Final Status Survey Planning Worksheet

GENERAL SECTION

Survey Area #: OOL-03	Survey Unit #: 01

Survey Unit Name: Sherman Reservoir Dam & South Shoreline Survey Area OOL-03

FSSP Number: YNPS-FSSP-OOL03-01-00

PREPARATION FOR FSS ACTIVITIES

Check marks in the boxes below signify affirmative responses and completion of the action.

1.1 Files have been established for survey unit FSS records. ☑

1.2 ALARA review has been completed for the survey unit. ☑ Refer to YA-REPT-00-003-05

1.3 The survey unit has been turned over for final status survey. ☑

1.4 An initial DP-8854 walkdown has been performed and a copy of the completed Survey Unit Walkdown Evaluation is in the survey area file. ☑

1.5 Activities conducted within area since turnover for FSS have been reviewed. ☑

Based on reviewed information, subsequent walkdown: ☐ not warranted ☑ warranted

If warranted, subsequent walkdown has been performed and documented per DP-8854. ☑

OR

The basis has been provided to and accepted by the FSS Project Manager for not performing a subsequent walkdown. ☐

1.6 A final classification has been performed. ☑

Classification: CLASS 1 ☐ CLASS 2 ☐ CLASS 3 ☑

DATA QUALITY OBJECTIVES (DQO)

1.0 Statement of the problem:

Survey Area OOL-03 consists of the surface area of Sherman Dam and the south shoreline of Sherman Reservoir. The open land area owned by Trans-Canada is comprised of soil, asphalt, concrete and riprap. Survey Unit OOL-03-01 is a sub unit of survey area OOL-03 and constitutes approximately 8,743 square meters of surface area.

The problem as defined by this survey plan is to demonstrate that the years of plant operation did not result in an accumulation of plant-related radioactivity that exceeds the release criteria.

The planning team for this effort consists of the FSS Project Manager, FSS Radiological Engineer, FSS Field Supervisor, and FSS Technicians. The FSS Radiological Engineer will make primary decisions with the concurrence of the FSS Project Manager.

2.0 Identify the decision:

Does residual plant-related radioactivity, if present in the survey unit, exceed the release criteria? Alternative actions that may be implemented in this effort are investigations.

3.0 Identify the inputs to the decision:

Sample media:	Soil & Asphalt
Types of measurements:	Soil samples and judgmental scans
Radionuclide-of-concern:	Cs-137
Applicable DCGL:	3.00 pCi Cs-137 per gram of soil (8.73-mrem/y DCGL)

Thirty-Three Final Status Survey samples from survey units OOL-04-01 and OOL-04-02 were used to provide the characterization data for survey unit OOL-03-01. The data is sufficient to support FSS planning of Survey Unit OOL-03-01 because the two FSS survey units used are similar in nature and contiguous with Survey Unit OOL-03-01.

Based on a review of the characterization data, Cs137 is the only plant-related radionuclide that was identified consistently (76%) in the thirty-three characterization samples analyzed. The results from the characterization data are summarized below:

- Cs-137 (25 detects) — Cs-137 is present in 76% of the characterization samples. When accounting for decay, no samples exceed 10% of the 23.73-mrem/y Cs-137 DCGL (0.81 pCi/g).
- Eu-155 (2 detects) — The activity concentrations from these samples represent a small fraction (<1%) of the 23.73-mrem/y DCGL. Eu-155 is not expected to pose a concern in subsequent sampling.
- Cs-134 (1 detect) — The activity concentration from this sample represents a small fraction (2%) of the 23.73-mrem/y DCGL. Cs-134 is not expected to pose a concern in subsequent sampling.
- Sb-125 (4 detects) — The activity concentrations from these samples represent a small fraction (<1%) of the 23.73-mrem/y DCGL. Sb-125 is not expected to pose a concern in subsequent sampling.
- Sr-90 (1 detect) — The activity concentration from this sample represents a small fraction (1%) of the 23.73-mrem/y DCGL. Sr-90 is not expected to pose a concern in subsequent sampling.

Based on the inconsistency of detection and the low fractions of their respective DCGL values Eu-155, Cs-134, Sb-125, and Sr-90 are not considered to be representative of the nuclide mixture for Survey Unit OOL-03-01. However, in accordance with DP-8852 five percent of the FSS random soil samples will be analyzed for these nuclides as well as all other plant-related gamma-emitting nuclides. HTD nuclides and TRUs will also be included in the assessment related to this survey plan. In accordance with DP-8856, "Preparation of Survey Plans" at least 5% of the soil samples collected will be sent to an independent laboratory for complete analyses (HTD nuclides and TRUs).

Survey Design / Release Criteria

Classification:	Class 3
Average Cs-137 concentration:	0.18 pCi/g
Standard deviation Cs-137 (σ):	0.14 pCi/g
Surrogate DCGL:	N/A (a surrogate DCGL will not be used)
Investigation Level for soil	• 1.5 pCi Cs-137 per gram of soil (> 50% of the 8.73-mrem/y DCGL

samples:	for Cs-137) • Additionally if any other LTP listed nuclide is identified at a concentration greater than 50% of its respective 8.73-mrem/y DCGL, or if the sum of the fractions for all detected LTP listed nuclides exceeds 0.5, an investigation will be conducted.
Investigation Level for scan:	Reproducible indication above background using SPA 3 and audible discrimination. The expected background range for SPA-3 scan is between 8,000 cpm and 15,000 cpm, and is dependent on the geology (rock composition) in the immediate vicinity of the scan.
Radionuclides for analysis:	All LTP nuclides with the focus on Cs-137
MDCs for gamma analysis of soil samples:	Nuclide — 10% - 50% of DCGL (pCi/g) Co-60 — 1.4E-1 - 7.0E-1 Nb-94 — 2.5E-1 - 1.3+0 Ag-108m — 2.5E-1 - 1.3E+0 Sb-125 — 1.1E+0 - 5.6E+0 Cs-134 — 1.7E-1 - 8.7E-1 Cs-137 — 3.0E-1 - 1.5E+0 Eu-152 — 3.6E-1 - 1.8E+0 Eu-154 — 3.3E-1 - 1.7E+0 Eu-155 — 1.4E+1 - 6.9E+1 The desired MDCs in the laboratory analyses of FSS soil samples will be the 10% DCGL values. If it is impractical to achieve those, the 50% DCGL values must be achieved in the laboratory analyses of the FSS soil samples.
MDCs for HTD nuclide:	Nuclide — 10% - 50% DCGL (pCi/g) H-3 — 1.3E+1 - 6.4E+1 C-14 — 1.9E-1 - 9.7E-1 Fe-55 — 1.0E+3 - 5.1E+3 Ni-63 — 2.8E+1 - 1.4E+2 Sr-90 — 6.0E-2 - 3.0E-1 Tc-99 — 5.0E-1 - 2.5E+0 Pu-238 — 1.2E+0 - 5.8E+0 Pu-239 — 1.1E+0 - 5.3E+0 Pu-241 — 3.4E+1 - 1.7E+2 Am-241 — 1.0E+0 - 5.1E+0 Cm-243 — 1.1E+0 - 5.6E+0 The MDC values for difficult to detect nuclides will be conveyed to the outside laboratory via the sample chain-of-custody form DPF-8823.1 which will accompany the soil samples.
Scan Coverage :	SPA-3 scans will be performed over an approximate 1m by 1m area surrounding each soil sample, as permitted by terrain. Three judgmental SPA-3 scans will be performed in Survey Unit OOL-03-01, each of which will cover an area of approximately 10 m^2 (1 m in width and 10 m in length). • The first scan area will be along the security gate, which separates Units 1 and 2. This location was chosen because this was the primary access point for receiving and shipping radioactive waste via truck transport. • The second scan area will be along the shoreline west of the

	circulating water discharge. This location was chosen because it represents the potential for elevated residual radioactivity based on FSS sediment data from survey unit OOL-01-01 (Seal Pit Discharge Cove). • The third scan area will be along the road way and the boundary for OOL-04-02.
MDCR for SPA-3:	The accompanying table in Attachment 1 provides MDCR values by various background levels.
MDC(fDCGL$_{surveyor\text{-}emc}$) for SPA-3 scans:	The accompanying table in Attachment 1 provides MDC values by various background levels. Note: Any radiation levels detected above background in a Class 3 Survey Unit should be investigated. A Class 3 Survey Unit is expected to have minimal contamination and not expected to have any hot spots. MARSSIM recommends scanning in a Class 3 Survey Unit be performed to verify proper classification. Scan MDC is not tied to the DCGLw in a Class 3 Survey Area and therefore scanning to levels above background is a measure of due-diligence on the appropriateness of the classification. (http://www.orau.gov/ddsc/expert/answers/marssim.htm question/answer dated 2/4/2003)
QC checks and measurements:	• QC checks for the Leica GPS will be performed in accordance with DP-8859. • QC checks for the SPA-3 will be performed in accordance with DP-8504. • One QC split sample will be collected (note: this is in accordance with DP-8852 requirements.) • One QC recount for soil samples will be performed by the YNPS Chemistry Lab (note: this is in accordance with DP8852 requirements.)

4.0 Define the boundaries of the survey:

- Boundaries of Survey Unit OOL-03-01 are as shown on the attached map. The Sherman Reservoir shoreline represents the northern boundary. Survey Unit OOL-03-02 defines the eastern boundary. A protected area security fence separates Unit 01 from Unit 02 and defines a logical control point for heavy equipment and personnel needing to access Unit 01. Survey Area OOL-04 and the Sherman Dam spillway define the western boundaries.

- A paved road traversing the Sherman dam was built after the plant began operation, around 1965. A section of the dam and roadway is scheduled for demolition and extension some time after FSS is complete. Any random sample points that fall on the road will be sampled at two levels, the asphalt itself and the soil underlying the asphalt.

- The survey will be performed under appropriate weather conditions (as defined by instrumentation limitations and human tolerance) and in daylight hours (allowing adequate daylight time for ingress and egress).

5.0 Develop a decision rule:

Upon review of the FSS data collected under this survey plan:

(a) If all the sample data show that the soil concentrations of plant related nuclides are below the 8.73 mrem/year DCGLs and the sum of fractions of nuclides are below unity, accept the characterization data as valid FSS data and reject the null hypothesis (i.e., Survey Unit OOL-03-01 meets the release criteria).

(b) If the action levels are exceeded, then perform an investigation survey.

(c) If the average concentration of any LTP-listed nuclide exceeds its respective DCGLw or the average sum of fractions for any LTP-listed nuclide exceed one, then accept the null hypothesis (i.e., Survey Unit OOL-03-01 fails to meet the release criteria).

Note: Alternate actions beyond investigations are not expected to be necessary within this survey unit.

6.0 Specify tolerable limits on decision errors:

Null hypothesis:	Residual plant-related radioactivity in Survey Unit OOL-03-01 exceeds the release criteria.
Probability of type I error:	0.05
Probability of type II error:	0.05
LBGR:	The applicable soil (8.73-mrem/y) DCGL ÷ 2 Cs-137: (3.0 pCi/g)/2 = 1.5 pCi/g

7.0 Optimize Design:

Type of statistical test: WRS Test ☐ Sign Test ☑ (background will not be subtracted)

Number and Location of Samples: 15 soil samples will be collected in randomly selected locations (refer to accompanying DPF-8853.1). Any sample location that falls on an asphalt surface will be sampled at two levels, the asphalt itself as well as the soil beneath. Asphalt samples will be distinguished from the soil sample by appending the letter "A" to the suffix of the alphanumeric sample ID. For example, if sample location 001 falls on the road the naming conventions for the two samples will be OOL-03-001-F (representative of the soil sample) and OOL-03-001-F-A (representative of the asphalt sample).

Biased samples: A minimum of 4 biased sample locations will be selected before, or at the time of sample collection and their locations will be added to the map, with the letter "B" added to the sample number. The addition of these samples and the relocation of any samples may be added to the map without requiring a revision. The coordinates of the biased sample locations will be determined and added to the record.

Biased sample locations:
- Two samples to be taken along the shoreline above the riprap east of the Sherman Station Valve House.
- Two samples to be taken along the boundary of survey unit OOL-03-02 west of the protected area security fence. One in the roadway on the asphalt and one on the soil just to the side of the roadway.

GENERAL INSTRUCTIONS

1. Collect 15 random 1-liter soil samples and 4 biased 1-liter soil samples in accordance with DP-8120, using sampling equipment as stated in DP-8120. One of the 15 random soil samples will be analyzed as QC split samples to fulfill the QC requirement of DP-8852. The same QC split samples will also be analyzed for Hard to Detect nuclides this in accordance with section 5.6.3.2.1 of the LTP and DP-8856.

2. Soil sample designation:

FSS soil samples:	OOL-03-01-001-F through OOL-03-01-015-F corresponding to FSS sample locations 001 through 015.
Biased FSS soil samples:	OOL-03-01-16-F-B through OOL-03-01-019-F-B corresponding to samples locations 016 through 019. • OOL-03-01-016-F-B to be taken above the riprap east of the Sherman Station Valve House. • OOL-03-01-017-F-B to be taken midway down the gravel roadway east of the Sherman Station Valve House. • OOL-03-01-018-F-B to be taken on the asphalt west of the protected area security fence. • OOL-03-01-019-F-B to be taken just off the roadway between the asphalt and Survey Unit OOL-04-02.
QC split samples:	OOL-03-01-012-F-S is to be designated as the QC split sample.
Recount samples:	OOL-03-01-004-F is to be counted twice on site. The results will be compared in accordance with DP-8864 "Split Sample Assessment for Final Status Survey."
Asphalt samples:	Any sample point that falls on the road will be sampled at two levels, the asphalt itself and the soil underlying the asphalt. Asphalt samples will be distinguished from the soil sample by appending the letter "A" to the suffix of the alphanumeric sample ID. Asphalt samples will be analyzed using the same MDCs as soil as specified in the DQO section of this plan.

3. All soil samples will be received and prepared in accordance with DP-8813, "Sample Receipt and Preparation."

4. Asphalt and Soil samples will be collected in accordance with DP-8120, "Collection of Site Characterization and Final Status Survey Samples."

5. Chain of Custody form will be used in accordance with DP-8123, "Sample Security and Chain of Custody" for all soil samples sent to an off-site laboratory.

6. The measurement locations have been identified using GPS, in accordance with DP-8859, "Operation of the Leica Geosystems GPS 1200 Global Positioning System for Identification of Final Status Survey Measurement Locations". Each location will be marked to assist in identifying the location. The FSS Radiological Engineer or FSS Field Supervisor will guide the FSS Technicians to the sample locations. Any locations that are not suitable for soil sampling will be relocated to the nearest suitable location and documented in the field log in accordance with DP-8856, "Preparation of survey Plans."

7. Survey instrument: Operation of the E-600 w/SPA-3 will be in accordance with DP-8535, with QC checks performed in accordance with DP-8504. The instrument response checks shall be performed before issue

and after use.

8. The job hazards associated with the Survey described in this package are addressed in the accompanying Job Hazard Assessment for OOL-03-01.

9. All personnel participating in this survey shall be trained in accordance with DP-8868, "Final Status Survey Training Programs."

SPECIFIC INSTRUCTIONS

1. FSS Technicians will perform scans by moving the SPA-3 detector at a speed ≤ 0.25 m/s, keeping the probe within approximately three inches of the ground surface, and following a serpentine pattern that includes at least three passes across each square meter. Scanning will be performed in the rate-meter mode with the audible feature on using earphones. Surveyors will listen for upscale readings, to which they will respond by slowing down or stopping the probe to distinguish between random fluctuations in the background and greater than background readings. Location(s) where detectable-above-background scan readings are found will be investigated. The FSS Field Supervisor will time and monitor a minimum of 50% of these scans.

   A first level investigation may be done with the SPA-3/E-600 to determine if the observed increase in the scan measurement is due to the presence of rocks and boulders. SPA-3 scans performed in non-impacted areas have shown that rock formations accounted for increased count rates. If it can be demonstrated that the presence of rocks and boulders is the cause of an increased count rate during a SPA-3 scan, record that finding form DPF-8856.2. If it is demonstrated that the rocks and boulders do not account for an above background SPA-3 measurement, a soil sample will be collected at the point of the highest SPA-3 reading in the scanned area. Detailed descriptions of investigation actions will be recorded on form DPF-8856.2 <u>and</u> the location of the above background scan and sample will be recorded on the survey map. The location description must include sufficient detail to revisit the spot at a later time. If a soil sample is collected during the first level investigation, the sample designation will consist of the measurement location code plus the letter "I" (for investigation). For example, if a soil sample is collected during a first level investigation at measurement location 003, and the next available three digit sample location is 020 then the sample number would be OOL-03-01-020-F-I

2. All designated measurement locations have been already identified by GPS per DP-8859. If a designated sample location is obstructed for any reason, the FSS Radiological Engineer or the FSS Field Supervisor will select an alternate location in accordance with DP-8856. A detailed description of the alternate location will be recorded on form DPF-8856.2, survey unit map will be annotated appropriately, and the alternate location will be conspicuously marked to facilitate re-visiting to identify and record the coordinates with GPS in accordance with DP-8859.

3. Gamma analysis will be performed on all soil samples. If any of the gamma analyses show that the Cs-137 concentration is greater than 1.5 pCi/g or a sum of fractions greater than 0.5, an investigation survey will be conducted at that sample location.

4. Soil Samples:

   - YNPS Chemistry will analyze OOL-03-01-001-F through OOL-03-01-015-F and OOL-03-01-016-F-B through OOL-03-01-019-F-B for gamma-emitting nuclides.
   - YNPS Chemistry will analyze OOL-03-01-004-F as a sample recount. The recounted sample will possess the naming convention OOL-03-01-004-F-RC.
   - OOL-03-01-012-F-S will be sent to the off-site laboratory. This sample will be analyzed for gamma-emitting nuclides and HTD.

5. On-site gamma analysis of the FSS samples shall achieve the MDC values stated in the DQO section of this plan. The MDCs will be communicated to the laboratory using an attachment to the Chain-of Custody form.

NOTIFICATION POINTS

QA notification point(s) (y/n) * y Specify:

1. Date/time of initial pre-survey briefing	QA Signature:
2. Date/time of commencement of soil sampling	QA Signature:
3. Date/time of initial asphalt sampling	QA Signature:
4. Date/time of the soil scan measurements.	QA Signature:

*Email notification to trudeau@yankee.com with a copy to calsyn@yankee.com satisfies this step.

FSI point(s) (y/n) n

Specify:	Field Supervisor Signature /Date:
1.	
2.	

Prepared by _____ Date 11-9-05
FSS Radiological Engineer

Reviewed by _____ Date 11-9-05
FSS Radiological Engineer

Approved by D.C. Smith _____ Date 11/9/05
FSS Project Manager

Attachment 1
SPA-3 Scan MDC/MDCR Values

MDCR Calculation

$$MDCR = 1.38 \frac{\sqrt{b}}{\sqrt{p} * t}$$ *(DP-8853)*

where:
- b = background counts in time interval t
- p = surveyor efficiency
- t = time the detector is above localized activity

Inputs:

• Scan speed	0.25	meters per second
• b		counts per min
• p	0.5	
• t	0.04	min

Assume:
Localized contam diam = 56 cm (LTP/MARSSIM)

MDC ($fDCGL_{EMC}$) Calculation

$$MDC(fDCGL_{EMC}) = MDCR \sum \frac{f^i}{E^i AF^i DCGL^i_w}$$ *(DP-8853)*

where:
- AF= Area Factor
- E_i = Scanning instrument efficiency *(YA-REPT-00-015-04)*
- f = radionuclide fraction

Inputs:

	Cs-137	Co-60	*Nuclide*	
• E_i	188	379		cpm/pCi/g
• DCGL	3	1.4		*(8.73 mrem/y Soil DCGL)*
• f	1	0		
• AF	1	1		

Table 1
(MDC and MDCR Values for Various Background Levels)

BKG	BKG/t	MDCR	MDC($fDCGL_{emc}$)
7000	261	845	1.5
8000	299	903	1.6
9000	336	958	1.7
10000	373	1010	1.8
11000	411	1059	1.9
12000	448	1106	2.0
13000	485	1152	2.0
14000	523	1195	2.1
15000	560	1237	2.2
16000	597	1278	2.3
17000	635	1317	2.3
18000	672	1355	2.4
19000	709	1392	2.5
20000	747	1428	2.5
21000	784	1464	2.6
22000	821	1498	2.7
23000	859	1532	2.7
24000	896	1565	2.8
25000	933	1597	2.8

GENERAL SECTION			
Survey Area No.:	OOL-03	Survey Unit No.:	02
Survey Unit Name:	Sherman Reservoir and ESD Out-Fall		
FSSP No.:	YNPS-FSSP-OOL-03-02-00		

PREPARATION FOR FSS ACTIVITIES

Check marks in the boxes below signify affirmative responses and completion of the action.

1.1	Files have been established for survey unit FSS records.	X
1.2	ALARA review has been completed for the survey unit.	X
1.3	The survey unit has been turned over for final status survey.	X
1.4	An initial DP-5554 walk down has been performed and a copy of the completed Survey Unit Walk down Evaluation is in the survey area file.	X
1.5	Activities conducted within area since turnover for FSS have been reviewed.	X
	Based on reviewed information, subsequent walk down: X not warranted _____ warranted	
	If warranted, subsequent walk down has been performed and documented per DP-8854.	_____
	OR	
	The basis has been provided to and accepted by the FSS Project Manager for not performing a subsequent walk down.	_____
1.6	A final classification has been performed. Classification: Class 1	X

DATA QUALITY OBJECTIVES (DQO)

1.0 State the problem:

Define the problem so that the focus of the survey will be unambiguous.

Members of the planning team: FSS Project manager, Radiological Engineer, Field Supervisor, and Technicians.

Primary decision maker/method: FSS Radiological Engineer with concurrence of the FSS Project Manager.

Available resources/deadlines: N/A

Concise description of problem: Release of OOL-03-02 to demonstrate compliance with YNPS LTP release criterion.

2.0 Identify the decision:

Define the question that the survey will attempt to resolve and identify alternative actions that may be taken based on the outcome of the survey.

Principal study question: Is the residual radioactivity in OOL-03-02 below the 8.73 mr/yr release criterion?

Alternative actions: If residual radioactivity in OOL-03-02 exceeds the 8.73 mr/yr release criterion, investigations will be performed, potentially resulting in remediation or resurveys.

Decision statement: Determine whether or not OOL-03-02 satisfies the 8.73 mr/yr release criterion.

3.0 Identify the inputs to the decision:

Informational inputs needed to resolve the decision statement and environmental variables that will be measured.

Sources of information: 27 samples from historical data was sufficient to develop the DQOs for OOL-03-02. 40 new data measurements will be acquired to support DQAs.

Direct measurement technique: Soil samples will be collected and analyzed on site for all ETD LTP listed radionucluides, 2 samples will be sent to an independent lab for analyses of all LTP listed radionuclides.

Scan measurement technique: Surfaces will be scanned via a SPA-3 probe, and/or ISOCS Assays.

Sample matrix: Soil

Radionuclide(s) of concern: Based on a review of YNPS historical data, the following radionuclides are the only facility related radionuclides of concern: Co-60, Cs-137

Sample Quantity 29 ~~15~~ (calculated) + ~~25~~ 11 (added), for a total of 40 samples. (+2 QC) 12/18/06

Gridded Sample Area Size 14.25 m2 (Survey Unit Area/N)

Sample Grid Spacing: Triangular: 4.1m

Detection Limits:	For direct measurements and sample analyses, Minimum Detectable Concentrations (MDCs) less than 10% of the DCGL are prefered, while MDCs up to 50% of the DCGL are acceptable. See Attachment 2 for MDC Table.
MDC (fDCGLemc):	The accompanying MDCR/MDC table in Attachment 1 provides MDC values, as a fraction of DCGLemc, for various background levels.
MDCR(surveyor):	The accompanying MDCR/MDC table in Attachment 1 provides MDCR values for various background levels.
Background Measurements:	No reference area (background) measurements are required, the Sign Test will be used.
Release criteria DCGL based on:	8.73 mr/yr for Soil. See Attachment 2 for radionuclide specific breakdown of DCGLs.

4.0 Define the boundaries of the survey:

Define the spatial and temporal boundaries that will be covered by the decision statement so data can be easily interpreted.

Temporal boundaries:	The data are used to reflect the condition of radionuclides leaching into the ground water over a period of 1,000 years. The survey may be performed under appropriate weather conditions (as defined by instrument tolerance and personnel safety) on any shift of work.
Spatial Boundaries:	YNPS has been divided into multiple survey areas and units with relatively homogeneous characteristics based on information collected during the years of facility operation, the HSA, and post remediation activities. The area of interest has been named OOL-03, and the survey unit is 02. The medium of interest is described as Soil. The radiological characteristics of this unit classify it as a Class 1 area. Which has ≤ 2,000 m2 as a surface area guide line. The total surface area is 570 m2, which is well within the ≤ 2,000 m2 guide line. The maximum length is 26m, and the maximum width is 33.8m. Soil is surveyed to a depth of 15 cm. See included GPS coordinates and maps that demonstrate the measurement locations, the survey unit boundaries and unit relationship to site.
Detailed description of unit:	Survey Unit OOL-03-02 consists of the area excavated to remove the crib wall, east storm drain and where the east storm drain out-fall enters Sherman Resevoir. It is bounded on the east by OOL-01-05, on the east and south by OOL-02-05 on the west and north by OOL-03-03. There is a buried electrical conduit providing power to the truck monitor that traverses the survey unit from north to south. A surface water discharge point (the 05) was located on the east bounds of OOL-03-02. The surface area of OOL-03-02 consists of some asphalt covered soil and loose soils in the excavated area. The slope running down to the water's edge is steep with assorted weeds, brush and rocks covering the un-excavated portions of the slope. There is extensive erosion control present in the area consistng of geo-tech fabric, silt fence and staked hay bales. Some of the brush overgrowth is substantial and may impact ISOCS scans. The brush should be thinned-out or removed if necessary to perform ISOCS scans.

Define the parameter of interest, specify action levels, and the DCGL.

Investigation Levels:	If an investigation level below is exceeded, then perform an investigation survey.
Direct measurements:	> DCGLemc or > DCGLw + 3 Sigma
Scan measurements:	> DCGLemc
Parameter of interest:	If there are no investigation issues, and the the residual radioactivity in OOL-03-02 systematic samples is less than the DCGLw then the survey unit is in compliance with the release criterion (8.73 mr/yr).
Critical Value:	If the average concentration is less than DCGLw, the sum of fractions is less than 1, and less than 14 of the 40 samples are above the DCGLw, the Survey Units passes.

Survey Area No.:	OOL-03	Survey Unit No.:	02
Survey Unit Name:	Sherman Resevoir and ESD Out-Fall		
FSSP No.:	YNPS-FSSP-OOL-03-02-00		

6.0 Specify limits on decision errors:

Specify the decision maker's limits on decision errors, used to establish performance goals for the data collection design.

Null Hypothesis (H_0):	The residual radioactivity in the survey unit data is greater than the DCGLw
Tolerance for Error:	Type I Error: 0.05 (probability of rejecting the null hypothesis when it is true.) Type II Error: 0.05 (probability of accepting the null hypothesis when it is false.)
DCGLw (Unity):	1
LBGR:	0.5 (Initial LBGR: 0.5)
Relative shift (Δ/σ):	1.06
Sigma (σ):	0.4715
Power of survey design:	See attachment for prospective power curve.

7.0 Optimize Design:

Type of statistical test: WRS Test _____ Sign Test ___X___

(background will not be subtracted)

Design optimization is included in the DQO process, and reflected in the data published in this plan.

Number & Location of Samples: 40 Soil samples will be collected at locations based on a random start, systematic triangular grid (refer to accompanying DPF-8853.2). See map for specific locations.

GENERAL INSTRUCTIONS

1 Where possible, measurement locations will be identified using GPS in accordance with DP-8859. Each location will be marked to assist in identifying the location.
2 Soil samples will be collected in accordance with DP-8120.
3 Chain of Custody form will be used in accordance with DP-8123 for all soil samples sent to an off-site laboratory.
4 All soil samples will be received and prepared in accordance with DP-8813. Note: Split samples to be sent to an off-site lab will not be dried prior to counting on site or shipping.
5 Survey instrument: Operation of the E-600 w/SPA-3 will be in accordance with DP-8535 with QC checks performed in accordance with DP-8504. The instrument response checks shall be performed before issue and after use.
6 All SPA-3 scans will be performed with the audible feature activated. Listen for upscale readings and respond by slowing down or stopping the probe to distinguish between random fluctuations in the background and greater than background readings. Investigate any reproducible upscale readings as described in the specific instructions.
7 The job hazards associated with the survey described in this package are addressed in the accompanying Job Hazard Assessment (JHA) for OOL-03-02.
8 All personnel participating in this survey shall be trained in accordance with DP-8868.
9 Collect ISOCS measurements in accordance with DPP 8871 to provide 100% scan coverage of the survey unit.

SPECIFIC INSTRUCTIONS

1 *SPA-3 Scans:*
- Move the SPA-3 in rate-meter mode at a speed of 0.25m or less per second, keeping the probe at a distance of ≤ 3" from the surface and following a serpentine path that includes at least 3 passes across each square meter. The maximum background a SPA-3 may be used in is 26000 cpm.
- Perform supplimental/judgmental scans with SPA-3 in addition to ISOCS scans, as needed.

2 *Scan Investigations:*
If any of the ISOCS scan measurements show that an investigation level has been exceeded an investigation survey will be conducted of that ISOCS scan location as directed by the radiological engineer. Note: Detailed descriptions of investigation actions shall be recorded in the daily survey journal (DPF-8856.2) and locations marked on a map.

Survey Area No.: OOL-03	Survey Unit No.: 02
Survey Unit Name: Sherman Resevoir and ESD Out-Fall	
FSSP No.: YNPS-FSSP-OOL-03-02-00	

3 *Sample Locations:*

All designated measurement locations will be identified by GPS per DP-8859 or by use of reference points, tape measure and compass as necessary. If a designated sample location is obstructed for any reason, the FSS Radiological Engineer or the FSS Field Supervisor will select an alternate location in accordance with DP-8856. A detailed description of the alternate location will be recorded on form DPF-8856.2, the survey unit map will be annotated appropriately, and the alternate location will be conspicuously marked to facilitate re-visiting to identify and record the coordinates with GPS in accordance with DP-8859 or by measurement from a known reference point when a GPS is not available.

4 *Sample Requirements:* Collect 40 samples in accordance with DP-8120. Document sample collection date, time and sample collector on DPF-8856.2 for each sample collected.
2 of the 40 samples will be analyzed as QC split samples to fulfill the QC requirement of DP-8852. The same QC split samples will be analyzed for HTD nuclides in accordance with section 5.6.3.2.1 of the LTP and DP-8856.

Biased samples: No biased samples will be collected.

5 *Sample Designation:*

FSS soil samples: OOL-03-02-001-F through OOL-03-02-040-F corresponding to FSS sample locations 001 through 040.

Biased soil samples: No biased samples will be collected.

QC split samples: OOL-03-02-013-F-S and OOL-03-02-027-F-S are to be designated as QC split samples. These samples will be sent to the off-site laboratory (do not dry).

Recount samples: OOL-03-02-012-F-RC will be counted twice on site. The results will be compared in accordance with DP-8864.

6 *Sample Analysis:*

- Gamma analysis will be performed on all soil samples. If any of the gamma analyses show that an investigation level has been exceeded an investigation survey will be conducted at that sample location as directed by the radiological engineer.
- YNPS Chemistry will analyze OOL-03-02-001-F through OOL-03-02-040-F for gamma-emitting nuclides.
- YNPS Chemistry will analyze OOL-03-02-012-F as a sample recount. The recounted sample will possess the naming convention OOL-03-02-012-F-RC.
- YNPS Chemistry will analyze OOL-03-02-013-F-S and OOL-03-02-027-F-S for gamma-emitting nuclides prior to being sent to the off-site laboratory. These samples will be analyzed for gamma-emitting nuclides and HTD at the off-site laboratory.
- All gamma analysis of the FSS samples shall achieve the MDC values stated in the DQO section of this plan. The MDC's will be communicated to the laboratory using an attachment to the Chain-of- Custody form.

7 *ISOCS Assays:*

- Collect ISOCS measurements in accordance with DP-8871. ISOCS measurements to be spaced on a 3m triangular grid pattern, additional measurement may be necessary to provide 100% scan coverage of the survey unit.
- ISOCS assays are designated as OOL-03-02-xxx -F-G where "xxx" starts at 101 and continues sequentially.
- QC checks shall be performed at least once per day in accordance with DP-8869 and DP-8871. Resolve flags encountered prior to survey.
- ISOCS assays to be performed with 90° collimator at 2m unless otherwise directed by the FSS Engineer. Make note on the daily survey journal (DPF-8856.2) if other geometries are used.
- For ISOCS assay position the detector downward facing keeping the detector perpendicular to the ground.
- Document ISOCS scan measurements performed on map titled "ISOCS Scans", include ISOCS serial number and the date, time and initials of technician positioning the ISOCS. Designate additional assay locations in continuing sequence from the last number assigned to an FSS measurement. Record detailed information about additional assay locations on the daily survey journal.

Survey Area No.:	OOL-03	Survey Unit No.:	02
Survey Unit Name:	Sherman Resevoir and ESD Out-Fall		
FSSP No.:	YNPS-FSSP-OOL-03-02-00		

- Remove standing water prior to performance of ISOCS assays. Contact the FSS Engineer for directions if conditions are such that standing water cannot be removed.
- If the results on any ISOCS assay exceed an investigation level, investigate the area within the field of view (~~7m~~ 2m diameter, ~~38.5 m2~~ 12.6m² area) for that assay.

Prepared by Ron Shippee Ronald Shippee Date August 9, 2006
FSS Radiological Engineer

Reviewed by Rennhak M Date 8-9-06
FSS Radiological Engineer

Approved by Martin Erickson Martin C Erickson Date 8/9/06
FSS Project Manager

YNPS-FSSP-OOL-03-02-00
Attachment 2

DCGL MDC Table

Nuclide	Soil 8.73 mr/yr (pCi/g)	10% MDC DCGL	50% MDC DCGL	Easy to Detect?	Area Factor	DCGLemc
Co-60	1.4E+00	1.4E-01	7.0E-01	ETD	1.5E+00	2.1E+00
Nb-94	2.5E+00	2.5E-01	1.3E+00	ETD	1.3E+00	3.3E+00
Ag-108m	2.5E+00	2.5E-01	1.3E+00	ETD	1.3E+00	3.3E+00
Sb-125	1.1E+01	1.1E+00	5.6E+00	ETD	1.3E+00	1.4E+01
Cs-134	1.7E+00	1.7E-01	8.7E-01	ETD	2.3E+00	3.9E+00
Cs-137	3.0E+00	3.0E-01	1.5E+00	ETD	3.1E+00	9.3E+00
Eu-152	3.6E+00	3.6E-01	1.8E+00	ETD	1.3E+00	4.7E+00
Eu-154	3.3E+00	3.3E-01	1.7E+00	ETD	1.3E+00	4.3E+00
Eu-155	1.4E+02	1.4E+01	6.9E+01	ETD	1.3E+00	1.8E+02
Am-241	1.0E+01	1.0E+00	5.1E+00	ETD	1.5E+01	1.5E+02
H-3	1.3E+02	1.3E+01	6.4E+01	HTD	3.9E+01	5.1E+03
C-14	1.9E+00	1.9E-01	9.7E-01	HTD	3.7E+02	7.0E+02
Fe-55	1.0E+04	1.0E+03	5.1E+03	HTD	1.0E+02	1.0E+06
Ni-63	2.8E+02	2.8E+01	1.4E+02	HTD	7.7E+01	2.2E+04
Sr-90	6.0E-01	6.0E-02	3.0E-01	HTD	2.7E+01	1.6E+01
Tc-99	5.0E+00	5.0E-01	2.5E+00	HTD	2.3E+01	1.2E+02
Pu-238	1.2E+01	1.2E+00	5.8E+00	HTD	1.9E+01	2.3E+02
Pu-239	1.1E+01	1.1E+00	5.3E+00	HTD	1.9E+01	2.1E+02
Pu-241	3.4E+02	3.4E+01	1.7E+02	HTD	1.5E+01	5.1E+03
Cm-243	1.1E+01	1.1E+00	5.6E+00	HTD	4.0E+00	4.4E+01

YNPS-FSSP-OOL-03-02-00
Attachment 1
SPA-3 Scan Tables

Max Background

BKG(cpm)	MDCR	MDC(fDCGLemc)
4,000	639	4.65E-01
5,000	715	5.20E-01
6,000	783	5.70E-01
7,000	845	6.16E-01
8,000	904	6.58E-01
9,000	959	6.98E-01
10,000	1,011	7.36E-01
11,000	1,060	7.72E-01
12,000	1,107	8.06E-01
13,000	1,152	8.39E-01
14,000	1,196	8.70E-01
15,000	1,238	9.01E-01
16,000	1,278	9.31E-01
17,000	1,318	9.59E-01
18,000	1,356	9.87E-01
19,000	1,393	1.01E+00
20,000	1,429	1.04E+00
21,000	1,464	1.07E+00
22,000	1,499	1.09E+00
23,000	1,533	1.12E+00
24,000	1,565	1.14E+00
25,000	1,598	1.16E+00
26,000	1,629	1.19E+00
27,000	1,660	1.21E+00
28,000	1,691	1.23E+00
30,000	1,750	1.27E+00
32,000	1,808	1.32E+00
34,000	1,863	1.36E+00
36,000	1,917	1.40E+00
38,000	1,970	1.43E+00
40,000	2,021	1.47E+00

Scan Speed

In/Sec	m/Sec	BKG (cpm)
39	1.00	4,000
20	0.50	9,000
13	0.33	13,000
10	0.25	18,000
8	0.20	23,000
5	0.13	36,000
4	0.10	46,000

Sample Number Calculation Worksheet - Data Input

Your Name	Ron Shippee				
Date	8/9/2006				
Survey Area	OOL-03				
Survey Unit	02				
Site Name	Sherman Reservoir and ESD Out-Fall				
Revision	00				
Number of Strata	1				
Stratum 1 Length (L)	26.0 m				
Stratum 1 Width (W)	33.8 m				
Total Area	570.0 m				
Initial Grid Samples	25				Grid Spacing (m)
Grid Samples	2				Grid 1
Biased Samples	0				BG-1
Biased Scans	0				BGS = 0
Scan w/ ISOCS?	TRUE				
Radionuclide(s)	Co-60	Cs-137			
Stratum 1 Scan MDC (pCi/g)	3.30E-01	1.23E-00			Stratum 1
Stratum 1 Area Factor	2.38E-01	8.68E-01			Stratum 1
Total Number of Scans	33,000				Total Number of Scans
Scan Speed (m/sec)	0.25	= 10 meters/sec			Scan Speed Conversion

Instructions for Investigation of Subsurface Soil Radioactivity Identified During Characterization in Survey Unit OOL-03-02

Characterization soil sample analysis for samples collected in the area of the East Storm Drain (ESD) out-fall indicate an accumulation of radioactivity throughout the out-fall flow path from the point just below the end of the ESD pipe to where the effluent enters Sherman Reservoir. This document identifies sample locations and sampling techniques to be employed to investigate subsurface radioactivity.

1. Soil samples will be collected in accordance with DP-8120 using a hand auger. Collect a 3" diameter column of soil from the surface down to a depth of 1.5 meters or refusal as a composite sample, composite the entire volume of soil into a single sample. Sieve and thoroughly mix each composite sample. From each sample fill a one-liter marinelli beaker for on site analysis and a 500ml jar for off site analysis.
2. Collect the soil samples at 12 systematic locations on a 3.5 meter grid with a biased start point. (SEE map and GPS co-ordinates)
3. Soil sample designation:
   a. FSS investigation soil samples for on site analysis will be labeled as follows: OOL-03-02-041-F-I through OOL-03-02-052-F-I.
   b. FSS investigation soil samples for off site analysis will be labeled as follows: OOL-03-02-041-F-I-H through OOL-03-02-052-F-I-H. See attached memo for required analysis by the off-site laboratory.
   c. Sample OOL-03-02-046-F-I designated as split sample OOL-03-02-046-F-I-S (NOTE To ensure sufficient volume of sample it may be necessary to collect two samples at this location) See attached memo for required analysis by the off-site laboratory.
   d. The off-site gamma spec. results will be compared with the on-site results in accordance with DP-8864.
4. All soil samples will be received and prepared in accordance with DP-8813.
5. Chain-of-Custody form will be used in accordance with DP-8123 for all the samples sent off site for analysis.
6. The sampling locations will be identified using GPS. In cases where the location cannot be determined directly using GPS, an offset will be used to describe the distance and bearing from a known GPS location, Each location will be marked by a flag, either prior to or at the time of the sampling. The FSS Radiological Engineer or FSS Field Supervisor will guide the FSS Technician to the sample locations.

Prepared by Ronald J Shypee Date 8-17-06
FSS Radiological Engineer

Approved by Mark C. Eil Date 8/17/06
FSS Project Manager

Soil Sample Investigations OOL-03-02

Investigation of soil sample locations with indications of elevated radioactivity will consist of collection of additional soil samples so that the bounds of the elevated radioactivity indications surface area in square meters may be determined. Perform the following steps at each sample location to be investigated.

- At the sample location to be investigated lay-out four sample locations at a distance from the original sample location, 1 on the north, 1on the east, 1 on the south and 1on the west. The distance between adjacent sample points not to exceed 3.5 meters.
- Identify the investigation sample locations using the next sequential sample number appended with the letter "I" (example OOL-03-02-XXX-F-I).
- Collect soil samples in accordance with DP-8120, sufficient volume of soil to provide for an additional 500ml sample.
- Sieve the soil sample and load a 1 liter marinelli and a 500ml jar.
- The 1 liter marinelli sample will be prepared and analyzed using the FSS sample analysis protocol.
- The 500 ml jar sample will be sent to an off site lab for Sr-90 analysis.

- Detailed descriptions of investigation actions shall be recorded in the daily survey journal (DPF-8856.2) and on a survey map (include date, time, instrument, etc...).

Prepared By Ronald J Shyppil Date 8-18-06

Approved By Mark C. Eid Date 8/18/06

Soil Sample Investigations OOL-03-02

Continued investigation of soil sample locations with indications of elevated radioactivity will consist of collection of additional soil samples so that the bounds of the elevated radioactivity indications surface area in square meters may be determined. Samples collected on 8/18/06 indicate little or no radioactivity of concern in the soils 3.5 meters up slope from sample location #037-F. The samples down slope towards the water's edge indicate radioactivity present. In order to more precisely establish the bounds the radioactivity in this area, additional samples will be collected at the following locations:

- From sample location #037-F, proceed 1 meter up slope in the direction of sample #053-F-I.
- From sample location #037-F, proceed 1 meter up slope in the direction of sample #056-F-I.
- From sample location #037-F, proceed in the direction of sample #054-F-I and beyond to the water's edge.
- From sample location #037-F, proceed in the direction of sample #055-F-I and beyond to the water's edge.

Perform the following steps at each sample location to be investigated.

- Identify the investigation sample locations using the next sequential sample number appended with the letter "I" (example OOL-03-02-XXX-F-I).
- Collect soil samples in accordance with DP-8120, sufficient volume of soil to provide a 1 liter marinelli of sample.
- Sieve the soil sample and load a 1 liter marinelli.
- The 1 liter marinelli sample will be prepared and analyzed using the FSS sample analysis protocol.
- Detailed descriptions of investigation actions shall be recorded in the daily survey journal (DPF-8856.2) and on a survey map (include date, time, instrument, etc...).

Prepared By Ronald J Shippee Date 8-21-06

Approved By Nate C. [illegible] Date 8/21/06

GENERAL SECTION			
Survey Area No.:	OOL-03	Survey Unit No.:	03
Survey Unit Name:	Sherman Reservoir Shoreline West		
FSSP No.:	YNPS-FSSP-OOL-03-03-00		

PREPARATION FOR FSS ACTIVITIES

Check marks in the boxes below signify affirmative responses and completion of the action.

1.1	Files have been established for survey unit FSS records.	X
1.2	ALARA review has been completed for the survey unit.	X
1.3	The survey unit has been turned over for final status survey.	X
1.4	An initial DP-5554 walk down has been performed and a copy of the completed Survey Unit Walk down Evaluation is in the survey area file.	X
1.5	Activities conducted within area since turnover for FSS have been reviewed.	X
	Based on reviewed information, subsequent walk down: X not warranted ____ warranted	
	If warranted, subsequent walk down has been performed and documented per DP-8854.	____
	OR	
	The basis has been provided to and accepted by the FSS Project Manager for not performing a subsequent walk down.	____
1.6	A final classification has been performed. Classification: Class 2	X

DATA QUALITY OBJECTIVES (DQO)

1.0 State the problem:

Define the problem so that the focus of the survey will be unambiguous.

Members of the planning team:	FSS Project manager, Radiological Engineer, Field Supervisor, and Technicians.
Primary decision maker/method:	FSS Radiological Engineer with concurrence of the FSS Project Manager.
Available resources/deadlines:	N/A
Concise description of problem:	Release of OOL-03-03 to demonstrate compliance with YNPS LTP release criterion.

2.0 Identify the decision:

Define the question that the survey will attempt to resolve and identify alternative actions that may be taken based on the outcome of the survey.

Principal study question:	Is the residual radioactivity in OOL-03-03 below the 8.73 mr/yr release criterion?
Alternative actions:	If residual radioactivity in OOL-03-03 exceeds the 8.73 mr/yr release criterion, investigations will be performed, potentially resulting in remediation, reclassification or resurveys.
Decision statement:	Determine whether or not OOL-03-03 satisfies the 8.73 mr/yr release criterion.

3.0 Identify the inputs to the decision:

Informational inputs needed to resolve the decision statement and environmental variables that will be measured.

Sources of information:	37 samples from historical data was sufficient to develop the DQOs for OOL-03-03. 20 new data measurements will be acquired to support DQAs.
Direct measurement technique:	Soil samples will be collected and analyzed on site for all ETD LTP listed radionucluides, 1 sample will be sent to an independent lab for analyses of all LTP listed radionuclides.
Scan measurement technique:	Surfaces will be scanned via a SPA-3 probe, and/or ISOCS Assays.
Sample matrix:	Soil
Radionuclide(s) of concern:	Based on a review of YNPS historical data, the following radionuclides are the only facility related radionuclides of concern: Co-60, Cs-137
Sample Quantity	15 (calculated) + 5 (added), for a total of 20 samples. (+1 QC)
Gridded Sample Area Size	224 m2 (Survey Unit Area/N)
Sample Grid Spacing:	Triangular: 16.1m

Detection Limits:	For direct measurements and sample analyses, Minimum Detectable Concentrations (MDCs) less than 10% of the DCGL are prefered, while MDCs up to 50% of the DCGL are acceptable. See Attachment 2 for MDC Table.
MDC (fDCGL):	The accompanying MDCR/MDC table in Attachment 1 provides MDC values, as a fraction of DCGL, for various background levels.
MDCR(surveyor):	The accompanying MDCR/MDC table in Attachment 1 provides MDCR values for various background levels.
Background Measurements:	No reference area (background) measurements are required, the Sign Test will be used.
Release criteria DCGL based on:	8.73 mr/yr for Soil. See Attachment 2 for radionuclide specific breakdown of DCGLs.

4.0 Define the boundaries of the survey:

Define the spatial and temporal boundaries that will be covered by the decision statement so data can be easily interpreted.

Temporal boundaries:	The data are used to reflect the condition of radionuclides leaching into the ground water over a period of 1,000 years. The survey may be performed under appropriate weather conditions (as defined by instrument tolerance and personnel safety) on any shift of work.
Spatial Boundaries:	YNPS has been divided into multiple survey areas and units with relatively homogeneous characteristics based on information collected during the years of facility operation, the HSA, and post remediation activities. The area of interest has been named OOL-03, and the survey unit is 03. The medium of interest is described as Soil. The radiological characteristics of this unit classify it as a Class 2 area. Which has > 2,000 m2, ≤ 10,000 m2 as a surface area guidance. The total surface area is 4,480 m2, which is in compliance with the Class 2 guidance. The maximum length is 241m, and the maximum width is 241m. Soil is surveyed to a depth of 15 See included GPS coordinates and maps that demonstrate the measurement locations, the survey unit boundaries and unit relationship to site.
Detailed description of unit:	Survey Unit OOL-03-03 is located adjacent to the Sherman Dam on the eastern side of the plant site. The property is owned by TransCanada. The Sherman Reservoir (Survey Area OOL-01) shoreline defines the north and a portion of the east boundary. OOL-03-02 also delineates the eastern boundary. OOL-02-05 forms the southern boundary and OOL-03-01 forms the western boundary. Survey Unit OOL-03-03 has a total surface area of 4480 square meters. The surface area of the unit is comprised of loose soils, vegetation and RipRap. There is a remnant of an asphalt covered swale located on the east side of the pennisula. In the south west corner there is an area previously remediated for lead contamination. The former YAEC MET tower and support structure in the northern portion of the survey unit were surveyed for release and will remain on the property. There is erosion control in place located at the top of the slope that runs down to the water's edge which consists of a double silt fence with a saw dust buffer and hay bales.

5.0 Develop a decision rule:

Define the parameter of interest, specify action levels, and the DCGL.

Investigation Levels:	If an investigation level below is exceeded, then perform an investigation survey.
Direct measurements:	> DCGLw
Scan measurements:	> DCGLw or > MDC
Parameter of interest:	If there are no investigation issues, and the the residual radioactivity in OOL-03-03 systematic samples is less than the DCGLw then the survey unit is in compliance with the release criterion (8.73 mr/yr).
Critical Value:	If the average concentration is less than DCGLw, the sum of fractions is less than 1, and less than 6 of the 20 samples are above the DCGLw, the Survey Units passes.

Survey Area No.: OOL-03	Survey Unit No.: 03
Survey Unit Name: Sherman Reservoir Shoreline West	
FSSP No.: YNPS-FSSP-OOL-03-03-00	

6.0 Specify limits on decision errors:

Specify the decision maker's limits on decision errors, used to establish performance goals for the data collection design.

Null Hypothesis (H_0):	The residual radioactivity in the survey unit data is greater than the DCGLw
Tolerance for Error:	Type I Error: 0.05 (probability of rejecting the null hypothesis when it is true.) Type II Error: 0.05 (probability of accepting the null hypothesis when it is false.)
DCGLw (Unity):	1
LBGR:	0.868 (Initial LBGR: 0.5)
Relative shift (Δ/σ):	2
Sigma (σ):	0.066
Power of survey design:	See attachment for prospective power curve.

7.0 Optimize Design:

Type of statistical test: WRS Test _____ Sign Test ___X___

(background will not be subtracted)

Design optimization is included in the DQO process, and reflected in the data published in this plan.

Number & Location of Samples: 20 Soil samples will be collected at locations based on a random start, systematic Triangular grid (refer to accompanying DPF-8853.2). See map for specific locations.

GENERAL INSTRUCTIONS

1 Where possible, measurement locations will be identified using GPS in accordance with DP-8859. Each location will be marked to assist in identifying the location.

2 Soil samples will be collected in accordance with DP-8120. Sample locations that fall on asphalt will require collection of an asphalt sample and a soil sample from under the asphalt.

3 Chain of Custody form will be used in accordance with DP-8123 for all soil samples sent to an off-site laboratory.

4 All soil samples will be received and prepared in accordance with DP-8813. Note: Split samples to be sent to an off-site lab will not be dried prior to counting on site or shipping.

5 Survey instrument: Operation of the E-600 w/SPA-3 will be in accordance with DP-8535 with QC checks performed in accordance with DP-8504. The instrument response checks shall be performed before issue and after use.

6 All SPA-3 scans will be performed with the audible feature activated. Listen for upscale readings and respond by slowing down or stopping the probe to distinguish between random fluctuations in the background and greater than background readings. Investigate any reproducible upscale readings as described in the specific instructions.

7 The job hazards associated with the survey described in this package are addressed in the accompanying Job Hazard Assessment (JHA) for OOL-03-03.

8 All personnel participating in this survey shall be trained in accordance with DP-8868.

9 Collect ISOCS measurements in accordance with DP-8871 to provide at least 10% (448 m2) scan coverage of the survey unit.

SPECIFIC INSTRUCTIONS

1 *SPA-3 Scans:*

- Move the SPA-3 in rate-meter mode at a speed of 0.25m or less per second, keeping the probe at a distance of ≤ 3" from the surface and following a serpentine path that includes at least 3 passes across each square meter.

2 *Scan Investigations:*

Note: Detailed descriptions of investigation actions shall be recorded in the daily survey journal (DPF-8856.2) and locations marked on a map.

- Scan a 1m radius footprint around the investigation location in accordance with the scan requirements above. The area of scan should be increased as necessary to bound any areas of elevated activity identified. Perform a sample investigation as noted below.

Survey Area No.: OOL-03	Survey Unit No.: 03
Survey Unit Name: Sherman Reservoir Shoreline West	
FSSP No.: YNPS-FSSP-OOL-03-03-00	

3 *Sample Locations:*

All designated measurement locations will be identified by GPS per DP-8859 or by use of reference points, tape measure and compass as necessary. If a designated sample location is obstructed for any reason, the FSS Radiological Engineer or the FSS Field Supervisor will select an alternate location in accordance with DP-8856. A detailed description of the alternate location will be recorded on form DPF-8856.2, the survey unit map will be annotated appropriately, and the alternate location will be conspicuously marked to facilitate re-visiting to identify and record the coordinates with GPS in accordance with DP-8859 or by measurement from a known reference point when a GPS is not available.

4 *Sample Requirements:* Collect 20 samples in accordance with DP-8120. Document sample collection date, time and sample collector on DPF-8856.2 for each sample collected.

1 of 20 samples will be analyzed as a QC split sample to fulfill the QC requirement of DP-8852. The same QC split sample will be analyzed for HTD nuclides in accordance with section 5.6.3.2.1 of the LTP and DP-8856.

Biased samples: No biased samples will be collected.

5 *Sample Designation:*

FSS soil samples: OOL-03-03-001-F through OOL-03-03-020-F corresponding to FSS sample locations 001 through 020.

Biased soil samples: No biased samples will be collected.

QC split samples: OOL-03-03-007-F-S is to be designated as QC split sample. This sample will be sent to the off-site laboratory (do not dry).

Recount samples: OOL-03-03-006-F-RC will be counted twice on site. The results will be compared in accordance with DP-8864.

6 *Sample Analysis:*

- Gamma analysis will be performed on all soil samples. If any of the gamma analyses show that an investigation level has been exceeded an investigation survey will be conducted at that sample location as directed by the radiological engineer.
- YNPS Chemistry will analyze OOL-03-03-001-F through OOL-03-03-020-F for gamma-emitting nuclides.
- YNPS Chemistry will analyze OOL-03-03-006-F as a sample recount. The recounted sample will possess the naming convention OOL-03-03-006-F-RC.
- YNPS Chemistry will analyze OOL-03-03-007-F-S for gamma-emitting nuclides prior to being sent to the off-site laboratory. These samples will be analyzed for gamma-emitting nuclides and HTD at the off-site laboratory.
- All gamma analysis of the FSS samples shall achieve the MDC values stated in the DQO section of this plan. The MDC's will be communicated to the laboratory using an attachment to the Chain-of- Custody form.

7 *ISOCS Assays:*

- Collect at least 36 ISOCS measurements in accordance with DP-8871 to provide at least 10% (448 m2) scan coverage of the survey unit.
- ISOCS assays are designated as OOL-03-03-xxx -F-G where "xxx" starts at 101 and continues sequentially.
- QC checks shall be performed at least once per day in accordance with DP-8869 and DP-8871. Resolve flags encountered prior to survey.
- ISOCS assays to be performed with 90° collimator at 2m unless otherwise directed by the FSS Engineer. Make note on the daily survey journal (DPF-8856.2) if other geometries are used.
- For ISOCS assay position the detector downward facing keeping the detector perpendicular to the ground.

  Document ISOCS scan measurements performed on map titled "ISOCS Scans", include ISOCS serial number and the date, time and initials of technician positioning the ISOCS. Designate additional assay locations in continuing sequence from the last number assigned to an FSS measurement. Record detailed information about additional assay locations on the daily

Survey Area No.:	OOL-03	Survey Unit No.:	03
Survey Unit Name:	Sherman Reservoir Shoreline West		
FSSP No.:	YNPS-FSSP-OOL-03-03-00		

- Remove standing water prior to performance of ISOCS assays. Contact the FSS Engineer for directions if conditions are such that standing water cannot be removed.
- If the results on any ISOCS assay indicate plant related radionuclides, investigate the area within the field of view (4m diameter, 12.6 m2 area) for that assay.

  Investigation may include qualitative use of ISOCS performed by suspending the detector 1 meter from the reference plain with the 90° columator in place. The original scan area will be rescanned in 4 quadrants.

  The isolated quadrant (3.14m2) with positive indications of plant related nuclides will be investigated using a shielded SPA-3 scan method as defined in steps 1 &2 of this section.

Prepared by Ron Shippee Ronald Shippee — Date August 10, 2006
FSS Radiological Engineer

Reviewed by _____ — Date 8/11/06
FSS Radiological Engineer

Approved by Martin Erickson Martin C. Erickson — Date 8/11/06
FSS Project Manager

SPA-3 Scan Tables

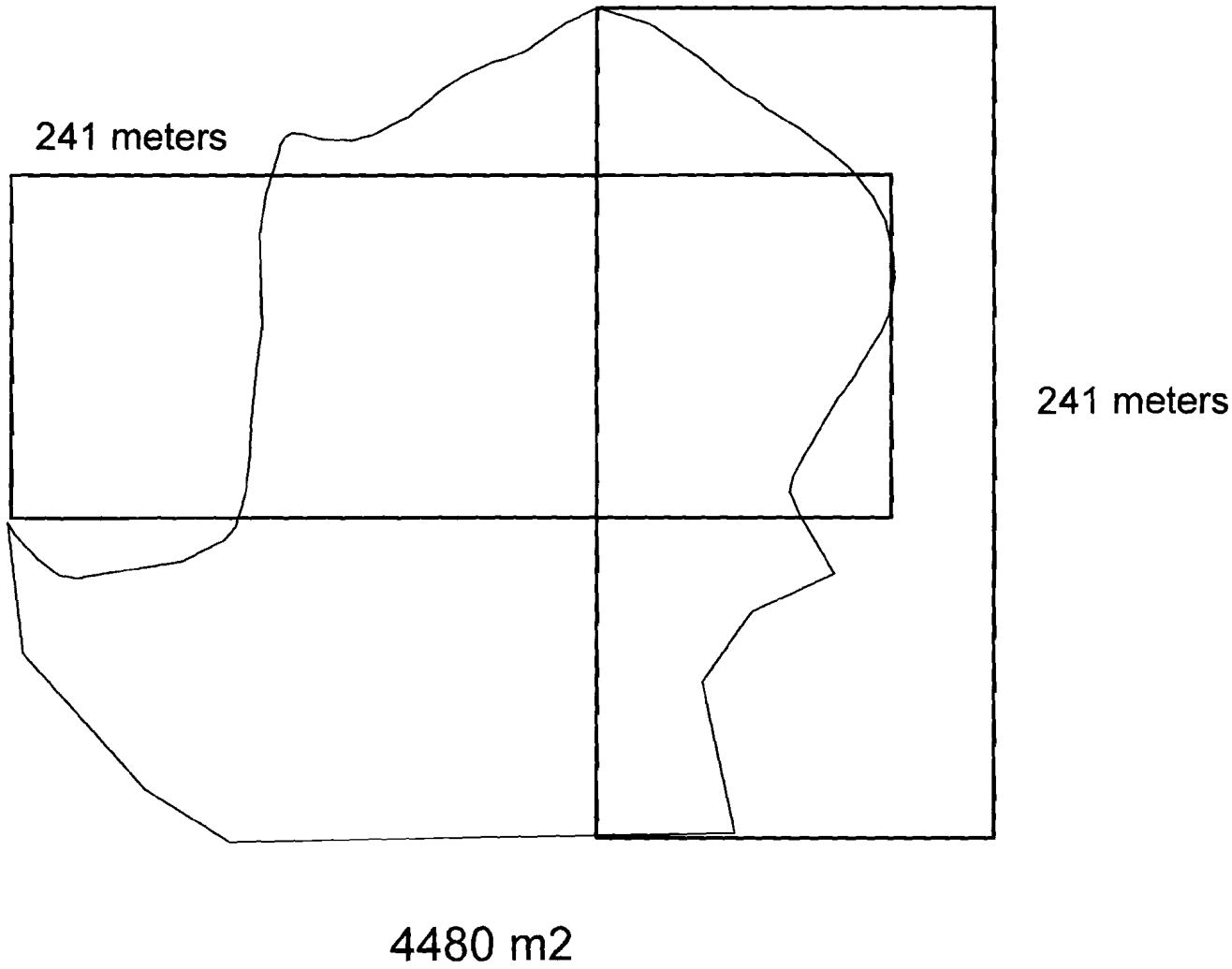
Max Background

BKG(cpm)	MDCR	MDC(fDCGL)
4,000	639	1.14E+00
5,000	715	1.27E+00
6,000	783	1.40E+00
7,000	845	1.51E+00
8,000	904	1.61E+00
9,000	959	1.71E+00
10,000	1,011	1.80E+00
11,000	1,060	1.89E+00
12,000	1,107	1.97E+00
13,000	1,152	2.05E+00
14,000	1,196	2.13E+00
15,000	1,238	2.21E+00
16,000	1,278	2.28E+00
17,000	1,318	2.35E+00
18,000	1,356	2.42E+00
19,000	1,393	2.48E+00
20,000	1,429	2.55E+00
21,000	1,464	2.61E+00
22,000	1,499	2.67E+00
23,000	1,533	2.73E+00
24,000	1,565	2.79E+00
25,000	1,598	2.85E+00
26,000	1,629	2.90E+00
27,000	1,660	2.96E+00
28,000	1,691	3.01E+00
30,000	1,750	3.12E+00
32,000	1,808	3.22E+00
34,000	1,863	3.32E+00
36,000	1,917	3.42E+00
38,000	1,970	3.51E+00
40,000	2,021	3.60E+00

YNPS-FSSP-OOL-03-03-00
Attachment 2

DCGL MDC Table

Nuclide	Soil 8.73 mr/yr (pCi/g)	10% MDC DCGL	50% MDC DCGL	Easy to Detect?
Co-60	1.4E+00	1.4E-01	7.0E-01	ETD
Nb-94	2.5E+00	2.5E-01	1.3E+00	ETD
Ag-108m	2.5E+00	2.5E-01	1.3E+00	ETD
Sb-125	1.1E+01	1.1E+00	5.6E+00	ETD
Cs-134	1.7E+00	1.7E-01	8.7E-01	ETD
Cs-137	3.0E+00	3.0E-01	1.5E+00	ETD
Eu-152	3.6E+00	3.6E-01	1.8E+00	ETD
Eu-154	3.3E+00	3.3E-01	1.7E+00	ETD
Eu-155	1.4E+02	1.4E+01	6.9E+01	ETD
Am-241	1.0E+01	1.0E+00	5.1E+00	ETD
H-3	1.3E+02	1.3E+01	6.4E+01	HTD
C-14	1.9E+00	1.9E-01	9.7E-01	HTD
Fe-55	1.0E+04	1.0E+03	5.1E+03	HTD
Ni-63	2.8E+02	2.8E+01	1.4E+02	HTD
Sr-90	6.0E-01	6.0E-02	3.0E-01	HTD
Tc-99	5.0E+00	5.0E-01	2.5E+00	HTD
Pu-238	1.2E+01	1.2E+00	5.8E+00	HTD
Pu-239	1.1E+01	1.1E+00	5.3E+00	HTD
Pu-241	3.4E+02	3.4E+01	1.7E+02	HTD
Cm-243	1.1E+01	1.1E+00	5.6E+00	HTD



OOL-03-03 Dimensions