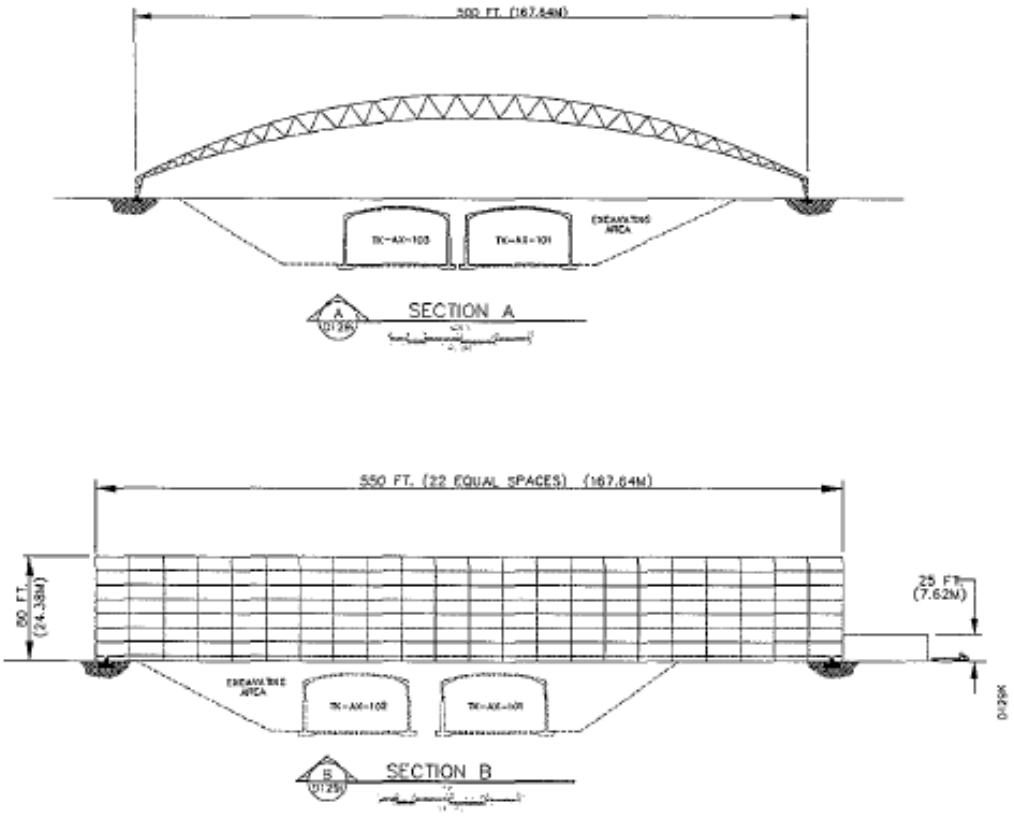
Source: DOE (2003).

3.2 AX TANK FARM TANK REMOVAL STUDY

HNF-3378, *AX Tank Farm Tank Removal Study* was prepared in 1998 to evaluate alternative approaches and concepts for removing the AX tank farm tanks from the ground. Various concepts were identified as candidate methods for tank removal.

Based on the expected chemical and radiological contamination present in the soil one of the functional requirements identified was the adequate worker protection, dust control, and isolation of the site. A free-span enclosure and support facility was included in the tank removal concept to meet these requirements. The footprint of the enclosure structure required for the 241-AX tank farm (4 tanks) was 500 ft by 550 ft as shown in Figure 3-3.

Figure 3-3. AX Tank Removal – Enclosure Concept.



The enclosure concept included two separate structures. One designed to span the entire width and length of the excavation and one for support facilities. Support facilities include a decontamination chamber for decontaminating waste containers, airlocks for personnel, waste container, and equipment entry and exit.

Features of the enclosure facility included:

- Ventilation system – 112,500 standard cubic feet per minute (scfm) ventilation system with high-efficiency particulate air (HEPA) filtration for the primary portion of the system; 7,000 scfm HEPA filtered system for the secondary zone; and a 4,750 scfm heating, ventilation, and air conditioning (HVAC) system for the support facility.
- Lighting – fixed lighting for general illumination.
- Fire protection – dry foam and water spray systems sized for a 4-hour fire.

Following construction of the enclosure and support facilities, the technical approach developed for demolition and removal of the tanks consisted of the following steps:

- Place 1 ft of controlled density fill (CDF) (flowable grout) into the tanks for shielding.
- Removal of cover soil using conventional excavation equipment, placement of soil in RO/RO containers, and transporting to ERDF for disposal.
- Demolition and removal of tank domes using hydraulic excavators. Two excavators were identified, one with concrete pulverizing jaws and one with shears that would be used to break up the concrete and cut both the reinforcing steel (rebar) and the steel plate used to for the tank liner on the inner tank sidewalls and tank bottom. A front end loader would work behind the excavators loading rubble into the containers.
- Removal of lateral soil around tank sidewalls, placement in RO/RO containers, and transporting to ERDF for disposal.
- Demolition of the tank sidewalls using hydraulic excavators .
- Demolition of the base slab. This step of the process was envisioned to contain the majority of the residual tank waste. The study noted that there were no existing waste package designs suitable for transporting the base slab rubble with a 0.2 to 0.5 curies per cubic feet (Ci/ft^3) of cesium-137 (Cs-137). Because of the inventory associated with the base slab debris, this waste stream was assumed to require additional processing to separate the waste stream prior to disposal of the rubble and debris.
- Backfill of the excavation after tank removal. For the AX tank farm a total of 212,400 cubic yards (yd^3) (bank volume) was required to backfill the tank farm.

  Waste form and volume projections for the demolition and removal of the four 241-AX 100-series SSTs are summarized in Table 3-1.

In summary, the AX tank removal study, which did not address removal of the contaminated soil below the tank base slab or the ancillary equipment (see Section 3.3), resulted in the following estimates:

- Cumulative dose to workers of 6,971 millirem (mrem) (HNF-3378, Table 3.5.2). This is equivalent to the annual allowable radiation worker dose for 35 workers.
- Approximately 12,800 container loads of soil/debris for onsite disposal. Note base slab rubble did not meet waste acceptance criteria and required construction and operation of a new processing facility.

- Estimated cost of approximately $81,330,000 in 1998 dollars. Note this did not include removal and disposal of the ancillary equipment.

Table 3-1. AX Tank Farm Tank Removal Volume Estimates.

Waste Form	Characteristics
Cover soil:	
Soil volume (in place)	20,500 yd^3
Number of containers	1,384 containers
Container size	20 ft L by 7.5 ft W by 5.5 ft H
Radionuclide inventory	Assumed to meet ERDF acceptance criteria
Disposal location	ERDF
Lateral soil:	
Volume (in place)	144,300 yd^3
Number of containers	9,740 container loads
Container size	20 ft L by 7.5 ft W by 5.5 ft H
Radionuclide inventory	Assumed to meet ERDF acceptance criteria
Disposal location	ERDF
Concrete rubble:	
Volume (in place)	2,124 yd^3
Number of containers	213 container loads
Container size	20 ft L by 7.5 ft W by 5.5 ft H
Radionuclide inventory	Assumed to meet ERDF acceptance criteria
Disposal location	ERDF
Rubble from tank domes and base slabs:	
Volume (loose)	5,100 yd^3
Number of containers	1,460 container loads
Container size	12.1 ft L by 4.2 ft W by 3.3 ft H
Radionuclide inventory	High – assumed to contain the tank residuals
Disposal location	Requires further treatment that generates 2 waste streams. One stream goes to WTP and cleaned rubble/debris to ERDF.

Source: HNF-3378, Table 3.2.
L = length.
W = width.
H = height.

3.3 AX TANK FARM ANCILLARY EQUIPMENT STUDY

Removal and disposal of the ancillary equipment in the AX tank farm was evaluated in parallel to the removal of the AX farm tanks described in Section 3.2. HNF-3441, *AX Tank Farm Ancillary Equipment Study*, provides the results of an engineering evaluation of two options for disposition of the ancillary equipment. One option was the removal and disposal of all ancillary equipment and waste materials and the other option was the stabilization (grouting) of ancillary equipment in-place.

A series of enabling assumptions were made in developing the removal concepts for ancillary equipment. Significant assumptions that affect the tank removal concept included:

- Lightly contaminated debris would be transported to ERDF for disposal while heavily contaminated debris would be packaged in shielded containers and transported to a PPF near or adjacent to the WTP.
- Ancillary equipment removal would be performed by an organization dedicated to tank farm closure and would operate under a set of requirements and work practices tailored to tank farm closure instead of tank farm operations. This was assumed to provide for significantly higher worker productivities in terms of the number of productive hours of work per shift and higher allowable worker dose rates of 1,500 millirem/year (mrem/yr).
- Enclosure facility described for tank removal would be in place to support removal of ancillary equipment.

The ancillary equipment removal conceptual approach involved using heavily shielded hydraulic excavators (Caterpillar® 375 or equivalent) for demolition and removal of ancillary equipment. The overall concept involved demolition and size reduction of above-grade structures as well as buried ancillary equipment (pits, diversion boxes, piping) and packaging the debris for disposal. Debris that was highly contaminated was packaged and transported to a conceptual PPF where the debris would be subject to washing/leaching to remove contamination.

In summary, the AX ancillary equipment study resulted in the following estimates:

- Cumulative dose to workers of 11,839 mrem (HNF-3441, Table 2.8). This is equivalent to the annual allowable radiation worker dose for 60 workers at an allowable exposure limit of 200 mrem/yr.
- Approximately 780 container loads of soil/debris for onsite disposal or subsequent treatment prior to disposal.
- Estimated cost of approximately $19,340,000 in 1998 dollars.

Waste form and volume projections associated with the AX tank farm ancillary equipment removal are summarized in Table 3-2.

3.4 AX TANK FARM STUDY REFINEMENTS

HNF-4195, *Hanford Tanks Initiative Engineering Study Refinements Report,* was prepared to supplement the information provided in HNF-3378 and HNF-3441. The purpose of the refinements study was to address in-situ grouting of contaminated soils as well as refinements in the conceptual approach to tank removal following a postulated tank leak during waste retrieval. The overall concept for tank demolition and deep soil excavation involved construction of a tiered set of geo-pile walls and the use of a straddle crane for deep soil excavation. The process assumed for demolition and removal of the tanks was the same as described in HNF-3378.

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Table 3-2. AX Tank Farm Ancillary Equipment Removal Volume Estimates.

Waste Form	Description
Non-contaminated debris/rubble	
Volume	114 yd^3
Disposal location	Municipal landfill
Lightly-contaminated debris/rubble	
Volume	18,800 yd^3
Disposal location	ERDF
Moderately-contaminated debris/rubble	
Volume	223 yd^3
Disposal location	Onsite low-level burial grounds
Heavily-contaminated debris/rubble/equipment	
Volume	322 yd^3
Disposal location	PPF

Source: HNF-3441, Table 2.1.

4.0 241-C TANK FARM BACKGROUND

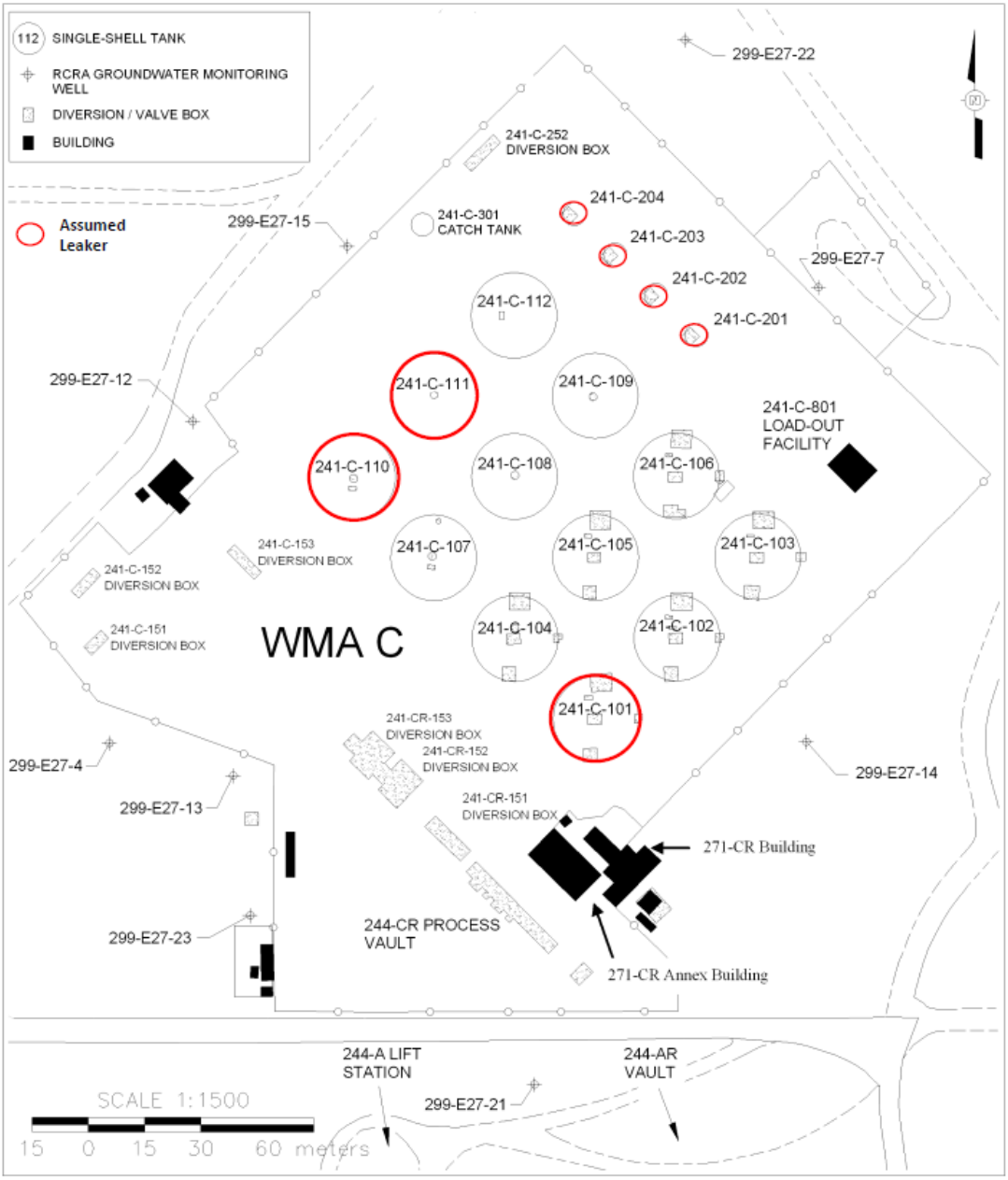
The 241-C tank farm, also known as WMA C, is located in the eastern portion of the 200 East Area of the Central Plateau of the Hanford Site (see Figure 4-1). This area was constructed from 1944 to 1945, began operations in 1946, and is currently out of service pending completion of waste retrieval. Additional facilities were constructed in C farm in 1951 through 1952 and pipelines were constructed throughout its operating life. Historically seven of the 16 C tank farm tanks have been classified as assumed leakers (Figure 4-2). Recent evaluations of historical data have resulted in reclassifying tanks C-110 and C-111 as sound tanks. The C tank farm fence line is irregular in shape with the overall extent of the footprint at 670 ft by 785 ft as shown in Figure 4-3. The footprint of the twelve 100-series tanks encloses an area approximately 300 ft by 400 ft. An aerial view of the 241-C tank farm taken in 2008 is shown in Figure 4-1.

The 241-C tank farm and surrounding area includes the following features that will need to be addressed in development of a concept for tank removal:

- Approximately 8.5 acres inside the fence line
- 12 SSTs (530,000-gallon capacity)
- 4 SSTs (55,000-gallon capacity)
- Catch tank (36,000-gallon capacity)
- CR vault (4 tanks)
  - 2 tanks with 15,000-gallon capacity
  - 2 tanks with 50,000-gallon capacity
- 7 diversion boxes
- Over 8 miles of pipeline
- 14 recorded unplanned releases (UPR)
- 71 drywells
- 10 groundwater monitoring wells.

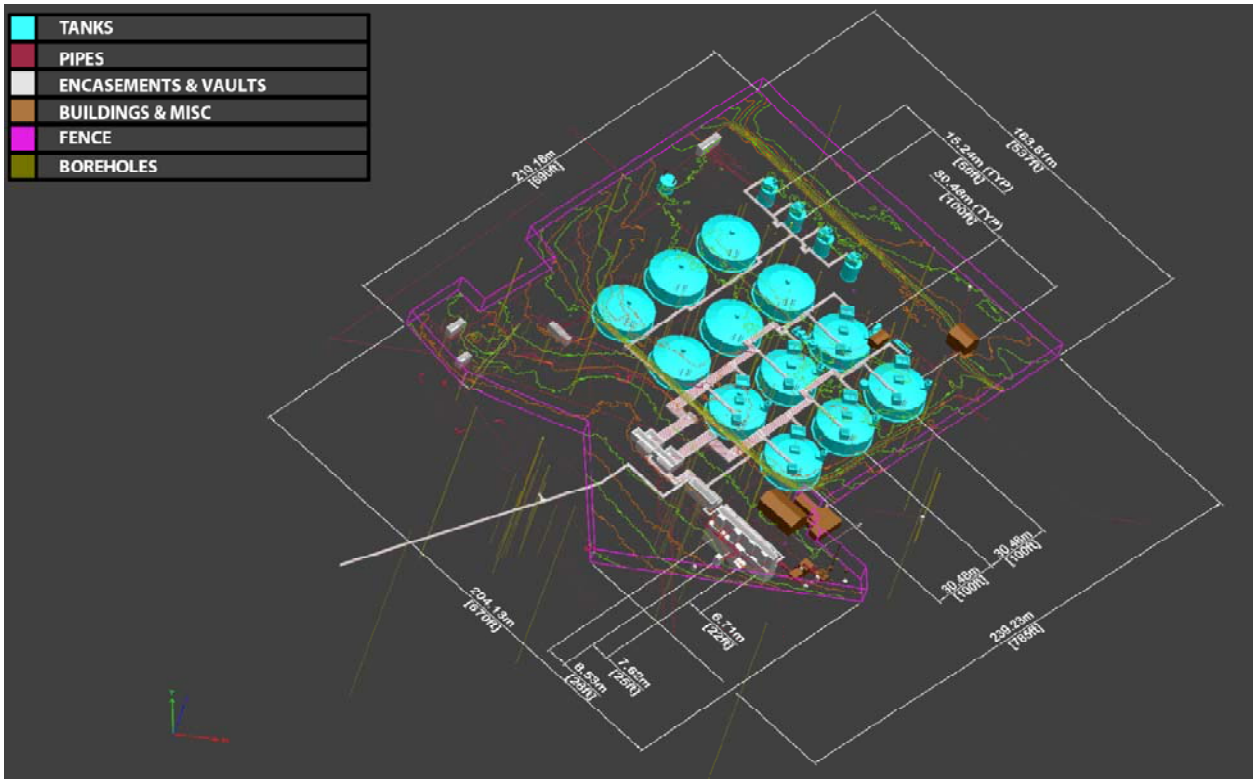
Figure 4-1. 241-C Tank Farm Aerial (2008).

Figure 4-2. 241-C Tank Farm Leak Classification.



Note: Tanks C-110 and C-111 have been evaluated and determined to be sound and are no longer classified as assumed leakers.

Figure 4-3. C Farm Solid Model.



4.1 SINGLE-SHELL TANKS

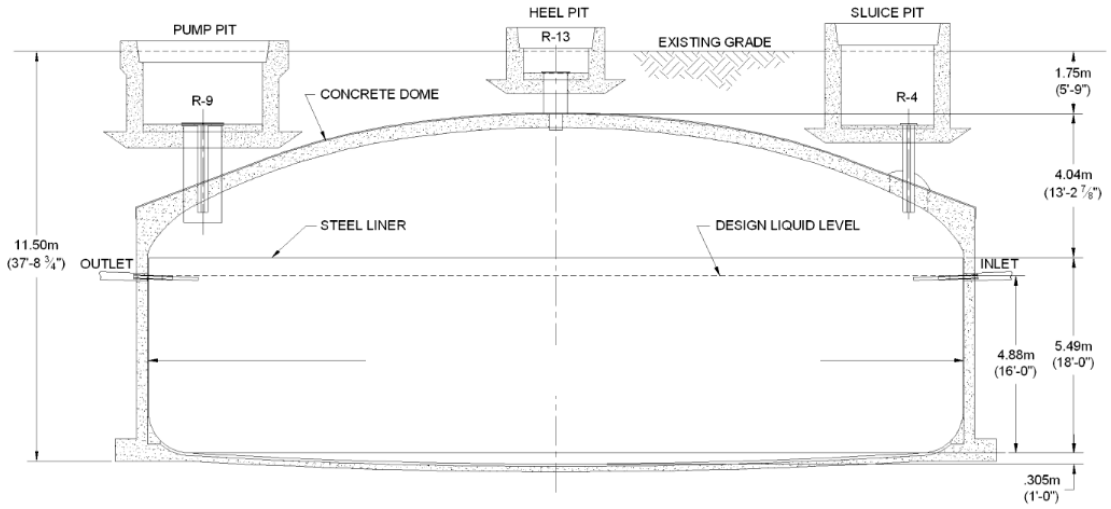
The 241-C tank farm contains twelve primary SSTs, which are referred to as the 100-series SSTs. These tanks are 75 ft in diameter and have a maximum height of 30 ft. These tanks have a 15-ft operating depth and have an operating capacity of 530,000 gallons each. Typical 100-series SST configuration and dimensions are shown in Figure 4-4. Tanks 241-C-101 through 241-C-106 are the only tanks that have concrete pits shown in Figure 4-4. Tanks 241-C-107 through 241-C-112 have centrally located saltwell pump pits instead of the concrete pits. Tank pits are located on top of all of the tanks and provide access to the tank, pumps, and monitoring equipment. The 100-series tanks are connected in four, three-tank cascade lines. The tanks are connected via a cascade line:

- C-101 through C-103
- C-104 through C-106
- C-107 through C-109
- C-110 through C-112.

The tank cascade lines are arranged such that each successive receiving tank is 1 ft lower than the preceding feed tank allowing fluids to flow from one tank to another as they are filled. The 100-series SSTs are therefore approximately 22 to 24 ft below the ground surface and enclosed

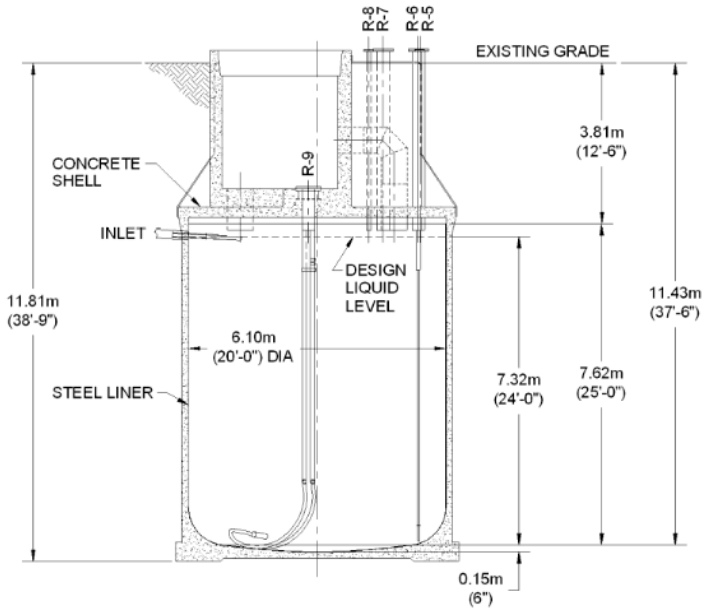
by at least 7 ft of soil cover, which provides shielding from radiation exposure to operating personnel.

Figure 4-4. C Tank Farm 100-Series SST Cross Section.



The C tank farm contains four secondary SSTs that are referred to as the 200-series SSTs. These tanks are 20 ft in diameter and have a maximum height of 37 ft. The 200-series SSTs have a 24-ft operating depth and an operating capacity of 55,000 gallons each. Typical 200-series SST configuration and dimensions are shown in Figure 4-5. The tanks are also completely underground and are enclosed by 11 ft of soil cover.

Figure 4-5. C Tank Farm 200-Series SST Cross Section.



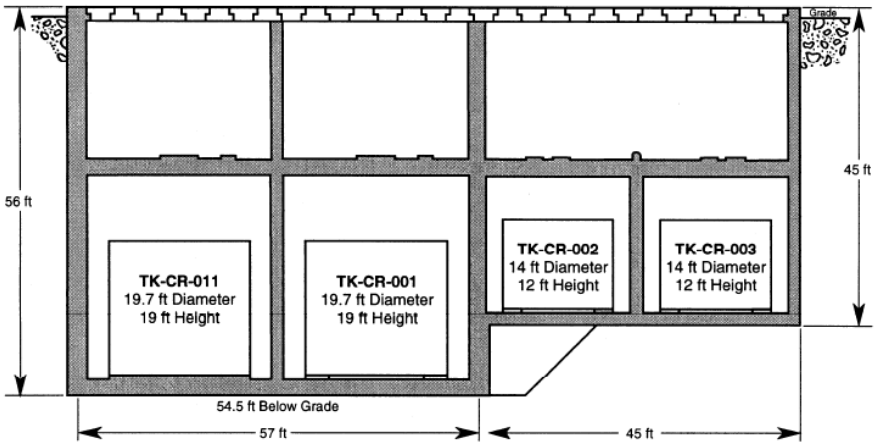
Both the 100-series and 200-series SSTs were constructed with 3/8-inch (in.)-thick carbon steel bottom lining and 1/4-in.-thick carbon steel side lining. There are four inlet lines on each tank, all of which can be found near the top of the liners along with the outlet lines. In addition to the cascade lines, there are pipelines placed throughout the farm interconnecting tanks, diversion boxes, and the vault.

4.2 ANCILLARY EQUIPMENT

In support of the transfer and storage of waste within WMA C SSTs, there is a complex waste transfer system that consists of pipelines/transfer lines, diversion boxes, a vault, valve pits, a catch tank, and other structures. Collectively, these are referred to as ancillary equipment.

The 244-CR vault is located south of the tanks (Figure 4-6). The vault is a two-level, multi-cell, reinforced concrete structure constructed mostly below grade, which contains four underground tanks along with overhead piping and equipment. About 1 ft is exposed. There are two 19-ft tall tanks with diameters of 19.7 ft and operating capacities of 45,000 gallons: TK-CR-001 and TK-CR-011. The other two tanks, TK-CR-002 and TK-CR-003, are 12 ft tall, have a 14-ft diameter, and have an operating capacity of 14,700 gallons. The vault was constructed in 1951 and stopped operating in 1988. Figure 4-6 shows a diagram of the 244-CR vault.

Figure 4-6. 244-CR Vault Cross Section.



The routing of liquid waste from the operations buildings to the tank farms was accomplished using underground piping/transfer lines, diversion boxes, and valve pits.

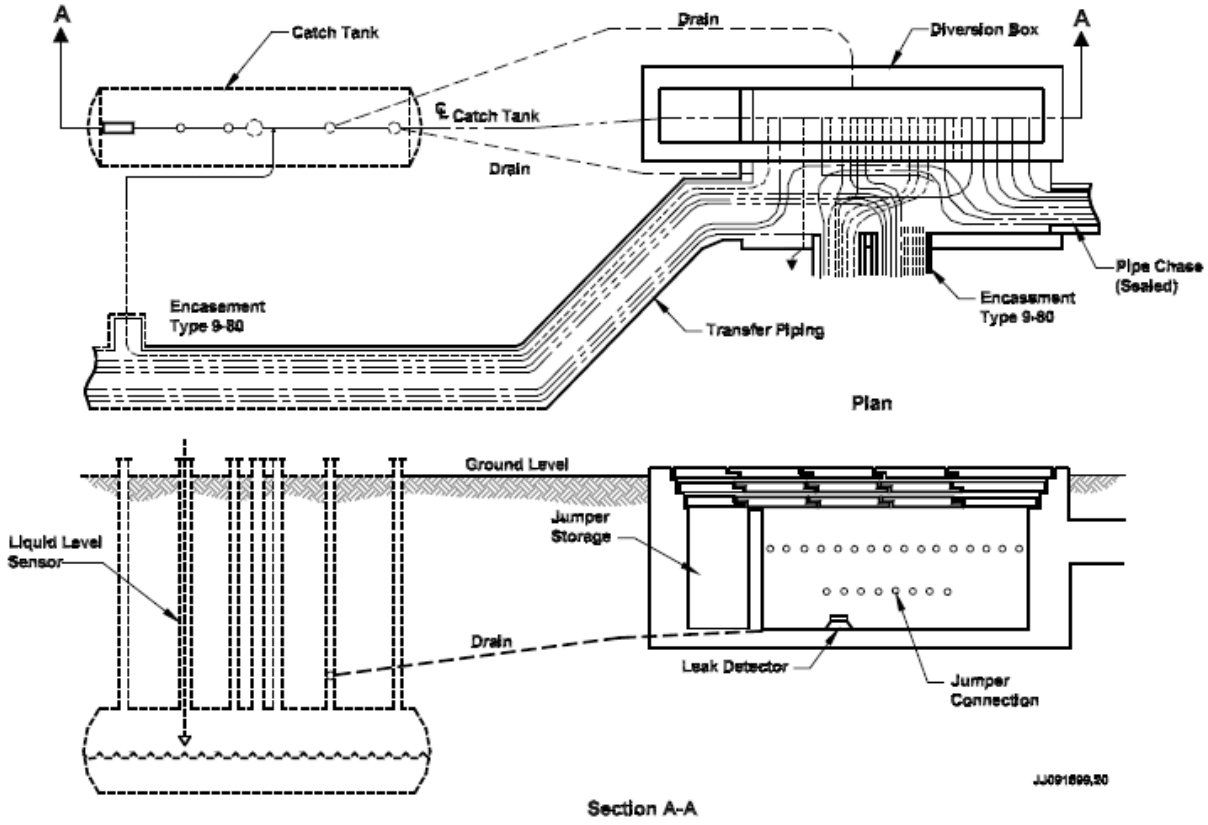
The diversion boxes are below ground, reinforced-concrete boxes that were designed to contain any waste that leaked from the high-level waste transfer line connections. There are seven diversion boxes located directly in the C farm labeled:

- 241-C-151
- 241-C-152
- 241-C-153
- 241-C-252
- 241-CR-151
- 241-CR-152
- 241-CR-153.

Figure 4-7 shows the location of the diversion boxes within the tank farm. Additional detail on the current configurations, contents, and transfer lines routed into and out of the diversion boxes can be found in RPP-RPT-43427, *241-C Farm Diversion Box Feasibility Study*. This study concluded that there is limited information on the current levels of contamination within the diversion boxes and recommended core drilling through the cover blocks and performing a survey of the current contents.

In order for waste to be transferred from one line to another, the diversion boxes contained remote pipeline connectors. If waste leaked into a diversion box gravity generally drained it to the nearby catch tanks where all spilled waste was stored and eventually pumped to the SSTs. Figure 4-7 shows a diagram of a typical diversion box transfer system.

Figure 4-7. Typical Diversion Box/Catch Tank Arrangement.



Tank 241-C-301 is an underground catch tank that is located northwest of tank 241-C-112 (see Figure 4-2). The tank catches waste from the 241-C-151, 241-C-152, 241-C-153, and 241-C-252 diversion boxes. Catch tank 241-C-301 is constructed of reinforced concrete with 5-in. thick walls and has an outside diameter of 20 ft, 10 in. The currently reported waste volume in the catch tank is 10,470 gallons (HNF-EP-0182, *Waste Tank Summary Report for Month Ending May 30, 2010*). The catch tank contains approximately 1,400 gallons of liquid waste and 9,000 gallons of solid waste. However, the liquid level has not been monitored since the time it

was stabilized in June 1985. Additional detail on catch tank 241-C-301 tank is summarized in RPP-RPT-45723.

There are three valve boxes and one valve pit within WMA C. The valve boxes and pit contain valve assemblies that were used for routing the liquid waste through transfer lines. There is a valve box associated with the 241-C-801 cesium load-out facility; one on the south side of 241-C-112, another located on the south side of 241-C-111, and the valve pit is positioned next to C-103. This valve pit is a below ground culvert with a reinforced-concrete floor with a drain to 241-C-103.

There is a complex network of piping systems within the C tank farm that were constructed over the operational life of the farm. There is a total of approximately 10 miles of pipeline within the boundaries of the tank farm.

4.3 LEAK DETECTION

Each tank is surrounded by several boreholes in which radiometric instruments were used to detect changes in activity levels in the sediments surrounding the boreholes. WMA C has over 71 leak detection drywells that were drilled from 1944 to 1982. The depth ranges for most of these drywells are between 100 and 150 feet below ground surface. There are also 10 groundwater monitoring wells that have been drilled in this area.

4.4 SOIL CONTAMINATION

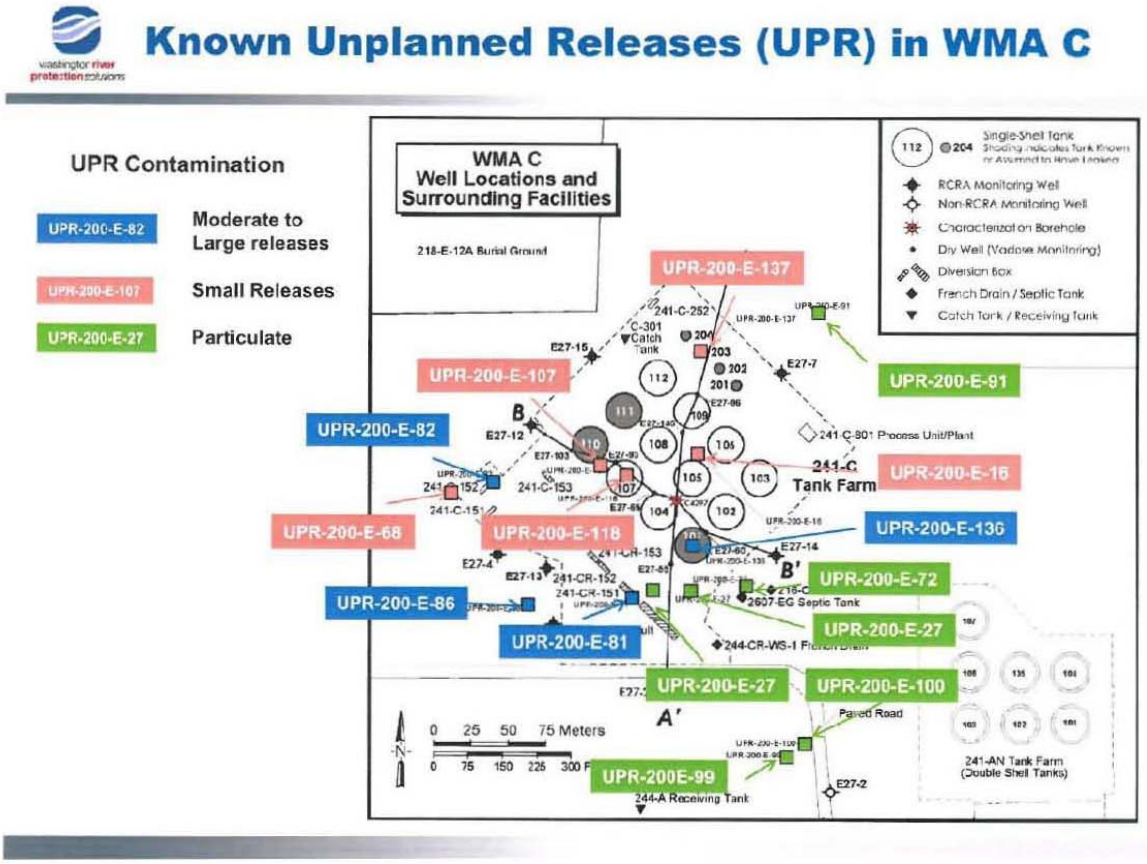
There is a significant amount of historical information regarding soil contamination in the 241-C tank farm. The most current inventory estimates for soil contamination for post-retrieval and closure conditions are provided in RPP-RPT-42294, *Hanford Waste Management Area C Soil Inventory Estimates*. Contaminant inventories by source are provided in Appendix A.

In the upper 15 ft of the tank farm, the following generalizations have been made with respect to Cs-137 contamination (worker exposure contaminant of concern):

- Cs-137 concentration in drywells is generally below $1x10^{-10}$ curies per gram (100 picocuries per gram [pCi/g]) in the top 15 ft of soil in tank farm area in WMA C. There are also localized areas within the tank farm that have high levels of contamination.
- Cs-137 inventory in the top 15 ft of soil estimated at about 20 curies (Ci) assuming the entire area encompassed by the tanks in the farm is contaminated (RPP-RPT-42294).
- Small inventory compared to 20,000 Ci estimated for tank and UPRs.

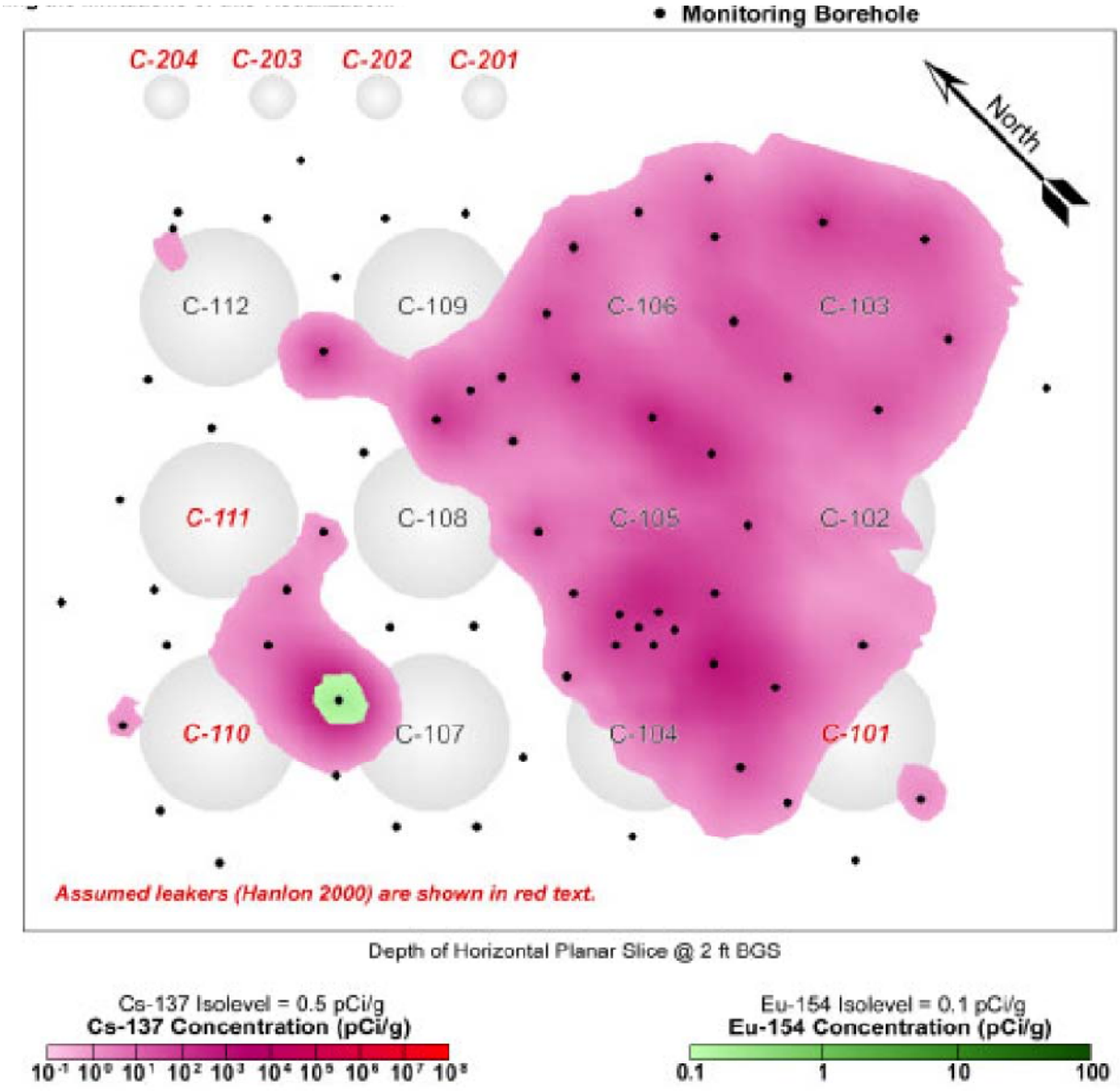
Figure 4-8 shows the location and the relative size of the UPRs associated with the C tank farm. Note that some of these UPRs are outside of the C farm fence line and are not considered in the scope of tank removal addressed in this evaluation. Figure 4-9 shows the interpreted spectral gamma logging results for shallow contamination, 2 feet below ground surface, in the tank farm. The interpreted contamination levels are from soils or from residual waste remaining in pipelines. The peak cesium concentration (1.2E-07 Ci/g [1.2E+05 pCi/g]) at this depth occurs near tank C-107 where the green area showing the europium-154 results. The purpose of including Figure 4-9 is to show the widespread distribution of near surface contamination. The evaluation of logging results is constrained to the areas where there is drywell coverage.

Figure 4-8. Unplanned Releases in C Tank Farm.



Source: Washington River Protection Solutions, LLC.

Figure 4-9. Near Surface Soil Contamination.



Source: GJO-HAN-18, *Vadose Zone Characterization Project at the Hanford Tank Farms, C Tank Farm Report.*

Note: Isolevel value is a model setting used to generate the visualization.

4.5 ANCILLARY EQUIPMENT

Inventory estimates for ancillary equipment are taken from RPP-PRT-42323, *Hanford C-Farm Tank and Ancillary Equipment Residual Wastes Inventory*. This report provides estimates based on knowledge of tank farm inventories as of January 1, 2009. Current knowledge includes waste volume measurements and estimates, analysis of tank samples and process knowledge estimates of tank waste composition and includes analysis of tank waste residuals for tanks retrieved as of

January 1, 2009. Projected residual estimates are based on assumptions for the amount of waste that will be retrieved prior to closure and the composition of waste remaining in tanks and ancillary equipment.

4.6 TANK RESIDUALS

Inventory estimates for waste residuals remaining in C farm tanks after retrieval is completed are taken from RPP-PRT-42323. This report provides estimates based on knowledge of tank farm inventories as of January 1, 2009. Current knowledge includes waste volume measurements and estimates, analysis of tank samples and process knowledge estimates of tank waste composition and includes analysis of tank waste residuals for tanks retrieved as of January 1, 2009. Projected residual estimates are based on assumptions for the amount of waste that will be retrieved prior to closure and the composition of waste remaining in tanks and ancillary equipment.

5.0 REQUIREMENTS

Regulatory and functional requirements will constrain the technical approach for tank and ancillary equipment (i.e., piping, diversion boxes, vaults) removal. Concept selection and design will include engineering controls to ensure worker safety as well as protection of the public while complying with applicable regulatory requirements.

5.1 REGULATORY REQUIREMENTS

There are numerous regulatory requirements that would potentially be applicable to tank removal. A full listing of potentially applicable laws, regulations, and other requirements is beyond the scope of this report. A detailed discussion is provided in the Draft EIS (DOE/EIS-0391).

Regulations that will be key to design and implementing the tank removal concept include:

- Air Quality – 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants;" WAC 246-247, "Radiation Protection – Air Emissions."
- Hazardous Waste and Materials Management – RCW 70.105, "Hazardous Waste Management Act;" WAC 173-303.
- HFFACO (Ecology et al. 1989)
- DOE Order 435.1, *Radioactive Waste Management*
- Occupational Safety and Health Act of 1970
- 10 CFR 835, "Occupational Radiation Protection"
- 10 CFR 71, "Packaging and Transportation of Radioactive Material."

5.2 FUNCTIONAL REQUIREMENTS

The functional requirements for tank removal are centered on accessing, demolition, and removal of the contaminated soil, structures, systems, and equipment from the C tank farm. At the concept stage the functional requirements define the features and performance characteristics. A practical concept is required for removal of the tanks, ancillary equipment, and soil within the tank farm boundary to a depth of 42 ft below ground surface. The 42-ft depth was selected based on capturing the entire tank structure plus approximately 5 ft of soil/backfill beneath the base of the tanks. This was selected as a representative depth for the purpose of concept development and is not tied to a performance measure. Performance criteria or cleanup levels would be required to implement tank and soil removal and would likely result in a non-uniform excavation to accommodate variations in the contamination levels.

The tank removal concept shall include features to perform the following based on information assembled to date:

- Excavate and package soils with varying contamination levels for onsite disposal. Overall contamination levels within the near surface soils across the tank farm are low compared to the expected contamination levels associated with UPRs. There are hot spots within the farm with measured Cs-137 concentrations as high as 10^{-7} Ci/g (10^{5} pCi/g) near C-107 and expected high levels of Cs-137 under the shotcrete covered cesium pile covering UPR-82.
- Demolish and package highly reinforced concrete structures for disposal.
- Demolish steel tank liners, equipment, and piping and cut into appropriately sized pieces for packaging in containers.
- Demolish tank base with remaining residual tank waste. The ability to perform this function is one of the biggest constraints on concept development. The presence of the residual tank waste provides challenges from an exposure, transportation, and disposal perspective.

5.3 WASTE DISPOSAL REQUIREMENTS - WASTE ACCEPTANCE CRITERIA

The ERDF is a waste isolation structure for bulk soil, demolition debris, and miscellaneous contaminated material from the Hanford Site cleanup activities (WCH-191, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*). It is designed to *Resource Conservation and Recovery Act of 1976* (RCRA) minimum technology requirements and *Toxic Substances Control Act* specifications for chemical landfills. Waste that enters the ERDF is controlled on the basis of source, physical form, and contaminant concentration and activity levels.

The ERDF is authorized to accept waste from Hanford Site environmental restoration activities consistent with the ERDF Record of Decision (ROD) (EPA 1995), Explanation of Significant Differences, and ROD amendments. Inactive treatment, storage, and disposal; RCRA past-practice; and decontamination and decommissioning waste may be placed in the ERDF through a remedial action ROD or removal action memorandum issued in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* and 40 CFR 300, "National Oil and Hazardous Substances Pollution National Contingency Plan." On a case-by-case basis, other documents may be used to provide regulatory authority for disposal of waste at the ERDF.

Worker protection shall be provided by compliance with the requirements of the health and safety plan for the ERDF, 29 CFR 1910, "Occupational Safety and Health Standards," and applicable 10 CFR and 49 CFR waste transportation regulations. Occupational exposure was evaluated in the remedial investigation/feasibility study (RI/FS) (DOE/RL-93-99, *Remedial Investigation and Feasibility Study Report for the Environmental Restoration Disposal Facility*) and helped establish the necessary dangerous/hazardous constituent limits that ensured occupational exposure is within required limits. The waste handling at ERDF shall be consistent with maintaining worker exposure ALARA (as low as reasonably achievable). Workers shall be

protected from direct radiation and radioactive materials in accordance with the requirements of 10 CFR 835, “Occupational Radiation Protection.”

The primary long-term routes of exposure to dangerous/hazardous constituents and the radionuclides that are of concern after placement of waste in the ERDF include the ingestion of contaminated groundwater or intrusion into the waste. The ERDF draft performance assessment (BHI-00169, *Environmental Restoration Disposal Facility Performance Assessment*) and the RI/FS (DOE-RL 1994) evaluated the risk from dangerous/hazardous constituents and radionuclides in the waste and established limits necessary to protect human health.

6.0 TANK REMOVAL CONCEPT DEFINITION

6.1 INITIAL CONDITIONS

The physical configuration and initial conditions assumed as the starting point for removal of the 241-C tank farm is based on the following:

- Waste retrieval operations will be completed in all of the C farm tanks. The inventory remaining in the tanks is represented as the 99 percent retrieval case and is equal to 1 percent of the best-basis tank inventory prior to initiating waste retrieval.
- Waste retrieval operations will be completed in catch tank C-301, CR vault tanks, and diversion boxes will have been cleaned out as required to support removal.
- All above grade temporary equipment from wastes retrieval and operations activities will be removed.
- All above grade facilities will be removed.
- Sufficient characterization of pits, boxes, and ancillary equipment will have been completed to support demolition and disposal planning.
- All groundwater monitoring wells within the footprint of the tank farm will be decommissioned prior to initiating tank and ancillary equipment removal.

6.2 ENABLING ASSUMPTIONS

- The scope of this study was limited to the boundary of WMA C. UPR-200-E86 outside of the C farm fence line is not included in the study. It is likely that if tank and ancillary equipment removal were selected for implementation the footprint may not correspond to the tank farm fence line.
- This is a conceptual level study that is based on removal/remediation concepts adapted from other evaluations or recent demolition projects.
- Compliance with 40 CFR 61, Subpart H, "National Emissions Standards for Radionuclides other than Radon from Department of Energy Facilities," and WAC 246-247, will require the use of enclosure facilities with exhausters to limit the radionuclide emissions to acceptable levels. This assumption is based on a scoping level calculation of the potential dose to an offsite receptor if no emission controls were used during tank removal. Using the methodology defined in DOE/RL-2006-29, *Calculating Potential-to-Emit Radiological Releases and Doses*, scoping level calculations indicate that the potential dose to the maximum public receptor from unabated emissions associated with C farm tank removal is 13 mrem/yr. This dose exceeds the maximum allowable dose of 10 mrem/yr to an offsite receptor from all sources within the Hanford Site.
- Excavation and uniform removal of 5 ft of soil following removal of the tanks will be sufficient to capture the majority of long-lived immobile contaminants associated with

past leaks. This depth of soil removal was selected for development of the tank removal concept. Additional localized soil removal could be performed within the soil removal concept described; however, significant soil removal would require a different concept for supporting the excavation. Deep soil removal (i.e., plume chasing) was evaluated in the Draft EIS.

- Worker doses can be approximated from previous dose modeling performed for the AX tank farm. This approach is based on scaling the AX modeling results by a scaling factor for total inventory and a scaling factor for total volume to be removed.
- Onsite waste disposal is assumed at ERDF. Waste streams generated by tank removal will be compared to the ERDF waste acceptance criteria.
- Piping that extends beyond the boundary of the area covered by tank removal will not require isolation. The process of shearing the pipe with the hydraulic excavator will pinch the piping but will not provide a seal.

6.3 EQUIPMENT CONCEPTS

A variety of equipment would be used in demolition and removal of the tanks, soils, and ancillary equipment. The primary equipment selected for use includes commercially available heavy equipment modified for use in a radioactive environment. Modifications to equipment would be required to support deployment and include options for supplied air to the operator cab, and additional steel and leaded glass to reduce radiation dose to the equipment operator. Scaling the dose rates presented in HNF-3378, Appendix A, Table 13 by the Cs-137 inventory ratio between AX-101 and the C farm tanks indicates that approximately 1 to 2 in. of steel or equivalent shielding would be required on the excavators and loaders performing demolition and removal of hot spots while maintaining operator dose rates in the range of 1 to 15 mrem/hr at a distance of 20 ft from the source. This degree of shielding is feasible; however, because of the uncertainties with the contamination levels and the time required to demolish and remove some structures, heavy equipment modified for remote operations is included in the concept for deployment in high dose rate areas such as tank base demolition and removal activities. Details on the number and types of equipment included in the cost estimate are provided in Appendix C. The types of equipment that could be used include:

- Large hydraulic excavators for use in removing soils, demolishing concrete structures, and cutting piping and equipment to size that can be placed into containers.
- Suite of demolition tools for use with the excavators including concrete crushers, shears, pulverizers, impact hammers, and grapples.
- Wheel or track loader to load soils/debris into containers for transport to the disposal site.
- Haul trucks to transport containers from within the enclosure to a designated staging area.
- Guzzler truck for localized excavation of small quantities of soil outside of the enclosures. The guzzler could be used to remove cover soils and expose piping and ancillary equipment.

6.4 ENCLOSURE FACILITY CONCEPTS

Control of the potential airborne radiological emissions drives the need for a structural enclosure that will support control of the airspace surrounding the excavation and demolition activities. Airspace control will rely on negative air pressure zones necessary to capture and filter airborne contaminants to the extent necessary to meet regulatory requirements.

Tension membrane or fabric-covered structures are included in the tank removal concept. These structures are aligned with the need for a temporary structure and are engineered to meet snow and wind loading requirements. Examples of tension membrane structures of a size similar to those required for tank removal are shown in Figure 6-1. These types of buildings are currently in use at both the Savannah River Site and at Idaho National Laboratory, although not for the purpose of tank removal.

Figure 6-1. Example Rubb® Structure (255-Foot Span by 270 Feet Long).

Source: Rubb Building Systems.

®Rubb is a registered trademark of Rubb, Inc.

A number of different sized structures would be needed to support the entire project. Each structure would require a ventilation system with HEPA filtration and dust removal equipment necessary to remove contaminants in the air stream.

Each structure would need to be anchored to the ground. This would be accomplished through the use of helical anchors or with concrete foundations installed on-grade. Smaller structures would be anchored with standard ecology blocks.

A fabric cover would be installed on the outside and inside of the support frames. The second interior liner would be provided for contamination control and for use in establishing a secondary ventilation zone.

Two primary ventilation systems will be provided the primary zone would be the main interior of the structure and would be maintained at the highest negative pressure differential relative to atmosphere. The annulus between the inner and outer skin of the structure would be a secondary zone and would be maintained at an intermediate negative pressure so that in-leakage would be from the outside into the secondary and from the secondary to the primary zone. At two air space exchanges per hour, the primary vent system supply and dual HEPA-filtered exhaust would be sized for a flow rate of approximately 200,000 scfm. This flow rate is roughly equivalent to the WTP high level vitrification plant ventilation system (24590-WTP-RPT-ENV-01-008, *Radioactive Air Emissions Notice of Construction Permit Application for the River Protection Project – Waste Treatment Plant*). Demolition activities have the potential to generate significant particulate so electrostatic precipitators will be used in the ventilation system to reduce the particulate loading on the HEPA filters.

Supplemental lighting will be incorporated into the facility.

Fire protection for the interior of the facility will be provided. Fire protection requirements and criteria would be evaluated during design. For the purposes of concept development it is assumed that a dry foam and water spay system would be provided.

Portable smaller enclosures and remotely operated equipment could be used within the larger enclosures to address localized hot spots.

6.5 TANK REMOVAL DESCRIPTION

The overall approach to tank and ancillary equipment removal parallels the approach described for removal of the AX tanks in HNF-3378. The footprint of the C tank farm along with the number and location of the ancillary equipment components requires some adaptation of the tank removal concept. A single free-span enclosure structure to support removal activities is not feasible for the 16 C farm tanks or the surrounding diversion boxes, catch tank, and vault. The conceptual approach is to first construct enclosure structures and remove the ancillary components (diversion boxes, catch tank, CR vault). This will remove obstructions and provide clearance for construction of the large enclosure structures required for removal of the 100-series tanks.

Implementation of the tank removal concept would require characterization of the equipment and structures to be removed along with detail design of the concept and review of the sequencing of the demolition and removal actions.

The excavation/removal zones associated with primary C farm structures are illustrated in the figure on page C-2 in Appendix C. Seven separate large enclosures would be utilized to support ancillary equipment and tank removal and two enclosures would provide support functions. Additionally, a number of smaller temporary enclosures would be required to support installation of the shoring walls and removal of contaminated soils within the tank farm fence line, but outside of the footprints shown on page C-2.

Tension membrane structures (fabric covered engineered buildings) would be constructed to provide for capture and treatment of air emissions for all of the tanks, diversion boxes, and ancillary components. A single larger enclosure facility is assumed to cover the CR vault, CR-151 diversion box, and the CR-152 and -153 diversion boxes (page C-2, Enclosure #8). Because of proximity of some ancillary structures to the main enclosure facilities that are envisioned for use during removal of the tanks, integration and sequencing of the support facilities and foundations may be possible.

The following list provides a summary description of the steps associated with tank and ancillary equipment removal. The estimated volumes of materials (i.e., soil, concrete rubble, steel) associated with removal are summarized in Section 8.0. The general sequence for tank and ancillary equipment removal follows.

1. Characterize contamination levels in ancillary equipment and soils to the extent necessary to support work planning. Perform geotechnical evaluation necessary to support construction of the pile walls required for tank removal.
2. CR vault/CR-151/CR-152/CR-153 diversion boxes
    a. Construct 120 ft by 400 ft enclosure (Enclosure #8).
    b. Remove cover blocks.
    c. Remove diversion boxes, pipe trenches, and piping to a depth of 16 ft below ground surface with standard layback.
    d. Demolish pipe trenches and cut piping back to the face of the excavation layback.
    e. Demolish CR vault structure to depth of 16 ft below ground surface.
    f. Install shoring around the CR vault structure to enable excavation and removal of the vault equipment and structure down to a depth of 56 ft below ground surface.
    g. Backfill excavation to grade.
    h. Remove enclosure structure.
3. C-153 diversion box removal
    a. Construct 75 ft by 130 ft enclosure.
    b. Remove cover blocks.
    c. Remove diversion box and piping to a depth of 16 ft below ground surface with standard layback.
    d. Cut piping back to the face of the excavation layback.

4. C-151 and C-152 diversion box removal

   a. Construct 120 ft by 120 ft enclosure.

   b. Remove cover blocks.

   c. Remove diversion box and surrounding soil to a depth of 16 ft below ground surface with standard layback.

   d. Note the cesium mound (UPR-82) is adjacent to the C-151 and C-152 diversion boxes. This area was covered with shotcrete to cover a UPR. The UPR occurred in December 1969 and an estimated 2,100 gallons of waste was released from a break in the line coming from tank C-105 (RPP-RPT-42294). An estimated 100 gallons surfaced adjacent to the box, sometimes referred to as "the cesium mound." The contaminated surface was covered with clean gravel and subsequently covered with concrete. Calculations indicate that 11,300 Ci of Cs-137 were lost to the soil during the release. The present day inventory of cesium will be less than half of this value due to decay. Characterization activities have confirmed the presence of contamination around the 241-C-152 diversion box (PNNL-15617, *Characterization of Vadose Zone Sediments from C Waste Management Area: Investigation of the C-152 Transfer Line Leak*). The bulk of the Cs-137 contamination is constrained in the shallow vadose zone near the leak site while the mobile contaminants have migrated both laterally and vertically – at least 80 ft below ground surface (PNNL-15617).

   e. Cut piping back to the face of the excavation.

5. C-252 diversion box/C-301 catch tank removal

   a. Construct enclosure 90 ft by 200 ft. Note the enclosure layout concept takes advantage of the shoring wall that would be constructed to support removal of the 100-series tanks. The removal action for the C-252 diversion box and the C-301 catch tank would be sequenced after installation of the pile wall discussed under the tank removal section.

6. Tank removal

   a. Place shielding grout in all tanks. Use a flowable CDF with low strength. Place approximately 3 ft of fill in each tank. Adding 3 ft of fill provides for sufficient shielding and sufficient volume to achieve grout cover at the edges of the tank in the event that the grout mounds in the center of the tank. This will require approximately 500 yd^3 of grout for each 100-series tank and 35 yd^3 for each 200-series tank.

   b. Remove piping and interferences along common shoring wall. This will require excavation, demolition, and removal of the concrete encased pipe trench and associated piping running between tanks C-106/-109, C-105/-108, and C-104/-107 to a depth of approximately 5 ft. The figure on page C-1 of Appendix C shows the pipe trenches connecting the CR diversion boxes and CR vault with the tanks.

   c. Drill and construct drilled reinforced tangent pile walls (3 walls constructed of 36-in. diameter drilled piles 82 ft deep); each pile will have 3 pile walls 600 ft

long each for a total of 1,800 ft of pile wall. The drilled or bored piles will require reinforcing steel to resist the Earth's pressure. A cantilevered wall with an exposed face of 42 ft will require a significant beam. Scoping level calculations were performed that resulted in identifying a 36-in. wide flange beam weighing 798 pounds per foot or a prefabricated rebar cage with equivalent section properties. The structural requirements for the pile wall beam could be reduced through the use of tie-backs on the exterior walls and performing the excavation in steps removing layers from both sides of the pile wall to limit the depth of soil supported by the wall at any one time.

d. Construct tank enclosure facilities (Rubb type of arched enclosure).

Two separate free-span enclosure structures would be constructed to support tank demolition and removal operations. The pile walls would serve as the foundations and would anchor the structures.

The footprint of the enclosures would be approximately 225 ft in span by 500 ft long. For perspective, an example of a free-span Rubb structure having approximately the same span is shown in Figure 6-1.

Building utilities – electrical service and communications/control systems will be installed to support operations.

Ventilation – ventilation systems will be installed to provide both primary and secondary supply and exhaust. Large skid-mounted exhausters with HEPA filters and treatment technologies necessary to meet required emissions control. Functional requirements for the ventilation system have not been defined. Because of number and size of the equipment operating within the facility along with the nature of the operations, it is anticipated that personnel within the enclosure will be on supplied air.

Enclosure lighting – supplemental lighting will be incorporated into the facility.

Fire protection – fire protection for the interior of the facility will be provided. Fire protection requirements and criteria would be evaluated during design. For the purposes of concept development, it is assumed that a dry foam and water spray system would be provided.

e. Construct support facilities

Support facilities will be constructed adjacent to the main enclosures. One support facility would be approximately 100 ft by 100 ft and would provide an airlock for equipment entrance and exit from the main enclosures. Waste containers would be surveyed and decontaminated as required prior to being transported to the burial grounds. A second support facility would provide for personnel entry and exit and would contain change rooms, monitoring room, and survey stations. The personnel support facility provides for controlled entry/exit from the primary demolition area. Separate support facilities located away from the primary enclosure.

f. Remove cover soil to expose tank domes

Once the enclosure and support facilities were in place, removal operations can proceed. The first step involves removal of the cover soil. Cover soil removal will be performed in parallel with removal of the piping/concrete pipe trenches. A number of obstructions will be encountered as excavation progresses. Monitoring wells surrounding the tanks, as well as the on-tank risers and pits, will require demolition and removal as the excavation proceeds.

Equipment installed in the tanks will be evaluated and either removed as long-length equipment and packaged for disposal or left in place for demolition with the tank structure. Tank risers will be cut or removed as the excavation progresses. On-tank pits will be demolished and placed into containers. Soil and debris will be loaded into containers and moved from the excavation area to the staging area where they will be covered and staged for transport to the adjacent support facility for survey/decontamination.

g. Remove piping/concrete pipe trenches

Waste transfer lines were installed as either direct buried or within concrete pipe trenches. In general, the piping in concrete trenches is located within the top 5 ft of the existing tank farm surface. Direct buried lines will be encountered from a few feet below the existing grade down to the cascade lines between the tanks, which are approximately 20 ft below existing grade. Three excavators working together would be utilized to expose the piping and pipe trenches.

As the cover soils are removed to expose the tank domes, the concrete pipe trenches connecting the CR diversion boxes and CR vault with the tanks will be exposed. These concrete structures contain steel transfer lines (generally 3-in. and 6-in. diameter) that were routed to the tanks. The pipe trenches are nominally 8-in.-thick reinforced concrete with reinforced concrete cover blocks.

The hydraulic excavators will be used to crush the concrete and cut the reinforcing steel to expose the transfer lines. The transfer lines will be crimped and sheared to length and placed in containers.

h. Demolish tank domes

After the domes are exposed the heavy equipment will be used to crush the concrete and cut the reinforcing steel to remove the tank domes. The concrete debris will fall into the tank while the reinforcing steel will be sheared and placed into containers.

i. Remove lateral soil between tanks

Following removal of the tank domes, the lateral soil between and around the tanks will be removed to expose the tank sidewalls. Removal of the lateral soil will expose the cascade lines and transfer lines routed to the tank nozzles located on the sidewalls of the tanks. The transfer lines will be sheared to length and placed into containers.

j. Remove tank sidewalls

The tank sidewalls are approximately 22 ft tall with a carbon steel liner extending approximately 18 ft up the inside surface. Removal of the tank sidewalls will involve breaking up or crushing the concrete and shearing the steel reinforcement to removal the wall. As removal of the sidewalls progresses, the tank liner will be exposed. The liner will be cut into pieces sized to fit into the shipping containers.

Concrete and steel rubble from this operation will fall into the tank for later recovery. As the tank sidewalls are taken down, the pile of rubble and debris sitting on top of the shielding grout will be accessible for load out into waste containers.

Once sidewalls are removed down to the point where the shielding grout layer starts and the tank dome and sidewall debris are removed, the sidewall removal operation would be complete.

k. Remove base slab and footing rings

Following removal of the tank sidewalls, the tank base slab would consist of the lower 3 ft of the sidewall, the bottom of the tank, and the 3 ft of shielding grout in one slab. The residual waste would be mostly sandwiched between the bottom of the tank and the shielding grout.

The tank bases would be demolished by breaking the concrete base and trimming the reinforcing steel and tank liner working perpendicular to the tank base to limit the amount of tank liner and residual waste exposed at any one time.

The waste stream resulting from base slab removal is expected to have the highest levels of contamination because this volume will contain the residual tank waste.

l. Remove 5 ft of soil beneath the tanks

Following demolition and removal of the tank bases, an additional 5 ft of soil would be excavated, placed into containers, and removed from the farm. Hot spots would be expected in areas that were directly impacted by tank leaks.

m. Backfill excavations to surrounding grade

After the soil beneath the tanks is removed the resulting excavation area will be backfilled with clean fill material to match the original grade. This will require approximately 244,000 yd^3.

n. Other near surface areas

The layout of the temporary enclosures around the ancillary equipment and tanks would provide coverage for removal of the concrete structures and interconnecting piping. There will be some pipe runs that will not be included within the excavations required for facility demolition/removal. A number of localized excavations would be required to expose and remove remaining piping and contaminated soil in the near surface.

7.0 HUMAN HEALTH AND ENVIRONMENTAL IMPACTS

7.1 RADIOLOGICAL EXPOSURE TO WORKERS

Workers involved with implementation of the tank removal concept have the potential of being exposed to radiological and chemical contamination in the soil, ancillary equipment, and residual waste remaining in the tanks. Previous evaluations performed for tank and ancillary equipment removal in HNF-3441 and HNF-3378 indicate that the operations could be performed with manned equipment with shielding added to the equipment to reduce exposures to the extent practical.

Site-specific dose calculations were not performed for this evaluation. Site specific dose calculations would require information not readily available and therefore can only be approximated. A site specific dose evaluation would require numerous enabling assumptions for the number of workers, shielding, as well as the location and characteristics of source terms. An approximation of the anticipated dose was developed using the dose modeling performed for the AX tank removal study (HNF-3378) and ancillary equipment removal study (HNF-3441). There are a number of uncertainties associated with this approach. It is assumed that the cumulative dose estimates can be estimated based on consideration of the inventory and labor hours estimated to perform the work. Additionally, it is assumed that the background radiation levels in the C tank farm following completion of waste retrieval and removal of above grade equipment will be approximately equal to those in the AX tank farm.

The AX tank removal study noted that the highest expected dose rates associated with tank removal would be associated with demolition and removal of the tank bases where the residual waste inventory following waste retrieval is assumed to be located. However, cumulative doses associated with construction of the enclosure were significant because of the large number of hours required for that activity. The tank removal concept developed in this report is based on utilizing remotely operated equipment for demolition of the tank bases; however, manned equipment would be used to transfer containers into and out of the facility.

The cumulative exposure for removal of the C farm tanks can be approximated by scaling the AX exposure estimates by a ratio of the Cs-137 inventory and by a ratio of estimated worker hours to account for changes in the estimated crew size and the additional number of tanks associated with the C tank farm as compared to the AX tank farm. Cs-137 was selected because it is the primary contributor to worker dose (HNF-3378). The cumulative worker exposure for C farm tank and ancillary equipment removal is estimated using the following formula:

$$\text{Exposure}_{\text{C farm}} = (\text{Exposure}_{\text{AX tank and anc. equip removal}}) * (\text{Cs-137 inventory}_{\text{C farm}} / \text{Cs-137 inventory}_{\text{AX farm}}) * (\text{Estimated labor}_{\text{C farm removal}} / \text{Estimated Labor}_{\text{AX removal}})$$

Table 7-1 provides the Cs-137 inventory in the AX and C tank residual waste inventory estimates. Cs-137 was used as an indicator contaminant for the purposes of estimating worker exposures and may not be representative of the total curie content of the contamination. As shown in the table, the overall farm wide inventory estimates for Cs-137 in the AX tank farm residual waste are slightly higher than the C tank farm.

Table 7-1. Post Retrieval Cesium-137 Residual Waste Inventories.

Tank	Cs-137 (Ci)[a]	Tank	Cs-137 (Ci)[b]
AX-101	5.16E+03	C-101	3.22E+02
AX-102	7.17E+03	C-102	2.77E+02
AX-103	1.09E+04	C-103	9.41E+02
AX-104	1.09E+04	C-104	9.50E+02
AX soils	N/A[c]	C-105	8.19E+02
AX ancillary equipment	2.54E+03	C-106	1.55E+03
–	–	C-107	6.32E+02
–	–	C-108	9.13E+01
–	–	C-109	7.30E+00
–	–	C-110	1.55E+02
–	–	C-111	2.12E+02
–	–	C-112	2.44E+03
–	–	C-201	1.09E-01
–	–	C-202	9.58E-02
–	–	C-203	1.41E-01
–	–	C-204	6.39E-02
–	–	Ancillary equipment	1.29E+03
–	–	C farm soils	2.51E+04
Total	3.79E+04	Total	3.48E+04

(a) Source HNF-3378 and HNF-3441 (Table B-4).
(b) Source RPP-RPT-42323 and are decayed to 01/01/2001.
(c) Dose contribution from soils is included in the background dose rates used in the AX tank removal study.

Table 7-2. Estimated Worker Hour Comparisons.

Tank Removal (HNF-3378, Table 3.4)			Cost Estimate (Appendix D)		
Activity	**Rad Workers (hours)**	**Support Personnel (hours)**	**Activity**	**Rad Workers (hours)**	**Support Workers (hours)**
Building construction	–	33,150	General contractor mobilization	–	9,955
Tank removal	71,680	2,560	Roads, trailers, parking	–	2,249
Ancillary equipment removal (HNF-3441, Table 2.7)			Electrical install	–	1,682
Perforate/grout wells	4,320	–	Management and support craft	–	545,376
Demolish buildings	2,692	–	Roads/parking lifecycle	–	45,453
Remove piping	22,088	–	Construct survey tent	–	3,083
Demolish pits/boxes	2,552	–	Pit labor	541,948	–
Support crew	8,832	–	Construct enclosures 3-9	–	189,000
–	–	–	Construct shoring walls	125,620	
–	–	–	Construct weather enclosures 1 and 2	–	343,200
–	–	–	Waste level 4, waste handling	4,029	–
–	–	–	Apply fixative to inside of tanks	8,145	–
–	–	–	Grout tank heels	4,620	–
–	–	–	Backfill excavation	–	114,393
Subtotal	**112,164**	**35,710**	**Subtotal**	**720,072**	**1,254,391**

Note: Hours estimated based on full-time equivalents from HNF-3378, HNF-3441, and the cost estimate provided in Appendix D.

Cumulative exposure estimated for AX tank & ancillary equipment removal = 10,088 mrem + 7,655 mrem = 17,743 mrem.

C farm labor = 720,072+1,254,391 = 1.97E+06 hours.

AX farm labor = 112,164 + 35,710 = 1.48E+05 hours.

Cumulative Exposure tank removal = 17,743 mrem * (3.48E+04/3.79E+04) * ((1.97E+06)/(1.48E+05)).

Cumulative Exposure tank removal = 200,000 mrem (reported at 1 significant figure).

Note that the labor hour estimate for the C farm removal is approximately one order of magnitude larger than the AX labor hour estimate while the total Cs-137 inventory is similar. The scaling approach used therefore produces an estimated cumulative dose that is approximately one order of magnitude higher. Further examination of labor hour estimates show a significant increase in the estimated non-rad labor hours in the C farm estimate. Improving the estimate by separating the rad/non-rad labor hour estimates and scaling these values separately was considered however review of the cumulative exposure estimates by unit process (HNF-3378, Table 3.5.2) showed the cumulative exposure for construction of the tank enclosure

with non-rad workers was the highest estimated cumulative dose in the estimate. This was due to a combination of a small dose rate (0.05 mrem/hr) and a large number of hours. Based on review of the AX cumulative dose estimates by unit process it was determined that scaling the C farm estimate at the summary level was sufficient for the purpose of this study.

Shipping Container Shielding Requirements

HNF-3378 developed estimated requirements for shipping container design in terms of the thickness of steel required to maintain either 200 mrem/hr on contact or 10 mrem/hr at a distance of 1 meter. These are limiting dose rates for transportation of the containers to the disposal facility. The average Cs-137 concentration in the AX-103 and AX-104 base slab rubble was 0.5 Ci/ft^3, which resulted in the need for 4-in. of steel in the shipping boxes in order to maintain the dose rates at 1 meter to less than 10 mrem/hr.

Scaling this analysis to the C farm tank removal study provides for an approximation of the shipping container that would be required for the C farm base slab debris.

Tank C-112 has the highest estimated residual inventory of Cs-137 at 2,440 Ci. The tank base slab volume alone without the addition of any shielding grout or soil beneath the tank base is approximately 0.14 Ci/ft^3. This is based on an in place volume of the tank base of 468 yd^3 and a swell factor of 40 percent. This indicates that containers with an equivalent of 3 in. of steel would be suitable for C-112 waste.

Localized Cs-137 concentrations in the soil are also a concern from a shipping, handling, and disposal standpoint. Cesium concentrations have been reported as high as 10^{-7} (10^5 pCi/g), which is approximately 0.005 Ci/ft^3 of soil. While the soil volumes associated with these contamination levels are small, they require special consideration when selecting container types and container transporting.

7.2 IMPACTS TO GROUNDWATER

In order to quantitatively assess the reduction in long-term impacts to the groundwater from tank removal, a fate and transport model or a performance assessment would be necessary. Because the tank removal concept involves exhuming contaminated material from the tank farm and transferring the material to an onsite disposal facility, the reduction in long-term impacts to groundwater from the tank farm would be offset in part or in whole by an increase in groundwater impacts from the disposal facility.

A performance assessment for WMA C is planned and when completed will provide the estimated risk to the environment and public if the farm landfill closed and waste remains in place and will provide a means to evaluate the relative contributions of the different contaminant sources to the long-term impacts. The performance assessment will also include the deep vadose zone contamination that would not be removed with the tanks. Pending the completion of the performance assessment, a qualitative comparison can be made using inventory summaries for technetium-99 and Cs-137 shown in Table 7-3. Technetium is used to represent the long-lived mobile contaminants and typically technetium-99 is the major contributor to long-term human health risk through the groundwater pathway. Cs-137 is included in the comparison because it is a significant contributor to radiological exposure and worker dose.

Table 7-3. Inventory Summary Comparison.

Inventory Source	Tc-99 (Ci)	Cs-137 (Ci)
Tank residuals	2.92E+00	8.40E+03
Ancillary equipment	5.33E-01	1.29E+03
Soils, past leaks	7.82E+00	2.51E+04

Tank removal would remove the tank residual and ancillary equipment from the C tank farm and would capture a percentage of the inventory present in the soils from past leaks. The contaminant inventory from past leaks and spills has been in the vadose zone for a number of years and the groundwater monitoring results indicate that technetium-99 and nitrate in the groundwater are from tank sources (RPP-35484, *Field Investigation Report of Waste Management Areas C and A-AX*). Contaminants from past leaks and spills that occurred in the late 1950s up through the early 1980s have been subject to natural transport processes for 30 to 50 years and the mobile constituents are expected to extend from the point of the leaks down to the groundwater for some releases.

The depth of the water table at the C tank farm is approximately 255 ft below ground surface at the C tank farm (RPP-35484) and the removal concept involves removing the top 42 ft. This leaves approximately 210 ft of soil above the water table. It is expected that a large percentage of the non-mobile contaminants present in the vadose zone that drive worker exposure (i.e., Cs-137) will be encountered during tank removal. Conversely the mobile contaminants from past leaks and spills are distributed throughout the vadose zone and removal of the top 42 ft would only capture a small percentage of the mobile contaminant inventory associated with past leaks and spills. Additionally, it is assumed that the use of water for dust control during demolition and excavation activities will not contribute to further migration of contaminants.

7.3 ON SITE DISPOSAL

Table 8-1 identifies the sources of materials that will be generated for disposal. For the purposes of this study it is assumed that the contaminated soil and debris from tank and soil removal would be transported to ERDF for disposal. Most of the soil, structural concrete, along with the debris from the 200-series tanks would be suitable for direct disposal (dumped from the RO/RO container and not disposed of in a container), while the highly contaminated debris (steel plate associated with the tank liner, highly contaminated piping and soils) would be stabilized using grout in a disposal container.

Both the contaminated soil and the debris would have to meet land disposal restrictions (LDR) requirements defined in 40 CFR 268, “Land Disposal Restrictions,” as amended. Restrictions for soil are concentration based and it is expected that most soils could meet LDR requirements while debris and highly contaminated soils would require macroencapsulation. Depending on the specific macroencapsulation requirements the total waste stream volume could increase.

Based on the estimated waste stream volumes the total weight of soil/debris to be disposed of is approximately 900,000 tons, which would occupy approximately 60 percent of one ERDF disposal cell. The costs associated with ERDF disposal are included in the tank removal cost estimate (Section 11.0).

8.0 WASTE STREAM SUMMARY

Waste streams generated from the excavation and removal of soil, tanks, and ancillary equipment will be placed into containers and transported to ERDF. Some portions of the waste stream may exceed waste acceptance criteria for onsite disposal. For cases where the waste stream exceeds waste acceptance criteria, the available options include treatment of the waste stream, interim storage pending future disposition, or modification of the waste acceptance criteria. A summary of the waste stream volumes is provided in Table 8-1.

Table 8-1. Waste Stream Volume Summary.

Source	Volume (yd^3)*	Waste Stream Disposition
Cover soils (0-9 ft below ground surface) over tanks	81,800	Contaminated soil - disposal at ERDF
Lateral soils (9-37 ft below ground surface) between tanks	211,000	Contaminated soil - disposal at ERDF
Soils below tanks (37-42 ft below ground surface)	41,400	Contaminated soil - disposal at ERDF
CR vault (concrete, steel tanks, and equipment) (probable LDR)	3,200	Concrete rubble, steel tanks, piping, and equipment – disposal at ERDF
Diversion boxes (probable LDR)	1,570	Concrete rubble, piping – disposal at ERDF
Piping (probable LDR)	4,400	Pipe sections requires subsequent stabilization to minimize void spaces – disposal at ERDF
Tanks, 100-series		
On-tank pits (probable LDR)	840	ERDF
Tank domes (probable LDR)	4,170	ERDF
Tank sidewalls (probable LDR)	6,970	ERDF
Tank bases (probable LDR)	11,540	Packaged for storage
Tank Liner (probable LDR)	245	Packaged for storage
Residual tank waste (probable LDR)	160	
Tanks, 200-series		
Concrete (probable LDR)	465	ERDF
Steel liner (probable LDR)	29	ERDF
Catch tank, C-301 (probable LDR)	66	Concrete rubble - ERDF
Soils surrounding structures (soils that would be excavated as a part of diversion box/vault/catch tank removal)	41,377	ERDF
Other soils	387,380	ERDF – lightly contaminated
Total volume	796,000	

*Volumes following excavation and include swell factors and represent grouted volumes for equipment/debris/piping.

ERDF = Environmental Restoration Disposal Facility.
ft = feet.
LDR = land disposal restriction.

A comparison of the estimated radionuclide and chemical concentrations compared to the waste acceptance criteria at ERDF and the waste classification in accordance with 10 CFR 61.55, "Licensing Requirements for Land Disposal of Radioactive Waste," "Waste Classification," in the different waste streams is presented in Appendix B. It should be noted that the comparison is made by calculating overall average concentrations based on total inventory and total volume estimates. This approach does not account for variability in contamination levels within the soil and demolition debris. The waste stream resulting from the removal of the tank bases is an issue from a waste acceptance and disposal standpoint. For the tank base waste stream, the volume includes the tank liner and shielding grout in addition to the concrete tank base. As shown in Appendix B the tank base waste stream for a number of the 100-series tanks exceeds the ERDF waste acceptance criteria for the concentration of plutonium-239 or americium-241. Additionally, the transuranic inventory in the tank residuals for tanks C-102, C-103, C-104, C-106, and C-107 is at a level that causes the waste stream associated with the tank bases to approach or exceed the transuranic limit of 100 nanocuries per gram limit for the tank base debris.

If tank removal were to be implemented then the options for addressing this include:

- Pursue a special case exemption for those wastes that do not meet established acceptance criteria at the disposal facility.
- Retrieve additional waste from the tanks prior to removal. This is a potential for tank residuals but not for contamination in the soils.
- Place smaller amounts of highly contaminated material in the disposal boxes and shield with other soils or grout.
- Construct a new treatment/processing facility to perform soil/debris washing or acid washing to remove contaminants from the soil/debris waste stream.
- With the exception of the first bullet, implementation of any of these options would involve a significant increase in the cost and schedule for tank removal.

9.0 IMPLEMENTABILITY ISSUES

Implementation of the tank removal concept as described for removal of the C farm tanks, ancillary equipment, and soils has a number of issues that would need to be addressed during design and planning efforts should this concept be selected for implementation.

There is limited information currently available on the contamination levels present in the soils and ancillary equipment as well as the inventory that will remain in the tanks following waste retrieval. Characterization to support shielding and exposure assessments would be required to support the detail design and work planning. Additionally methods for monitoring for hot spots and work practices for handling high levels of contamination (i.e., high dose rate) areas would need to be developed. Depending on radiation levels encountered, hot spots could result in significant cost and schedule impacts associated with changing equipment or work techniques.

The shoring wall concept described in this report for supporting the tank excavation and the enclosure facilities is based on commercial practices; however, the amount of reinforcement that would be required, the existing infrastructure that would need to be removed prior to installing the wall, and installation in a contaminated soil will be a significant challenge.

The equipment concepts utilized in this study rely on both shielded heavy construction equipment as well as heavy construction equipment adapted for remote operation. Fully remote heavy equipment is currently not commercially available; however, equipment adaptation for remote operation has been performed in the past.

There is some regulatory uncertainty associated with disposal of the tank base slabs comingled with the residual tank waste. Depending on regulatory classification of this waste stream and the final waste characteristics it is possible that this waste steam could end up as an orphaned waste stream with no defined disposal pathway. If this were to happen it could greatly increase the cost and duration since interim storage of the waste containers would be required pending issue resolution and selection of a final disposal location.

10.0 COMPARISON WITH DRAFT TANK CLOSURE AND WASTE MANAGEMENT EIS

A comparison between the tank and soil removal concepts described in the Draft Tank Closure and Waste Management EIS (DOE/EIS-0391) and this report is presented in the following sections. The comparison identifies the primary differences as well as the similarities. Both DOE/EIS-0391 and this report have a similar approach to the overall construction or deconstruction of the tank farms and ultimately tank removal. Tank and soil removal concepts in both documents include the construction of an enclosure facility to provide control of potential airborne contamination, as well as operations support facilities. The Draft EIS alternatives 6A and 6B are the alternatives that include tank and soil removal. These alternatives also include tank and soil removal of all SST farms. As the scopes of the two documents are different some direct comparisons cannot be made.

The scope of this report focuses more on the construction approach and specific facilities/ equipment within the C tank farm, where as the scope of DOE/EIS-0391 covers more of the environmental resources such as air emissions and resource requirements.

10.1 COMPARISON OF PRE-CONSTRUCTION METHODS

Site preparation activities are included in this evaluation as well as the Draft EIS to prepare for tank removal construction activities. In both documents, a layer of grout is assumed to be used to stabilize the remaining tank waste and provide radiological shielding for workers involved with tank removal activities. DOE/EIS-0391 assumes that the tank waste will be removed to a 99.9 percent removal efficiency for all tank farms, while this report assumes a 99 percent removal of tank waste in the C farm. DOE/EIS-0391 assumes a 1 ft layer of grout in the bottom of each tank while this report assumes a 3 ft thick layer of grout for waste stabilization and shielding.

Removal of all aboveground utilities, monitoring equipment, and abovegrade structures are assumed in both DOE/EIS-0391 and this report to occur before tank and soil removal begins.

10.2 COMPARISON OF FACILITIES

Construction activities described in both documents include the construction of large free span structures coupled with ventilation systems to provide control of potential airborne emissions. DOE/EIS-0391 identifies a large containment structure, which will span the width of a tank farm and roll on rails as tank removal progresses. The tank removal concept developed in this report includes a single free span structure that would cover the entire farm. Both documents assume that all surface equipment and facilities will be removed prior to this activity. This report identifies the need for smaller structures that would be built to first remove equipment and structures such as vaults, diversion boxes and catch tanks, to allow for easier construction of the larger structure over the entire tank farm. This report identifies a commercially available fabric covered structure manufactured by Rubb Industries as an example of the type of structure that would be built over the tank farm. The structure also includes measures for dust and emissions

control such as overhead water misters. DOE/EIS-0391 identifies a similar facility will be required but does not include the detail as given in this report, which is as expected due to a different scope of DOE/EIS-0391.

Both DOE/EIS-0391 and this report estimate that there will be the need to have at least two zones of negative gauge pressure provided by exhausters to ensure proper emissions control. The two zones will consist of a primary zone that will be the where the tank and ancillary equipment demolition and soil removal will occur and will have the lowest pressure. The secondary zone would be separated by an airlock and would be where worker facilities and operations control would occur. This pressure differential will ensure that if a leak occurs in any of the structures it will flow into the primary zone where waste removal occurs.

10.3 COMPARISON OF CONSTRUCTION EQUIPMENT

Construction equipment identified in the two documents is similar as well. Both documents identify the use of shielded hydraulic excavators that will be modified from existing heavy equipment. The primary modifications would be the addition of approximately 2 to 3 in. of steel and leaded glass to the operators cab for shielding. Further modifications to the operators cab in the two documents were the optional addition of a ventilation system. The excavators would also be equipped with various attachments such as shears for steel size reduction and concrete crushers for concrete size reduction. Both documents also include using a guzzler truck for localized excavation, when necessary.

It is also estimated in both documents that remote operated equipment may be necessary if any hot spots are encountered. Further equipment required would also include a conveyor system which would be employed to move the excavated material to a staging area for placement in a RO/RO-type container system, for transport to the associated disposal facility.

10.4 COMPARISON OF SOIL EXCAVATION DEPTH

The two documents differ in the depth below the tanks in that soil is removed following tank removal operations. DOE/EIS-0391 assumes all contaminated soils will be removed to a minimum of 10 ft below the tank bases, where as the concept developed in this report involves removing 5 ft of soil below the tanks. These differences are in part due to the volume of tank waste that is assumed to leak from each SST during retrieval in DOE/EIS-0391. DOE/EIS-0391 also includes deep soil removal, or excavation of all contaminated soils down to groundwater levels when necessary.

10.5 COMPARISON OF WASTE TREATMENT AND DISPOSAL

The clean closure alternatives in DOE/EIS-0391 include the construction of a PPF for the treatment of highly contaminated tank rubble and soils. A fraction of all tank rubble and soils removed from the farms are assumed to be treated at the PPF. The tank and soil removal concept developed in this document assumes that all tank rubble and soils would be directly disposed of in ERDF in applicable containers. A comparison of average contaminant concentrations in the waste streams is presented and the possibility that some of the soil and debris may not meet the criteria for disposal in ERDF.

10.6 COMPARISON OF PROJECT COSTS

DOE/EIS-0391 includes a cost estimate for the construction, operation, and decontamination of tank and soil removal activities for all SST farms. The cost estimates in DOE/EIS-0391 were developed for the purpose of understanding relative cost differences between alternatives and are not activity-based, bottom-up cost estimates (DOE/ORP-2003-14). DOE/EIS-0391 does not include a farm by farm breakout where as this report only includes the cost associated with the C farm clean closure so a direct comparison of the costs cannot be made.

10.7 COMPARISON OF ESTIMATED LABOR REQUIREMENTS AND DURATIONS

A comparison of the estimated labor hours and durations associated with implementing the tank and soil removal concepts described in DOE/EIS-0391 and this report is presented in Table 10-1.

Table 10-1. Removal of C Tank Farm Labor Hours.

	Total Hours	Duration			Hours per Year	Full time Equivalents per Year	Onsite Full Time Equivalents
		Start	Finish	Years			
DOE/EIS-0391							
C Farm Removal							
Radiological Workers	692,733	2088	2099	12	57,728	28	73
Nonradiological workers							
Onsite	1,098,495	2088	2099	12	91,541	45	
Offsite							
Deep Soil Removal							
Radiological Workers	4,449	2100	2107	8	556	1	2
Nonradiological workers							
Onsite	5,145	2100	2107	8	643	1	
Offsite							
RPP-RPT-47167							
Radiological Workers	720,072	N/A	N/A	13	55,390	27	74
Nonradiological workers							
Onsite	1,254,391	N/A	N/A	13	96,492	47	
Offsite							

DOE/EIS-0391 includes slightly lower estimated labor resources as compared to this report. The total labor estimated for the C tank farm removal in this report is 1,974,463 total hours as compared to 1,800,822 total hours in DOE/EIS-0391, a difference of approximately 9 percent. DOE/EIS-0391 also has a timeline of 12 years for tank removal operations and 8 years for deep soil removal where as the summary level project schedule developed for C farm removal in this document includes an overall project schedule of 13 years. The summary level project schedules in DOE/EIS-0391 and in this document are based on a number of assumptions for the duration of

individual activities. There is significant uncertainty associated with this schedule and the potential unexpected conditions or complications that may result in a substantially longer duration.

10.8 COMPARISON OF PROJECT RESOURCES REQUIRED

The Draft EIS also includes estimates for the resources associated with construction and operation of the clean closure activities. These resources include items such as electricity, fuel, construction materials, and water required for clean closure. Estimates for these types of resources support the environmental impact analyses. Environmental impacts were not assessed as a part of this report so these resources were not estimated.

10.9 COMPARISON OF ESTIMATED AIR EMISSIONS

Air emissions data from the tank farm removal activities including construction, operations, and deactivation are detailed in DOE/EIS-0391 at a summary level for all SST farms. Emissions estimates are not addressed in this report for removal of the C tank farm; therefore, a comparison cannot be made at this time.

10.10 COMPARISON SUMMARY

A summary of the primary differences between the tank and soil removal concepts defined in DOE/EIS-0391 and this report are presented in Table 10-2.

Table 10-2. Summary of Primary Differences.

	DOE/EIS-0391	RPP-RPT-47167
Tank waste removal	99.9 percent	99 percent
Depth of shielding grout	1 feet	3 feet
Total estimated labor	1,800,822 hours	1,974,463 hours
Operation duration	20 years*	13 years
Waste disposal	Disposal Containers with as required processing by pre-processing facility	Total in Environmental Restoration Disposal Facility
Soils removed	All contaminated soils including excavation to ground water levels if necessary	Up to 5 ft below tank base and localized hot spots (e.g., pot holing)

*Duration includes 8 yrs for deep soil removal.

As shown in Table 10-2, the primary differences between the two reports are the assumed residual waste volume present in the tanks at the start of tank removal, depth of shielding grout placed into the tanks, estimated labor required, the need for supplemental processing of the tank rubble and soils to meet waste disposal criteria, and the extent of soil removal beneath the base of the tanks. DOE/EIS-0391 also allows for soils to be removed to groundwater levels when necessary, whereas this report assumes that soil removal is limited to 5 ft below the tank. Overall, DOE/EIS-0391 and this report estimate similar approaches to the clean closure of the tank farms. However, DOE/EIS-0391 includes deep soil removal and therefore results in a different end point for the inventory remaining within tank farm at closure.

11.0 COST ESTIMATE SUMMARY

The cost estimate developed for removal of the C tank farm tanks, ancillary equipment, and soils is summarized in Table 11-1. Additional cost estimate detail is provided in Appendix D. The estimate is based on the tank removal concept described in Section 6.0.

Table 11-1. Estimate Summary. (2 Sheets)

Estimate Summary

washington river protection solutions

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
Est No: #2723
Date: 8/10/2010

Description	Quant.	Unit	Total Labor Hrs	Labor Dollars	Material Dollars	Equip Dollars	Sub Contract Dollars	Total Dollars
WRPS Support								
01 Project Management			73,801	5,485,260	82,279	0	0	5,567,539
02 Engineering, Design and Inspection			17,155	1,540,546	0	0	9,435,441	10,975,987
03 Project Support			858	77,030	0	0	471,772	548,802
04 Procurement			0	0	0	0	18,796,548	18,796,548
05 Procurement Support			7,364	661,251	0	0	0	661,251
06 Field Work (Plant Forces)			10,801	484,921	14,500	114,500	1,000,000	1,613,921
08 WRPS Construction Management			221,401	17,025,218	255,378	0	0	17,280,596
09 WRPS Construction Support			261,370	14,280,967	0	0	5,000	14,285,967
Total WRPS Support Cost			592,750	39,555,194	352,157	114,500	29,708,761	69,730,612
Field Construction								
Mobilization Scope			9,955	718,308	522,891	95,212	158,815	1,495,226
Construction Mgmt & Infrastructure Support Staff			545,376	20,572,030	6,612,983	11,010,478	12,959,912	51,155,403
Support Trailers OPS Rental, Cleaning, & Maintenance			0	0	56,221	0	3,328,106	3,384,327
Install Roads, Trailers, Vehicle Parking Lot, Equip Lay-Down Area, CTA/Q, & Pit Ramp			2,249	124,362	47,834	72,009	1,426,899	1,671,104
Maintain Roads, Trailers, Vehicle Parking Lot, Equip Lay-Down Area, CTA/Q, & Pit Ramp			45,453	1,250,057	179,176	1,099,809	386,673	2,915,714
Install Electrical Infrastructure			1,682	136,540	902	23,666	2,046,896	2,208,003
Install Survey Facility			3,038	175,098	151,706	29,165	28,177	384,146
Pit & Waste Handling Equipment			577,141	0	0	27,007,113	0	27,007,113
Pit & Waste Handling OPS Labor			541,948	29,156,983	5,065,831	0	918,005	35,140,818
Install & Remove Weather Enclosures #3, #4, #5, #6, #7, #8, & #9			0	0	0	0	23,555,185	23,555,185

Table 11-1. Estimate Summary. (2 Sheets)

Estimate Summary

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
Est No: #2723
Date: 8/10/2010

Description	Quant.	Unit	Total Labor Hrs	Labor Dollars	Material Dollars	Equip Dollars	Sub Contract Dollars	Total Dollars
Install & Remove HEPA Filter Systems On Each Weather Enclosure #1, #2, #3, #4, #5, #6, #7, #8, & #9			0	0	0	0	83,600,861	83,600,861
Weather Enclosures Foundation			125,620	5,953,495	4,199,271	11,848,586	51,534	22,052,886
Install & Remove Weather Enclosures #1 & #2			0	0	0	0	38,475,529	38,475,529
Rad Level #4 Waste Processing Facility			0	0	0	0	31,205,430	31,205,430
Level #1 Waste Disposal SubK $			0	0	0	0	21,675,312	21,675,312
Level #2 Waste Disposal SubK $			0	0	0	0	3,559,879	3,559,879
Level #3 Waste Disposal SubK $			0	0	0	0	146,512	146,512
Level #4 Waste Disposal SubK $			0	0	0	0	50,557,828	50,557,828
Remote Operated D&D Equipment			0	0	0	0	18,524,496	18,524,496
Apply Fixative to Inside of Tank			8,145	432,915	157,755	63,353	16,832	670,856
Grout Fill Tank Bottoms 3' Deep In 100 and 200 Tanks, & Catch Tank C-301			4,620	285,210	598,597	28,790	13,524	926,120
Back-fill Soil After Tank/s Are Removed			114,393	6,611,174	204,215	448,848	20,689,353	27,953,590
Demobilization Scope 25% of Mobilization			2,489	179,577	130,723	23,803	39,704	373,807
			0	0	0	0	0	0
Total Filed Construction Cost			1,982,110	65,595,747	17,928,105	51,750,832	313,365,462	448,680,547
Total Project Cost			2,574,860	105,150,941	18,280,262	51,865,332	343,074,223	518,411,159
Contingency	50%			52,575,471	9,140,131	25,932,666	171,537,111	259,185,380
Escalation - All Segment of Costs Priced Using FY2010 Rates and NO Escalation Has Been Applied For Out Years.				0	0	0	0	0
Total Project				157,726,412	27,420,394	77,797,999	514,611,334	777,596,539

12.0 SUMMARY LEVEL PROJECT SCHEDULE

An overall project schedule was developed using the activity durations from the cost estimate and an estimate for the general sequence of activities for implanting the tank removal concept. The summary level schedule is provided in Figure 12-1 and shows the duration for tank removal activities is just over 8 years while the overall project schedule is approximately 13 years. This schedule assumes that ancillary equipment removal could be performed in parallel with installation of the shoring walls and construction of the main enclosure facilities. If these activities could not be performed in parallel then the overall schedule would increase.

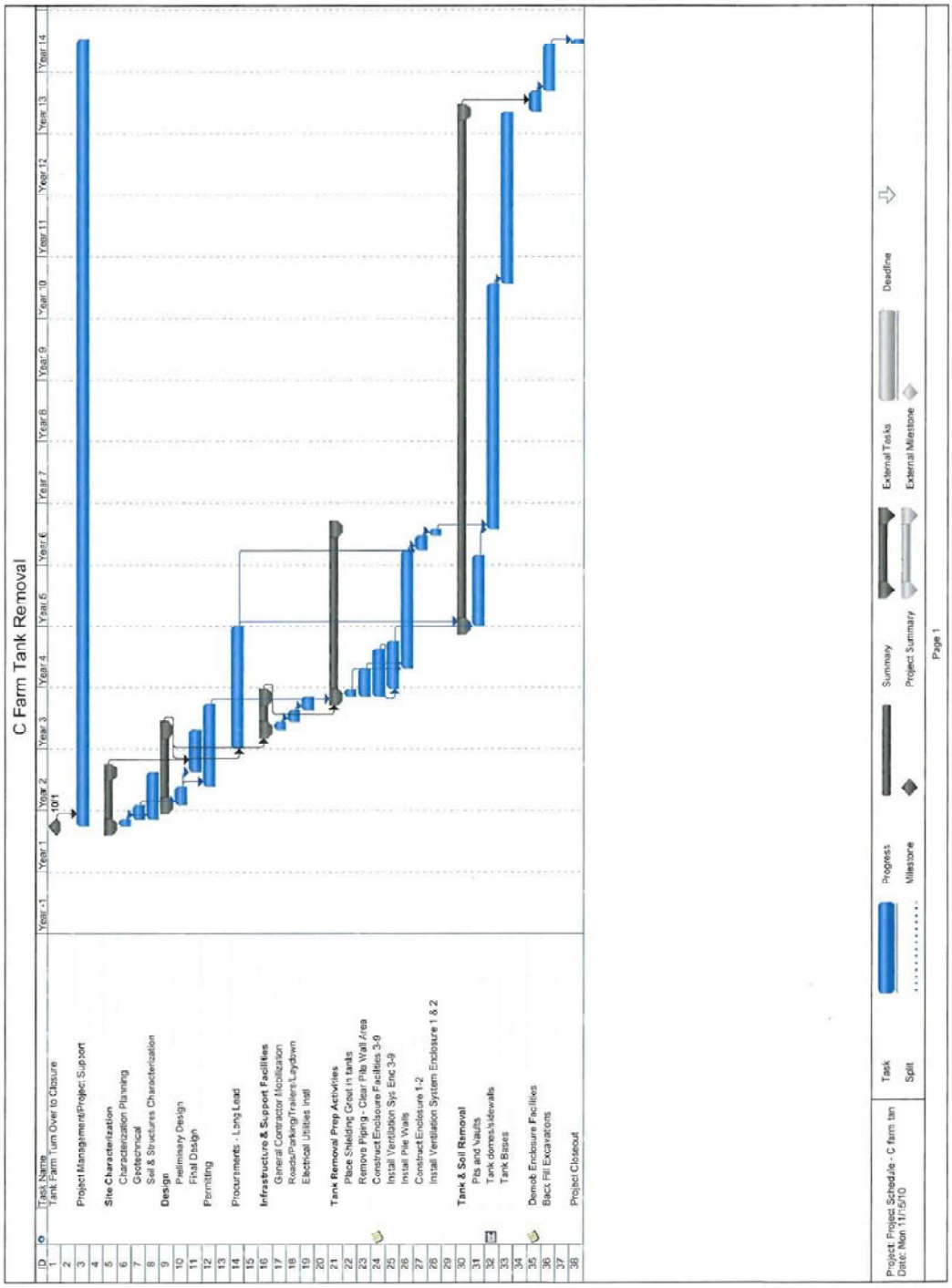


Figure 12-1. C Farm Tank Removal Project Schedule.

13.0 REFERENCES

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APPENDIX A

WASTE STREAM CLASSIFICATION AND COMPARISON TO ACCEPTANCE CRITERIA

Table A-1. C Farm Tank Removal Volume Estimates.

Tank/ Equip	Material Description	Notes	In Place (yd^3)	Swell Factor	Loose (yd^3)
C-100 Series Tanks	On tank pits	Based on 1.5 yd3/tank for tanks C-104 and C-107- C-112 and 118 cu-yds for C-	601	40%	841
	Tank domes - concrete	Derived from solid model	2,976	40%	4,166
	Tank sidewalls - concrete	Derived from solid model	4,980	40%	6,972
	Tank liner steel - sidewalls	Calculated - based on 0.25" plate to a	39	500%	236
	Tank bases- concrete	Based on base slab plus concrete 3' up	2,510	40%	3,514
	Tank liner steel -base	Calculated see volume estimates - tank	41	500%	245
	Shielding grout (3' thick)	Calculated see volume estimates - tank	5,888	20%	7,065
	Residual tank waste (360 cu-ft/tank)	Assumed based on TPA interim retrieval	160	20%	192
C-200 Series Tanks	Concrete	Derived from solid model	332	40%	465
	Steel liner	Calculated	4	500%	23
	Residual waste	Assumed based on TPA interim retreival	4	0%	4
Piping	Concrete encased piping	Derived from solid model	1,286	40%	1,800
	Piping	Derived from solid model	102	500%	612
Other	Cover soils (0-9' bgs)	Cover soils within tank excavation area	68,178	20%	81,814
	Lateral soils (9' - 37' bgs)	Lateral soils between tanks w/in tank	175,937	20%	211,124
	Soils below tanks (37' - 42' bgs)	Excavation volume beneath tanks w/in	34,511	20%	41,413
	CR vault - concrete	Derived from solid model	1,595	40%	2,233
	CR vault - steel tanks/equip	Derived from solid model	730	40%	1,022
	C-151 diversion box	Derived from solid model	68	40%	95
	C-152 diversion box	Derived from solid model	93	40%	130
	C-153 diversion box	Derived from solid model	106	40%	148
	C-252 diversion box	Derived from solid model	128	40%	179
	CR-151 diversion box	Derived from solid model	267	40%	374
	CR-152 diversion box	Derived from solid model	228	40%	319
	CR-153 diversion box	Derived from solid model	231	40%	323
	Valve pits	Derived from solid model	2	500%	12
	Direct buried piping	Derived from solid model	334	500%	2,004
	C-301 catch tank concrete	Derived from solid model	47	40%	66
	Soils surrounding other structures	Based on excavation plan for ancillary	34,481	20%	41,377
	Misc - in farm soils	Based on total soil volume of 635,924 - soil volumes associated with tank excavation and soils surrounding other	322,817	20%	387,380
	Back fill volume	Est includes soils removed plus gross volume occupied by 100 and 200-series	700,585	N/A	N/A

Table A-2. Tank Removal Volume Estimates Used for Evaluating Waste Acceptance Criteria.

Tank/ Equip	Material Description	In Place (yd^3)	In Place (m^3)	In Place (kg)	Swell Factor	Loose (yd^3)	Loose (m^3)
C-100 Series Tank Base	Tank bases - concrete [a]	2510	1919	4432583	40%	3514	2686
	Tank liner - steel [b]	41	31	245509	500%	245	188
	3' of grout [c]	5890	4504	10403316	20%	7069	5404
	Residual waste	160	122	195237	0%	160	122
	Total volume	8601	6576	15276644	N/A	10987	8400
	Volume/tank	**717**	**548**	**1273054**	**N/A**	**916**	**700**
C-200 Series Tank Base	Tank bases - concrete [d]	122	93	215327	40%	171	131
	Tank liner - steel [b]	1	1	5819	500%	6	4
	3' of grout [c]	140	107	246597	20%	168	128
	Residual waste	4	3	5382	0%	4	3
	Total volume	267	204	473126	N/A	348	266
	Volume/tank	**67**	**51**	**118282**	**N/A**	**87**	**67**
Catch Tanks	CR vault - concrete	1595	1220	2817300	40%	2233	1707
	CR vault - steel tanks/equip	730	558	4381282	40%	1022	781
	C-301 catch tank concrete	47	36	83008	40%	66	50
	Total volume	**2372**	**1814**	**7281589**	**N/A**	**3321**	**2539**
Pits	Valve pits	2	2	3532	500%	12	9
	On tank pits	600	459	1059673	500%	3600	2752
	Total volume	**602**	**460**	**1063205**	**10.0**	**3612**	**2762**
Pipelines	Piping [g]	102	78	124775	500%	612	468
	Direct buried piping	334	255	408578	500%	2004	1532
	Total volume	**436**	**333**	**533353**	**N/A**	**2616**	**2000**

Notes:

a. This volume estimate was based on a 6" thick layer of concrete and 2" thick layer of grout over a 75' diameter plus footing ring estimated to be 4' wide and 2' thick which is located along the outside of the original 75' diameter plus a portion of the concrete wall which is approximately 3' tall by 1' thick. Refer to drawing W-71387. The following calculation was used to estimate this volume: 12*(1/27)*((((2/3)*3.14*(75/2)^2)+(2*3.14*((75/2+4)^2-(75/2)^2)))+(3*3.14*((75/2+1)^2-(75/2)^2)))

b. This volume estimate was based on a 1/4" thick layer of steel liner over a 75' diameter for the 100 series tanks and 3' thick layer over a 20' diameter for the 200 series tanks. Refer to drawing W-71387 and W-72417. The following calculations were used to estimate this volume for 100 series tanks and 200 series tanks, respectively: 12*(1/27)*(1/48)*3.14*(75/2)^2, 4*(1/27)*(1/48)*3.14*(20/2)^2

c. For total waste volume purposes, it is assumed that there is an additional 3' thick layer of grout over a 75' diameter for the 100 series tanks and 3' thick layer over a 20' diameter for the 200 series tanks. The following calculations were used to estimate this volume for 100 series tanks and 200 series tanks, respectively: 12*(1/27)*3*3.14*(75/2)^2, 4*(1/27)*3*3.14*(20/2)^2

d. This volume estimate was based on a 6" thick layer of concrete and 1" thick layer of grout over a 20' diameter plus footing ring estimated to be 2.5' wide and 2.5' thick which is located along the outside of the original 20' diameter plus a portion of the concrete wall which is approximately 3' tall by 1' thick. Refer to drawing W-72417. The following calculation was used to estimate this volume: 4*(1/27)*((((7/12)*3.14*(20/2)^2)+(2.5*3.14* ((20/2+2.5)^2-(20/2)^2)))+(3*3.14*((20/2+1)^2-(20/2)^2)))

g. Assume that piping is size reduced, placed in boxes and filled with soil, therefore use the density of soil for unit cubic meters to kilograms

RPP-RPT-42323 reports no current waste estimates for diversion boxes

All other volumes have been extracted from solid model

APPENDIX B

WASTE ACCEPTANCE CRITERIA COMPARISON

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

Notes: Radionuclides decayed to 1/1/2001. Inventory values are from RPP-RPT-42323. ERDF Limits values are from WCH-191. Concentrations were calculated by dividing the inventory value by the estimated "loose" waste volume in cubic meters and "in place" waste volume in kg for the specific series of tanks/equipment. Refer to Table A-2 for volumes used.

241-C-101 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	6.61E-03	9.44E-06	5.10E+00	Yes
Ni-59	6.30E-02	9.00E-05	2.10E+02	Yes
Ni-63	2.35E+00	3.36E-03	7.00E+02	Yes
Se-79	2.78E-05	3.97E-08	2.70E+01	Yes
Sr-90	4.08E+02	5.83E-01	7.00E+03	Yes
Zr-93	1.60E-04	2.29E-07	1.40E+02	Yes
Tc-99	4.54E-03	6.49E-06	1.30E+00	Yes
Sn-126	5.19E-05	7.41E-08	8.40E-03	Yes
I-129	1.39E-03	1.99E-06	8.00E-02	Yes
Cs-137	3.22E+02	4.60E-01	3.20E+01	Yes
Sm-151	4.73E-01	6.75E-04	5.30E+04	Yes
Eu-152	2.85E-05	4.07E-08	2.10E+07	Yes
Ra-226	5.00E-08	7.14E-11	1.40E-04	Yes
Ra-228	3.11E-13	4.45E-16	2.20E-04	Yes
Ac-227	2.51E-07	3.59E-10	7.60E+04	Yes
Pa-231	3.91E-08	5.59E-11	7.40E-03	Yes
Th-229	1.62E-11	2.32E-14	2.50E-02	Yes
Th-232	1.34E-13	1.91E-16	5.80E-03	Yes
U-232	1.28E-06	1.82E-09	1.20E+00	Yes
U-233	6.58E-08	9.40E-11	7.40E-02	Yes
U-234	3.67E-02	5.24E-05	7.40E-02	Yes
U-235	1.59E-03	2.27E-06	2.70E-03	Yes
U-236	6.87E-04	9.81E-07	5.10E-01	Yes
U-238	3.76E-02	5.37E-05	1.20E-02	Yes
Np-237	3.46E-05	4.94E-08	1.50E-03	Yes
Pu-238	6.73E-02	9.62E-05	1.50E+00	Yes
Pu-239	4.67E+00	6.67E-03	2.90E-02	Yes
Pu-240	8.27E-01	1.18E-03	2.90E-02	Yes
Pu-241	3.21E+00	4.58E-03	5.60E+00	Yes
Pu-242	2.31E-05	3.30E-08	1.10E-01	Yes
Am-241	8.71E-01	1.24E-03	5.40E-02	Yes
Am-243	1.12E-04	1.60E-07	5.60E-02	Yes
Cm-242	1.86E-04	2.66E-07	3.20E+01	Yes
Cm-243	2.29E-06	3.27E-09	8.60E+01	Yes
Cm-244	5.41E-05	7.73E-08	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	2.49E+06	1.96E+00	5.90E+04	Yes
Mn	1.85E+06	1.45E+00	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-102 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	1.44E-02	2.06E-05	5.10E+00	Yes
Ni-59	2.16E-01	3.09E-04	2.10E+02	Yes
Ni-63	8.26E+00	1.18E-02	7.00E+02	Yes
Se-79	5.97E-05	8.53E-08	2.70E+01	Yes
Sr-90	3.01E+02	4.29E-01	7.00E+03	Yes
Zr-93	2.30E-03	3.29E-06	1.40E+02	Yes
Tc-99	8.87E-03	1.27E-05	1.30E+00	Yes
Sn-126	1.04E-04	1.49E-07	8.40E-03	Yes
I-129	2.32E-03	3.31E-06	8.00E-02	Yes
Cs-137	2.77E+02	3.96E-01	3.20E+01	Yes
Sm-151	5.90E-01	8.43E-04	5.30E+04	Yes
Eu-152	1.75E-04	2.49E-07	2.10E+07	Yes
Ra-226	1.54E-07	2.21E-10	1.40E-04	Yes
Ra-228	2.79E-02	3.98E-05	2.20E-04	Yes
Ac-227	1.56E-02	2.23E-05	7.60E+04	Yes
Pa-231	1.11E-03	1.59E-06	7.40E-03	Yes
Th-229	5.58E-03	7.98E-06	2.50E-02	Yes
Th-232	1.20E-02	1.71E-05	5.80E-03	Yes
U-232	1.81E-02	2.59E-05	1.20E+00	Yes
U-233	1.15E+00	1.64E-03	7.40E-02	Yes
U-234	6.00E-02	8.57E-05	7.40E-02	Yes
U-235	2.26E-03	3.23E-06	2.70E-03	Yes
U-236	7.58E-04	1.08E-06	5.10E-01	Yes
U-238	5.17E-02	7.39E-05	1.20E-02	Yes
Np-237	2.78E-05	3.97E-08	1.50E-03	Yes
Pu-238	9.02E-01	1.29E-03	1.50E+00	Yes
Pu-239	**3.40E+01**	**4.86E-02**	**2.90E-02**	**No**
Pu-240	8.16E+00	1.17E-02	2.90E-02	Yes
Pu-241	6.37E+01	9.10E-02	5.60E+00	Yes
Pu-242	4.71E-04	6.73E-07	1.10E-01	Yes
Am-241	1.06E+01	1.52E-02	5.40E-02	Yes
Am-243	4.32E-04	6.18E-07	5.60E-02	Yes
Cm-242	6.52E-04	9.31E-07	3.20E+01	Yes
Cm-243	5.22E-05	7.46E-08	8.60E+01	Yes
Cm-244	1.43E-03	2.04E-06	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	6.43E+06	5.05E+00	5.90E+04	Yes
Mn	1.50E+07	1.18E+01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-103 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	7.01E-03	1.00E-05	5.10E+00	Yes
Ni-59	2.81E-01	4.02E-04	2.10E+02	Yes
Ni-63	2.12E+01	3.03E-02	7.00E+02	Yes
Se-79	2.64E-05	3.77E-08	2.70E+01	Yes
Sr-90	1.07E+04	1.53E+01	7.00E+03	Yes
Zr-93	7.03E-04	1.00E-06	1.40E+02	Yes
Tc-99	4.48E-02	6.40E-05	1.30E+00	Yes
Sn-126	5.27E-05	7.53E-08	8.40E-03	Yes
I-129	3.00E-03	4.29E-06	8.00E-02	Yes
Cs-137	9.41E+02	1.34E+00	3.20E+01	Yes
Sm-151	4.98E-01	7.12E-04	5.30E+04	Yes
Eu-152	6.81E-05	9.73E-08	2.10E+07	Yes
Ra-226	1.55E-08	2.22E-11	1.40E-04	Yes
Ra-228	4.62E-04	6.60E-07	2.20E-04	Yes
Ac-227	1.17E-07	1.67E-10	7.60E+04	Yes
Pa-231	1.66E-07	2.37E-10	7.40E-03	Yes
Th-229	2.60E-11	3.72E-14	2.50E-02	Yes
Th-232	1.99E-04	2.84E-07	5.80E-03	Yes
U-232	3.89E-06	5.56E-09	1.20E+00	Yes
U-233	5.85E-03	8.36E-06	7.40E-02	Yes
U-234	1.36E-02	1.94E-05	7.40E-02	Yes
U-235	7.10E-04	1.01E-06	2.70E-03	Yes
U-236	3.74E-04	5.34E-07	5.10E-01	Yes
U-238	1.64E-02	2.34E-05	1.20E-02	Yes
Np-237	1.35E-02	1.93E-05	1.50E-03	Yes
Pu-238	1.51E+00	2.16E-03	1.50E+00	Yes
Pu-239	4.99E+00	7.13E-03	2.90E-02	Yes
Pu-240	1.04E+00	1.49E-03	2.90E-02	Yes
Pu-241	4.50E+00	6.42E-03	5.60E+00	Yes
Pu-242	3.24E-05	4.63E-08	1.10E-01	Yes
Am-241	4.98E+00	7.11E-03	5.40E-02	Yes
Am-243	3.70E-05	5.29E-08	5.60E-02	Yes
Cm-242	6.08E-05	8.69E-08	3.20E+01	Yes
Cm-243	1.21E-06	1.72E-09	8.60E+01	Yes
Cm-244	3.14E-05	4.48E-08	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	2.38E+06	1.87E+00	5.90E+04	Yes
Mn	4.42E+06	3.47E+00	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-104 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	1.82E-02	2.60E-05	5.10E+00	Yes
Ni-59	1.43E-01	2.04E-04	2.10E+02	Yes
Ni-63	5.40E+00	7.71E-03	7.00E+02	Yes
Se-79	5.24E-02	7.49E-05	2.70E+01	Yes
Sr-90	4.81E+03	6.87E+00	7.00E+03	Yes
Zr-93	1.79E-02	2.56E-05	1.40E+02	Yes
Tc-99	5.76E-01	8.23E-04	1.30E+00	Yes
Sn-126	9.02E-04	1.29E-06	8.40E-03	Yes
I-129	6.66E-03	9.51E-06	8.00E-02	Yes
Cs-137	9.50E+02	1.36E+00	3.20E+01	Yes
Sm-151	5.86E+02	8.37E-01	5.30E+04	Yes
Eu-152	1.79E-01	2.56E-04	2.10E+07	Yes
Ra-226	1.31E-06	1.88E-09	1.40E-04	Yes
Ra-228	9.22E-02	1.32E-04	2.20E-04	Yes
Ac-227	2.25E-02	3.21E-05	7.60E+04	Yes
Pa-231	1.70E-03	2.43E-06	7.40E-03	Yes
Th-229	5.53E-03	7.91E-06	2.50E-02	Yes
Th-232	3.97E-02	5.67E-05	5.80E-03	Yes
U-232	2.33E-02	3.32E-05	1.20E+00	Yes
U-233	3.37E+00	4.81E-03	7.40E-02	Yes
U-234	1.69E-01	2.41E-04	7.40E-02	Yes
U-235	4.38E-03	6.26E-06	2.70E-03	Yes
U-236	5.58E-03	7.97E-06	5.10E-01	Yes
U-238	9.56E-02	1.37E-04	1.20E-02	Yes
Np-237	3.59E-02	5.13E-05	1.50E-03	Yes
Pu-238	4.60E+00	6.57E-03	1.50E+00	Yes
Pu-239	**3.15E+01**	**4.50E-02**	**2.90E-02**	**No**
Pu-240	8.10E+00	1.16E-02	2.90E-02	Yes
Pu-241	1.21E+02	1.73E-01	5.60E+00	Yes
Pu-242	7.52E-04	1.07E-06	1.10E-01	Yes
Am-241	**4.52E+01**	**6.46E-02**	**5.40E-02**	**No**
Am-243	1.13E-02	1.62E-05	5.60E-02	Yes
Cm-242	1.68E-02	2.40E-05	3.20E+01	Yes
Cm-243	1.59E-03	2.28E-06	8.60E+01	Yes
Cm-244	3.95E-02	5.64E-05	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	1.45E+07	1.14E+01	5.90E+04	Yes
Mn	6.97E+07	5.48E+01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-105 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	5.06E-03	7.23E-06	5.10E+00	Yes
Ni-59	1.15E-01	1.64E-04	2.10E+02	Yes
Ni-63	4.28E+00	6.12E-03	7.00E+02	Yes
Se-79	1.57E-05	2.24E-08	2.70E+01	Yes
Sr-90	4.75E+03	6.78E+00	7.00E+03	Yes
Zr-93	2.88E-04	4.11E-07	1.40E+02	Yes
Tc-99	8.14E-01	1.16E-03	1.30E+00	Yes
Sn-126	3.05E-05	4.36E-08	8.40E-03	Yes
I-129	9.30E-04	1.33E-06	8.00E-02	Yes
Cs-137	8.19E+02	1.17E+00	3.20E+01	Yes
Sm-151	2.85E-01	4.07E-04	5.30E+04	Yes
Eu-152	3.08E-05	4.40E-08	2.10E+07	Yes
Ra-226	1.68E-08	2.39E-11	1.40E-04	Yes
Ra-228	2.41E-13	3.45E-16	2.20E-04	Yes
Ac-227	9.85E-08	1.41E-10	7.60E+04	Yes
Pa-231	6.83E-08	9.76E-11	7.40E-03	Yes
Th-229	1.30E-11	1.86E-14	2.50E-02	Yes
Th-232	1.04E-13	1.49E-16	5.80E-03	Yes
U-232	1.39E-06	1.99E-09	1.20E+00	Yes
U-233	6.74E-08	9.63E-11	7.40E-02	Yes
U-234	3.20E-02	4.57E-05	7.40E-02	Yes
U-235	1.37E-03	1.96E-06	2.70E-03	Yes
U-236	6.93E-04	9.90E-07	5.10E-01	Yes
U-238	3.28E-02	4.69E-05	1.20E-02	Yes
Np-237	2.01E-05	2.87E-08	1.50E-03	Yes
Pu-238	3.27E-01	4.67E-04	1.50E+00	Yes
Pu-239	1.98E+01	2.83E-02	2.90E-02	Yes
Pu-240	3.90E+00	5.58E-03	2.90E-02	Yes
Pu-241	1.64E+01	2.34E-02	5.60E+00	Yes
Pu-242	1.18E-04	1.69E-07	1.10E-01	Yes
Am-241	1.20E+01	1.72E-02	5.40E-02	Yes
Am-243	2.78E-04	3.97E-07	5.60E-02	Yes
Cm-242	4.33E-04	6.19E-07	3.20E+01	Yes
Cm-243	5.06E-06	7.22E-09	8.60E+01	Yes
Cm-244	1.07E-04	1.52E-07	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	3.85E+06	3.02E+00	5.90E+04	Yes
Mn	1.90E+07	1.49E+01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-106 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	8.23E-03	1.18E-05	5.10E+00	Yes
Ni-59	2.64E+01	3.77E-02	2.10E+02	Yes
Ni-63	7.44E+01	1.06E-01	7.00E+02	Yes
Se-79	9.57E-03	1.37E-05	2.70E+01	Yes
Sr-90	7.11E+04	1.02E+02	7.00E+03	Yes
Zr-93	1.04E+01	1.49E-02	1.40E+02	Yes
Tc-99	1.64E-01	2.34E-04	1.30E+00	Yes
Sn-126	1.76E+00	2.51E-03	8.40E-03	Yes
I-129	6.31E-04	9.01E-07	8.00E-02	Yes
Cs-137	1.55E+03	2.22E+00	3.20E+01	Yes
Sm-151	9.06E+03	1.29E+01	5.30E+04	Yes
Eu-152	5.34E+00	7.63E-03	2.10E+07	Yes
Ra-226	5.18E-04	7.39E-07	1.40E-04	Yes
Ra-228	1.30E-03	1.86E-06	2.20E-04	Yes
Ac-227	3.19E-03	4.55E-06	7.60E+04	Yes
Pa-231	2.53E-03	3.61E-06	7.40E-03	Yes
Th-229	1.91E-05	2.73E-08	2.50E-02	Yes
Th-232	5.60E-04	8.00E-07	5.80E-03	Yes
U-232	5.89E-04	8.41E-07	1.20E+00	Yes
U-233	1.82E-03	2.60E-06	7.40E-02	Yes
U-234	9.40E-04	1.34E-06	7.40E-02	Yes
U-235	3.86E-05	5.51E-08	2.70E-03	Yes
U-236	1.73E-05	2.47E-08	5.10E-01	Yes
U-238	9.02E-04	1.29E-06	1.20E-02	Yes
Np-237	5.41E-02	7.73E-05	1.50E-03	Yes
Pu-238	2.77E+00	3.96E-03	1.50E+00	Yes
Pu-239	1.67E+01	2.39E-02	2.90E-02	Yes
Pu-240	3.57E+00	5.10E-03	2.90E-02	Yes
Pu-241	4.59E+01	6.56E-02	5.60E+00	Yes
Pu-242	4.16E-04	5.94E-07	1.10E-01	Yes
Am-241	**6.57E+01**	**9.39E-02**	**5.40E-02**	**No**
Am-243	3.05E-03	4.36E-06	5.60E-02	Yes
Cm-242	1.54E-01	2.20E-04	3.20E+01	Yes
Cm-243	8.72E-02	1.25E-04	8.60E+01	Yes
Cm-244	1.53E+00	2.19E-03	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	3.78E+06	2.97E+00	5.90E+04	Yes
Mn	5.49E+08	4.31E+02	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-107 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	5.56E-03	7.95E-06	5.10E+00	Yes
Ni-59	7.06E-02	1.01E-04	2.10E+02	Yes
Ni-63	2.67E+00	3.81E-03	7.00E+02	Yes
Se-79	1.16E-03	1.66E-06	2.70E+01	Yes
Sr-90	2.24E+04	3.20E+01	7.00E+03	Yes
Zr-93	4.50E-02	6.43E-05	1.40E+02	Yes
Tc-99	3.77E-01	5.39E-04	1.30E+00	Yes
Sn-126	2.40E-03	3.43E-06	8.40E-03	Yes
I-129	7.15E-03	1.02E-05	8.00E-02	Yes
Cs-137	6.32E+02	9.03E-01	3.20E+01	Yes
Sm-151	6.46E+03	9.23E+00	5.30E+04	Yes
Eu-152	1.59E+00	2.27E-03	2.10E+07	Yes
Ra-226	8.66E-08	1.24E-10	1.40E-04	Yes
Ra-228	1.68E-03	2.40E-06	2.20E-04	Yes
Ac-227	3.22E-05	4.61E-08	7.60E+04	Yes
Pa-231	5.32E-06	7.60E-09	7.40E-03	Yes
Th-229	1.45E-04	2.07E-07	2.50E-02	Yes
Th-232	7.24E-04	1.03E-06	5.80E-03	Yes
U-232	7.84E-04	1.12E-06	1.20E+00	Yes
U-233	4.72E-02	6.74E-05	7.40E-02	Yes
U-234	3.12E-02	4.46E-05	7.40E-02	Yes
U-235	1.34E-03	1.91E-06	2.70E-03	Yes
U-236	5.11E-04	7.30E-07	5.10E-01	Yes
U-238	3.08E-02	4.40E-05	1.20E-02	Yes
Np-237	5.28E-04	7.54E-07	1.50E-03	Yes
Pu-238	4.53E-01	6.48E-04	1.50E+00	Yes
Pu-239	**2.18E+01**	**3.11E-02**	**2.90E-02**	**No**
Pu-240	3.54E+00	5.06E-03	2.90E-02	Yes
Pu-241	2.06E+01	2.94E-02	5.60E+00	Yes
Pu-242	1.63E-04	2.33E-07	1.10E-01	Yes
Am-241	**6.74E+01**	**9.62E-02**	**5.40E-02**	**No**
Am-243	1.88E-02	2.69E-05	5.60E-02	Yes
Cm-242	2.57E-02	3.67E-05	3.20E+01	Yes
Cm-243	1.67E-03	2.38E-06	8.60E+01	Yes
Cm-244	4.05E-02	5.79E-05	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	9.26E+06	7.27E+00	5.90E+04	Yes
Mn	5.01E+07	3.94E+01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-108 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	1.28E-04	1.83E-07	5.10E+00	Yes
Ni-59	2.61E-05	3.73E-08	2.10E+02	Yes
Ni-63	1.29E-03	1.84E-06	7.00E+02	Yes
Se-79	3.08E-06	4.40E-09	2.70E+01	Yes
Sr-90	9.41E+00	1.34E-02	7.00E+03	Yes
Zr-93	9.30E-04	1.33E-06	1.40E+02	Yes
Tc-99	1.30E-02	1.86E-05	1.30E+00	Yes
Sn-126	1.32E-05	1.89E-08	8.40E-03	Yes
I-129	6.30E-07	9.00E-10	8.00E-02	Yes
Cs-137	9.13E+01	1.30E-01	3.20E+01	Yes
Sm-151	1.07E-01	1.52E-04	5.30E+04	Yes
Eu-152	1.22E-05	1.74E-08	2.10E+07	Yes
Ra-226	4.23E-09	6.05E-12	1.40E-04	Yes
Ra-228	6.27E-10	8.96E-13	2.20E-04	Yes
Ac-227	7.32E-08	1.05E-10	7.60E+04	Yes
Pa-231	2.27E-07	3.24E-10	7.40E-03	Yes
Th-229	4.60E-10	6.58E-13	2.50E-02	Yes
Th-232	2.70E-10	3.86E-13	5.80E-03	Yes
U-232	1.47E-08	2.10E-11	1.20E+00	Yes
U-233	5.78E-08	8.26E-11	7.40E-02	Yes
U-234	5.63E-05	8.04E-08	7.40E-02	Yes
U-235	2.51E-06	3.59E-09	2.70E-03	Yes
U-236	6.61E-07	9.44E-10	5.10E-01	Yes
U-238	5.72E-05	8.17E-08	1.20E-02	Yes
Np-237	7.10E-06	1.01E-08	1.50E-03	Yes
Pu-238	2.91E-05	4.15E-08	1.50E+00	Yes
Pu-239	3.44E-03	4.92E-06	2.90E-02	Yes
Pu-240	3.77E-04	5.39E-07	2.90E-02	Yes
Pu-241	8.00E-04	1.14E-06	5.60E+00	Yes
Pu-242	5.88E-09	8.40E-12	1.10E-01	Yes
Am-241	1.18E-02	1.69E-05	5.40E-02	Yes
Am-243	1.21E-06	1.73E-09	5.60E-02	Yes
Cm-242	2.03E-06	2.90E-09	3.20E+01	Yes
Cm-243	2.54E-08	3.63E-11	8.60E+01	Yes
Cm-244	5.92E-07	8.46E-10	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	4.37E+05	3.43E-01	5.90E+04	Yes
Mn	4.93E+04	3.87E-02	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-109 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	9.87E-05	1.41E-07	5.10E+00	Yes
Ni-59	1.35E-05	1.92E-08	2.10E+02	Yes
Ni-63	7.59E-04	1.08E-06	7.00E+02	Yes
Se-79	1.23E-04	1.76E-07	2.70E+01	Yes
Sr-90	2.23E+00	3.18E-03	7.00E+03	Yes
Zr-93	7.04E-04	1.01E-06	1.40E+02	Yes
Tc-99	1.04E-02	1.49E-05	1.30E+00	Yes
Sn-126	2.25E-06	3.21E-09	8.40E-03	Yes
I-129	2.20E-07	3.14E-10	8.00E-02	Yes
Cs-137	7.30E+00	1.04E-02	3.20E+01	Yes
Sm-151	4.46E-02	6.38E-05	5.30E+04	Yes
Eu-152	1.63E-06	2.33E-09	2.10E+07	Yes
Ra-226	2.73E-09	3.90E-12	1.40E-04	Yes
Ra-228	1.68E-13	2.40E-16	2.20E-04	Yes
Ac-227	5.16E-08	7.37E-11	7.60E+04	Yes
Pa-231	1.74E-07	2.49E-10	7.40E-03	Yes
Th-229	8.63E-12	1.23E-14	2.50E-02	Yes
Th-232	7.25E-14	1.04E-16	5.80E-03	Yes
U-232	3.36E-09	4.79E-12	1.20E+00	Yes
U-233	2.71E-10	3.87E-13	7.40E-02	Yes
U-234	2.61E-04	3.73E-07	7.40E-02	Yes
U-235	1.17E-05	1.67E-08	2.70E-03	Yes
U-236	2.92E-06	4.17E-09	5.10E-01	Yes
U-238	2.66E-04	3.80E-07	1.20E-02	Yes
Np-237	9.48E-07	1.35E-09	1.50E-03	Yes
Pu-238	2.58E-04	3.68E-07	1.50E+00	Yes
Pu-239	3.57E-02	5.10E-05	2.90E-02	Yes
Pu-240	3.89E-03	5.56E-06	2.90E-02	Yes
Pu-241	7.55E-03	1.08E-05	5.60E+00	Yes
Pu-242	5.41E-08	7.73E-11	1.10E-01	Yes
Am-241	6.00E-03	8.57E-06	5.40E-02	Yes
Am-243	6.00E-07	8.58E-10	5.60E-02	Yes
Cm-242	1.00E-06	1.43E-09	3.20E+01	Yes
Cm-243	1.23E-08	1.76E-11	8.60E+01	Yes
Cm-244	2.89E-07	4.13E-10	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	3.56E+05	2.80E-01	5.90E+04	Yes
Mn	4.02E+04	3.16E-02	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-110 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	3.57E-03	5.10E-06	5.10E+00	Yes
Ni-59	2.64E-04	3.77E-07	2.10E+02	Yes
Ni-63	1.49E-02	2.13E-05	7.00E+02	Yes
Se-79	2.65E-05	3.79E-08	2.70E+01	Yes
Sr-90	3.99E+01	5.70E-02	7.00E+03	Yes
Zr-93	1.38E-02	1.97E-05	1.40E+02	Yes
Tc-99	3.42E-01	4.89E-04	1.30E+00	Yes
Sn-126	4.42E-05	6.31E-08	8.40E-03	Yes
I-129	4.29E-06	6.13E-09	8.00E-02	Yes
Cs-137	1.55E+02	2.22E-01	3.20E+01	Yes
Sm-151	8.77E-01	1.25E-03	5.30E+04	Yes
Eu-152	3.19E-05	4.56E-08	2.10E+07	Yes
Ra-226	5.39E-08	7.69E-11	1.40E-04	Yes
Ra-228	3.30E-12	4.71E-15	2.20E-04	Yes
Ac-227	1.02E-06	1.45E-09	7.60E+04	Yes
Pa-231	3.43E-06	4.90E-09	7.40E-03	Yes
Th-229	1.69E-10	2.42E-13	2.50E-02	Yes
Th-232	1.42E-12	2.03E-15	5.80E-03	Yes
U-232	8.91E-08	1.27E-10	1.20E+00	Yes
U-233	7.20E-09	1.03E-11	7.40E-02	Yes
U-234	6.95E-03	9.93E-06	7.40E-02	Yes
U-235	3.10E-04	4.43E-07	2.70E-03	Yes
U-236	7.76E-05	1.11E-07	5.10E-01	Yes
U-238	7.08E-03	1.01E-05	1.20E-02	Yes
Np-237	1.86E-05	2.66E-08	1.50E-03	Yes
Pu-238	5.01E-03	7.16E-06	1.50E+00	Yes
Pu-239	6.96E-01	9.94E-04	2.90E-02	Yes
Pu-240	7.58E-02	1.08E-04	2.90E-02	Yes
Pu-241	1.47E-01	2.10E-04	5.60E+00	Yes
Pu-242	1.05E-06	1.50E-09	1.10E-01	Yes
Am-241	4.18E-01	5.97E-04	5.40E-02	Yes
Am-243	4.28E-05	6.12E-08	5.60E-02	Yes
Cm-242	7.15E-05	1.02E-07	3.20E+01	Yes
Cm-243	8.74E-07	1.25E-09	8.60E+01	Yes
Cm-244	2.05E-05	2.93E-08	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	4.51E+06	3.54E+00	5.90E+04	Yes
Mn	5.11E+05	4.01E-01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-111 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	2.12E-03	3.03E-06	5.10E+00	Yes
Ni-59	7.71E-02	1.10E-04	2.10E+02	Yes
Ni-63	2.81E+00	4.02E-03	7.00E+02	Yes
Se-79	6.02E-05	8.60E-08	2.70E+01	Yes
Sr-90	9.75E+03	1.39E+01	7.00E+03	Yes
Zr-93	2.19E-03	3.13E-06	1.40E+02	Yes
Tc-99	2.56E-02	3.66E-05	1.30E+00	Yes
Sn-126	1.13E-04	1.61E-07	8.40E-03	Yes
I-129	3.24E-04	4.63E-07	8.00E-02	Yes
Cs-137	2.12E+02	3.02E-01	3.20E+01	Yes
Sm-151	7.85E+00	1.12E-02	5.30E+04	Yes
Eu-152	1.45E-03	2.06E-06	2.10E+07	Yes
Ra-226	9.75E-08	1.39E-10	1.40E-04	Yes
Ra-228	1.11E-12	1.59E-15	2.20E-04	Yes
Ac-227	6.46E-07	9.23E-10	7.60E+04	Yes
Pa-231	7.71E-07	1.10E-09	7.40E-03	Yes
Th-229	5.93E-11	8.48E-14	2.50E-02	Yes
Th-232	4.78E-13	6.83E-16	5.80E-03	Yes
U-232	4.64E-07	6.63E-10	1.20E+00	Yes
U-233	4.91E-07	7.01E-10	7.40E-02	Yes
U-234	1.52E-02	2.17E-05	7.40E-02	Yes
U-235	6.65E-04	9.50E-07	2.70E-03	Yes
U-236	2.50E-04	3.57E-07	5.10E-01	Yes
U-238	1.55E-02	2.21E-05	1.20E-02	Yes
Np-237	6.31E-05	9.01E-08	1.50E-03	Yes
Pu-238	3.19E-02	4.56E-05	1.50E+00	Yes
Pu-239	1.70E+00	2.43E-03	2.90E-02	Yes
Pu-240	3.30E-01	4.72E-04	2.90E-02	Yes
Pu-241	1.48E+00	2.12E-03	5.60E+00	Yes
Pu-242	1.09E-05	1.56E-08	1.10E-01	Yes
Am-241	1.92E+00	2.74E-03	5.40E-02	Yes
Am-243	2.54E-04	3.63E-07	5.60E-02	Yes
Cm-242	8.89E-04	1.27E-06	3.20E+01	Yes
Cm-243	3.14E-05	4.49E-08	8.60E+01	Yes
Cm-244	7.41E-04	1.06E-06	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	8.88E+05	6.98E-01	5.90E+04	Yes
Mn	8.81E+05	6.92E-01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-112 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	3.10E-02	4.43E-05	5.10E+00	Yes
Ni-59	1.80E-01	2.56E-04	2.10E+02	Yes
Ni-63	6.52E+00	9.31E-03	7.00E+02	Yes
Se-79	4.76E-03	6.80E-06	2.70E+01	Yes
Sr-90	5.54E+03	7.91E+00	7.00E+03	Yes
Zr-93	2.82E-03	4.03E-06	1.40E+02	Yes
Tc-99	5.42E-01	7.74E-04	1.30E+00	Yes
Sn-126	1.83E-04	2.61E-07	8.40E-03	Yes
I-129	2.33E-04	3.33E-07	8.00E-02	Yes
Cs-137	2.44E+03	3.49E+00	3.20E+01	Yes
Sm-151	3.01E+00	4.30E-03	5.30E+04	Yes
Eu-152	3.09E-04	4.42E-07	2.10E+07	Yes
Ra-226	2.08E-07	2.97E-10	1.40E-04	Yes
Ra-228	2.95E-04	4.21E-07	2.20E-04	Yes
Ac-227	4.97E-06	7.11E-09	7.60E+04	Yes
Pa-231	1.56E-06	2.23E-09	7.40E-03	Yes
Th-229	1.70E-05	2.43E-08	2.50E-02	Yes
Th-232	1.27E-04	1.81E-07	5.80E-03	Yes
U-232	3.02E-04	4.32E-07	1.20E+00	Yes
U-233	1.82E-02	2.60E-05	7.40E-02	Yes
U-234	6.83E-02	9.76E-05	7.40E-02	Yes
U-235	3.01E-03	4.30E-06	2.70E-03	Yes
U-236	9.23E-04	1.32E-06	5.10E-01	Yes
U-238	6.94E-02	9.91E-05	1.20E-02	Yes
Np-237	6.43E-03	9.19E-06	1.50E-03	Yes
Pu-238	6.91E-02	9.87E-05	1.50E+00	Yes
Pu-239	7.86E-01	1.12E-03	2.90E-02	Yes
Pu-240	1.00E-01	1.43E-04	2.90E-02	Yes
Pu-241	2.84E-01	4.06E-04	5.60E+00	Yes
Pu-242	2.03E-06	2.90E-09	1.10E-01	Yes
Am-241	4.07E+00	5.81E-03	5.40E-02	Yes
Am-243	5.07E-04	7.25E-07	5.60E-02	Yes
Cm-242	7.49E-04	1.07E-06	3.20E+01	Yes
Cm-243	2.10E-04	3.00E-07	8.60E+01	Yes
Cm-244	5.06E-03	7.23E-06	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	1.87E+06	1.47E+00	5.90E+04	Yes
Mn	1.13E+06	8.88E-01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-201 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	7.66E-06	1.14E-07	5.10E+00	Yes
Ni-59	1.02E-04	1.53E-06	2.10E+02	Yes
Ni-63	9.49E-03	1.42E-04	7.00E+02	Yes
Se-79	5.49E-07	8.19E-09	2.70E+01	Yes
Sr-90	2.70E+00	4.03E-02	7.00E+03	Yes
Zr-93	1.46E-05	2.18E-07	1.40E+02	Yes
Tc-99	2.63E-05	3.93E-07	1.30E+00	Yes
Sn-126	1.10E-06	1.64E-08	8.40E-03	Yes
I-129	4.57E-09	6.82E-11	8.00E-02	Yes
Cs-137	1.09E-01	1.62E-03	3.20E+01	Yes
Sm-151	2.77E-01	4.13E-03	5.30E+04	Yes
Eu-152	5.57E-05	8.31E-07	2.10E+07	Yes
Ra-226	1.01E-11	1.51E-13	1.40E-04	Yes
Ra-228	9.36E-08	1.40E-09	2.20E-04	Yes
Ac-227	6.31E-11	9.42E-13	7.60E+04	Yes
Pa-231	6.79E-11	1.01E-12	7.40E-03	Yes
Th-229	1.18E-13	1.76E-15	2.50E-02	Yes
Th-232	4.03E-08	6.01E-10	5.80E-03	Yes
U-232	2.71E-08	4.05E-10	1.20E+00	Yes
U-233	1.14E-07	1.70E-09	7.40E-02	Yes
U-234	3.65E-04	5.45E-06	7.40E-02	Yes
U-235	1.48E-05	2.21E-07	2.70E-03	Yes
U-236	5.23E-06	7.81E-08	5.10E-01	Yes
U-238	3.69E-04	5.51E-06	1.20E-02	Yes
Np-237	3.42E-05	5.10E-07	1.50E-03	Yes
Pu-238	5.14E-03	7.67E-05	1.50E+00	Yes
Pu-239	1.58E-01	2.36E-03	2.90E-02	Yes
Pu-240	3.40E-02	5.08E-04	2.90E-02	Yes
Pu-241	2.09E-01	3.12E-03	5.60E+00	Yes
Pu-242	1.60E-06	2.39E-08	1.10E-01	Yes
Am-241	2.54E-02	3.79E-04	5.40E-02	Yes
Am-243	9.78E-06	1.46E-07	5.60E-02	Yes
Cm-242	8.80E-04	1.31E-05	3.20E+01	Yes
Cm-243	4.87E-05	7.27E-07	8.60E+01	Yes
Cm-244	1.15E-03	1.72E-05	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	1.22E+05	1.03E+00	5.90E+04	Yes
Mn	1.90E+05	1.61E+00	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-202 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	2.03E-06	3.03E-08	5.10E+00	Yes
Ni-59	1.04E-04	1.56E-06	2.10E+02	Yes
Ni-63	2.28E-03	3.40E-05	7.00E+02	Yes
Se-79	5.61E-07	8.37E-09	2.70E+01	Yes
Sr-90	5.23E+00	7.81E-02	7.00E+03	Yes
Zr-93	1.49E-05	2.22E-07	1.40E+02	Yes
Tc-99	2.50E-05	3.73E-07	1.30E+00	Yes
Sn-126	1.13E-06	1.69E-08	8.40E-03	Yes
I-129	7.35E-08	1.10E-09	8.00E-02	Yes
Cs-137	9.58E-02	1.43E-03	3.20E+01	Yes
Sm-151	2.82E-01	4.21E-03	5.30E+04	Yes
Eu-152	5.67E-05	8.46E-07	2.10E+07	Yes
Ra-226	1.03E-11	1.54E-13	1.40E-04	Yes
Ra-228	9.54E-08	1.42E-09	2.20E-04	Yes
Ac-227	6.44E-11	9.61E-13	7.60E+04	Yes
Pa-231	6.93E-11	1.03E-12	7.40E-03	Yes
Th-229	1.20E-13	1.79E-15	2.50E-02	Yes
Th-232	4.11E-08	6.13E-10	5.80E-03	Yes
U-232	2.41E-08	3.60E-10	1.20E+00	Yes
U-233	1.02E-07	1.52E-09	7.40E-02	Yes
U-234	3.52E-04	5.25E-06	7.40E-02	Yes
U-235	1.42E-05	2.12E-07	2.70E-03	Yes
U-236	3.52E-06	5.25E-08	5.10E-01	Yes
U-238	3.28E-04	4.90E-06	1.20E-02	Yes
Np-237	2.90E-05	4.33E-07	1.50E-03	Yes
Pu-238	4.64E-03	6.92E-05	1.50E+00	Yes
Pu-239	1.43E-01	2.13E-03	2.90E-02	Yes
Pu-240	3.08E-02	4.60E-04	2.90E-02	Yes
Pu-241	1.88E-01	2.80E-03	5.60E+00	Yes
Pu-242	1.45E-06	2.16E-08	1.10E-01	Yes
Am-241	1.24E-02	1.86E-04	5.40E-02	Yes
Am-243	4.72E-06	7.05E-08	5.60E-02	Yes
Cm-242	4.25E-04	6.34E-06	3.20E+01	Yes
Cm-243	2.35E-05	3.51E-07	8.60E+01	Yes
Cm-244	5.54E-04	8.27E-06	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	9.09E+04	7.69E-01	5.90E+04	Yes
Mn	1.69E+05	1.43E+00	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-203 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	1.66E-06	2.48E-08	5.10E+00	Yes
Ni-59	8.54E-05	1.27E-06	2.10E+02	Yes
Ni-63	6.32E-04	9.43E-06	7.00E+02	Yes
Se-79	4.58E-07	6.84E-09	2.70E+01	Yes
Sr-90	2.46E+00	3.67E-02	7.00E+03	Yes
Zr-93	1.22E-05	1.82E-07	1.40E+02	Yes
Tc-99	2.32E-05	3.46E-07	1.30E+00	Yes
Sn-126	9.21E-07	1.37E-08	8.40E-03	Yes
I-129	1.47E-07	2.19E-09	8.00E-02	Yes
Cs-137	1.41E-01	2.10E-03	3.20E+01	Yes
Sm-151	2.30E-01	3.43E-03	5.30E+04	Yes
Eu-152	4.64E-05	6.92E-07	2.10E+07	Yes
Ra-226	8.47E-12	1.26E-13	1.40E-04	Yes
Ra-228	4.41E-08	6.58E-10	2.20E-04	Yes
Ac-227	5.26E-11	7.85E-13	7.60E+04	Yes
Pa-231	5.67E-11	8.46E-13	7.40E-03	Yes
Th-229	9.83E-14	1.47E-15	2.50E-02	Yes
Th-232	1.90E-08	2.84E-10	5.80E-03	Yes
U-232	7.98E-08	1.19E-09	1.20E+00	Yes
U-233	3.37E-07	5.03E-09	7.40E-02	Yes
U-234	1.13E-03	1.69E-05	7.40E-02	Yes
U-235	4.79E-05	7.15E-07	2.70E-03	Yes
U-236	8.33E-06	1.24E-07	5.10E-01	Yes
U-238	1.09E-03	1.63E-05	1.20E-02	Yes
Np-237	2.70E-07	4.03E-09	1.50E-03	Yes
Pu-238	1.59E-04	2.37E-06	1.50E+00	Yes
Pu-239	4.86E-03	7.26E-05	2.90E-02	Yes
Pu-240	1.05E-03	1.57E-05	2.90E-02	Yes
Pu-241	6.43E-03	9.60E-05	5.60E+00	Yes
Pu-242	4.94E-08	7.37E-10	1.10E-01	Yes
Am-241	3.26E-04	4.86E-06	5.40E-02	Yes
Am-243	1.22E-07	1.82E-09	5.60E-02	Yes
Cm-242	1.10E-05	1.64E-07	3.20E+01	Yes
Cm-243	6.10E-07	9.10E-09	8.60E+01	Yes
Cm-244	1.44E-05	2.15E-07	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	2.60E+04	2.20E-01	5.90E+04	Yes
Mn	5.13E+03	4.34E-02	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

241-C-204 - Tank Base

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	1.88E-06	2.81E-08	5.10E+00	Yes
Ni-59	7.98E-05	1.19E-06	2.10E+02	Yes
Ni-63	1.67E-04	2.49E-06	7.00E+02	Yes
Se-79	4.29E-07	6.40E-09	2.70E+01	Yes
Sr-90	1.63E+00	2.44E-02	7.00E+03	Yes
Zr-93	1.14E-05	1.70E-07	1.40E+02	Yes
Tc-99	3.18E-05	4.75E-07	1.30E+00	Yes
Sn-126	8.61E-07	1.29E-08	8.40E-03	Yes
I-129	3.57E-09	5.33E-11	8.00E-02	Yes
Cs-137	6.39E-02	9.54E-04	3.20E+01	Yes
Sm-151	2.15E-01	3.21E-03	5.30E+04	Yes
Eu-152	4.34E-05	6.47E-07	2.10E+07	Yes
Ra-226	7.92E-12	1.18E-13	1.40E-04	Yes
Ra-228	3.30E-07	4.92E-09	2.20E-04	Yes
Ac-227	4.92E-11	7.35E-13	7.60E+04	Yes
Pa-231	5.30E-11	7.91E-13	7.40E-03	Yes
Th-229	9.19E-14	1.37E-15	2.50E-02	Yes
Th-232	1.42E-07	2.12E-09	5.80E-03	Yes
U-232	5.95E-08	8.88E-10	1.20E+00	Yes
U-233	2.51E-07	3.75E-09	7.40E-02	Yes
U-234	8.27E-04	1.23E-05	7.40E-02	Yes
U-235	3.42E-05	5.10E-07	2.70E-03	Yes
U-236	5.13E-06	7.66E-08	5.10E-01	Yes
U-238	8.13E-04	1.21E-05	1.20E-02	Yes
Np-237	2.16E-04	3.22E-06	1.50E-03	Yes
Pu-238	3.20E-06	4.78E-08	1.50E+00	Yes
Pu-239	9.84E-05	1.47E-06	2.90E-02	Yes
Pu-240	2.12E-05	3.17E-07	2.90E-02	Yes
Pu-241	1.30E-04	1.94E-06	5.60E+00	Yes
Pu-242	9.98E-10	1.49E-11	1.10E-01	Yes
Am-241	3.26E-05	4.86E-07	5.40E-02	Yes
Am-243	1.22E-08	1.82E-10	5.60E-02	Yes
Cm-242	1.10E-06	1.64E-08	3.20E+01	Yes
Cm-243	6.08E-08	9.08E-10	8.60E+01	Yes
Cm-244	1.44E-06	2.15E-08	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	1.36E+04	1.15E-01	5.90E+04	Yes
Mn	2.39E+03	2.02E-02	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

Catch Tanks

Analyte	Inventory (Ci)	Concentration (Ci/m^3)	Limit (Ci/m^3)	Acceptable
C-14	9.65E-03	3.80E-06	5.10E+00	Yes
Ni-59	2.28E-01	8.97E-05	2.10E+02	Yes
Ni-63	4.13E+00	1.63E-03	7.00E+02	Yes
Se-79	2.82E-01	1.11E-04	2.70E+01	Yes
Sr-90	4.54E-03	1.79E-06	7.00E+03	Yes
Zr-93	7.00E+03	2.76E+00	1.40E+02	Yes
Tc-99	3.16E-01	1.24E-04	1.30E+00	Yes
Sn-126	8.84E-03	3.48E-06	8.40E-03	Yes
I-129	1.36E-03	5.35E-07	8.00E-02	Yes
Cs-137	7.66E+02	3.02E-01	3.20E+01	Yes
Sm-151	5.55E+02	2.19E-01	5.30E+04	Yes
Eu-152	1.53E-01	6.03E-05	2.10E+07	Yes
Ra-226	2.67E-06	1.05E-09	1.40E-04	Yes
Ra-228	7.98E-03	3.14E-06	2.20E-04	Yes
Ac-227	2.41E-03	9.50E-07	7.60E+04	Yes
Pa-231	1.91E-04	7.51E-08	7.40E-03	Yes
Th-229	6.99E-04	2.75E-07	2.50E-02	Yes
Th-232	3.44E-03	1.35E-06	5.80E-03	Yes
U-232	2.70E-03	1.06E-06	1.20E+00	Yes
U-233	2.99E-01	1.18E-04	7.40E-02	Yes
U-234	6.32E-02	2.49E-05	7.40E-02	Yes
U-235	2.48E-03	9.75E-07	2.70E-03	Yes
U-236	1.03E-03	4.04E-07	5.10E-01	Yes
U-238	5.74E-02	2.26E-05	1.20E-02	Yes
Np-237	6.35E-03	2.50E-06	1.50E-03	Yes
Pu-238	6.38E-01	2.51E-04	1.50E+00	Yes
Pu-239	1.41E+01	5.54E-03	2.90E-02	Yes
Pu-240	3.00E+00	1.18E-03	2.90E-02	Yes
Pu-241	2.28E+01	8.98E-03	5.60E+00	Yes
Pu-242	1.61E-04	6.35E-08	1.10E-01	Yes
Am-241	1.23E+01	4.84E-03	5.40E-02	Yes
Am-243	2.58E-03	1.02E-06	5.60E-02	Yes
Cm-242	2.60E-02	1.02E-05	3.20E+01	Yes
Cm-243	1.90E-03	7.48E-07	8.60E+01	Yes
Cm-244	4.25E-02	1.67E-05	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	7.58E+06	1.04E+00	5.90E+04	Yes
Mn	2.08E+07	2.86E+00	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

Pits				
Analyte	**Inventory (Ci)**	**Concentration (Ci/m^3)**	**Limit (Ci/m^3)**	**Acceptable**
C-14	1.10E-04	3.98E-08	5.10E+00	Yes
Ni-59	2.59E-03	9.39E-07	2.10E+02	Yes
Ni-63	4.70E-02	1.70E-05	7.00E+02	Yes
Se-79	5.17E-05	1.87E-08	2.70E+01	Yes
Sr-90	7.97E+01	2.89E-02	7.00E+03	Yes
Zr-93	6.63E-04	2.40E-07	1.40E+02	Yes
Tc-99	3.60E-03	1.30E-06	1.30E+00	Yes
Sn-126	1.01E-04	3.65E-08	8.40E-03	Yes
I-129	1.55E-05	5.60E-09	8.00E-02	Yes
Cs-137	8.73E+00	3.16E-03	3.20E+01	Yes
Sm-151	6.33E+00	2.29E-03	5.30E+04	Yes
Eu-152	1.74E-03	6.31E-07	2.10E+07	Yes
Ra-226	3.04E-08	1.10E-11	1.40E-04	Yes
Ra-228	9.09E-05	3.29E-08	2.20E-04	Yes
Ac-227	2.75E-05	9.95E-09	7.60E+04	Yes
Pa-231	2.17E-06	7.86E-10	7.40E-03	Yes
Th-229	7.96E-06	2.88E-09	2.50E-02	Yes
Th-232	3.91E-05	1.42E-08	5.80E-03	Yes
U-232	3.07E-05	1.11E-08	1.20E+00	Yes
U-233	3.40E-03	1.23E-06	7.40E-02	Yes
U-234	7.20E-04	2.61E-07	7.40E-02	Yes
U-235	2.82E-05	1.02E-08	2.70E-03	Yes
U-236	1.17E-05	4.23E-09	5.10E-01	Yes
U-238	6.54E-04	2.37E-07	1.20E-02	Yes
Np-237	7.23E-05	2.62E-08	1.50E-03	Yes
Pu-238	7.26E-03	2.63E-06	1.50E+00	Yes
Pu-239	1.60E-01	5.80E-05	2.90E-02	Yes
Pu-240	3.42E-02	1.24E-05	2.90E-02	Yes
Pu-241	2.60E-01	9.40E-05	5.60E+00	Yes
Pu-242	1.84E-06	6.65E-10	1.10E-01	Yes
Am-241	1.40E-01	5.07E-05	5.40E-02	Yes
Am-243	2.94E-05	1.07E-08	5.60E-02	Yes
Cm-242	2.96E-04	1.07E-07	3.20E+01	Yes
Cm-243	2.16E-05	7.83E-09	8.60E+01	Yes
Cm-244	4.84E-04	1.75E-07	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	8.63E+04	8.12E-02	5.90E+04	Yes
Mn	2.37E+05	2.23E-01	4.40E+05	Yes

Table B-1. C Farm Estimated Waste Stream Concentration Comparison to ERDF Waste Acceptance Criteria.

	Pipelines			
Analyte	**Inventory (Ci)**	**Concentration (Ci/m^3)**	**Limit (Ci/m^3)**	**Acceptable**
C-14	6.52E-03	3.26E-06	5.10E+00	Yes
Ni-59	1.54E-01	7.70E-05	2.10E+02	Yes
Ni-63	2.79E+00	1.40E-03	7.00E+02	Yes
Se-79	3.07E-03	1.53E-06	2.70E+01	Yes
Sr-90	4.73E+03	2.37E+00	7.00E+03	Yes
Zr-93	3.94E-02	1.97E-05	1.40E+02	Yes
Tc-99	2.14E-01	1.07E-04	1.30E+00	Yes
Sn-126	5.98E-03	2.99E-06	8.40E-03	Yes
I-129	9.18E-04	4.59E-07	8.00E-02	Yes
Cs-137	5.18E+02	2.59E-01	3.20E+01	Yes
Sm-151	3.76E+02	1.88E-01	5.30E+04	Yes
Eu-152	1.04E-01	5.18E-05	2.10E+07	Yes
Ra-226	1.81E-06	9.03E-10	1.40E-04	Yes
Ra-228	5.40E-03	2.70E-06	2.20E-04	Yes
Ac-227	1.63E-03	8.16E-07	7.60E+04	Yes
Pa-231	1.29E-04	6.44E-08	7.40E-03	Yes
Th-229	4.73E-04	2.36E-07	2.50E-02	Yes
Th-232	2.32E-03	1.16E-06	5.80E-03	Yes
U-232	1.82E-03	9.12E-07	1.20E+00	Yes
U-233	2.02E-01	1.01E-04	7.40E-02	Yes
U-234	4.27E-02	2.14E-05	7.40E-02	Yes
U-235	1.67E-03	8.37E-07	2.70E-03	Yes
U-236	6.93E-04	3.47E-07	5.10E-01	Yes
U-238	3.88E-02	1.94E-05	1.20E-02	Yes
Np-237	4.29E-03	2.15E-06	1.50E-03	Yes
Pu-238	4.31E-01	2.16E-04	1.50E+00	Yes
Pu-239	9.50E+00	4.75E-03	2.90E-02	Yes
Pu-240	2.03E+00	1.01E-03	2.90E-02	Yes
Pu-241	1.54E+01	7.70E-03	5.60E+00	Yes
Pu-242	1.09E-04	5.45E-08	1.10E-01	Yes
Am-241	8.31E+00	4.16E-03	5.40E-02	Yes
Am-243	1.75E-03	8.73E-07	5.60E-02	Yes
Cm-242	1.76E-02	8.78E-06	3.20E+01	Yes
Cm-243	1.28E-03	6.42E-07	8.60E+01	Yes
Cm-244	2.87E-02	1.44E-05	3.90E+01	Yes
Analyte	**(mg)**	**(mg/kg)**	**(mg/kg)**	**Acceptable**
Cr	5.12E+06	9.60E+00	5.90E+04	Yes
Mn	1.41E+07	2.64E+01	4.40E+05	Yes

Table B-2. C Farm Estimated Waste Stream Concentration Comparison to 10 CFR 61.55 Waste Classification Criteria.

Notes: The following data follows the procedures listed in 10 CFR 61.55 for classifying waste. Nuclides with less than 5 year half-life were not considered since the waste is decades old, therefore these values would be insignificant. Radionuclides decayed to 1/1/2001. Inventory values are from RPP-RPT-42323. Concentrations were calculated by dividing the inventory value by the estimated "in place" waste volume for the specific series of tanks/equipment. Refer to Table A-2 for volumes used.

10 CFR 61.55 - Table 2 Col. 1 Analysis

Tank/ Equip	Analyte	Inventory (Ci)	Conc. (Ci/m^3)	Limit (Ci/m^3)	Sum of Fractions	SoF Total	Conclusion
C-101	H-3	6.82E-01	1.24E-03	4.00E+01	3.11E-05	1.9E+01	Exceeds 1, see Col. 2 analysis below
	Co-60	1.99E-02	3.63E-05	7.00E+02	5.19E-08		
	Ni-63	2.35E+00	4.29E-03	3.50E+00	1.23E-03		
	Sr-90	4.08E+02	7.45E-01	4.00E-02	1.86E+01		
	Cs-137	3.22E+02	5.88E-01	1.00E+00	5.88E-01		
C-102	H-3	4.29E-01	7.82E-04	4.00E+01	1.95E-05	1.4E+01	Exceeds 1, see Col. 2 analysis below
	Co-60	5.56E-01	1.01E-03	7.00E+02	1.45E-06		
	Ni-63	8.26E+00	1.51E-02	3.50E+00	4.31E-03		
	Sr-90	3.01E+02	5.49E-01	4.00E-02	1.37E+01		
	Cs-137	2.77E+02	5.06E-01	1.00E+00	5.06E-01		
C-103	H-3	1.16E-02	2.12E-05	4.00E+01	5.29E-07	4.9E+02	Exceeds 1, see Col. 2 analysis below
	Co-60	8.86E-02	1.62E-04	7.00E+02	2.31E-07		
	Ni-63	2.12E+01	3.87E-02	3.50E+00	1.11E-02		
	Sr-90	1.07E+04	1.95E+01	4.00E-02	4.89E+02		
	Cs-137	9.41E+02	1.72E+00	1.00E+00	1.72E+00		
C-104	H-3	4.73E-01	8.63E-04	4.00E+01	2.16E-05	2.2E+02	Exceeds 1, see Col. 2 analysis below
	Co-60	1.08E+00	1.97E-03	7.00E+02	2.82E-06		
	Ni-63	5.40E+00	9.85E-03	3.50E+00	2.81E-03		
	Sr-90	4.81E+03	8.77E+00	4.00E-02	2.19E+02		
	Cs-137	9.50E+02	1.73E+00	1.00E+00	1.73E+00		
C-105	H-3	1.24E+00	2.26E-03	4.00E+01	5.64E-05	2.2E+02	Exceeds 1, see Col. 2 analysis below
	Co-60	3.44E-01	6.28E-04	7.00E+02	8.97E-07		
	Ni-63	4.28E+00	7.82E-03	3.50E+00	2.23E-03		
	Sr-90	4.75E+03	8.66E+00	4.00E-02	2.17E+02		
	Cs-137	8.19E+02	1.49E+00	1.00E+00	1.49E+00		
C-106	H-3	1.21E-02	2.22E-05	4.00E+01	5.54E-07	3.2E+03	Exceeds 1, see Col. 2 analysis below
	Co-60	1.08E+01	1.97E-02	7.00E+02	2.82E-05		
	Ni-63	7.44E+01	1.36E-01	3.50E+00	3.88E-02		
	Sr-90	7.11E+04	1.30E+02	4.00E-02	3.25E+03		
	Cs-137	1.55E+03	2.83E+00	1.00E+00	2.83E+00		
C-107	H-3	3.72E-02	6.79E-05	4.00E+01	1.70E-06	1.0E+03	Exceeds 1, see Col. 2 analysis below
	Co-60	9.90E-01	1.81E-03	7.00E+02	2.58E-06		
	Ni-63	2.67E+00	4.87E-03	3.50E+00	1.39E-03		
	Sr-90	2.24E+04	4.08E+01	4.00E-02	1.02E+03		
	Cs-137	6.32E+02	1.15E+00	1.00E+00	1.15E+00		

Table B-2. C Farm Estimated Waste Stream Concentration Comparison to 10 CFR 61.55 Waste Classification Criteria.

10 CFR 61.55 - Table 2 Col. 1 Analysis

Tank/ Equip	Analyte	Inventory (Ci)	Conc. (Ci/m^3)	Limit (Ci/m^3)	Sum of Fractions	SoF Total	Conclusion
C-108	H-3	3.44E-04	6.28E-07	4.00E+01	1.57E-08	6.0E-01	Class A Waste
	Co-60	5.36E-05	9.78E-08	7.00E+02	1.40E-10		
	Ni-63	1.29E-03	2.36E-06	3.50E+00	6.73E-07		
	Sr-90	9.41E+00	1.72E-02	4.00E-02	4.29E-01		
	Cs-137	9.13E+01	1.67E-01	1.00E+00	1.67E-01		
C-109	H-3	1.91E-04	3.49E-07	4.00E+01	8.73E-09	1.1E-01	Class A Waste
	Co-60	2.02E-05	3.69E-08	7.00E+02	5.27E-11		
	Ni-63	7.59E-04	1.38E-06	3.50E+00	3.96E-07		
	Sr-90	2.23E+00	4.06E-03	4.00E-02	1.02E-01		
	Cs-137	7.30E+00	1.33E-02	1.00E+00	1.33E-02		
C-110	H-3	7.25E-03	1.32E-05	4.00E+01	3.31E-07	2.1E+00	Exceeds 1, see Col. 2 analysis below
	Co-60	3.95E-04	7.21E-07	7.00E+02	1.03E-09		
	Ni-63	1.49E-02	2.72E-05	3.50E+00	7.77E-06		
	Sr-90	3.99E+01	7.28E-02	4.00E-02	1.82E+00		
	Cs-137	1.55E+02	2.83E-01	1.00E+00	2.83E-01		
C-111	H-3	1.72E-01	3.14E-04	4.00E+01	7.85E-06	4.5E+02	Exceeds 1, see Col. 2 analysis below
	Co-60	7.65E-03	1.40E-05	7.00E+02	1.99E-08		
	Ni-63	2.81E+00	5.13E-03	3.50E+00	1.47E-03		
	Sr-90	9.75E+03	1.78E+01	4.00E-02	4.45E+02		
	Cs-137	2.12E+02	3.86E-01	1.00E+00	3.86E-01		
C-112	H-3	6.20E-02	1.13E-04	4.00E+01	2.83E-06	2.6E+02	Exceeds 1, see Col. 2 analysis below
	Co-60	1.48E-02	2.70E-05	7.00E+02	3.86E-08		
	Ni-63	6.52E+00	1.19E-02	3.50E+00	3.40E-03		
	Sr-90	5.54E+03	1.01E+01	4.00E-02	2.53E+02		
	Cs-137	2.44E+03	4.46E+00	1.00E+00	4.46E+00		
C-201	H-3	4.58E-06	8.98E-08	4.00E+01	2.25E-09	1.3E+00	Exceeds 1, see Col. 2 analysis below
	Co-60	1.15E-04	2.26E-06	7.00E+02	3.22E-09		
	Ni-63	9.49E-03	1.86E-04	3.50E+00	5.32E-05		
	Sr-90	2.70E+00	5.29E-02	4.00E-02	1.32E+00		
	Cs-137	1.09E-01	2.13E-03	1.00E+00	2.13E-03		
C-202	H-3	4.67E-06	9.16E-08	4.00E+01	2.29E-09	2.6E+00	Exceeds 1, see Col. 2 analysis below
	Co-60	1.18E-04	2.31E-06	7.00E+02	3.31E-09		
	Ni-63	2.28E-03	4.47E-05	3.50E+00	1.28E-05		
	Sr-90	5.23E+00	1.03E-01	4.00E-02	2.56E+00		
	Cs-137	9.58E-02	1.88E-03	1.00E+00	1.88E-03		
C-203	H-3	3.81E-06	7.47E-08	4.00E+01	1.87E-09	1.2E+00	Exceeds 1, see Col. 2 analysis below
	Co-60	1.04E-04	2.04E-06	7.00E+02	2.91E-09		
	Ni-63	6.32E-04	1.24E-05	3.50E+00	3.54E-06		
	Sr-90	2.46E+00	4.83E-02	4.00E-02	1.21E+00		
	Cs-137	1.41E-01	2.76E-03	1.00E+00	2.76E-03		

Table B-2. C Farm Estimated Waste Stream Concentration Comparison to 10 CFR 61.55 Waste Classification Criteria.

10 CFR 61.55 - Table 2 Col. 1 Analysis

Tank/ Equip	Analyte	Inventory (Ci)	Conc. (Ci/m^3)	Limit (Ci/m^3)	Sum of Fractions	SoF Total	Conclusion
C-204	H-3	3.28E-06	6.43E-08	4.00E+01	1.61E-09	8.0E-01	Class A Waste
	Co-60	9.00E-05	1.76E-06	7.00E+02	2.52E-09		
	Ni-63	1.67E-04	3.27E-06	3.50E+00	9.35E-07		
	Sr-90	1.63E+00	3.20E-02	4.00E-02	8.01E-01		
	Cs-137	6.39E-02	1.25E-03	1.00E+00	1.25E-03		
Catch Tanks	H-3	2.87E-01	1.58E-04	4.00E+01	3.96E-06	9.7E+01	Exceeds 1, see Col. 2 analysis below
	Co-60	2.82E-01	1.55E-04	7.00E+02	2.22E-07		
	Ni-63	4.13E+00	2.28E-03	3.50E+00	6.50E-04		
	Sr-90	7.00E+03	3.86E+00	4.00E-02	9.65E+01		
	Cs-137	7.66E+02	4.22E-01	1.00E+00	4.22E-01		
Pipelines	H-3	1.94E-01	5.83E-04	4.00E+01	1.46E-05	3.6E+02	Exceeds 1, see Col. 2 analysis below
	Co-60	1.91E-01	5.74E-04	7.00E+02	8.19E-07		
	Ni-63	2.79E+00	8.38E-03	3.50E+00	2.39E-03		
	Sr-90	4.73E+03	1.42E+01	4.00E-02	3.55E+02		
	Cs-137	5.18E+02	1.56E+00	1.00E+00	1.56E+00		
Pits	H-3	3.27E-03	2.14E-03	4.00E+01	5.34E-05	1.3E+03	Exceeds 1, see Col. 2 analysis below
	Co-60	3.21E-03	2.10E-03	7.00E+02	3.00E-06		
	Ni-63	4.70E-02	3.07E-02	3.50E+00	8.78E-03		
	Sr-90	7.97E+01	5.21E+01	4.00E-02	1.30E+03		
	Cs-137	8.73E+00	5.71E+00	1.00E+00	5.71E+00		

10 CFR 61.55 - Table 2 Col. 2 Analysis

Tank/ Equip	Analyte	Inventory (Ci)	Conc. (Ci/m^3)	Limit (Ci/m^3)	Sum of Fractions	SoF Total	Conclusion
C-101	Ni-63	2.35E+00	4.29E-03	7.00E+01	6.13E-05	1.8E-02	Class B Waste
	Sr-90	4.08E+02	7.45E-01	1.50E+02	4.97E-03		
	Cs-137	3.22E+02	5.88E-01	4.40E+01	1.34E-02		
C-102	Ni-63	8.26E+00	1.51E-02	7.00E+01	2.15E-04	1.5E-02	Class B Waste
	Sr-90	3.01E+02	5.49E-01	1.50E+02	3.66E-03		
	Cs-137	2.77E+02	5.06E-01	4.40E+01	1.15E-02		
C-103	Ni-63	2.12E+01	3.87E-02	7.00E+01	5.53E-04	1.7E-01	Class B Waste
	Sr-90	1.07E+04	1.95E+01	1.50E+02	1.30E-01		
	Cs-137	9.41E+02	1.72E+00	4.40E+01	3.90E-02		
C-104	Ni-63	5.40E+00	9.85E-03	7.00E+01	1.41E-04	9.8E-02	Class B Waste
	Sr-90	4.81E+03	8.77E+00	1.50E+02	5.85E-02		
	Cs-137	9.50E+02	1.73E+00	4.40E+01	3.94E-02		
C-105	Ni-63	4.28E+00	7.82E-03	7.00E+01	1.12E-04	9.2E-02	Class B Waste
	Sr-90	4.75E+03	8.66E+00	1.50E+02	5.77E-02		
	Cs-137	8.19E+02	1.49E+00	4.40E+01	3.40E-02		

Table B-2. C Farm Estimated Waste Stream Concentration Comparison to 10 CFR 61.55 Waste Classification Criteria.

10 CFR 61.55 - Table 2 Col. 2 Analysis

Tank/ Equip	Analyte	Inventory (Ci)	Conc. (Ci/m^3)	Limit (Ci/m^3)	Sum of Fractions	SoF Total	Conclusion
C-106	Ni-63	7.44E+01	1.36E-01	7.00E+01	1.94E-03	9.3E-01	Class B Waste
	Sr-90	7.11E+04	1.30E+02	1.50E+02	8.65E-01		
	Cs-137	1.55E+03	2.83E+00	4.40E+01	6.43E-02		
C-107	Ni-63	2.67E+00	4.87E-03	7.00E+01	6.95E-05	3.0E-01	Class B Waste
	Sr-90	2.24E+04	4.08E+01	1.50E+02	2.72E-01		
	Cs-137	6.32E+02	1.15E+00	4.40E+01	2.62E-02		
C-110	Ni-63	1.49E-02	2.72E-05	7.00E+01	3.89E-07	6.9E-03	Class B Waste
	Sr-90	3.99E+01	7.28E-02	1.50E+02	4.85E-04		
	Cs-137	1.55E+02	2.83E-01	4.40E+01	6.43E-03		
C-111	Ni-63	2.81E+00	5.13E-03	7.00E+01	7.33E-05	1.3E-01	Class B Waste
	Sr-90	9.75E+03	1.78E+01	1.50E+02	1.19E-01		
	Cs-137	2.12E+02	3.86E-01	4.40E+01	8.77E-03		
C-112	Ni-63	6.52E+00	1.19E-02	7.00E+01	1.70E-04	1.7E-01	Class B Waste
	Sr-90	5.54E+03	1.01E+01	1.50E+02	6.74E-02		
	Cs-137	2.44E+03	4.46E+00	4.40E+01	1.01E-01		
C-201	Ni-63	9.49E-03	1.86E-04	7.00E+01	2.66E-06	4.0E-04	Class B Waste
	Sr-90	2.70E+00	5.29E-02	1.50E+02	3.53E-04		
	Cs-137	1.09E-01	2.13E-03	4.40E+01	4.84E-05		
C-202	Ni-63	2.28E-03	4.47E-05	7.00E+01	6.38E-07	7.3E-04	Class B Waste
	Sr-90	5.23E+00	1.03E-01	1.50E+02	6.84E-04		
	Cs-137	9.58E-02	1.88E-03	4.40E+01	4.27E-05		
C-203	Ni-63	6.32E-04	1.24E-05	7.00E+01	1.77E-07	3.8E-04	Class B Waste
	Sr-90	2.46E+00	4.83E-02	1.50E+02	3.22E-04		
	Cs-137	1.41E-01	2.76E-03	4.40E+01	6.28E-05		
Catch Tanks	Ni-63	4.13E+00	2.28E-03	7.00E+01	3.25E-05	3.5E-02	Class B Waste
	Sr-90	7.00E+03	3.86E+00	1.50E+02	2.57E-02		
	Cs-137	7.66E+02	4.22E-01	4.40E+01	9.60E-03		
Pipelines	Ni-63	2.79E+00	8.38E-03	7.00E+01	1.20E-04	1.3E-01	Class B Waste
	Sr-90	4.73E+03	1.42E+01	1.50E+02	9.47E-02		
	Cs-137	5.18E+02	1.56E+00	4.40E+01	3.54E-02		
Pits	Ni-63	4.70E-02	3.07E-02	7.00E+01	4.39E-04	4.8E-01	Class B Waste
	Sr-90	7.97E+01	5.21E+01	1.50E+02	3.47E-01		
	Cs-137	8.73E+00	5.71E+00	4.40E+01	1.30E-01		

Table B-3. C Farm Estimated Waste Stream Concentration Comparison to TRU Waste Classification Criteria.

Notes: Radionuclides decayed to 1/1/2001. Inventory values are from RPP-RPT-42323. ERDF TRU waste criteria: If sum of conentrations for particular tank/equipment exceeds 100 nCi/g, then it is considered TRU waste. Concentrations were calculated by dividing the inventory value by the estimated "in place" waste volume for the specific series of tanks/equipment. Refer to Table A-2 for volumes used.

Tank/Equip	Analyte	Inventory (nCi)	Conc. (nCi/g)	Sum (nCi/g)	Conclusion
C-101	Np-237	3.46E+04	2.72E-05	7.6E+00	Not TRU waste
	Pu-238	6.73E+07	5.29E-02		
	Pu-239	4.67E+09	3.67E+00		
	Pu-240	8.27E+08	6.49E-01		
	Pu-241	3.21E+09	2.52E+00		
	Pu-242	2.31E+04	1.81E-05		
	Am-241	8.71E+08	6.84E-01		
	Am-243	1.12E+05	8.80E-05		
	Cm-242	1.86E+05	1.46E-04		
	Cm-243	2.29E+03	1.80E-06		
	Cm-244	5.41E+04	4.25E-05		
C-102	Np-237	2.78E+04	2.18E-05	9.2E+01	Not TRU waste
	Pu-238	9.02E+08	7.08E-01		
	Pu-239	3.40E+10	2.67E+01		
	Pu-240	8.16E+09	6.41E+00		
	Pu-241	6.37E+10	5.01E+01		
	Pu-242	4.71E+05	3.70E-04		
	Am-241	1.06E+10	8.34E+00		
	Am-243	4.32E+05	3.40E-04		
	Cm-242	6.52E+05	5.12E-04		
	Cm-243	5.22E+04	4.10E-05		
	Cm-244	1.43E+06	1.12E-03		
C-103	Np-237	1.35E+07	1.06E-02	1.3E+01	Not TRU waste
	Pu-238	1.51E+09	1.19E+00		
	Pu-239	4.99E+09	3.92E+00		
	Pu-240	1.04E+09	8.18E-01		
	Pu-241	4.50E+09	3.53E+00		
	Pu-242	3.24E+04	2.55E-05		
	Am-241	4.98E+09	3.91E+00		
	Am-243	3.70E+04	2.91E-05		
	Cm-242	6.08E+04	4.78E-05		
	Cm-243	1.21E+03	9.47E-07		
	Cm-244	3.14E+04	2.46E-05		

Table B-3. C Farm Estimated Waste Stream Concentration Comparison to TRU Waste Classification Criteria.

Tank/Equip	Analyte	Inventory (nCi)	Conc. (nCi/g)	Sum (nCi/g)	Conclusion
C-104	Np-237	3.59E+07	2.82E-02	1.7E+02	**TRU Waste**
	Pu-238	4.60E+09	3.61E+00		
	Pu-239	3.15E+10	2.47E+01		
	Pu-240	8.10E+09	6.36E+00		
	Pu-241	1.21E+11	9.54E+01		
	Pu-242	7.52E+05	5.91E-04		
	Am-241	4.52E+10	3.55E+01		
	Am-243	1.13E+07	8.88E-03		
	Cm-242	1.68E+07	1.32E-02		
	Cm-243	1.59E+06	1.25E-03		
	Cm-244	3.95E+07	3.10E-02		
C-105	Np-237	2.01E+04	1.58E-05	4.1E+01	Not TRU waste
	Pu-238	3.27E+08	2.57E-01		
	Pu-239	1.98E+10	1.56E+01		
	Pu-240	3.90E+09	3.07E+00		
	Pu-241	1.64E+10	1.29E+01		
	Pu-242	1.18E+05	9.27E-05		
	Am-241	1.20E+10	9.45E+00		
	Am-243	2.78E+05	2.19E-04		
	Cm-242	4.33E+05	3.40E-04		
	Cm-243	5.06E+03	3.97E-06		
	Cm-244	1.07E+05	8.38E-05		
C-106	Np-237	5.41E+07	4.25E-02	1.1E+02	**TRU Waste**
	Pu-238	2.77E+09	2.18E+00		
	Pu-239	1.67E+10	1.31E+01		
	Pu-240	3.57E+09	2.81E+00		
	Pu-241	4.59E+10	3.61E+01		
	Pu-242	4.16E+05	3.27E-04		
	Am-241	6.57E+10	5.16E+01		
	Am-243	3.05E+06	2.40E-03		
	Cm-242	1.54E+08	1.21E-01		
	Cm-243	8.72E+07	6.85E-02		
	Cm-244	1.53E+09	1.20E+00		
C-107	Np-237	5.28E+05	4.15E-04	8.9E+01	Not TRU waste
	Pu-238	4.53E+08	3.56E-01		
	Pu-239	2.18E+10	1.71E+01		
	Pu-240	3.54E+09	2.78E+00		
	Pu-241	2.06E+10	1.62E+01		
	Pu-242	1.63E+05	1.28E-04		
	Am-241	6.74E+10	5.29E+01		
	Am-243	1.88E+07	1.48E-02		
	Cm-242	2.57E+07	2.02E-02		
	Cm-243	1.67E+06	1.31E-03		
	Cm-244	4.05E+07	3.18E-02		

Table B-3. C Farm Estimated Waste Stream Concentration Comparison to TRU Waste Classification Criteria.

Tank/Equip	Analyte	Inventory (nCi)	Conc. (nCi/g)	Sum (nCi/g)	Conclusion
C-108	Np-237	7.10E+03	5.58E-06	1.3E-02	Not TRU waste
	Pu-238	2.91E+04	2.28E-05		
	Pu-239	3.44E+06	2.70E-03		
	Pu-240	3.77E+05	2.96E-04		
	Pu-241	8.00E+05	6.28E-04		
	Pu-242	5.88E+00	4.62E-09		
	Am-241	1.18E+07	9.29E-03		
	Am-243	1.21E+03	9.51E-07		
	Cm-242	2.03E+03	1.59E-06		
	Cm-243	2.54E+01	2.00E-08		
	Cm-244	5.92E+02	4.65E-07		
C-109	Np-237	9.48E+02	7.45E-07	4.2E-02	Not TRU waste
	Pu-238	2.58E+05	2.03E-04		
	Pu-239	3.57E+07	2.80E-02		
	Pu-240	3.89E+06	3.06E-03		
	Pu-241	7.55E+06	5.93E-03		
	Pu-242	5.41E+01	4.25E-08		
	Am-241	6.00E+06	4.71E-03		
	Am-243	6.00E+02	4.72E-07		
	Cm-242	1.00E+03	7.86E-07		
	Cm-243	1.23E+01	9.65E-09		
	Cm-244	2.89E+02	2.27E-07		
C-110	Np-237	1.86E+04	1.46E-05	1.1E+00	Not TRU waste
	Pu-238	5.01E+06	3.94E-03		
	Pu-239	6.96E+08	5.47E-01		
	Pu-240	7.58E+07	5.95E-02		
	Pu-241	1.47E+08	1.16E-01		
	Pu-242	1.05E+03	8.25E-07		
	Am-241	4.18E+08	3.28E-01		
	Am-243	4.28E+04	3.36E-05		
	Cm-242	7.15E+04	5.62E-05		
	Cm-243	8.74E+02	6.87E-07		
	Cm-244	2.05E+04	1.61E-05		
C-111	Np-237	6.31E+04	4.96E-05	4.3E+00	Not TRU waste
	Pu-238	3.19E+07	2.51E-02		
	Pu-239	1.70E+09	1.34E+00		
	Pu-240	3.30E+08	2.59E-01		
	Pu-241	1.48E+09	1.17E+00		
	Pu-242	1.09E+04	8.56E-06		
	Am-241	1.92E+09	1.51E+00		
	Am-243	2.54E+05	2.00E-04		
	Cm-242	8.89E+05	6.98E-04		
	Cm-243	3.14E+04	2.47E-05		
	Cm-244	7.41E+05	5.82E-04		

Table B-3. C Farm Estimated Waste Stream Concentration Comparison to TRU Waste Classification Criteria.

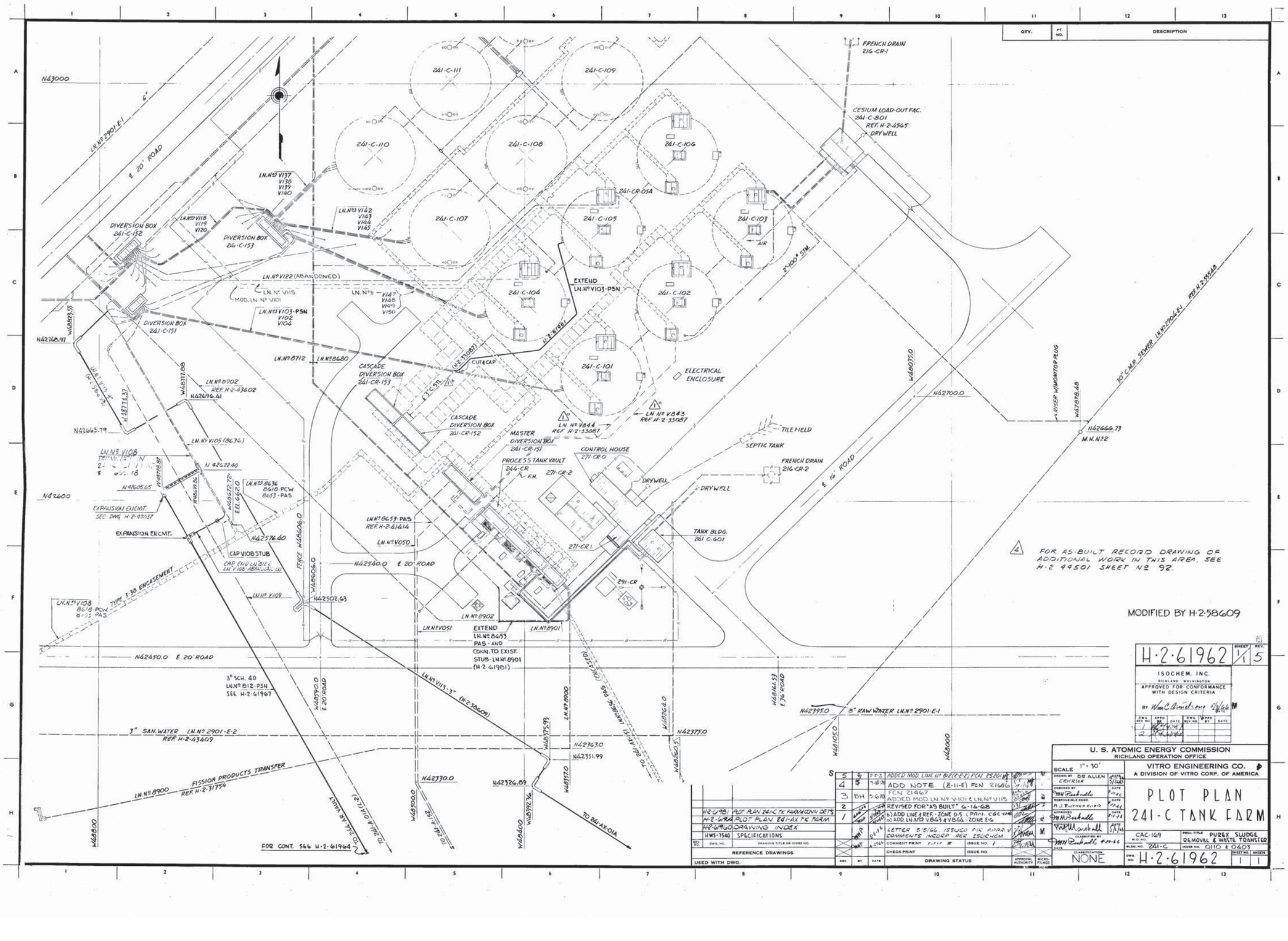
Tank/Equip	Analyte	Inventory (nCi)	Conc. (nCi/g)	Sum (nCi/g)	Conclusion
C-112	Np-237	6.43E+06	5.05E-03	4.2E+00	Not TRU waste
	Pu-238	6.91E+07	5.43E-02		
	Pu-239	7.86E+08	6.18E-01		
	Pu-240	1.00E+08	7.86E-02		
	Pu-241	2.84E+08	2.23E-01		
	Pu-242	2.03E+03	1.59E-06		
	Am-241	4.07E+09	3.19E+00		
	Am-243	5.07E+05	3.99E-04		
	Cm-242	7.49E+05	5.88E-04		
	Cm-243	2.10E+05	1.65E-04		
	Cm-244	5.06E+06	3.97E-03		
C-201	Np-237	3.42E+04	2.89E-04	3.7E+00	Not TRU waste
	Pu-238	5.14E+06	4.34E-02		
	Pu-239	1.58E+08	1.34E+00		
	Pu-240	3.40E+07	2.88E-01		
	Pu-241	2.09E+08	1.76E+00		
	Pu-242	1.60E+03	1.35E-05		
	Am-241	2.54E+07	2.15E-01		
	Am-243	9.78E+03	8.27E-05		
	Cm-242	8.80E+05	7.44E-03		
	Cm-243	4.87E+04	4.12E-04		
	Cm-244	1.15E+06	9.72E-03		
C-202	Np-237	2.90E+04	2.45E-04	3.2E+00	Not TRU waste
	Pu-238	4.64E+06	3.92E-02		
	Pu-239	1.43E+08	1.21E+00		
	Pu-240	3.08E+07	2.61E-01		
	Pu-241	1.88E+08	1.59E+00		
	Pu-242	1.45E+03	1.23E-05		
	Am-241	1.24E+07	1.05E-01		
	Am-243	4.72E+03	3.99E-05		
	Cm-242	4.25E+05	3.59E-03		
	Cm-243	2.35E+04	1.99E-04		
	Cm-244	5.54E+05	4.69E-03		
C-203	Np-237	2.70E+02	2.28E-06	1.1E-01	Not TRU waste
	Pu-238	1.59E+05	1.34E-03		
	Pu-239	4.86E+06	4.11E-02		
	Pu-240	1.05E+06	8.88E-03		
	Pu-241	6.43E+06	5.44E-02		
	Pu-242	4.94E+01	4.18E-07		
	Am-241	3.26E+05	2.75E-03		
	Am-243	1.22E+02	1.03E-06		
	Cm-242	1.10E+04	9.30E-05		
	Cm-243	6.10E+02	5.15E-06		
	Cm-244	1.44E+04	1.22E-04		

Table B-3. C Farm Estimated Waste Stream Concentration Comparison to TRU Waste Classification Criteria.

Tank/Equip	Analyte	Inventory (nCi)	Conc. (nCi/g)	Sum (nCi/g)	Conclusion
C-204	Np-237	2.16E+05	1.83E-03	4.3E-03	Not TRU waste
	Pu-238	3.20E+03	2.71E-05		
	Pu-239	9.84E+04	8.32E-04		
	Pu-240	2.12E+04	1.79E-04		
	Pu-241	1.30E+05	1.10E-03		
	Pu-242	9.98E-01	8.44E-09		
	Am-241	3.26E+04	2.75E-04		
	Am-243	1.22E+01	1.03E-07		
	Cm-242	1.10E+03	9.30E-06		
	Cm-243	6.08E+01	5.14E-07		
	Cm-244	1.44E+03	1.22E-05		
Catch Tanks	Np-237	6.35E+06	8.72E-04	7.3E+00	Not TRU waste
	Pu-238	6.38E+08	8.76E-02		
	Pu-239	1.41E+10	1.93E+00		
	Pu-240	3.00E+09	4.12E-01		
	Pu-241	2.28E+10	3.13E+00		
	Pu-242	1.61E+05	2.21E-05		
	Am-241	1.23E+10	1.69E+00		
	Am-243	2.58E+06	3.55E-04		
	Cm-242	2.60E+07	3.57E-03		
	Cm-243	1.90E+06	2.61E-04		
	Cm-244	4.25E+07	5.84E-03		
Pits	Np-237	7.23E+04	6.80E-05	5.7E-01	Not TRU waste
	Pu-238	7.26E+06	6.83E-03		
	Pu-239	1.60E+08	1.51E-01		
	Pu-240	3.42E+07	3.21E-02		
	Pu-241	2.60E+08	2.44E-01		
	Pu-242	1.84E+03	1.73E-06		
	Am-241	1.40E+08	1.32E-01		
	Am-243	2.94E+04	2.77E-05		
	Cm-242	2.96E+05	2.78E-04		
	Cm-243	2.16E+04	2.03E-05		
	Cm-244	4.84E+05	4.55E-04		
Pipelines	Np-237	4.29E+06	8.05E-03	6.7E+01	Not TRU waste
	Pu-238	4.31E+08	8.08E-01		
	Pu-239	9.50E+09	1.78E+01		
	Pu-240	2.03E+09	3.81E+00		
	Pu-241	1.54E+10	2.89E+01		
	Pu-242	1.09E+05	2.04E-04		
	Am-241	8.31E+09	1.56E+01		
	Am-243	1.75E+06	3.28E-03		
	Cm-242	1.76E+07	3.29E-02		
	Cm-243	1.28E+06	2.41E-03		
	Cm-244	2.87E+07	5.39E-02		

APPENDIX C

SKETCHES


N43000
LN. Nº 2901-E-1
℄ 20' ROAD
241-C-111
241-C-109
241-C-110
241-C-108
241-C-106
241-C-107
241-C-105
241-C-103
241-C-106
241-C-102
241-C-101
241-CR-05A
AIR
FRENCH DRAIN 216-CR-1
CESIUM LOAD-OUT FAC. 241-C-801 REF. H-2-45565 DRY WELL
LN. Nº3 V137 V138 V139 V140
LN. Nº3 V116 V119 V120
DIVERSION BOX 241-C-152
DIVERSION BOX 241-C-153
LN. Nº3 V142 V143 V144 V145
LN. Nº V122 (ABANDONED)
LN. Nº V115
MOD. LN. Nº V101
LN. Nº5 V147 V148 V149 V150
EXTEND LN. Nº V103-P5N
LN. Nº3 V103-P5N V102 V104
DIVERSION BOX 241-C-151
W48823.55
N42768.97
LN. Nº 8712
LN. Nº 8680
CASCADE DIVERSION BOX 241-CR-153
(42-7008)
CUT & CAP
H-2-8198
LN. Nº 8702 REF. H-2-43602
W48217.66
N42696.41
W48271.32
N42663.79
CASCADE DIVERSION BOX 241-CR-152
MASTER DIVERSION BOX 241-CR-151
LN. Nº V844 REF. H-2-33087
LN. Nº V843 REF. H-2-33087
ELECTRICAL ENCLOSURE
TILE FIELD
SEPTIC TANK
CONTROL HOUSE 271-CR-0
PROCESS TANK VAULT 244-CR F.H.
271-CR-2
DRYWELL
FRENCH DRAIN 216-CR-2
DRYWELL
LN. Nº V105 (8637)
LN. Nº V108
N 42622.40
W48672.75
E 662.20
N42605.65
LN. Nº3 8636 8618-PCW 8653-PAS
EXPANSION ENCMT.
SEE DWG. H-2-43037
EXPANSION ENCMT.
N42576.40
CAP V108 STUB
CAP END LN. V108 LN. V108 REMAINING LN.
N42600
E 16' ROAD
LN. Nº3 8636 8618-PCW 8653-PAS
REF. H-2-41414
LN. Nº V050
TANK BLDG. 261-C-601
271-CR-1
291-CR
FENCE W48606.0
N42540.0 ℄ 20' ROAD
TYPE T-3D ENCASEMENT
LN. Nº3 V108 8618-PCW 8653-PAS
N42502.63
LN. Nº 8902
LN. Nº V051
EXTEND LN. Nº 8653 PAS - AND CONN. TO EXIST. STUB - LN. Nº 8901 (H-2-61981)
LN. Nº 8901
N42450.0 ℄ 20' ROAD
3" SCH. 40 LN. Nº B12-PSN SEE H-2-61967
W48992.0
℄ 20' ROAD
LN. Nº V113-3" (H-2-58609)
LN. Nº 8900
(42-7010) (CMP-4250)
W48375.93
W48357.0
W48326.0
W48164.53
℄ 16' ROAD
N42395.0
8" RAW WATER LN. Nº 2901-E-1
N42375.0
W48105.0
W48000
N42363.0
N42351.99
W48360.5
3" SAN. WATER LN. Nº 2901-E-2 REF. H-2-43409
FISSION PRODUCTS TRANSFER LN. Nº 8900 REF. H-2-31794
N42330.0
N42326.89
W48357.0
W48392.76
W48400
W48800
TO 241-AX-01A
TO 241-AX-02A
TO 241-AX-03A
FOR CONT. SEE H-2-61964
W48078.68
N42700.0
RISER W/MONITOR PLUG
30" C.M.P. SEWER LN. Nº 2901-E-1 REF. H-2-55360
N42666.73
M.H. N°32
FOR AS-BUILT RECORD DRAWING OF ADDITIONAL WORK IN THIS AREA, SEE H-2-44501 SHEET Nº 92.
MODIFIED BY H-2-58609
QTY. | FT. NO. | DESCRIPTION
H-2-61962 SHEET 1/1 REV. 5
ISOCHEM. INC. RICHLAND, WASHINGTON
APPROVED FOR CONFORMANCE WITH DESIGN CRITERIA
BY Wm C Armistead 5/16/66
DWG. REV. NO. | APPD. BY | DATE | DWG. REV. NO. | APPD. BY | DATE
1 | | | | | |
2 | | | | | |
U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATION OFFICE
VITRO ENGINEERING CO.
A DIVISION OF VITRO CORP. OF AMERICA
SCALE 1" = 30'
DRAWN BY D.D. ALLEN ERICKSON
CHECKED BY
RESPONSIBLE ENGR. M. J. RUTHERFORD
APPROVED
PLOT PLAN
241-C TANK FARM
CAC-169
PROJ. TITLE PUREX SLUDGE REMOVAL & WASTE TRANSFER
BLDG. NO. 241-C
INDEX NO. 0110 & 0403
CLASSIFICATION NONE
DWG. NO. H-2-61962
SHEET NO. 1
SHEETS 1
REFERENCE DRAWINGS USED WITH DWG.
H-2-61981 PLOT PLAN 241-C TO FARM CONN. DETS
H-2-61962 PLOT PLAN 241-AX TO FARM
H-2-61960 DRAWING INDEX
HWS-7540 SPECIFICATIONS
DRAWING STATUS
REV. | BY | DATE | ISSUE NO.
5 | 5 | 5-5-66 | ADDED MOD. LINE to B12(E-E2) FCN 25201
4 | 5 | 7-18-66 | ADD NOTE (Z-11-E) FCN 21486
3 | BH | 5-6-66 | FCN 21467 ADDED MOD LN. Nº V101 & LN. Nº V115
2 | | | REVISED FOR "AS BUILT" 6-14-66
1 | | | b.) ADD LINE & REF - ZONE D-5 (PRIN. CAC-169) c.) ADD LN. Nº3 V843 & V844 - ZONE E-6
| | | LETTER 5/5/66, ISSUED FOR APPROVAL COMMENTS INCORP. PER ISSUE
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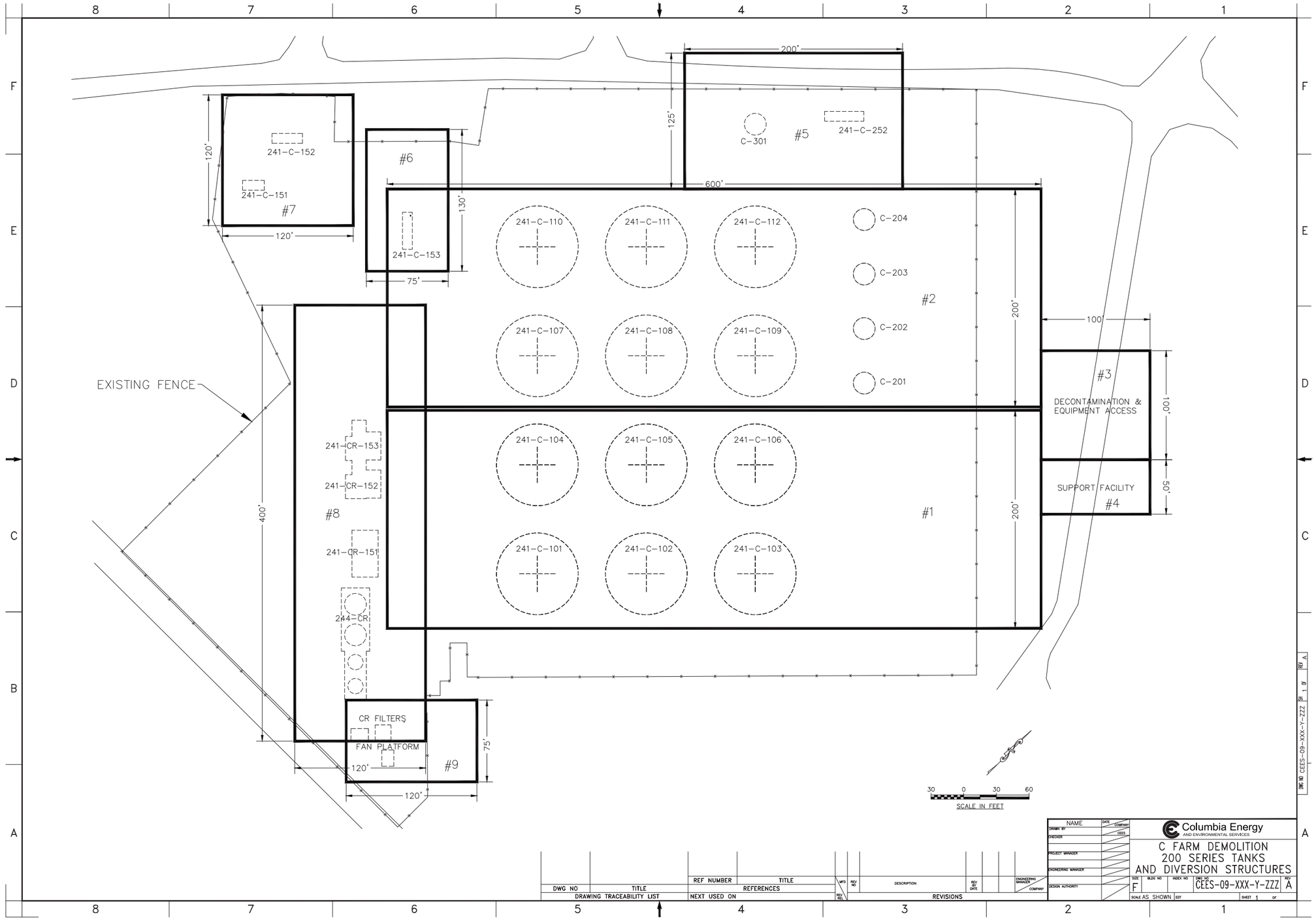
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125'
C-301
#5
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600'
120'
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#7
#6
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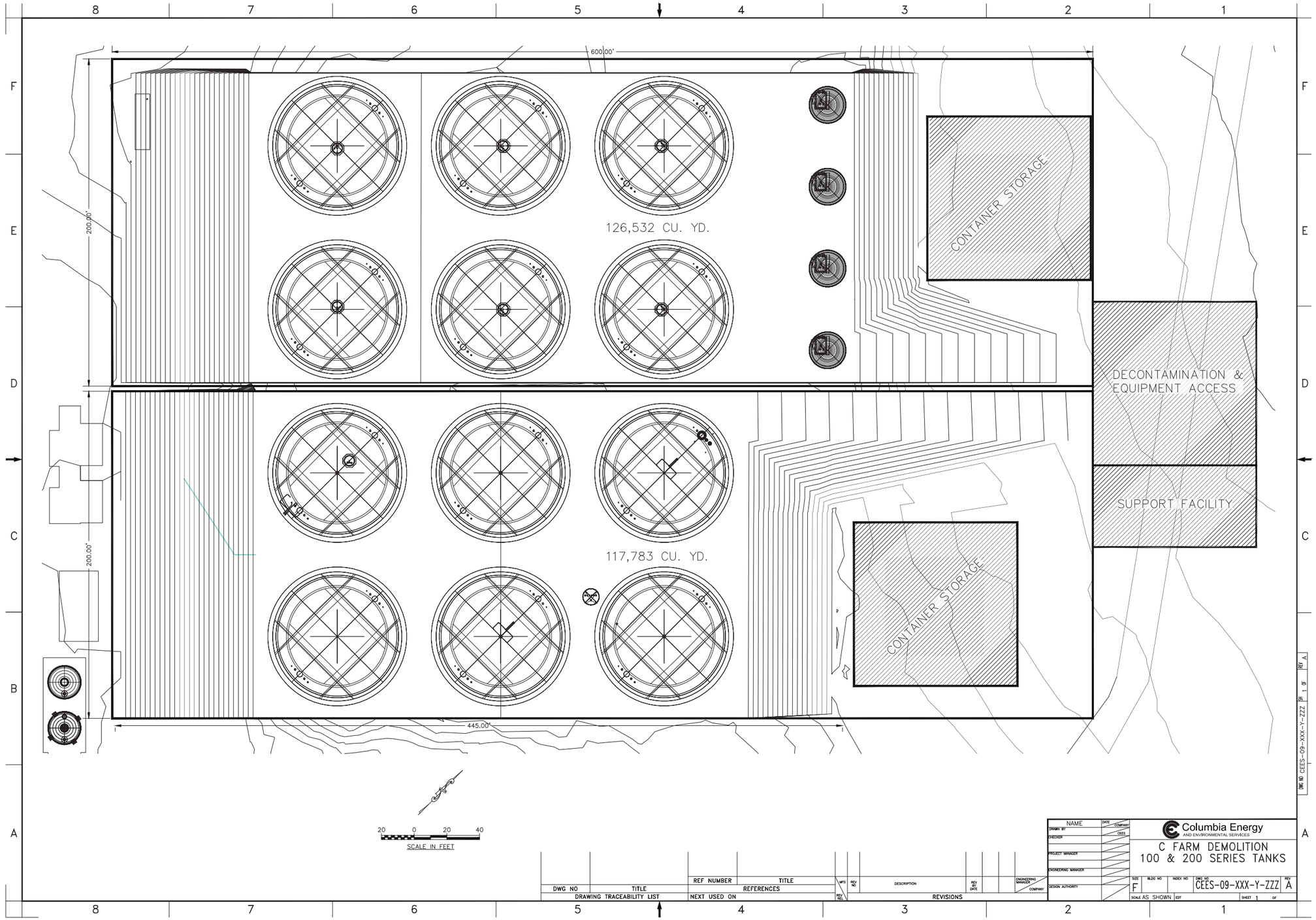
120'
75'
241-C-110
241-C-111
241-C-112
C-204
C-203
#2
241-C-107
241-C-108
241-C-109
C-202
C-201
200'
100'
#3
DECONTAMINATION & EQUIPMENT ACCESS
100'
SUPPORT FACILITY
#4
50'
EXISTING FENCE
241-C-104
241-C-105
241-C-106
241-CR-153
241-CR-152
#8
#1
200'
400'
241-C-101
241-C-102
241-C-103
241-CR-151
244-CR
CR FILTERS
FAN PLATFORM
#9
75'
120'
120'
30 0 30 60
SCALE IN FEET
Columbia Energy
AND ENVIRONMENTAL SERVICES
C FARM DEMOLITION
200 SERIES TANKS
AND DIVERSION STRUCTURES
CEES-09-XXX-Y-ZZZ
A
DRAWING TRACEABILITY LIST
REFERENCES
REVISIONS
DWG NO CEES-09-XXX-Y-ZZZ REV A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200.00'
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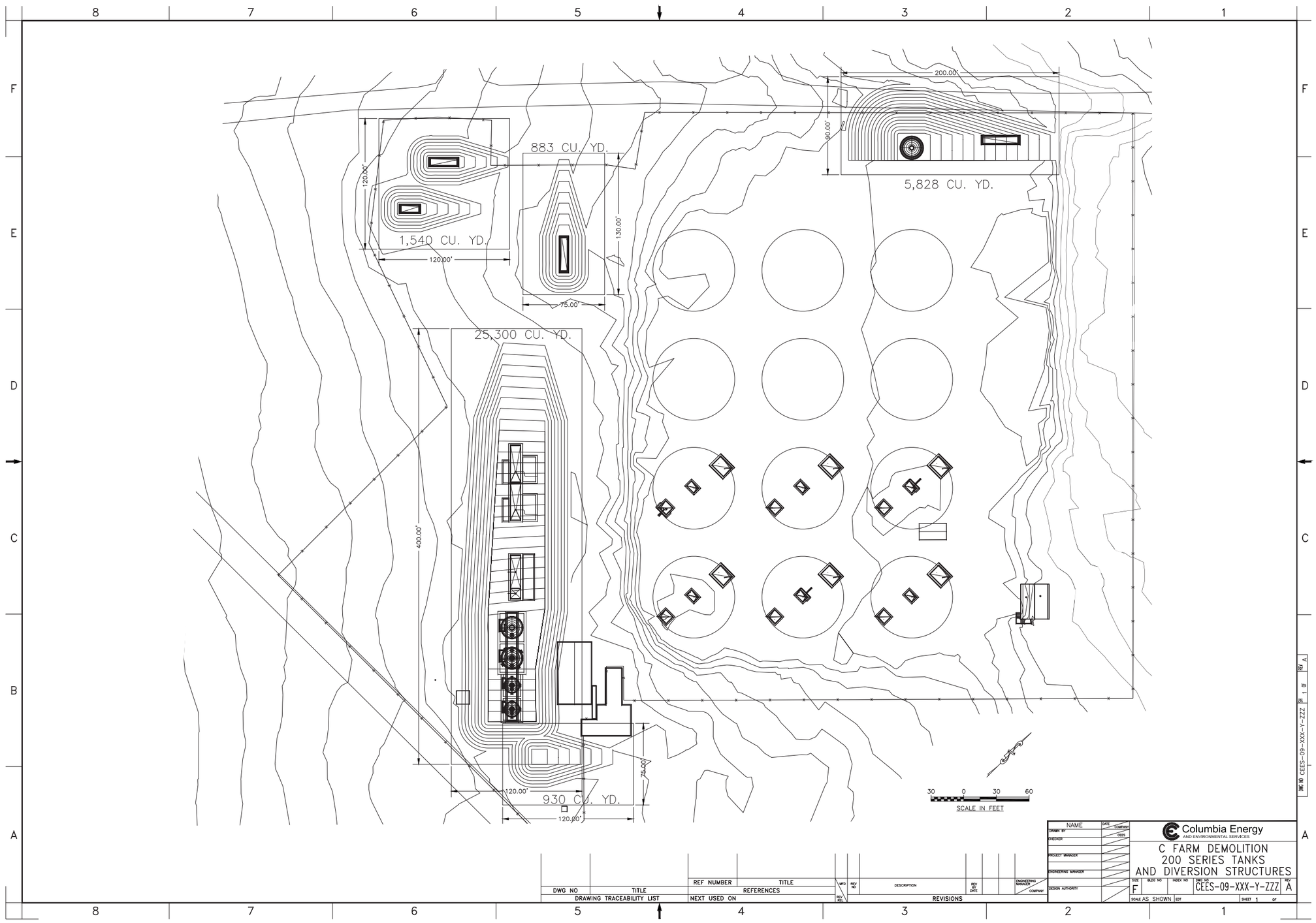
117,783 CU. YD.
CONTAINER STORAGE
DECONTAMINATION & EQUIPMENT ACCESS
SUPPORT FACILITY
CONTAINER STORAGE
445.00'
20 0 20 40
SCALE IN FEET
Columbia Energy AND ENVIRONMENTAL SERVICES
C FARM DEMOLITION
100 & 200 SERIES TANKS
DWG NO CEES-09-XXX-Y-ZZZ REV A
SCALE AS SHOWN
SHEET 1 OF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120.00'
1,540 CU. YD.
120.00'
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75.00'
200.00'
90.00'
5,828 CU. YD.
25,300 CU. YD.
400.00'
120.00'
930 CU. YD.
120.00'
75.00'
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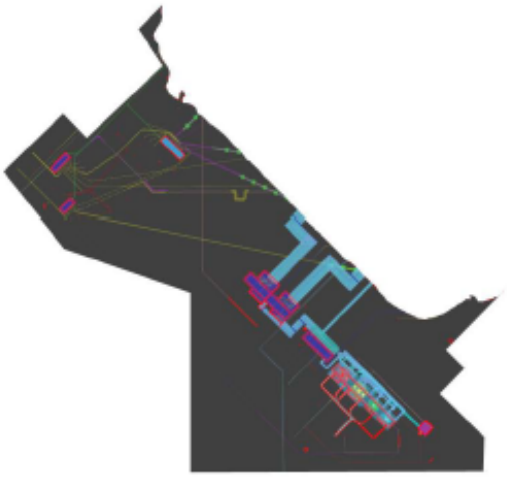
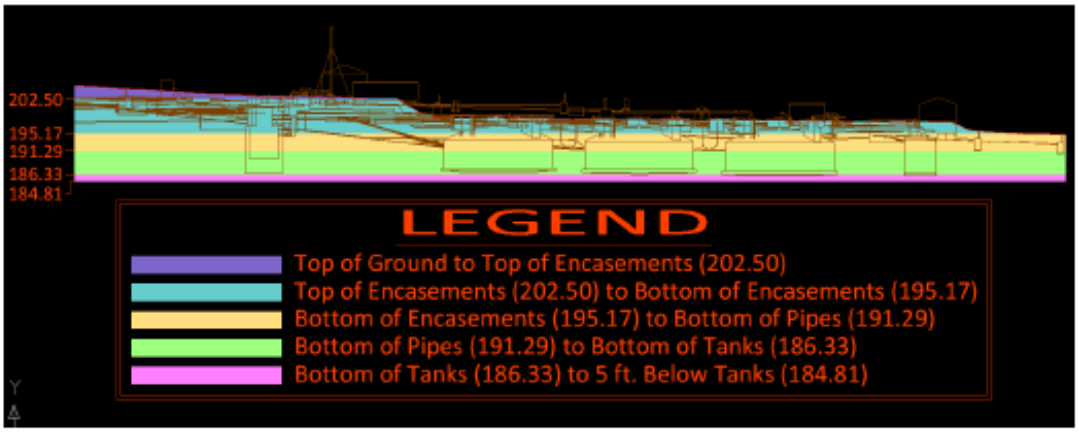
SCALE IN FEET
Columbia Energy
AND ENVIRONMENTAL SERVICES
C FARM DEMOLITION
200 SERIES TANKS
AND DIVERSION STRUCTURES
CEES-09-XXX-Y-ZZZ
REV A
SCALE AS SHOWN
SHEET 1 OF

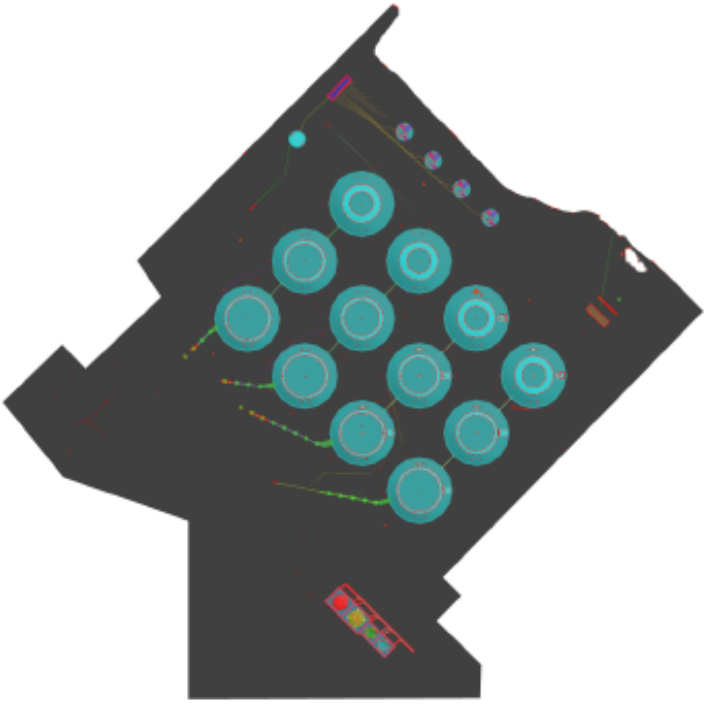
TOP OF GROUND TO TOP OF ENCASEMENT

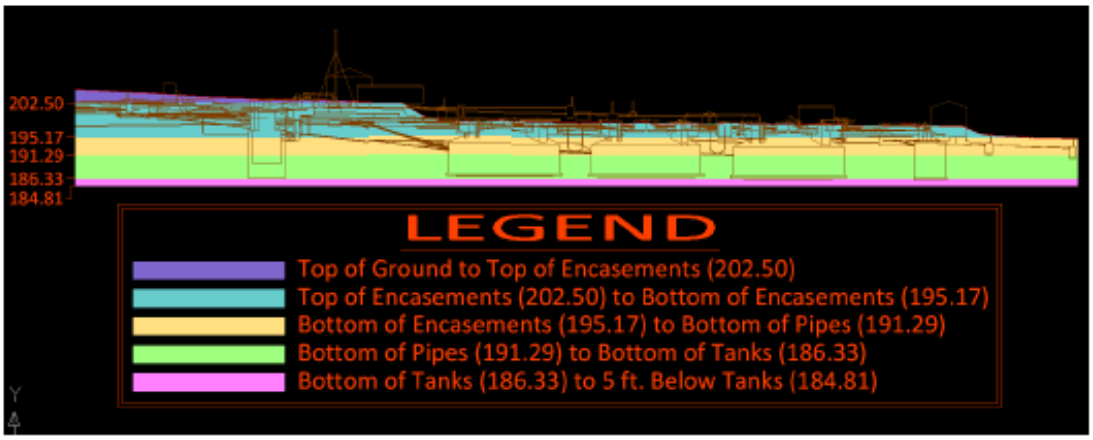




Location of Excavation	Volumes (Minus Tanks)
Top of Ground to Top of Encasements	44,686 C.Y.
Top of Encasements to Bottom of Encasements	364,054 C.Y.
Bottom of Encasements to Bottom of Pipes	190,005 C.Y.
Bottom of Pipes to Bottom of Tanks	133,336 C.Y.
Bottom of Tanks to 5 ft. Below	63,919 C.Y.
Total Volume	**796,000 C.Y.**

TOP OF ENCASEMENT TO BOTTOM OF ENCASEMENT





Location of Excavation	Volumes (Minus Tanks)
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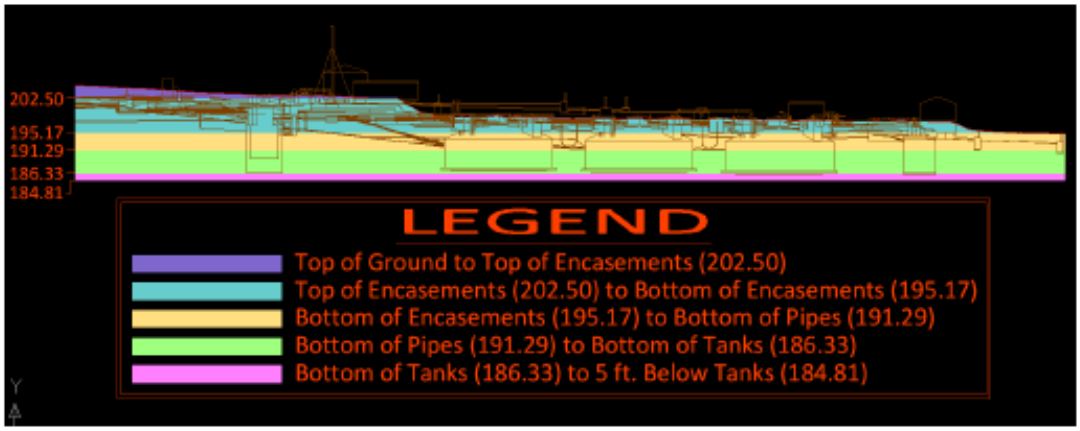
Top of Encasements to Bottom of Encasements	**364,054 C.Y.**
Bottom of Encasements to Bottom of Pipes	190,005 C.Y.
Bottom of Pipes to Bottom of Tanks	133,336 C.Y.
Bottom of Tanks to 5 ft. Below	63,919 C.Y.
Total Volume	**796,000 C.Y.**

BOTTOM OF ENCASEMENT TO BOTTOM OF PIPES



Location of Excavation	Volumes (Minus Tanks)
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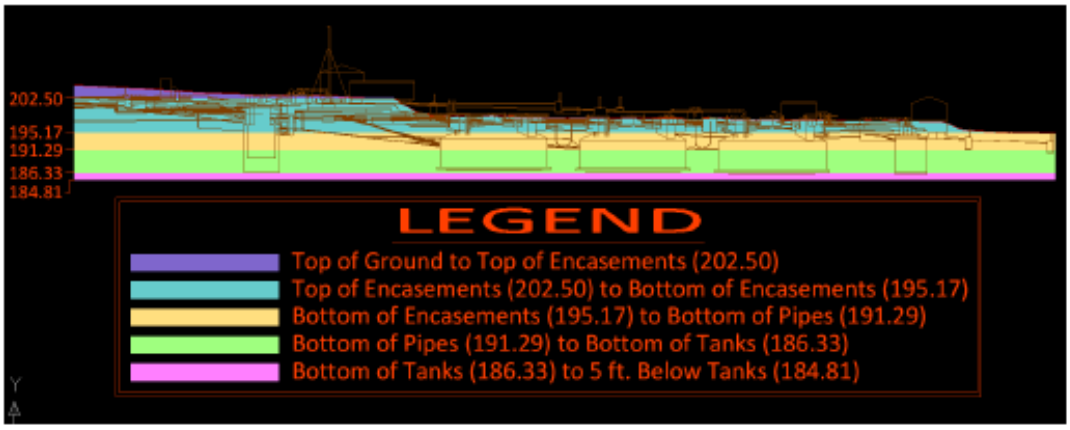
Bottom of Tanks to 5 ft. Below	63,919 C.Y.
Total Volume	**796,000 C.Y.**

BOTTOM OF PIPES TO BOTTOM OF TANKS



Location of Excavation	Volumes (Minus Tanks)
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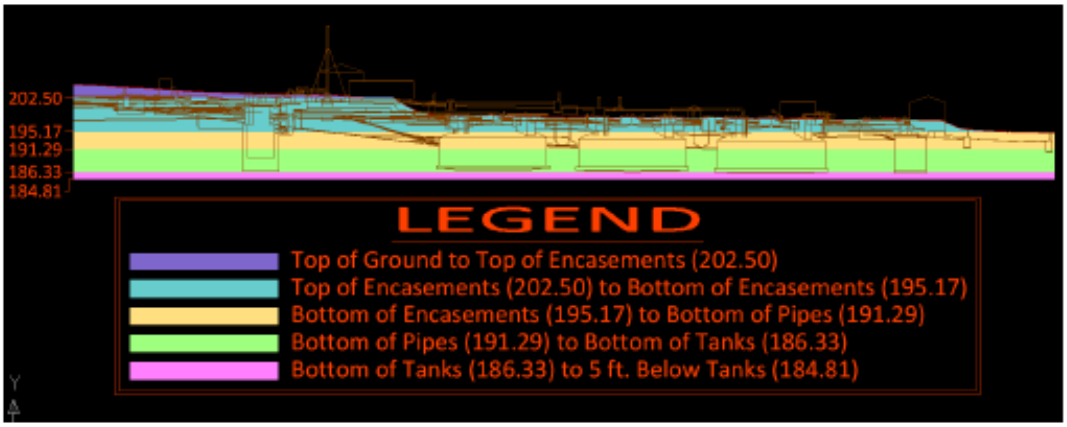
Top of Encasements to Bottom of Encasements	364,054 C.Y.
Bottom of Encasements to Bottom of Pipes	190,005 C.Y.
Bottom of Pipes to Bottom of Tanks	**133,336 C.Y.**
Bottom of Tanks to 5 ft. Below	63,919 C.Y.
Total Volume	**796,000 C.Y.**

BOTTOM OF TANKS TO 5 FT. BELOW



Location of Excavation	Volumes (Minus Tanks)
Top of Ground to Top of Encasements	44,686 C.Y.
Top of Encasements to Bottom of Encasements	364,054 C.Y.
Bottom of Encasements to Bottom of Pipes	190,005 C.Y.
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Bottom of Tanks to 5 ft. Below	63,919 C.Y.
Total Volume	**796,000 C.Y.**

APPENDIX D

ROM COST ESTIMATE

TABLE OF CONTENTS

D1.0 INTRODUCTION

This appendix provides the ROM cost estimate developed for C tank farm removal. The cost estimate was developed around the removal concept described in Section 6.0 of the report. A number of assumptions were made as a part of developing the estimate and the key estimating assumptions are described in Section D2.0. The estimate summary provided in Section D3.0 can be cross walked to the estimate detail provided in Section D4.0 by the description titles.

D2.0 ESTIMATE PURPOSE, SCOPE, AND ASSUMPTIONS

8 washington river protection solutions

Estimate Purpose, Scope & Assumptions

Title: C Farm Tank Removal Study - ROM Estimate | Est No: #2723
Estimator: Dan Jakubek | Date: 8/10/2010

Estimate Purpose

The purpose of this Rough Order of Magnitude (ROM) estimate is to provide an estimate of costs for all necessary plant, labor, supervision, technical and professional services, materials, tools, equipment, and consumables necessary and required to perform hazardous waste removal from C Farm at the Department of Energy's Hanford Site.

Estimate Scope

Perform the following Scope:

a - The Subcontractor shall furnish necessary management, labor, supervision, technical, safety, and professional services, materials, tools, equipment, and consumables necessary to perform the following activities at the US Department of Energy's Hanford Site.

b - Mobilization

c - Activities associated with the safe removal of contaminated and hazardous waste such as: piping systems; transfer and tank to tank hazardous waste piping systems; pump and valve pits; tank egress ports and access pits; storage tanks (including their base mud mats, side wall structures, and tops/caps/lids); underground support systems (sensors, instruments, cathodic protection, heat-trace, etc); biological hazards; and "C" Farm infrastructure systems (electrical feed, RAW water, HLAN, firewater, air monitoring, etc).

d - Package and transport waste to required disposal sites meeting local, state, federal, and disposal requirements.

e - Provide supportive documentation of work performed including Contractor verification.

f - Project demobilization activities

The Subcontractor shall perform the operations necessary and required for the satisfactory completion of work in accordance with the "C" Farm closure requirements.

EXECUTION PLAN:

1 - Mobilization accomplished in 7 weeks including: site prep; construction office and support trailer set-up; start-up materials purchased; personnel trained; safety equipment in place; and conduct of operations successfully demonstrated.

2 - Work schedule will be 4-10hr days, 40hrs per week, and 2,000hrs per year.

3 - Complete "C" Farm waste removal starting construction on Oct 1st 2010 and completing in 8.14 years.

4 - The schedule will encompass: Mobilization in (.14) years, or 7 weeks; site infrastructure in (.5) years; drilling and installing weather enclosure foundations #1 & #2 solder piers in (1.8) years; removing Level #1, # 2, & #3 waste in (2.64) years; removing Level #4 waste in (1.39) years; backfill completed in (1.59) years; and Demobe and close-out in (.08) years or 1 month.

5 - Complete Demobilization by November 15th, 2018.

ASSUMPTIONS:

1 - Estimate does not include costs for WRPS developing project, meaning preliminary and operational permitting, approvals, BCR and budget approval, project scope development, and project close out after Subcontractor demobilization are completed.

2 - Only costs for design, procurement, selection of D&D contractor, mobilization, D&D Subcontractor performing 100% of the scope, and demobilization.

3 - Work will be performed in a contaminated and hazardous waste environment.

4 - Subcontractor will be require to meet Hanford and scope requirements including refresher course schedule updating.

5 - Initial training requirements is estimated to take (15) 8/hr days, or (120) hours per each site worker. Hammer facility conducts classes based on an 8/hr per day schedule.

6 - Assume 100% of Subcontractor work force will be trained.

7 - WRPS Operating Contractor will perform ground surveys of area prior to work performed in accordance with construction schedule dates.

8 - Lock and Tag-out and disconnecting existing utilities will be performed by WRPS HMTC Craft, and Lockheed Martin for HLAN system.

9 - Standard Construction Debris receptacle/s will be provided by WRPS Operating Contractor including disposal of construction waste.

10 - Existing "C" Tank Farm operational and infrastructure buildings will have been removed under other projects and are not costed in this estimate.

11 - (10%) over-time for various WRPS and subcontractor support personnel performing shift turn-over and operations prep.

8. washington river protection solutions

Estimate Purpose, Scope & Assumptions

Title: C Farm Tank Removal Study - ROM Estimate | Est No: #2723
Estimator: Dan Jakubek | Date: 8/10/2010

12 - WRPS will supply power for Subcontractor's support trailers, waste removal activities, 2ndary containment shelters, etc as related to main power feed to the Hanford site. This will be costed under WRPS scope of work. Where temporary power or special power is needed the Subcontractor will furnish.

13 - Standard ERDF waste containers will be used for Level #1 & #2 waste. Level #3 ERDF Containers will have additional shielding to meet DOT requirements. Assume ERDF will supply Container s for Level #1, #2, and #3, and maintain them as needed. Level #4 high Rad waste will be placed in specialized 5'x5'x8' Boxes and inserted into an over-pack for worker protection during handling, hauling , and placement into the ERDF pit. These special Boxes will be purchased by WRPS and provided to the Subcontractor as GFE. Assume 100% of the C-Farm waste can be disposed of at ERDF.

14 - Waste will be disposed of at ERDF in the following manners and costs:
a - Piping - Level #1, & #3 @ $11.30/Tn Travel + $15.88/Tn Disposal + $157/Tn Grout = $184.18/Tn; Level #2 @ $11.30/Tn for Travel + $15.88/Tn for ERDF disposal + 50% uplift for extra ERDF involvement + $157/Tn for Grout = $192.12/TN; and for Level #4 @ $11.30/Tn Trvl + $15.88/Tn Disposal + $157/Tn Grout + $2,777.78/Tn for special handling & over-pack costs = $2,962.18/Tn.

b - Concrete under and over 2' thick - Level #1 @ $11.30/Tn Travel + $15.88/Tn Disposal at ERDF = $27.18/TN; Level #2 @ $11.30/Tn for Travel + $15.88/Tn for ERDF disposal + 50% uplift for extra ERDF involvement = $40.77/TN; Level #3 @ $11.30/Tn for Travel + $15.88/Tn for ERDF disposal + $27.18/Tn for Grouting = $184.18; and for Level #4 $11.30/Tn Travel + $15.88/Tn Disposal + $157/Tn Grout + $2,777.78/Tn for special handling & over-pack costs = $2,962.18/Tn.

c - Structural Steel - Level #1 @ $11.30/Tn Travel + $15.88/Tn Disposal at ERDF = $27.18/TN; Level #2 @ $11.30/Tn for Travel + $15.88/Tn for ERDF disposal + 50% uplift for extra ERDF involvement = $40.77/TN; Level #3 @ $11.30/Tn for Travel + $15.88/Tn for ERDF disposal + $27.18/Tn for Grouting = $184.18; and for Level #4 $11.30/Tn Travel + $15.88/Tn Disposal + $157/Tn Grout + $2,777.78/Tn for special handling & over-pack costs = $2,962.18/Tn.

d - Soils - Level #1 @ $11.30/Tn Travel + $15.88/Tn Disposal at ERDF = $27.18/TN; Level #2 @ $11.30/Tn for Travel + $15.88/Tn for ERDF disposal + 50% uplift for extra ERDF involvement = $40.77/TN; Level #3 @ $11.30/Tn for Travel + $15.88/Tn for ERDF disposal + $27.18/Tn for Grouting = $184.18; and for Level #4 $11.30/Tn Travel + $15.88/Tn Disposal + $157/Tn Grout + $2,777.78/Tn for special handling & over-pack costs = $2,962.18/Tn.

15 - Specialty high Rad waste Boxes/containers (5'x5'x8') are captured under WRPS Procurement costs, and an allowance of $2,000 each covering fabrication, purchase, & delivery to Hanford C-Farm site.

16 - WRPS support personnel such as RAD Techs, Safety Inspectors, Field Oversight personnel, QA/QC, etc. will be supplied such it will not limit or hinder the Subcontractor from accomplishing their work.

17 - Subcontractor's staff and worker trailers will be located within walking distance from work site.

18 - Subcontractor will mange Sub-tier Subcontractors where involved such as: in mobilization; Infrastructure set-up; installing Weather Enclosures; Altering Enclosures; D&D removal of Weather Enclosures; 2ndry containment shelters; etc.

19 - Majority of worker PPE in the pit or performing hazardous and contaminated waste activities will be in Level "B" fitted with respirator .

20 - Personal PPE minimum at the site will be gloves, ear plugs (designated areas or around equipment), steel toed boots, hard hats, and safety glasses.

21 - WRPS will provide drinking water to the Subcontractor at a central location, and the Subcontractor will manage the set-up locations including water delivery to and from placement locations.

22 - (1) RAW water fill station will be provided to the Subcontractor in "C" Tank Farm for dust suppression and other watering needs.

23 - Maintenance of the haul roads and "Q" container storage area will be performed by the Subcontractor and include periodic leveling, re-coating road base, compacting, and dust/soil control.

24 - Radiological control support, monitoring personnel, detectors, and associated instrumentation will be costed under WRPS project support.

25 - Waste cauterization sampling, technicians, sampling equipment, and associated reporting will be costed under WRPS project support.

26 - Respirators used to protect Subcontractors from radiological or hazardous mat'ls will be provided, and maintained by WRPS project support.

27 - Analytical services (field screening and laboratory analyses) will be costed under Subcontractor project support.

EXCLUSIONS -
Scope not include or priced -

1 - Waste depth >5' below tank's base foundations, diversion box, and other designated specialty scope.

2 - WRPS developing project, meaning preliminary and operational permitting, approvals, BCR and budget approval, project scope development, and project close out after Subcontractor demobilization are completed.

3 - Solder pier drilling hitting rock, or Level #4 high Rad waste requiring remote operated drilling rig and operations.

4 - Hazardous or Rad waste outside of C-Farm fence boundary.

5 - Waste quantities surfacing above the expressed amounts and known levels provided by CEES Engineering in their Waste Quantity worksheet.

8 washington river protection solutions

Estimate Purpose, Scope & Assumptions

Title: C Farm Tank Removal Study - ROM Estimate | Est No: #2723
Estimator: Dan Jakubek | Date: 8/10/2010

6 - Increasing production and personnel to shorten construction schedule, adding additional shifts, or deviating from a 4/10hr day shift . A 10% OT is applied to most cost segments for turn-over, supervision/foreman early/late time preping for daily operations, maintenance/fuel/prep equipment, and other special needs optimizing waste activities.

7 - Waste not going to ERDF, and is required to be disposed of at another site. Or waste requiring additional processing from a specialty company outside of C-Farm such as CWC, or PremaFix.

8 - Paying for additional ERDF cell space construction. Currently the C-Farm waste quantity will fill 64% of one "standard" ERDF cell. One standard cell cost is approximately $24 million, and can hold 1.4 million tons of waste. Currently the C-Farm waste quantity is 902,652 US Tons.

ESTIMATE METHODOLOGY:

1 - Scope indicated herein is based on discussions with WRPS Project Mgmt, CEES Design Engineering personnel, and other project supporting groups.

2 - Weather Enclosures, and Special high Rad pit processing facility square foot costs were developed from Means estimating manuals, Vendor's quotes (RUBB Bldg Systems) and discussions, previous Tank Farm estimates, previous URS ROM estimate for a Tank Farm enclosure, Survey Tent estimate, Project Team discussions, and Estimator's experience.

3 - Subcontractor Craft Labor rates were taken from current FY2010 Hanford site Labor rates (HSSA - Building Trades Agreement). Base wage rates and fringes for manual craft are published rates from the Hanford Stabilization agreement, Appendix A. Rates include fringes, applicable taxes and insurance. Labor job hours are estimated by crews and against production rates.

4 - Subcontractor Non-Manual labor rates were taken from FY10 historical rates used on awarded projects, based on Estimator's experience, and at a percentage of the total construction and procurement costs.

5 - Material, equipment, or subcontract pricing is based on Means estimating manuals, Vendor quotes and discussions, current pricing information from other projects, and Estimators experience .

6 - Construction equipment costs were taken from July 7, 2010 Equipment Watch Blue Book, Ownership @ 80%, & Operating Cost 100% unless expressed otherwise.

7 - Cost adders for: Sub-Contractor Overhead and Profit multiplier applied @ 15%; B&O Tax multiplier applied @ .471%; and Contractor Bond multiplier applied @ 1.75% based on Estimator's experience for contracts containing significant risk factors surrounding hazardous and contaminated waste decommissioning scope.

8 - Washington State sales tax was applied to site non support services labor, material, equipment, and Sub-Contracts at 8.3%.

WRPS AND OTHER PROJECT SUPPORT:
WRPS Construction Management, Procurement, HPTs, Safety, and other site service support is estimated at 35% of the total construction and procurement costs, and based on historical data for WRPS oversight and support work performed in the Tank Farms.

Engineering Design and Support:
Is estimated at various percentages based on commodity, purpose, and support activities and was selected from Estimators experience. See Excel column F & G of estimate Summary for application, range, and budget amount.

ESCALATION:

The estimate is in current dollars.
Escalation is not included in this cost estimate.

CONTINENCY:

Contingency is included in this estimate at 50%, and is acceptable for Study cost purpose.

D3.0 ESTIMATE SUMMARY

Estimate Summary

washington river protection solutions

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Est No: #2723
Date: 8/10/2010

Description	Quant.	Unit	Total Labor Hrs	Labor Dollars	Material Dollars	Equip Dollars	Sub Contract Dollars	Total Dollars
WRPS Support								
01 Project Management			73,801	5,485,260	82,279	0	0	5,567,539
02 Engineering, Design and Inspection			17,155	1,540,546	0	0	9,435,441	10,975,987
03 Project Support			858	77,030	0	0	471,772	548,802
04 Procurement			0	0	0	0	18,796,548	18,796,548
05 Procurement Support			7,364	661,251	0	0	0	661,251
06 Field Work (Plant Forces)			10,801	484,921	14,500	114,500	1,000,000	1,613,921
08 WRPS Construction Management			221,401	17,025,218	255,378	0	0	17,280,596
09 WRPS Construction Support			261,370	14,280,967	0	0	5,000	14,285,967
Total WRPS Support Cost			592,750	39,555,194	352,157	114,500	29,708,761	69,730,612
Field Construction								
Mobilization Scope			9,955	718,308	522,891	95,212	158,815	1,495,226
Construction Mgmt & Infrastructure Support Staff			545,376	20,572,030	6,612,983	11,010,478	12,959,912	51,155,403
Support Trailers OPS Rental, Cleaning, & Maintenance			0	0	56,221	0	3,328,106	3,384,327
Install Roads, Trailers, Vehicle Parking Lot, Equip Lay-Down Area, CTA/Q, & Pit Ramp			2,249	124,362	47,834	72,009	1,426,899	1,671,104
Maintain Roads, Trailers, Vehicle Parking Lot, Equip Lay-Down Area, CTA/Q, & Pit Ramp			45,453	1,250,057	179,176	1,099,809	386,673	2,915,714
Install Electrical Infrastructure			1,682	136,540	902	23,666	2,046,896	2,208,003
Install Survey Facility			3,038	175,098	151,706	29,165	28,177	384,146
Pit & Waste Handling Equipment			577,141	0	0	27,007,113	0	27,007,113
Pit & Waste Handling OPS Labor			541,948	29,156,983	5,065,831	0	918,005	35,140,818
Install & Remove Weather Enclosures #3, #4, #5, #6, #7, #8, & #9			0	0	0	0	23,555,185	23,555,185
Install & Remove HEPA Filter Systems On Each Weather Enclosure #1, #2, #3, #4, #5, #6, #7, #8, & #9			0	0	0	0	83,600,861	83,600,861
Weather Enclosures Foundation			125,620	5,953,495	4,199,271	11,848,586	51,534	22,052,886
Install & Remove Weather Enclosures #1 & #2			0	0	0	0	38,475,529	38,475,529
Rad Level #4 Waste Processing Facility			0	0	0	0	31,205,430	31,205,430
Level #1 Waste Disposal SubK $			0	0	0	0	21,675,312	21,675,312

Level #2 Waste Disposal SubK $	**0**	**0**	**0**	**0**	**3,559,879**	**3,559,879**
Level #3 Waste Disposal SubK $	**0**	**0**	**0**	**0**	**146,512**	**146,512**
Level #4 Waste Disposal SubK $	**0**	**0**	**0**	**0**	**50,557,828**	**50,557,828**
Remote Operated D&D Equipment	**0**	**0**	**0**	**0**	**18,524,496**	**18,524,496**
Apply Fixative to Inside of Tank	**8,145**	**432,915**	**157,755**	**63,353**	**16,832**	**670,856**
Grout Fill Tank Bottoms 3' Deep In 100 and 200 Tanks, & Catch Tank C-301	**4,620**	**285,210**	**598,597**	**28,790**	**13,524**	**926,120**
Back-fill Soil After Tank/s Are Removed	**114,393**	**6,611,174**	**204,215**	**448,848**	**20,689,353**	**27,953,590**
Demobilization Scope 25% of Mobilization	**2,489**	**179,577**	**130,723**	**23,803**	**39,704**	**373,807**
	0	**0**	**0**	**0**	**0**	**0**
Total Filed Construction Cost	**1,982,110**	**65,595,747**	**17,928,105**	**51,750,832**	**313,365,462**	**448,640,147**
Total Project Cost	**2,574,860**	**105,150,941**	**18,280,262**	**51,865,332**	**343,074,223**	**518,370,759**
Contingency 50%		**52,575,471**	**9,140,131**	**25,932,666**	**171,537,111**	**259,185,380**
Escalation - All Segment of Costs Priced Using FY2010 Rates and NO Escalation Has Been Applied For Out Years.		**0**	**0**	**0**	**0**	**0**
Total Project		**157,726,412**	**27,420,394**	**77,797,999**	**514,611,334**	**777,556,139**

D4.0 ESTIMATE DETAILS

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
WRPS Project Support
Est No: #2723
Date: 08/10/10

Description	Resource Code	Quant.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
01 Project Management														
Managers & Executives - Est (1) FTE 100% of Proj Sch Duration	M020-REG	14,760	HRS	1.00	14,760	101.16	1,493,122	-	-	-	-	-	-	1,493,122
Other Engineers - Est (1) FTE 100% of Proj Sch Duration	E130-REG	14,760	HRS	1.00	14,760	89.80	1,325,448	-	-	-	-	-	-	1,325,448
Proj Ctrls Support - Planner/Scheduler/Estimators - Est (2) FTEs 100% of Proj Sch Duration	P070-REG	29,520	HRS	1.00	29,520	68.88	2,033,338	-	-	-	-	-	-	2,033,338
Administrative Assistants - Est (1) FTEs 100% of Proj Sch Duration	G010-REG	14,760	HRS	1.00	14,760	42.91	633,352	-	-	-	-	-	-	633,352
Project Office Materials - Est 1.5% of Fld Const $	10	1	LS	1.00	1	1.00	1	82,279	82,279	-	-	-	-	82,280
Subtotal Project Management					**73,801**		**5,485,260**		**82,279**		**-**		**-**	**5,567,539**
02 Engineering, Design and Inspection														
Subcontracted Design - Allowance est 9% of construction costs based on project specialties such as: contamination levels, robotics required for certain debris removal; specialty facilities; special waste handling processes; etc - Allowance covering 100% phases of design development, reviews, approval, permitting, etc.	21	1	LS	-	-	1.00	-	-	-	-	-	9,435,441	9,435,441	9,435,441
WRPS Design support Overseeing Subcontractor design development - Allowance 20% of SubK costs	E130-REG	17,155	HRS	1.00	17,155	89.80	1,540,546	-	-	-	-	-	-	1,540,546
Subtotal ED&I					**17,155**		**1,540,546**		**-**		**-**		**9,435,441**	**10,975,987**
03 Project Support														
Subcontracted Design Support During Construction Activities - Allowance est 5% covering regulatory permitting; NS&L docs; reviews; approval; permitting; work plan; safety docs; gen support; etc.	21	1	LS	-	-	1.00	-	-	-	-	-	471,772	471,772	471,772
WRPS Design support Overseeing Subcontractor design development - Allowance 30% of SubK costs	E130-REG	858	HRS	1.00	858	89.80	77,030	-	-	-	-	-	-	77,030
Subtotal Project Support					**858**		**77,030**		**-**		**-**		**471,772**	**548,802**
04 Procurement														
Materials, Equipment, and Subcontracts														
Equipment - Robotic equip - See separate cost detail sheet for budget	10	1	LS	-	-	1.00	-	-	-	-	-	-	-	-
Fabricated Items - Specialty contamination containers/boxes/over-packs used on high level rad waste - Allowance est 300 items at $2,500	21	300	EA	-	-	1.00	-	-	-	-	-	2,500	750,000	750,000
WRPS Purchase Power for C-Farm During D&D Activities - Allowance est for (8.5) years @ $500,000 per year	21	8.5	YRS	-	-	1.00	-	-	-	-	-	500,000	4,250,000	4,250,000
WA State Sales Tax	24						-		-		-		415,000	415,000
Fabricated Items														

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
WRPS Project Support
Est No: #2723
Date: 08/10/10

Description	Resource Code	Quant.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Fabricated Items - Specialty contamination containers/boxes used on high level rad waste - Allowance est .28 to 3 Tons per 1 specialty Box - Est 74 Tons of < 2' Thk Concrete + 16,692 Tons of > 2' Thk Concrete + 302 Tons of Structural Steel = 17,068 Tons of High Level Waste + 5% overage qty = 17,921 Tons / 2.9 Tons per Box = 6,178 Boxes - Allowance for 5'x5'x8 steel specialty Boxes @ $2,000 ea.	21	6,178	EA	-	-	1.00	-	-	-	-	-	2,000	12,356,000	12,356,000
Fabricated Item	21	-	EA	-	-	1.00	-	-	-	-	-	-	-	-
WA State Sales Tax	24						-		-		-		1,025,548	1,025,548
Subtotal Procurement					-		-		-		-		**18,796,548**	**18,796,548**
05 Procurement Support														
Incl - Perp/Issue SOW; Revise SOW as needed; Award procurements; prepare Mat'l Reqs; Prepare ECNs; QAIP support; Oversee procurement & fab; etc - Allowance est 1/2% of construction costs	E130-REG	7,364	HRS	1.00	7,364	89.80	661,251	-	-	-	-	-	-	661,251
Subtotal Procurement Support					**7,364**		**661,251**		**-**		**-**		**-**	**661,251**
06 Field Work (Plant Forces)														
Incl - Field Work Plant Forces Support As Need Basis - Allowance est 1/2% of construction costs	1O	10,800	HRS	1.00	10,800	44.90	484,920	-	-	-	-	-	-	484,920
Provide Power to C-Farm Area - WRSP to ensure grid power is available to D&D subcontractor to perform activities - MSA currently is managing the feed system. It is assumed the feed incoming system will need minor changes to accomidate. Possibly transformer/s, feed capability changes on 4-sides of area, etc. - Allowance est for power feed changes & periodic alteration.	21	1	LS	1.00	1	1.00	1	-	-	-	-	1,000,000	1,000,000	1,000,001
Crane & Rigging - Allowance $100,000	3P	1	LS	-	-	1.00	-	-	-	100,000	100,000	-	-	100,000
Miscellaneous Equipment/Small Tools - Est 3% of Labor	10	1	LS	-	-	1.00	-	14,500	14,500	14,500	14,500	-	-	29,000
Subtotal Field Work					**10,801**		**484,921**		**14,500**		**114,500**		**1,000,000**	**1,613,921**
08 WRPS Construction Management														
Project Manager - Est (1) FTEs 100% of Const Schedule	M020-REG	14,760	HRS	1.00	14,760	101.16	1,493,122	-	-	-	-	-	-	1,493,122
Construction Manager - Est (2) FTEs 100% of Const Schedule	M020-REG	29,520	HRS	1.00	29,520	101.16	2,986,243	-	-	-	-	-	-	2,986,243
Construction Field Lead / 1st line Supv - Est (3) FTEs 100% of Const Schedule	M010-REG	44,280	HRS	1.00	44,280	71.40	3,161,592	-	-	-	-	-	-	3,161,592
Other Engineers - Est (2) FTEs 100% of Proj Sch Duration	E130-REG	29,520	HRS	1.00	29,520	89.80	2,650,896	-	-	-	-	-	-	2,650,896
Proj Ctrls Support - Planner/Scheduler/Estimators - Est (6) FTEs 100% of Proj Sch Duration	P070-REG	88,560	HRS	1.00	88,560	68.88	6,100,013	-	-	-	-	-	-	6,100,013
Administrative Assistants - Est (1) FTEs 100% of Proj Sch Duration	G010-REG	14,760	HRS	1.00	14,760	42.91	633,352	-	-	-	-	-	-	633,352
Project Office Materials - Est 1.5% of Fld Const $	10	1	LS	1.00	1	1.00	1	255,378	255,378	-	-	-	-	255,379
Subtotal Construction Management					**221,401**		**17,025,218**		**255,378**		**-**		**-**	**17,280,596**

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
WRPS Project Support
Est No: #2723
Date: 08/10/10

Description	Resource Code	Quant.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
09 WRPS Construction Support														
HPT Construction Support - Assume @ 100% of Const Duration														
Health Physics Technician - Est (10) FTEs 100% of Schedule	T050-REG	147,600	HRS	1.00	147,600	52.02	7,678,152	-	-	-	-	-	-	7,678,152
IH Construction Support - Assume @ 100% of Const Duration														
Industrial Health & Safety - Est (5) FTEs 100% of Schedule	T060-REG	73,800	HRS	1.00	73,800	51.93	3,832,434	-	-	-	-	-	-	3,832,434
PHMC Crane Usage														
Crane & Rigging	44	-	LS	-	-	1.00	-	-	-	-	-	-	-	-
Planning & Work Package Prep - (Simple)		50	EA											
System Engineer	E130-REG	50	EA	24.00	1,200	89.80	107,760	-	-	-	-	-	-	107,760
Field Work Supervisor	M010-REG	50	EA	24.00	1,200	71.40	85,680	-	-	-	-	-	-	85,680
Planner	P070-REG	50	EA	40.00	2,000	68.88	137,760	-	-	-	-	-	-	137,760
Radiation Control	P090-REG	50	EA	24.00	1,200	72.95	87,540	-	-	-	-	-	-	87,540
Planning & Work Package Prep - (Complex)		30	EA											
Planner	P070-REG	30	EA	240.00	7,200	65.11	468,792	-	-	-	-	-	-	468,792
System Engineer	E130-REG	30	EA	48.00	1,440	87.27	125,669	-	-	-	-	-	-	125,669
Radiation Control	P090-REG	30	EA	48.00	1,440	69.49	100,066	-	-	-	-	-	-	100,066
Field Work Supervisor	M010-REG	30	EA	48.00	1,440	68.30	98,352	-	-	-	-	-	-	98,352
Enhanced Work Planning - (Complex)		30	EA											
Planner	P070-REG	30	EA	8.00	240	65.11	15,626	-	-	-	-	-	-	15,626
Carpenter	C010-REG	30	EA	8.00	240	50.49	12,118	-	-	-	-	-	-	12,118
Electrician	C020-REG	30	EA	8.00	240	55.14	13,234	-	-	-	-	-	-	13,234
Pipefitter	C080-REG	30	EA	8.00	240	51.62	12,389	-	-	-	-	-	-	12,389
Other Crafts	C120-REG	30	EA	8.00	240	51.48	12,355	-	-	-	-	-	-	12,355
Environmental Engineer	E050-REG	30	EA	8.00	240	79.99	19,198	-	-	-	-	-	-	19,198
Quality Control	E110-REG	30	EA	8.00	240	71.06	17,054	-	-	-	-	-	-	17,054
Safety Engineer	E120-REG	30	EA	8.00	240	62.55	15,012	-	-	-	-	-	-	15,012
System Engineer	E130-REG	30	EA	8.00	240	87.27	20,945	-	-	-	-	-	-	20,945
Light Vehicle Driver	L070-REG	30	EA	8.00	240	41.78	10,027	-	-	-	-	-	-	10,027
Field Work Supervisor	M010-REG	30	EA	8.00	240	68.30	16,392	-	-	-	-	-	-	16,392
Industrial Hygiene	P090-REG	30	EA	8.00	240	69.49	16,678	-	-	-	-	-	-	16,678
Health Physics Technician	T050-REG	30	EA	8.00	240	53.64	12,874	-	-	-	-	-	-	12,874
Review & Approve Work Packages - (Simple)		50	EA											
Environmental Engineer	E050-REG	50	EA	4.00	200	84.52	16,904	-	-	-	-	-	-	16,904
Operations Plant Engineer	E100-REG	50	EA	20.00	1,000	65.95	65,950	-	-	-	-	-	-	65,950
Quality Control	E110-REG	50	EA	4.00	200	75.25	15,050	-	-	-	-	-	-	15,050
Safety Engineer	E120-REG	50	EA	4.00	200	59.70	11,940	-	-	-	-	-	-	11,940
System & Other Engineer	E130-REG	50	EA	12.00	600	89.80	53,880	-	-	-	-	-	-	53,880
Field Work Supervisor	M010-REG	50	EA	4.00	200	71.40	14,280	-	-	-	-	-	-	14,280
Planner	P070-REG	50	EA	16.00	800	68.88	55,104	-	-	-	-	-	-	55,104
Health Physics Technician	T050-REG	50	EA	4.00	200	52.02	10,404	-	-	-	-	-	-	10,404
Industrial Health & Safety	T060-REG	50	EA	4.00	200	51.93	10,386	-	-	-	-	-	-	10,386
Review & Approve Work Packages - (Complex)		30	EA											
Planner	P070-REG	30	EA	30.00	900	65.11	58,599	-	-	-	-	-	-	58,599
Environmental Engineer	E050-REG	30	EA	8.00	240	79.99	19,198	-	-	-	-	-	-	19,198
Quality Control	E110-REG	30	EA	8.00	240	71.06	17,054	-	-	-	-	-	-	17,054
Safety Engineer	E120-REG	30	EA	8.00	240	62.55	15,012	-	-	-	-	-	-	15,012
System & Other Engineer	E130-REG	30	EA	23.00	690	87.27	60,216	-	-	-	-	-	-	60,216
Field Work Supervisor	M010-REG	30	EA	8.00	240	68.30	16,392	-	-	-	-	-	-	16,392
Health Physics Technician	T050-REG	30	EA	8.00	240	53.64	12,874	-	-	-	-	-	-	12,874

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
WRPS Project Support
Est No: #2723
Date: 08/10/10

Description	Resource Code	Quant.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Industrial Health & Safety	T060-REG	30	EA	8.00	240	52.06	12,494	-	-	-	-	-	-	12,494
Operations Plant Engineer	E100-REG	30	EA	38.00	1,140	64.82	73,895	-	-	-	-	-	-	73,895
Close Out Work Packages - (Moderate)		80	EA											
Planner	P070-REG	80	EA	16.00	1,280	65.11	83,341	-	-	-	-	-	-	83,341
Operations Plant Engineer	E100-REG	80	EA	8.00	640	64.82	41,485	-	-	-	-	-	-	41,485
Administration	G020-REG	80	EA	4.00	320	29.24	9,357	-	-	-	-	-	-	9,357
Other Engineer	E130-REG	80	EA	8.00	640	87.27	55,853	-	-	-	-	-	-	55,853
Field Work Supervisor	M010-REG	80	EA	4.00	320	68.30	21,856	-	-	-	-	-	-	21,856
Prepare USQ - (Moderate)		10	EA											
Other Engineer	E130-REG	10	EA	28.00	280	89.80	25,144	-	-	-	-	-	-	25,144
Review Engineer	E130-REG	10	EA	9.00	90	89.80	8,082	-	-	-	-	-	-	8,082
Prepare ECN's - (Moderate)		10	EA											
Electrical Engineer	E040-REG	10	EA	4.00	40	73.81	2,952	-	-	-	-	-	-	2,952
Environmental Engineer	E050-REG	10	EA	1.00	10	84.52	845	-	-	-	-	-	-	845
Plant Engineer	E100-REG	10	EA	4.00	40	65.95	2,638	-	-	-	-	-	-	2,638
Quality Assurance Engineer	E110-REG	10	EA	2.00	20	75.25	1,505	-	-	-	-	-	-	1,505
Safety Engineer	E120-REG	10	EA	1.00	10	59.70	597	-	-	-	-	-	-	597
System Engineer	E130-REG	10	EA	4.00	40	89.80	3,592	-	-	-	-	-	-	3,592
Radiation Control Supervisor	M010-REG	10	EA	2.00	20	71.40	1,428	-	-	-	-	-	-	1,428
Management	M020-REG	10	EA	1.00	10	101.16	1,012	-	-	-	-	-	-	1,012
Industrial Hygiene	P090-REG	10	EA	1.00	10	72.95	730	-	-	-	-	-	-	730
Material Requests - (Simple)		-	EA											
Material Coordinator	G030-REG	-	EA	4.00	-	44.71	-	-	-	-	-	-	-	-
Pre Job Briefings - (Simple) .5 HR per Day		1,000	DAY											
Other Engineers	E130-REG	1,000	DAY	1.00	1,000	89.80	89,800	-	-	-	-	-	-	89,800
Administration	G020-REG	1,000	DAY	1.00	1,000	30.96	30,960	-	-	-	-	-	-	30,960
1st Line Supervisor	M010-REG	1,000	DAY	1.00	1,000	71.40	71,400	-	-	-	-	-	-	71,400
Post Job Alara Review - (Moderate) 6 months x 5 days x 4.333 weeks		20	DAY											
Planner	P070-REG	20	DAY	2.00	40	65.11	2,604	-	-	-	-	-	-	2,604
Electrician	C020-REG	20	DAY	4.00	80	55.14	4,411	-	-	-	-	-	-	4,411
Electrical Engineer	E040-REG	20	DAY	2.00	40	71.89	2,876	-	-	-	-	-	-	2,876
Environmental Engineer	E050-REG	20	DAY	1.00	20	79.99	1,600	-	-	-	-	-	-	1,600
System Engineer	E130-REG	20	DAY	4.00	80	87.27	6,982	-	-	-	-	-	-	6,982
Administration	G020-REG	20	DAY	2.00	40	29.24	1,170	-	-	-	-	-	-	1,170
First Line Supervision	M010-REG	20	DAY	1.00	20	68.30	1,366	-	-	-	-	-	-	1,366
Ground Scanning		20	EA											
Civil Engineer	E020-REG	20	EA	6.00	120	70.50	8,460	-	-	-	-	-	-	8,460
Other Engineers	E130-REG	20	EA	54.00	1,080	89.80	96,984	-	-	-	-	-	-	96,984
First Line Supervision	M010-REG	20	EA	4.00	80	71.40	5,712	-	-	-	-	-	-	5,712
Perform Ground Scanning - (Subcontract)	21	1	LS	-	-	1.00	-	-	-	-	-	5,000	5,000	5,000
Radiation Work Permits		20	EA											
Planner	P070-REG	20	EA	14.00	280	65.11	18,231	-	-	-	-	-	-	18,231
Electrician	C020-REG	20	EA	2.00	40	55.14	2,206	-	-	-	-	-	-	2,206
Electrical Engineer	E040-REG	20	EA	2.00	40	71.89	2,876	-	-	-	-	-	-	2,876
Environmental Engineer	E050-REG	20	EA	5.00	100	79.99	7,999	-	-	-	-	-	-	7,999
Operations Plant Engineer	E100-REG	20	EA	2.00	40	64.82	2,593	-	-	-	-	-	-	2,593
Safety Engineer	E120-REG	20	EA	2.00	40	62.55	2,502	-	-	-	-	-	-	2,502
System Engineer	E130-REG	20	EA	5.00	100	87.27	8,727	-	-	-	-	-	-	8,727
Field Work Supervisor	M010-REG	20	EA	5.00	100	68.30	6,830	-	-	-	-	-	-	6,830
Health Physics Technician	T050-REG	20	EA	5.00	100	53.64	5,364	-	-	-	-	-	-	5,364
Industrial Health & Safety	T060-REG	20	EA	2.00	40	52.06	2,082	-	-	-	-	-	-	2,082

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
WRPS Project Support
Est No: #2723
Date: 08/10/10

Description	Resource Code	Quant.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Field Work Changes - (Moderate)		20	EA											
Planner	P070-REG	20	EA	48.00	960	65.11	62,506	-	-	-	-	-	-	62,506
Environmental Engineer	E050-REG	20	EA	3.00	60	79.99	4,799	-	-	-	-	-	-	4,799
Quality Control Engineer	E110-REG	20	EA	3.00	60	71.06	4,264	-	-	-	-	-	-	4,264
Safety Engineer	E120-REG	20	EA	3.00	60	62.55	3,753	-	-	-	-	-	-	3,753
System Engineer	E130-REG	20	EA	14.00	280	87.27	24,436	-	-	-	-	-	-	24,436
Field Work Supervisor	M010-REG	20	EA	7.00	140	68.30	9,562	-	-	-	-	-	-	9,562
Engineering	E130-REG	20	EA	3.00	60	87.27	5,236	-	-	-	-	-	-	5,236
Health Physics Technician	T050-REG	20	EA	7.00	140	53.64	7,510	-	-	-	-	-	-	7,510
Operations Plant Engineer	E100-REG	20	EA	10.00	200	64.82	12,964	-	-	-	-	-	-	12,964
Pre Job Briefings - (Complex) 1 HR per Day		50	DAY											
Other Engineers	E130-REG	50	DAY	1.00	50	87.27	4,364	-	-	-	-	-	-	4,364
Administration	G020-REG	50	DAY	1.00	50	29.24	1,462	-	-	-	-	-	-	1,462
Management	M010-REG	50	DAY	1.00	50	68.30	3,415	-	-	-	-	-	-	3,415
Support Haz Waste Transport to ERDF		20	EA											
Nuclear Waste Process Operator	R050-REG	20	EA	8.00	160	57.22	9,155	-	-	-	-	-	-	9,155
Shipper	C120-REG	20	EA	4.00	80	53.85	4,308	-	-	-	-	-	-	4,308
First Line Supervision	M010-REG	20	EA	2.00	40	71.40	2,856	-	-	-	-	-	-	2,856
Lock/Tag-outs - (Simple)		10	EA											
Electrician	C020-REG	10	EA	8.00	80	57.65	4,612	-	-	-	-	-	-	4,612
First Line Supervision	M010-REG	10	EA	8.00	80	71.40	5,712	-	-	-	-	-	-	5,712
Nuclear Waste Process Operator	R050-REG	10	EA	8.00	80	57.22	4,578	-	-	-	-	-	-	4,578
Construction Acceptance Test (CAT) - Support		1	WKS											
Mechanical Engineer	E070-REG	1	WKS	-	-	74.96	-	-	-	-	-	-	-	-
Electrical Engineer	E040-REG	1	WKS	40.00	40	73.81	2,952	-	-	-	-	-	-	2,952
Plant Engineer	E100-REG	1	WKS	40.00	40	65.95	2,638	-	-	-	-	-	-	2,638
Subtotal Construction Support					**261,370**		**14,280,967**		**-**		**-**		**5,000**	**14,285,967**
10 Startup & Testing														
Subtotal Startup and Testing					**-**		**-**		**-**		**-**		**-**	**-**
11 Operations														
Subtotal Operations					**-**		**-**		**-**		**-**		**-**	**-**
12 D&D														
Subtotal D&D					**-**		**-**		**-**		**-**		**-**	**-**
Total Project (Without Contingency or Escalation)					**592,750**		**39,555,194**		**352,157**		**114,500**		**29,708,761**	**69,730,612**
Contingency							**-**		**-**		**-**		**-**	**-**
Escalation							**-**		**-**		**-**		**-**	**-**
Total Project					**592,750**		**39,555,194**		**352,157**		**114,500**		**29,708,761**	**69,730,612**

8/18/2010

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Mobilization

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Operations and Overheads																
1	~ Project Mgr - Est 100% of Mobe const sch - Incl trailer set-up, roads, parking lots, lay-dwn area, pit egress rds, survey tent, & utilities - crews wkng 4/10s	Cnst E Mgmt	21	60.3	DYS	10.0	602.6	93.73	56,482	0	0	0.00	0	0.00	0	56,482
2	~ Proj Mgmt Vehicle support - Equip hrly costs from Blue Book	SubK	21	602.6	HRS	0.0	0.0	0.00	0	0	0	17.08	10,293	0.00	0	10,293
1	~ Field Engineer - Est 100% of Mobe const sch - Incl trailer set-up, roads, parking lots, lay-dwn area, pit egress rds, survey tent, & utilities - crews wkng 4/10s	Cnst E Eng	21	60.3	DYS	10.0	602.6	92.27	55,602	0	0	0.00	0	0.00	0	55,602
2	~ Field Engineer Vehicle support - Equip hrly costs from Blue Book	SubK	21	602.6	HRS	0.0	0.0	0.00	0	0	0	17.08	10,293	0.00	0	10,293
3	~ Field Work Supervisor - Est 100% of Mobe const sch - Incl trailer set-up, roads, parking lots, lay-dwn area, pit egress rds, survey tent, & utilities - crews wkng 4/10s	Cnst E Sup	21	60.3	DYS	10.0	602.6	89.80	54,113	0	0	0.00	0	0.00	0	54,113
4	~ Field Work Supervisor Vehicle support - Equip hrly costs from Blue Book	SubK	21	602.6	HRS	0.0	0.0	0.00	0	0	0	17.08	10,293	0.00	0	10,293
5	~ Safety Rep - Est 100% of Mobe const sch - Incl trailer set-up, roads, parking lots, lay-dwn area, pit egress rds, survey tent, & utilities - crews wkng 4/10s	Cnst E Safe	21	60.3	DYS	10.0	602.6	87.04	52,450	0	0	0.00	0	0.00	0	52,450
6	~ Safety Rep Vehicle support - Equip hrly costs from Blue Book	SubK	21	602.6	HRS	0.0	0.0	0.00	0	0	0	17.08	10,293	0.00	0	10,293
7	~ Admin Services - Est 100% of Mobe const sch - Incl trailer set-up, roads, parking lots, lay-dwn area, pit egress rds, survey tent, & utilities - crews wkng 4/10s	Cnst E Adm	21	60.3	DYS	10.0	602.6	33.60	20,246	0	0	0.00	0	0.00	0	20,246
Mobilization Staffing & Training																
8	~ Operating Engineers Foreman - Full-time supporting site - Performing excavating, moving ERDF & waste containers, dressing rd/s, running fork-lift/sml cranes - Training 80hrs of training paid for 8/hrs dys) - Estimate class SubK $ (Est 7 classes x $250 ea)	1OF	21	1.0	CRFT	80.0	80.0	45.98	3,678	0.00	0	0.00	0	1,750	1,750	5,428
9	~ Operating Engineers - Full-time supporting site - Performing excavating, moving ERDF & waste containers, dressing rd/s, running fork-lift/sml cranes - Training 80hrs of training paid for 8/hrs dys) - Estimate class SubK $ (Est 7 classes x $250 ea)	1O	21	3.0	CRFT	80.0	240.0	44.90	10,776	0.00	0	0.00	0	1,750	5,250	16,026
10	~ Teamsters Foreman - Full-time supporting site - Performing moving ERDF & waste containers, mat'ls, dust control, etc - Training 80hrs of training paid for 8/hrs dys) - Estimate class SubK $ (Est 7 classes x $250 ea)	1TMF	21	1.0	CRFT	80.0	80.0	44.76	3,581	0.00	0	0.00	0	1,750	1,750	5,331
11	~ Teamsters - Full-time supporting site - Performing moving ERDF & waste containers, mat'ls, dust control, etc - Training 80hrs of training paid for 8/hrs dys) - Estimate class SubK $ (Est 7 classes x $250 ea)	1TM	21	4.0	CRFT	80.0	320.0	43.68	13,978	0.00	0	0.00	0	1,750	7,000	20,978
12	~ Electrical Foreman - Full-time supporting site - Installing & moving elect items, lighting, elect feed sys, etc - Training 80hrs of training - Estimate class SubK $ (Est 7 classes x $250 ea)	1ELF	21	1.0	CRFT	80.0	80.0	62.14	4,971	0.00	0	0.00	0	1,750	1,750	6,721
13	~ Electricians - Full-time supporting site - Installing & moving elect items, lighting, elect feed sys, etc - Training 80hrs of training - Estimate class SubK $ (Est 7 classes x $250 ea)	1EL	21	2.0	CRFT	80.0	160.0	56.49	9,038	0.00	0	0.00	0	1,750	3,500	12,538

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Mobilization

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
14	~ Carpenter Foreman - Full-time supporting site - Building protective structures, containments, etc - Training 80hrs of training - Estimate class SubK $ (Est 7 classes x $250 ea)	1CF	21	1.0	CRFT	80.0	80.0	48.26	3,861	0.00	0	0.00	0	1,750	1,750	5,611
15	~ Carpenters - Full-time supporting site - Building protective structures, containments, etc - Training 80hrs of training - Estimate class SubK $ (Est 7 classes x $250 ea)	1C	21	1.0	CRFT	80.0	80.0	46.38	3,710	0.00	0	0.00	0	1,750	1,750	5,460
16	~ Carpenter Foreman - Full-time supporting site - Building protective structures, containments, etc - Training 80hrs of training - Estimate class SubK $ (Est 7 classes x $250 ea)	1CF	21	1.0	CRFT	80.0	80.0	48.26	3,861	0.00	0	0.00	0	1,750	1,750	5,611
17	~ Labor Foreman - Full-time supporting site - Supporting D&D activities, applying fixatives, dust suppression, etc -Training 80hrs of training - Estimate class SubK $ (Est 7 classes x $250 ea)	1LF	21	1.0	CRFT	80.0	80.0	40.20	3,216	0.00	0	0.00	0	1,750	1,750	4,966
18	~ Labors - Full-time supporting site - Supporting D&D activities, applying fixatives, dust suppression, etc - Training 80hrs of training - Estimate class SubK $ (Est 7 classes x $250 ea)	1L	21	4.0	CRFT	80.0	320.0	38.58	12,346	0.00	0	0.00	0	1,750	7,000	19,346
	Total Staff >>			**20.0**												
	Personnel Physicals															
19	~ Physicals for Staff - Est allowance for medical eval costs. Est (4) Mgmt/Supv) + (20) Craft - No Phys for Admin & equip delivery Operators = (24) Total. - Estimate $750 per	SubK	21	24.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	18,000	18,000
	Dosimetry															
20	~ Dosimetry for Staff - Est allowance for dosimetry costs. Est (4) Mgmt/Supv) + (20) Craft - Not required for Admin & equip delivery Operators = (24) Total - Estimate $128.23/yr	SubK	21	24.0	EA	4.0	96.0	0.00	0	0.00	0	0.00	0	145	3,471	3,471
	Mobilization Support Services															
21	~ Temp Const. Porta-Let Services - Est 4 single person units for duration of infrastructure set-up - Each Unit costs $97/mth (incl rent, cleaning, pumping, & consumables); extra wkly cleaning @ $27.5 = $110/mth; $97 + $110 = $207 / 16-working dys per mth $12.94/dy x 4 units $51.75/dy - Pricing from current WRPS contract	SubK	21	60.3	DYS	0.0	0.0	0.00	0	0	0	0.00	0	51.75	3,118	3,118
22	~ Project Signs, Barricades - Est set-up/tr-dwn/adjst/move as needed - Estimate for Mat'l	2LB	21	60.3	DYS	1.0	60.3	39.39	2,375	15	904	0.00	0	0.00	0	3,279
23	~ Initial Delivery of Equipment Support - Operator Craft - Labor Only - Est 4-Operator/s delivering equip fueling/maint, & running water truck.	3O1OF	21	4.0	CRFT	40.0	160.0	45.17	7,227	0	0	0.00	0	0.00	0	7,227
24	~ ~ Initial Delivery of Equipment Support - Teamster Craft - Labor Only - Est 4-Teamsters/s delivering equip.	3TM1TMF	21	4.0	CRFT	40.0	160.0	43.95	7,032	0	0	0.00	0	0.00	0	7,032
25	~ Construction Radios - 12 for Subcontractor & 2 spares. They come with w/extra battery, charger, holster, & speaker extension mic. Est $1,400 ea	SubK	21	14.0	EA	0.0	0.0	0.00	0	1,400	19,600	0.00	0	0.00	0	19,600
26	~ Estimate Mobilization Small Tools @ 2% of Labor $	SubK	21	1.0	LS	0.0	0.0	0.00	0	1,793	1,793	0.00	0	0.00	0	1,793
27	~ Estimate Mobilization Mat'ls @ 3% of Labor $	SubK	21	1.0	LS	0.0	0.0	0.00	0	2,690	2,690	0.00	0	0.00	0	2,690
	Subtotal General Requirements						**5,089**		**328,544**		**24,986**		**41,173**		**59,590**	**454,293**
	Mobe Support Facilities															
	Mobe Office Trailer															
28	~ Subcontractor - Office Trailer - 24' x 60' - Move in & set up - Est 200Sf per person - Room for 10-12Subs	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	7,500.00	7,500	7,500

washington river protection solutions

Cost Estimate

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Estimator: Dan Jakubek

Mobilization

Est No: #2723
Date: 08/10/10

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29	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
30	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
31	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
32	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	4,634	4,634	0.00	0	0.00	0	4,634
33	~ Mat'ls Supporting Craft - Office set-up, Computer, file cabinet, tables - Allowance $5,500 per person	SubK	21	12.0	EA	0.0	0.0	0.00	0	5,500	66,000	0.00	0	0.00	0	66,000
34	~ Subcontractor - Office Trailer - 24' x 60' - Move in & set up - Est 200Sf per person - Room for 10-12Subs	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	7,500.00	7,500	7,500
35	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
36	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
37	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
38	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	2,317	2,317	0.00	0	0.00	0	2,317
39	~ Mat'ls Supporting Craft - Office set-up, Computer, file cabinet, tables - Allowance $5,500 per person	SubK	21	12.0	EA	0.0	0.0	0.00	0	5,500	66,000	0.00	0	0.00	0	66,000
	Mobe Craft & RCT's OPS Trailers															
40	~ Subcontractor - POD / Lunch Room Trailer 24' x 60' - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	7,500.00	7,500	7,500
41	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
42	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
43	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
44	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	2,317	2,317	0.00	0	0.00	0	2,317
45	~ Mat'ls Supporting Craft - Tables, chairs, 2-refrigerators, etc - Allowance $2,000 per person	SubK	21	12.0	EA	0.0	0.0	0.00	0	2,000	24,000	0.00	0	0.00	0	24,000
46	~ Subcontractor - POD / Lunch Room Trailer 24' x 60' - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	7,500.00	7,500	7,500
47	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
48	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
49	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
50	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	2,317	2,317	0.00	0	0.00	0	2,317
51	~ Mat'ls Supporting Craft - Tables, chairs, 2-refrigerators, etc - Allowance $2,000 per person	SubK	21	12.0	EA	0.0	0.0	0.00	0	2,000	24,000	0.00	0	0.00	0	24,000
52	~ Subcontractor - PPE Trailer 24' x 60' - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	7,500.00	7,500	7,500
53	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
54	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086

8/18/2010

Cost Estimate

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Mobilization
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55	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
56	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	2,317	2,317	0.00	0	0.00	0	2,317
57	~ Mat'ls Supporting Craft - Chairs, clothing bins, partitions, etc - Allowance $3,000 per person	SubK	21	12.0	EA	0.0	0.0	0.00	0	3,000	36,000	0.00	0	0.00	0	36,000
58	~ Contractor RCT Trailer - OPS Trailer & Lunch Room Trailer 14' x 66' - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	3,750.00	3,750	3,750
59	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
60	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
61	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
62	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	1,437	1,437	0.00	0	0.00	0	1,437
63	~ Mat'ls Supporting Craft - Tables, chairs, 2-refrigerators, etc - Allowance $2,000 per person	SubK	21	12.0	EA	0.0	0.0	0.00	0	2,000	24,000	0.00	0	0.00	0	24,000
	Mobe Analytical Trailer															
64	~ Analytical Trailer 14' x 66' - Move in & set-up - Trailer used for evaluating waste samples, packaging, reporting, & records.	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	3,750.00	3,750	3,750
65	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
66	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
67	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
68	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	1,158	1,158	0.00	0	0.00	0	1,158
69	~ Mat'ls Supporting Craft - Office set-up, Computer, file cabinet, tables - Allowance $5,500 per person	SubK	21	12.0	EA	0.0	0.0	0.00	0	5,500	66,000	0.00	0	0.00	0	66,000
	Mobe Restroom Trailers															
70	~ Restroom Trailer 12' x 25' Self Contained Potable & RAW storage tanks - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	3,750.00	3,750	3,750
71	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
72	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
73	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
74	~ Pipefitters supporting trailer installation - Allowance for Labor & Equip.	2PF	21	4.0	DYS	20.0	80.0	71.24	5,699	50	200	50.00	200	0.00	0	6,099
74	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	3,500	3,500	0.00	0	0.00	0	3,500
75	~ Restroom Trailer 12' x 25' Self Contained Potable & RAW storage tanks - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	3,750.00	3,750	3,750
76	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
77	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
78	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
79	~ Pipefitters supporting trailer installation - Allowance for Labor & Equip.	2PF	21	4.0	DYS	20.0	80.0	71.24	5,699	50	200	50.00	200	0.00	0	6,099

washington river protection solutions

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Mobilization

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80	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	3,500	3,500	0.00	0	0.00	0	3,500
	Mobe Shower Trailers															
81	~ Shower Trailer 12' x 25' Self Contained Potable & RAW storage tanks - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	3,750.00	3,750	3,750
82	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
83	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
84	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
85	~ Pipefitters supporting trailer installation - Allowance for Labor & Equip.	2PF	21	4.0	DYS	20.0	80.0	71.24	5,699	50	200	50.00	200	0.00	0	6,099
85	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	3,500	3,500	0.00	0	0.00	0	3,500
86	~ Shower Trailer 12' x 25' Self Contained Potable & RAW storage tanks - Move in & set up	SubK	21	1	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	3,750.00	3,750	3,750
87	~ Electricians supporting trailer installation - Allowance for Labor & Equip.	2EL	21	4.0	DYS	20.0	80.0	52.63	4,210	250	1,000	150.00	600	0.00	0	5,810
88	~ Carpenters supporting trailer installation - Allowance for Labor & Equip.	2CP	21	4.0	DYS	20.0	80.0	47.32	3,786	425	1,700	150.00	600	0.00	0	6,086
89	~ Labors supporting trailer installation - Allowance for Labor & Equip.	2LB	21	4.0	DYS	20.0	80.0	39.39	3,151	50	200	50.00	200	0.00	0	3,551
90	~ Pipefitters supporting trailer installation - Allowance for Labor & Equip.	2PF	21	4.0	DYS	20.0	80.0	71.24	5,699	50	200	50.00	200	0.00	0	6,099
91	~ Mat'ls supporting trailer installation - Allowance	SubK	21	1.0	LS	0.0	0.0	0.00	0	3,500	3,500	0.00	0	0.00	0	3,500
	Mobe Light Duty Trucks															
92	~ Pickup Truck - 3/4 Ton, 4x4, 165 Hp, Crew Cab, Gas, Yr/08	1TM	21	3	EA	4.00	12.0	43.68	524	0.00	0	12.83	154		0	678
93	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4, Yr/08	1TM	21	1	EA	4.00	4.0	43.68	175	0.00	0	45.34	181		0	356
94	~ Lube / Mechanic Truck, 1500 gal, On-Highway 199 HP, Gas, Yr/08	1TM	21	1	EA	4.00	4.0	43.68	175	0.00	0	29.14	117		0	291
	Mobe Haul Trucks															
95	~ Roll-off Truck - Misc Mod, On-Highway, Roll-on Roll-off, 8x4, 450 Hp, 85000 lbs max, 15-18 cy, Yr/08	1TM	21	5	EA	4.00	20.0	43.68	874	0.00	0	350.83	7,017		0	7,890
96	~ Dump Truck - Mechanical Drive Rear Dumps - CAT 769D, 36.4 MT, 487 Hp, Yr/07	1TM	21	2	EA	4.00	8.0	43.68	349	0.00	0	250.07	2,001		0	2,350
	Mobe Heavy Duty Trucks															
97	~ Water Truck - Misc Mod, On-Highway Tanker, 4000 Gal, 250 Hp, Diesel, Yr/08	1TM	21	1	EA	4.00	4.0	43.68	175	0.00	0	45.34	181		0	356
	Mobe Heavy Equipment															
98	~ Grader - Articulated Frame - CAT 12H, 145 Hp, 12' Moldboard, Diesel, 31320 Lbs, Yr/07	1TM	21	1	EA	4.00	4.0	43.68	175	0.00	0	54.13	217		0	391
99	~ Compactor - Single Drum (Smooth) Vibratory - CAT CS-563D, 145Hp, 84" Wide, Yr/03	1TM	21	1	EA	4.00	4.0	43.68	175	0.00	0	48.08	192		0	367
100	~ Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.6', Reach 27'4", 100Hp, 4WD, Yr/08	1TM	21	2	EA	4.00	8.0	43.68	349	0.00	0	82.26	658		0	1,008
101	~ Excavator - Crawler Mounted Hydraulic Excavator - Komatsu PC300LC-7, 2.56 Cy, 246 Hp, 34.2 MT, Yr/07	1TM	21	2	EA	4.00	8.0	43.68	349	0.00	0	235.30	1,882		0	2,232

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
Mobilization
Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
102	~ Excavator - Crawler Mounted Hydraulic Excavator, Komatsu PC400LC-7, 2.54 Cy, 345 Hp, 44.4 MT, Yr/08	1TM	21	2	EA	4.00	8.0	43.68	349	0.00	0	316.75	2,534		0	2,883
103	~ Excavator Attachment - Concrete Cruncher / Pulverizer - LaBounty CP40, 30" Jaw Opening, 2,875 Lbs, Yr/08	1TM	21	2	EA	1.00	2.0	43.68	87	0.00	0	31.93	64		0	151
104	~ Excavator Attachment - Hydraulic Impact Breaker - Stanley MB30EXS, 2000 Ft-lb Impact Energy, 500/700 bpm, Yr/08	1TM	21	2	EA	1.00	2.0	43.68	87	0.00	0	40.47	81		0	168
105	~ Excavator Shear - CAT S320, Jaw Opening 15.4, 4,741 Lbs, Yr/08	1TM	21	2	EA	1.00	2.0	43.68	87	0.00	0	54.57	109		0	196
106	~ Front End Loader - CAT 930G, 4-WD Articulated Wheel Loaders, 149 Hp, Diesel, 3.25 Cy, Fy/08	1TM	21	3	EA	4.00	12.0	43.68	524	0.00	0	128.07	1,537		0	2,061
	Mobe Support Equipment															
107	~ Air Compressor (83 CFM @ 120 Gal Cap), 20Hp, Yr/08	1TM	21	1	EA	4.00	4.0	43.68	175	0.00	0	2.18	9		0	183
108	~ Light Plant - Misc Mod, 7 KW, 11.5 Hp, 30' w/4 lights, Yr/08	1TM	21	4	EA	4.00	16.0	43.68	699	0.00	0	33.95	543		0	1,242
109	~ Generator - Misc Mod, 20kW/6.5 kva, Enclosed, 34 Hp, Diesel, Yr/08	1TM	21	2	EA	4.00	8.0	43.68	349	0.00	0	25.33	203		0	552
110	~ Storage Trailer - 8'W x 8H x 22'Lng doors on both ends - $2.12/hr ea + $200 delivery	SubK	21	4	EA	4.00	16.0	0.00	0	0.00	0	8.46	935		0	935
	Subtotal Field Work						**3,106**		**151,094**		**369,197**		**34,814**		**60,000**	**615,105**
	Subtotal General Req's & Field Work						**8,195**		**479,638**		**394,183**		**75,987**		**119,590**	**1,069,398**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				1,230.0		71,946							71,946
	Non Productive Supervision - 1.5% of Const. Labor		21				120.0		7,195							7,195
	Weather Delays - 5% of Const. Labor		21				410.0		23,982							23,982
	Estimate for Construction Consumables - 4% of Const. Labor		21								19,186					19,186
	Estimate for Construction Cleanup - 5% of Const. Labor		21						23,982							23,982
	Estimate for Construction Material Movement - 1% of Const. Material		21								3,942					3,942
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						7,195							7,195
	Subtotal Construction General Requirements Adders						**1,760**		**134,300**		**23,128**		**0**		**0**	**157,428**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												8,969	8,969
	Construction Contractor G&A - @ 10%		21						61,394		41,731		7,599		11,959	122,683
	Construction Contractor Fee - @ 7%		21						42,976		29,212		5,319		8,371	85,878
	Construction Contractor Sales Tax - @ 8.3%		21								34,637		6,307		9,926	50,870
	Subtotal Construction Markup Adders						**0**		**104,370**		**105,580**		**19,225**		**39,225**	**268,400**
	Subtotal Construction Subcontractor						**9,955**		**718,308**		**522,891**		**95,212**		**158,815**	**1,495,226**
	Contingency								**0**		**0**		**0**		**0**	**0**
	Escalation								**0**		**0**		**0**		**0**	**0**
	Total Project						**9,955**		**718,308**		**522,891**		**95,212**		**158,815**	**1,495,226**

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
	07 Construction Subcontractor															
	General Contractor Activities															
	Construction Mgmt & Oversight Support															
	** Proj Mgmt, Support Craft, & Design Engineering involvement and associated costs captured in Mobe & OPS start-up phases.															
	Field Work															
	Site Roads - Install New & Prep Existing															
1	~ Survey & Place Markers at Work Area - Est 2 men survey & place markers for const boundaries 3-10/hr dys = 60Hrs, elev, etc - Allowance for Labor & mat'l	2CP	21	1	LS	60.00	60.0	47.32	2,839	500.00	500	0.00	0	0.00	0	3,339
2	~ Clear & Grub - Excavate area w/fire break **for Site Roads** Egress Rds 30' x 400' (12,000SF) x 3" (.25') deep = 3,000/BCF x 15% LCF = 3,450LCF / 27 = 128 LCY - Use 105HP Bulk Dozer Common Earth - Means 02315-432-3320	21	21	127.8	LCY	0.00	0.0	1.00	0	0.00	0	0.00	0	10.32	1,318	1,318
3	~ Load Clear/Grub - Load 16.5/Tn Cap Trucks - Est 20 min load time (127 LCY / 16.5 = 7 truck loads x .33/hr + min dwn time = .41/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	127.8	LCY	0.025	3.2	44.90	144	0.00	0	42.69	137	0.00	0	280
4	~ Remove Clear/Grub Debris & Haul to site land fill -Incl removing debris; load into a off-rd truck/s; haul to disposal pit; & dump - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	127.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	1,420	1,420
5	~ Excavate & Screen New Back-fill - At Handford pit - Est excavator, front end loader, & vibratory screen. For qty 30' x 400 x 6" deep - Assume processing 25% more soil to obtain soil spec size. - Equip hrly costs from Blue Book	1OF1O	21	277.8	LCY	0.050	13.9	45.44	632	0.00	0	39.06	271	0.00	0	903
6	~ Load Gravel / Soil At Hanford Borrow Pit - Load 16.5/Tn Cap Trucks - Est 20 min load time (222LCY / 16.5 = 14 truck loads x .33/hr + min dwn time = .42/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	222.2	LCY	0.025	5.6	44.90	251	0.00	0	42.69	239	0.00	0	491
7	~ Haul Gravel / Soil From Hanford Pit to C Farm - Haul mat'l, & place in area as back-fill. - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	222.2	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	2,470	2,470
8	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	222.2	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	403	403
9	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1200	SubK	21	222.2	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.36	6,080	6,080
10	~ Haul Gravel From Town & Dump - Haul mat'l, & place in parking lot extension - 20 CY Truck Cap - 3' top-coat. Est haul 80miles rnd trip. - Phone Discussion with Darren at American Rock on 4-23-10	3TM1TM F1O	21	111.1	LCY	0.000	0.0	44.14	0	15.79	1,755	0.00	0	18.94	2,104	3,859
11	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	111.1	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	201	201

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
12	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1100	SubK	21	111.1	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.14	3,015	3,015
13	~ 4000 gal, 250 Hp On-Highway Water Tanker - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book	1TM	21	41.8	HRS	1.0	41.8	43.68	1,826	0	0	45.34	1,893	0.00	0	3,719
14	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support - Est operating partial time - Equip hrly costs from Blue Book	1O	21	8.4	HRS	1.0	8.4	44.90	377	0	0	26.65	223	0.00	0	600
	Office/Facilities Areas & Parking Lot															
15	~ Survey & Place Markers at Work Area - Est 2 men survey & place markers for const boundaries 1-10/hr dy = 20Hrs, elev, etc - Allowance for Labor & mat'l	2CP	21	1	LS	20.00	20.0	47.32	946	500.00	500	0.00	0	0.00	0	1,446
16	~ Clear & Grub - Excavate area w/fire break - **Est for Trailer Area, & staff Parking Lot** - 100' wide x 250' long (25,000SF) + Parking Lot 80' x 130' (10,400SF) = 35,400 x 3" (.25') deep = 8,850/BCF x 15% LCF = 10,1178LCF / 27 = 377 LCY - Use 105HP Bulk Dozer Common Earth - Means 02315-432-3320	21	21	376.9	LCY	0.00	0.0	1.00	0	0.00	0	0.00	0	10.32	3,889	3,889
17	~ Load Clear/Grub - Load 16.5/Tn Cap Trucks - Est 20 min load time (377 LCY / 16.5 = 23 truck loads x .33/hr + min dwn time = .41/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	376.9	LCY	0.025	9.5	44.90	427	0.00	0	42.69	406	0.00	0	832
18	~ Remove Clear/Grub Debris & Haul to site land fill -Incl removing debris; load into a off-rd truck/s; haul to disposal pit; & dump - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	376.9	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	4,190	4,190
19	~ Excavate & Screen New Back-fill - At Handford pit - Est excavator, front end loader, & vibratory screen. Qty 100' x 250' + 80' x 130' x 6" deep - Assume processing 25% more soil to obtain soil spec size. - Equip hrly costs from Blue Book	1OF1O	21	819.4	LCY	0.050	41.0	45.44	1,863	0.00	0	0.00	0	0.00	0	1,863
20	~ Load Gravel / Soil At Hanford Borrow Pit - Load 16.5/Tn Cap Trucks - Est 20 min load time (656LCY / 16.5 = 40 truck loads x .33/hr + min dwn time = .42/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	655.6	LCY	0.025	16.5	44.90	741	0.00	0	42.69	704	0.00	0	1,445
21	~ Haul Gravel / Soil From Hanford Pit to C Farm - Haul mat'l, & place in area as back-fill. - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	655.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	7,287	7,287
22	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	655.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	1,188	1,188
23	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1200	SubK	21	655.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.36	17,936	17,936
24	~ Haul Gravel From Town & Dump - Haul mat'l, & place in parking lot extension - 20 CY Truck Cap - 3' top-coat. Est haul 80miles rnd trip. - Phone Discussion with Darren at American Rock on 4-23-10	3TM1TM F1O	21	327.8	LCY	0.000	0.0	44.14	0	15.79	5,176	0.00	0	18.94	6,207	11,383

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
25	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	327.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	594	594
26	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1100	SubK	21	327.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.14	8,895	8,895
27	~ 4000 gal, 250 Hp On-Highway Water Tanker - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book	1TM	21	83.5	HRS	1.0	83.5	43.68	3,647	0	0	45.34	3,786	0.00	0	7,433
28	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support - Est operating partial time - Equip hrly costs from Blue Book	1O	21	16.7	HRS	1.0	16.7	44.90	750	0	0	26.65	445	0.00	0	1,195
	Equipment / Lay-down Area															
29	~ Survey & Place Markers at Work Area - Est 2 men survey & place markers for const boundaries 1-5/hr dy = 10Hrs, elev, etc - Allowance for Labor & mat'l	2CP	21	1	LS	10.00	10.0	47.32	473	500.00	500	0.00	0	0.00	0	973
30	~ Clear & Grub - Excavate area w/fire break - **Est Equip & Lay-Dwn Area Lot** - 100' wide x 150' long (15,000SF) x 3" (.25') deep = 3,750/BCF x 15% LCF = 4,313LCF / 27 = 160 LCY - Use 105HP Bulk Dozer Common Earth - Means 02315-432-3320	21	21	159.7	LCY	0.00	0.0	1.00	0	0.00	0	0.00	0	10.32	1,648	1,648
31	~ Load Clear/Grub - Load 16.5/Tn Cap Trucks - Est 20 min load time (159 LCY / 16.5 = 10 truck loads x .33/hr + min dwn time = .41/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	159.7	LCY	0.025	4.0	44.90	180	0.00	0	42.69	171	0.00	0	350
32	~ Remove Clear/Grub Debris & Haul to site land fill -Incl removing debris; load into a off-rd truck/s; haul to disposal pit; & dump - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	159.7	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	1,775	1,775
33	~ Excavate & Screen New Back-fill - At Handford pit - Est excavator, front end loader, & vibratory screen. Qty 100' x 150' x 6" deep - Assume processing 25% more soil to obtain soil spec size. - Equip hrly costs from Blue Book	1OF1O	21	347.2	LCY	0.050	17.4	45.44	791	0.00	0	0.00	0	0.00	0	791
34	~ Load Gravel / Soil At Hanford Borrow Pit - Load 16.5/Tn Cap Trucks - Est 20 min load time (279LCY / 16.5 = 17 truck loads x .33/hr + min dwn time = .42/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	277.8	LCY	0.025	7.0	44.90	314	0.00	0	42.69	299	0.00	0	613
35	~ Haul Gravel / Soil From Hanford Pit to C Farm - Haul mat'l, & place in area as back-fill. - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	277.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	3,088	3,088
36	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	277.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	504	504
37	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1200	SubK	21	277.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.36	7,600	7,600
38	~ Haul Gravel From Town & Dump - Haul mat'l, & place in parking lot extension - 20 CY Truck Cap - 3' top-coat. Est haul 80miles rnd trip. - Phone Discussion with Darren at American Rock on 4-23-10	3TM1TM F1O	21	138.9	LCY	0.000	0.0	44.14	0	15.79	2,193	0.00	0	18.94	2,630	4,823

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
39	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	138.9	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	252	252
40	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1100	SubK	21	138.9	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.14	3,769	3,769
41	~ 4000 gal, 250 Hp On-Highway Water Tanker - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book	1TM	21	41.8	HRS	1.0	41.8	43.68	1,826	0	0	45.34	1,893	0.00	0	3,719
42	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support - Est operating partial time - Equip hrly costs from Blue Book	1O	21	8.4	HRS	1.0	8.4	44.90	377	0	0	26.65	223	0.00	0	600
	Q / CTA Area															
43	~ Survey & Place Markers at Work Area - Est 2 men survey & place markers for const boundaries 3-10/hr dy = 30Hrs, elev, etc - Allowance for Labor & mat'l	2CP	21	1	LS	60.00	60.0	47.32	2,839	500.00	500	0.00	0	0.00	0	3,339
44	~ Clear & Grub - Excavate area w/fire break **for "Q" / CTA** 200' wide x 500' long (100,000SF) & Egress Rds To/From CTA 30' x 300' (9,000SF) x 3" (.25') deep = 27,250/BCF x 15% LCF = 31,338LCF / 27 = 1,161 LCY - Use 105HP Bulk Dozer Common Earth - Means 02315-432-3320	21	21	1,160.6	LCY	0.00	0.0	1.00	0	0.00	0	0.00	0	10.32	11,974	11,974
45	~ Load Clear/Grub - Load 16.5/Tn Cap Trucks - Est 20 min load time (1,161 LCY / 16.5 = 70 truck loads x .33/hr + min dwn time = .41/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	1,160.6	LCY	0.025	29.2	44.90	1,311	0.00	0	42.69	416	0.00	0	1,727
46	~ Remove Clear/Grub Debris & Haul to site land fill -Incl removing debris; load into a off-rd truck/s; haul to disposal pit; & dump - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	1,160.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	12,901	12,901
47	~ Excavate & Screen New Back-fill - At Handford pit - Est excavator, front end loader, & vibratory screen. Qty 200' x 500' + 30' x 300 x 6" deep = - Assume processing 25% more soil to obtain soil spec size. - Equip hrly costs from Blue Book	1OF1O	21	2,523.1	LCY	0.050	126.2	45.44	5,735	0.00	0	0.00	0	0.00	0	5,735
48	~ Load Gravel / Soil At Hanford Borrow Pit - Load 16.5/Tn Cap Trucks - Est 20 min load time (2,130LCY / 16.5 = 129 truck loads x .33/hr + min dwn time = .42/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	2,018.5	LCY	0.025	50.8	44.90	2,281	0.00	0	42.69	723	0.00	0	3,004
49	~ Haul Gravel / Soil From Hanford Pit to C Farm - Haul mat'l, & place in area as back-fill. - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	2,018.5	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	22,436	22,436
50	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	2,018.5	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	3,659	3,659
51	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1200	SubK	21	2,018.5	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.36	55,227	55,227
52	~ Haul Gravel From Town & Dump - Haul mat'l, & place in parking lot extension - 20 CY Truck Cap - 3' top-coat. Est haul 80miles rnd trip. - Phone Discussion with Darren at American Rock on 4-23-10	3TM1TM F1O	21	1,009.3	LCY	0.000	0.0	44.14	0	15.79	15,938	0.00	0	18.94	19,110	35,049

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
53	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	1,009.3	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	1,829	1,829
54	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1100	SubK	21	1,009.3	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.14	27,389	27,389
55	~ 4000 gal, 250 Hp On-Highway Water Tanker - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book	1TM	21	208.8	HRS	1.0	208.8	43.68	9,120	0	0	45.34	9,464	0.00	0	18,585
56	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support - Est operating partial time - Equip hrly costs from Blue Book	1O	21	41.8	HRS	1.0	41.8	44.90	1,877	0	0	0.00	0	0.00	0	1,877
	Pit Egress Ramp															
57	~ Survey & Place Markers at Work Area - Est 2 men survey & place markers for const boundaries 1-10/hr dys = 20Hrs, elev, etc - Allowance for Labor & mat'l	2CP	21	1	LS	20.00	20.0	47.32	946	500.00	500	0.00	0	0.00	0	1,446
58	~ Clear & Grub - Excavate area w/fire break **for Pit Egress Ramp** 50' x 950' (47,500SF) x 3" (.25') deep = 11,875/BCF x 15% LCF = 13,656 LCF / 27 = 506 LCY - Use 105HP Bulk Dozer Common Earth - Means 02315-432-3320	21	21	505.8	LCY	0.00	0.0	1.00	0	0.00	0	0.00	0	10.32	5,218	5,218
59	~ Load Clear/Grub - Load 16.5/Tn Cap Trucks - Est 20 min load time (213 LCY / 16.5 = 13 truck loads x .33/hr + min dwn time = .41/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	505.8	LCY	0.025	12.7	44.90	570	0.00	0	42.69	542	0.00	0	1,112
60	~ Remove Clear/Grub Debris & Haul to site land fill -Incl removing debris; load into a off-rd truck/s; haul to disposal pit; & dump - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	505.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	5,622	5,622
61	~ Excavate Ramp **for Pit Egress Ramp** 50' x 950' @ 6% grade + Lay-back to 40' depth = 30,347 LCY - Use 105HP Bulk Dozer Common Earth - Means 02315-432-3320	21	21	30,347.2	LCY	0.00	0.0	1.00	0	0.00	0	0.00	0	10.32	313,092	313,092
62	~ Load Excavated Soil - Load 16.5/Tn Cap Trucks - Est 20 min load time (30,347 LCY / 16.5 = 1,839 truck loads x .33/hr + min dwn time = .41/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	30,347.2	LCY	0.025	763.1	44.90	34,263	0.00	0	42.69	32,577	0.00	0	66,840
63	~ Remove Soil & Haul to site land fill -Incl removing debris; load into a off-rd truck/s; haul to disposal pit; & dump - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	30,347.2	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	337,309	337,309
61	~ Excavate & Screen New Back-fill - At Handford pit - Est excavator, front end loader, & vibratory screen. Qty 50' x 400 x 6" deep - Assume processing 25% more soil to obtain soil spec size. - Equip hrly costs from Blue Book	1OF1O	21	1,099.5	LCY	0.050	55.0	45.44	2,499	0.00	0	0.00	0	0.00	0	2,499
62	~ Load Gravel / Soil At Hanford Borrow Pit - Load 16.5/Tn Cap Trucks - Est 20 min load time (222LCY / 16.5 = 14 truck loads x .33/hr + min dwn time = .42/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	879.6	LCY	0.025	22.1	44.90	992	0.00	0	42.69	943	0.00	0	1,936
63	~ Haul Gravel / Soil From Hanford Pit to C Farm - Haul mat'l, & place in area as back-fill. - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	879.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	9,777	9,777

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
64	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	879.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	1,594	1,594
65	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1200	SubK	21	879.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.36	24,067	24,067
66	~ Haul Gravel From Town & Dump - Haul mat'l, & place in parking lot extension - 20 CY Truck Cap - 3' top-coat. Est haul 80miles rnd trip. - Phone Discussion with Darren at American Rock on 4-23-10	3TM1TM F1O	21	439.8	LCY	0.000	0.0	44.14	0	15.79	6,946	0.00	0	18.94	8,328	15,274
67	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	439.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	797	797
68	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1100	SubK	21	439.8	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.14	11,935	11,935
69	~ 4000 gal, 250 Hp On-Highway Water Tanker - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book	1TM	21	41.8	HRS	1.0	41.8	43.68	1,826	0	0	45.34	1,893	0.00	0	3,719
70	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support - Est operating partial time - Equip hrly costs from Blue Book	1O	21	8.4	HRS	1.0	8.4	44.90	377	0	0	26.65	223	0.00	0	600
	Install Perimeter Fencing															
71	~ Install 6' High w/3 Strn B-wire on Top 9 ga wire mesh, galv. Steel - Est 500 Yrds square area, or 1,500' x 4 sides = 6,000' - Sch 40 posts in concrete - Means #02820-130-0200	SubK	21	6000	LF	0.00	0.0	0.00	0	0.00	0	0.00	0	17.28	103,707	103,707
72	~ Install Dbl Swng Gate 20' Opening - Vehicle Gate - Est 6' High w/3 Strn B-wire manual opening w/6" dia sch 40 galv end posts - Est 6 loc - Posts in concrete, & 9 ga fence. - Means #02820-130-5070 + Added distance from twn, conn to existing fence, & sml qty @ 20%.	SubK	21	6	EA	0.00	0.0	0.00	0	0.00	0	0.00	0	1,412.78	8,477	8,477
73	~ Install 5' Wide Personnel Gate - Est 6' High w/3 Strn B-wire manual opening w/4" dia sch 40 galv end posts - Est 6 loc - Posts in concrete, & 16 ga fence. - Means #02820-130-2400	SubK	21	6	EA	0.00	0.0	0.00	0	0.00	0	0.00	0	260.36	1,562	1,562
	Subtotal Field Work						**1,849**		**83,041**		**34,508**		**57,469**		**1,074,473**	**1,249,491**
	Subtotal General Req's & Field Work						**1,849**		**83,041**		**34,508**		**57,469**		**1,074,473**	**1,249,491**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				280.0		12,456							12,456
	Non Productive Supervision - 1.5% of Const. Labor		21				30.0		1,246							1,246
	Weather Delays - 5% of Const. Labor		21				90.0		4,152							4,152
	Estimate for Construction Consumables - 4% of Const. Labor		21								3,322					3,322
	Estimate for Construction Cleanup - 5% of Const. Labor		21						4,152							4,152
	Estimate for Construction Material Movement - 1% of Const. Material		21								345					345

8/18/2010

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						1,246							1,246
Subtotal Construction General Requirements Adders						**400**		**23,252**		**3,667**		**0**		**0**	**26,919**
Construction Markup & Taxes Adders															
Construction Contractor Subcontractor Markup - @ 7.5%		21												80,585	80,585
Construction Contractor G&A - @ 10%		21						10,629		3,818		5,747		107,447	127,641
Construction Contractor Fee - @ 7%		21						7,440		2,672		4,023		75,213	89,348
Construction Contractor Sales Tax - @ 8.3%		21								3,169		4,770		89,181	97,120
Subtotal Construction Markup Adders						**0**		**18,069**		**9,659**		**14,540**		**352,426**	**394,694**
Subtotal Construction Subcontractor						**2,249**		**124,362**		**47,834**		**72,009**		**1,426,899**	**1,671,104**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**2,249**		**124,362**		**47,834**		**72,009**		**1,426,899**	**1,671,104**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Electrical Infrastructure Install

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Operations and Overheads																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Mgmt	21	48.0	DYS	6.0	288.0	93.73	26,994	0.00	0	0.00	0	0.00	0	26,994
2	~ Proj Admin Vehicle support	SubK	21	288.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	4,919	0.00	0	4,919
3	~ Field Work Supervisor - Est 50% of Mechanical Const Sch. & other 50% as Working Craft. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Sup	21	48.0	DYS	5.0	240.0	89.80	21,552	0.00	0	0.00	0	0.00	0	21,552
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	240.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	4,100	0.00	0	4,100
5	~ Safety Rep - Est 25% of Mechanical Const Sch. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Safe	21	48.0	DYS	2.5	120.0	87.04	10,445	0.00	0	0.00	0	0.00	0	10,445
6	~ Safety Rep - Est Vehicle support	SubK	21	120.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	2,050	0.00	0	2,050
7	~ QA/QC Inspections/Audits - Est 30% of Mechanical Const Sch. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E QA	21	48.0	DYS	3.0	144.0	66.58	9,588	0.00	0	0.00	0	0.00	0	9,588
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	144.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	2,460	0.00	0	2,460
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	SubK	21	48.0	DYS	0.0	0.0	0.00	0	0.00	0	8.04	3,859	3.70	1,776	5,635
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	48.0	DYS	1.0	48.0	39.39	1,891	15	720	0.00	0	0.00	0	2,611
Mobilization																
11	~ - Mob-Training (Est 84hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 6 classes x $250 ea)	1EL	21	7.0	CRFT	84.0	588.0	56.49	33,216	0.00	0	0.00	0	1,500	10,500	43,716
12	~ Physicals - Est allowance for medical eval costs. Est 100% of working craft / Electricians = (7) total. - Estimate $750 per	SubK	21	7.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	5,250	5,250
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working craft / Electricians = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	2EL1O1 TM	21	2.0	DYS	40.00	80.0	50.39	4,031	0.00	0	500	1,000	350	700	5,731
15	~ Mob-Submittals - Est 16	1PM	21	16.0	EA	2.0	32.0	93.73	2,999	0.00	0	0.00	0	0.00	0	2,999
Demobilization																
16	~ Demob - Site / Area Cleanup	2EL	21	1.0	DAY	30.00	30.0	52.63	1,579	0.00	0	0.00	0	0.00	0	1,579
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	2EL1O1 TM	21	1.0	DAY	80.00	80.0	50.39	4,031	0.00	0	500	500	100.00	100	4,631
	Subtotal General Requirements						**1,682**		**116,701**		**720**		**18,887**		**19,339**	**155,646**
Field Work																
Install Electrical System to Support Trailers																

8/18/2010

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Electrical Infrastructure Install

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
19	~ Similar Trailers placed in in AW Farm - Incl install power poles, transformer, disconnects, underground conduit & wire, & connections - Field electrical estimated @ $160,000 / 4 trailers = $40,000 per trailer. Assume running to Office trls (2), lunch/meeting trls (2), PPE Trl (1), RCT trl (1), Analytical trl (1), Bth Rm trl (2), & Shower trl (2).	SubK	21	11	EA	0.00	0.0	0.00	0	0.00	0	0.00	0	40,000.00	440,000	440,000
	Phone & Internet Connection to Support Trailers															
20	~ Similar (4) Trailers placed in in AW Farm - Incl connect to site system, underground conduit & wire, connection in equip rm in trailer, & chk conn at office conn pts. Contract performed for $79,000 / 3 trailers (1 was bathroom trailer) = $26,333 per trailer. Assume running to Office trls (2), lunch/meeting trls (2), RCT trl (1), & Analytical trl (1).	SubK	21	6	EA	0.00	0.0	0.00	0	0.00	0	0.00	0	26,333.00	157,998	157,998
	Install Electrical System to Excavation Weather Enclosures															
21	~ Assume power set-up to each Weather Enclosure building estimated at 30% of the power requirements of the trailer complex - Est (7) weather enclosures for accomplishing scope. Trailer complex subtotal estimated @ $440,000 x 30% = $132,000 ea Weather Enclosure.	SubK	21	7	EA	0.00	0.0	0.00	0	0.00	0	0.00	0	132,000.00	924,000	924,000
	Subtotal Field Work						**0**		**0**		**0**		**0**		**1,521,998**	**1,521,998**
	Subtotal General Req's & Field Work						**1,682**		**116,701**		**720**		**18,887**		**1,541,337**	**1,677,644**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				0.0		0							0
	Non Productive Supervision - 1.5% of Const. Labor		21				0.0		0							0
	Weather Delays - 5% of Const. Labor		21				0.0		0							0
	Estimate for Construction Consumables - 4% of Const. Labor		21								0					0
	Estimate for Construction Cleanup - 5% of Const. Labor		21						0							0
	Estimate for Construction Material Movement - 1% of Const. Material		21								0					0
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						0							0
	Subtotal Construction General Requirements Adders						**0**		**0**		**0**		**0**		**0**	**0**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												115,600	115,600
	Construction Contractor G&A - @ 10%		21						11,670		72		1,889		154,134	167,765
	Construction Contractor Fee - @ 7%		21						8,169		50		1,322		107,894	117,435
	Construction Contractor Sales Tax - @ 8.3%		21								60		1,568		127,931	129,559
	Subtotal Construction Markup Adders						**0**		**19,839**		**182**		**4,779**		**505,559**	**530,359**
	Subtotal Construction Subcontractor						**1,682**		**136,540**		**902**		**23,666**		**2,046,896**	**2,208,003**
	Contingency								**0**		**0**		**0**		**0**	**0**
	Escalation								**0**		**0**		**0**		**0**	**0**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Electrical Infrastructure Install

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Total Project						1,682		136,540		902		23,666		2,046,896	2,208,003

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Project Management, Support Staff, & Support Equipment

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Oversight																
1	~ Training Budget - Estimated amount for Subcontractor training expenses at 3% of SubK Labor costs.	SubK	21	1.0	LS	10.0	10.0	0.00	0	0	0	0.00	0	617,161	617,161	617,161
2	~ Project Mgr - Est 100% of D&D schedule - Est Sch duration 5/Yrs - Used 167/Hrs per Mth / 10/Hr Dys = 16.7/Dys per Mth x 12/Mths = 200.4/Dys per Yr - Also deducted Mobe (28/dys) & Demobe (16/dys) durations	Cnst E Mgmt	21	1,446.8	DYS	10.0	14,467.9	93.73	1,356,076	0	0	0.00	0	0.00	0	1,356,076
3	~ Proj Mgmt Vehicle support - Equip hrly costs from Blue Book - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	14,467.9	HRS	0.0	0.0	0.00	0	0	0	7.28	105,345	0.00	0	105,345
4	~ Field Engineer - Est 100% of D&D schedule	Cnst E Eng	21	1,446.8	DYS	10.0	14,467.9	92.27	1,334,953	0	0	0.00	0	0.00	0	1,334,953
5	~ Field Engineer Vehicle support - Equip hrly costs from Blue Book - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	14,467.9	HRS	0.0	0.0	0.00	0	0	0	7.28	105,345	0.00	0	105,345
6	~ Field Work Supervisor - Est 100% of D&D schedule	Cnst E Sup	21	1,446.8	DYS	10.0	14,467.9	89.80	1,299,217	0	0	0.00	0	0.00	0	1,299,217
7	~ Field Work Supervisor Vehicle support - Equip hrly costs from Blue Book - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	14,467.9	HRS	0.0	0.0	0.00	0	0	0	7.28	105,345	0.00	0	105,345
8	~ Safety Rep - Est 50% of D&D schedule	Cnst E Safe	21	1,446.8	DYS	5.0	7,234.0	87.04	629,647	0	0	0.00	0	0.00	0	629,647
9	~ Safety Rep Vehicle support - Equip hrly costs from Blue Book - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	7,234.0	HRS	0.0	0.0	0.00	0	0	0	7.28	52,673	0.00	0	52,673
10	~ Admin Services - Est 100% of D&D schedule	Cnst E Adm	21	1,446.8	DYS	5.0	7,234.0	33.60	243,044	0	0	0.00	0	0.00	0	243,044
Waste Sampling Analysis Costs																
11	~ Waste Sampling & Analysis - Est 50 samples per day taken, packaged, analyzed, reported, logged, etc by specialty analysis firm - Allowance for SubK pricing & all inclusive in sample cost.	SubK	21	1,446.8	DYS	50.0	72,339.5	0.00	0	0	0	0.00	0	125.00	9,042,438	9,042,438
Construction Support Staff																
12	~ Operating Engineers - 1-FTE Full-time supporting site - Incl equip support, managing equip pool, moving ERDF & waste containers, dressing rd/s, running fork-lift/sml crains	1O	21	1,446.8	DYS	10.0	14,467.9	44.90	649,609	0.00	0	0.00	0	0	0	649,609
13	~ Electrical Foreman - 1-FTE Full-time supporting site - Installing & moving elect items, lighting, elect feed sys, etc	1ELF	21	1,446.8	DYS	10.0	14,467.9	62.14	899,035	0.00	0	0.00	0	0	0	899,035
14	~ Electricians - 1-FTE Full-time supporting site - Installing & moving elect items, lighting, elect feed sys, etc	1EL	21	1,446.8	DYS	10.0	14,467.9	56.49	817,292	0.00	0	0.00	0	0	0	817,292
15	~ Teamsters Foreman - 1-FTE Full-time supporting site - Performing moving ERDF & waste containers, mat'ls, dust control, etc.	1TMF	21	1,446.8	DYS	10.0	14,467.9	44.76	647,583	0.00	0	0.00	0	0	0	647,583
16	~ Teamsters - 2-FTEs Full-time supporting site - Performing moving ERDF & waste containers, mat'ls, dust control, etc.	1TM	21	1,446.8	DYS	20.0	28,935.8	43.68	1,263,916	0.00	0	0.00	0	0	0	1,263,916
17	~ Labor Foreman - 1-FTE Full-time supporting site - Flagman/Spotter - Supporting CAN movements; set-up/clean PPE trailer, shower trailers, & support trailers; & oversee warehouse & mat'l shipments.	1LF	21	1,446.8	DYS	10.0	14,467.9	40.20	581,610	0.00	0	0.00	0	0	0	581,610
18	~ Labors - 6-FTEs Full-time supporting site - Flagman/Spotter - Supporting CAN movements; set-up/clean PPE trailer, shower trailers, & support trailers; & oversee warehouse & mat'l shipments.	1L	21	1,446.8	DYS	60.0	86,807.4	38.58	3,349,029	0.00	0	0.00	0	0	0	3,349,029

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Project Management, Support Staff, & Support Equipment

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
19	~ Mechanic / Operating Engineers - 1-FTE Full-time supporting site - Incl maintenance of haul trucks, heavy equip, supporting equip pool, etc	1O	21	1,446.8	DYS	10.0	14,467.9	44.90	649,609	0.00	0	0.00	0	0	0	649,609
20	~ Construction Radios - Est 3 replacements during the year - They come with w/extra battery, charger, holster, & speaker extension mic. Est $1,400 ea	SubK	21	15.0	EA	0.0	0.0	0.00	0	1,400	21,000	0.00	0	0	0	21,000
21	~ PPE Supplies - Est $20.15 per dress-out x 4 chg-outs/dy = $80.58 per person x 24 FTEs for Contractor RCTs & 12 additional for Subcontractor for a total of 36 - $80.58 x 36 personnel per day = $2,901/day - + 10% additional qty to cover for schedule OT	SubK	21	1,446.8	DYS	80.0	115,743.2	0.00	0	2,901.00	4,197,138	0.00	0	0	0	4,197,138
	Personnel Physicals															
22	~ Physicals for Craft Infrastructure Staff Due to Attrition - Est 15% ea year x 5 years = 13 Craft x 15% x 5 = 75% during schedule duration.- Estimate $750 per	1EF1E1LF6L2O2TM	21	10.0	EA	4.0	40.0	43.65	1,746	0.00	0	0.00	0	750	7,500	9,246
	Dosimetry															
23	~ Dosimetry Badging - Est 4-FTEs in Oversight + 13-FTEs in Infrastructure Support = 17-FTEs - Cost for reading badges - Allowance qtrly/$50 x 4 evaluations per year = $200/yrly ea FTE	SubK	21	85.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	200	17,000	17,000
	Support Services															
24	~ Temp Const. Porta-Let Services - Est 4 single person units for duration of infrastructure set-up - Each Unit costs $97/mth (incl rent, cleaning, pumping, & consumables); extra wkly cleaning @ $27.5 = $110/mth; $97 + $110 = $207 / 16-working dys per mth $12.94/dy x 4 units $51.75/dy - Pricing from current WRPS contract	SubK	21	1,446.8	DYS	0.0	0.0	0.00	0	0	0	0.00	0	51.75	74,871	74,871
25	~ Project Signs, Barricades - Est set-up/tr-dwn/adjst/move as needed - Estimate for Mat'l	2LB	21	1.0	DYS	1.0	1.0	39.39	39	15	15	0.00	0	0.00	0	54
26	~ Initial Delivery of Equipment Support - Operator Craft - Labor Only - Est 4-Operator/s delivering equip fueling/maint, & running water truck.	3O1OF	21	4.0	CRFT	40.0	160.0	45.17	7,227	0	0	0.00	0	0.00	0	7,227
27	~ ~ Initial Delivery of Equipment Support - Teamster Craft - Labor Only - Est 4-Teamsters/s delivering equip.	3TM1TMF	21	4.0	CRFT	40.0	160.0	43.95	7,032	0	0	0.00	0	0.00	0	7,032
28	~ Construction Radios - 12 for Subcontractor & 2 spares. They come with w/extra battery, charger, holster, & speaker extension mic. Est $1,400 ea	SubK	21	14.0	EA	0.0	0.0	0.00	0	1,400	19,600	0.00	0	0.00	0	19,600
29	~ Estimate Mobilization Small Tools @ 2% of Labor $	SubK	21	1.0	LS	0.0	0.0	0.00	0	177,475	177,475	0.00	0	0.00	0	177,475
30	~ Estimate Mobilization Mat'ls @ 3% of Labor $	SubK	21	1.0	LS	0.0	0.0	0.00	0	266,212	266,212	0.00	0	0.00	0	266,212
	Subtotal General Requirements						**448,876**		**13,736,666**		**4,681,439**		**368,708**		**9,758,970**	**28,545,783**
	Light Duty Trucks - Outside Waste Retrieval Pit/Areas															
31	~ Pickup Truck - 3/4 Ton, 4x4, 285 Hp, Crew Cab, Gas, Yr/08 - Est (3) - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	43,403.7	HRS	0.00	0.0	0.00	0	0.00	0	6.53	283,599		0	283,599
32	~ Site Fueling Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	26.65	385,534		0	385,534
33	~ Site Lube / Mechanic Truck, 2 ton, 800 gal, On-Highway 250 HP, Diesel, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	14.37	207,913		0	207,913

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Project Management, Support Staff, & Support Equipment

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Haul Trucks - Outside Waste Retrieval Pit/Areas																
34	~ Roll-off Truck - Misc Mod, On-Highway, Roll-on Roll-off, 8x4, 450 Hp, 85,000 lbs max, 15-18 cy, Yr/08 - Est (2) Pcs (Rental cost 100% & operating cost 80%)	SubK	21	28,935.8	HRS	0.00	0.0	0.00	0	0.00	0	61.05	1,766,388		0	1,766,388
35	~ Dump Truck - Mechanical Drive Rear Dumps - CAT 769D, 36.4 MT, 487 Hp, Yr/07 - Est (2) Pcs (Rental cost 100% & operating cost 80%)	SubK	21	28,935.8	HRS	0.00	0.0	0.00	0	0.00	0	113.59	3,286,696		0	3,286,696
Heavy Duty Trucks - Outside Waste Retrieval Pit/Areas																
35	~ Water Truck - Misc Mod, On-Highway Tanker, 4000 Gal, 250 Hp, Diesel, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 50%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	31.99	462,793		0	462,793
Heavy Equipment - Outside Waste Retrieval Pit/Areas																
36	~ Grader - Articulated Frame - CAT 12H, 145 Hp, 12' Moldboard, Diesel, 31320 Lbs, Yr/07- Est (1) Pc (Rental cost 100% & operating cost 20%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	33.05	478,196		0	478,196
37	~ Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.5', Reach 27', 100Hp, 4WD, Yr/08 - Est (2) Pcs (Rental cost 100% & operating cost 30%)	SubK	21	28,935.8	HRS	0.00	0.0	0.00	0	0.00	0	26.61	769,843		0	769,843
38	~ Front End Loader - CAT 930GI, 4-WD Articulated Wheel Loaders, 149 Hp, Diesel, 3.25 Cy, Fy/08 - Est (1) Pc (Rental cost 100% & operating cost 50%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	31.64	457,775		0	457,775
Support Equipment - Outside Waste Retrieval Pit/Areas																
39	~ Air Compressor (96 CFM @ 120 Gal Cap), Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 20%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	1.42	20,510		0	20,510
40	~ Light Plant - Misc Mod, 7 KW, 10.5 Hp, 30' w/4 lights, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	5.86	84,816		0	84,816
41	~ Generator - Misc Mod, 20kw/6.5 kva, Enclosed, 34 Hp, Diesel, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	14,467.9	HRS	0.00	0.0	0.00	0	0.00	0	6.37	92,098		0	92,098
42	~ Storage Trailer - 8'wd x 8Hgh x 22'lng doors on both ends - $2.12/hr x 10/hrs = $21.20/Dy - Est (4) Pc (Rental cost 100%)	SubK	21	57,871.6	HRS	0.00	0.0	0.00	0	0.00	0	2.12	122,426		0	122,426
	Subtotal Field Work						**0**		**0**		**0**		**8,418,585**		**0**	**8,418,585**
	Subtotal General Req's & Field Work						**448,876**		**13,736,666**		**4,681,439**		**8,787,293**		**9,758,970**	**36,964,368**
Construction General Requirements Adders																
	Productivity Factor - 15% of Const Labor		21				67,330.0		2,060,500							2,060,500
	Non Productive Supervision - 1.5% of Const. Labor		21				6,730.0		206,050							206,050
	Weather Delays - 5% of Const. Labor		21				22,440.0		686,833							686,833
	Estimate for Construction Consumables - 4% of Const. Labor		21								549,467					549,467
	Estimate for Construction Cleanup - 5% of Const. Labor		21						686,833							686,833
	Estimate for Construction Material Movement - 1% of Const. Material		21								46,814					46,814
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						206,050							206,050
	Subtotal Construction General Requirements Adders						**96,500**		**3,846,266**		**596,281**		**0**		**0**	**4,442,547**
Construction Markup & Taxes Adders																
	Construction Contractor Subcontractor Markup - @ 7.5%		21												731,923	731,923

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Project Management, Support Staff, & Support Equipment

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Construction Contractor G&A - @ 10%		21						1,758,293		527,772		878,729		975,897	4,140,691
Construction Contractor Fee - @ 7%		21						1,230,805		369,440		615,111		683,128	2,898,484
Construction Contractor Sales Tax - @ 8.3%		21								438,051		729,345		809,994	1,977,390
Subtotal Construction Markup Adders						**0**		**2,989,098**		**1,335,263**		**2,223,185**		**3,200,942**	**9,748,488**
Subtotal Construction Subcontractor						**545,376**		**20,572,030**		**6,612,983**		**11,010,478**		**12,959,912**	**51,155,403**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**545,376**		**20,572,030**		**6,612,983**		**11,010,478**		**12,959,912**	**51,155,403**

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
	** Proj Mgmt, Support Craft, & Design Engineering involvement and associated costs captured in Mobe & OPS start-up phases.															
Field Work																
Maintenance Site Roads, Parking Area, & Other Areas																
1	~ Operator - Running Motor Grader - Est working area every 3/mths or 4x per year - Est 20hrs for rds; 20hrs for CTA; & 20hrs for other areas = 60 x 4 = 240hrs x qty of proj years	1O	21	1,780.6	HRS	1.00	1,780.6	44.90	79,949	0.00	0	0.00	0	0.00	0	79,949
2	~ Grader - Articulated Frame - CAT 12H, 145 Hp, 12' Moldboard, Diesel, 31320 Lbs, Yr/07	SubK	21	1,780.6	HRS	1.00	1,780.6	0.00	0	0.00	0	54.13	96,388		0	96,388
3	~ Operator - Running Vibrator Compactor - Est working area every 6/mths or 2x per year - Est ea referb @ 40hrs for rds; 40hrs for CTA; & 40hrs for other areas = 120 x 2 = 240hrs x qty of proj years	1O	21	1,781.3	HRS	1.00	1,781.3	44.90	79,980	0.00	0	0.00	0	0.00	0	79,980
4	~ Compactor - Single Drum (Smooth) Vibratory - CAT CS-563D, 145Hp, 84" Wide, Yr/03	SubK	21	1,781.3	HRS	1.00	1,781.3	0.00	0	0.00	0	48.08	85,639		0	85,639
Dust Control Site Roads, Parking Area, & Other Areas																
5	~ Teamster - Running Dust Ctrl/H2o Truck - Est working 2.5hrs in morning & afternoon for 5hrs per day X 200 days per year x qty of proj years	1TM	21	7,422.1	HRS	1.00	7,422.1	43.68	324,197	0.00	0	0.00	0	0.00	0	324,197
6	~ Water Truck - Misc Mod, On-Highway Tanker, 4000 Gal, 250 Hp, Diesel, Yr/08	SubK	21	7,422.1	HRS	1.00	7,422.1	0.00	0	0.00	0	45.34	336,500		0	336,500
7	~ Materials - Dust suppression - Allowance @ $250/wk	SubK	21	50.0	WKS	0.000	0.0	0.00	0	250.00	12,500	0.00	0	0.00	0	12,500
Haul Water to Site Year Round																
8	~ Teamster - Hauling water to storage tanks at site, supplying inside fence with water, & performing dust ctrl as needed - Est working 5hrs/day X 200 days per year x qty of proj years	1TM	21	7,422.1	HRS	1.00	7,422.1	43.68	324,197	0.00	0	0.00	0	0.00	0	324,197
9	~ Water Truck - Misc Mod, On-Highway Tanker, 4000 Gal, 250 Hp, Diesel, Yr/08	SubK	21	7,422.1	HRS	1.00	7,422.1	0.00	0	0.00	0	45.34	336,500		0	336,500
Re-Gravel Roads & CTA - Each Year																
	Re-Gravel Roads (2) Times - Apply Gravel, Level, Compact, & Dress Edges															
10	~ Haul Gravel From Town & Dump - Haul mat'l, & place in parking lot extension - 20 CY Truck Cap - 3' top-coat. Est haul 80miles rnd trip. - Phone Discussion with Darren at American Rock on 4-23-10 - Est re-coat/re-surface 3 x during contract duration	3TM1TM F1O	21	6,080.6	LCY	0.000	0.0	44.14	0	15.79	96,024	0.00	0	18.94	115,136	211,160
11	~ Spreading Fill Mat'l - In lifts at location - Means #02315-520-0020	SubK	21	6,080.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	11,022	11,022
12	~ Leveling & Compacting - Level & compact lifts w/vibrating roller - Means #02315-520-1100	SubK	21	6,080.6	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.14	165,011	165,011

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Install / Prep - Trailer Set-up Area, Roads, Parking Lot, Lay-Down Yard, & Q

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
13	~ 4000 gal, 250 Hp On-Highway Water Tanker - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book - Est re-coat/re-surface 3 x during contract duration.	1TM	21	501.0	HRS	1.0	501.0	43.68	21,884	0	0	45.34	22,714	0.00	0	44,598
14	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support - Est operating partial time - Equip hrly costs from Blue Book	1O	21	100.2	HRS	1.0	100.2	44.90	4,499	0	0	0.00	0	0.00	0	4,499
	Subtotal Field Work						**37,413**		**834,707**		**108,524**		**877,741**		**291,169**	**2,112,140**
	Subtotal General Req's & Field Work						**37,413**		**834,707**		**108,524**		**877,741**		**291,169**	**2,112,140**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				5,610.0		125,206							125,206
	Non Productive Supervision - 1.5% of Const. Labor		21				560.0		12,521							12,521
	Weather Delays - 5% of Const. Labor		21				1,870.0		41,735							41,735
	Estimate for Construction Consumables - 4% of Const. Labor		21								33,388					33,388
	Estimate for Construction Cleanup - 5% of Const. Labor		21						41,735							41,735
	Estimate for Construction Material Movement - 1% of Const. Material		21								1,085					1,085
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						12,521							12,521
	Subtotal Construction General Requirements Adders						**8,040**		**233,718**		**34,473**		**0**		**0**	**268,191**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												21,838	21,838
	Construction Contractor G&A - @ 10%		21						106,842		14,300		87,774		29,117	238,033
	Construction Contractor Fee - @ 7%		21						74,790		10,010		61,442		20,382	166,624
	Construction Contractor Sales Tax - @ 8.3%		21								11,869		72,852		24,167	108,888
	Subtotal Construction Markup Adders						**0**		**181,632**		**36,179**		**222,068**		**95,504**	**535,383**
	Subtotal Construction Subcontractor						**45,453**		**1,250,057**		**179,176**		**1,099,809**		**386,673**	**2,915,714**
	Contingency								**0**		**0**		**0**		**0**	**0**
	Escalation								**0**		**0**		**0**		**0**	**0**
	Total Project						**45,453**		**1,250,057**		**179,176**		**1,099,809**		**386,673**	**2,915,714**

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Support Trailers Monthly Rental & Their Maintenance

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
Support Facilities																
Facilities Maint. & Cleaning																
1	~ Estimate Trailers Maintenance Costs - Incl general trailer up-keep, repairs, HVAC yrly eval/charge, outside lights chg-out, etc. Allowance @ 3% of rental costs.	SubK	21	1.0	LS	0.00	0.0	0.00	0	0.00	0	0.00	0	53,070	53,070	53,070
Office Trailer																
2	~ Subcontractor - Office Trailer - 24' x 60' - Move in & set up - Est 200Sf per person - Room for 10-12FTEs	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,195.00	106,177	106,177
3	~ Subcontractor - Office Trailer - 24' x 60' - Move in & set up - Est 200Sf per person - Room for 10-12FTES	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,195.00	106,177	106,177
4	~ Estimate Trailer Cleaning Service Cost - Est for 2,880 SF - Incl cleaning, & waste disposal. Allownace @ of costs.	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	633.60	56,296	56,296
Craft & RCT's OPS Trailers																
5	~ Subcontractor - POD / Lunch Room Trailer 24' x 60' -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,195.00	106,177	106,177
6	~ Subcontractor - POD / Lunch Room Trailer 24' x 60' -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,195.00	106,177	106,177
7	~ Subcontractor - PPE Trailer 24' x 60' -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,195.00	106,177	106,177
8	~ Contractor RCT Trailer - OPS Trailer & Lunch Room Trailer 14' x 66' -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	625.00	55,532	55,532
9	~ Estimate Trailer Cleaning Service Cost - Est 4,320SF - Incl cleaning, & waste disposal. Allownace @ of costs.	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	950.40	84,444	84,444
Analytical Trailer																
10	~ Analytical Trailer 14' x 66' - Trailer used for evaluating waste samples, packaging, reporting, & records.	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	625.00	55,532	55,532
11	~ Estimate Trailer Cleaning Service Cost - Est 924SF - Incl cleaning, waste disposal, bathroom consumables. Allownace @ of costs.	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	203.28	18,062	18,062
Restroom Trailers																
12	~ Restroom Men's Trailer 12' x 25' Self Contained Potable & RAW storage tanks -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	905.00	80,410	80,410
13	~ Restroom Men/Women Trailer 12' x 25' Self Contained Potable & RAW storage tanks -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	905.00	80,410	80,410
14	~ Estimate Trailer Cleaning Service Cost - Est 600SF - Incl cleaning, waste disposal, RAW Water disposal, & bathroom consumables. Allownace @ of costs.	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	4,008.00	356,114	356,114
Shower Trailers																
15	~ Shower Men's Trailer 12' x 25' Self Contained Potable & RAW storage tanks -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,784.00	158,510	158,510
16	~ Shower Men/Women Trailer 12' x 25' Self Contained Potable & RAW storage tanks -	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,784.00	158,510	158,510

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Support Trailers Monthly Rental & Their Maintenance

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
17	~ Materials - Allownace for towel cleaning & other support items @ $350/Mth ea trailer - Est 50-70 personnel requirig 3-4 showers per day or 60 x 3 = 180 towels per day @ $.35ea = $56/Day + 15% = $64/day - 16.7/Dys per Mth = $1,069/Mth	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	1,511.38	134,288	134,288
18	~ Estimate Trailer Cleaning Service Cost - Est 600SF - Incl cleaning, waste disposal, RAW Water disposal, shower consumables. Allownace @ of costs.	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	4,008.00	356,114	356,114
	Facility Personnel Support Items															
19	~ Estimate personnel support items to be replaced (equip, furniture, computers, etc.), re-furbishments, sys additions or alterations - Mthly allowance for OPS sch duration	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	500.00	44,425	0.00	0	3,570.77	317,266	361,691
20	~ Storage Trailer - 8'wd x 8Hgh x 22'lng doors on both ends - $120/Mth	SubK	21	88.9	MTHs	0.00	0.0	0.00	0	0.00	0	0.00	0	120.00	10,662	10,662
	Subtotal Field Work						**0**		**0**		**44,425**		**0**		**2,506,104**	**2,550,529**
	Subtotal General Req's & Field Work						**0**		**0**		**44,425**		**0**		**2,506,104**	**2,550,529**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				0.0		0							0
	Non Productive Supervision - 1.5% of Const. Labor		21				0.0		0							0
	Weather Delays - 5% of Const. Labor		21				0.0		0							0
	Estimate for Construction Consumables - 4% of Const. Labor		21								0					0
	Estimate for Construction Cleanup - 5% of Const. Labor		21						0							0
	Estimate for Construction Material Movement - 1% of Const. Material		21								444					444
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						0							0
	Subtotal Construction General Requirements Adders						**0**		**0**		**444**		**0**		**0**	**444**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												187,958	187,958
	Construction Contractor G&A - @ 10%		21						0		4,487		0		250,610	255,097
	Construction Contractor Fee - @ 7%		21						0		3,141		0		175,427	178,568
	Construction Contractor Sales Tax - @ 8.3%		21								3,724		0		208,007	211,731
	Subtotal Construction Markup Adders						**0**		**0**		**11,352**		**0**		**822,002**	**833,354**
	Subtotal Construction Subcontractor						**0**		**0**		**56,221**		**0**		**3,328,106**	**3,384,327**
	Contingency								**0**		**0**		**0**		**0**	**0**
	Escalation								**0**		**0**		**0**		**0**	**0**
	Total Project						**0**		**0**		**56,221**		**0**		**3,328,106**	**3,384,327**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Survey Tent

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E Mgmt	21	24.0	DYS	6.0	144.0	93.73	13,497	0.00	0	0.00	0	0.00	0	13,497
2	~ Proj Admin Vehicle support	SubK	21	144.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	2,460	0.00	0	2,460
3	~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E Sup	21	24.0	DYS	5.0	120.0	89.80	10,776	0.00	0	0.00	0	0.00	0	10,776
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	120.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	2,050	0.00	0	2,050
5	~ Safety Rep - Est 25% of Mechanical Const Sch. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Safe	21	24.0	DYS	2.5	60.0	87.04	5,222	0.00	0	0.00	0	0.00	0	5,222
6	~ Safety Rep - Est Vehicle support	SubK	21	60.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	1,025	0.00	0	1,025
7	~ QA/QC Inspections/Audits - Est 10% of Const Sch. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E QA	21	24.0	DYS	3.0	72.0	66.58	4,794	0.00	0	0.00	0	0.00	0	4,794
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	72.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	1,230	0.00	0	1,230
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	SubK	21	24.0	DYS	0.0	0.0	0.00	0	0.00	0	8.04	1,929	3.70	888	2,817
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	24.0	DYS	1.0	24.0	39.39	945	15	360	0.00	0	0.00	0	1,305
Mobilization																
11	~ - Mob-Training (Est 40hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 4 classes x $250 ea)	3C1CF2 L1TM	21	7.0	CRFT	40.0	280.0	44.03	12,328	0.00	0	0.00	0	1,000	7,000	19,328
12	~ Physicals - Est allowance for medical eval costs. Est 100% of working Craft = (7) total. - Estimate $750 per	SubK	21	7.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	5,250	5,250
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	3C1CF2 L1TM	21	1.0	DAY	70.00	70.0	44.03	3,082	0.00	0	500	500	350	350	3,932
15	~ Mob-Submittals - Est 16	1PM	21	16.0	EA	2.0	32.0	93.73	2,999	0.00	0	0.00	0	0.00	0	2,999
Demobilization																
16	~ Demob - Site / Area Cleanup	3C1CF2 L1TM	21	0.5	DAY	70.00	35.0	44.03	1,541	0.00	0	0.00	0	0.00	0	1,541
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	3C1CF2 L1TM	21	0.5	DAY	140.00	70.0	44.03	3,082	0.00	0	500	250	100.00	50	3,382
	Subtotal General Requirements						**939**		**58,643**		**360**		**9,443**		**14,551**	**82,997**
Field Work																
Survey Tent - Install																

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Survey Tent

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
1	~ Survey & Place Markers at Work Area - Est 2 man survey crew - Incl place markers for Survey Tent, & elect utilities - 1/2 Day - Allowance for Labor & mat'l	2CP	21	1	LS	10.00	10.0	47.32	473	100.00	100	0.00	0	0.00	0	573
2	~ Survey Tent 30'w x 60' lng (Mat'l Purchase Only) - Tensioned Fabric Enclosure (structural Steel & Fabric) FOB to C Farm site.	21	21	1800.0	SF	0.00	0.0	1.00	0	44.85	80,730	0.00	0	0.00	0	80,730
3	~ Carpenters - Foreman - Survey Tent Erection Labor - Incl anchoring Tent; erect worker scaffolding platform on both sides of Tent for Craft performing CAN examinations / surveys; install (2) remote roll-up doors; & air ventilation unit w/louvers in tent dormer (not HVAC). Allowance for Labor	1CF	21	16.0	DYS	10.0	160.0	48.26	7,722	150.00	2,400	0.00	0	0	0	10,122
4	~ Carpenters - 3-Craft - Allowance for install Labor	3C	21	16.0	DYS	30.0	480.0	46.38	22,262	0.00	0	0.00	0	0	0	22,262
5	~ Mat'ls - Incl anchoring Tent tie-dwns (eco blocs, or screw-in tie-dwns); scaffolding platform items; (2) remote roll-up doors; & air ventilation unit w/louvers (not HVAC). Allowance for Labor, Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	17,800.00	17,800	0.00	0	0	0	17,800
6	~ Labors - 2-Craft - Flagman/Spotter/Support - erecting tent - Allowance for install Labor	2LB	21	16.0	DYS	20.0	320.0	39.39	12,605	0.00	0	0.00	0	0	0	12,605
7	~ Teamster - Supporting Carps erecting tent - Allowance for install Labor - Est 25% of the sch	1TM	21	4.0	DYS	10.0	40.0	43.68	1,747	0.00	0	28.03	374	0.00	0	2,121
8	~ Flatbed Truck - Misc Model, 4.25 ton, 180 Hp, 4x2, Gas, Yr/08 - Est 25% of the sch	SubK	21	4.0	DYS	10.0	40.0	0.00	0	0.00	0	21.69	867		0	867
9	~ Operator - Supporting Carps erecting tent - Allowance for install Labor - Est 50% of the sch	1O	21	8.0	DYS	10.0	80.0	44.90	3,592	0.00	0	36.64	977	0.00	0	4,569
10	~ Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.6', Reach 27'4", 100Hp, 4WD, Yr/08 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	8.0	DYS	10.0	80.0	0.00	0	0.00	0	30.76	2,460		0	2,460
11	~ Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	8.0	DYS	10.0	80.0	0.00	0	0.00	0	50.02	4,002		0	4,002
12	~ Electrical Foreman - 1-FTE - Supporting elect install items, lighting, elect feed sys, etc - Allowance for install Labor	1ELF	21	12.0	DYS	10.0	120.0	62.14	7,457	0.00	0	0.00	0	0	0	7,457
13	~ Electricians - 2-FTEs - Supporting elect install items, lighting, elect feed sys, etc - Allowance for install Labor	2EL	21	12.0	DYS	20.0	240.0	52.63	12,631	0.00	0	0.00	0	0	0	12,631
14	~ Electrical Items - Est transformer w/pad & dscnt; 3" PVC buried conduit (main power loc to tent); #2 THHN & grd; 2-grd 10' rods; weather proof panel; 10 breakers; 1" EMT w/fittings; #12 THHN; conn; 8-flood lights w/supports; dscnt for air handler/wall vent; 1" flex conduit; #10 THHN; conn; 6-110V outlets; 3/4 EMT w/fittings; #12 THHN; & conn - inside tent - Allowance for Mat'l & equip	SubK	21	1.0	LS	10.0	10.0	0.00	0	15,000.00	15,000	3,000.00	3,000	0	0	18,000
	Install Tent Floor Gravel & Entrance/Exist Area															
15	~ Clear & Grub - Excavate area w/fire break **for Survey Tent Area** 30' wide x 60' long (1,800SF) & Egress Rds In/Out of tent 30' x 100' (300SF) x 3" (.25') deep = 1,200/BCF x 15% LCF = 1,380 LCF / 27 = 51 LCY - Use 105HP Bulk Dozer Common Earth - Means 02315-432-3320	21	21	51.1	LCY	0.00	0.0	1.00	0	0.00	0	0.00	0	10.32	527	527
16	~ Load Clear/Grub - Load 16.5/Tn Cap Trucks - Est 20 min load time (51 LCY / 16.5 = 3 truck loads x .33/hr + min dwn time = .41/hr) - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	51.1	LCY	0.025	1.3	44.90	58	0.00	0	42.69	18	0.00	0	77

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Survey Tent

Est No: #2723
Date: 08/10/10

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17	~ Remove Clear/Grub Debris & Haul to site land fill -Incl removing debris; load into a off-rd truck/s; haul to disposal pit; & dump - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	51.1	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	568	568
18	~ Excavate & Screen New Back-fill - At Hanford pit - Est excavator, front end loader, & vibratory screen. Qty 30' x 60' + 30' x 100 x 6" deep = - Assume processing 25% more soil to obtain soil spec size. - Equip hrly costs from Blue Book	1OF1O	21	111.1	LCY	0.050	5.6	45.44	254	0.00	0	0.00	0	0.00	0	254
19	~ Load Gravel / Soil At Hanford Borrow Pit - Load 16.5/Tn Cap Trucks - Est 20 min load time - Est 4 loads (89 LCY / 16.5 = 6 truck loads x .33/hr + min dwn time = 20/hrs - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	88.9	LCY	0.025	2.2	44.90	99	0.00	0	24.55	18	0.00	0	117
20	~ Haul Gravel / Soil From Hanford Pit to Survey Tent Area - Haul mat'l, & place as back-fill. - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	88.9	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	988	988
21	~ Spreading Fill Mat'l at Survey Tent Egress points & - Means #02315-520-0020	SubK	21	88.9	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	161	161
22	~ Leveling & Compacting New Waste Handling Lot Area - Level & compact 9" lifts lot extension area w/vibrating roller - Means #02315-520-1200	SubK	21	88.9	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	27.36	2,432	2,432
23	~ Haul Gravel From Town & Dump - Haul mat'l, & place in Survey Tent Area - 20 CY Truck Cap - 3' top-coat. Est haul 80miles rnd trip. - Phone Discussion with Darren at American Rock on 4-23-10	3TM1TM F1O	21	44.4	LCY	0.000	0.0	44.14	0	15.16	674	0.00	0	18.94	842	1,515
24	~ Spreading Fill Mat'l New Waste Handling Lot Area - lifts lot extension area - Means #02315-520-0020	SubK	21	44.4	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	81	81
25	~ Leveling & Compacting New Waste Handling Lot Area - Level & compact 6" lifts lot extension area w/vibrating roller - Means #02315-520-1100	SubK	21	44.4	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	24.06	1,069	1,069
26	~ 4000 gal, 250 Hp On-Highway Water Tanker - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book	1TM	21	41.8	HRS	1.0	41.8	43.68	1,826	0	0	45.34	1,893	0.00	0	3,719
27	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support - Est operating partial time - Equip hrly costs from Blue Book	1O	21	8.4	HRS	1.0	8.4	44.90	377	0	0	26.65	223	0.00	0	600
	Subtotal Field Work						**1,719**		**71,104**		**116,704**		**13,832**		**6,668**	**208,308**
	Subtotal General Req's & Field Work						**2,658**		**129,746**		**117,064**		**23,276**		**21,218**	**291,304**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				260.0		10,666							10,666
	Non Productive Supervision - 1.5% of Const. Labor		21				30.0		1,067							1,067
	Weather Delays - 5% of Const. Labor		21				90.0		3,555							3,555
	Estimate for Construction Consumables - 4% of Const. Labor		21								2,844					2,844
	Estimate for Construction Cleanup - 5% of Const. Labor		21						3,555							3,555
	Estimate for Construction Material Movement - 1% of Const. Material		21								1,167					1,167

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Survey Tent

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						1,067							1,067
Subtotal Construction General Requirements Adders						**380**		**19,910**		**4,011**		**0**		**0**	**23,921**
Construction Markup & Taxes Adders															
Construction Contractor Subcontractor Markup - @ 7.5%		21												1,591	1,591
Construction Contractor G&A - @ 10%		21						14,966		12,107		2,328		2,122	31,523
Construction Contractor Fee - @ 7%		21						10,476		8,475		1,629		1,485	22,065
Construction Contractor Sales Tax - @ 8.3%		21								10,049		1,932		1,761	13,742
Subtotal Construction Markup Adders						**0**		**25,442**		**30,631**		**5,889**		**6,959**	**68,921**
Subtotal Construction Subcontractor						**3,038**		**175,098**		**151,706**		**29,165**		**28,177**	**384,146**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**3,038**		**175,098**		**151,706**		**29,165**		**28,177**	**384,146**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Support Equipment - Life Cycle

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
	Support Infrastructure Equipment Cost															
	Light Duty Trucks - Inside Waste Retrieval Pit/Areas															
1	~ Pickup Truck - 3/4 Ton, 4x4, 165 Hp, Crew Cab, Gas, Yr/08 - Est (2) Pcs (Rental cost 100% & operating cost 30%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	6.53	193,982		0	193,982
2	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 20%)	SubK	21	14,844	HRS	1.00	14,844.1	0.00	0	0.00	0	23.98	355,925		0	355,925
3	~ Lube / Mechanic Truck, 1500 gal, On-Highway 199 HP, Gas, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 10%)	SubK	21	14,844	HRS	1.00	14,844.1	0.00	0	0.00	0	10.15	150,677		0	150,677
	Waste Haul Trucks - Inside Waste Retrieval Pit/Areas															
4	~ Roll-off Truck - Misc Mod, On-Highway, Roll-on Roll-off, 8x4, 450 Hp, 85000 lbs max, 15-18 cy, Yr/08 - Est (5) Pcs (Rental cost 100% & operating cost 90%)	SubK	21	74,221	HRS	1.00	74,220.5	0.00	0	0.00	0	65.61	4,869,241		0	4,869,241
5	~ Dump Truck - Mechanical Drive Rear Dumps - CAT 769D, 36.4 MT, 487 Hp, Yr/07 - Est (1) Pc (Rental cost 100% & operating cost 20%)	SubK	21	14,844	HRS	1.00	14,844.1	0.00	0	0.00	0	79.24	1,176,184		0	1,176,184
	Heavy Duty Trucks - Inside Waste Retrieval Pit/Areas															
6	~ Water Truck - Misc Mod, On-Highway Tanker, 4000 Gal, 250 Hp, Diesel, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 50%)	SubK	21	14,844	HRS	1.00	14,844.1	0.00	0	0.00	0	31.99	474,826		0	474,826
	Heavy Equipment - Inside Waste Retrieval Pit/Areas															
7	~ Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.6', Reach 27'4", 100Hp, 4WD, Yr/08 - Est (2) Pcs (Rental cost 100% & operating cost 90%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	39.06	1,159,479		0	1,159,479
8	~ Excavator - Crawler Mounted Hydraulic Excavator - Komatsu PC300LC-7, 2.56 Cy, 246 Hp, 34.2 MT, Yr/07 - Est (2) Pcs (Rental cost 100% & operating cost 90%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	111.88	3,321,521		0	3,321,521
9	~ Excavator - Crawler Mounted Hydraulic Excavator, Komatsu PC400LC-7, 2.54 Cy, 345 Hp, 44.4 MT, Yr/08 - Est (2) Pcs (Rental cost 100% & operating cost 90%)	SubK	21	44,532	HRS	1.00	44,532.3	0.00	0	0.00	0	150.65	6,708,696		0	6,708,696
10	~ Excavator Attachment - Concrete Cruncher / Pulverizer - LaBounty CP40, 30" Jaw Opening, 2,875 Lbs, Yr/08 - Est (2) Pc (Rental cost 100% & operating cost 25%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	6.55	194,531		0	194,531
11	~ Excavator Attachment - Hydraulic Impact Breaker - Stanley MB30EXS, 2000 Ft-lb Impact Energy, 500/700 bpm, Yr/08 - Est (2) Pc (Rental cost 100% & operating cost 25%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	14.05	417,049		0	417,049
12	~ Excavator Shear - CAT S320, Jaw Opening 15.4, 4,741 Lbs, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 20%)	SubK	21	14,844	HRS	1.00	14,844.1	0.00	0	0.00	0	15.20	225,676		0	225,676
13	~ Front End Loader - CAT 930G, 4-WD Articulated Wheel Loaders, 149 Hp, Diesel, 3.25 Cy, Fy/08 - Est (2) Pcs (Rental cost 100% & operating cost 90%)	SubK	21	44,532	HRS	1.00	44,532.3	0.00	0	0.00	0	40.48	1,802,699		0	1,802,699
	Support Equipment - Inside Waste Retrieval Pit/Areas															
14	~ Air Compressor (83 CFM @ 120 Gal Cap), 20Hp, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 20%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	2.18	64,649		0	64,649

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Support Equipment - Life Cycle

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
15	~ Generator - Misc Mod, 20kW/6.5 kva, Enclosed, 34 Hp, Diesel, Yr/08 - Est (1) Pc (Rental cost 100% & operating cost 30%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	12.67	376,022		0	376,022
16	~ Storage Trailer - 8'W x 8H x 22'Lng doors on both ends - $2.12/hr ea + $200 delivery - Est (1) Pc (Rental cost 100%)	SubK	21	29,688	HRS	1.00	29,688.2	0.00	0	0.00	0	2.12	62,805		0	62,805
	Subtotal Field Work						**475,011**		**0**		**0**		**21,553,961**		**0**	**21,553,961**
	Subtotal General Req's & Field Work						**475,011**		**0**		**0**		**21,553,961**		**0**	**21,553,961**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				71,250.0		0							0
	Non Productive Supervision - 1.5% of Const. Labor		21				7,130.0		0							0
	Weather Delays - 5% of Const. Labor		21				23,750.0		0							0
	Estimate for Construction Consumables - 4% of Const. Labor		21								0					0
	Estimate for Construction Cleanup - 5% of Const. Labor		21						0							0
	Estimate for Construction Material Movement - 1% of Const. Material		21								0					0
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						0							0
	Subtotal Construction General Requirements Adders						**102,130**		**0**		**0**		**0**		**0**	**0**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												0	0
	Construction Contractor G&A - @ 10%		21						0		0		2,155,396		0	2,155,396
	Construction Contractor Fee - @ 7%		21						0		0		1,508,777		0	1,508,777
	Construction Contractor Sales Tax - @ 8.3%		21								0		1,788,979		0	1,788,979
	Subtotal Construction Markup Adders						**0**		**0**		**0**		**5,453,152**		**0**	**5,453,152**
	Subtotal Construction Subcontractor						**577,141**		**0**		**0**		**27,007,113**		**0**	**27,007,113**
	Contingency								**0**		**0**		**0**		**0**	**0**
	Escalation								**0**		**0**		**0**		**0**	**0**
	Total Project						**577,141**		**0**		**0**		**27,007,113**		**0**	**27,007,113**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
Pit Working Staff & Craft - Life Cycle
Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	** Proj Mgmt, Support Craft, & Design Engineering involvement and associated costs captured in Mobe & OPS start-up phases.	Cnst E Mgmt	21	1,443.4	DYS	10.0	14,433.8	93.73	1,352,880	0	0	0.00	0	0.00	0	1,352,880
Construction Support Staff																
2	~ Training Budget - Estimated amount for Subcontractor training expenses at 3% of SubK Labor costs.	SubK	21	1	LS	10.0	10.0	0.00	0	0	0	0.00	0	584,074	584,074	584,074
3	~ Operating Engineer Foreman - 1-FTE Full-time supporting site - Incl Operating equip; supervising Operators; moving waste containers; dressing rd/s; running fork-lift, sml crains, & equip; time keeping; conducting safety meetings; etc	1OF	21	1	FTE	14,829.8	14,829.8	45.98	681,874	0.00	0	0.00	0	0	0	681,874
4	~ Operating Engineers - 8-FTEs Full-time supporting site - Incl equip support; operating equip; moving waste containers; dressing rd/s; running fork-lifts; & sml crains - Est (4) w/Crane certs & (4) Hvy Equip Operators to cover all the equip needs.	1O	21	8	FTE	14,829.8	118,638.3	44.90	5,326,860	0.00	0	0.00	0	0	0	5,326,860
5	~ Teamsters Foreman - 1-FTE Full-time supporting site - Incl Operating trucks; supervising Teamsters; moving waste containers & mat'ls; operating dust control truck; time keeping; conducting safety meetings; etc	1TMF	21	1	FTE	14,829.8	14,829.8	44.76	663,782	0.00	0	0.00	0	0	0	663,782
6	~ Teamsters - 4-FTEs Full-time supporting site - Incl Operating trucks; moving waste containers & mat'ls; operating dust control truck; running mat'ls; etc	1TM	21	6	FTE	14,829.8	88,978.7	43.68	3,886,590	0.00	0	0.00	0	0	0	3,886,590
7	~ Labor Foreman - 1-FTE Full-time supporting site - Incl operating sml equip; supervising Labors; Flagging; supporting waste container sealment; running sml fork-lift; time keeping; conducting safety meetings; etc.	1LF	21	1	FTE	14,829.8	14,829.8	40.20	596,158	0.00	0	0.00	0	0	0	596,158
8	~ Labors - 11-FTEs Full-time supporting site - Incl operating sml (1-FTE) equip, sml fork-lift, etc; (1-FTE) flag; (2-FTEs) spraying soil fixatives; (2-FTEs) handling air bottles / monitoring fresh air supply bottle racks & hoses; & (3-FTEs) support waste container handling install liners, & sealment; (2-FTEs) floaters supporting others as needed.	1L	21	11	FTE	14,829.8	163,127.7	38.58	6,293,467	0.00	0	0.00	0	0	0	6,293,467
9	~ Mechanic / Operating Engineers - 1-FTE Full-time supporting site - Incl maintain: haul trucks; heavy equip; support equip pool; operate equipment; etc	1O	21	1	FTE	14,829.8	14,829.8	44.90	665,858	0.00	0	0.00	0	0	0	665,858
10	~ PPE Supplies - Est $20.15 per dress-out x 4 chg-outs/dy = $80.58 per person x 24 Construction Craft - $80.58 x 25 personnel per day = $2,015/day + 10% additional qty to cover for schedule OT = $2,215.95 per day	SubK	21	1,440.4	DYS	1.0	1,440.4	0.00	0	2,215.95	3,191,877	0.00	0	0	0	3,191,877
Personnel Physicals																
11	~ Physicals for Craft Infrastructure Staff Due to Attrition - Est 15% ea year x 5 years, or 25 Craft x 15% = 4/Yr x 5 yrs = 20 for schedule duration.- Estimate $750 per	1OF7O1 TF4T1LF 11L	21	10.0	EA	4.0	40.0	41.77	1,671	0.00	0	0.00	0	750	7,500	9,171
Dosimetry																
12	~ Dosimetry Badging - Est 25-FTEs Construction Craft (Craft performing pit waste retrieval & Tank D&D activities) - Cost for reading badges - Allowance qtrly/$50 x 4 evaluations per year = $200/yrly ea FTE	SubK	21	125.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	200	25,000	25,000

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek
Pit Working Staff & Craft - Life Cycle
Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Support Services																
13	~ Temp Const. Porta-Let Services - Est 4 single person units for duration of infrastructure set-up - Each Unit costs $97/mth (incl rent, cleaning, pumping, & consumables); extra wkly cleaning @ $27.5 = $110/mth; $97 + $110 = $207 / 16-working dys per mth $12.94/dy x 4 units $51.75/dy - Pricing from current WRPS contract	SubK	21	1,443.4	DYS	0.0	0.0	0.00	0	0	0	0.00	0	51.75	74,695	74,695
14	~ Project Signs, Barricades - Est set-up/tr-dwn/adjst/move as needed - Estimate for Mat'l	SubK	21	60.0	MTH	1.0	60.0	0.00	0	200	12,000	0.00	0	0.00	0	12,000
15	~ Construction Radios - Est 24 Field Craft w/Supervisors - Est replacing 4 per year. Incl extra battery, charger, holster, & speaker extension mic. Est $1,400 ea	SubK	21	20.0	EA	0.0	0.0	0.00	0	1,400	28,000	0.00	0	0.00	0	28,000
	Subtotal Field Work						**446,048**		**19,469,139**		**3,231,877**		**0**		**691,269**	**23,392,284**
	Subtotal General Req's & Field Work						**446,048**		**19,469,139**		**3,231,877**		**0**		**691,269**	**23,392,284**
Construction General Requirements Adders																
	Productivity Factor - 15% of Const Labor		21				66,910.0		2,920,371							2,920,371
	Non Productive Supervision - 1.5% of Const. Labor		21				6,690.0		292,037							292,037
	Weather Delays - 5% of Const. Labor		21				22,300.0		973,457							973,457
	Estimate for Construction Consumables - 4% of Const. Labor		21								778,766					778,766
	Estimate for Construction Cleanup - 5% of Const. Labor		21						973,457							973,457
	Estimate for Construction Material Movement - 1% of Const. Material		21								32,319					32,319
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						292,037							292,037
	Subtotal Construction General Requirements Adders						**95,900**		**5,451,359**		**811,085**		**0**		**0**	**6,262,444**
Construction Markup & Taxes Adders																
	Construction Contractor Subcontractor Markup - @ 7.5%		21												51,845	51,845
	Construction Contractor G&A - @ 10%		21						2,492,050		404,296		0		69,127	2,965,473
	Construction Contractor Fee - @ 7%		21						1,744,435		283,007		0		48,389	2,075,831
	Construction Contractor Sales Tax - @ 8.3%		21								335,566		0		57,375	392,941
	Subtotal Construction Markup Adders						**0**		**4,236,485**		**1,022,869**		**0**		**226,736**	**5,486,090**
	Subtotal Construction Subcontractor						**541,948**		**29,156,983**		**5,065,831**		**0**		**918,005**	**35,140,818**
Contingency									**0**		**0**		**0**		**0**	**0**
Escalation									**0**		**0**		**0**		**0**	**0**
	Total Project						**541,948**		**29,156,983**		**5,065,831**		**0**		**918,005**	**35,140,818**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #3 thru #9

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration 6/Wks (16/dys mth x 1/mth)	Cnst E Mgmt	21	16.0	DYS	6.0	96.0	93.73	8,998	0.00	0	0.00	0	0.00	0	8,998
2	~ Proj Admin Vehicle support	SubK	21	96.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	1,640	0.00	0	1,640
3	~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E Sup	21	16.0	DYS	5.0	80.0	89.80	7,184	0.00	0	0.00	0	0.00	0	7,184
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	80.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	1,367	0.00	0	1,367
5	~ Safety Rep - Est 25% of Mechanical Const Sch. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Safe	21	16.0	DYS	2.5	40.0	87.04	3,482	0.00	0	0.00	0	0.00	0	3,482
6	~ Safety Rep - Est Vehicle support	SubK	21	40.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	683	0.00	0	683
7	~ QA/QC Inspections/Audits - Est 10% of Const Sch. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E QA	21	16.0	DYS	3.0	48.0	66.58	3,196	0.00	0	0.00	0	0.00	0	3,196
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	48.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	820	0.00	0	820
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	SubK	21	16.0	DYS	0.0	0.0	0.00	0	0.00	0	8.04	1,286	3.70	592	1,878
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	16.0	DYS	1.0	16.0	39.39	630	15	240	0.00	0	0.00	0	870
Mobilization																
11	~ - Mob-Training (Est 40hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 4 classes x $250 ea)	3C1CF2 L1TM	21	7.0	CRFT	40.0	280.0	44.03	12,328	0.00	0	0.00	0	1,000	7,000	19,328
12	~ Physicals - Est allowance for medical eval costs. Est 100% of working Craft = (7) total. - Estimate $750 per	SubK	21	7.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	5,250	5,250
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	3C1CF2 L1TM	21	1.0	DAY	70.00	70.0	44.03	3,082	0.00	0	500	500	350	350	3,932
15	~ Mob-Submittals - Est 16	1PM	21	16.0	EA	2.0	32.0	93.73	2,999	0.00	0	0.00	0	0.00	0	2,999
Demobilization																
16	~ Demob - Site / Area Cleanup	3C1CF2 L1TM	21	0.5	DAY	70.00	35.0	44.03	1,541	0.00	0	0.00	0	0.00	0	1,541
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	3C1CF2 L1TM	21	0.5	DAY	140.00	70.0	44.03	3,082	0.00	0	500	250	100.00	50	3,382
	Subtotal General Requirements						**799**		**46,898**		**240**		**6,546**		**14,255**	**67,938**
Field Work																
Survey Facility - Install																

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #3 thru #9

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
1	~ Survey & Place Markers at Work Area - Est 2 man survey crew - Incl place markers for Survey Facility, & elect utilities - 1/2 Day - Allowance for Labor & mat'l	2CP	21	1	LS	10.00	10.0	47.32	473	100.00	100	0.00	0	0.00	0	573
2	~ Survey Facility 30'w x 60' lng (Mat'l Purchase Only) - Tensioned Fabric Enclosure (structural Steel & Fabric) FOB to C Farm site.	21	21	1800.0	SF	0.00	0.0	1.00	0	44.85	80,730	0.00	0	0.00	0	80,730
3	~ Carpenters - Foreman - Survey Facility Erection Labor - Incl anchoring Tent; erect worker scaffolding platform on both sides of Tent for Craft performing CAN examinations / surveys; install (2) remote roll-up doors; & air ventilation unit w/louvers in tent dormer (not HVAC). Allowance for Labor	1CF	21	16.0	DYS	10.0	160.0	48.26	7,722	150.00	2,400	0.00	0	0	0	10,122
4	~ Carpenters - 3-Craft - Allowance for install Labor	3C	21	16.0	DYS	30.0	480.0	46.38	22,262	0.00	0	0.00	0	0	0	22,262
5	~ Mat'ls - Incl anchoring Tent tie-dwns (eco blocs, or screw-in tie-dwns); scaffolding platform items; (2) remote roll-up doors; & air ventilation unit w/louvers (not HVAC). Allowance for Labor, Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	17,800.00	17,800	0.00	0	0	0	17,800
6	~ Labors - 2-Craft - Flagman/Spotter/Support - erecting tent - Allowance for install Labor	2LB	21	16.0	DYS	20.0	320.0	39.39	12,605	0.00	0	0.00	0	0	0	12,605
7	~ Teamster - Supporting Carps erecting tent - Allowance for install Labor - Est 25% of the sch	1TM	21	4.0	DYS	10.0	40.0	43.68	1,747	0.00	0	28.03	374	0.00	0	2,121
8	~ Flatbed Truck - Misc Model, 4.25 ton, 180 Hp, 4x2, Gas, Yr/08 - Est 25% of the sch	SubK	21	4.0	DYS	10.0	40.0	0.00	0	0.00	0	21.69	867		0	867
9	~ Operator - Supporting Carps erecting tent - Allowance for install Labor - Est 50% of the sch	1O	21	8.0	DYS	10.0	80.0	44.90	3,592	0.00	0	36.64	977	0.00	0	4,569
10	~ Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.6', Reach 27'4", 100Hp, 4WD, Yr/08 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	8.0	DYS	10.0	80.0	0.00	0	0.00	0	30.76	2,460		0	2,460
11	~ Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	8.0	DYS	10.0	80.0	0.00	0	0.00	0	50.02	4,002		0	4,002
12	~ Electrical Foreman - 1-FTE - Supporting elect install items, lighting, elect feed sys, etc - Allowance for install Labor	1ELF	21	12.0	DYS	10.0	120.0	62.14	7,457	0.00	0	0.00	0	0	0	7,457
13	~ Electricians - 2-FTEs - Supporting elect install items, lighting, elect feed sys, etc - Allowance for install Labor	2EL	21	12.0	DYS	20.0	240.0	52.63	12,631	0.00	0	0.00	0	0	0	12,631
14	~ Electrical Items - Est transformer w/pad & dscnt; 3" PVC buried conduit (main power loc to tent); #2 THHN & grd; 2-grd 10' rods; weather proof panel; 10 breakers; 1" EMT w/fittings; #12 THHN; conn; 8-flood lights w/supports; dscnt for air handler/wall vent; 1" flex conduit; #10 THHN; conn; 6-110V outlets; 3/4 EMT w/fittings; #12 THHN; & conn - inside tent - Allowance for Mat'l & equip	SubK	21	1.0	LS	10.0	10.0	0.00	0	15,000.00	15,000	3,000.00	3,000	0	0	18,000
	Subtotal Field Work						**1,660**		**68,489**		**116,030**		**11,680**		**0**	**196,200**
	Subtotal General Req's & Field Work						**2,459**		**115,387**		**116,270**		**18,226**		**14,255**	**264,138**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				250.0		10,273							10,273
	Non Productive Supervision - 1.5% of Const. Labor		21				20.0		1,027							1,027
	Weather Delays - 5% of Const. Labor		21				80.0		3,424							3,424
	Estimate for Construction Consumables - 4% of Const. Labor		21								2,740					2,740
	Estimate for Construction Cleanup - 5% of Const. Labor		21						3,424							3,424
	Estimate for Construction Material Movement - 1% of Const. Material		21								1,160					1,160

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #3 thru #9

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						1,027							1,027
Subtotal Construction General Requirements Adders						**350**		**19,175**		**3,900**		**0**		**0**	**23,075**
Construction Markup & Taxes Adders															
Construction Contractor Subcontractor Markup - @ 7.5%		21												1,069	1,069
Construction Contractor G&A - @ 10%		21						13,456		12,017		1,823		1,425	28,721
Construction Contractor Fee - @ 7%		21						9,419		8,412		1,276		998	20,105
Construction Contractor Sales Tax - @ 8.3%		21								9,974		1,513		1,183	12,670
Subtotal Construction Markup Adders						**0**		**22,875**		**30,403**		**4,612**		**4,675**	**62,565**
Subtotal Construction Subcontractor						**2,809**		**157,437**		**150,573**		**22,838**		**18,930**	**349,778**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**2,809**		**157,437**		**150,573**		**22,838**		**18,930**	**349,778**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #1 & #2 Foundation

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Based on drilling crew duration (1.8/years) + misc dys rnd to 1.9/yrs	Cnst E Mgmt	21	380.0	DYS	6.0	2,280.0	93.73	213,704	0.00	0	0.00	0	0.00	0	213,704
2	~ Proj Admin Vehicle support	SubK	21	2,280.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	38,945	0.00	0	38,945
3	~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Based on drilling crew duration (1.8/years) + misc dys rnd to 2/yrs	Cnst E Sup	21	380.0	DYS	5.0	1,900.0	89.80	170,620	0.00	0	0.00	0	0.00	0	170,620
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	1,900.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	32,454	0.00	0	32,454
5	~ Safety Rep - Est 25% of Mechanical Const Sch. - Based on drilling crew duration (1.8/years) + misc dys rnd to 1.9/yrs	Cnst E Safe	21	380.0	DYS	2.5	950.0	87.04	82,688	0.00	0	0.00	0	0.00	0	82,688
6	~ Safety Rep - Est Vehicle support	SubK	21	950.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	16,227	0.00	0	16,227
7	~ QA/QC Inspections/Audits - Est 20% of Const Sch. - Based on drilling crew duration (1.8/years) + misc dys rnd to 1.9/yrs	Cnst E QA	21	380.0	DYS	2.0	760.0	66.58	50,601	0.00	0	0.00	0	0.00	0	50,601
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	760.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	12,982	0.00	0	12,982
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Based on drilling crew duration (1.8/years) + misc dys rnd to 1.9/yrs	SubK	21	380.0	DYS	0.0	0.0	0.00	0	0.00	0	8.04	30,547	3.70	14,060	44,607
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	380.0	DYS	1.0	380.0	39.39	14,968	15	5,700	0.00	0	0.00	0	20,668
Mobilization																
11	~ - Mob-Training (Est 84hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 6 classes x $250 ea) - Est 3-FTEs per drilling rig x 3 rigs & Foreman = 10-FTEs	1O	21	10.0	CRFT	84.0	840.0	44.90	37,716	0.00	0	0.00	0	1,500	15,000	52,716
12	~ Physicals - Est allowance for medical eval costs. Est 100% of working Craft = (10) total. - Estimate $750 per	SubK	21	10.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	7,500	7,500
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (10) total - Estimate $128.23/yr	SubK	21	10.0	EA	4.0	40.0	0.00	0	0.00	0	0.00	0	145	1,446	1,446
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	1OF1O1 LB1TM	21	2.0	DAY	40.00	80.0	43.29	3,463	0.00	0	500	1,000	350	700	5,163
15	~ Mob-Submittals - Est 16	1PM	21	16.0	EA	2.0	32.0	93.73	2,999	0.00	0	0.00	0	0.00	0	2,999
Demobilization																
16	~ Demob - Site / Area Cleanup	1OF1O1 LB1TM	21	1.0	DAY	40.00	40.0	43.29	1,732	0.00	0	0.00	0	0.00	0	1,732
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	1OF1O1 LB1TM	21	1.0	DAY	40.00	40.0	43.29	1,732	0.00	0	500	500	100.00	100	2,332
	Subtotal General Requirements						**7,346**		**580,598**		**5,700**		**132,656**		**38,806**	**757,760**
Field Work																
Drilling Solder Pile Wall																

8/18/201

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #1 & #2 Foundation

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
1	~ Survey Area to Place Drill Markers - Est 2 man survey crew - Incl place markers for drilling hole lay-out - 1 Day - Allowance for Labor & mat'l	2CP	21	1	LS	20.00	20.0	47.32	946	200.00	200	0.00	0	0.00	0	1,146
2	~ Drilling Rig Purchase - Soilmec 518 - Crawler Mounted Hydraulic Driller - Machine class 60ton, Caterpillar type 3.30 B, 2010 model - Est (4) Pcs three 3-man crews operating drill rigs. Est NO spare rig.	SubK	21	4	EA	1.00	4.0	0.00	0	0.00	0	1,800,000	7,200,000		0	7,200,000
3	~ Drilling Rigs Operating Cost - Soilmec 518 - Crawler Mounted Hydraulic Driller - Machine class 60ton, Caterpillar type 3.30 B, 2010 model - Est (4) Pcs (Rental cost 0% & operating cost 90%)	SubK	21	4	EA	3,600.00	14,400.0	0.00	0	0.00	0	102.83	1,480,752		0	1,480,752
4	~ Drilling Mat'ls - Incl drill bits/teeth, attachment cplg, securing pins, etc - Est 1 set-up per rig x 1 chg-out every 100 holes + (5) for start-up - Allowance for Mat'l $25,000 ea drill bit w/attachments.	SubK	21	12	EA	0.0	0.0	0.00	0	25,000	305,000	0.00	0	0	0	305,000
5	~ Operator Foreman - Overseeing drilling activities, operating drilling rig on as need basis, time keeping, safety meetings, etc - Allowance for install Labor - Est 100% of drill sch / 200 dys per Yr = 1.8 Yrs	1OF	21	1.0	FTE	3,600.0	3,600.0	45.98	165,528	0.00	0	0.00	0	0.00	0	165,528
6	~ Operator - Performing drilling activities - Est unit rate three 3-man crews to drill 720 holes x 2-days per hole - Est 100% of the sch	1O	21	9.0	FTE	3,600.0	32,400.0	44.90	1,454,760	0.00	0	0.00	0	0.00	0	1,454,760
7	~ Ironworker Foreman - Overseeing reinforcement cage fabrication, performing some fab work on as need basis, time keeping, safety meetings, etc - Est cage fab takes 1-day ea - Est 200/dys per wk yr	1IWF	21	1.0	FTE	2,400.0	2,400.0	59.54	142,896	0.00	0	0.00	0	0.00	0	142,896
8	~ Ironworker - Fabricating re-bar cages for ea solder pile - Est 2-man crew fabricating re-bar cages - Est cage fab takes 1-day ea - Est 3 2-man crews fabricating cages.	1IW	21	6.0	FTE	2,400.0	14,400.0	56.31	810,864	0.00	0	0.00	0	0.00	0	810,864
9	~ Mat'ls - Est Mat'l per each solder pier - Allowance for Mat'l cost	SubK	21	785.5	TNS	0.0	0.0	0.00	0	808.64	635,156	0.00	0	0	0	635,156
10	~ Ironworker Foreman - Install Re-bar Cages into Holes - Overseeing reinforcement cage lift & set, performing some support on as need basis, time keeping, safety meetings, etc - Est cage set & secured takes 2-hrs ea	1IWF	21	720.0	EA	2.0	1,440.0	59.54	85,738	0.00	0	0.00	0	0.00	0	85,738
11	~ Ironworker - Install Re-bar Cages into Holes - Lift & place re-bar cage, & secure for concrete pour - Est cage lifted, set, & secured 2-man crew x 2 hrs ea cage lift, place, & set	1IW	21	720.0	EA	4.0	2,880.0	56.31	162,173	0.00	0	0.00	0	0.00	0	162,173
12	~ Operator - Performing lifting re-bar cages into solder Pier holes - Est 100% of the sch	1O	21	720.0	EA	2.0	1,440.0	44.90	64,656	0.00	0	0.00	0	0.00	0	64,656
13	~ Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	720.0	EA	2.0	1,440.0	0.00	0	0.00	0	50.02	72,033		0	72,033
14	~ Cement Mason Foreman - Overseeing concrete installation activities, support placement on as need basis, time keeping, safety meetings, etc - Allowance for install Labor - Est 2-hrs ea solder pier	1CMF	21	720.0	EA	2.0	1,440.0	44.13	63,547	0.00	0	0.00	0	0.00	0	63,547
15	~ Cement Masons - Incl set up equip, install concrete, place anchors, & finish concrete - Est 2-man crew 2/hrs ea pier	1CM	21	720.0	EA	4.0	2,880.0	42.52	122,458	0.00	0	0.00	0	0.00	0	122,458
16	~ Mat'ls - Concrete For Solder Piers - Incl cost for travel in town to site & return trip - Est 6-7% overage - Allowance for Mat'l	SubK	21	16,538.6	CY	0.0	0.0	0.00	0	135.00	2,232,716	0.00	0	0.00	0	2,232,716
17	~ Operator - Performing concrete equip pumping activities - Est unit rate three 1-man 720 holes - Est 2/hrs pumping time 1/4/hr set-up & 1/4/hr clean-up = 2.5/hrs total ea pier	1O	21	720.0	EA	2.5	1,800.0	44.90	80,820	0.00	0	0.00	0	0.00	0	80,820

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #1 & #2 Foundation

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
18	~ Concrete Pump Booms for Truck Mounting - 2023H-6/S 45 SX, 182 yph, 148' Vert Boom, Yr/08 & Haul Truck - Misc Mod, GVW >60000 Lbs, 6x4 / 400 Hp, Diesel, Max GVW 75000, Yr/08· Est equip Rental 100% & 100% for Ops cost. Est 2/hrs pumping time 1/4/hr set-up & 1/4/hr clean-up = 2.5/hrs total ea pier	SubK	21	720.0	EA	2.5	1,800.0	0.00	0	0.00	0	214.10	385,380		0	385,380
19	~ Labors - 2-Craft - Flagman/Spotter/Support - Allowance for labor supporting during activities. Est 2-men x 10 hrs per day x 1.5 years	2LB	21	300.0	DYS	20.0	6,000.0	39.39	236,340	0.00	0	0.00	0	0	0	236,340
20	~ Teamster - Supporting Ironworkers erecting cages, moving mat'ls, deliveries, moving cages to hole for set, etc - Est 1-man x 10 hrs per day x 1.5 years	1TM	21	300.0	DYS	10.0	3,000.0	43.68	131,040	0.00	0	28.03	28,027	0.00	0	159,067
21	~ Flatbed Truck - Misc Model, 4.25 ton, 180 Hp, 4x2, Gas, Yr/08 - Est 25% of the sch	SubK	21	300.0	DYS	10.0	3,000.0	0.00	0	0.00	0	21.69	65,061		0	65,061
22	~ Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.6', Reach 27'4", 100Hp, 4WD, Yr/08 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	300.0	DYS	10.0	3,000.0	0.00	0	0.00	0	30.76	92,266		0	92,266
	Subtotal Field Work						**97,344**		**3,521,766**		**3,173,072**		**9,323,519**		**0**	**16,018,357**
	Subtotal General Req's & Field Work						**104,690**		**4,102,364**		**3,178,772**		**9,456,175**		**38,806**	**16,776,117**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				14,600.0		528,265							528,265
	Non Productive Supervision - 1.5% of Const. Labor		21				1,460.0		52,826							52,826
	Weather Delays - 5% of Const. Labor		21				4,870.0		176,088							176,088
	Estimate for Construction Consumables - 4% of Const. Labor		21								140,871					140,871
	Estimate for Construction Cleanup - 5% of Const. Labor		21						176,088							176,088
	Estimate for Construction Material Movement - 1% of Const. Material		21								31,731					31,731
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						52,826							52,826
	Subtotal Construction General Requirements Adders						**20,930**		**986,093**		**172,602**		**0**		**0**	**1,158,695**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												2,910	2,910
	Construction Contractor G&A - @ 10%		21						508,846		335,137		945,617		3,881	1,793,481
	Construction Contractor Fee - @ 7%		21						356,192		234,596		661,932		2,716	1,255,436
	Construction Contractor Sales Tax - @ 8.3%		21								278,164		784,862		3,221	1,066,247
	Subtotal Construction Markup Adders						**0**		**865,038**		**847,897**		**2,392,411**		**12,728**	**4,118,074**
	Subtotal Construction Subcontractor						**125,620**		**5,953,495**		**4,199,271**		**11,848,586**		**51,534**	**22,052,886**
	Contingency								**0**		**0**		**0**		**0**	**0**
	Escalation								**0**		**0**		**0**		**0**	**0**
	Total Project						**125,620**		**5,953,495**		**4,199,271**		**11,848,586**		**51,534**	**22,052,886**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #1 & #2

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration 6/Wks (16/dys mth x 1/mth)	Cnst E Mgmt	21	16.0	DYS	6.0	96.0	93.73	8,998	0.00	0	0.00	0	0.00	0	8,998
2	~ Proj Admin Vehicle support	SubK	21	96.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	1,640	0.00	0	1,640
3	~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E Sup	21	16.0	DYS	5.0	80.0	89.80	7,184	0.00	0	0.00	0	0.00	0	7,184
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	80.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	1,367	0.00	0	1,367
5	~ Safety Rep - Est 25% of Mechanical Const Sch. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Safe	21	16.0	DYS	2.5	40.0	87.04	3,482	0.00	0	0.00	0	0.00	0	3,482
6	~ Safety Rep - Est Vehicle support	SubK	21	40.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	683	0.00	0	683
7	~ QA/QC Inspections/Audits - Est 10% of Const Sch. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E QA	21	16.0	DYS	3.0	48.0	66.58	3,196	0.00	0	0.00	0	0.00	0	3,196
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	48.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	820	0.00	0	820
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	SubK	21	16.0	DYS	0.0	0.0	0.00	0	0.00	0	8.04	1,286	3.70	592	1,878
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	16.0	DYS	1.0	16.0	39.39	630	15	240	0.00	0	0.00	0	870
Mobilization																
11	~ - Mob-Training (Est 40hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 4 classes x $250 ea)	3C1CF2 L1TM	21	7.0	CRFT	40.0	280.0	44.03	12,328	0.00	0	0.00	0	1,000	7,000	19,328
12	~ Physicals - Est allowance for medical eval costs. Est 100% of working Craft = (7) total. - Estimate $750 per	SubK	21	7.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	5,250	5,250
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	3C1CF2 L1TM	21	1.0	DAY	70.00	70.0	44.03	3,082	0.00	0	500	500	350	350	3,932
15	~ Mob-Submittals - Est 16	1PM	21	16.0	EA	2.0	32.0	93.73	2,999	0.00	0	0.00	0	0.00	0	2,999
Demobilization																
16	~ Demob - Site / Area Cleanup	3C1CF2 L1TM	21	0.5	DAY	70.00	35.0	44.03	1,541	0.00	0	0.00	0	0.00	0	1,541
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	3C1CF2 L1TM	21	0.5	DAY	140.00	70.0	44.03	3,082	0.00	0	500	250	100.00	50	3,382
	Subtotal General Requirements						**799**		**46,898**		**240**		**6,546**		**14,255**	**67,938**
Field Work																
Survey Facility - Install																

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #1 & #2

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
1	~ Survey & Place Markers at Work Area - Est 2 man survey crew - Incl place markers for Survey Facility, & elect utilities - 1/2 Day - Allowance for Labor & mat'l	2CP	21	1	LS	10.00	10.0	47.32	473	100.00	100	0.00	0	0.00	0	573
2	~ Survey Facility 30'w x 60' lng (Mat'l Purchase Only) - Tensioned Fabric Enclosure (structural Steel & Fabric) FOB to C Farm site.	21	21	1800.0	SF	0.00	0.0	1.00	0	44.85	80,730	0.00	0	0.00	0	80,730
3	~ Carpenters - Foreman - Survey Facility Erection Labor - Incl anchoring Tent; erect worker scaffolding platform on both sides of Tent for Craft performing CAN examinations / surveys; install (2) remote roll-up doors; & air ventilation unit w/louvers in tent dormer (not HVAC). Allowance for Labor	1CF	21	16.0	DYS	10.0	160.0	48.26	7,722	150.00	2,400	0.00	0	0	0	10,122
4	~ Carpenters - 3-Craft - Allowance for install Labor	3C	21	16.0	DYS	30.0	480.0	46.38	22,262	0.00	0	0.00	0	0	0	22,262
5	~ Mat'ls - Incl anchoring Tent tie-dwns (eco blocs, or screw-in tie-dwns); scaffolding platform items; (2) remote roll-up doors; & air ventilation unit w/louvers (not HVAC). Allowance for Labor, Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	17,800.00	17,800	0.00	0	0	0	17,800
6	~ Labors - 2-Craft - Flagman/Spotter/Support - erecting tent - Allowance for install Labor	2LB	21	16.0	DYS	20.0	320.0	39.39	12,605	0.00	0	0.00	0	0	0	12,605
7	~ Teamster - Supporting Carps erecting tent - Allowance for install Labor - Est 25% of the sch	1TM	21	4.0	DYS	10.0	40.0	43.68	1,747	0.00	0	28.03	374	0.00	0	2,121
8	~ Flatbed Truck - Misc Model, 4.25 ton, 180 Hp, 4x2, Gas, Yr/08 - Est 25% of the sch	SubK	21	4.0	DYS	10.0	40.0	0.00	0	0.00	0	21.69	867		0	867
9	~ Operator - Supporting Carps erecting tent - Allowance for install Labor - Est 50% of the sch	1O	21	8.0	DYS	10.0	80.0	44.90	3,592	0.00	0	36.64	977	0.00	0	4,569
10	~ Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.6', Reach 27'4", 100Hp, 4WD, Yr/08 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	8.0	DYS	10.0	80.0	0.00	0	0.00	0	30.76	2,460		0	2,460
11	~ Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	8.0	DYS	10.0	80.0	0.00	0	0.00	0	50.02	4,002		0	4,002
12	~ Electrical Foreman - 1-FTE - Supporting elect install items, lighting, elect feed sys, etc - Allowance for install Labor	1ELF	21	12.0	DYS	10.0	120.0	62.14	7,457	0.00	0	0.00	0	0	0	7,457
13	~ Electricians - 2-FTEs - Supporting elect install items, lighting, elect feed sys, etc - Allowance for install Labor	2EL	21	12.0	DYS	20.0	240.0	52.63	12,631	0.00	0	0.00	0	0	0	12,631
14	~ Electrical Items - Est transformer w/pad & dscnt; 3" PVC buried conduit (main power loc to tent); #2 THHN & grd; 2-grd 10' rods; weather proof panel; 10 breakers; 1" EMT w/fittings; #12 THHN; conn; 8-flood lights w/supports; dscnt for air handler/wall vent; 1" flex conduit; #10 THHN; conn; 6-110V outlets; 3/4 EMT w/fittings; #12 THHN; & conn - inside tent - Allowance for Mat'l & equip	SubK	21	1.0	LS	10.0	10.0	0.00	0	15,000.00	15,000	3,000.00	3,000	0	0	18,000
	Subtotal Field Work						**1,660**		**68,489**		**116,030**		**11,680**		**0**	**196,200**
	Subtotal General Req's & Field Work						**2,459**		**115,387**		**116,270**		**18,226**		**14,255**	**264,138**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Cosnt Labor		21				250.0		10,273							10,273
	Non Productive Supervision - 1.5% of Const. Labor		21				20.0		1,027							1,027
	Weather Delays - 5% of Const. Labor		21				80.0		3,424							3,424
	Estimate for Construction Consumables - 4% of Const. Labor		21								2,740					2,740
	Estimate for Construction Cleanup - 5% of Const. Labor		21						3,424							3,424
	Estimate for Construction Material Movement - 1% of Const. Material		21								1,160					1,160

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Weather Enclosures #1 & #2

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						1,027							1,027
Subtotal Construction General Requirements Adders						**350**		**19,175**		**3,900**		**0**		**0**	**23,075**
Construction Markup & Taxes Adders															
Construction Contractor Subcontractor Markup - @ 7.5%		21												1,069	1,069
Construction Contractor G&A - @ 10%		21						13,456		12,017		1,823		1,425	28,721
Construction Contractor Fee - @ 7%		21						9,419		8,412		1,276		998	20,105
Construction Contractor Sales Tax - @ 8.3%		21								9,974		1,513		1,183	12,670
Subtotal Construction Markup Adders						**0**		**22,875**		**30,403**		**4,612**		**4,675**	**62,565**
Subtotal Construction Subcontractor						**2,809**		**157,437**		**150,573**		**22,838**		**18,930**	**349,778**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**2,809**		**157,437**		**150,573**		**22,838**		**18,930**	**349,778**

8/18/201

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

HEPA Filter Systems On Enclosures

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor															
Facility #1 110,000 Square Feet															
Subtotal Project			110,000	SF									171.23	18,834,897	18,834,897
Remove Facility #1 110,000 Square Feet															
Subtotal Project			110,000	SF									17.12	1,883,490	1,883,490
Facility #2 110,000 Square Feet															
Subtotal Project			110,000	SF									171.23	18,834,897	18,834,897
Remove Facility #2 110,000 Square Feet															
Subtotal Project			110,000	SF									17.12	1,883,490	1,883,490
Facility #3 10,000 Square Feet															
Subtotal Project			10,000	SF									424.09	4,240,865	4,240,865
Remove Facility #3 10,000 Square Feet															
Subtotal Project			10,000	SF									42.41	424,087	424,087
Facility #4 5,000 Square Feet															
Subtotal Project			5,000	SF									559.59	2,797,928	2,797,928
Remove Facility #4 5,000 Square Feet															
Subtotal Project			5,000	SF									55.96	279,793	279,793
Facility #5 25,000 Square Feet															
Subtotal Project			25,000	SF									293.95	7,348,835	7,348,835
Remove Facility #5 25,000 Square Feet															
Subtotal Project			25,000	SF									29.40	734,884	734,884
Facility #6 9,750 Square Feet															
Subtotal Project			9,750	SF									428.40	4,176,931	4,176,931
Remove Facility #6 9,750 Square Feet															
Subtotal Project			9,750	SF									42.84	417,693	417,693
Facility #7 14,400 Square Feet															
Subtotal Project			14,400	SF									366.53	5,278,032	5,278,032
Remove Facility #7 14,400 Square Feet															
Subtotal Project			14,400	SF									36.65	527,803	527,803
Facility #8 48,000 Square Feet															
Subtotal Project			48,000	SF									226.44	10,869,241	10,869,241
Remove Facility #8 48,000 Square Feet															
Subtotal Project			48,000	SF									22.64	1,086,924	1,086,924
Facility #9 9,000 Square Feet															
Subtotal Project			9,000	SF									442.34	3,981,072	3,981,072
Remove Facility #9 9,000 Square Feet															
Subtotal Project			9,000	SF									44.23	398,107	398,107
Subtotal Construction Subcontractor						0		0		0		0		83,600,861	83,600,861
Contingency								0		0		0		0	0
Escalation								0		0		0		0	0
Total Project						0		0		0		0		83,600,861	83,600,861

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

HEPA Filter Systems On Enclosures

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars

Notes & Assumptions:
#1 - The scope of this worksheet is to cost HEPA Filter Systems supporting Weather Enclosures tent/structures. Main HEPA filtration equipment will be skid mounted outside of structure. System duct will be supported from Weather enclosure structure and exhaust venting shall meet site personnel protection requirements. Electrical feed to the HEPA system is priced into the system cost. System cost was developed from CEES Engineering discussions and based on the Weather enclosure's square feet including air flow requirements.

#2 - Assume HEPA systems including filters and components will be built from standard off the shelf items and require minimal fabrication. Majority of fabrication will take place at site during facility and system erection activities. A Sub-tier Subcontractor will install system with General D&D contractor oversight.

#3 - HEPA system construction schedule will coincide with facility construction and meet D&D area schedule deliverables meaning system will be completed prior to work starting in waste removal area.

#4 - Assume a Sub-tier Subcontractor willpersonnel used for Management, Support Staff, erection, mat'l, equipment, PPE, personnel training, and associated adders are priced in system based off of the facilities square feet.

#5 - No design was provided, and assume site main power able to service area, and only upgrades and running underground utilities will be needed to survey Tent.

#6 - Assume design and associated costs provided in WRPS Support based on a % of total construction costs.

Pricing Logic Assumptions -
From: Colin Henderson [mailto:chenderson@columbia-energy.com]
Sent: Tuesday, July 27, 2010 8:12 AM
To: Jakubek, Daniel J
Su

Facility	Footprint	SCFM	Scalar	Cost
0		1500		$1,000,000
1	120000	200000	18.8349	$18,834,897
2	120000	200000	18.8349	$18,834,897
3	10000	16666.67	4.240865	$4,240,865
4	5000	8333.333	2.797928	$2,797,928
5	25000	41666.67	7.348835	$7,348,835
6	9750	16250	4.176931	$4,176,931
7	14400	24000	5.278032	$5,278,032
8	48000	80000	10.86924	$10,869,241
9	9000	15000	3.981072	$3,981,072

8/18/2010

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Pit High Level Eval & Packaging Facility

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor															
General Contractor Activities															
Construction Mgmt & Oversight Support															
1 ~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration 1/Yr	Cnst E Mgmt	21	200.0	DYS	6.0	1,200.0	93.73	112,476	0.00	0	0.00	0	0.00	0	112,476
2 ~ Proj Admin Vehicle support	SubK	21	1,200.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	20,498	0.00	0	20,498
3 ~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Est sch duration 1/Yr	Cnst E Sup	21	200.0	DYS	5.0	1,000.0	89.80	89,800	0.00	0	0.00	0	0.00	0	89,800
4 ~ Field Work Supervisor - Est Vehicle support	SubK	21	1,000.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	17,081	0.00	0	17,081
5 ~ Safety Rep - Est 25% of Mechanical Const Sch. - Est sch duration 1/Yr	Cnst E Safe	21	200.0	DYS	2.5	500.0	87.04	43,520	0.00	0	0.00	0	0.00	0	43,520
6 ~ Safety Rep - Est Vehicle support	SubK	21	500.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	8,541	0.00	0	8,541
7 ~ QA/QC Inspections/Audits - Est 10% of Const Sch.- Est sch duration 1/Yr	Cnst E QA	21	200.0	DYS	3.0	600.0	66.58	39,948	0.00	0	0.00	0	0.00	0	39,948
8 ~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	600.0	HRS	0.0	0.0	0.00	0	0.00	0	17.08	10,249	0.00	0	10,249
9 ~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration 1/Yr	SubK	21	200.0	DYS	0.0	0.0	0.00	0	0.00	0	8.04	16,077	3.70	7,400	23,477
10 ~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	200.0	DYS	1.0	200.0	39.39	7,878	15	3,000	0.00	0	0.00	0	10,878
Mobilization															
11 ~ - Mob-Training (Est 40hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 4 classes x $250 ea)	3C1CF2 L1TM	21	7.0	CRFT	40.0	280.0	44.03	12,328	0.00	0	0.00	0	1,000	7,000	19,328
12 ~ Physicals - Est allowance for medical eval costs. Est 100% of working Craft = (7) total. - Estimate $750 per	SubK	21	7.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	5,250	5,250
13 ~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14 ~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	3C1CF2 L1TM	21	1.0	DAY	70.00	70.0	44.03	3,082	0.00	0	500	500	350	350	3,932
15 ~ Mob-Submittals - Est 16	1PM	21	16.0	EA	2.0	32.0	93.73	2,999	0.00	0	0.00	0	0.00	0	2,999
Demobilization															
16 ~ Demob - Site / Area Cleanup	3C1CF2 L1TM	21	0.5	DAY	70.00	35.0	44.03	1,541	0.00	0	0.00	0	0.00	0	1,541
17 ~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18 ~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	3C1CF2 L1TM	21	0.5	DAY	140.00	70.0	44.03	3,082	0.00	0	500	250	100.00	50	3,382
Subtotal General Requirements						**4,019**		**317,030**		**3,000**		**73,196**		**21,063**	**414,288**
Field Work															
Pit Waste Evaluation Facility (PWEF)															
1 ~ Survey & Place Markers at Work Area - Est 2 man survey crew - Incl place markers for Survey Facility, & elect utilities - 1/2 Day - Allowance for Labor & mat'l	2CP	21	1	LS	10.00	10.0	47.32	473	100.00	100	0.00	0	0.00	0	573

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Pit High Level Eval & Packaging Facility

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
2	~ Pit Waste Evaluation Facility - For evaluating: waste Rad levels; providing special handling & packaging; analysis capabilities; etc ensuring containerized waste is ready to leave pit. Incl: 40'x100' building w/rad shielding; utilities run to support; inside facility utilities; special HVAC sys; HEPA filter sys; Hot Cell/s; fire protection sys; etc - Est 1 year to const - Allowance for building - SF pricing covers Eng dsg, & 100% const.	SubK	21	4000.0	SF	0.00	0.0	0.00	0	0.00	0	0.00	0	1,500.00	6,000,000	6,000,000
3	~ Analyzing Equipment - Incl monitoring equipment, sniffers, instruments, etc. To evaluate waste verifying rad/contamination levels meet permitting requirements, & substantiate packaging sealment complete for shipment. - Allowance for Equip.	SubK	21	1.0	LS	0.0	0.0	0.00	0	0.00	0	2,000,000	2,000,000	0	0	2,000,000
4	~ Robotic Container Handling Equipment - Incl remote operated equipment, conveyors, etc. To enable Operators to move haz waste thru evaluation areas of the facility, complete drum/box sealment meeting permitting requirements complete for shipment. - Allowance for Equip.	SubK	21	1.0	LS	0.0	0.0	0.00	0	0.00	0	1,500,000	1,500,000	0	0	1,500,000
5	~ Automated Grout/Concrete Injection System - Est Equipment for placing grout or concrete into a 5'x5"8' CS box containing Rad waste - Incl hoppers, mixer, injection piping (gravity feed), valving, controls, & cleaning/rinsing sys once grout/concrete is placed. Est off-shelf sys w/minor chgs to a small production unit - Operators will load equip w/water, Portland cement, sand, etc for daily operations. - Allowance for Equip.	SubK	21	1.0	LS	0.0	0.0	0.00	0	0.00	0	550,000	550,000	0	0	550,000
6	~ Testing Facility and Processing Systems - Incl remote operated equipment, conveyors, sampling equipment, and facility processing capabilities etc. - Allowance for Labor.	SubK	21	1.0	LS	0.0	0.0	0.00	0	0.00	0	1,012,000	1,012,000	0	0	1,012,000
7	~ D&D Waste Evaluation Facility - Est D&D, packaging, & disposal at ERDFF & CWC of bldg debris once project is complete - Specialty high level Rad "Level #4" only in Hot Cell, & remainder of facility std ERDF Waste - Allowance @ 10% of construction cost	SubK	21	4000.0	SF	0.00	0.0	0.00	0	0.00	0	0.00	0	150.00	600,000	600,000
	Subtotal Field Work						**10**		**473**		**100**		**5,062,000**		**6,600,000**	**11,662,573**
	Subtotal General Req's & Field Work						**4,029**		**317,503**		**3,100**		**5,135,196**		**6,621,063**	**12,076,861**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				0.0		71							71
	Non Productive Supervision - 1.5% of Const. Labor		21				0.0		7							7
	Weather Delays - 5% of Const. Labor		21				0.0		24							24
	Estimate for Construction Consumables - 4% of Const. Labor		21								19					19
	Estimate for Construction Cleanup - 5% of Const. Labor		21						24							24
	Estimate for Construction Material Movement - 1% of Const. Material		21								1					1
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						7							7
	Subtotal Construction General Requirements Adders						**0**		**133**		**20**		**0**		**0**	**153**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												496,580	496,580
	Construction Contractor G&A - @ 10%		21						31,764		312		513,520		662,106	1,207,702
	Construction Contractor Fee - @ 7%		21						22,235		218		359,464		463,474	845,391

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Pit High Level Eval & Packaging Facility

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Construction Contractor Sales Tax - @ 8.3%		21								259		426,221		549,548	976,028
Subtotal Construction Markup Adders						**0**		**53,999**		**789**		**1,299,205**		**2,171,708**	**3,525,701**
Subtotal Construction Subcontractor						**4,029**		**371,635**		**3,909**		**6,434,401**		**8,792,771**	**15,602,715**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**4,029**		**371,635**		**3,909**		**6,434,401**		**8,792,771**	**15,602,715**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Apply Fixative to Inside of Tanks

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration based on const duration / 10hr days / 4 man crew	Cnst E Mgmt	21	67.9	DYS	6.0	407.4	93.73	38,186	0.00	0	0.00	0	0.00	0	38,186
2	~ Proj Admin Vehicle support	SubK	21	407.4	HRS	0.0	0.0	0.00	0	0.00	0	17.08	6,959	0.00	0	6,959
3	~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E Sup	21	67.9	DYS	5.0	339.5	89.80	30,487	0.00	0	0.00	0	0.00	0	30,487
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	339.5	HRS	0.0	0.0	0.00	0	0.00	0	17.08	5,799	0.00	0	5,799
5	~ Safety Rep - Est 25% of Mechanical Const Sch. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Safe	21	67.9	DYS	2.5	169.8	87.04	14,779	0.00	0	0.00	0	0.00	0	14,779
6	~ Safety Rep - Est Vehicle support	SubK	21	169.8	HRS	0.0	0.0	0.00	0	0.00	0	17.08	2,900	0.00	0	2,900
7	~ QA/QC Inspections/Audits - Est 10% of Const Sch. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E QA	21	67.9	DYS	3.0	203.7	66.58	13,562	0.00	0	0.00	0	0.00	0	13,562
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	203.7	HRS	0.0	0.0	0.00	0	0.00	0	17.08	3,479	0.00	0	3,479
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	SubK	21	67.9	DYS	0.0	0.0	0.00	0	0.00	0	8.04	5,458	3.70	2,512	7,971
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	67.9	DYS	1.0	67.9	39.39	2,675	15	1,019	0.00	0	0.00	0	3,693
Mobilization																
11	~ - Mob-Training (Est 40hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 4 classes x $250 ea)	3PNTR1 LB1TM	21	5.0	CRFT	40.0	200.0	37.96	7,592	0.00	0	0.00	0	1,000	5,000	12,592
12	~ Physicals - Est allowance for medical eval costs. Est a portion of working Craft. - Estimate $750 per	SubK	21	5.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	3,750	3,750
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	3PNTR1 LB1TM	21	1.0	DAY	50.00	50.0	37.96	1,898	0.00	0	500	500	350	350	2,748
15	~ Mob-Submittals - Est 4	1PM	21	4.0	EA	2.0	8.0	93.73	750	0.00	0	0.00	0	0.00	0	750
Demobilization																
16	~ Demob - Site / Area Cleanup	3PNTR1 LB1TM	21	0.5	DAY	50.00	25.0	37.96	949	0.00	0	0.00	0	0.00	0	949
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	3PNTR1 LB1TM	21	0.5	DAY	100.00	50.0	37.96	1,898	0.00	0	500	250	100.00	50	2,198
	Subtotal General Requirements						**1,553**		**113,151**		**1,019**		**25,346**		**12,675**	**152,190**
Field Work																
Apply Fixative to Inside of Tanks																

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Apply Fixative to Inside of Tanks

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
	~ Scope Incl: Survey tank/Area for installing fixative; setting up barriers, worker boundaries, & vehicle with pressurization system; remove tank sleeve cap/plug; install paint spray nozzle; apply paint fixative to ceiling, walls, & floor of inside of tank; remove paint spray nozzle; & dispose of spray piping & nozzle used inside of tank in ERDF CAN; re-install tank riser plug; disassemble barriers; & clean-up placing debris in ERDF CANs.															
19	~ Labor Foreman - Working Foreman - Est 1/2-dy set-up, & 1/2-dy tear-dwn/clean area = 1/dy per 100 series tank & 2-dys for all 200 series tanks - Allowance for Labor	1LF	21	14.0	DYS	10.0	140.0	40.20	5,628	0.00	0	0.00	0	0	0	5,628
20	~ Labors - 1-Craft - Est 1/2-dy set-up, & 1/2-dy tear-dwn/clean area = 1/dy per 100 series tank & 2-dys for all 200 series tanks - Allowance for Labor	1L	21	14.0	DYS	10.0	140.0	38.58	5,401	0.00	0	0.00	0	0	0	5,401
21	~ Mat'ls - For barriers, concrete/grout shoot, work area grd protection, etc - Allowance for Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	500.00	500	0.00	0	0	0	500
22	~ Carpenter Foreman - Working Foreman - Set-up Area - Incl hand-rail, & barriers to support painting - Est 1/2-dy set-up, & 1/2-dy tear-dwn/clean area = 1/dy per 100 series tank & 2-dys for all 200 series tanks - Allowance for Labor	1CF	21	14.0	DYS	10.0	140.0	48.26	6,756	150.00	2,100	0.00	0	0	0	8,856
23	~ Carpenter - 1-Craft - Est 1/2-dy set-up, & 1/2-dy tear-dwn/clean area = 1/dy per 100 series tank & 2-dys for all 200 series tanks - Allowance for Labor	3C	21	14.0	DYS	10.0	140.0	46.38	6,493	0.00	0	0.00	0	0	0	6,493
24	~ Mat'ls - For barriers, concrete/grout shoot support, & grout shoot (sheet-metal applied to plywood) - Allowance for Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	500.00	500	0.00	0	0	0	500
25	~ Pipefitter Foreman - Incl placing rigging on tank riser plug, pulling riser plug & placing in secured area on plastic, & re-installing after grout our is complete - Est 2/hrs to rig plug & place secure area & 2/hrs to re-install plug - Allowance for Labor	1PFF	21	17.0	EA	4.0	68.0	75.66	5,145	0.00	0	19.63	445	0.00	0	5,590
26	~ Pipefitter - Incl placing rigging on tank riser plug, pulling riser plug & placing in secured area on plastic, & re-installing after grout our is complete - Est 2/hrs to rig plug & place secure area & 2/hrs to re-install plug - Allowance for Labor	1PF	21	17.0	EA	4.0	68.0	69.03	4,694	0.00	0	13.31	302	0.00	0	4,996
27	~ Operator - Supporting Pipefitters & tank riser plug removal & re-install - Allowance for Labor	1O	21	17.0	EA	4.0	68.0	44.90	3,053	0.00	0	19.63	445	0.00	0	3,498
28	~ Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	17.0	EA	4.0	68.0	0.00	0	0.00	0	50.02	3,402		0	3,402
29	~ Painter Foreman - Working Foreman - Work on 100 Series Tanks - Incl setting up equip; inserting paint wand into tank; installing paint; & D&D paint wand used inside tank in ERDF CAN - Est 1-day for set-up; 2-days ea coat x 2 coats = 4-days to apply epoxy fixative; & 1-day for tear-dwn & disposal - Allowance for Labor	1PTF	21	12.0	EA	60.0	720.0	37.40	26,928	150.00	1,800	0.00	0	0	0	28,728
30	~ Painter - 4 Craft - Work On 100 Series Tanks - Incl setting up equip; inserting paint wand into tank; installing paint; & D&D paint wand used inside tank in ERDF CAN - Est 1-day for set-up; 2-days ea coat x 2 coats = 8-dys to apply epoxy fixative; & 1-day for tear-dwn & disposal - Allowance for Labor	1PT	21	12.0	EA	240.0	2,880.0	35.08	101,030	150.00	1,800	0.00	0	0	0	102,830

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Apply Fixative to Inside of Tanks

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
31	~ Painter Foreman - Working Foreman - Work on 200 Series & C-301 Tank - Incl setting up equip; inserting paint wand into tank; installing paint; & D&D paint wand used inside tank in ERDF CAN - Est 1-day for set-up; 1-day ea coat x 2 coats = 2-dys to apply epoxy fixative; & 1-day for tear-dwn & disposal - Allowance for Labor	1PTF	21	5.0	EA	40.0	200.0	37.40	7,480	150.00	750	0.00	0	0	0	8,230
32	~ Painter - 4 Craft - Work On 100 Series Tanks - Incl setting up equip; inserting paint wand into tank; installing paint; & D&D paint wand used inside tank in ERDF CAN - Est 2-days for set-up; 4-days ea coat x 2 coats = 8-dys to apply epoxy fixative; & 1-day for tear-dwn & disposal - Allowance for Labor	1PT	21	5.0	EA	160.0	800.0	35.08	28,064	150.00	750	0.00	0	0	0	28,814
31	~ Mat'ls & Equipment - Paint, Wand & Hose, Mixing Equip, etc - Incl mixing 5/gal "A" & 5/gal "B" for epoxy @ $30 per gal - Est total SF for all tanks to be 196,400SF x 2 coats = 392,800 x 5% overage = 412,440SF - (1) gal covers 150SF - 412,440 / 150 = 2,750/gal x $30 per gal = $82,500 - Allowance for equipment $25,000 (able to lower paint piping & spray nozzle into tank = $107,500, or $.26 per SF - Mat'l cost incl transportation from town - Allowance for Equipment	SubK	21	412,440.0	SF	0.0	0.0	0.00	0	0.261	107,500	0.05	20,622	0	0	128,122
	Subtotal Field Work						**5,432**		**200,673**		**115,700**		**25,215**		**0**	**341,589**
	Subtotal General Req's & Field Work						**6,985**		**313,824**		**116,718**		**50,561**		**12,675**	**493,779**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				810.0		30,101							30,101
	Non Productive Supervision - 1.5% of Const. Labor		21				80.0		3,010							3,010
	Weather Delays - 5% of Const. Labor		21				270.0		10,034							10,034
	Estimate for Construction Consumables - 4% of Const. Labor		21								8,027					8,027
	Estimate for Construction Cleanup - 5% of Const. Labor		21						10,034							10,034
	Estimate for Construction Material Movement - 1% of Const. Material		21								1,157					1,157
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						3,010							3,010
	Subtotal Construction General Requirements Adders						**1,160**		**56,189**		**9,184**		**0**		**0**	**65,373**
	Construction Markup & Taxes Adders															
	Construction Contractor Subcontractor Markup - @ 7.5%		21												951	951
	Construction Contractor G&A - @ 10%		21						37,001		12,590		5,056		1,267	55,914
	Construction Contractor Fee - @ 7%		21						25,901		8,813		3,539		887	39,140
	Construction Contractor Sales Tax - @ 8.3%		21								10,450		4,197		1,052	15,699
	Subtotal Construction Markup Adders						**0**		**62,902**		**31,853**		**12,792**		**4,157**	**111,704**
	Subtotal Construction Subcontractor						**8,145**		**432,915**		**157,755**		**63,353**		**16,832**	**670,856**
	Contingency								**0**		**0**		**0**		**0**	**0**
	Escalation								**0**		**0**		**0**		**0**	**0**
	Total Project						**8,145**		**432,915**		**157,755**		**63,353**		**16,832**	**670,856**

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

3' Grout Cap Inside Tanks

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration based on const duration / 10hr days / 4 man crew	Cnst E Mgmt	21	47.9	DYS	6.0	287.2	93.73	26,919	0.00	0	0.00	0	0.00	0	26,919
2	~ Proj Admin Vehicle support	SubK	21	287.2	HRS	0.0	0.0	0.00	0	0.00	0	17.08	4,906	0.00	0	4,906
3	~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E Sup	21	47.9	DYS	5.0	239.3	89.80	21,489	0.00	0	0.00	0	0.00	0	21,489
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	239.3	HRS	0.0	0.0	0.00	0	0.00	0	17.08	4,088	0.00	0	4,088
5	~ Safety Rep - Est 25% of Mechanical Const Sch. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	Cnst E Safe	21	47.9	DYS	2.5	119.7	87.04	10,419	0.00	0	0.00	0	0.00	0	10,419
6	~ Safety Rep - Est Vehicle support	SubK	21	119.7	HRS	0.0	0.0	0.00	0	0.00	0	17.08	2,045	0.00	0	2,045
7	~ QA/QC Inspections/Audits - Est 10% of Const Sch. - Est sch duration 6/Wks (16/dys mth x 1.5/mths = 24/dys	Cnst E QA	21	47.9	DYS	3.0	143.6	66.58	9,561	0.00	0	0.00	0	0.00	0	9,561
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	143.6	HRS	0.0	0.0	0.00	0	0.00	0	17.08	2,453	0.00	0	2,453
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration 3/mths (16/dys mth x 3/mths = 48/dys	SubK	21	47.9	DYS	0.0	0.0	0.00	0	0.00	0	8.04	3,848	3.70	1,771	5,619
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	47.9	DYS	1.0	47.9	39.39	1,887	15	718	0.00	0	0.00	0	2,605
Mobilization																
11	~ - Mob-Training (Est 40hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 4 classes x $250 ea)	2C1LB1TM	21	4.0	CRFT	40.0	160.0	44.23	7,077	0.00	0	0.00	0	1,000	4,000	11,077
12	~ Physicals - Est allowance for medical eval costs. Est a portion of working Craft = (4) total. - Estimate $750 per	SubK	21	4.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	3,000	3,000
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	2C1LB1TM	21	1.0	DAY	40.00	40.0	44.23	1,769	0.00	0	500	500	350	350	2,619
15	~ Mob-Submittals - Est 4	1PM	21	4.0	EA	2.0	8.0	93.73	750	0.00	0	0.00	0	0.00	0	750
Demobilization																
16	~ Demob - Site / Area Cleanup	2C1LB1TM	21	0.5	DAY	40.00	20.0	44.23	885	0.00	0	0.00	0	0.00	0	885
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	2C1LB1TM	21	0.5	DAY	80.00	40.0	44.23	1,769	0.00	0	500	250	100.00	50	2,069
	Subtotal General Requirements						**1,138**		**82,899**		**718**		**18,089**		**10,184**	**111,890**
Field Work																
Install Grout Barrier In 100 Series Tanks																

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

3' Grout Cap Inside Tanks

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
	~ Scope Incl: Survey tank/Area for installing grout; setting up barriers, worker boundaries, & vehicle/cement truck location; remove tank sleeve cap/plug; install cement/grout shoot; install cement/grout; remove cement/grout shoot & dispose in ERDF CAN; re-install tank riser plug; disassemble barriers; & clean-up placing debris in ERDF CANs.															
19	~ Labor Foreman - Working Foreman - Est 1/dy setup, 2/dys for pour, 1/dy tear-dwn = 4/dys per 100 series tank x 12 tanks - Allowance for Labor	1LF	21	12.0	EA	40.0	480.0	40.20	19,296	0.00	0	0.00	0	0	0	19,296
20	~ Labors - 1-Craft - Est 1/dy setup, 2/dys for pour, 1/dy tear-dwn = 4/dys per 100 series tank x 12 tanks - Allowance for Labor	1L	21	12.0	EA	40.0	480.0	38.58	18,518	0.00	0	0.00	0	0	0	18,518
21	~ Mat'ls - For barriers, concrete/grout shoot, work area grd protection, etc - Allowance for Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	500.00	500	0.00	0	0	0	500
22	~ Carpenter Foreman - Working Foreman - Set-up Area - Incl hand-rail, barriers, concrete/grout shoot support, etc - Est 1/dy fab shoot & support area set-up, 2/dys for pour (ensure shoot secure during pour), 1/dy tear-dwn/clean area = 4/dys per 100 series tank x 12 tanks - Allowance for Labor	1CF	21	12.0	EA	40.0	480.0	48.26	23,165	150.00	1,800	0.00	0	0	0	24,965
23	~ Carpenter - 1-Craft - Est 1/dy fab shoot & support area set-up, 2/dys for pour (ensure shoot secure during pour), 1/dy tear-dwn/clean area = 4/dys per 100 series tank x 12 tanks - Allowance for Labor	3C	21	12.0	EA	40.0	480.0	46.38	22,262	0.00	0	0.00	0	0	0	22,262
24	~ Mat'ls - For barriers, concrete/grout shoot support, & grout shoot (sheet-metal applied to plywood) - Allowance for Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	1,000.00	1,000	0.00	0	0	0	1,000
25	~ Pipefitter Foreman - Incl placing rigging on tank riser plug, pulling riser plug & placing in secured area on plastic, & re-installing after grout our is complete - Est 2/hrs to rig plug & place secure area & 2/hrs to re-install plug - Allowance for Labor	1PFF	21	12.0	EA	4.0	48.0	75.66	3,632	0.00	0	19.63	314	0.00	0	3,946
26	~ Pipefitter - Incl placing rigging on tank riser plug, pulling riser plug & placing in secured area on plastic, & re-installing after grout our is complete - Est 2/hrs to rig plug & place secure area & 2/hrs to re-install plug - Allowance for Labor	1PF	21	12.0	EA	4.0	48.0	69.03	3,313	0.00	0	13.31	213	0.00	0	3,526
27	~ Operator - Supporting Pipefitters & tank riser plug removal & re-install - Allowance for Labor	1O	21	12.0	EA	4.0	48.0	44.90	2,155	0.00	0	19.63	314	0.00	0	2,469
28	~ Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02 - Est equip Rental 100% & 50% for Ops cost.	SubK	21	12.0	EA	4.0	48.0	0.00	0	0.00	0	50.02	2,401		0	2,401
29	~ Cement Mason Foreman - Working Foreman - Placing concrete/grout into tanks - Est 2/dys for pour - Allowance for Labor	1CMF	21	12.0	EA	20.0	240.0	44.13	10,591	150.00	1,800	0.00	0	0	0	12,391
30	~ Cement Mason - Placing concrete/grout into tanks - Est 2/dys for pour - Allowance for Labor	1CM	21	12.0	EA	20.0	240.0	42.52	10,205	150.00	1,800	0.00	0	0	0	12,005
31	~ Mat'ls - Concrete/grout Est 100/PSI - 500 Cy per tank x 12 Tanks + 5% overage - Mat'l cost incl transportation from town - Allowance for Mat'l	SubK	21	6,300.0	CY	0.0	0.0	0.00	0	70.00	441,000	0.00	0	0	0	441,000
	Install Grout Barrier In 200 Series Tanks & Catch Tank C-301															
	~ Scope Incl: Survey tank/Area for installing grout; setting up barriers, worker boundaries, & vehicle/cement truck location; remove tank sleeve cap/plug; install cement/grout shoot; install cement/grout; remove cement/grout shoot & dispose in ERDF CAN; re-install tank riser plug; disassemble barriers; & clean-up placing debris in ERDF CANs.															

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

3' Grout Cap Inside Tanks

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
32	~ Labor Foreman - Working Foreman - Est 2/dy setup, 1/dy for pour, 1/dy tear-dwn = 5/dys per 200 series tank & C-301 tank x 5 tanks - Allowance for Labor	1LF	21	4.0	DYS	10.0	40.0	40.20	1,608	0.00	0	0.00	0	0	0	1,608
33	~ Labors - 1-Craft - Est 2/dy setup, 1/dy for pour, 1/dy tear-dwn = 4/dys per 200 series tank & C-301 tank x 5 tanks - Allowance for Labor	1L	21	4.0	DYS	10.0	40.0	38.58	1,543	0.00	0	0.00	0	0	0	1,543
34	~ Mat'ls - For barriers, concrete/grout shoot, work area grd protection, etc - Allowance for Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	500.00	500	0.00	0	0	0	500
35	~ Carpenter Foreman - Working Foreman - Set-up Area - Incl hand-rail, barriers, concrete/grout shoot fab, etc - Est 2/dys fab shoots (make 5 shoots thereby able to make grout pour in 1-day), support area set-up 1/dy, 1/dy for pour (ensure shoot secure during pour), 1/dy tear-dwn/clean area = 5/dys for all 5 tanks - Allowance for Labor	1CF	21	5.0	DYS	10.0	50.0	48.26	2,413	150.00	750	0.00	0	0	0	3,163
36	~ Carpenter - 1-Craft - Est 2/dys fab shoots (make 5 shoots thereby able to make grout pour in 1-day), support area set-up 1/dy, 1/dy for pour (ensure shoot secure during pour), 1/dy tear-dwn/clean area = 5/dys for all 5 tanks - Allowance for Labor	1C	21	5.0	DYS	10.0	50.0	46.38	2,319	0.00	0	0.00	0	0	0	2,319
37	~ Mat'ls - For barriers, concrete/grout shoot support, & grout shoot (sheet-metal applied to plywood) - Allowance for Mat'l	SubK	21	1.0	LS	0.0	0.0	0.00	0	5,000.00	5,000	0.00	0	0	0	5,000
38	~ Pipefitter Foreman - Incl placing rigging on tank riser plug, pulling riser plug & placing in secured area on plastic, & re-installing after grout our is complete - Est 2/hrs to rig plug & place secure area & 2/hrs to re-install plug - Allowance for Labor	1PFF	21	5.0	EA	4.0	20.0	75.66	1,513	0.00	0	12.67	84	0.00	0	1,598
39	~ Pipefitter - Incl placing rigging on tank riser plug, pulling riser plug & placing in secured area on plastic, & re-installing after grout our is complete - Est 2/hrs to rig plug & place secure area & 2/hrs to re-install plug - Allowance for Labor	1PF	21	5.0	EA	4.0	20.0	69.03	1,381	0.00	0	18.88	126	0.00	0	1,506
40	~ Operator - Supporting Pipefitters & tank riser plug removal & re-install - Allowance for Labor	1O	21	5.0	EA	4.0	20.0	44.90	898	0.00	0	12.67	84	0.00	0	982
41	~ Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02 - Est equip Rental 100% & 100% for Ops cost.	SubK	21	5.0	EA	4.0	20.0	0.00	0	0.00	0	67.57	1,351		0	1,351
42	~ Cement Mason Foreman - Working Foreman - Placing concrete/grout into tanks - Est 1/dy for pour - Allowance for Labor	1CMF	21	1.0	DY	10.0	10.0	44.13	441	150.00	150	0.00	0	0	0	591
43	~ Cement Mason - Placing concrete/grout into tanks - Est 1/dy for pour - Allowance for Labor	1CM	21	1.0	DY	10.0	10.0	42.52	425	150.00	150	0.00	0	0	0	575
44	~ Mat'ls - Concrete/grout Est 100/PSI - 35 Cy per tank x 5 Tanks + 5% overage - Mat'l cost incl transportation from town - Allowance for Mat'l	SubK	21	183.8	CY	0.0	0.0	0.00	0	70.00	12,863	0.00	0	0	0	12,863
	Subtotal Field Work						**2,872**		**125,679**		**467,313**		**4,888**		**0**	**597,880**
	Subtotal General Req's & Field Work						**4,010**		**208,579**		**468,031**		**22,977**		**10,184**	**709,770**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				430.0		18,852							18,852
	Non Productive Supervision - 1.5% of Const. Labor		21				40.0		1,885							1,885
	Weather Delays - 5% of Const. Labor		21				140.0		6,284							6,284
	Estimate for Construction Consumables - 4% of Const. Labor		21								5,027					5,027
	Estimate for Construction Cleanup - 5% of Const. Labor		21						6,284							6,284

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

3' Grout Cap Inside Tanks

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Estimate for Construction Material Movement - 1% of Const. Material		21								4,673					4,673
Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						1,885							1,885
Subtotal Construction General Requirements Adders						**610**		**35,190**		**9,700**		**0**		**0**	**44,890**
Construction Markup & Taxes Adders															
Construction Contractor Subcontractor Markup - @ 7.5%		21												764	764
Construction Contractor G&A - @ 10%		21						24,377		47,773		2,298		1,018	75,466
Construction Contractor Fee - @ 7%		21						17,064		33,441		1,608		713	52,826
Construction Contractor Sales Tax - @ 8.3%		21								39,652		1,907		845	42,404
Subtotal Construction Markup Adders						**0**		**41,441**		**120,866**		**5,813**		**3,340**	**171,460**
Subtotal Construction Subcontractor						**4,620**		**285,210**		**598,597**		**28,790**		**13,524**	**926,120**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**4,620**		**285,210**		**598,597**		**28,790**		**13,524**	**926,120**

8/18/2010

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Pit Backfill Soil

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor																
General Contractor Activities																
Construction Mgmt & Oversight Support																
1	~ Project Mgr/Design Eng - Allowance for 2 persons 3/hrs per day for oversight/support - Est sch duration based on const duration placing 120 truck loads & compacting per day.	Cnst E Mgmt	21	424.7	DYS	6.0	2,548.5	93.73	238,871	0.00	0	0.00	0	0.00	0	238,871
2	~ Proj Admin Vehicle support	SubK	21	2,548.5	HRS	0.0	0.0	0.00	0	0.00	0	17.08	43,532	0.00	0	43,532
3	~ Field Work Supervisor - Est 50% of Const Sch. & other 50% as Working Craft. - Est sch duration based on const duration placing 120 truck loads & compacting per day.	Cnst E Sup	21	424.7	DYS	5.0	2,123.7	89.80	190,708	0.00	0	0.00	0	0.00	0	190,708
4	~ Field Work Supervisor - Est Vehicle support	SubK	21	2,123.7	HRS	0.0	0.0	0.00	0	0.00	0	17.08	36,276	0.00	0	36,276
5	~ Safety Rep - Est 25% of Sch. - Est sch duration based on const duration placing 120 truck loads & compacting per day.	Cnst E Safe	21	424.7	DYS	2.5	1,061.9	87.04	92,428	0.00	0	0.00	0	0.00	0	92,428
6	~ Safety Rep - Est Vehicle support	SubK	21	1,061.9	HRS	0.0	0.0	0.00	0	0.00	0	17.08	18,139	0.00	0	18,139
7	~ QA/QC Inspections/Audits - Est 10% of Const Sch. - Est sch duration based on const duration placing 120 truck loads & compacting per day.	Cnst E QA	21	424.7	DYS	3.0	1,274.2	66.58	84,836	0.00	0	0.00	0	0.00	0	84,836
8	~ QA/QC Inspections/Audits - Est Vehicle support	SubK	21	1,274.2	HRS	0.0	0.0	0.00	0	0.00	0	17.08	21,765	0.00	0	21,765
9	~ Temp Const. Facilities/Portalets/& Elect Generator - 100% Est Const Schedule. - Est sch duration based on const duration placing 120 truck loads & compacting per day.	SubK	21	424.7	DYS	0.0	0.0	0.00	0	0.00	0	8.04	34,144	3.70	15,716	49,860
10	~ Project Signs, Barricades - Est set-up/tr-dwn/adjust/move as needed - Allowance for Mat'l	2LB	21	424.7	DYS	1.0	424.7	39.39	16,729	15	6,371	0.00	0	0.00	0	23,100
Mobilization																
11	~ - Mob-Training (Est 40hrs of training paid for 10/hr dys for ea FTE) Normal Const sch 4/10s - Allowance for class SubK $ (Est 4 classes x $250 ea)	3TM1TM F1O	21	5.0	CRFT	40.0	200.0	44.14	8,828	0.00	0	0.00	0	1,000	5,000	13,828
12	~ Physicals - Est allowance for medical eval costs. Est a portion of working Craft. - Estimate $750 per	SubK	21	5.0	EA	0.0	0.0	0.00	0	0.00	0	0.00	0	750	3,750	3,750
13	~ Dosimetry - Est allowance for medical eval costs. Est 100% of working Craft = (7) total - Estimate $128.23/yr	SubK	21	7.0	EA	4.0	28.0	0.00	0	0.00	0	0.00	0	145	1,013	1,013
14	~ Mob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Allowance for Equip	3TM1TM F1O	21	1.0	DAY	50.00	50.0	44.14	2,207	0.00	0	500	500	350	350	3,057
15	~ Mob-Submittals - Est 4	1PM	21	4.0	EA	2.0	8.0	93.73	750	0.00	0	0.00	0	0.00	0	750
Demobilization																
16	~ Demob - Site / Area Cleanup	3TM1TM F1O	21	0.5	DAY	50.00	25.0	44.14	1,104	0.00	0	0.00	0	0.00	0	1,104
17	~ Demob - GFE Turn-over, Chemical, Usage Report, & personnel	1PM	21	2.0	DYS	2.00	4.0	93.73	375	0.00	0	0.00	0	0.00	0	375
18	~ Demob - Craft & Equipment - Temporary Construction Facilities (e.g., Office/Lunchroom, Portable Sanitary Facilities, Potable Water, Portable Electrical Power) - Equipment/SubK $ Allowance	3TM1TM F1O	21	0.5	DAY	100.00	50.0	44.14	2,207	0.00	0	500	250	100.00	50	2,507
	Subtotal General Requirements						**7,798**		**639,042**		**6,371**		**154,605**		**25,878**	**825,897**
Field Work																
Install Backfill Soil In Pit After Tank/s Are Removed																

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Pit Backfill Soil

Est No: #2723
Date: 08/10/10

	Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
	~ Scope Incl: Survey tank/Area for installing back-fill; setting up barriers, truck routing paths, install back-fill; & compact back-fill.															
19	~ Labor Foreman - Working Foreman - Est setup barriers, performing flagging, & other support - Est 100% of back-fill sch - Allowance for Labor	1LF	21	424.7	DYS	10.0	4,247.5	40.20	170,750	0.00	0	0.00	0	0	0	170,750
20	~ Labors - 1-Craft - Est setup barriers, performing flagging, & other support - Est 100% of back-fill sch - Allowance for Labor	1L	21	424.7	DYS	10.0	4,247.5	38.58	163,869	0.00	0	0.00	0	0	0	163,869
21	~ Excavate & Screen New Back-fill - At Hanford pit - Est excavator, front end loader, & vibratory screen. Qty 841,000 Cubic Yards - Assume processing 25% more soil to obtain soil spec size. - Equip hrly costs from Blue Book	1OF1O	21	1,051,250	LCY	0.050	52,562.5	45.44	2,388,440	0.00	0	0.00	0	0.00	0	2,388,440
22	~ Load Gravel / Soil At Hanford Borrow Pit - Load 16.5/Tn Cap Trucks - Est 20 min load time ea = .33/hr + min dwn time = unit rate - Est Operator & Wheel Loader 3.25CY - Equip Watch pricing.	1O	21	841,000	LCY	0.025	21,146.1	44.90	949,460	0.00	0	24.55	173,039	0.00	0	1,122,499
23	~ Haul Gravel / Soil From Hanford Pit to C Farm pit bottom - Haul mat'l, & place as back-fill. - Est 10 miles rnd trip w/16.5CY - Means #02315-490-1120	SubK	21	841,000	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	11.12	9,347,715	9,347,715
24	~ Spreading Fill Mat'l at C Farm pit bottom - Means #02315-520-0020	SubK	21	841,000	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	1.81	1,524,397	1,524,397
25	~ Leveling & Compacting at C farm pit - Level, spreading, & compact with D-6 CAT. Same as seen in WCH contract for 300-Area back-fill practices. Due to obstructions, pit ramp grade, & placing soils as tanks are removed & not waiting till 100% of the tanks are removed a 40% adder is assessed.	SubK	21	841,000	LCY	0.000	0.0	0.00	0	0.00	0	0.00	0	5.57	4,681,342	4,681,342
26	~ 4000 gal, 250 Hp On-Highway Water Tanker - Performing dust suppression & compaction support - Est Vehicle support entire proj duration. Est operating 100% time - Equip hrly costs from Blue Book	1TM	21	424.7	DYS	10.0	4,247.5	43.68	185,531	0	0	45.34	19,257	0.00	0	204,788
27	~ Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4 - Est Vehicle support, fuel, & grease - Est operating 3/hrs ea sch day - Equip hrly costs from Blue Book	1O	21	424.7	DYS	3.0	1,274.2	44.90	57,212	0	0	26.65	11,318	0.00	0	68,530
	Subtotal Field Work						**87,725**		**3,915,260**		**0**		**203,614**		**15,553,454**	**19,672,329**
	Subtotal General Req's & Field Work						**95,523**		**4,554,303**		**6,371**		**358,219**		**15,579,332**	**20,498,225**
	Construction General Requirements Adders															
	Productivity Factor - 15% of Const Labor		21				13,160.0		587,289							587,289
	Non Productive Supervision - 1.5% of Const. Labor		21				1,320.0		58,729							58,729
	Weather Delays - 5% of Const. Labor		21				4,390.0		195,763							195,763
	Estimate for Construction Consumables - 4% of Const. Labor		21								156,610					156,610
	Estimate for Construction Cleanup - 5% of Const. Labor		21						195,763							195,763
	Estimate for Construction Material Movement - 1% of Const. Material		21								0					0
	Estimate for Construction Personnel Movement - 1.5% of Const. Labor		21						58,729							58,729

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Pit Backfill Soil

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
Subtotal Construction General Requirements Adders						**18,870**		**1,096,273**		**156,610**		**0**		**0**	**1,252,883**
Construction Markup & Taxes Adders															
Construction Contractor Subcontractor Markup - @ 7.5%	21													1,168,450	1,168,450
Construction Contractor G&A - @ 10%	21							565,058		16,298		35,822		1,557,933	2,175,111
Construction Contractor Fee - @ 7%	21							395,540		11,409		25,075		1,090,553	1,522,577
Construction Contractor Sales Tax - @ 8.3%	21									13,527		29,732		1,293,085	1,336,344
Subtotal Construction Markup Adders						**0**		**960,598**		**41,234**		**90,629**		**5,110,021**	**6,202,482**
Subtotal Construction Subcontractor						**114,393**		**6,611,174**		**204,215**		**448,848**		**20,689,353**	**27,953,590**
Contingency								**0**		**0**		**0**		**0**	**0**
Escalation								**0**		**0**		**0**		**0**	**0**
Total Project						**114,393**		**6,611,174**		**204,215**		**448,848**		**20,689,353**	**27,953,590**

8/18/201^

washington river protection solutions

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Remote Operated Equipment

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
07 Construction Subcontractor															
Komatsu PC-1000 - For Mjr Demo Activities															
Subtotal Project			2	EA									1,050,000	2,100,000	2,100,000
Decontaminate, Dwn Size, Place in CAN, & Disposal Cost															
Subtotal Project			1	EA									105,000	105,000	105,000
Remote Control Set Up for Komatsu PC-1000															
Subtotal Project			2	EA									1,750,000	3,500,000	3,500,000
Decontaminate, Dwn Size, Place in CAN, & Disposal Cost															
Subtotal Project			1	EA									175,000	175,000	175,000
Komatsu PC-1000 - Attachments (Shear, Hammer, etc)															
Subtotal Project			14	EA									575,000	8,050,000	8,050,000
Decontaminate, Dwn Size, Place in CAN, & Disposal Cost															
Subtotal Project			1	EA									57,500	57,500	57,500
Komatsu PC-300 - Sizing Debris & Loading CAN Activities															
Subtotal Project			2	EA									270,000	540,000	540,000
Decontaminate, Dwn Size, Place in CAN, & Disposal Cost															
Subtotal Project			1	EA									27,000	27,000	27,000
Remote Control Set Up for Komatsu PC-300															
Subtotal Project			2	EA									449,998	899,996	899,996
Decontaminate, Dwn Size, Place in CAN, & Disposal Cost															
Subtotal Project			1	EA									45,000	45,000	45,000
Komatsu PC-300 - Attachments (Shear, Hammer, etc)															
Subtotal Project			12	EA									250,000	3,000,000	3,000,000
Decontaminate, Dwn Size, Place in CAN, & Disposal Cost															
Subtotal Project			1	EA									25,000	25,000	25,000
Subtotal Construction Subcontractor						0		0		0		0		18,524,496	18,524,496
Contingency								0		0		0		0	0
Escalation								0		0		0		0	0
Total Project						0		0		0		0		18,524,496	18,524,496

Notes & Assumptions:
#1 - The scope of this worksheet is to cost remote operated equipment used in performing high Rad waste removal activities. These specialized pieces of equipment will be operated from a control trailer outside of the pit by trained craft Operators viewing activities from cameras mounted on equipment. Activities include: equipment movement to/from staging area; changing out attachments; excavating; rubblizing concrete; shearing piping, steel beams, and rebar; moving waste Boxes; and loading waste boxes. Assume excavator attachments will be placed on a tool bar capable of performing connection/disconnection activities. Once D&D activities are complete equipment will be disassembled, placed in ERDF CANs, and grout encapsulated at ERDG.

#2 - Construction schedule duration is seen in the Waste Disposal Rates worksheet.

#3 - Estimate 100% of the remote equipment will be purchased and GFE to the D&D contractor. This is due to equipment being subjected to high Rad waste D&D activities and high possibility of equipment not being able to be

Cost Estimate

Title: C Farm Tank Removal Study - ROM Estimate
Estimator: Dan Jakubek

Remote Operated Equipment

Est No: #2723
Date: 08/10/10

Description	Const Crew	Resc Code	Quan.	Unit	Labor Unit Hrs	Total Labor Hrs	Labor Rate	Labor Dollars	Material Unit Cost	Material Dollars	Equip Unit Cost	Equip Dollars	Sub Contract Unit Cost	Sub Contract Dollars	Total Dollars
cleaned and meet WRPS release requirements. #4 - Estimator experience selected equipment based on types of waste, D&D activities, and waste quantities. Personnel costs operating equipment are in Pit Labor Lf-Cycle workbook. #5 - Assume equipment having normal maintenance performed can accomplish tasks within the schedule durations and time frame estimated with no replacement equipment required. #6 - Base equipment pricing came from a phone discussion with Michel at Modern Machinery Co Inc out of Kent Washington (253) 872-3500 on 7/27/10. #7 - Equipment remote control installation and set-up per discussion with FEC VP DeVern (509-375-1608, or cell 308-0951) @ $1/mil to $1.1/mil for remote set-up. DeVern had worked in past with Lampson Intrn Inc (Bill Lampson) & SA Technologies on similar D&D high Rad subject matter surrounding Reactors & WCH contracts, and other high Rad Hanford D&D work. #8 - Base equipment and attachment costs were from phone discussion with Michel at Modern Machinery Co Inc in Kent Wa. (253-872-3500) for ROM equip pricing 7/27/10.														

D5.0 ESTIMATE EQUIPMENT LIST

Make	Model Details	Description	Capacity	Year	Monthly Rental	CFC%	Eq Age Adjst Fac	Rgnl Adjst Factor	Equip Hrly Rate	Operating Hrly Rate	Equip/OPS Hrly Rate
Misc Mdl	83 CFM	Air Compressor (83 CFM @ 120 Gal Cap), 20Hp, Yr/08	83 CFM	2008	285	13%	91.1%	98.7%	$ 1.23	$ 0.95	**$ 2.18**
CAT	CS-563D	Compactor - Single Drum (Smooth) Vibratory - CAT CS-563D, 145Hp, 84" Wide, Yr/03	145Hp	2003	3,945	18%	100.0%	98.3%	$ 18.58	$ 29.50	**$ 48.08**
Grove	RT58D	Crane 18T - Grove RT58D, 4x4x4, Hydraulic, 60ft boom, 125Hp, 17- 24.9 Tons, Yr/02	60' Boom - 17-24.9 Ton Cap	2002	6,910	13%	100.0%	98.1%	$ 32.47	$ 35.10	**$ 67.57**
CAT	769D	Dump Truck - Mechanical Drive Rear Dumps - CAT 769D, 36.4 MT, 487 Hp, Yr/07	22.2 - 31.7 CY, 487 Hp	2007	14,395	15%	100.0%	98.3%	$ 67.79	$ 57.25	**$ 125.04**
Komatsu	PC300LC-7	Excavator - Crawler Mounted Hydraulic Excavator - Komatsu PC300LC-7, 2.56 Cy, 246 Hp, 34.2 MT, Yr/07	2.56 Cy, 246 Hp, 34.2 MT	2007	12,770	15%	100.0%	98.0%	$ 59.95	$ 57.70	**$ 117.65**
Komatsu	PC 400LC-7	Excavator - Crawler Mounted Hydraulic Excavator, Komatsu PC400LC-7, 2.54 Cy, 345 Hp, 44.4 MT, Yr/08	2.54 Cy, 345 Hp, 44.4 MT	2008	17,280	15%	100.0%	98.0%	$ 81.12	$ 77.25	**$ 158.37**
Labounty	CP 40	Excavator Attachment - Concrete Cruncher / Pulverizer - LaBounty CP40, 30" Jaw Opening, 2,875 Lbs, Yr/08	26"- 35" Opening	2008	740	16%	98.3%	98.0%	$ 3.41	$ 12.55	**$ 15.96**
Stanley	MB30EXS	Excavator Attachment - Hydraulic Impact Breaker - Stanley MB30EXS, 2000 Ft-lb Impact Energy, 500/700 bpm, Yr/08	2000 Ft-lb	2008	2,540	8%	98.5%	100.0%	$ 11.99	$ 8.25	**$ 20.24**
CAT	S320	Excavator Shear - CAT S320, Jaw Opening 15.4, 4,741 Lbs, Yr/08	15"- 24" Jaw Opening - 4741 Lbs	2008	2,640	12%	98.3%	98.0%	$ 12.18	$ 15.10	**$ 27.28**
Misc Mdl	8,500 Lbs	Flatbed Truck - Misc Model, 4.25 ton, 180 Hp, 4x2, Gas, Yr/08	2.5 Ton, 4x2	2008	1,620	14%	98.8%	98.3%	$ 7.54	$ 14.15	**$ 21.69**
JCB	508C	Forklift - Telescoping Boom Rough Terrain Lift Truck - JCB 508C, 8000 lb, Max Lift Height 41.6', Reach 27'4", 100Hp, 4WD, Yr/08	41' Max Height - 8000 Lbs	2008	4,385	9%	98.9%	98.1%	$ 20.38	$ 20.75	**$ 41.13**
CAT	930G	Front End Loader - CAT 930G, 4-WD Articulated Wheel Loaders, 149 Hp, Diesel, 3.25 Cy, Fy/08	3.25 Cy, 149 Hp	2008	4,395	19%	100.0%	97.8%	$ 20.59	$ 22.10	**$ 42.69**
Misc Mdl	250 Hp	Fuel Truck - On-Highway Tanker - Misc Mod, 250 Hp, 4000 Gal, 14000 Lbs, 2x4, Yr/08	4000 Gal, 14000 Lb, 250 Hp	2008	4,010	14%	98.7%	98.3%	$ 18.64	$ 26.70	**$ 45.34**
Misc Mdl	20 kW (6.5 kva)	Generator - Misc Mod, 20kW/6.5 kva, Enclosed, 34 Hp, Diesel, Yr/08	20KW, 34 Hp	2008	805	14%	96.8%	98.2%	$ 3.67	$ 9.00	**$ 12.67**
CAT	12H	Grader - Articulated Frame - CAT 12H, 145 Hp, 12' Moldboard, Diesel, 31320 Lbs, Yr/07	12' MdBd, 145 Hp	2007	5,930	17%	100.0%	97.8%	$ 27.78	$ 26.35	**$ 54.13**
Misc Mdl	30' / 4 Lights	Light Plant - Misc Mod, 7 KW, 11.5 Hp, 30' w/4 lights, Yr/08	30' / 4 lights	2008	1,005	8%	98.4%	100.0%	$ 4.74	$ 3.75	**$ 8.49**
Misc Mdl	1500 Gal	Lube / Mechanic Truck, 1500 gal, On-Highway 199 HP, Gas, Yr/08	1500 Gal, 199 Hp	2008	1,730	14%	98.7%	98.3%	$ 8.04	$ 21.10	**$ 29.14**
Misc Mdl	3/4 Ton	Pickup Truck - 3/4 Ton, 4x2, 285 Hp, Conventional Cab, Gas, Yr/08	3/4Ton, 4x2	2008	655	11%	99.9%	98.3%	$ 3.08	$ 14.00	**$ 17.08**
Misc Mdl	3/4 Ton	Pickup Truck - 3/4 Ton, 4x4, 165 Hp, Crew Cab, Gas, Yr/08	3/4Ton, 4x4	2008	815	11%	99.9%	98.3%	$ 3.83	$ 9.00	**$ 12.83**
Misc Mdl	GVW 85000 Max	Roll-off Truck - Misc Mod, On-Highway, Roll-on Roll-off, 8x4, 450 Hp, 85000 lbs max, 15-18 cy, Yr/08	85000 lbs Max, 450 Hp	2008	5,280	12%	98.8%	98.3%	$ 24.57	$ 45.60	**$ 70.17**
Misc Mdl	6x4 / 50,000#	Haul Truck Tractor - Misc Mod, ON-Highway, 6x4, 50000 lbs, Diesel, 400 Hp, YR/08	6x4 / 50000 lb	2008	3,795	12%	98.8%	98.3%	$ 17.66	$ 35.35	**$ 53.01**
Misc Mdl	Fld Office Trailer	Field Office Trailer - Enclosed 8'w x 24'lg - Yr/08	8' w x 24' lg	2008	250	15%	99.0%	98.3%	$ 1.17	$ 0.95	**$ 2.12**
Misc Mdl	4000 gal, 250 Hp	Water Truck - Misc Mod, On-Highway Tanker, 4000 Gal, 250 Hp, Diesel, Yr/08	4000 gal, 250 Hp	2008	4,010	14%	98.7%	98.3%	$ 18.64	$ 26.70	**$ 45.34**
Soilmec	R-625	Crawler Mounted Rotary Rig - Soilmec R-625, 60-80MT, 177,000 flb Rotary Torque, 408 Hp, Diesel, Yr/10	177,000 flb, 408 Hp	2010	0	18%	100.0%	95.0%	$ -	$ 102.83	**$ 102.83**
Schwing	2023H-6/S 45 SX	Concrete Pump Booms for Truck Mounting - 2023H-6/S 45 SX, 182 yph, 148' Vert Boom, Yr/08	182 yph, 148 Vert Boom	2008	23,090	9%	97.9%	99.2%	$ 107.42	$ 51.15	**$ 158.57**
											1 Hr Amt >>

Make	Model Details	Description	Capacity	Year	Monthly Rental	CFC%	Eq Age Adjst Fac	Rgnl Adjst Factor	Equip Hrly Rate	Operating Hrly Rate	Equip/OPS Hrly Rate
											$ -