1221563

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-NR-1 **Control No.:** 2013-051

Waste Site Code(s)/Subsite Code(s): 100-N-61:4

Reclassification Category: Interim ☒ Final ☐

Reclassification Status: Closed Out ☒ No Action ☐ Rejected ☐ RCRA Post closure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Description of current waste site condition:

The 100-N-61 pipelines waste site, part of the 100-NR-1 Operable Unit, was added to the *Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington* (100-N Area ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999), by the *Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2011) as a remove, treat, and dispose (RTD) site.

The 100-N-61 pipelines include the underground water pipelines used to transport reactor cooling water between water treatment facilities and the 105-N/109-N Buildings. Reactor cooling water was pumped from the Columbia River, settled and treated to remove minerals, and then injected into the reactor primary coolant loop. The 100-N-61 pipelines were administratively divided into subsites based on geographical locations to support closeout of the waste site as the pipeline segments were remediated. The 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N subsite is addressed in this document.

During the remediation of the 100-N-61:4 pipeline subsite, co-located segments of the 100-N-84:4, 100-N Area Steam and Condensate Pipelines, and 100-N-84:6, 100-N Area Chemical and Process Sewer Pipelines subsites were removed. All segments of the 100-N-84:4 and 100-N-84:6 pipelines within the defined 100-N-61:4 remediation area were removed and sampled for closeout along with the 100-N-61:4 pipelines. However, the reclassification of the 100-N-84:4 and 100-N-84:6 pipelines will be documented separately from the 100-N-61:4 pipelines.

Remedial action at the 100-N-61:4 and other co-located pipelines occurred between October 8, 2012 and February 4, 2013. Remediation included removal of soil, steel pipe, asbestos tar paper and mastic, concrete, steel debris, and building demolition debris. The piping was removed and disposed at the Environmental Restoration Disposal Facility (ERDF). The amount of piping included approximately 565 m (1,854 ft) for the 100-N-61:4 subsite, 152 m (499 ft) for the 100-N-84:4 segments, and 199 m (653 ft) for the 100-N-84:6 segments. Approximately 20,660 bank cubic meters (BCM) (26,950 bank cubic yards [BCY]) of material was removed during the remediation. Most of the material was directly loaded for disposal at the ERDF with only 4,589 BCM (5,986 BCY) staged at the south staging pile (SSP) area prior to disposal. The pipelines excavation extended to a maximum depth of approximately 3.5 m (11.5 ft) below ground surface.

All material removed from the 100-N-61:4 subsite, including the co-located pipeline segments, was disposed at ERDF. However, clean overburden from the 100-N-61:1 and 100-N-61:2 subsites along with the 100-N-64:1, 100-N-64:2, 100-N-62, 100-N-84:2, 100-N-84:4, 100-N-84:5, and 100-N-84:6 pipeline remediation areas was staged at three overburden piles. Verification sampling of the three overburden piles is included with the 100-N-61:4 cleanup verification documentation. The overburden volume at these three piles totals approximately 18,754 BCM (24,464 BCY).

Due to previous facility deactivation, decontamination, decommissioning, and demolition (D4) activities at 100-N Area, asphaltic debris was present in the overburden from these pipelines sites. Following D4 activities, the soil containing asphaltic debris had been used to backfill demolished facilities and surrounding areas that previously covered portions of the pipelines. In-process samples of the overburden measured benzo(a)pyrene concentrations in excess of direct exposure RAGs from the asphaltic debris. Due to the direct exposure exceedances attributed to asphalt, an agreement with the Washington State Department of Ecology (Ecology) was made that the material from these three overburden

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WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-NR-1 **Control No.:** 2013-051

Waste Site Code(s)/Subsite Code(s): 100-N-61:4

piles will be backfilled only in deep zone (areas greater than 4.6 m [15 ft] bgs) 100-N waste site excavation areas ("PAH Laden Overburden Pile Use Acceptance," CCN 170275 to J. C. Chance, U.S. Department of Energy, Richland Operations Office, from W. Elliot, Washington State Department of Ecology, Richland, Washington, March 19, 2013). The backfill to deep zone locations will provide no direct exposure pathway to humans or ecological receptors. The backfill locations will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation, thereby providing a sufficient vadose depth to demonstrate groundwater and river protection based on RESRAD modeling discussed in Appendix C of the *Remedial Design Report/Remedial Action Work Plan for the 100-N Area* (100-N Area RDR/RAWP), DOE/RL-2005-93, Rev. 0, U.S. Department of Energy, Richland, Washington (DOE-RL 2006). The locations for deep zone backfill of this overburden will be agreed to with Ecology prior to initiating backfill operations. Deep zone locations which receive this backfill will require a waste site institutional control to prevent uncontrolled drilling. Because the 100-N-61:4 excavation did not extend to the deep zone, the 100-N pipelines overburden will not be used to backfill the 100-N-61:4 excavation area.

Included with the 100-N-61:4 closeout is the verification sampling of the SSP, which received waste from the 100-N-29, 100-N-30, 100-N-37, 100-N-53, 100-N-57, 100-N-61:1, 100-N-61:2, 100 N 61:4, 100-N-62, 100-N-64:1, 100-N-64:2, 100-N-79, 100-N-84:2, 100-N-84:4, 100-N-84:5, 100-N-84:6, 100-N-84:8, 116-N-4, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, and UPR-100-N-32 waste sites. The SSP began operation on February 16, 2011 and the final waste load out occurred on December 31, 2012. Per agreement with Ecology, the waste from these sites was not separated within the SSP as contributing waste sites were adjacent or co-located. Ecology also agreed that the SSP would be closed with the 100-N-61 waste site. In total, approximately 85,111 BCM (111,023 BCY) of waste material was staged at the SSP prior to disposal at ERDF.

In-process sample results from the SSP measured elevated TPH and PAH, with benzo(a)pyrene above direct exposure remedial action goals (RAGs). Previous construction and demolition activities were attributed to the asphalt contamination in the SSP area. Further remediation of the SSP was not performed in accordance with the previous agreement with Ecology regarding PAH exceedances attributable to cross-contamination of structural asphaltic materials (*Unit Managers Meeting: 100 Areas Remedial Action Unit/Source Operable Units Meeting Minutes 10/11/12*, CCN 168569, Washington Closure Hanford, Richland, Washington).

Cleanup verification sampling was performed on April 25, 2013, at the 100-N-61:4 excavation and on May 16, 2013, at the SSP and 100-N pipeline overburden piles. Additional removal of 1 m (3.3 ft) of soil surrounding a single excavation area sample location north of the former 182-N Building was conducted May 13 through May 16, 2013, due to the presence of polycyclic aromatic hydrocarbons (PAH) at concentrations exceeding direct exposure RAGs. The removal totaled approximately 532 BCM (694 BCY) of soil which was disposed at ERDF. Verification sampling for only PAH at this single location was performed May 16, 2013. Results from the final sample showed PAH concentrations were below direct exposure RAGs.

Suspected oil staining unrelated to the pipelines was observed intermittently in the excavation following remediation. Verification samples included analyses for total petroleum hydrocarbons (TPH), and PAH to help determine the extent of affected soil. Three sample locations south of the former 182-N Building had both elevated TPH and PAH results. However, no additional remediation was performed to remove TPH/PAH contamination as the contaminated soil area will be added to the 100-N-106, Shallow Petroleum-Only Releases (SPOR) waste site in accordance with the "SPOR Agreement," CCN 167464 to J. Chance, U.S. Department of Energy, Richland Operations Office, Richland, Washington, and W. Elliot, Washington State Department of Ecology, from D. G. Saueressig, Washington Closure Hanford, Richland, Washington, September 12, 2012.

Cleanup verification sampling was performed to determine if the 100-N-61:4 subsite, as well as the SSP and 100-N pipeline overburden, met the remedial action objectives and RAGs established by the 100-N Area ROD (EPA 1999) and the 100-N Area RDR/RAWP (DOE-RL 2006). The selected remedy at the 100-N-61:4 subsite involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-NR-1 **Control No.:** 2013-051

Waste Site Code(s)/Subsite Code(s): 100-N-61:4

ERDF, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification as Interim Closed Out.

Basis for reclassification:

Cleanup verification sampling results were evaluated in comparison to the RAGs. In accordance with this evaluation, the verification sampling results support a reclassification of the 100-N-61:4 pipeline subsite to Interim Closed Out. The current site conditions achieve the RAGs established by the 100-N Area ROD (EPA 1999) and the 100-N Area RDR/RAWP (DOE-RL 2006). The evaluation (which may include fate-and-transport modeling) of all data collected from the waste site resulted in a determination that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow-zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. Contamination above direct exposure RAGs was not observed in shallow zone soils and is concluded to not exist in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N Subsite, South Staging Pile, and 100-N Pipelines Overburden* (attached).

Regulator comments:

Waste Site Controls:

Engineered Controls:	☐ Yes ☒ No	Institutional Controls:	☐ Yes ☒ No
O&M Requirements:	☐ Yes ☒ No		

If any of the Waste Site Controls are checked Yes, specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents:

J. P. Neath	[signature]	8/15/13
DOE Federal Project Director (printed)	Signature	Date
N. Menard	[signature]	8/21/13
Ecology Project Manager (printed)	Signature	Date
N/A		
EPA Project Manager (printed)	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-N-61:4, WATER TREATMENT AND STORAGE FACILITIES UNDERGROUND PIPELINES SOUTH OF 182-N SUBSITE, SOUTH STAGING PILE, AND 100-N PIPELINES OVERBURDEN

Attachment to Waste Site Reclassification Form 2013-051

August 2013

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-N-61:4, WATER TREATMENT AND STORAGE FACILITIES UNDERGROUND PIPELINES SOUTH OF 182-N SUBSITE, SOUTH STAGING PILE, AND 100-N PIPELINES OVERBURDEN

EXECUTIVE SUMMARY

The 100-N-61 waste site, part of the 100-NR-1 Operable Unit, includes the underground water pipelines used to transport reactor cooling water between water treatment facilities and the 105-N/109-N Buildings. The 100-N-61:4 Water Treatment and Storage Facilities Underground Pipelines South of 182-N pipeline subsite surrounds the former 182-N High-Lift Pump House Building.

During the remediation of the 100-N-61:4 pipeline subsite, co-located segments of the 100-N-84:4, 100-N Area Steam and Condensate Pipelines, and 100-N-84:6, 100-N Area Chemical and Process Sewer Pipelines subsites were removed. All segments of the 100-N-84:4 and 100-N-84:6 pipelines within the defined 100-N-61:4 remediation area were removed and sampled for closeout along with the 100-N-61:4 pipelines. However, the reclassification of the 100-N-84:4 and 100-N-84:6 pipelines will be documented separately from the 100-N-61:4 pipelines.

Remedial action at the 100-N-61:4 and co-located pipelines occurred between October 8, 2012, and February 4, 2013. Remediation included removal of soil, steel pipe, asbestos tar paper and mastic, concrete, steel debris, and building demolition debris. The piping was removed and disposed at the Environmental Restoration Disposal Facility (ERDF). The amount of removed piping included approximately 565 m (1,854 ft) for the 100-N-61:4 subsite, 152 m (499 ft) for the 100-N-84:4 segments, and 199 m (653 ft) for the 100-N-84:6 segments. Approximately 20,660 bank cubic meters (BCM) (26,950 bank cubic yards [BCY]) of material was removed during the remediation. Most of the material was directly loaded for disposal at the ERDF with only 4,589 BCM (5,986 BCY) staged at the south staging pile (SSP) area prior to disposal. The pipelines excavation extended to a maximum depth of approximately 3.5 m (11.5 ft) below ground surface.

Suspected oil staining unrelated to the 100-N-61:4 and co-located 100-N-84:4 and 100-N-84:6 pipelines was observed intermittently in the excavation following remediation. Verification samples were analyzed for total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) to provide information on the extent of affected soil. A single verification sample location north of the former 182-N Building measured PAH above direct exposure remedial action goals (RAGs). Elevated TPH was not measured at this location. An additional 1 m (3 ft) of soil was removed at this location between May 13 and 16, 2013, with 532 BCM (696 BCY) of additional material disposed at ERDF. Verification sampling for only PAH at this single location was performed on May 16, 2013. Results from the final sample showed PAH concentrations were below direct exposure RAGs.

Three sample locations south of the former 182-N Building had both elevated TPH and PAH results. However, no additional remediation was performed to remove TPH/PAH contamination

as the contaminated soil area will be added to the 100-N-106, Shallow Petroleum-Only Releases (SPOR) waste site in accordance with the SPOR agreement (WCH 2012f).

Included with the 100-N-61:4 cleanup verification documentation is the verification sampling of the SSP, which received waste from the 100-N-29, 100-N-30, 100-N-37, 100-N-53, 100-N-57, 100-N-61:1, 100-N-61:2, 100-N-61:4, 100-N-62, 100-N-64:1, 100-N-64:2, 100-N-79, 100-N-84:2, 100-N-84:4, 100-N-84:5, 100-N-84:6, 100-N-84:8, 116-N-4, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, and UPR-100-N-32 waste sites. The SSP began operation February 16, 2011. The final waste loadout occurred on December 31, 2012. Per agreement with the Washington State Department of Ecology (Ecology) (Ecology 2011), the waste from these sites was not separated within the SSP as contributing waste sites were adjacent or co-located. Ecology also agreed that the SSP would be closed with the 100-N-61 waste site. In total, approximately 85,111 BCM (111,023 BCY) of waste material was staged at the SSP prior to disposal at the ERDF.

All material removed from the 100-N-61:4 subsite, including the co-located pipeline segments, was disposed at ERDF. However, clean overburden from the 100-N-61:1 and 100-N-61:2 subsites along with the 100-N-64:1, 100-N-64:2, 100-N-62, 100-N-84:2, 100-N-84:4, 100-N-84:5, and 100-N-84:6 pipeline remediation areas was staged at three overburden piles. Verification sampling of the 100-N pipeline overburden piles is included with the 100-N-61:4 cleanup verification documentation. The overburden volume at these three piles totals approximately 18,754 BCM (24,464 BCY). Due to asphaltic debris present in the 100-N pipelines overburden, all material will be backfilled only to locations that are greater than 4.6 m (15 ft) below ground surface. The backfill locations will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. The locations for deep zone backfill of this overburden will be agreed to with Ecology prior to initiating backfill operations.

Verification soil sampling of the 100-N-61:4 and co-located 100-N-84:4 and 100-N-84:6 pipelines was conducted on April 25 and May 16, 2013. Verification soil sampling of the SSP and 100-N pipeline overburden piles was conducted on April 30, 2013. A summary of the cleanup evaluation for the soil sampling results against the applicable RAGs is presented in Table ES-1. The results of the verification sampling were used to make reclassification decisions for the 100-N-61:4 subsite in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011).

Suspected oil staining unrelated to the 100-N-61:4 and co-located 100-N-84:4 and 100-N-84:6 pipelines was observed intermittently in the excavation following remediation. Verification samples were analyzed for TPH and PAH to provide information on the extent of affected soil. The TPH and PAH results were not evaluated for the purpose of making a waste site reclassification status decision because the contaminated soil is considered to be within the 100-N-106, Shallow Petroleum-Only Releases waste site. Therefore, no additional remediation was performed to remove TPH/PAH contamination.

Table ES-1. Summary of Remedial Action Goals for the 100-N-61:4 Pipelines Subsite, South Staging Pile, and 100-N Pipelines Overburden. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain dose rate of <15 mrem/yr above background over 1,000 years.	Radionuclides were not COPCs for the 100-N-61:4 pipelines subsite. The maximum dose rate from the sum-of-fractions evaluation for the SSP using dose-equivalent lookup values is 0.173 mrem/yr, which is <15 mrem/yr. Radionuclides were not detected in the 100-N pipelines overburden samples.	Yes
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	All individual COPC concentrations at the 100-N-61:4 subsite and SSP are below the direct exposure cleanup criteria [a]. There is no direct exposure pathway for the 100-N pipelines overburden because it will be backfilled only to locations below 4.6 m (15 ft) in depth.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	The hazard quotients for individual nonradionuclide COPCs are <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient for the 100-N-61:4 subsite and SSP (5.9×10^{-2}) is <1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The excess cancer risk for individual carcinogens is $<1 \times 10^{-6}$.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess cancer risk for the 100-N-61:4 subsite and SSP (5.5×10^{-7}) is $<1 \times 10^{-5}$.	
Groundwater/River Protection – Radionuclides	Attain single COPC groundwater and river RAGs.	Radionuclides were not COPCs for the 100-N-61:4 pipelines subsite. Residual concentrations of radionuclides at the SSP meet the groundwater and river protection remedial action objectives. Radionuclides were not detected in the 100-N pipeline overburden samples.	Yes
	Attain National Primary Drinking Water Regulations [b]: 4 mrem/yr (beta/gamma) dose standard to target receptor/organ.		
	Meet drinking water standards for alpha emitters: the more stringent of 15 pCi/L MCL or 1/25th of the derived concentration guide for DOE Order 5400.5 [c].		
	Meet total uranium standard of 30 µg/L (21.2 pCi/L) [d].		

Table ES-1. Summary of Remedial Action Goals for the 100-N-61:4 Pipelines Subsite, South Staging Pile, and 100-N Pipelines Overburden. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and Columbia River cleanup requirements.	Residual concentrations of lead at the 100-N-61:4 subsite; lead, carbazole, 4,4-DDT and total PCBs (aroclor-1254 and aroclor-1260) at the SSP; and lead, mercury, total PCBs (aroclor-1254 and aroclor-1260), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene at the 100-N pipelines overburden exceed soil RAGs for groundwater and/or river protection. However, based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), it is predicted that these constituents will not reach groundwater (and thus the Columbia River) within 1,000 years [e, f, g].	Yes

[a] Areas within the 100-N-61:4 excavation with elevated TPH and PAH will be added to the 100-N-106, Shallow Petroleum-Only Releases waste site (WCH 2012d).

[b] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).

[c] *Radiation Protection of the Public and Environment* (DOE Order 5400.5).

[d] Based on the isotopic distribution of uranium in the 100 Area, the 30 µg/L MCL corresponds to 21.2 pCi/L. Concentration-to-activity calculations are documented in *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater* (BHI 2001).

[e] Based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), residual concentrations of lead at the 100-N-61:4 excavation are predicted to migrate less than 1.8 m (6 ft) vertically in 1,000 years (based on the soil-partitioning coefficient of 30 mL/g). The vadose zone beneath the deepest portion of the 100-N-61:4 excavation is approximately 10.5 m (34.5 ft) thick. Therefore, residual concentrations of lead are predicted to be protective of groundwater and consequently are protective of the Columbia River.

[f] Based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), residual concentrations of lead, carbazole, 4,4-DDT and total PCBs (aroclor-1254 and aroclor-1260) at the SSP are predicted to migrate less than 1.8 m (6 ft) vertically in 1,000 years (based on the lowest soil-partitioning coefficient of the contaminants [lead] of 30 mL/g). The vadose zone beneath the south staging pile is approximately 22.0 m (72 ft) thick. Therefore, the residual concentration of all constituents exceeding groundwater and/or river protection soil RAGs are predicted to be protective of groundwater and consequently are protective of the Columbia River.

[g] Based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), residual concentrations of lead, mercury, total PCBs (aroclor-1254 and aroclor-1260), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene are predicted to migrate less than 1.8 m (6.6 ft) vertically in 1,000 years (based on the lowest soil-partitioning coefficient of the contaminants [lead and mercury] of 30 mL/g). The overburden from these piles will be backfilled to deep zone locations that are at least 4.6 m (15 ft) below ground surface and will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. Therefore, residual concentrations of these contaminants are predicted to be protective of groundwater and consequently are protective of the Columbia River.

COPC = contaminant of potential concern
MCL = maximum contaminant level
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
RAG = remedial action goal
RDR/RAWP = Remedial Design Report/Remedial Action Work Plan
RESRAD = RESidual RADioactivity (dose model)
SSP = south staging pile
TPH = total petroleum hydrocarbons

In accordance with this evaluation, the verification sampling results and modeling support a reclassification of this site to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding RAGs established in the *Remedial Design Report/Remedial Action Work Plan for the 100-N Area* (DOE-RL 2006b) and the *Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington* (100-N Area ROD) (EPA 1999). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The sample and modeling results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft] deep), and contaminant levels remaining in the soil are protective of groundwater and the Columbia River. The 100-N-61:4 subsite was excavated to a maximum depth of 3.5 m (11.5 ft) bgs. Contamination is concluded not to exist further in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

Elevated concentrations of PAHs were measured in the 100-N Pipelines overburden piles. The overburden from these three piles will be used to backfill only excavated waste site areas that are in the deep zone (greater than 4.6 m [15 ft] bgs) (WCH 2013b), thereby providing no direct exposure pathway to humans. The backfill locations will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation, thereby providing a sufficient vadose depth to demonstrate groundwater and river protection. The locations for deep zone backfill of this overburden will be agreed to with Ecology prior to initiating backfill operations.

Soil cleanup levels were established in the 100-N Area ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the 100-N Area ROD, a comparison against ecological risk screening levels has been made for the 100-N-61:4 subsite and SSP contaminants of potential concern and other constituents (Appendix A). Because the 100-N pipelines overburden will be backfilled only to areas that are located below a depth of 4.6 m (15 ft) bgs, there is no risk to ecological receptors and no evaluation of ecological risk is required for this material. Ecological screening levels from *Washington Administrative Code* 173-340 were exceeded for boron, mercury, and vanadium. The U.S. Environmental Protection Agency ecological soil screening levels were exceeded for antimony, lead, manganese, vanadium, and zinc. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the concentration of antimony is below the Washington State background value, and mercury, manganese, and zinc are below the Hanford Site background value, it is believed that the presence of these constituents do not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for risk to ecological receptors as part of the final closeout decision for this site.

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-N-61:4, WATER TREATMENT AND STORAGE FACILITIES UNDERGROUND PIPELINES SOUTH OF 182-N SUBSITE, SOUTH STAGING PILE, AND 100-N PIPELINES OVERBURDEN

STATEMENT OF PROTECTIVENESS

The 100-N-61:4 subsite (including co-located segments of 100-N-86:4 and 100-N-86:6 pipelines), south staging pile (SSP), and 100-N pipelines overburden cleanup verification sampling data, site evaluations, and supporting documentation demonstrate that the 100-N-61:4 subsite and associated SSP and 100-N pipelines overburden meet the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 100-N Area* (100-N Area RDR/RAWP) (DOE-RL 2006b) and the *Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington* (100-N Area ROD) (EPA 1999). The results of verification sampling and modeling show that residual soil concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. The 100-N-61:4 subsite and co-located 100-N-84:4 and 100-N-84:6 pipeline segments were excavated to a maximum depth of 3.5 m (11.5 ft) below ground surface (bgs). Contamination is concluded not to extend further into deep zone soil; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

Suspected oil staining unrelated to the 100-N-61:4 and co-located 100-N-84:4 and 100-N-84:6 pipelines was observed intermittently in the excavation following remediation. Verification samples were analyzed for total petroleum hydrocarbons (TPH), and polycyclic aromatic hydrocarbons (PAH) to provide information on the extent of affected soil. No additional remediation was performed to remove TPH/PAH contamination as the contaminated soil area will be added to the 100-N-106, Shallow Petroleum-Only Releases (SPOR) waste site in accordance with the SPOR agreement (WCH 2012f).

Elevated concentrations of PAHs were measured in the 100-N Pipelines overburden piles. The overburden from these three piles will be used to backfill only excavated waste site areas that are in the deep zone (greater than 4.6 m [15 ft] bgs) (WCH 2013b), thereby providing no direct exposure pathway to humans. The backfill locations will also have an underlying vadose zone that is at least 3 m (9.9 ft) thick, thereby providing a sufficient vadose depth to demonstrate groundwater and river protection. The locations for deep zone backfill of this overburden will be agreed to with Ecology prior to initiating backfill operations.

Soil cleanup levels were established in the 100-N Area ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the 100-N Area ROD, a comparison against ecological risk screening levels has been made for the 100-N-61:4 subsite and SSP contaminants of potential concern (COPCs) and other constituents (Appendix A). Because the 100-N pipelines overburden will be backfilled only to areas that are located below a depth of 4.6 m (15 ft) bgs, there is no risk to ecological receptors and no evaluation of ecological risk is required for this material. Ecological screening levels from *Washington Administrative*

Code (WAC) 173-340 were exceeded for boron, mercury, and vanadium. The U.S. Environmental Protection Agency (EPA) ecological soil screening levels were exceeded for antimony, lead, manganese, vanadium, and zinc. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the concentration of antimony is below the Washington State background value, and mercury, manganese, and zinc are below the Hanford Site background value, it is believed that the presence of these constituents do not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for risk to ecological receptors as part of the final closeout decision for this site.

GENERAL SITE INFORMATION AND BACKGROUND

100-N-61:4 and Co-Located Pipelines

The 100-N-61 waste site encompassed all underground water pipelines used to transport reactor cooling water between water treatment facilities and the 105-N/109-N Buildings. This included all underground pipelines between buildings and those connected to drainage facilities. Pipelines within buildings and all pipelines that are downstream from the reactor building, such as pipelines carrying cooling water from the reactor to effluent disposal facilities such as the dump tank and cribs, were not included in the 100-N-61 waste site.

The 100-N-61 pipelines were divided into subsites based on geographical locations rather than process differences (WCH 2012a). The subsites included the following:

- 100-N-61:1 Water Treatment and Storage Facilities Underground Pipelines South of 109-N
- 100-N-61:2 Water Treatment and Storage Facilities Underground Pipelines East of 109-N
- 100-N-61:3 Water Treatment and Storage Facilities Underground Pipelines West of 109-N
- 100-N-61:4 Water Treatment and Storage Facilities Underground Pipelines South of 182-N.

The 100-N-61:4 pipelines were located south of the 105-N/109-N Reactor buildings near the 182-N High-Lift Pump House Building (Figure 1). Many of the 100-N-61:4 pipelines were associated with the 182-N Building and transported raw and filtered water in 10- to 107-cm (4- to 42-in.)-diameter steel pipes, wrapped in coal tar enamel mastic. Remediation of 100-N-61:4 pipelines began after the deactivation, decontamination, decommissioning, and demolition (D4) of the 182-N Building and 1900-N Facility were completed. An aerial photograph of the general 100-N-61:4 pipelines area as it appeared in 2005 before D4 of the 182-N Building is presented in Figure 2.

Figure 1. Overall Site Location of the 100-N-61:4 Pipelines.

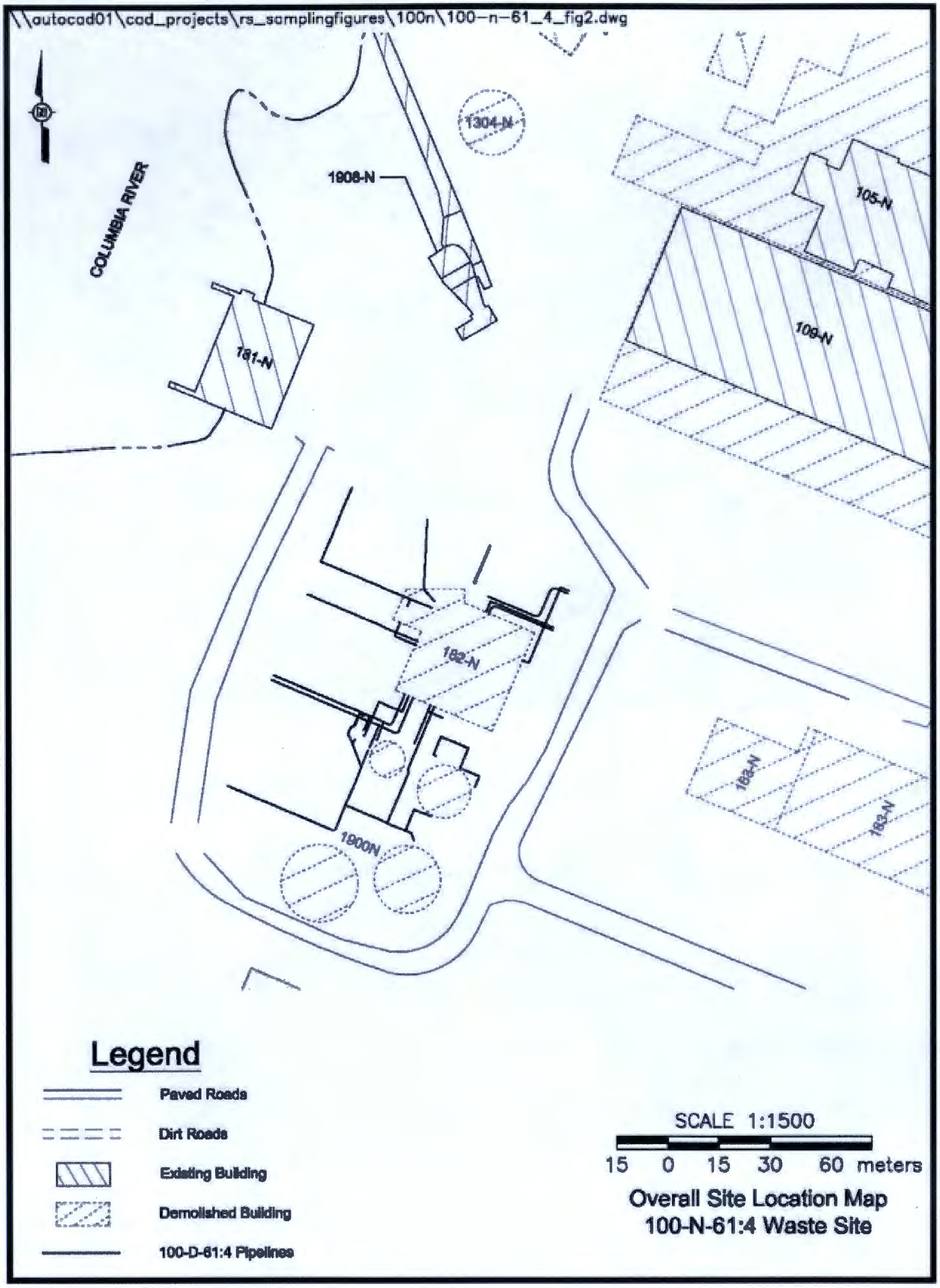
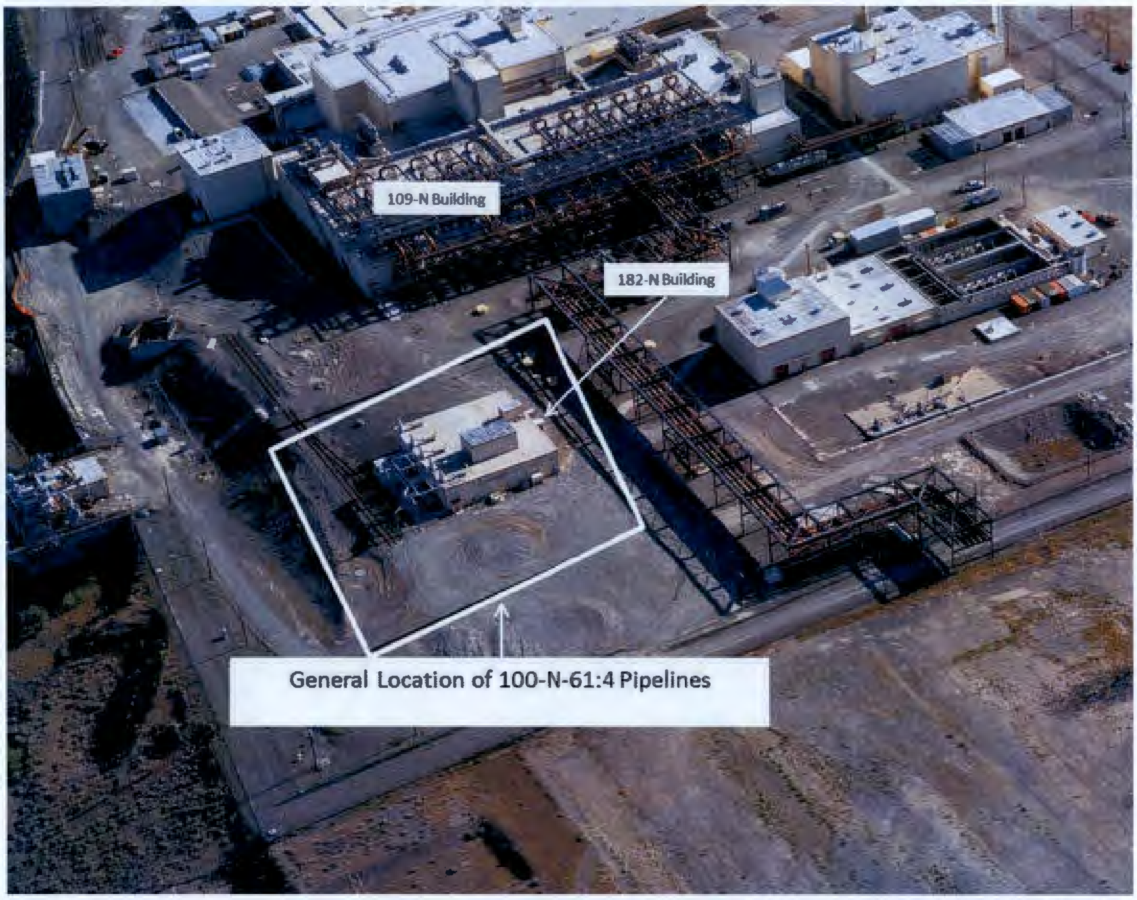


Figure 2. Photograph of the 100-N-61:4 Pipelines Area and 182-N Building in 2005.

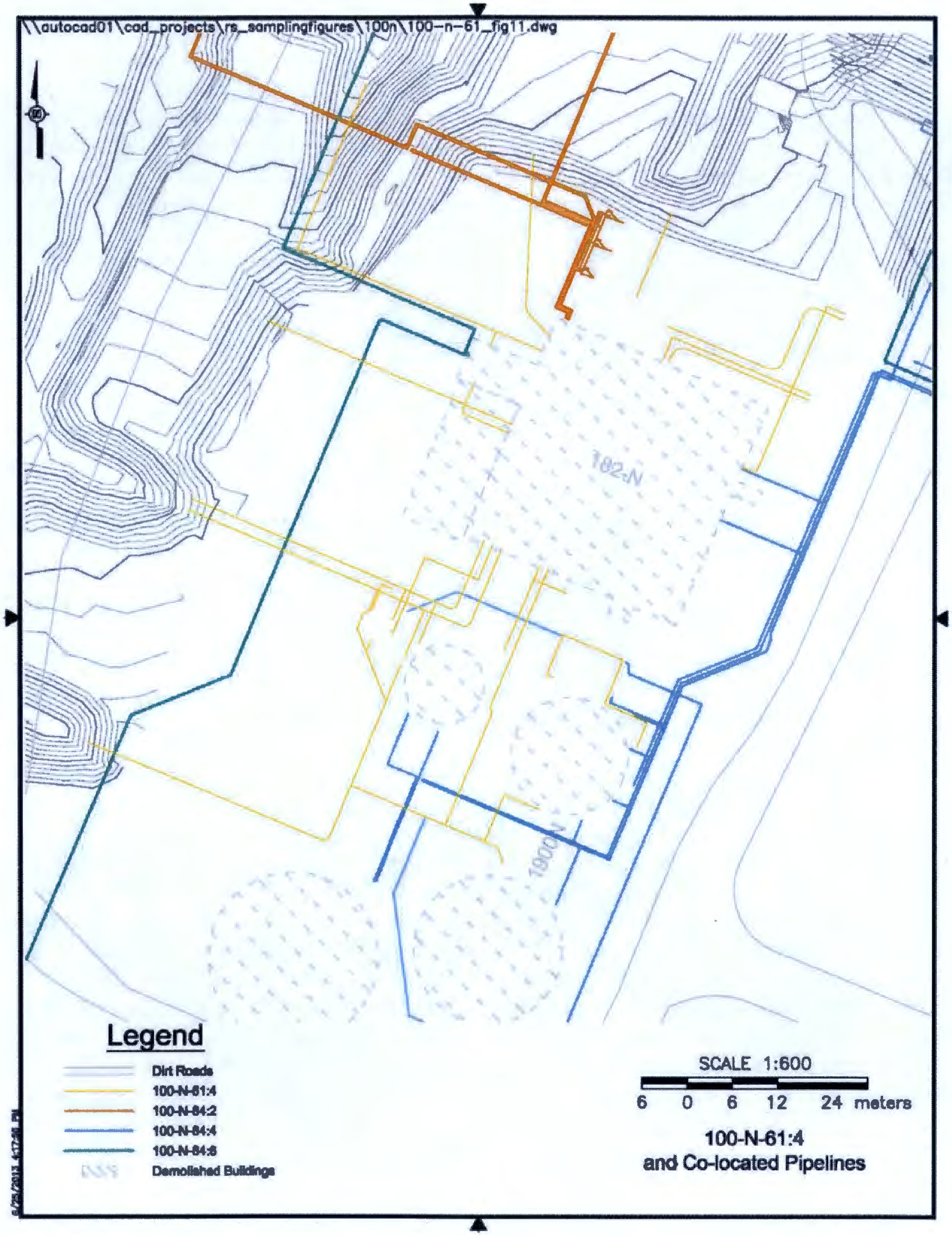


Segments of several of the 100-N-84 pipelines subsites were co-located with the 100-N-61:4 pipelines. These included the following:

- 100-N-84 pipelines subsites previously reclassified to Interim No Action
  - 100-N-84:1, 100-N Area Raw Water Pipelines
  - 100-N-84:3, 100-N Area Filtered and Potable Water Pipelines
  - 100-N-84:7, 100-N Area Unidentified and Other Miscellaneous Pipelines.
- 100-N-84 pipelines subsites for remedial action
  - 100-N-84:2, 100-N Area Fuel and Foam Pipelines
  - 100-N-84:4, 100-N Area Steam and Condensate Pipelines
  - 100-N-84:6, 100-N Area Chemical and Process Sewer Pipelines.

Figure 3 presents the general location of the 100-N-61:4 pipelines and the co-located segments of the 100-N-84 pipeline subsites that require remedial action: 100-N-84:2, 100-N-84:4, and 100-N-84:6.

Figure 3. The 100-N-61:4 and Co-Located 100-N-84:2, 100-N-84:4, and 100-N-84:6 Pipelines.



South Staging Pile

The 100-N SSP began operation on February 16, 2011 (Ecology 2011) and received waste from the 100-N-29, 100-N-30, 100-N-37, 100-N-53, 100-N-57, 100-N-61:1, 100-N-61:2, 100 N 61:4, 100-N-62, 100-N-64:1, 100-N-64:2, 100-N-79, 100-N-84:2, 100-N-84:4, 100-N-84:5, 100-N-84:6, 100-N-84:8, 116-N-4, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, and UPR-100-N-32 waste sites. Per agreement with the Washington State Department of Ecology (Ecology), the waste from these sites was not separated within the SSP as the contributing waste sites were adjacent or co-located (Ecology 2011). Ecology also agreed that the SSP would be closed with the 100-N-61 waste site. After the agreement, the 100-N-61 site was divided into four subsites. All of the subsites except 100-N-61:4 have been previously sampled for cleanup verification. Therefore, the SSP closure is documented with the closeout of the 100-N-61:4 subsite. The location of the SSP is presented in Figure 4.

100-N Pipelines Overburden

Three locations near the SSP were designated to receive overburden material from multiple 100-N Area pipeline waste sites including the 100-N-61:1, 100-N-61:2, 100-N-64:1, 100-N-64:2, 100-N-62, 100-N-84:2, 100-N-84:4, 100-N-84:5, and 100-N-84:6 subsites. Although there was no overburden material from the 100-N-61:4 subsite, overburden from the 100-N-61:1 and 100-N-61:2 subsites is staged at the piles. Verification sampling and evaluation of the overburden is documented with the closeout of the 100-N-61:4 subsite. The locations of the three 100-N pipelines overburden piles are presented in Figure 4.

REMEDIAL ACTION SUMMARY

100-N-61:4 Pipelines Subsite and Co-Located Segments of 100-N-84:4 and 100-N-84:6 Pipelines

As previously discussed, the 100-N-61:4 remedial action began after completion of the 182-N Building and 1900-N Facility D4 operations. An aerial photograph of the general pipelines location after the D4 was completed is presented in Figure 5. The 100-N-61:4 and co-located pipelines were remediated between October 8, 2012, and February 4, 2013. Remediation included removal of soil, steel pipe, asbestos tar paper and mastic, concrete, steel debris, and building demolition debris. The lengths of pipeline removed and disposed at the Environmental Restoration Disposal Facility (ERDF) included approximately 565 m (1,854 ft) for the 100-N-61:4 subsite, 152 m (499 ft) for the 100-N-84:4 segments, and 199 m (653 ft) for the 100-N-84:6 segments. Approximately 20,660 bank cubic meters (BCM) (26,950 bank cubic yards [BCY]) of material was removed during the remediation. Most of the material was directly loaded for disposal at the ERDF with only 4,589 BCM (5,986 BCY) staged at the SSP area prior to disposal. The pipelines excavation extended to a maximum depth of approximately 3.5 m (11.5 ft) bgs. A post-excavation civil survey is presented in Figure 6 and post-remediation aerial photograph of the area is presented in Figure 7.

Figure 4. Locations of the South Staging Pile and 100-N Pipeline Overburden Piles.

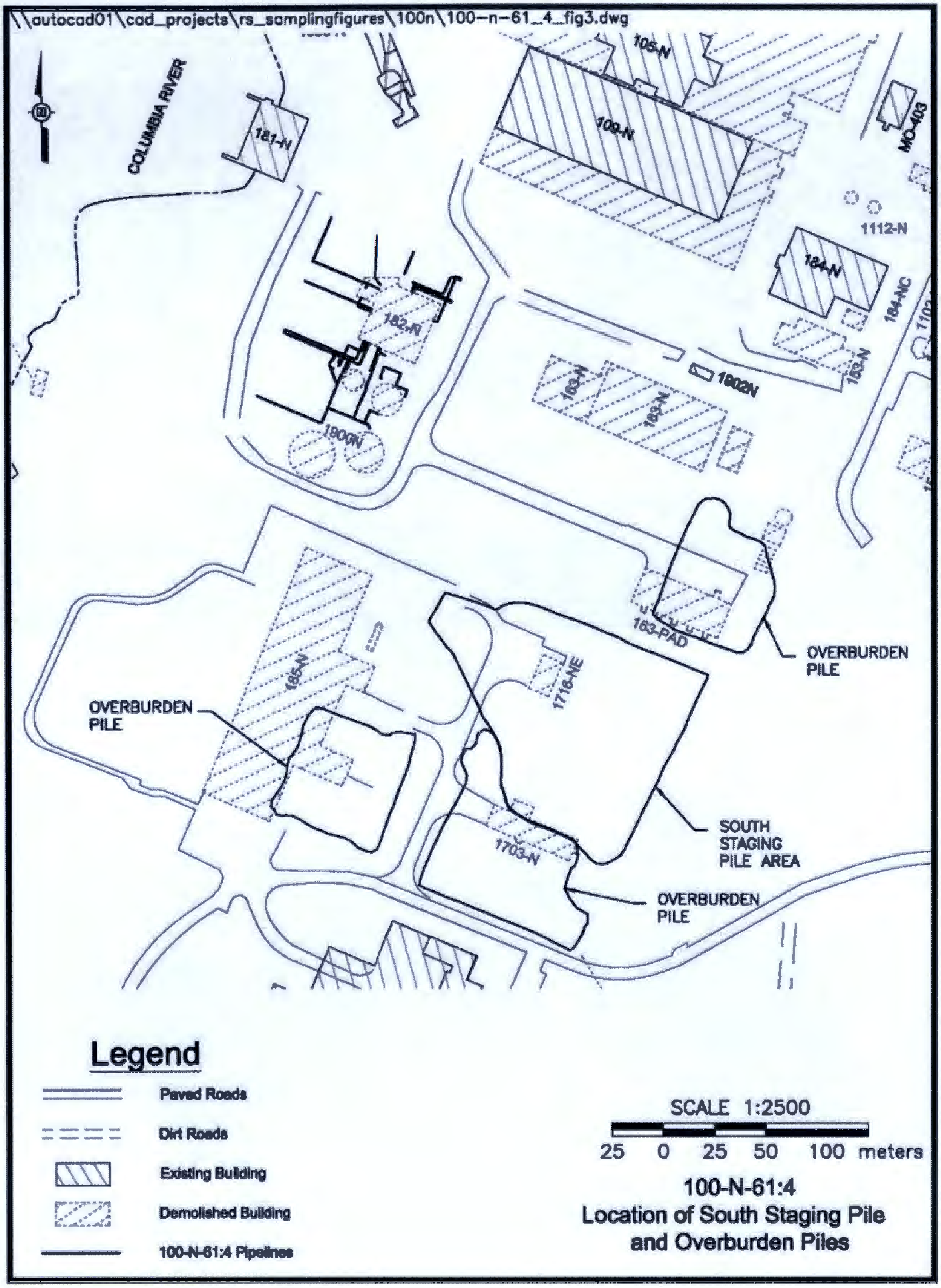


Figure 5. Pre-Remediation Photograph of the 100-N-61:4 Pipelines Area After 182-N Building Demolition (View to Southeast) (September 2012).

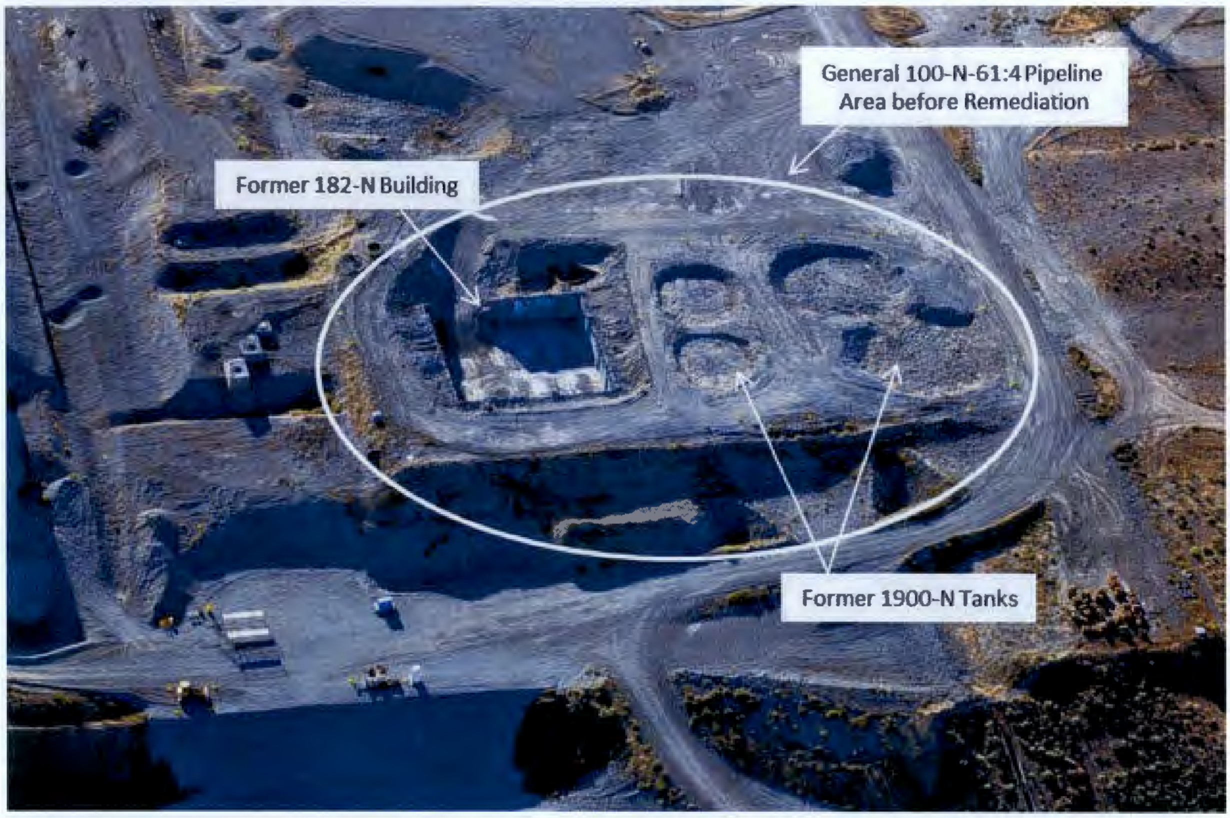


Figure 6. Post-Remediation Civil Survey of the 100-N-61:4 Excavation and Surrounding Area (June 2013).

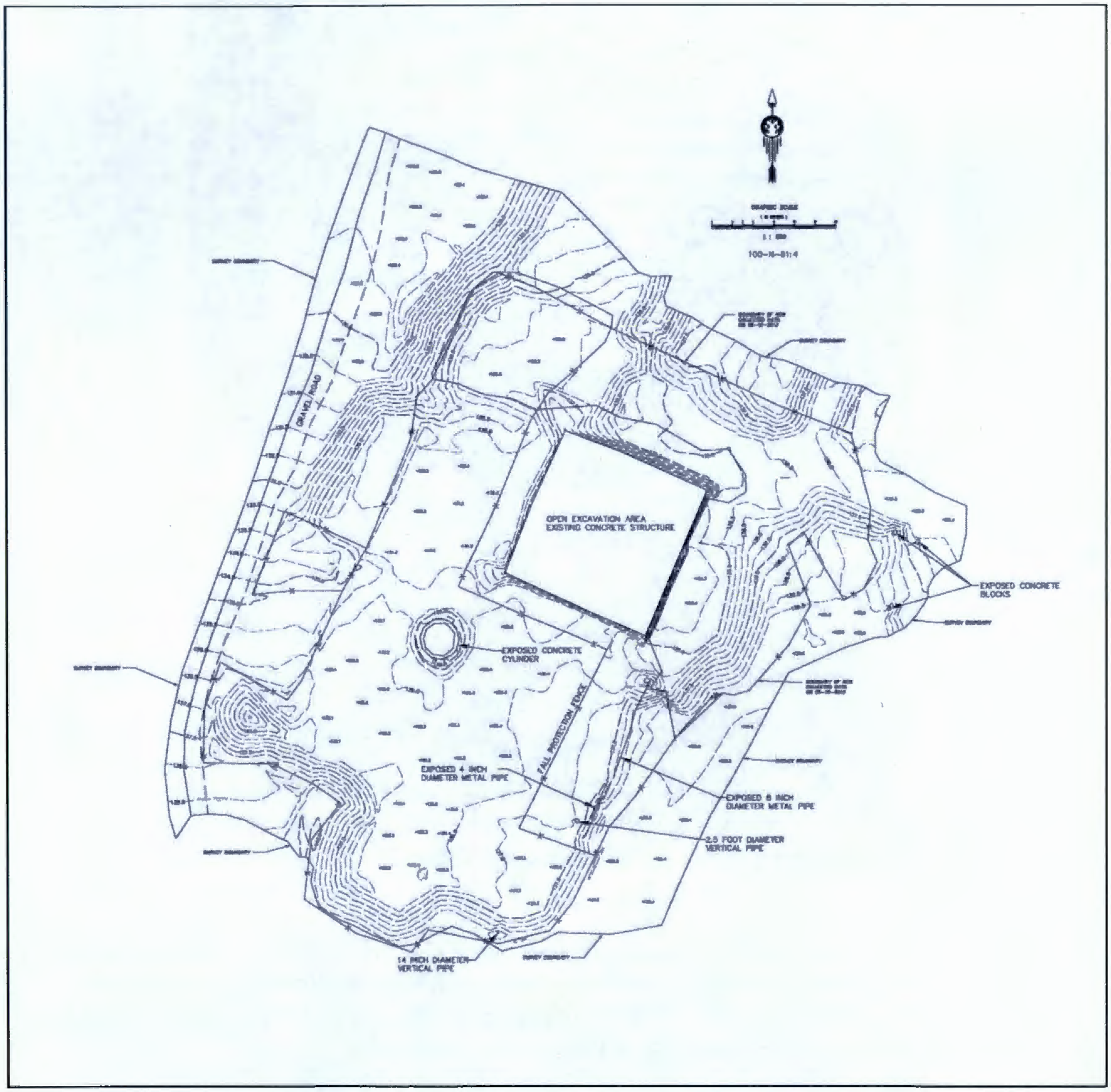


Figure 7. Post-Remediation Photograph of the 100-N-61:4 Pipelines Area (April 2013).

Global Positioning Environmental Radiological Surveyor (GPERS) surveys were conducted on March 14 through 24, 2013 over the 100-N-61:4 and co-located pipelines remediation area, including areas between pipelines. All accessible areas were surveyed to prepare a composite figure. A composite gamma survey map is presented in Figure 8.

No anomalies were discovered during remediation. Soil staining was observed in the south excavation sidewall (Figure 9) and intermittently within the pipeline excavation. In-process sample results from the 100-N-61:4 pipeline measured TPH above 200 mg/kg and benzo(a)pyrene above direct exposure remedial action goals (RAGs) (Appendix B) in the pipeline footprint area south of the 182-N Building. Three verification sample locations south of the former 182-N Building also had both elevated TPH and PAH results. The results are due to petroleum contamination, which is not associated with the 100-N-61:4 subsite. Therefore, no additional remediation was performed. The portion of the 100-N-61:4 remediation area with residual petroleum contamination will be added to the 100-N-106, Shallow Petroleum-Only (SPOR) waste site in accordance with the SPOR agreement (WCH 2012f).

Figure 8. 100-N-61:4 Excavation Radiological Gamma Survey (March 2013).

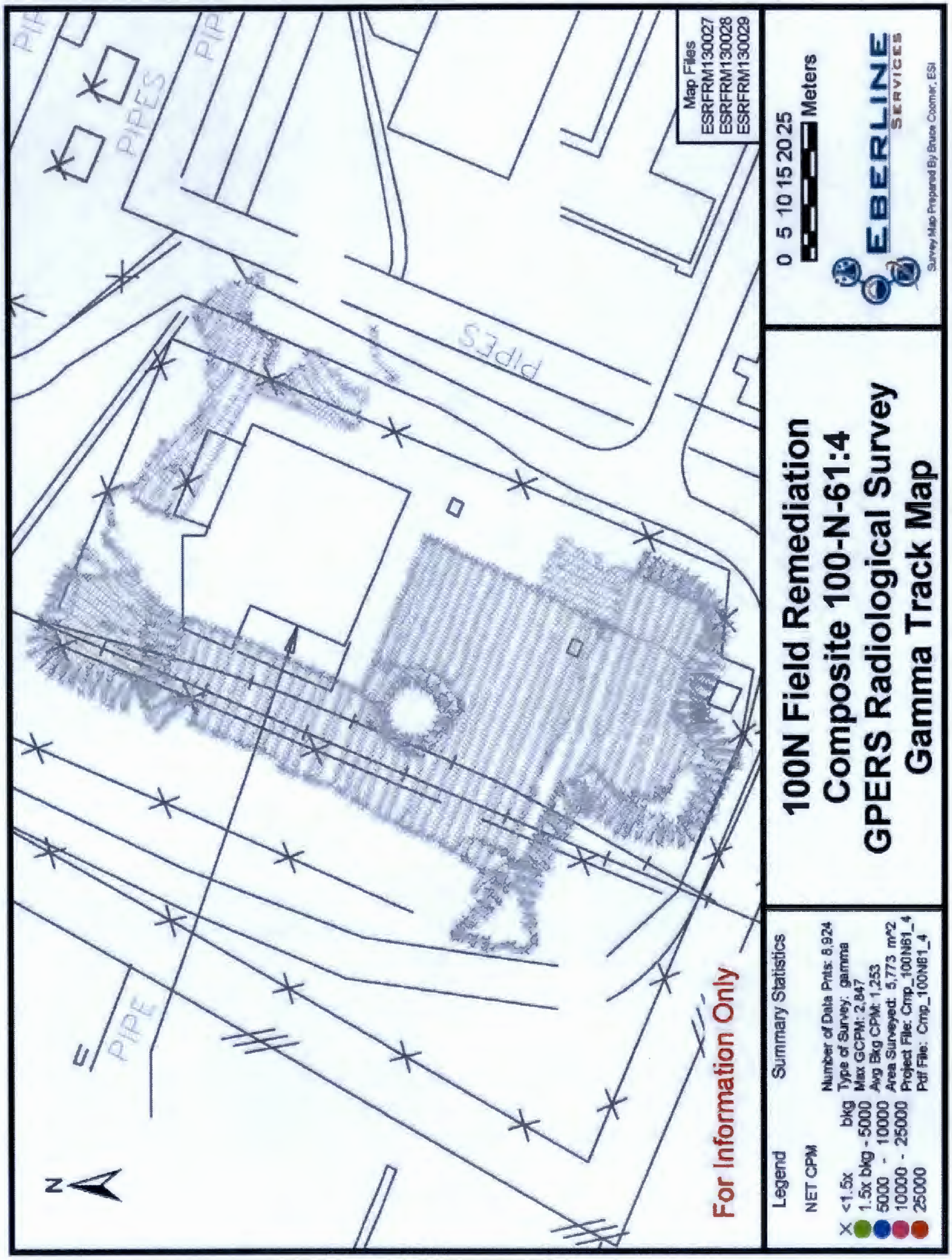


Figure 9. Stained Soil in the 100-N-61:4 Excavation South Sidewall (March 2013).

A single verification sample location north of the former 182-N Building measured PAH above direct exposure cleanup criteria. Elevated TPH was not measured at this location. An additional 1 m (3 ft) of soil was removed at this location between May 13 and 16, 2013, with 532 BCM (696 BCY) of additional material disposed at ERDF. Verification sampling for only PAH at this single location was performed on May 16, 2013. Results from the final sample showed PAH concentrations were below direct exposure cleanup criteria.

South Staging Pile Area

The 100-N SSP area began operation on February 16, 2011 (Ecology 2011), and received waste from the 100-N-29, 100-N-30, 100-N-37, 100-N-53, 100-N-57, 100-N-61:1, 100-N-61:2, 100-N-61:4, 100-N-62, 100-N-64:1, 100-N-64:2, 100-N-79, 100-N-84:2, 100-N-84:4, 100-N-84:5, 100-N-84:6, 100-N-84:8, 116-N-4, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, and UPR-100-N-32 waste sites. In total, approximately 85,111 BCM (111,023 BCY) of waste material was staged at the SSP prior to disposal at the ERDF.

No radiological contamination was detected during field screening of the waste that was staged in the SSP.

After removal of the waste at the SSP in early 2012, approximately 0.2 m (0.5 ft) of material was removed from the surface of the SSP in April 2012. Five in-process samples were collected on May 7, 2012. Four of these locations had visible staining. Multiple PAH were detected in all samples, with benzo(a)pyrene above direct exposure RAGs in one of the five samples. The SSP was then used to stage waste from 100-N-61:4. The material was disposed at ERDF with the final load out occurring on December 13, 2012. After removal of the waste, 0.2 m (0.5 ft) of material was removed from the SSP surface.

Five in-process samples were taken at the SSP on December 31, 2012. One of the samples (J1R7X5) was taken at a location with soil staining. Results from these in-process results showed elevated TPH and multiple PAH, with benzo(a)pyrene above direct exposure RAGs (Appendix B). The SSP was located east of the former 185-N Building in an area that was previously utilized during 185-N construction activities (Figure 10). The 1716-NE, HGP Maintenance Garage, now demolished, was also within the SSP area (Figure 11). Additionally, asphalt-covered roads and parking areas were previously located within the area (Figure 11). The previous construction and demolition activities were responsible for asphalt contamination in the SSP area. Further remediation of the SSP was not performed in accordance with the previous DOE and ECY agreement regarding PAH exceedances attributable to cross-contamination of structural asphaltic materials (WCH 2012g). A GPERS survey of the SSP area was conducted on January 5, 2013, and is presented in Figure 12.

Figure 10. 185-N Building Construction Photograph from September 1964 Showing Construction Activity Within the South Staging Pile Area.

Figure 11. 1996 Aerial Photograph of the Area Used for the South Staging Pile Showing Buildings and Asphalt-Covered Roads and Parking Areas.

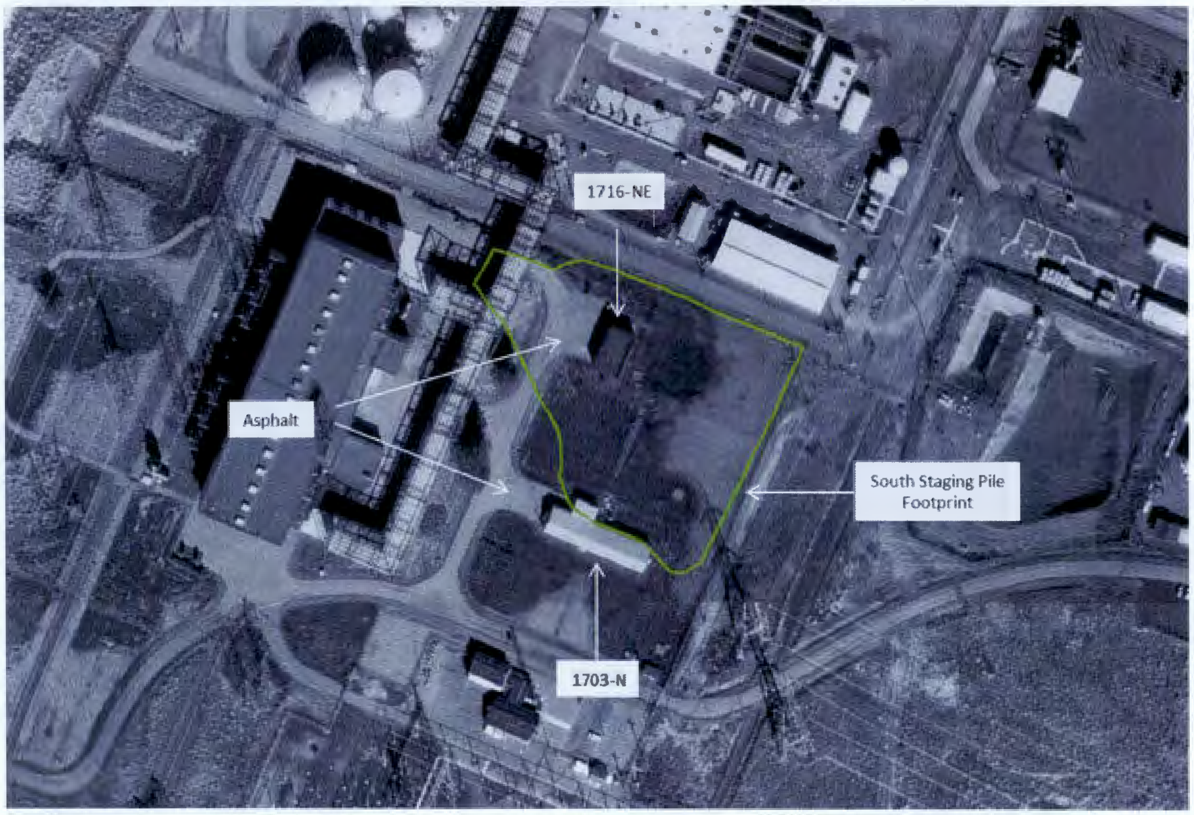
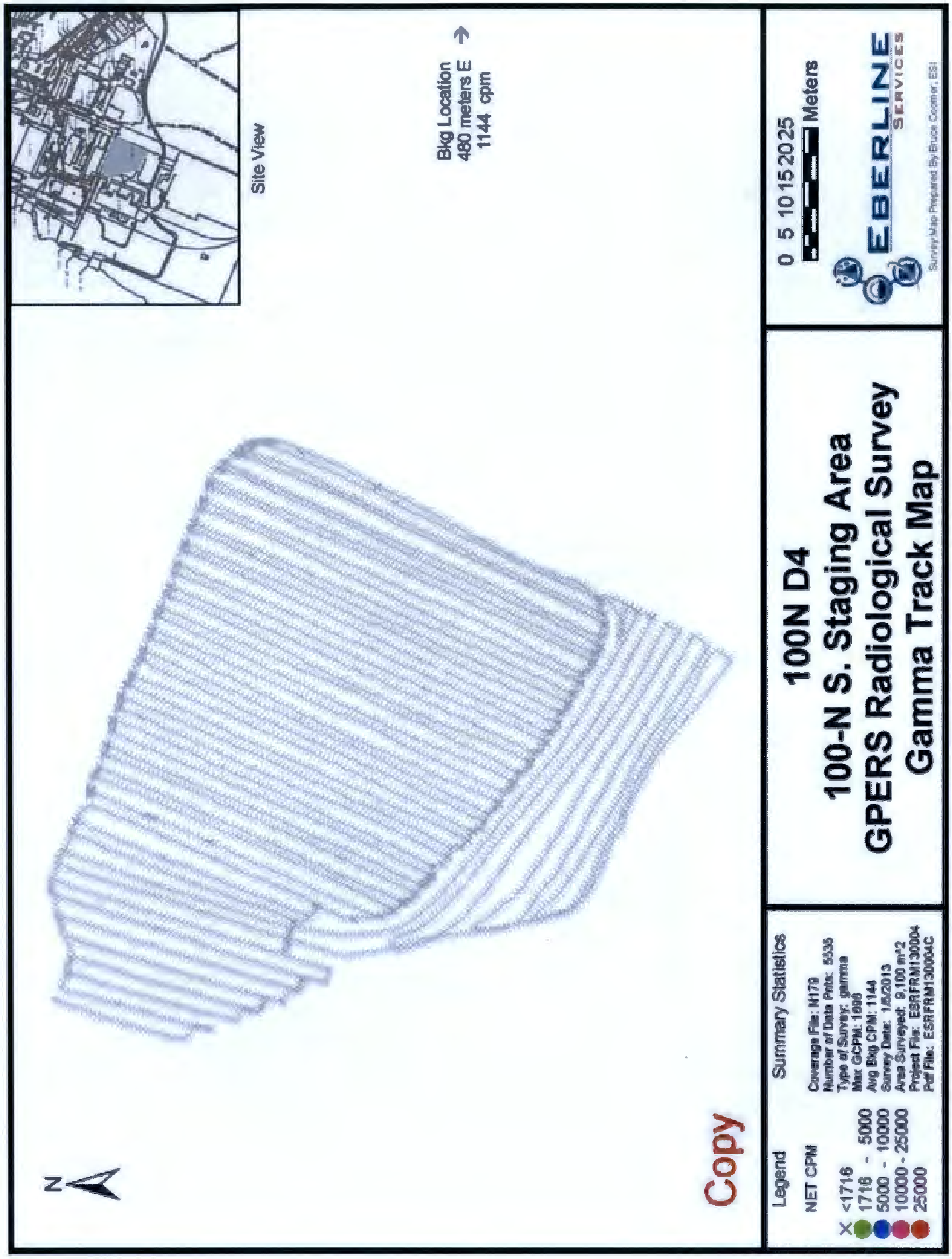


Figure 12. South Staging Pile Area Radiological Gamma Survey (January 2013).



100-N Pipelines Overburden

Three locations near the SSP received overburden material from multiple pipeline waste sites in the 100-N Area including the 100-N-61:1, 100-N-61:2, 100-N-64:1, 100-N-64:2, 100-N-62, 100-N-84:2, 100-N-84:4, 100-N-84:5, and 100-N-84:6 subsites. In-process composite samples at the overburden pile were collected May 9, 2012. Multiple PAH were detected, with benzo(a)pyrene at concentrations exceeding direct exposure RAGs (Appendix B). The elevated PAH concentrations are due to asphalt material in the soil. The asphalt had been mixed with the soil during previous D4 activities. The soil contaminated with asphaltic debris from D4 activities had been used as backfill in areas that previously covered portions of these pipelines.

Material with visible debris at two of the overburden piles was removed and disposed. These overburden piles were sampled again on December 31, 2012; however, similar PAH concentrations were measured, including benzo(a)pyrene above direct exposure RAGs (Appendix B). Due to levels of benzo(a)pyrene in excess of direct exposure RAGs from the asphaltic debris, an agreement was reached that the overburden from these three piles will be used to backfill only excavated waste site areas that are in the deep zone (greater than 4.6 m [15 ft] bgs) (WCH 2013b). The backfill locations will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. The combined volume at the three overburden piles totals approximately 18,754 BCM (24,464 BCY). The locations for deep zone backfill of this overburden will be agreed to with Ecology prior to initiating backfill operations.

VERIFICATION SAMPLING ACTIVITIES

Verification soil sampling was conducted on April 25, April 30, and May 16, 2013, per the *Work Instruction for Verification Sampling of the 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N and Co-located Segments of the 100-N-84:4, 100-N Area Steam and Condensate Pipeline and 100-N-84:6, 100-N Area Chemical and Process Sewer Pipelines; South Staging Pile Area; and 100-N Pipelines Overburden* (WCH 2013c). Sampling was conducted to support a determination that residual contaminant concentrations in the soil meet cleanup criteria specified in the 100-N Area RDR/RAWP (DOE-RL 2006b) and 100-N Area ROD (EPA 1999).

The verification sample results are provided in the 95% upper confidence limit (UCL) calculation brief (Appendix C) and indicate that the removal action achieved compliance with the remedial action objectives (RAOs) and RAGs for the 100-N-61:4 and co-located segments of the 100-N-84:4 and 100-N-84:6 pipelines, SSP, and 100-N pipelines overburden. The following subsections provide additional discussion of the information used to develop the verification sampling design. The statistical results of verification sampling are also summarized to support interim closure of the site. A more detailed discussion of the verification sampling design can be found in the verification work instruction (WCH 2013c).

Contaminants of Potential Concern

The COPCs identified for each of the three decision units, 100-N-61:4 and co-located segments of the 100-N-84:4 and 100-N-84:6 pipelines, SSP, and 100-N pipelines overburden, were unique. Therefore, COPCs for each of the decision units are discussed separately.

Contaminants of Potential Concern for the 100-N-61:4 and Co-Located 100-N-84:4 and 100-N-84:6 Pipeline Segments

The COPCs listed in the 100-N Area RDR/RAWP (DOE-RL 2006b) specific to the 100-N-61 pipelines are chemically contaminated cooling water, sulfuric acid, sodium hydroxide, aluminum sulfate, hydrated calcium oxide, separan, chlorine, and sodium dichromate. The 100-N-61 pipelines were not designed to receive radiologically contaminated water.

A previous sampling agreement, the 100-N FR South River Road Agreement (WCH 2011a), listed anions, total chromium, hexavalent chromium, lead, gamma energy analysis (GEA), strontium-90, and asbestos as COPCs for the 100-N-61 pipelines. This agreement was in place to support soil sampling and backfilling of the portions of the 100-N-61 pipeline segments that were remediated in support of the demolition of the 100-N river structures. Because the 100-N river structures were located west of the 105-N Reactor near areas of known radiological soil contamination associated with other waste sites, radionuclides were added as COPCs in the 100-N FR South River Road Agreement (WCH 2011a).

After the 100-N FR South River Road Agreement was approved, the 100-N-61 waste site was subdivided into four subsites (WCH 2012a). The subsites include the following:

- 100-N-61:1 Water Treatment and Storage Facilities Underground Pipelines South of 109-N
- 100-N-61:2 Water Treatment and Storage Facilities Underground Pipelines East of 109-N
- 100-N-61:3 Water Treatment and Storage Facilities Underground Pipelines West of 109-N
- 100-N-61:4 Water Treatment and Storage Facilities Underground Pipelines South of 182-N.

Due to potential co-location with waste sites containing radiological soil contamination west of the 105-N Reactor, GEA and strontium-90 were included as COPCs for 100-N-61 in the 100-N FR South River Road Agreement (WCH 2011a). In contrast, the 100-N-61:4 subsite pipelines were south of the 105-N Reactor and not located with any waste sites with suspected radiological soil contamination. The 100-N-61 pipelines were designed to transport pre-reactor cooling water, which is not radiologically contaminated.

Due to the location of the 100-N-61:4 pipelines being outside of known radiologically contaminated areas and the absence of processes that would have carried radiologically contaminated water, the radiological COPCs assigned to 100-N-61 in the 100-N FR South River Road Agreement (WCH 2011a) (gamma-emitting radionuclides and strontium-90) were eliminated for verification sampling. Therefore, anions, total chromium, hexavalent chromium, lead, and asbestos were the identified COPCs for the 100-N-61:4 pipelines.

Co-Located 100-N-84:4 and 100-N-84:6 Pipeline Segments

Segments of three 100-N-84 pipelines subsites requiring remediation were co-located with the 100-N-61:4 pipelines. The 100-N-84:4 and 100-N-84:6 pipeline segments were completely removed within the 100-N-61:4 closeout boundary. Not all of the 100-N-84:2 pipelines have been removed. Therefore, only the co-located 100-N-84:4 and 100-N-84:6 pipeline segments were addressed with the 100-N-61:4 cleanup verification sampling. Waste site reclassification of the 100-N-84:4 and 100-N-84:6 subsites will be addressed separately from the 100-N-61:4 subsite.

The COPCs associated with the 100-N-84:4 subsite are metals, mercury, hexavalent chromium, TPH, PAH, anions, and nitrate/nitrite (WCH 2012b). The COPCs identified for the 100-N-84:6 are TPH, chromium, lead, and anions (WCH 2010b). The list of COPCs from the 100-N-61:4, 100-N-84:4, and 100-N-84:6 pipelines and associated analytical methods are presented in Table 1.

Table 1. Laboratory Analytical Methods for the 100-N-61:4 and Co-Located Segments of the 100-N-84:4 and 100-N-84:6 Pipelines.

Analytical Method	Contaminants of Potential Concern
ICP metals [a] – EPA Method 6010	Chromium (total), lead
Mercury – EPA Method 7471	Mercury
Hexavalent chromium – EPA Method 7196	Hexavalent chromium
IC anions – EPA Method 300.0 [b]	Inorganic anions
Nitrate/nitrite – EPA Method 353.2	Nitrate/nitrite
PAH – EPA Method 8310	Polycyclic aromatic hydrocarbons [c]
TPH – NWTPH-Dx	Total petroleum hydrocarbons [c]
Bulk asbestos – NIOSH Method 7400	Asbestos

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.

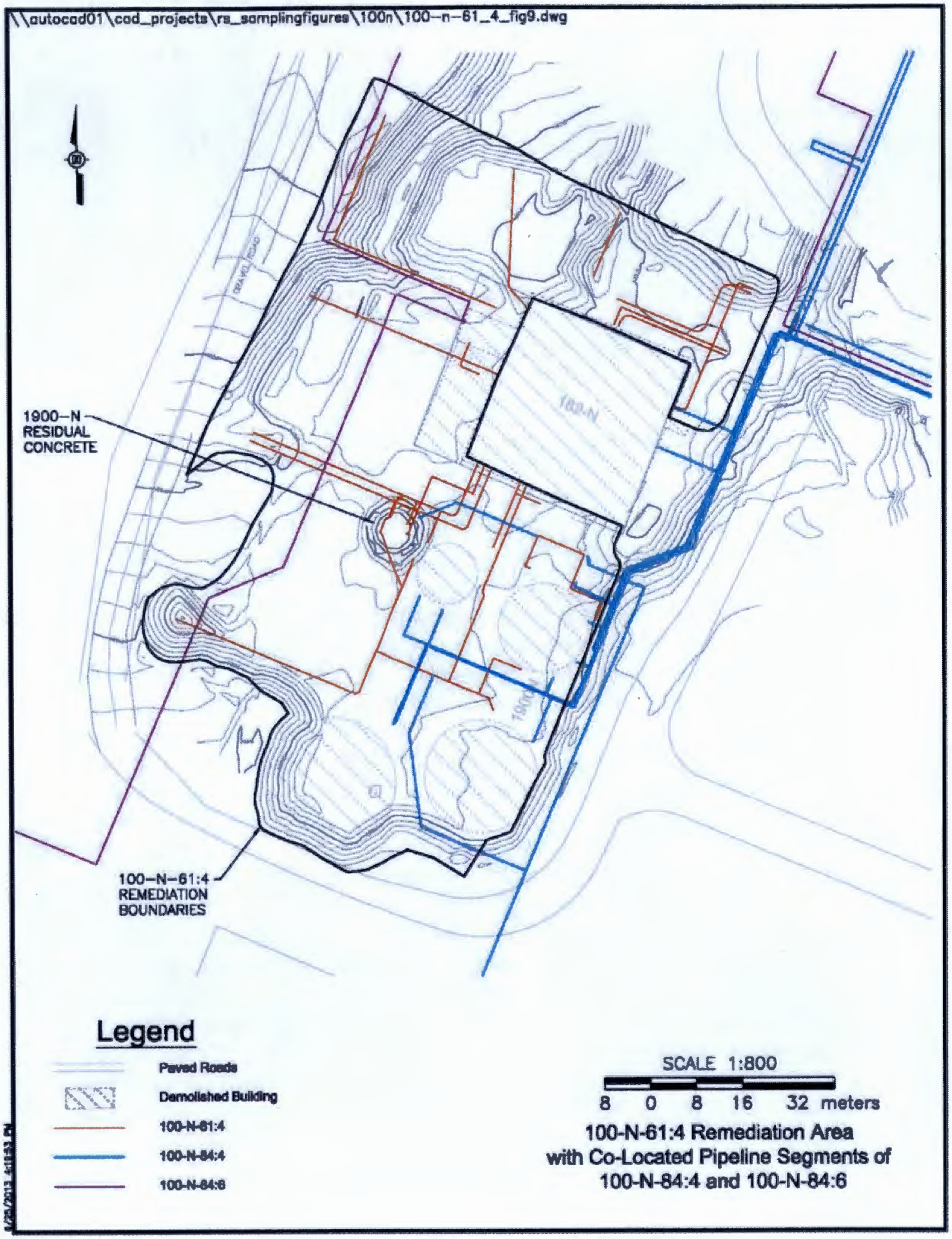
[b] The extended list of IC anions including bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate was requested. To preclude holding time issues for nitrate and nitrite with EPA Method 300.0, EPA Method 353.2 was also performed.

[c] Due to TPH contamination in the 100-N-61:4 and co-located 100-N-84:4 and 100-N-84:6 pipelines excavation area, TPH and PAH results were used for information only and not evaluated for compliance with remedial action goals. The portions of the 100-N-61:4 subsite with petroleum contamination will be added to the 100-N-106, Shallow Petroleum-Only Releases waste site.

EPA = U.S. Environmental Protection Agency
IC = ion chromatography
ICP = inductively coupled plasma
NWTPH-Dx = Northwest total petroleum hydrocarbons – diesel range organics
NIOSH = National Institute for Occupational Safety and Health
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons

Within the defined 100-N-61:4 remediation boundary, all segments of the 100-N-84:4 and 100-N-84:6 pipelines were removed (Figure 13). Therefore, these portions of 100-N-84:4 and 100-N-84:6 were included in the verification sampling design for 100-N-61:4. The areas between the pipelines footprints are also included in the verification sampling design per agreement with Ecology (WCH 2012a).

Figure 13. Remediation Boundary of 100-N-61:4 and Co-Located 100-N-84:4 and 100-N-84:6 Pipeline Segments for Closeout Sampling.



In-process samples were collected on January 29, 2013, from the 100-N-61:4 pipeline excavation footprint. In the pipeline footprint area south of the 182-N Building, TPH above 200 mg/kg and benzo(a)pyrene above direct exposure RAGs were measured (Appendix B). The elevated results are due to petroleum contamination, which is not associated with the 100-N-61:4 subsite. While TPH and PAH are retained as COPCs for verification sampling of 100-N-61:4 and the co-located portions of 100-N-84:4 and 100-N-84:6, the data from these analyses were not evaluated for waste site reclassification decisions. The portion of the 100-N-61:4 remediation footprint with residual petroleum contamination will be added to the 100-N-106, Shallow Petroleum-Only Releases waste site.

The COPCs for the 100-N-61:4 and co-located segments of 100-N-84:4 and 100-N-84:6 pipelines verification sampling includes total chromium, lead, mercury, hexavalent chromium, anions, TPH, PAH, GEA, strontium-90, and asbestos. As previously discussed, the cleanup verification TPH and PAH sample results were used for information only and were not evaluated for waste site reclassification. The analytical methods that were performed to evaluate the site COPCs are provided in Table 1.

Contaminants of Potential Concern for the South Staging Pile

The SSP received waste from the 100-N-29, 100-N-30, 100-N-37, 100-N-53, 100-N-57, 100-N-61:1, 100-N-61:2, 100-N-61:4, 100-N-62, 100-N-64:1, 100-N-64:2, 100-N-79, 100-N-84:1, 100-N-84:2, 100-N-84:3, 100-N-84:4, 100-N-84:5, 100-N-84:6, 100-N-84:7, 100-N-84:8, 116-N-4, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, and UPR-100-N-32 waste sites and subsites. Of these, the waste from the 100-N-84:1, 100-N-84:3, and 100-N-84:7 pipelines subsites was incidental to other remedial actions. Since the 100-N-84:1, 100-N-84:3, and 100-N-84:7 pipelines subsites are reclassified to Interim No Action (WCH 2012c, 2012d, 2012e), COPCs from these subsites are not evaluated.

The COPCs associated with the waste sites contributing waste material to the SSP are reported in Table 2. Both PAH and TPH are COPCs at several of these sites. However, asphalt contamination due to previous construction and/or demolition activities exists in the area used for the SSP. Elevated concentrations of PAH were measured in the in-process samples collected on May 7 and December 31, 2012 (Appendix B). Further remediation of the SSP was not performed in accordance with the previous agreement with Ecology regarding PAH exceedances attributable to cross-contamination of structural asphaltic materials (WCH 2012g). Therefore, analyses for PAH and TPH were not performed on verification samples. Semivolatile organic compounds (SVOC) were COPCs at several contributing waste sites. Because of the known asphalt contamination at the SSP, the concentrations of PAH analytes (acenaththene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) determined using the SVOC analytical method (EPA Method 8270) were reported for information only, and were not evaluated for compliance with RAGs.

Table 2. Contaminants of Potential Concern for Waste Sites Associated with the South Staging Pile.

Waste Site or Grouping	Contaminants of Potential Concern	Reference
100-N-29, 100-N-30, 100-N-37, 100-N-61:1, 100-N-64:1	ICP metals, mercury, hexavalent chromium, anions, nitrate/nitrite, GEA, Pu-239/240, Sr-90, tritium, asbestos	WCH 2012i
100-N-53	Copper, lead, zinc, mercury, PAH, PCBs, TPH	WCH 2011b
100-N-57, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, UPR-100-N-32	Total chromium, lead, mercury, hexavalent chromium, anions, nitrate/nitrite, PAH, PCBs, SVOCs, GEA, Pu-239/240, Sr-90, tritium	WCH 2011d
100-N-61:2, 100-N-62, 100-N-64:2	ICP metals, mercury, hexavalent chromium, anions, PAH, TPH, GEA, Sr-90, asbestos	WCH 2012h
100-N-61:4	Total chromium, lead, hexavalent chromium, anions, TPH, PAH, and asbestos	WCH 2013c
100-N-79	Total chromium, lead, mercury, hexavalent chromium, PCBs, GEA, C-14, Ni-63, Pu-238, Pu-239/240, Sr-90, tritium, isotopic uranium	WCH 2013d
100-N-84:2	Total chromium, lead, PAH, TPH	WCH 2010a
100-N-84:4	Total chromium, lead, mercury, hexavalent chromium, anions, nitrate/nitrite, PAH, TPH	WCH 2012b
100-N-84:5	Total chromium, lead, mercury, hexavalent chromium, PCBs, pesticides, SVOCs	WCH 2011c
100-N-84:6	Total chromium, lead, anions, TPH	WCH 2010b
100-N-84:8	Total chromium, lead, mercury, hexavalent chromium, anions, nitrate/nitrite, PCBs, SVOCs, pesticides	WCH 2010c
116-N-4	Total chromium, lead, mercury, hexavalent chromium, PAH, Cs-137, Co-60, Pu-239/240, Sr-90, tritium, SVOC	WCH 2011e

GEA = gamma energy analysis
ICP = inductively coupled plasma
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons
SVOC = semivolatile organic compound

The COPCs for the SSP verification sampling included inductively coupled plasma (ICP) metals (antimony, arsenic, barium, beryllium, boron, cadmium, chromium [total], cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc), mercury, hexavalent chromium, anions, nitrate/nitrite, pesticides, polychlorinated biphenyls (PCBs), SVOCs, gamma-emitting radionuclides, carbon-14, nickel-63, plutonium-238, plutonium-239/240, strontium-90, tritium, isotopic uranium, and asbestos. Analyses for PAH and TPH were not performed due to pre-existing asphalt contamination. As previously discussed, the PAH sample results determined in the SVOC analysis were used for information only and were not evaluated for waste site reclassification. The analytical methods that were performed to evaluate the SSP site COPCs are presented in Table 3.

Table 3. Laboratory Analytical Methods for Verification Sampling of the South Staging Pile.

Analytical Method	Contaminants of Potential Concern
ICP metals [a] – EPA Method 6010	ICP metals
Mercury – EPA Method 7471	Mercury
Hexavalent chromium – EPA Method 7196	Hexavalent chromium
IC anions – EPA Method 300.0 [b]	Inorganic anions
Nitrate/nitrite – EPA Method 353.2	Nitrate/nitrite
PCB – EPA Method 8082	Polychlorinated biphenyls
Bulk asbestos – NIOSH Method 7400	Asbestos
Pesticides – EPA Method 8081	Pesticides
SVOA – EPA Method 8270	Semivolatile organic compounds [c]
GEA – Gamma spectroscopy	Gamma-emitting radionuclides
Nickel-63 – LSC	Nickel-63
Carbon-14 – LSC	Carbon-14
Isotopic uranium – U AEA	Uranium-233/234, uranium-235, uranium-238
Isotopic plutonium – Pu AEA	Plutonium-238, plutonium-239/240
Tritium – LSC	Tritium
Total beta radiostrontium – GPC	Strontium-90

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.
[b] The extended list of IC anions including bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate was requested. To preclude holding time issues for nitrate and nitrite with EPA Method 300.0, EPA Method 353.2 was also performed.
[c] Due to pre-existing asphalt contamination at the location of the SSP, the polycyclic aromatic hydrocarbon results determined using EPA Method 8270 (acenaththene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) were presented for information only and not evaluated for compliance with remedial action goals.

AEA = alpha energy analysis
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
GPC = gas proportional counting
IC = ion chromatography
ICP = inductively coupled plasma
LSC = liquid scintillation counting
NIOSH = National Institute for Occupational Safety and Health
PCB = polychlorinated biphenyl
SSP = south staging pile
SVOA = semivolatile organic analysis

Contaminants of Potential Concern for the 100-N Pipelines Overburden

The three 100-N pipelines overburden piles received overburden material from the 100-N-61:1, 100-N-61:2, 100-N-62, 100-N-64:1, 100-N-64:2, 100-N-84:2, 100-N-84:4, 100-N-84:5, and 100-N-84:6 waste site/subsites. The COPCs associated with the waste sites contributing material to the 100-N pipelines overburden are reported in Table 4.

Table 4. Contaminants of Potential Concern for Waste Sites Associated with the 100-N Pipelines Overburden.

Waste Site or Grouping	Contaminants of Potential Concern	Reference
100-N-61:1, 100-N-64:1	Lead, total chromium, mercury, hexavalent chromium, anions, GEA, strontium-90, asbestos	WCH 2012i
100-N-61:2, 100-N-62, 100-N-64:2	Lead, total chromium, manganese, mercury, hexavalent chromium, anions, PAH, TPH, GEA, stronium-90, asbestos	WCH 2012h
100-N-84:2	Total chromium, lead, PAH, TPH	WCH 2010a
100-N-84:4	Total chromium, lead, mercury, hexavalent chromium, anions, nitrate/nitrite, PAH, TPH	WCH 2012b
100-N-84:5	Total chromium, lead, mercury, hexavalent chromium, PCBs, pesticides, SVOCs	WCH 2011c
100-N-84:6	Total chromium, lead, anions, TPH	WCH 2010b

GEA = gamma energy analysis
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons
SVOC = semivolatile organic compound

Due to previous facility demolition activities, asphaltic debris was present in the overburden soil removed during remediation of these pipelines. The soil containing asphaltic debris had been used to backfill demolished facilities that previously covered portions of these pipelines. Due to the direct exposure exceedances for PAH from asphalt measured in the in-process samples (Appendix B), the backfill material from these three overburden piles will be placed only in deep zone 100-N waste site excavation areas (areas greater than 4.6 m [15 ft] bgs) (WCH 2013b). The locations for deep zone backfill of these overburden piles will be agreed to with Ecology prior to initiating backfill operations.

The COPCs for the 100-N pipelines overburden verification sampling included total chromium, lead, manganese, mercury, hexavalent chromium, anions, nitrate/nitrite, TPH, PAH, SVOCs, pesticides, PCBs, gamma-emitting radionuclides, strontium-90, and asbestos. The analytical methods performed to evaluate the 100-N pipelines overburden COPCs are provided in Table 5.

Table 5. Laboratory Analytical Methods for the 100-N Pipelines Overburden. (2 Pages)

Analytical Method	Contaminants of Potential Concern
ICP metals [a] – EPA Method 6010	Chromium (total), lead, manganese
Mercury – EPA Method 7471	Mercury
Hexavalent chromium – EPA Method 7196	Hexavalent chromium
IC anions – EPA Method 300.0 [b]	Inorganic anions
Nitrate/nitrite – EPA Method 353.2	Nitrate/nitrite
PAH – EPA Method 8310 [c]	Polycyclic aromatic hydrocarbons
SVOA – EPA Method 8270	Semivolatile organic compounds

Table 5. Laboratory Analytical Methods for the 100-N Pipelines Overburden. (2 Pages)

Analytical Method	Contaminants of Potential Concern
PCBs – EPA Method 8082	Polychlorinated biphenyls
Pesticides– EPA Method 8081	Pesticides
TPH – NWTPH-Dx	Total petroleum hydrocarbons
GEA – Gamma spectroscopy	Gamma-emitting radionuclides
Total beta radiostrontium - GPC	Strontium-90
Bulk asbestos – NIOSH Method 7400	Asbestos

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.

[b] The extended list of IC anions including bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate was requested. To preclude holding time issues for nitrate and nitrite with EPA Method 300.0, EPA Method 353.2 was also performed.

[c] Because method 8310 specifically analyzes for PAH, data from this method was used preferentially over method 8270 data for site evaluation of the PAH analytes.

EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
GPC = gas proportional counting
IC = ion chromatography
ICP = inductively coupled plasma
NWTPH-Dx = Northwest total petroleum hydrocarbons – diesel range organics
NIOSH = National Institute for Occupational Safety and Health
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons

Verification Sample Design

The 100-N-61:4 and co-located segments of the 100-N-84:4 and 100-N-84:6 pipelines excavation area, including the areas between the pipelines, were considered one decision unit for verification sampling. The SSP and 100-N pipelines overburden were each considered decision units for verification sampling. Twelve statistical verification soil samples, a duplicate sample, and a split sample were collected from each of the three decision units.

All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites* (DOE-RL 2006a). All samples were grab samples collected at the predetermined coordinates. Additional information related to verification sampling can be found in the field sampling logbook (WCH 2013a). The verification sample summaries for the three decision units are provided in Tables 6, 7, and 8. Figure 14 shows the sample locations within the remediation boundary of 100-N-61:4 and co-located pipelines. Figure 15 shows the sample locations for the SSP area, and Figure 16 shows the sample locations at the 100-N pipelines overburden piles.

Table 6. 100-N-61:4 and Co-located 100-N-84:4 and 100-N-84:6 Pipelines Verification Sample Summary.

Sample Location	HEIS Sample Number	HEIS Sample Number (Asbestos)	Washington State Plane Coordinates		Sample Analysis
			Northing (m)	Easting (m)	
EXC-1	J1RL16	J1RL30	149310.5	571031.6	ICP metals [a], mercury, hexavalent chromium, IC anions, nitrate/nitrite, PAH, TPH, asbestos
EXC-2	J1RL17	J1RL31	149310.5	571058.3	
EXC-3	J1RL18	J1RL32	149333.6	571018.2	
EXC-4	J1RL19	J1RL33	149333.6	571044.9	
EXC-5	J1RL20	J1RL34	149356.8	571031.6	
EXC-6	J1RL21	J1RL35	149356.8	571058.3	
EXC-7	J1RL22	J1RL36	149379.9	571018.2	
EXC-8	J1RL23	J1RL37	149379.9	571044.9	
EXC-9	J1RL24	J1RL38	149403.0	571031.6	
EXC-10	J1RL25	J1RL39	149403.0	571058.3	
EXC-10 resample (PAH only)	J1RMR0	NA	149403.0	571058.3	
EXC-11	J1RL26	J1RL40	149403.0	571085.0	
EXC-12	J1RL27	J1RL41	149426.2	571044.9	
Duplicate of J1RL18	J1RL28	J1RL42	149333.6	571018.2	
Split of J1RL18	J1N152	J1RL44	149333.6	571018.2	
Equipment blank	J1RL29	NA	NA	NA	ICP metals [a], mercury

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, magnesium, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package.

HEIS = Hanford Environmental Information System
IC = ion chromatography
ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons

Table 7. South Staging Pile Verification Sample Summary. (2 Pages)

Sample Location	HEIS Sample Number	HEIS Sample Number (Asbestos)	Washington State Plane Coordinates		Sample Analysis
			Northing (m)	Easting (m)	
SSP-1	J1RL90	J1RLC4	149136.4	571147.1	ICP metals [a], mercury, hexavalent chromium, IC anions, nitrate/nitrite, PCBs, SVOA, pesticides, asbestos, GEA, nickel-63, carbon-14, isotopic uranium, isotopic plutonium, tritium, total beta radiostrontium
SSP-2	J1RL91	J1RLC5	149136.4	571178.0	
SSP-3	J1RL92	J1RLC6	149163.2	571131.6	
SSP-4	J1RL93	J1RLC7	149163.2	571162.5	
SSP-5	J1RL94	J1RLC8	149163.2	571193.4	
SSP-6	J1RL95	J1RLC9	149189.9	571116.2	
SSP-7	J1RL96	J1RLD0	149189.9	571147.1	
SSP-8	J1RL97	J1RLD1	149189.9	571178.0	
SSP-9	J1RL98	J1RLD2	149189.9	571208.9	
SSP-10	J1RL99	J1RLD3	149216.7	571100.7	
SSP-11	J1RLC0	J1RLD4	149216.7	571131.6	
SSP-12	J1RLC1	J1RLD5	149216.7	571162.5	
Duplicate of J1RL91	J1RLC2	J1RLD6	149136.4	571178.0	
Split of J1RL91	J1RLD8	J1RLD9	149136.4	571178.0	

Table 7. South Staging Pile Verification Sample Summary. (2 Pages)

Sample Location	HEIS Sample Number	HEIS Sample Number (Asbestos)	Washington State Plane Coordinates		Sample Analysis
			Northing (m)	Easting (m)	
Equipment blank	J1RLC3	NA	NA	NA	ICP metals [a], mercury, SVOA

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, magnesium, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package.

GEA = gamma energy analysis
HEIS = Hanford Environmental Information System
IC = ion chromatography
ICP = inductively coupled plasma
NA = not applicable
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis

Table 8. 100-N Pipelines Overburden Verification Sample Summary.

Sample Location	HEIS Sample Number	HEIS Sample Number (Asbestos)	Washington State Plane Coordinates		Sample Analysis
			Northing (m)	Easting (m)	
OB-1	J1RL45	J1RL59	149138.3	571029.7	ICP metals [a], mercury, hexavalent chromium, IC anions, nitrate/nitrite, TPH, PAH, PCBs, SVOA, pesticides, asbestos, GEA, total beta radiostrontium
OB-2	J1RL46	J1RL60	149138.3	571061.0	
OB-3	J1RL47	J1RL61	149165.4	571045.4	
OB-4	J1RL48	J1RL62	149081.3	571132.2	
OB-5	J1RL49	J1RL63	149108.4	571085.2	
OB-6	J1RL50	J1RL64	149108.4	571116.5	
OB-7	J1RL51	J1RL65	149108.4	571147.9	
OB-8	J1RL52	J1RL66	149135.6	571100.9	
OB-9	J1RL53	J1RL67	149162.7	571116.5	
OB-10	J1RL54	J1RL68	149240.4	571207.1	
OB-11	J1RL55	J1RL69	149240.4	571238.4	
OB-12	J1RL56	J1RL70	149267.5	571222.7	
Duplicate of J1RL49	J1RL57	J1RL71	149108.4	571085.2	
Split of J1RL49	J1RL73	J1RL74	149108.4	571085.2	
Equipment blank	J1RL58	NA	NA	NA	ICP metals [a], mercury, SVOA

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, magnesium, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package.

GEA = gamma energy analysis
HEIS = Hanford Environmental Information System
IC = ion chromatography
ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons

Figure 14. 100-N-61:4 and Co-Located 100-N-84:4 and 100-N-84:6 Pipelines Excavation Area Verification Sample Locations.

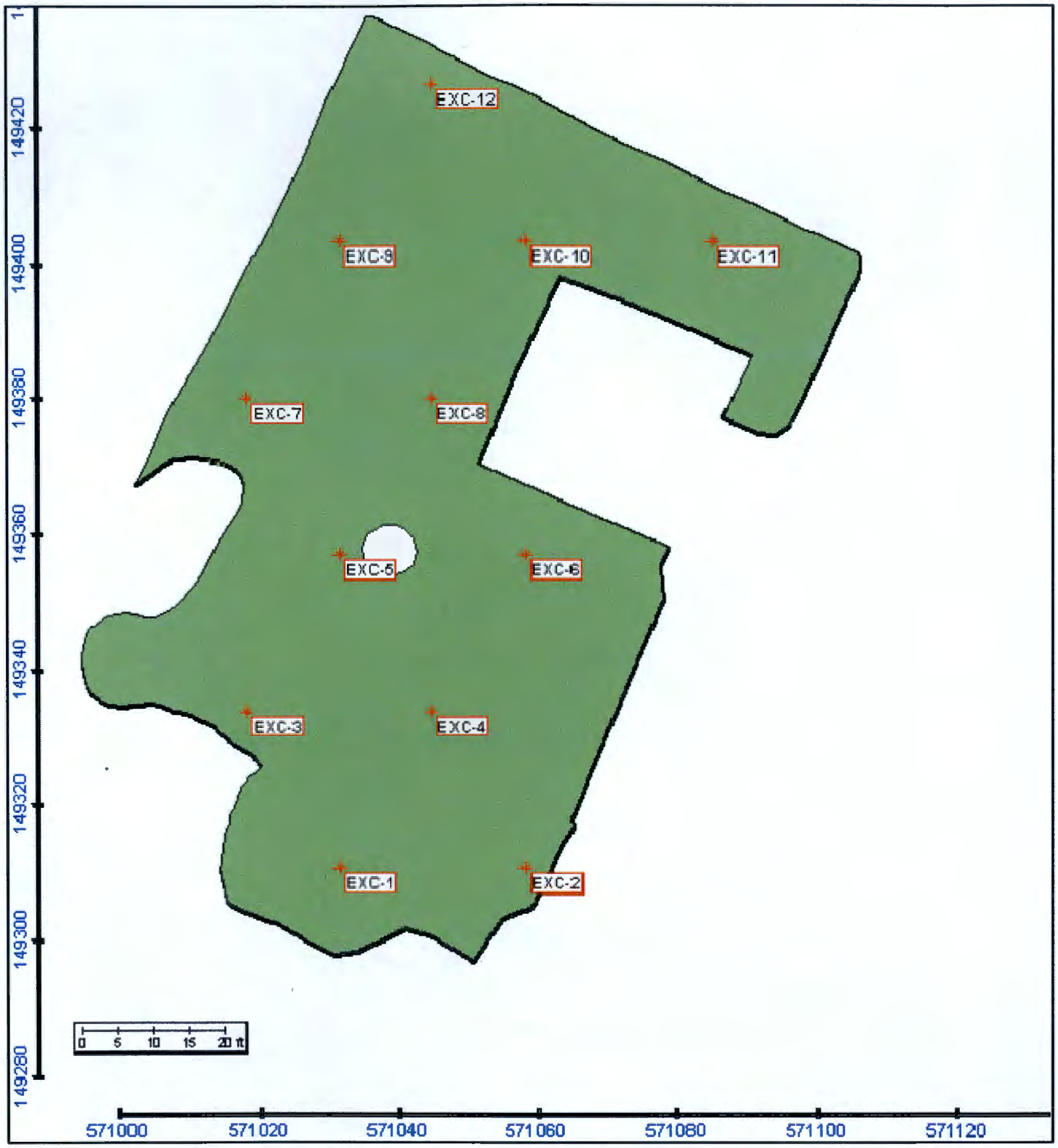


Figure 15. South Staging Pile Verification Sample Locations.

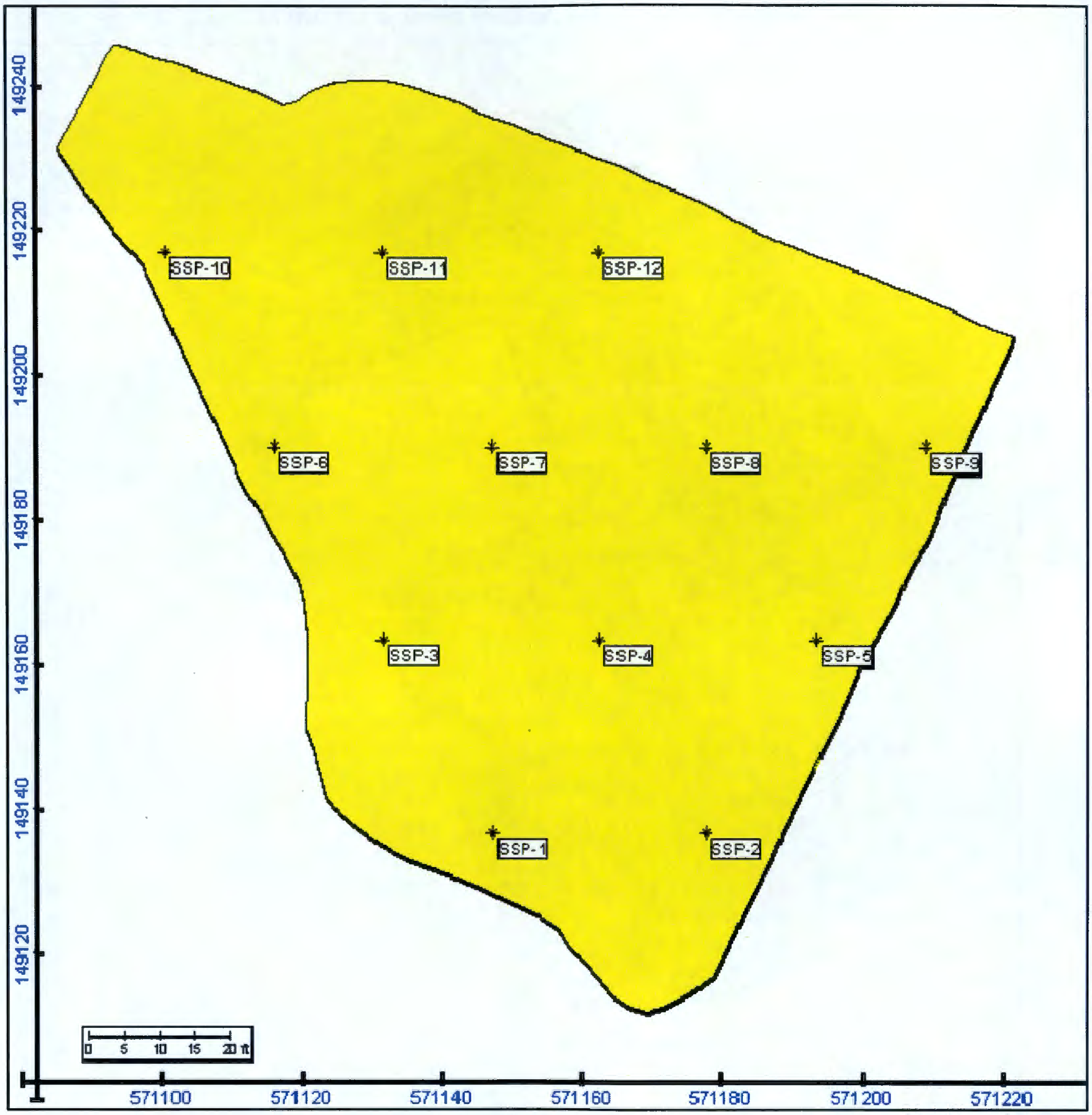
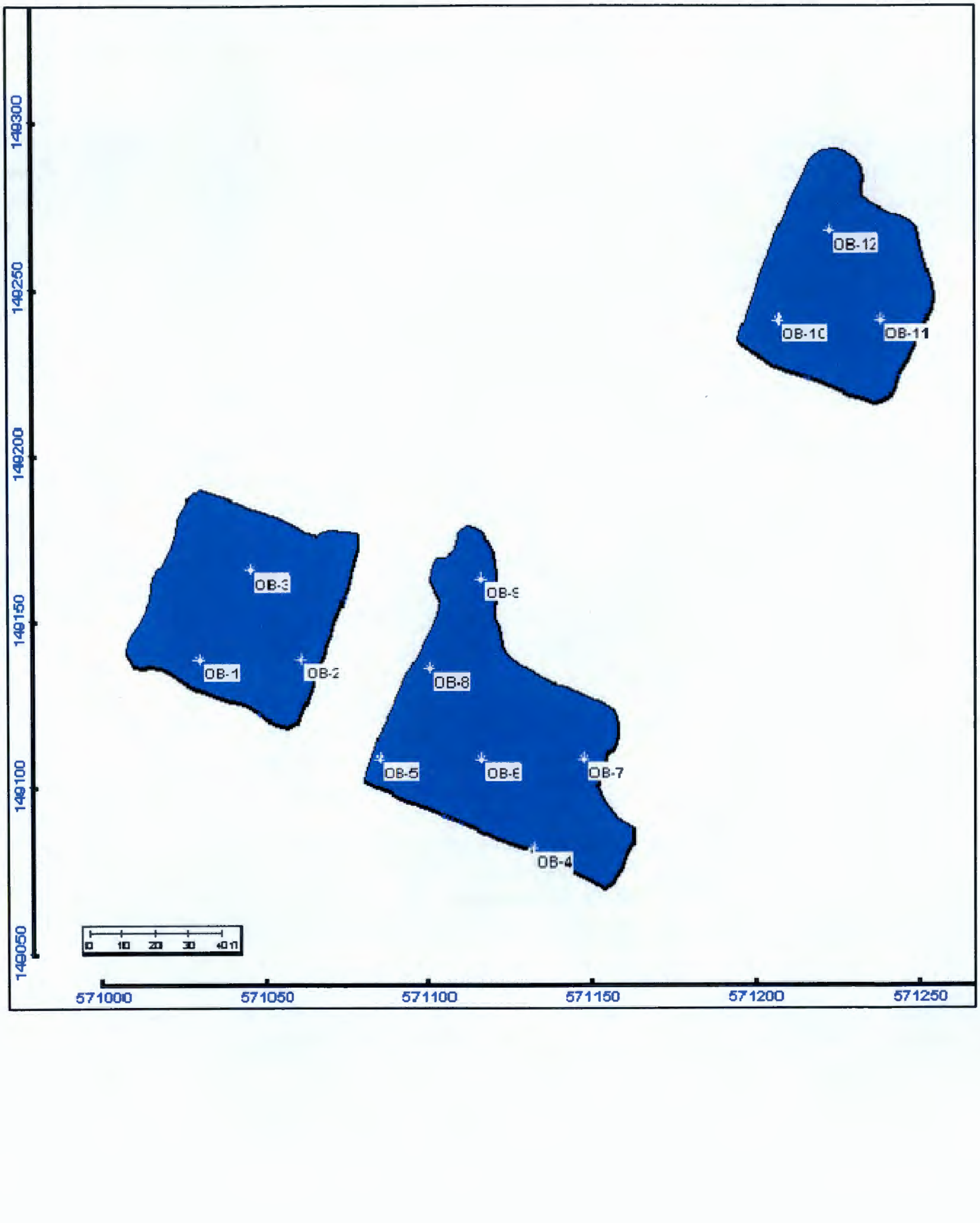


Figure 16. 100-N Pipelines Overburden Verification Sample Locations.



Verification Sample Results

All verification samples were analyzed using EPA-approved analytical methods. Evaluation of the verification data was performed by direct comparison of the statistical or maximum sample results for each COPC against the cleanup criteria.

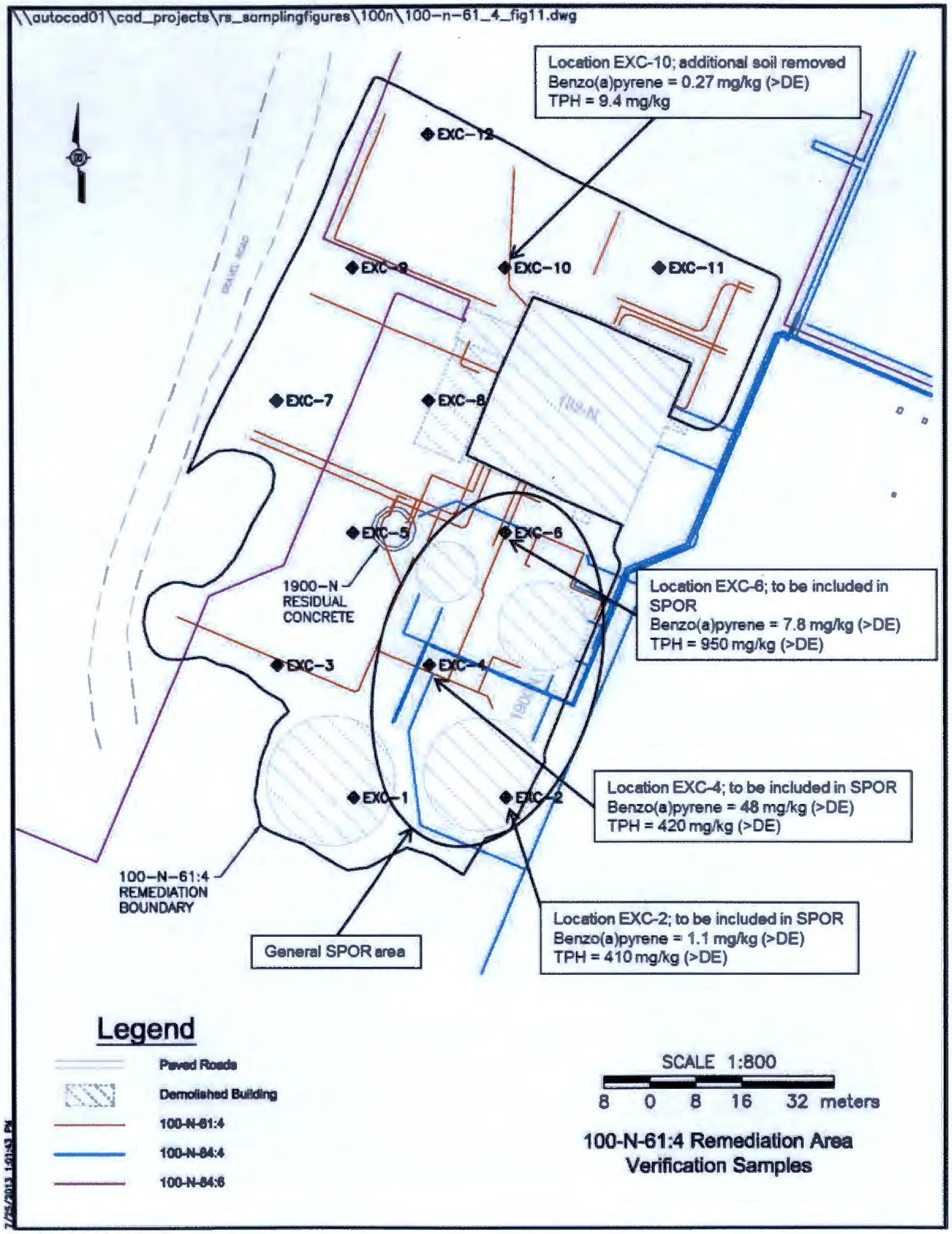
The primary statistical calculation to evaluate compliance with cleanup standards is the 95% upper confidence limit (UCL) on the arithmetic mean of the data. The 95% UCL values for each detected COPC are computed for each of the decision units as specified by the 100-N Area RDR/RAWP (DOE-RL 2006b). The calculations are provided in Appendix C. When a nonradionuclide COPC was detected in fewer than 50% of the verification samples collected for a decision unit, the maximum detected value was used for comparison to the RAGs. If no detections for a given COPC were reported in the data set, then no statistical calculation or evaluation was performed for that COPC.

Comparisons of the results for each COPC against the RAGs are summarized in Tables 9, 10, 11, and 12. Contaminants that were not detected by laboratory analysis are excluded from the tables. Calculated cleanup levels are not presented in the Cleanup Levels and Risk Calculations Database (Ecology 2012) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's *Risk Assessment Guidance for Superfund* (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COPCs and are also not included the tables. The complete laboratory results for all constituents are stored in the Environmental Restoration (ENRE) project-specific database prior to archival in Hanford Environmental Information System (HEIS) and are presented in Attachment 1 of the 95% UCL calculations (Appendix C).

Suspected oil staining unrelated to the 100-N-61:4 pipelines was observed intermittently in the excavation following remediation. Verification samples were analyzed for TPH and PAH to provide information on the extent of affected soil. The contaminated soil area will be added to the 100-N-106, Shallow Petroleum-Only Releases waste site. The TPH and PAH sample results from the excavation area are presented for information only in Attachment 2 of the 95% UCL calculations (Appendix C) and are not used for waste site reclassification evaluation. Concentrations of both TPH and PAH (including benzo(a)pyrene) in excess of direct exposure RAGs were measured at sample locations EXC-2, EXC-4, and EXC-6 as shown in Figure 17.

Elevated PAH results were measured in one verification sample (EXC-10) located north of the former 182-N Building (Figure 17). Because TPH was not elevated in this sample, the area underwent further remediation with approximately 1 m (3.3 ft) and approximately 532 BCM (694 BCY) of soil removed. The approximate removal area is shown in Figure 18. A sample (J1RMR0) was collected on May 16, 2013, from the EXC-10 location and analyzed for PAH only. All PAH results in J1RMR0 were below direct exposure RAGs.

Figure 17. Sample Locations within the 100-N-61:4 Excavation with PAH and/or TPH above Direct Exposure Remedial Action Goals.



DE = direct exposure
PAH = polycyclic aromatic hydrocarbons
SPOR = Shallow Petroleum-Only Releases; 100-N-106 waste site
TPH = total petroleum hydrocarbons

Figure 18. Additional Soil Removal Area Surrounding Sample Location EXC-10.

At the SSP, PAH and TPH were COPCs for staged waste material from multiple waste sites. However, asphalt contamination due to previous construction and/or demolition activities existed at the area used for the SSP. Therefore, analysis for PAH and TPH was not performed. Semivolatile organic compounds were COPCs at several contributing waste sites. Because of the known asphalt contamination at the SSP, the concentrations of PAH analytes determined using the SVOC analytical method (EPA Method 8270) (acenaththene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) are reported in Attachment 2 of the 95% UCL calculations (Appendix C) for information only and not evaluated for compliance with RAGs.

DATA EVALUATION

This section demonstrates that contaminant concentrations at the 100-N-61:4 subsite, SSP, and 100-N pipelines overburden achieve the applicable RAGs developed to support unrestricted land use at the 100 Area as established in the 100-N Area ROD (EPA 1999) and documented in the 100-N Area RDR/RAWP (DOE-RL 2006b).

100-N-61:4 and Co-Located Segments of 100-N-84:4 and 100-N-84:6 Pipelines

Attainment of Radionuclide RAGS

Radionuclides were not COPCs for the 100-N-61:4, 100-N-84:4, and 100-N-84:6 pipelines.

Attainment of Nonradionuclide RAGS

Table 9 compares the cleanup verification sample results from the 100-N-61:4 excavation area to the applicable soil RAGs for direct exposure, protection of groundwater, and protection of the Columbia River.

Table 9. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-N-61:4 and Co-located 100-N-84:4 and 100-N-84:6 Pipeline Segments Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony [c]	0.85 (<BG)	32	5 [d]	5 [d]	No	--
Arsenic	3.4 (<BG)	20 [d]	20 [d]	20 [d]	No	--
Barium	63.9 (<BG)	16,000	200	400	No	--
Beryllium	0.019 (<BG)	10.4 [e]	1.51 [d]	1.51 [d]	No	--
Boron [f]	1.0	16,000	320	-- [g]	No	--
Cadmium [c]	0.17 (<BG)	13.9 [e]	0.81 [d]	0.81 [d]	No	--
Chromium	11.8 (<BG)	120,000	18.5 [d]	18.5 [d]	No	--
Cobalt	8.7 (<BG)	1,600	32	-- [g]	No	--
Copper	17.1 (<BG)	2,960	59.2	22.0 [d]	No	--
Hexavalent chromium [f]	0.190	2.1 [e]	4.8	2	No	--
Lead	12.1	353	10.2 [d]	10.2 [d]	Yes	Yes [h]
Manganese	325 (<BG)	11,200	512 [d]	-- [g]	No	--
Mercury	0.065 (<BG)	24	0.33 [d]	0.33 [d]	No	--
Molybdenum [f]	0.63	400	8	-- [g]	No	--
Nickel	13.1 (<BG)	1,600	19.1 [d]	27.4	No	--
Vanadium	55.5 (<BG)	560	85.1 [d]	-- [g]	No	--
Zinc	47.7 (<BG)	24,000	480	67.8 [d]	No	--
Chloride	6.9 (<BG)	--	25,000	-- [g]	No	--

Table 9. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-N-61:4 and Co-located 100-N-84:4 and 100-N-84:6 Pipeline Segments Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Does the Result Exceed RAGs?		
Fluoride	1.1 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate	7.7 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrite and nitrate	25.9	128,000	1,000	2,000	No	--
Sulfate	60.2 (<BG)	NA	25,000	-- [g]	No	--

[a] Remedial action goals obtained from the 100-N Area RDR/RAWP (DOE-RL 2006b) or the 100 Area RDR/RAWP (DOE-RL 2009).

[b] Maximum or 95% UCL, depending on data censorship, as described in the *100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations* (Appendix C).

[c] Hanford Site-specific background not available. Value is Washington State background from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

[d] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100-N Area RDR/RAWP (DOE-RL 2006b).

[e] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3], Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[f] No Hanford Site-specific or Washington State background value available.

[g] No parameters (bioconcentration factors or AWQC values) are available from the Ecology Cleanup Levels and Risk Calculations database or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], 1996 [Method B for surface waters]).

[h] Based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), the residual concentrations of lead are predicted to migrate less than 1.8 m (6 ft) vertically within 1,000 years (based on the soil-partitioning coefficient of 30 mL/g). The vadose zone beneath the deepest portion of the 100-N-61:4 and co-located segments of the 100-N-84:4 and 100-N-84:6 pipelines excavation is approximately 10.5 m (34.5 ft) thick. Therefore, the residual concentration of lead is predicted to be protective of groundwater and the Columbia River.

-- = not applicable
AWQC = ambient water quality criteria
BG = background
COPC = contaminant of potential concern
Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
NA = not available
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = Remedial Design Report/Remedial Action Work Plan
RESRAD = RESidual RADioactivity (dose model)
UCL = upper confidence limit
WAC = *Washington Administrative Code*

All COPCs from the 100-N-61:4 and co-located segments of the 100-N-84:4 and 100-N-84:6 pipelines were quantified below direct exposure RAGs. All COPCs were quantified below groundwater and/or river protection soil RAGs with the exception of lead. However, given the soil-partitioning coefficient (K_d) of lead (30 mL/g), none would be expected to migrate more than 1.8 m (6 ft) vertically in 1,000 years based on RESidual Radioactivity (RESRAD) modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b). The vadose zone beneath the deepest area within the 100-N-61:4 remediation boundary is approximately 10.5 m (34.5 ft) thick. Therefore, residual concentrations of lead are predicted to be protective of groundwater (and thus the Columbia River).

South Staging Pile Area

Table 10 compares the cleanup verification sample results from the SSP area to the applicable soil RAGs for direct exposure, protection of groundwater, and protection of the Columbia River.

Table 10. Comparison of Contaminant Concentrations to Remedial Action Goals for the South Staging Pile Area Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (pCi/g)	Soil Lookup Values [a] (pCi/g)			Does the Result Exceed Lookup Values?	Does the Result Pass RESRAD Modeling?
		Direct Exposure Lookup Value	Soil Lookup Value for Groundwater Protection	Soil Lookup Value for River Protection		
Cesium-137	0.0539 (<BG)	6.2	1,465	2,930	No	--
Nickel-63	6.82	4,013	83	166	No	--
Plutonium-239/240	0.0381	33.9	-- [c]	-- [c]	No	--
Tritium	0.0131	459	12.6	25.2	No	--
Uranium-234	0.204 (<BG)	1.1 [d]	1.1 [d]	1.1 [d]	No	--
Uranium-238	0.222 (<BG)	1.1 [d]	1.1 [d]	1.1 [d]	No	--
COPC	**Statistical or Maximum Result [b] (mg/kg)**	**Remedial Action Goals (mg/kg) [a]**			**Does the Result Exceed RAGs?**	**Does the Result Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Antimony [e]	0.49 (<BG)	32	5 [d]	5 [d]	No	--
Arsenic	3.3 (<BG)	20 [d]	20 [d]	20 [d]	No	--
Barium	81.1 (<BG)	16,000	200	400	No	--
Beryllium	0.25 (<BG)	10.4 [f]	1.51 [d]	1.51 [d]	No	--
Boron [g]	1.6	16,000	320	-- [h]	No	--
Cadmium [e]	0.27 (<BG)	13.9 [f]	0.81 [d]	0.81 [d]	No	--
Chromium	13.9 (<BG)	120,000	18.5 [d]	18.5 [d]	No	--
Cobalt	8.7 (<BG)	1,600	32	-- [h]	No	--
Copper	17.2 (<BG)	2,960	59.2	22.0 [d]	No	--
Hexavalent chromium [g]	0.185	2.1 [f]	4.8	2	No	--
Lead	17.6	353	10.2 [d]	10.2 [d]	Yes	Yes [i]
Manganese	348 (<BG)	11,200	512 [d]	-- [h]	No	--
Mercury	0.11 (<BG)	24	0.33 [d]	0.33 [d]	No	--
Molybdenum [g]	0.35	400	8	-- [h]	No	--
Nickel	16.7 (<BG)	1,600	19.1 [d]	27.4	No	--
Vanadium	49.5 (<BG)	560	85.1 [d]	-- [h]	No	--
Zinc	55.7 (<BG)	24,000	480	67.8 [d]	No	--
Chloride	43.5 (<BG)	--	25,000	-- [h]	No	--

Table 10. Comparison of Contaminant Concentrations to Remedial Action Goals for the South Staging Pile Area Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Does the Result Exceed RAGs?		
Fluoride	1.9 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate	91.7	128,000	1,000	2,000	No	--
Nitrogen in nitrite and nitrate	198	128,000	1,000	2,000	No	--
Sulfate	137 (<BG)	--	25,000	-- [h]	No	--
Carbazole	0.49	50 [j]	0.437	-- [h]	Yes	Yes [i]
Dibenzofuran	0.16	160	3.20	-- [h]	No	--
Aroclor-1254	0.086	0.5	0.017 [k]	0.017 [k]	Yes	Yes [i]
Aroclor-1260	0.133	0.5	0.017 [k]	0.017 [k]	Yes	Yes [i]
Total PCBs	0.219	0.5	0.017 [k]	0.017 [k]	Yes	Yes [i]
4,4'- DDD	0.0013	4.17 [j]	0.0365	0.005 [k]	No	--
4,4'- DDE	0.0013	2.94 [j]	0.0257	0.005 [k]	No	--
4,4'- DDT	0.012	2.94 [j]	0.0257	0.005 [k]	Yes	Yes [i]
Chlordane (alpha and gamma)	0.0028	2.86 [j]	0.025	0.0165 [k]	No	--
Dieldrin	0.00035	0.0625 [j]	0.003 [k]	0.003 [k]	No	--

[a] Lookup values and RAGs obtained from the 100-N Area RDR/RAWP (DOE-RL 2006b) or the 100 Area RDR/RAWP (DOE-RL 2009).

[b] Maximum or 95% UCL, depending on data censorship, as described in the *100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations* (in Appendix C).

[c] No value; because the distribution coefficient (K_d) value for this contaminant is greater than 80 mL/g, RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009) predicts that the contaminant will show no migration within the 100 Area vadose zone and no impact on groundwater or the Columbia River.

[d] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100-N Area RDR/RAWP (DOE-RL 2006b).

[e] Hanford Site-specific background not available. Value is Washington State background from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

[f] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3], Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[g] No Hanford Site-specific or Washington State background value available.

[h] No parameters (bioconcentration factors or AWQC values) are available from the Ecology Cleanup Levels and Risk Calculations database or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], 1996 [Method B for surface waters]).

[i] Based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), the residual concentrations of lead, carbazole, total PCBs (aroclor-1254 and aroclor-1260), and 4,4-DDT are predicted to migrate less than 1.8 m (6 ft) vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding RAGs, lead, with a distribution coefficient of 30 mL/g). The vadose zone beneath the south staging pile is approximately 22 m (72 ft) thick. Therefore, the residual concentration of all constituents exceeding groundwater and/or river protection soil RAGs are predicted to be protective of groundwater and the Columbia River.

[j] Carcinogenic cleanup level calculated per WAC 173-340-740(3), Method B, 1996.

[k] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).

--	= not applicable	PCB	= polychlorinated biphenyl
AWQC	= ambient water quality criteria	RAG	= remedial action goal
BG	= background	RDL	= required detection limit
COPC	= contaminant of potential concern	RDR/RAWP	= Remedial Design Report/Remedial Action Work Plan
Ecology	= Washington State Department of Ecology	RESRAD	= RESidual RADioactivity (dose model)
EPA	= U.S. Environmental Protection Agency	UCL	= upper confidence limit
NA	= not available	WAC	= *Washington Administrative Code*

Attainment of Radionuclide RAGs

Evaluation of the SSP radionuclide cleanup verification results (Table 10) indicates that all COPCs were quantified below direct exposure RAGs. Evaluation of direct exposure RAG attainment for radionuclides was performed using the single-radionuclide dose-equivalence lookup values to perform a sum of fractions evaluation. The model used to develop these dose-equivalence lookup values is presented in the 100-N Area RDR/RAWP (DOE-RL 2006b). Table 11 compares the radionuclide cleanup verification results from the SSP to direct exposure single radionuclide 15 mrem/yr dose-equivalence values and shows the sum of fractions evaluation for comparison of the total radionuclide dose to the RAG of 15 mrem/yr above background.

Table 11. Attainment of Radionuclide Direct Exposure Remedial Action Goals at the South Staging Pile.

COPC	95% UCL Statistical or Maximum Values (pCi/g)	Activity Equivalent to 15 mrem/yr Dose [a] (pCi/g)	Fraction
Cesium-137	0.0539 (<BG)	6.2	0.0087
Nickel-63	6.82	4,013	0.00170
Plutonium-239/240	0.0381	33.9	0.00112
Tritium	0.0131	459	0.0000285
Uranium-234	0.204 (<BG)	1.1	0 [b]
Uranium-238	0.222 (<BG)	1.1	0 [b]
		Total	0.0115
		Equivalent Dose (mrem/yr)	0.173

[a] Single radionuclide 15 mrem/yr dose-equivalence values and derivation methodology are presented in the *Remedial Design Report/Remedial Action Work Plan for the 100-N Area* (DOE-RL 2006b).

[b] Radionuclide background subtracted from statistical value resulting in no contribution to the sum of fractions for evaluation of dose.

BG = background

COPC= contaminant of potential concern

UCL = upper confidence limit

The columns on the left side of the table are the COPCs and the maximum radionuclide activities for the samples from the SSP. The third column presents the single radionuclide 15 mrem/yr dose-equivalence activities, and the last column presents the radionuclide activities divided by the dose-equivalence activities. As demonstrated by the summation of the fractions for the individual radionuclides, the maximum cumulative dose value contributed by the residual radionuclides is predicted to be less than the RAG of 15 mrem/yr above background. The maximum cumulative dose rate predicted for the SSP is 0.173 mrem/yr.

Attainment of Nonradionuclide RAGS

All nonradionuclide COPCs from the SSP were quantified below direct exposure RAGs. All COPCs were quantified below groundwater and/or river protection soil RAGs with the exception of lead, carbazole, total PCBs (aroclor-1254 and aroclor-1260), and 4,4-DDT. However, given the lowest soil K_d of these contaminants (lead) of 30 mL/g , none of the COPCs are expected to migrate more than 1.8 m (6 ft) vertically in 1,000 years based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b). The vadose zone beneath the SSP is approximately 22 m (72 ft) thick. Therefore, residual concentrations of all constituents exceeding groundwater and/or river protection soil RAGs are predicted to be protective of groundwater and the Columbia River.

100-N Pipelines Overburden

Attainment of Radionuclide RAGS

Radionuclide COPCs were not detected in the 100-N pipelines overburden verification samples.

Attainment of Nonradionuclide RAGS

Table 12 compares the cleanup verification sample results from the 100-N pipelines overburden to the applicable soil RAGs for protection of groundwater and protection of the Columbia River. As previously discussed, the 100-N pipelines overburden soil will be backfilled only to 100-N deep zone excavations (greater than 4.6 m [15 ft] bgs). Therefore, comparison to direct exposure RAGs is not applicable.

All COPCs were quantified below groundwater and/or river protection soil RAGs with the exception of lead, mercury, total PCBs (aroclor-1254 and aroclor-1260), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene. However, given the lowest soil K_d of these contaminants (lead and mercury) of 30 mL/g, none would be expected to migrate more than 1.8 m (6 ft) vertically in 1,000 years based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b). This overburden will be backfilled to deep zone excavation areas (WCH 2013b) and will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. The locations for deep zone backfill of the overburden soil will be agreed to with Ecology prior to initiating backfill operations. Therefore, residual concentrations of lead, mercury, total PCBs (aroclor-1254 and aroclor-1260), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene are predicted to be protective of groundwater (and thus the Columbia River).

Table 12. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-N Pipelines Overburden Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]		Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony [c]	0.76 (<BG)	5 [d]	5 [d]	No	--
Arsenic	2.3 (<BG)	20 [d]	20 [d]	No	--
Barium	58.4 (<BG)	200	400	No	--
Beryllium	0.14 (<BG)	1.51 [d]	1.51 [d]	No	--
Cadmium [c]	0.31 (<BG)	0.81 [d]	0.81 [d]	No	--
Chromium	9.4 (<BG)	18.5 [d]	18.5 [d]	No	--
Cobalt	9.4 (<BG)	32	-- [e]	No	--
Copper	18.2 (<BG)	59.2	22.0 [d]	No	--
Hexavalent chromium [f]	0.231	4.8	2	No	--
Lead	15.1	10.2 [d]	10.2 [d]	Yes	Yes [g]
Manganese	319 (<BG)	512 [d]	-- [e]	No	--
Mercury	1.0	0.33 [d]	0.33 [d]	Yes	Yes [g]
Molybdenum [f]	0.43	8	-- [e]	No	--
Nickel	11.7 (<BG)	19.1 [d]	27.4	No	--
Vanadium	53.9 (<BG)	85.1 [d]	-- [e]	No	--
Zinc	59.7 (<BG)	480	67.8 [d]	No	--
Chloride	11.3 (<BG)	25,000	-- [e]	No	--
Fluoride	0.91 (<BG)	96	400	No	--
Nitrogen in nitrate	1.2 (<BG)	1,000	2,000	No	--
Nitrogen in nitrite and nitrate	0.68 (<BG)	1,000	2,000	No	--
Sulfate	31.1 (<BG)	25,000	-- [e]	No	--
TPH (diesel range)	36	200	200	No	--
TPH (diesel range extended)	61	200	200	No	--
Aroclor-1254	0.23	0.017 [h]	0.017 [h]	Yes	Yes [g]
Aroclor-1260	0.12	0.017 [h]	0.017 [h]	Yes	Yes [g]
Total PCBs	0.35	0.017 [h]	0.017 [h]	Yes	Yes [g]
Acenaphthene	5.8	96	239	No	--
Anthracene	61	240	1,920	No	--
Benzo(a)anthracene	1.8	0.015 [h]	0.015 [h]	Yes	Yes [g]
Benzo(a)pyrene	6.8	0.015 [h]	0.015 [h]	Yes	Yes [g]
Benzo(b)fluoranthene	7.5	0.015 [h]	0.015 [h]	Yes	Yes [g]
Benzo(ghi)fluoranthene [i]	2.5	48	192	No	--
Benzo(k)fluoranthene	4.9	0.015 [h]	0.015 [h]	Yes	Yes [g]
Carbazole	0.43	0.437	-- [e]	No	--
Chrysene	9.9	1.2	0.10 [h]	Yes	Yes [g]
Dibenz(a,h)anthracene	0.17	0.03 [h]	0.03 [h]	Yes	Yes [g]
Dibenzofuran	0.073	3.20	-- [e]	No	--
Fluoranthene	69	64	18.0	Yes	Yes [g]

Table 12. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-N Pipelines Overburden Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]		Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Fluorene	6.5	64	260	No	--
Indeno(1,2,3-cd)pyrene	2.0	0.015 [h]	0.015 [h]	Yes	Yes [g]
Phenanthrene [i]	117	240	1,920	No	--
Pyrene	31	48	192	No	--
4,4'- DDE	0.0012	0.0257	0.005 [h]	No	--
4,4'- DDT	0.0015	0.0257	0.005 [h]	No	--
Dieldrin	0.0026	0.003 [h]	0.003 [h]	No	--
Endosulfan II	0.00033	9.6	0.0112	No	--

[a] Remedial action goals obtained from the 100-N Area RDR/RAWP (DOE-RL 2006b) or the 100 Area RDR/RAWP (DOE-RL 2009).

[b] Maximum or 95% UCL, depending on data censorship, as described in the *100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations* (in Appendix C).

[c] Hanford Site-specific background not available. Value is Washington State background from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

[d] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100-N Area RDR/RAWP (DOE-RL 2006b).

[e] No parameters (bioconcentration factors or AWQC values) are available from the Ecology Cleanup Levels and Risk Calculations database or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], 1996 [Method B for surface waters]).

[f] No Hanford Site-specific or Washington State background value available.

[g] Based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), the residual concentrations of lead, mercury, total PCBs (aroclor-1254 and aroclor-1260), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, and indeno(1,2,3-cd)pyrene are predicted to migrate less than 1.8 m (6 ft) vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding RAGs, lead and mercury, with a distribution coefficient of 30 mL/g). The overburden from these piles will be backfilled to deep zone locations that are at least 4.6 m (15 ft) bgs and will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. Therefore, the residual concentration of all constituents exceeding groundwater and/or river protection soil RAGs are predicted to be protective of groundwater and the Columbia River.

[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).

[i] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals.
Contaminant: benzo(g,h,i)perylene, surrogate: pyrene
Contaminant: phenanthrene, surrogate: anthracene.

-- = not applicable
AWQC = ambient water quality criteria
BG = background
COPC = contaminant of potential concern
Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
NA = not available
PCBs = polychlorinated biphenyls
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = Remedial Design Report/Remedial Action Work Plan
RESRAD = RESidual RADioactivity (dose model)
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Three-Part Test for Nonradionuclides

A RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test, which consists of the following criteria: (1) the cleanup verification 95% UCL value must be less than the cleanup level, (2) no single detection shall exceed two times the cleanup criteria, and (3) the percentage of samples exceeding the cleanup criteria must be less than 10% of the data set.

The application of the three-part test for the 100-N-61:4 subsite excavation, SSP, and 100-N pipelines overburden is included in the 95% UCL calculations, where half or more of the data set was detected (Appendix C). The results of this evaluation indicate that residual COPC concentrations pass the three-part test in comparison against applicable RAGs, with the exception of lead at both the 100-N-61:4 subsite and SSP and aroclor-1254, aroclor-1260, and 4-4'-DDT at the SSP only, which fail one or more parts of the three-part test to be protective of groundwater and the Columbia River. However, based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), the residual concentrations of these constituents are predicted to migrate less than 1.8 m (6 ft) vertically within 1,000 years (based on the contaminant with the lowest soil K_d [lead with a K_d of 30 mL/g]). The vadose zones beneath the 100-N-61:4 excavation and SSP are approximately 10.5 m (34.5 ft) and 22.0 m (72 ft) thick, respectively. Therefore, the residual concentrations of these contaminants are predicted to be protective of groundwater and the Columbia River.

The results of the three-part test evaluation for the 100-N pipelines overburden indicate that residual COPC concentrations pass the three-part test in comparison against applicable RAGs, with the exception of lead, mercury, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, aroclor-1254, and aroclor-1260, which fail one or more parts of the three-part test to be protective of groundwater and the Columbia River as well as the direct exposure RAGs for several of the PAH. However, based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), the residual concentrations of these constituents are predicted to migrate less than 1.8 m (6 ft) vertically within 1,000 years (based on the contaminants with the lowest soil K_d [lead and mercury with a K_d of 30 mL/g]). The overburden will be backfilled only to deep zone locations that are at least 4.6 m (15 ft) bgs (WCH 2013b) and not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. Therefore, the residual concentrations of these contaminants are predicted to be protective of groundwater and the Columbia River. Because those contaminants which exceed the direct exposure RAGs will be backfilled to the deep zone (greater than 4.6 m [15 ft] bgs), there will be no direct exposure pathway.

An additional application of the three-part test is included for the statistical data sets that default to the maximum because less than half of the data set was detected. The results of this evaluation indicate that residual COPC concentrations pass the three-part test in comparison against applicable RAGs with the exception of carbazole in the SSP and dibenz(a,h)anthracene in the 100-N pipelines overburden, which fail one or more parts of the three-part test to be protective of groundwater and the Columbia River. However, based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), the residual concentration of carbazole at the SSP is not predicted to migrate vertically within 1,000 years (based on the K_d of 200 mL/g). The vadose zone beneath the SSP is approximately 22 m (72 ft) thick. Additionally, based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b), the residual concentration of dibenz(a,h)anthracene from the 100-N pipelines overburden is not predicted to migrate vertically within 1,000 years (based on the K_d of 1,790 mL/g). The overburden will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. Therefore, nonradionuclide risk requirements related to groundwater are met.

Nonradionuclide Direct Contact Hazard Quotient and Carcinogenic Risk RAGs Attained

Nonradionuclide risk requirements for the 100-N-61:4 subsite and SSP included an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. These risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background. All individual hazard quotients for noncarcinogenic constituents were less than 1.0. The cumulative hazard quotient for those noncarcinogenic constituents above background or detected levels is 5.9×10^{-2}, which is less than 1.0. The individual carcinogenic risk values for the carcinogenic constituents detected above background are less than 1×10^{-6}, and the cumulative carcinogenic risk value was 5.5×10^{-7}, which is less than 1×10^{-5}. Therefore, the 100-N-61:4 subsite and SSP meet the requirements for the direct contact hazard quotient and excess carcinogenic risk as identified in the 100-N Area RDR/RAWP (DOE-RL 2006b).

For the 100-N pipelines overburden, these risk values were not calculated since the material will be backfilled below a depth of 4.6 m (15 ft) bgs and there will be no direct exposure pathway.

Nonradionuclide Groundwater Hazard Quotient and Carcinogenic Risk RAGs Attained

Assessment of the risk requirements for the 100-N-61:4 subsite, SSP, and 100-N pipelines overburden included a calculation of the hazard quotient and carcinogenic (excess cancer) risk values for groundwater protection for nonradionuclides. The requirements include an individual and cumulative hazard quotient of less than 1.0, an individual excess carcinogenic risk of less than 1×10^{-6}, and a cumulative excess carcinogenic risk of less than 1×10^{-5}. Risk values were calculated for constituents that were detected at concentrations above Hanford Site or Washington State background values or for which there is no background value. In addition, the soil K_d for these contaminants must be less than that necessary to show no migration to groundwater in 1,000 years based on RESRAD modeling discussed in Appendix C of the 100-N Area RDR/RAWP (DOE-RL 2006b). Based on this model and a vadose zone of at least 10.5 m (34.5 ft) in thickness for the 100-N-61:4 subsite and SSP, a K_d of 1.2 or greater is required to show no predicted migration to groundwater in 1,000 years. For the 100-N pipelines overburden, a vadose zone of at least 3 m (9.9 ft) in thickness and a K_d of 20 or greater is required to show no predicted migration to groundwater in 1,000 years. All individual hazard quotients for noncarcinogenic constituents are less than 1.0. The cumulative hazard quotient for the 100-N-61:4 subsite and SSP is 1.2×10^{-1}, which is less than 1.0. The cumulative hazard quotient for the 100-N pipelines overburden is 2.3×10^{-1}, which is less than 1.0. No carcinogenic soil constituents met the criteria for groundwater protection evaluation at the

100-N-61:4 subsite, SSP, or 100-N pipelines overburden; therefore, no calculations of excess carcinogenic risk were performed. Therefore, nonradionuclide risk requirements related to groundwater are met.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the verification sampling approach (WCH 2013c), the field logbook (WCH 2013a), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

The DQA for the 100-N-61:4 and co-located segments of the 100-N-84:4 and 100-N-84:6 pipelines, SSP, and 100-N pipelines overburden established that the data are of the right type, quality, and quantity to support site closeout decisions within specified error tolerances. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup verification sample analytical data are stored in the ENRE project-specific database for data evaluation prior to its archival in the HEIS and are summarized in Appendix C. The detailed DQA is presented in Appendix D.

SUMMARY FOR INTERIM CLOSURE

The 100-N-61:4 and co-located segments of the 100-N-84:4 and 100-N-84:6 pipelines, SSP, and 100-N pipelines overburden have been evaluated in accordance with the 100-N Area ROD (EPA 1999) and the 100-N Area RDR/RAWP (DOE-RL 2006b). Verification sampling was performed and the analytical results indicate that the residual concentrations of COPCs at the site meet the RAOs for direct exposure, groundwater protection, and river protection. The soil areas with elevated TPH and PAH concentrations within the 100-N-61:4 excavation area were excluded from evaluation because these will be addressed via the 100-N-106 waste site in accordance with the SPOR agreement (WCH 2012f). Due to asphaltic debris present in the 100-N pipelines overburden, all overburden material will be backfilled only to locations that are greater than 4.6 m (15 ft) bgs. The backfill locations will not be placed less than 3 m (9.9 ft) above the highest observed groundwater elevation to demonstrate protection of groundwater and surface water. The locations for deep zone backfill of this overburden will be agreed to with Ecology prior to initiating backfill operations. Deep zone locations which receive this backfill will require a waste site institutional control to prevent uncontrolled drilling.

In accordance with this evaluation, the verification sampling results support a reclassification of the 100-N-61:4 subsite to interim closed out. Contamination from the 100-N-61:4 subsite above direct exposure RAGs was not observed in shallow zone soils and is concluded to not exist in deep zone soils. Institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the sites are not required.

REFERENCES

40 CFR 141, "National Primary Drinking Water Regulations," *Code of Federal Regulations*, as amended.

BHI, 2001, *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater*, 0100X-CA-V0038, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

DOE Order 5400.5, *Radiation Protection of the Public and the Environment,* as amended, U.S. Department of Energy, Washington, D.C.

DOE-RL, 2006a, *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites,* DOE/RL-2005-92, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2006b, *Remedial Design Report/Remedial Action Work Plan for the 100-N Area,* DOE/RL-2005-93, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2009, *Remedial Design Report/Remedial Action Work Plan for the 100 Areas,* DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2011, *Tri-Party Agreement Handbook Management Procedures,* RL-TPA-90-0001, Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System (WIDS)," Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication No. 94-115, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1996, "Model Toxics Control Act – Cleanup," *Washington Administrative Code* (WAC) 173-340, Washington State Department of Ecology, Olympia, Washington.

Ecology, 2011, "*100-N South Staging Pile Area 1 Agreement*", CCN 162747, E-Mail to A. Boyd, Washington State Department of Ecology, and T. L. Faust, Washington Closure Hanford, from N. Menard, Washington State Department of Ecology, Richland Operations Office, Richland, Washington.

Ecology, 2012, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

ENV-1, *Environmental Monitoring & Management*, Washington Closure Hanford, Richland, Washington.

EPA, 1989, *Risk Assessment Guidance for Superfund: Volume 1, Human Health Evaluation Manual, Part A; Interim Final*, EPA/540/1-89/002, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1999, *Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

EPA, 2011, *Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington

WAC 173-340, 1996, "Model Toxics Control Act – Cleanup," *Washington Administrative Code.*

WCH, 2010a, "100-N-84:2 Remaining Site for Remedial Action," Interoffice Memorandum from M. L. Proctor to S. W. Callison, CCN 152843, Washington Closure Hanford, Richland, Washington, August 16.

WCH, 2010b, "100-N-84:6 Remaining Site for Remedial Action," Interoffice Memorandum from M. L. Proctor to S. W. Callison, CCN 152863, Washington Closure Hanford, Richland, Washington, August 16.

WCH, 2010c, "100-N-84:8 Remaining Site for Remedial Action," Interoffice Memorandum from M. L. Proctor to S. W. Callison, CCN 153995, Washington Closure Hanford, Richland, Washington, October 18.

WCH 2011a, "100-N FR South River Road Agreement," CCN 158653 to R. Varljen, Washington State Department of Ecology, from T. L. Faust, Washington Closure Hanford, Richland, Washington, May 19.

WCH, 2011b, "100-N-53 Remaining Site for Remedial Action," Interoffice Memorandum from M. L. Proctor to S. W. Callison, CCN 157966, Washington Closure Hanford, Richland, Washington, April 20.

WCH, 2011c, "100-N-84:5 Remaining Site for Remedial Action," Interoffice Memorandum from M. L. Proctor to S. W. Callison, CCN 152863, Washington Closure Hanford, Richland, Washington, January 4.

WCH, 2011d, *Work Instruction for Verification Sampling of the 100-N-57, UPR-100-N-1, UPR-100-N-2, UPR-100-N-29, UPR-100-N-30, and UPR-100-N-32 Waste Sites*, 0100N-WI-G0032, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2011e, *Work Instruction for Verification Sampling of the 116-N-4, Emergency Dump Basin*, 0100N-WI-G0035, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2012a, "100-N-61 and 100-N-64 Pipeline Waste Site Colonization," CCN 163468 to J. C. Chance, U.S. Department of Energy, Richland Operations Office, from N. Menard, Washington State Department of Ecology, Richland, Washington, January 6.

WCH, 2012b, "100-N-84:4, 100-N Area Steam and Condensate Pipelines for Remedial Action," Interoffice Memorandum from M. L. Proctor to S. W. Callison, CCN 165743, Washington Closure Hanford, Richland, Washington, May 21.

WCH, 2012c, *Remaining Sites Verification Package for the 100-N-84:1, 100-N Area Raw Water Pipelines, and the 100-N-84:9, 100-N Area Active Raw Water Pipelines*, Attachment to Waste Site Reclassification Forms 2010-019 and 2012-012, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2012d, *Remaining Sites Verification Package for the 100-N-84:3, 100-N Area Filter and Potable Water Pipelines*, Attachment to Waste Site Reclassification Form 2010-020, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2012e, *Remaining Sites Verification Package for the 100-N-84:7, Unidentified and Other Miscellaneous Pipelines*, Attachment to Waste Site Reclassification Form 2011-092, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2012f, "SPOR Agreement," CCN 167464 to J. Chance, U.S. Department of Energy, Richland Operations Office, and W. Elliot, Washington State Department of Ecology, from D. G. Saueressig, Washington Closure Hanford, Richland, Washington, September 12.

WCH, 2012g, *Unit Managers Meeting: 100 Areas Remedial Action Unit/Source Operable Units Meeting Minutes 10/11/12*, CCN 168569, Washington Closure Hanford, Richland, Washington.

WCH, 2012h, *Work Instruction for Verification Sampling of the 100-N-28, Resin Disposal Pit Liquid Waste Site 2; 100-N-61:2, Water Treatment and Storage Facilities Underground Pipelines East of 109-N; 100-N-62, 100-N, 105-N, 109-N, 163-N, 182-N, 183-N, and 184-N Underground Pipelines; and 100-N-64:2, Cooling Water Effluent Underground Pipelines East of 109-N*, 0100N-WI-G0050, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2012i, *Work Instruction for Verification Sampling of the 100-N-61:1, 100-N-64:1, 100-N-24, 100-N-29, 100-N-30, and 100-N-37 Grouping of Waste Sites*, 0100N-WI-G0055, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2013a, *100-N Field Remediation Sampling*, Logbook EL-1652-09, pp. 20-28 and 50-52, Washington Closure Hanford, Richland, Washington.

WCH, 2013b, "PAH Laden Overburden Pile Use Acceptance," CCN 170275 to J. C. Chance, U.S. Department of Energy, Richland Operations Office, from W. Elliot, Washington State Department of Ecology, Richland, Washington, March 19.

WCH, 2013c, *Work Instruction for Verification Sampling of the 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N and Co-located Segments of the 100-N-84:4, 100-N Area Steam and Condensate Pipeline and 100-N-84:6, 100-N Area Chemical and Process Sewer Pipelines; South Staging Pile Area; and 100-N Pipelines Overburden,* Work Instruction No. 0100N-WI-G0067, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2013d, *Work Instruction for Verification Sampling of the 100-N-79, 1908-N Spillway,* 0100N-WI-G0061, Rev. 0, Washington Closure Hanford, Richland, Washington.

WDOH, 1997, *Hanford Guidance for Radiological Cleanup*, WDOH/320-015, Rev. 1, Washington State Department of Health, Olympia, Washington.

APPENDIX A

ECOLOGICAL RISK COMPARISON TABLE

Table A-1. Maximum Contaminant Concentrations that Exceed Ecological Screening Levels for the 100-N-61:4 Subsite and South Staging Pile[a].

Hazardous Substance		2001 WAC 173-340 Table 749-3			EPA Ecological Soil Screening Levels[b]				Maximum Result
		Plants	Soil Biota	Wildlife	Plants	Soil Biota	Avian[c]	Mammalian[c]	
	Background	Metals (mg/kg)							
Antimony	5	5	NA	NA	NA	78	NA	0.27	0.85 (<BG)
Boron	NA	0.5	NA	NA	NA	NA	NA	NA	1.6
Lead	10.2	50	500	118	120	1,700	11	56	17.6
Manganese	512	1,100[d]	NA	1,500	220	450	4,300	4,000	348 (<BG)
Mercury	0.33	0.3	0.1	5.5	NA	NA	NA	NA	0.11 (<BG)
Vanadium	85.1	2	NA	NA	NA	NA	7.8	280	55.5 (<BG)
Zinc	67.8	86[d]	200	360	160	120	46	79	55.7 (<BG)

NOTE: Shaded cells indicate screening values that are exceeded.

[a] Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. All exceedances must be evaluated in the context of additional lines of evidence for ecological effects following a baseline risk assessment for the river corridor portion of the Hanford Site, which will include a more complete quantitative ecological risk assessment.

[b] Available on the Internet at www.epa.gov/ecotox/ecossl.

[c] Wildlife.

[d] Benchmark replaced by Washington state natural background concentration from Ecology, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication 94-115, Washington State Department of Ecology, Olympia, Washington.

BG = background
EPA = U.S. Environmental Protection Agency
NA = not available
WAC= *Washington Administrative Code*

APPENDIX B

IN-PROCESS SAMPLE DATA

Table B-1. 100-N-61:4 Pipelines Excavation In-Process Sample Results. (5 Pages)

Location	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrate			Nitrite		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1R9V0	1/29/13 11:05	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
2	J1R9V1	1/29/13 10:24	1	U	1	1	U	1	1	U	1	2.1	B	1	1	U	1
3	J1R9V2	1/29/13 10:30	1	U	1	1.7	B	1	1	U	1	19.3		1	1	U	1
4	J1R9V3	1/29/13 10:34	1	U	1	1.6	B	1	1	U	1	1	U	1	1	U	1
5	J1R9V4	1/29/13 10:46	1	U	1	1.7	B	1	1	U	1	5.9		1	1	U	1
6	J1RDL9	1/29/13 10:50	1.1	U	1.1	4.8	B	1.1	1.1	U	1.1	5.4	B	1.1	1.1	U	1.1
7	J1RDM0	1/29/13 10:38	1.1	U	1.1	2.4	B	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1

Location	HEIS Number	Sample Date	Phosphate			Sulfate			TPH - Diesel			TPH - Motor Oil			Percent Solids		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL
1	J1R9V0	1/29/13 11:05	2.1	U	2.1	14.2		1.1	4820		3540	9160	J	10600	93.9		0.1
2	J1R9V1	1/29/13 10:24	2.1	U	2.1	3.5	B	1	1060	J	3370	10100	U	10100	95.6		0.1
3	J1R9V2	1/29/13 10:30	2	U	2	30.5		1	3750	U	3750	11300	U	11300	88.7		0.1
4	J1R9V3	1/29/13 10:34	2	U	2	12.3		1	1370000		71400	1870000		214000	93.1		0.1
5	J1R9V4	1/29/13 10:46	2.6	B	2.1	17.2		1	3600	U	3600	22500		10800	92.2		0.1
6	J1RDL9	1/29/13 10:50	2.2	U	2.2	43		1.1	857000		73500	1160000		220000	90.2		0.1
7	J1RDM0	1/29/13 10:38	2.2	U	2.2	64.8		1.1	705000		77800	987000		233000	84.6		0.1

Table B-1. 100-N-61:4 Pipelines Excavation In-Process Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1R9V0	1/29/13	6360		13.3	1.6	U	1.6	1.83	B	2.66	56.5		1.33	0.249	B	0.53	5.32	U	5.32	0.532	U	0.53
2	J1R9V1	1/29/13	6350		12.9	1.54	U	1.54	2.19	B	2.57	47.2		1.29	0.229	B	0.51	5.14	U	5.14	0.514	U	0.51
3	J1R9V2	1/29/13	9050		13.9	1.66	U	1.66	3.64		2.77	64.8		1.39	0.303	B	0.55	5.54	U	5.54	0.554	U	0.55
4	J1R9V3	1/29/13	6350		15.5	1.86	U	1.86	2.67	B	3.1	55.7		1.55	0.221	B	0.62	6.2	U	6.2	0.62	U	0.62
5	J1R9V4	1/29/13	7550		13.6	1.63	U	1.63	2.26	B	2.71	62.9		1.36	0.252	B	0.54	5.42	U	5.42	0.542	U	0.54
6	J1RDL9	1/29/13	7100		12.2	1.47	U	1.47	2.58		2.45	63.1		1.22	0.272	B	0.49	4.89	U	4.89	0.489	U	0.49
7	J1RDM0	1/29/13	7760		15.3	2.21		1.83	3.48		3.06	82.2		1.53	0.272	B	0.61	6.11	U	6.11	0.611	U	0.61

Sample Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1R9V0	1/29/13	12800		266	6.86		0.53	8.23		5.32	17.8		2.66	0.21	U	0.21	25000		53.2	3.36		1.33
2	J1R9V1	1/29/13	5280		257	13.3		0.51	6.17		5.14	14.4		2.57	0.21	U	0.21	16100		51.4	3.23		1.29
3	J1R9V2	1/29/13	12800		277	16.9		0.55	8.03		5.54	18		2.77	0.23	U	0.23	22200		55.4	4.97		1.39
4	J1R9V3	1/29/13	7140		310	7.53		0.62	8.73		6.2	15.9		3.1	0.21	U	0.21	24800		62	5.49		1.55
5	J1R9V4	1/29/13	7750		271	15.4		0.54	9.77		5.42	25.1		2.71	0.22	U	0.22	26800		54.2	34.5		1.36
6	J1RDL9	1/29/13	7850		245	10.5		0.49	8.47		4.89	21.7		2.45	0.22	U	0.22	26400		48.9	19.3		1.22
7	J1RDM0	1/29/13	11100		306	16.5		0.61	9.45		6.11	23.4		3.06	0.24	U	0.24	32000		61.1	25.4		1.53

Table B-1. 100-N-61:4 Pipelines Excavation In-Process Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel			Potassium			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1R9V0	1/29/13	4360		200	290		13.3	0.027	U	0.03	5.32	U	5.32	9.03	B	10.6	791	B	1060	0.798	U	0.8
2	J1R9V1	1/29/13	3770		193	249		12.9	0.029	U	0.03	5.14	U	5.14	14.3		10.3	780	B	1030	0.772	U	0.77
3	J1R9V2	1/29/13	6640		208	356		13.9	0.026	U	0.03	5.54	U	5.54	14.8		11.1	1540		1110	0.832	U	0.83
4	J1R9V3	1/29/13	4600		232	312		15.5	0.048		0.03	6.2	U	6.2	8.81	B	12.4	969	B	1240	0.93	U	0.93
5	J1R9V4	1/29/13	5660		203	358		13.6	0.027	U	0.03	5.42	U	5.42	11.3		10.8	1080	B	1080	0.814	U	0.81
6	J1RDL9	1/29/13	4830		183	328		12.2	0.026	U	0.03	4.89	U	4.89	10.2		9.78	1060		978	0.734	U	0.73
7	J1RDM0	1/29/13	5430		229	341		15.3	0.014	B	0.03	6.11	U	6.11	13.9		12.2	1220	B	1220	0.917	U	0.92

Sample Location	HEIS Number	Sample Date	Silicon			Silver			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1R9V0	1/29/13	263		5.32	0.532	U	0.53	531		133	68.3		6.65	68.6		26.6
2	J1R9V1	1/29/13	399		5.14	0.514	U	0.51	221		129	36		6.43	39.4		25.7
3	J1R9V2	1/29/13	673		5.54	0.554	U	0.55	307		139	52.3		6.93	48		27.7
4	J1R9V3	1/29/13	566		6.2	0.62	U	0.62	402		155	68.2		7.75	51.1		31
5	J1R9V4	1/29/13	532		5.42	0.542	U	0.54	432		136	63.1		6.78	52.1		27.1
6	J1RDL9	1/29/13	565		4.89	0.489	U	0.49	362		122	61.6		6.12	58.7		24.5
7	J1RDM0	1/29/13	546		6.11	0.611	U	0.61	401		153	69.9		7.64	64.8		30.6

Table B-1. 100-N-61:4 Pipelines Excavation In-Process Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Americium-241 GEA			Cesium-137 GEA			Cobalt-60 GEA			Europium-152 GEA			Europium-154 GEA			Europium-155 GEA		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J1R9V0	1/29/13	0.058	U	0.058	0.021	U	0.021	0.02	U	0.02	0.057	U	0.057	0.063	U	0.063	0.06	U	0.06
2	J1R9V1	1/29/13	0.146	U	0.146	0.031	U	0.031	0.029	U	0.029	0.087	U	0.087	0.104	U	0.104	0.086	U	0.086
3	J1R9V2	1/29/13	0.084	U	0.084	0.064	U	0.064	0.07	U	0.07	0.207	U	0.207	0.212	U	0.212	0.15	U	0.15
4	J1R9V3	1/29/13	0.14	U	0.14	0.063	U	0.063	0.054	U	0.054	0.172	U	0.172	0.193	U	0.193	0.121	U	0.121
5	J1R9V4	1/29/13	0.351	U	0.351	0.087	U	0.087	0.085	U	0.085	0.219	U	0.219	0.243	U	0.243	0.228	U	0.228
6	J1RDL9	1/29/13	0.092	U	0.092	0.069	U	0.069	0.068	U	0.068	0.183	U	0.183	0.175	U	0.175	0.16	U	0.16
7	J1RDM0	1/29/13	0.173	U	0.173	0.065	U	0.065	0.083	U	0.083	0.168	U	0.168	0.202	U	0.202	0.169	U	0.169

Sample Location	HEIS Number	Sample Date	Potassium-40 GEA			Radium-226 GEA			Uranium-235 GEA			Uranium-238 GEA			Total beta radiostrontium GPC		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J1R9V0	1/29/13	9.91		0.194	0.308		0.038	0.13	U	0.13	2.43	U	2.43	0.084	U	0.204
2	J1R9V1	1/29/13	9.77		0.33	0.303		0.063	0.174	U	0.174	3.77	U	3.77	0.049	U	0.284
3	J1R9V2	1/29/13	12.9		0.938	0.486		0.134	0.396	U	0.396	9.17	U	9.17	0.041	U	0.32
4	J1R9V3	1/29/13	9.44		0.404	0.329		0.111	0.288	U	0.288	7.83	U	7.83	-0.07	U	0.292
5	J1R9V4	1/29/13	7.94		0.621	0.438		0.135	0.461	U	0.461	10.1	U	10.1	0.006	U	0.177
6	J1RDL9	1/29/13	11.2		0.416	0.367		0.139	0.373	U	0.373	8.64	U	8.64	0.09	U	0.295
7	J1RDM0	1/29/13	10.3		0.504	0.376		0.112	0.382	U	0.382	7.13	U	7.13	2.16		0.179

Table B-1. 100-N-61:4 Pipelines Excavation In-Process Sample Results. (5 Pages)

CONSTITUENT	J1R9V0			J1R9V1			J1R9V2			J1R9V3			J1R9V4			J1RDL9			J1RDM0		
	1/29/13			1/29/13			1/29/13			1/29/13			1/29/13			1/29/13			1/29/13		
	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	85.1	U	85.1	3.61		3.48	3.72	U	3.72	6920	U	6920	85.1	U	85.1	365	U	365	391	U	391
Acenaphthylene	85.1	U	85.1	3.48	U	3.48	5.77		3.72	6920	U	6920	85.1	U	85.1	717	D	365	2040	D	391
Anthracene	85.1	U	85.1	3.48	U	3.48	11.9		3.72	239000	D	6920	455	D	85.1	15400	D	365	10500	D	391
Benzo(a)anthracene	111	D	85.1	0.888	J	3.48	54.5		3.72	230000	D	6920	927	D	85.1	21100	D	365	18100	D	391
Benzo(a)pyrene	104	D	85.1	1.88	J	3.48	52.4		3.72	142000	D	6920	591	D	85.1	19800	D	365	12300	D	391
Benzo(b)fluoranthene	85.1	U	85.1	3.48	U	3.48	14		3.72	74300	D	6920	269	D	85.1	11700	D	365	5990	D	391
Benzo(ghi)perylene	241	D	85.1	1.76	J	3.48	30.1		3.72	6920	U	6920	314	D	85.1	365	U	365	5840	D	391
Benzo(k)fluoranthene	27.4	D	85.1	3.48	U	3.48	17		3.72	47000	D	6920	256	D	85.1	7370	D	365	4000	D	391
Chrysene	122	D	85.1	2.21	J	3.48	43.4		3.72	199000	D	6920	680	D	85.1	26100	D	365	17900	D	391
Dibenz[a,h]anthracene	85.1	U	85.1	3.48	U	3.48	2.27	J	3.72	6920	U	6920	85.1	U	85.1	806	D	365	540	D	391
Fluoranthene	181	D	85.1	3.1	J	3.48	95.1		3.72	788000	D	6920	2290	D	85.1	60500	D	365	43000	D	391
Fluorene	85.1	U	85.1	3.48	U	3.48	3.72	U	3.72	90000	D	6920	113	D	85.1	2730	D	365	2430	D	391
Indeno(1,2,3-cd)pyrene	53	D	85.1	3.48	U	3.48	14.5		3.72	6920	U	6920	199	D	85.1	4300	D	365	2790	D	391
Naphthalene	42.8	D	85.1	3.48	U	3.48	39.1		3.72	89300	D	6920	929	D	85.1	18000	D	365	8540	D	391
Phenanthrene	55.5	D	85.1	1.55	J	3.48	28.5		3.72	645000	D	6920	1430	D	85.1	36200	D	365	27700	D	391
Pyrene	179	D	85.1	3.64		3.48	84.9		3.72	571000	D	6920	1760	D	85.1	55500	D	365	39100	D	391

Table B-2. South Staging Pile May 2012 In-Process Sample Results. (6 Pages)

Location	HEIS Number	Sample Date	Bromide mg/kg	Bromide Q	Bromide PQL	Chloride mg/kg	Chloride Q	Chloride PQL	Fluoride mg/kg	Fluoride Q	Fluoride PQL	Nitrogen in Nitrate mg/kg	Nitrogen in Nitrate Q	Nitrogen in Nitrate PQL	Nitrogen in Nitrite mg/kg	Nitrogen in Nitrite Q	Nitrogen in Nitrite PQL
P2	J1P1P2	5/7/2012	0.81	B	0.41	1360	D	10.5	0.88	U	0.88	37.3		0.34	0.36	U	0.36
P3	J1P1P3	5/7/2012	0.64	B	0.39	2410	D	9.9	0.83	U	0.83	9.1		0.32	0.34	U	0.34
P4	J1P1P4	5/7/2012	0.74	B	0.41	2200	D	10.4	1.3	B	0.87	66.4		0.33	0.36	U	0.36
P5	J1P1P5	5/7/2012	0.4	U	0.4	18.4		2	1.2	B	0.85	24.4		0.33	0.35	U	0.35
P6	J1P1P6	5/7/2012	1.4	BN	0.39	153		2	0.83	UN	0.83	538	ND	3.2	0.35	B	0.34

Location	HEIS Number	Sample Date	Nitrogen in Nitrite mg/kg	Nitrogen in Nitrite Q	Nitrogen in Nitrite PQL	Phosphorous in mg/kg	Phosphorous in Q	Phosphorous in PQL	Sulfate mg/kg	Sulfate Q	Sulfate PQL	TPH - Diesel mg/kg	TPH - Diesel Q	TPH - Diesel PQL	TPH - Diesel EXT mg/kg	TPH - Diesel EXT Q	TPH - Diesel EXT PQL
P2	J1P1P2	5/7/2012	43.5		0.32	1.3	U	1.3	89.9		1.8	6000		670	11000		980
P3	J1P1P3	5/7/2012	8.8		0.31	1.2	U	1.2	37.1		1.7	7200		660	15000		970
P4	J1P1P4	5/7/2012	71.9		0.32	1.3	U	1.3	241		1.8	8200		710	11000		1000
P5	J1P1P5	5/7/2012	32.8		0.31	1.3	U	1.3	21.4		1.8	25000		670	77000	N	980
P6	J1P1P6	5/7/2012	641	D	3.1	1.2	U	1.2	195		1.7	9600		650	14000		950

Table B-2. South Staging Pile May 2012 In-Process Sample Results. (6 Pages)

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
P2	J1P1P2	5/7/12	9630	X	1.6	0.92		0.38	3		0.66	87.4	X	0.077	0.21		0.033	2.1		0.99	0.19	B	0.041
P3	J1P1P3	5/7/12	7630	X	1.4	0.56		0.35	2.2		0.61	61.6	X	0.07	0.16	B	0.031	1.5	B	0.91	0.14	B	0.038
P4	J1P1P4	5/7/12	8840	X	1.6	0.43	B	0.4	2.2		0.69	77.6	X	0.08	0.18	B	0.035	2.1		1	0.17	B	0.043
P5	J1P1P5	5/7/12	7410	X	1.5	0.37	U	0.37	3.2		0.65	74.1	X	0.074	0.15	B	0.032	1.5	B	0.96	0.21		0.04
P6	J1P1P6	5/7/12	8930	X	1.4	0.35	U	0.35	2.6		0.61	79.9	X	0.07	0.19		0.031	1.5	B	0.91	0.16	B	0.038

Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
P2	J1P1P2	5/7/12	4430	X	14.2	14.2	X	0.058	7.4	X	0.1	19.1	X	0.22	0.155	U	0.155	20400	X	3.4	6		0.27
P3	J1P1P3	5/7/12	6060	X	13.1	10.8	X	0.054	7	X	0.093	14.2	X	0.2	0.155	U	0.155	18700	X	3.4	4.5		0.25
P4	J1P1P4	5/7/12	4410	X	14.8	12.5	X	0.061	7.4	X	0.11	12.8	X	0.23	0.155	U	0.155	19700	X	3.8	5.1		0.28
P5	J1P1P5	5/7/12	5940	X	13.8	9	X	0.057	8	X	0.098	15.4	X	0.21	0.155	U	0.155	20100	X	3.7	17.4		0.26
P6	J1P1P6	5/7/12	4820	X	13	12.3	X	0.054	7.1	X	0.093	12.6	X	0.2	0.155	U	0.155	19800	X	3.7	5.3		0.25

Table B-2. South Staging Pile May 2012 In-Process Sample Results. (6 Pages)

Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel			Potassium			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
P2	J1P1P2	5/7/12	4160	X	3.7	354	X	0.1	0.022		0.005	0.26	B	0.26	12.2	X	0.12	1850		41.3	0.87	U	0.87
P3	J1P1P3	5/7/12	4560	X	3.4	286	X	0.093	0.005	U	0.005	1.1	B	0.24	11.2	X	0.11	1390		38	0.8	U	0.8
P4	J1P1P4	5/7/12	4390	X	3.9	336	X	0.11	0.0051	U	0.005	0.27	U	0.27	11.9	X	0.13	1800		43.1	0.9	U	0.9
P5	J1P1P5	5/7/12	3910	X	3.6	353	X	0.098	0.025		0.006	0.25	U	0.25	12.8	X	0.12	1400		40.1	1.7	U	1.7
P6	J1P1P6	5/7/12	4230	X	3.4	325	X	0.093	0.0064	U	0.006	0.24	U	0.24	11.8	X	0.11	1760		37.9	0.8	U	0.8

Location	HEIS Number	Sample Date	Silicon			Silver			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
P2	J1P1P2	5/7/12	570	X	5.7	0.14	U	0.14	400		59.4	41.8		0.095	43.6	X	0.36
P3	J1P1P3	5/7/12	348	XN	5.2	0.14	U	0.14	613		54.7	41.9		0.087	36.9	X	0.36
P4	J1P1P4	5/7/12	579	X	5.9	0.16	U	0.16	730		62	42.6		0.099	40.9	X	0.4
P5	J1P1P5	5/7/12	365	X	5.5	0.16	U	0.16	255		57.7	43.5		0.092	48	X	0.39
P6	J1P1P6	5/7/12	505	X	5.2	0.15	U	0.15	242		54.6	41.1		0.087	41.1	X	0.39

Table B-2. South Staging Pile May 2012 In-Process Sample Results. (6 Pages)

Location	HEIS Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154			Europium-155			Radium-226		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
P2	J1P1P2	5/7/12	0.046	U	0.056	0.0054	U	0.038	-0.00109	U	0.039	0.00379	U	0.092	-0.0186	U	0.114	0.00747	U	0.09	0.667		0.067
P3	J1P1P3	5/7/12	-0.00774	U	0.016	0.0914		0.02	0.0803		0.025	-0.00449	U	0.037	0.0377	U	0.082	0.0383	U	0.028	0.502		0.033
P4	J1P1P4	5/7/12	-0.109	U	0.084	0.0147	U	0.029	0.00799	U	0.03	-0.028	U	0.068	0.0197	U	0.089	-0.0318	U	0.065	0.596		0.053
P5	J1P1P5	5/7/12	-0.0022	U	0.046	0.0337	U	0.048	0.00693	U	0.044	-0.0846	U	0.099	0.0387	U	0.139	0.0385	U	0.078	0.518		0.08
P6	J1P1P6	5/7/12	-0.00685	U	0.113	0.0262	U	0.027	0.00597	U	0.028	-0.0167	U	0.051	0.00495	U	0.087	0.0575	U	0.052	0.566		0.041

Location	HEIS Number	Sample Date	Plutonium-238			Plutonium-239/240			Thorium-228			Thorium-230			Thorium-232			Uranium-234			Uranium-235		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
P2	J1P1P2	5/7/12	-0.00058	U	0.053	-0.00175	U	0.063	0.213		0.125	0.218		0.089	0.281		0.11	0.133		0.044	-0.00097	U	0.049
P3	J1P1P3	5/7/12	0	U	0.061	-0.00067	U	0.061	0.577		0.102	0.219		0.096	0.506		0.096	0.206		0.06	0.0284	U	0.06
P4	J1P1P4	5/7/12	0.0144	U	0.052	0.0138	U	0.052	0.345		0.137	0.314		0.114	0.277		0.151	0.14		0.047	0.0108	U	0.047
P5	J1P1P5	5/7/12	0	U	0.062	0.0162	U	0.062	0.337		0.156	0.246		0.125	0.403		0.113	0.173		0.053	0.0133	U	0.058
P6	J1P1P6	5/7/12	-0.00058	U	0.053	-0.00175	U	0.063	0.61		0.091	0.29		0.091	0.515		0.091	0.223		0.043	0.0108	U	0.047

Location	HEIS Number	Sample Date	Uranium-238			Total beta			Carbon-14			Nickel-63			Tritium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
P2	J1P1P2	5/7/12	0.108		0.052	0.0395	U	0.184	0.159	U	0.443	1.28	U	13.1	0.0438	U	0.049
P3	J1P1P3	5/7/12	0.176		0.064	0.077	U	0.173	0.159	U	0.441	0.418	U	15.4	0.0352	U	0.041
P4	J1P1P4	5/7/12	0.0808		0.051	0.0724	U	0.161	0.106	U	0.443	2.86	U	13.4	0.0419	U	0.05
P5	J1P1P5	5/7/12	0.23		0.058	-0.0723	U	0.179	0.00852	U	0.444	-2.61	U	13.3	0.0147	U	0.043
P6	J1P1P6	5/7/12	0.163		0.051	0.0327	U	0.153	-0.118	U	0.445	-0.165	U	12.7	0.0357	U	0.046

Table B-2. South Staging Pile May 2012 In-Process Sample Results. (6 Pages)

CONSTITUENT	CLASS	J1P1P2			J1P1P3			J1P1P4			J1P1P5			J1P1P6		
		5/7/12			5/7/12			5/7/12			5/7/12			5/7/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	220	X	11	10	U	10	10	U	10	9.6	U	9.6	10	U	10
Acenaphthylene	PAH	15	JX	9.5	9.4	U	9.4	9	U	9	8.6	U	8.6	9	U	9
Anthracene	PAH	690		3.2	16	J	3.2	35		3.1	47		2.9	52		3
Benzo(a)anthracene	PAH	1200		3.4	23	X	3.3	130		3.2	93		3.1	180		3.2
Benzo(a)pyrene	PAH	760		6.8	31		6.7	67		6.4	59		6.1	110		6.4
Benzo(b)fluoranthene	PAH	740	X	4.4	29	X	4.4	80	X	4.2	58	X	4	120	X	4.2
Benzo(ghi)perylene	PAH	290		7.6	22	J	7.5	38		7.2	17	JX	6.9	59		7.2
Benzo(k)fluoranthene	PAH	340		4.2	9.8	J	4.1	35		3.9	35		3.8	58		3.9
Chrysene	PAH	1100		5.1	36	J	5	150		4.8	92		4.6	170		4.8
Dibenz[a,h]anthracene	PAH	78	X	12	11	U	11	11	U	11	11	U	11	17	JX	11
Fluoranthene	PAH	2200		14	50		14	180	N	13	150		12	240		13
Fluorene	PAH	250		5.6	7	J	5.5	19	JX	5.3	13	JX	5.1	17	JX	5.3
Indeno(1,2,3-cd)pyrene	PAH	240		13	18	J	12	32		12	29		11	49		12
Naphthalene	PAH	13	U	13	12	U	12	12	U	12	11	U	11	12	U	12
Phenanthrene	PAH	1100		13	32	J	12	51		12	71		11	81		12
Pyrene	PAH	2600		13	72		12	220	N	12	150		11	270		12
Aroclor-1016	PCB	2.9	UN	2.9	2.7	U	2.7	2.9	U	2.9	2.8	U	2.8	2.7	U	2.7
Aroclor-1221	PCB	8.4	U	8.4	7.9	U	7.9	8.5	U	8.5	8.2	U	8.2	7.9	U	7.9
Aroclor-1232	PCB	2.1	U	2.1	2	U	2	2.1	U	2.1	2	U	2	2	U	2
Aroclor-1242	PCB	4.9	U	4.9	4.6	U	4.6	4.9	U	4.9	4.8	U	4.8	4.6	U	4.6
Aroclor-1248	PCB	4.9	U	4.9	4.6	U	4.6	4.9	U	4.9	4.8	U	4.8	4.6	U	4.6
Aroclor-1254	PCB	14	P	2.7	5.1	JP	2.6	2.8	U	2.8	56		2.7	7.9	JP	2.6
Aroclor-1260	PCB	2.7	UN	2.7	2.6	U	2.6	2.8	U	2.8	2.7	U	2.7	2.6	U	2.6
1,2,4-Trichlorobenzene	SVOA	28	U	28	28	U	28	30	U	30	29	U	29	28	U	28
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	23	U	23	23	U	23	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	13	U	13	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
2,4-Dimethylphenol	SVOA	66	U	66	67	U	67	70	U	70	69	U	69	66	U	66
2,4-Dinitrophenol	SVOA	330	U	330	340	U	340	350	U	350	350	U	350	330	U	330
2,4-Dinitrotoluene	SVOA	66	U	66	67	U	67	70	U	70	69	U	69	66	U	66
2,6-Dinitrotoluene	SVOA	28	U	28	28	U	28	30	U	30	29	U	29	28	U	28
2-Chloronaphthalene	SVOA	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
2-Chlorophenol	SVOA	21	U	21	21	U	21	22	U	22	22	U	22	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	20	U	20	20	U	20	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	14	U	14	14	U	14	13	U	13
2-Nitroaniline	SVOA	50	U	50	51	U	51	53	U	53	52	U	52	50	U	50
2-Nitrophenol	SVOA	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	33	U	33	35	U	35	34	U	34	33	U	33
3,3'-Dichlorobenzidine	SVOA	90	U	90	91	U	91	95	U	95	94	U	94	90	U	90
3-Nitroaniline	SVOA	73	U	73	74	U	74	77	U	77	76	U	76	73	U	73

Table B-2. South Staging Pile May 2012 In-Process Sample Results. (6 Pages)

CONSTITUENT	CLASS	J1P1P2			J1P1P3			J1P1P4			J1P1P5			J1P1P6		
		5/7/12			5/7/12			5/7/12			5/7/12			5/7/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	330	U	330	350	U	350	340	U	340	330	U	330
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	20	U	20	20	U	20	19	U	19
4-Chloro-3-methylphenol	SVOA	66	U	66	67	U	67	70	U	70	69	U	69	66	U	66
4-Chloroaniline	SVOA	82	U	82	83	U	83	87	U	87	85	U	85	82	U	82
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	22	U	22	22	U	22	21	U	21
4-Nitroaniline	SVOA	73	U	73	73	U	73	77	U	77	75	U	75	73	U	73
4-Nitrophenol	SVOA	97	U	97	98	U	98	100	U	100	100	U	100	97	U	97
Acenaphthene	SVOA	10	U	10	10	U	10	11	U	11	11	U	11	10	U	10
Acenaphthylene	SVOA	17	U	17	17	U	17	18	U	18	18	U	18	17	U	17
Anthracene	SVOA	25	J	17	17	U	17	62	J	18	18	U	18	33	J	17
Benzo(a)anthracene	SVOA	130	J	20	52	J	20	220	J	21	85	J	21	200	J	20
Benzo(a)pyrene	SVOA	87	J	20	38	J	20	130	J	21	59	J	21	130	J	20
Benzo(b)fluoranthene	SVOA	170	JX	26	63	JX	26	250	JX	28	110	JX	27	250	JX	26
Benzo(ghi)perylene	SVOA	41	J	16	21	J	16	51	J	17	25	J	17	51	J	16
Benzo(k)fluoranthene	SVOA	40	UX	40	40	UX	40	42	UX	42	42	UX	42	40	UX	40
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	24	U	24	24	U	24	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	24	U	24	24	U	24	23	U	23
Bis(2-chloroethyl) ether	SVOA	17	U	17	17	U	17	18	U	18	17	U	17	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	47	U	47	49	U	49	48	U	48	46	U	46
Butylbenzylphthalate	SVOA	43	U	43	43	U	43	46	U	46	45	U	45	43	U	43
Carbazole	SVOA	36	U	36	36	U	36	38	U	38	37	U	37	36	U	36
Chrysene	SVOA	150	J	27	59	J	27	240	J	29	94	J	28	210	J	27
Di-n-butylphthalate	SVOA	29	U	29	29	U	29	31	U	31	30	U	30	29	U	29
Di-n-octylphthalate	SVOA	14	U	14	15	U	15	15	U	15	15	U	15	14	U	14
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	20	U	20	20	U	20	19	U	19
Dibenzofuran	SVOA	20	U	20	20	U	20	21	U	21	21	U	21	20	U	20
Diethyl phthalate	SVOA	26	U	26	26	U	26	28	U	28	27	U	27	26	U	26
Dimethyl phthalate	SVOA	23	U	23	23	U	23	24	U	24	24	U	24	23	U	23
Fluoranthene	SVOA	180	J	36	87	J	36	400		38	130	J	37	270	J	36
Fluorene	SVOA	18	U	18	18	U	18	19	U	19	19	U	19	18	U	18
Hexachlorobenzene	SVOA	29	U	29	29	U	29	31	U	31	30	U	30	29	U	29
Hexachlorobutadiene	SVOA	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
Hexachlorocyclopentadiene	SVOA	50	U	50	51	U	51	53	U	53	52	U	52	50	U	50
Hexachloroethane	SVOA	21	U	21	22	U	22	23	U	23	22	U	22	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	33	J	22	22	U	22	48	J	23	23	U	23	45	J	22
Isophorone	SVOA	17	U	17	17	U	17	18	U	18	18	U	18	17	U	17
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	31	U	31	33	U	33	32	U	32	31	U	31
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	22	U	22	22	U	22	21	U	21
Naphthalene	SVOA	31	U	31	31	U	31	33	U	33	32	U	32	31	U	31
Nitrobenzene	SVOA	22	U	22	22	U	22	23	U	23	23	U	23	22	U	22
Pentachlorophenol	SVOA	330	U	330	330	U	330	350	U	350	340	U	340	330	U	330
Phenanthrene	SVOA	62	J	17	55	J	17	180	J	18	48	J	18	91	J	17
Phenol	SVOA	18	U	18	18	U	18	19	U	19	19	U	19	18	U	18
Pyrene	SVOA	190	J	12	100	J	12	390		13	150	J	13	300	J	12

Table B-3. South Staging Pile December 2012 In-Process Sample Results. (4 Pages)

Location	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrate			Nitrite		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
South Stock 1	J1R7X4	12/31/12	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
South Stock 2	J1R7X5	12/31/12	1	U	1	1	U	1	1	U	1	1	U	1	1	U	1
South Stock 3	J1R7X6	12/31/12	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
South Stock 4	J1R7X7	12/31/12	1.1	U	1.1	1.1	U	1.1	1.1	B	1.1	1.1	U	1.1	1.1	U	1.1
South Stock 5	J1R7X8	12/31/12	1.2	U	1.2	1.2	U	1.2	1.2	U	1.2	1.2	U	1.2	1.2	U	1.2

Location	HEIS Number	Sample Date	Nitrogen in Nitrite			Phosphate			Sulfate			TPH - Diesel			TPH - Motor Oil		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
South Stock 1	J1R7X4	12/31/12	0.11	U	0.11	2.1	U	2.1	4.4	B	1.1	10200		3640	19200		10900
South Stock 2	J1R7X5	12/31/12	0.1	U	0.1	2	U	2	1.8	B	1	3560	U	3560	3840	J	10700
South Stock 3	J1R7X6	12/31/12	0.11	U	0.11	2.4	B	2.1	2	B	1.1	1070	J	3550	10600	U	10600
South Stock 4	J1R7X7	12/31/12	0.13	B	0.11	5.1	B	2.2	1.3	B	1.1	3820	U	3820	11400	U	11400
South Stock 5	J1R7X8	12/31/12	0.12	U	0.12	3.4	B	2.3	7.9		1.2	3770	U	3770	145000		11300

Table B-3. South Staging Pile December 2012 In-Process Sample Results. (4 Pages)

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
South Stock 1	J1R7X4	12/31/12	6030		12.8	1.54	U	1.54	2.06	B	2.56	45.2		1.28	0.228	B	0.512	5.12	U	5.12	0.512	U	0.512
South Stock 2	J1R7X5	12/31/12	5290		14.8	1.78	U	1.78	1.87	B	2.96	60.7		1.48	0.235	B	0.593	5.93	U	5.93	0.593	U	0.593
South Stock 3	J1R7X6	12/31/12	5640		14.9	1.78	U	1.78	2.14	B	2.97	58.4		1.49	0.228	B	0.595	5.95	U	5.95	0.595	U	0.595
South Stock 4	J1R7X7	12/31/12	11300		14.9	1.78	U	1.78	3.01		2.97	88.6		1.49	0.371	B	0.594	2.04	B	5.94	0.594	U	0.594
South Stock 5	J1R7X8	12/31/12	7450		15.2	1.83	U	1.83	2.54	B	3.05	65.9		1.52	0.26	B	0.609	6.09	U	6.09	0.609	U	0.609

Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
South Stock 1	J1R7X4	12/31/12	7250		256	9.09		0.512	6.35		5.12	13.2		2.56	0.22	U	0.22	20700		51.2	3.3		1.28
South Stock 2	J1R7X5	12/31/12	7530		296	5.29		0.593	9.52		5.93	14.6		2.96	0.3	B	0.21	29200		59.3	2.28		1.48
South Stock 3	J1R7X6	12/31/12	5150		297	10.9		0.595	7.37		5.95	14.7		2.97	0.21	U	0.21	23500		59.5	3.06		1.49
South Stock 4	J1R7X7	12/31/12	4030		297	15.7		0.594	7.78		5.94	13.8		2.97	0.23	U	0.23	23400		59.4	4.55		1.49
South Stock 5	J1R7X8	12/31/12	6810		305	12.4		0.609	7.05		6.09	15		3.05	0.23	U	0.23	22600		60.9	5.63		1.52

Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel			Potassium			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
South Stock 1	J1R7X4	12/31/12	4220		192	286		12.8	0.0266	U	0.027	5.12	U	5.12	8.98	B	10.2	876	B	1020	0.768	U	0.768
South Stock 2	J1R7X5	12/31/12	4630		222	312		14.8	0.0259	U	0.026	0.682	B	5.93	6.42	B	11.9	982	B	1190	0.889	U	0.889
South Stock 3	J1R7X6	12/31/12	4680		223	313		14.9	0.0275	U	0.028	5.95	U	5.95	13.5		11.9	733	B	1190	0.892	U	0.892
South Stock 4	J1R7X7	12/31/12	4630		223	382		14.9	0.0272	U	0.027	5.94	U	5.94	13.1		11.9	2230		1190	0.891	U	0.891
South Stock 5	J1R7X8	12/31/12	4560		229	301		15.2	0.0376		0.03	6.09	U	6.09	11	B	12.2	1230		1220	0.914	U	0.914

Location	HEIS Number	Sample Date	Silicon			Silver			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
South Stock 1	J1R7X4	12/31/12	691		5.12	0.512	U	0.512	250		128	59.4		6.4	40.6		25.6
South Stock 2	J1R7X5	12/31/12	479		5.93	0.593	U	0.593	431		148	83.7		7.41	48.3		29.6
South Stock 3	J1R7X6	12/31/12	761		5.95	0.595	U	0.595	267		149	65.9		7.44	41.9		29.7
South Stock 4	J1R7X7	12/31/12	1530		5.94	0.594	U	0.594	249		149	53.2		7.43	45.9		29.7
South Stock 5	J1R7X8	12/31/12	927		6.09	0.609	U	0.609	338		152	56.6		7.62	53		30.5

Table B-3. South Staging Pile December 2012 In-Process Sample Results. (4 Pages)

CONSTITUENT	CLASS	J1R7X4			J1R7X5			J1R7X6			J1R7X7			J1R7X8		
		12/31/12			12/31/12			12/31/12			12/31/12			12/31/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	235	D	14.5	36.5		3.48	3.52	U	3.52	3.77	U	3.77	96.3	UD	96.3
Acenaphthylene	PAH	14.5	UD	14.5	3.48	U	3.48	3.52	U	3.52	3.77	U	3.77	96.3	UD	96.3
Anthracene	PAH	14.7	D	14.5	1.13	J	3.48	28.6		3.52	3.77	U	3.77	27.4	JD	96.3
Benzo(a)anthracene	PAH	173	D	14.5	14		3.48	103		3.52	3.77	U	3.77	345	D	96.3
Benzo(a)pyrene	PAH	177	D	14.5	11.2		3.48	73		3.52	3.77	U	3.77	243	D	96.3
Benzo(b)fluoranthene	PAH	146	D	14.5	8.78		3.48	51.4		3.52	3.77	U	3.77	168	D	96.3
Benzo(ghi)perylene	PAH	14.5	UD	14.5	10.5		3.48	61.1		3.52	3.77	U	3.77	96.3	UD	96.3
Benzo(k)fluoranthene	PAH	86.3	D	14.5	5.05		3.48	30.5		3.52	3.77	U	3.77	115	D	96.3
Chrysene	PAH	135	D	14.5	15.7		3.48	72.1		3.52	3.77	U	3.77	201	D	96.3
Dibenz[a,h]anthracene	PAH	16.4	D	14.5	1.05	J	3.48	5.31		3.52	3.77	U	3.77	96.3	UD	96.3
Fluoranthene	PAH	180	D	14.5	29.1		3.48	232		3.52	3.77	U	3.77	762	D	96.3
Fluorene	PAH	4.58	JD	14.5	1.88	J	3.48	4.18		3.52	3.77	U	3.77	28.5	JD	96.3
Indeno(1,2,3-cd)pyrene	PAH	66.4	D	14.5	5.1		3.48	26.9		3.52	3.77	U	3.77	114	D	96.3
Naphthalene	PAH	59.7	D	14.5	11.1		3.48	168		3.52	3.77	U	3.77	331	D	96.3
Phenanthrene	PAH	62	D	14.5	15.9		3.48	134		3.52	3.77	U	3.77	381	D	96.3
Pyrene	PAH	173	D	14.5	25.9		3.48	184		3.52	3.77	U	3.77	568	D	96.3
Aroclor-1016	PCB	14.5	U	14.5	13.8	U	13.8	14.1	U	14.1	15.2	U	15.2	15.2	U	15.2
Aroclor-1221	PCB	14.5	U	14.5	13.8	U	13.8	14.1	U	14.1	15.2	U	15.2	15.2	U	15.2
Aroclor-1232	PCB	14.5	U	14.5	13.8	U	13.8	14.1	U	14.1	15.2	U	15.2	15.2	U	15.2
Aroclor-1242	PCB	14.5	U	14.5	4.14	J	13.8	14.1	U	14.1	15.2	U	15.2	9.13	J	15.2
Aroclor-1248	PCB	14.5	U	14.5	13.8	U	13.8	14.1	U	14.1	15.2	U	15.2	15.2	U	15.2
Aroclor-1254	PCB	28		14.5	37.9		13.8	5.35	J	14.1	15.2	U	15.2	49.6		15.2
Aroclor-1260	PCB	6.25	J	14.5	27.8		13.8	14.1	U	14.1	15.2	U	15.2	35.9		15.2
Aroclor-1262	PCB	14.5	U	14.5	13.8	U	13.8	14.1	U	14.1	15.2	U	15.2	15.2	U	15.2
Aroclor-1268	PCB	14.5	U	14.5	13.8	U	13.8	14.1	U	14.1	15.2	U	15.2	15.2	U	15.2
Aldrin	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Alpha-BHC	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
alpha-Chlordane	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Delta-BHC	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Dichlorodiphenyldichloroethane	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Dichlorodiphenyldichloroethylene	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Dichlorodiphenyltrichloroethane	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Dieldrin	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Endosulfan I	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Endosulfan II	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Endosulfan sulfate	PEST	2.07	D	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	6.2	D	1.51
Endrin	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Endrin aldehyde	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Endrin ketone	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Gamma-BHC (Lindane)	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
gamma-Chlordane	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Heptachlor	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Heptachlor epoxide	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Methoxychlor	PEST	1.44	UD	1.44	1.37	UD	1.37	1.4	UD	1.4	1.51	UD	1.51	1.51	UD	1.51
Toxaphene	PEST	14.4	UD	14.4	13.7	UD	13.7	14	UD	14	15.1	UD	15.1	15.1	UD	15.1
1,2,4-Trichlorobenzene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
1,2-Dichlorobenzene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
1,3-Dichlorobenzene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
1,4-Dichlorobenzene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2,4,5-Trichlorophenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2,4,6-Trichlorophenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2,4-Dichlorophenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2,4-Dimethylphenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2,4-Dinitrophenol	SVOA	1730	U	1730	1710	U	1710	1760	U	1760	1870	U	1870	3770	U	3770
2,4-Dinitrotoluene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2,6-Dinitrotoluene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2-Chloronaphthalene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2-Chlorophenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2-Methylnaphthalene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2-Methylphenol (cresol, o-)	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
2-Nitroaniline	SVOA	1730	U	1730	1710	U	1710	1760	U	1760	1870	U	1870	3770	U	3770
2-Nitrophenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754

Table B-3. South Staging Pile December 2012 In-Process Sample Results. (4 Pages)

CONSTITUENT	CLASS	J1R7X4			J1R7X5			J1R7X6			J1R7X7			J1R7X8		
		12/31/12			12/31/12			12/31/12			12/31/12			12/31/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3+4 Methylphenol (cresol, m+p)	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
3,3'-Dichlorobenzidine	SVOA	691	U	691	683	U	683	704	U	704	747	U	747	1510	U	1510
3-Nitroaniline	SVOA	1730	U	1730	1710	U	1710	1760	U	1760	1870	U	1870	3770	U	3770
4,6-Dinitro-2-methylphenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
4-Bromophenylphenyl ether	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
4-Chloro-3-methylphenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
4-Chloroaniline	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
4-Chlorophenylphenyl ether	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
4-Nitroaniline	SVOA	1730	U	1730	1710	U	1710	1760	U	1760	1870	U	1870	3770	U	3770
4-Nitrophenol	SVOA	1730	U	1730	1710	U	1710	1760	U	1760	1870	U	1870	3770	U	3770
Acenaphthene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Acenaphthylene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Anthracene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	707	JD	754
Benzo(a)anthracene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	2060	D	754
Benzo(a)pyrene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	1050	D	754
Benzo(b)fluoranthene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	1110	D	754
Benzo(ghi)perylene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	332	JD	754
Benzo(k)fluoranthene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	1170	D	754
Bis(2-chloro-1-methylethyl)ether	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Bis(2-Chloroethoxy)methane	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Bis(2-chloroethyl) ether	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Bis(2-ethylhexyl) phthalate	SVOA	346	U	346	341	U	341	109	J	352	374	U	374	754	U	754
Butylbenzylphthalate	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Carbazole	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	155	JD	754
Chrysene	SVOA	59.4	J	346	341	U	341	352	U	352	374	U	374	2130	D	754
Di-n-butylphthalate	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Di-n-octylphthalate	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Dibenz[a,h]anthracene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	219	JD	754
Dibenzofuran	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Diethyl phthalate	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Dimethyl phthalate	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Fluoranthene	SVOA	87.9	J	346	72.1	J	341	352	U	352	374	U	374	4280	D	754
Fluorene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	122	JD	754
Hexachlorobenzene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Hexachlorobutadiene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Hexachlorocyclopentadiene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Hexachloroethane	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Indeno(1,2,3-cd)pyrene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	331	JD	754
Isophorone	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
N-Nitroso-di-n-dipropylamine	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
N-Nitrosodiphenylamine	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Naphthalene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Nitrobenzene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Pentachlorophenol	SVOA	1730	U	1730	1710	U	1710	1760	U	1760	1870	U	1870	3770	U	3770
Phenanthrene	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	2240	D	754
Phenol	SVOA	346	U	346	341	U	341	352	U	352	374	U	374	754	U	754
Pyrene	SVOA	89.5	J	346	66.1	J	341	352	U	352	374	U	374	4010	D	754

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

Location	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
2	J1P1R2	5/7/12	0.39	U	0.39	15.6		2	0.82	U	0.82	2.8		0.31	0.34	U	0.34
2	J1P1R3	5/7/12	0.39	U	0.39	10.1		2	0.82	U	0.82	1.7	B	0.31	0.34	U	0.34
3	J1P1R4	5/7/12	0.38	U	0.38	51.4		1.9	0.81	U	0.81	2.6		0.31	0.33	U	0.33
4	J1P1R5	5/7/12	0.39	UN	0.39	9.8	N	2	0.82	UN	0.82	3.7	N	0.31	0.34	UN	0.34
NA	J1P1R6	5/9/12	0.39	U	0.39	15.9		2	0.82	UN	0.82	2.4	B	0.31	0.34	U	0.34
NA	J1P1R7	5/9/12	0.39	U	0.39	115		2	0.83	U	0.83	3.2		0.32	0.34	U	0.34
NA	J1P1R8	5/9/12	0.37	U	0.37	8.2		1.9	0.79	U	0.79	4.3		0.3	0.32	U	0.32
NA	J1P1R9	5/9/12	0.39	U	0.39	17.1		2	0.82	U	0.82	6.9		0.31	0.53	B	0.34
NA	J1P1T0	5/9/12	0.39	U	0.39	3.1	B	2	0.83	U	0.83	2.2	B	0.32	0.34	U	0.34
NA	J1P1T1	5/9/12	0.39	U	0.39	8.2		2	0.83	U	0.83	3.6		0.32	0.34	U	0.34
NA	J1P1T2	5/9/12	0.59	B	0.39	15.5		2	0.82	U	0.82	10		0.31	0.33	U	0.33
NA	J1P1T3	5/9/12	0.57	B	0.39	10.8		2	0.82	U	0.82	4.5		0.31	0.34	U	0.34
NA	J1P1T4	5/9/12	0.39	U	0.39	16.7		2	0.83	U	0.83	2.2	B	0.32	0.34	U	0.34
NA	J1P1T5	5/9/12	0.39	U	0.39	1670	D	10	0.83	U	0.83	1.8	B	0.32	0.34	U	0.34
NA	J1P1T6	5/9/12	0.38	U	0.38	5.1		1.9	0.8	U	0.8	2.5		0.31	0.33	U	0.33
NA	J1P1T7	5/9/12	0.38	U	0.38	45.9		1.9	0.8	U	0.8	2.1	B	0.3	0.33	U	0.33

Location	HEIS Number	Sample Date	Nitrogen in Nitrite and Nitrate			Phosphorous in phosphate			Sulfate			TPH - Diesel			TPH - Diesel EXT		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
2	J1P1R2	5/7/12	3.7		0.3	1.2	U	1.2	54.3		1.7	11000		680	19000		1000
2	J1P1R3	5/7/12	1.3		0.3	1.2	U	1.2	32		1.7	16000		670	29000		980
3	J1P1R4	5/7/12	4.4		0.3	1.2	U	1.2	14.7		1.7	33000		680	51000		1000
4	J1P1R5	5/7/12	4.6		0.3	1.2	UN	1.2	10.5	N	1.7	29000	N	650	39000	N	960
NA	J1P1R6	5/9/12	2.4		0.3	1.2	UN	1.2	30		1.7	9100		660	17000		970
NA	J1P1R7	5/9/12	3.4		0.3	1.3	U	1.3	33.6		1.7	32000		640	66000		940
NA	J1P1R8	5/9/12	5.2		0.3	1.2	U	1.2	13.1		1.7	4500		640	7500		940
NA	J1P1R9	5/9/12	9.4		0.3	1.2	U	1.2	14.9		1.7	11000		640	18000		940
NA	J1P1T0	5/9/12	2.6		0.3	1.3	U	1.3	15.4		1.7	11000		660	15000		970
NA	J1P1T1	5/9/12	4		0.3	1.2	U	1.2	8.6		1.7	2100	J	650	4200		950
NA	J1P1T2	5/9/12	12.2		0.3	1.2	U	1.2	33.3		1.7	6400		680	9600		990
NA	J1P1T3	5/9/12	5		0.3	1.2	U	1.2	14.9		1.7	18000		640	25000		950
NA	J1P1T4	5/9/12	1.9		0.3	1.3	U	1.3	10.8		1.7	8500		670	14000		990
NA	J1P1T5	5/9/12	2.1		0.3	1.3	U	1.3	26.9		1.8	7100		640	9500		950
NA	J1P1T6	5/9/12	3	N	0.3	1.2	U	1.2	10		1.7	5000		640	8400		940
NA	J1P1T7	5/9/12	2.5		0.3	1.2	U	1.2	53.4		1.7	26000		660	40000		970

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
2	J1P1R2	5/7/12	7030		1.5	0.38	U	0.38	3.4		0.65	62.5		0.075	0.48		0.033	0.97	U	0.97	0.08	B	0.041
2	J1P1R3	5/7/12	6940		1.5	0.36	U	0.36	3.2		0.63	61.1		0.073	0.47		0.032	1	B	0.94	0.11	B	0.039
3	J1P1R4	5/7/12	7070		1.4	0.34	U	0.34	3.2		0.59	68.8		0.068	0.44		0.029	0.88	B	0.88	0.1	B	0.037
4	J1P1R5	5/7/12	7570		1.3	0.33	U	0.33	3.3		0.57	72.4		0.065	0.45		0.028	1.1	B	0.84	0.11	B	0.035
NA	J1P1R6	5/9/12	7590	X	1.6	1.3		0.38	2.9		0.67	62.1	X	0.077	0.09	B	0.033	1.2	B	0.99	0.2	C	0.041
NA	J1P1R7	5/9/12	7450	X	1.6	0.99		0.38	2.3		0.66	57.9	X	0.076	0.093	B	0.033	1.2	B	0.98	0.25		0.041
NA	J1P1R8	5/9/12	7400	X	1.4	0.61		0.36	2.7		0.62	60.3	X	0.071	0.11	B	0.031	1	B	0.92	0.16	BC	0.038
NA	J1P1R9	5/9/12	7140	X	1.5	0.74		0.36	2.5		0.62	60.9	X	0.072	0.097	B	0.031	0.94	B	0.93	0.21	C	0.039
NA	J1P1T0	5/9/12	7870	X	1.5	0.52	B	0.37	2.8		0.64	63.2	X	0.074	0.11	B	0.032	1	B	0.95	0.21	C	0.04
NA	J1P1T1	5/9/12	7980	X	1.6	0.56	B	0.38	3		0.66	64.9	X	0.076	0.12	B	0.033	1.3	B	0.99	0.2	C	0.041
NA	J1P1T2	5/9/12	7530	X	1.5	0.67		0.37	2.8		0.64	71	X	0.074	0.1	B	0.032	1	B	0.96	0.18	BC	0.04
NA	J1P1T3	5/9/12	7640	X	1.5	0.63		0.38	3.1		0.66	60.9	X	0.075	0.11	B	0.033	1	B	0.97	0.21	C	0.041
NA	J1P1T4	5/9/12	7170	X	1.5	0.89		0.36	2.4		0.63	62.5	X	0.072	0.094	B	0.031	0.93	U	0.93	0.19	C	0.039
NA	J1P1T5	5/9/12	7680	X	1.5	0.43	B	0.37	3		0.64	66	X	0.073	0.13	B	0.032	1.3	B	0.94	0.19	C	0.04
NA	J1P1T6	5/9/12	7720	X	1.6	0.73		0.38	2.4		0.66	66.9	X	0.076	0.13	B	0.033	1	B	0.98	0.21	C	0.041
NA	J1P1T7	5/9/12	7660	X	1.6	0.47	BM	0.38	2.4		0.67	65.2	X	0.077	0.12	B	0.033	1	B	0.99	0.23	C	0.041

Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
2	J1P1R2	5/7/12	7660		13.9	11.4		0.057	6.8	X	0.099	15.9		0.21	0.155	U	0.155	19100		3.8	5.8		0.27
2	J1P1R3	5/7/12	7520		13.5	10.9		0.055	6.4	X	0.095	16.8		0.21	0.246		0.155	18500		3.6	8.3		0.26
3	J1P1R4	5/7/12	6550		12.6	11		0.052	6.3	X	0.089	15.8		0.19	0.155	U	0.155	17000		3.4	6.3		0.24
4	J1P1R5	5/7/12	8640		12.1	11.9		0.05	6.3	X	0.086	15.6		0.19	0.155	U	0.155	17100		3.3	4.6		0.23
NA	J1P1R6	5/9/12	7800	X	14.2	10.7	X	0.058	8.1	X	0.1	16.5	X	0.22	0.155	U	0.155	21200	X	3.8	9.7	X	0.27
NA	J1P1R7	5/9/12	7580	X	14.1	10.1	X	0.058	8.7	X	0.1	20.2	X	0.22	0.155	U	0.155	22200	X	3.8	13	X	0.27
NA	J1P1R8	5/9/12	7150	X	13.2	9.9	X	0.054	7.9	X	0.093	16.2	X	0.2	0.155	U	0.155	21100	X	3.6	5.2	X	0.25
NA	J1P1R9	5/9/12	7820	X	13.3	9.6	X	0.055	8.4	X	0.095	17.5	X	0.21	0.155	U	0.155	22600	X	3.6	5.8	X	0.26
NA	J1P1T0	5/9/12	7490	X	13.7	10.9	X	0.056	8.3	X	0.097	17.6	X	0.21	0.155	U	0.155	22000	X	3.7	5.5	X	0.26
NA	J1P1T1	5/9/12	7690	X	14.2	11.5	X	0.058	8	X	0.1	17	X	0.22	0.155	U	0.155	20800	X	3.8	4.3	X	0.27
NA	J1P1T2	5/9/12	7040	X	13.8	12.2	X	0.057	8.8	X	0.098	17.2	X	0.21	0.155	U	0.155	22100	X	3.7	4.9	X	0.26
NA	J1P1T3	5/9/12	7340	X	14	10.8	X	0.058	8.7	X	0.099	16.5	X	0.22	0.155	U	0.155	22900	X	3.8	5.7	X	0.27
NA	J1P1T4	5/9/12	7520	X	13.4	9.7	X	0.055	8.9	X	0.095	18.1	X	0.21	0.155	U	0.155	22600	X	3.6	7.4	X	0.26
NA	J1P1T5	5/9/12	7750	X	13.6	10.6	X	0.056	7.9	X	0.096	15.7	X	0.21	0.155	U	0.155	20900	X	3.7	4.5	X	0.26
NA	J1P1T6	5/9/12	6210	X	14.1	10.4	X	0.058	8.1	X	0.1	15.5	X	0.22	0.155	U	0.155	21800	X	3.8	5.4	X	0.27
NA	J1P1T7	5/9/12	7700	X	14.2	12	X	0.059	9	X	0.1	17.9	X	0.22	0.155	U	0.155	23300	X	3.8	18.8	X	0.27

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

Location	HEIS Number	Sample Date	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Mercury mg/kg	Q	PQL	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Selenium mg/kg	Q	PQL
2	J1P1R2	5/7/12	4750		3.7	302		0.099	0.041		0.0054	0.29	B	0.26	11.3	X	0.12	1250		40.5	1.1		0.85
2	J1P1R3	5/7/12	4390		3.5	293		0.095	0.066		0.0053	0.25	U	0.25	10.4	X	0.12	1220		39.1	1		0.82
3	J1P1R4	5/7/12	4410		3.3	288		0.089	0.076		0.0049	0.23	U	0.23	11	X	0.11	1270		36.6	0.77	U	0.77
4	J1P1R5	5/7/12	4660		3.2	303		0.086	0.017	B	0.0061	0.22	U	0.22	11.4	X	0.11	1390		35.2	0.74	U	0.74
NA	J1P1R6	5/9/12	4910	X	3.7	317	X	0.1	0.022		0.0057	0.28	B	0.26	11.8	X	0.12	1160		41.3	0.87	U	0.87
NA	J1P1R7	5/9/12	4930	X	3.7	331	X	0.1	0.28		0.0067	0.26	U	0.26	12.1	X	0.12	1120		41	0.86	U	0.86
NA	J1P1R8	5/9/12	4650	X	3.5	316	X	0.093	0.0063	U	0.0063	0.24	U	0.24	10.8	X	0.11	1140		38.3	0.8	U	0.8
NA	J1P1R9	5/9/12	5010	X	3.5	328	X	0.095	0.023		0.0056	0.25	U	0.25	11	X	0.12	1100		38.8	0.81	U	0.81
NA	J1P1T0	5/9/12	4980	X	3.6	333	X	0.097	0.007	U	0.007	0.25	U	0.25	11.8	X	0.12	1230		39.8	0.84	U	0.84
NA	J1P1T1	5/9/12	4890	X	3.7	328	X	0.1	0.0069	U	0.0069	0.26	U	0.26	12	X	0.12	1150		41.2	0.86	U	0.86
NA	J1P1T2	5/9/12	6170	X	3.6	335	X	0.098	0.0049	U	0.0049	0.27	B	0.25	23.9	X	0.12	1080		40	0.84	U	0.84
NA	J1P1T3	5/9/12	5130	X	3.7	340	X	0.099	0.0067	U	0.0067	0.26	U	0.26	12.1	X	0.12	1260		40.7	0.85	U	0.85
NA	J1P1T4	5/9/12	4900	X	3.5	328	X	0.095	0.007	U	0.007	0.25	U	0.25	11.6	X	0.12	1090		39.1	0.82	U	0.82
NA	J1P1T5	5/9/12	4770	X	3.6	317	X	0.096	0.007	U	0.007	0.25	U	0.25	11.1	X	0.12	1180		39.5	0.83	U	0.83
NA	J1P1T6	5/9/12	4610	X	3.7	324	X	0.1	0.0076	B	0.0054	0.26	U	0.26	10.6	X	0.12	1240		41	0.86	U	0.86
NA	J1P1T7	5/9/12	5310	X	3.7	364	X	0.1	0.008	B	0.0054	0.27	B	0.26	18.2	X	0.12	1160		41.4	0.87	U	0.87

Location	HEIS Number	Sample Date	Silicon mg/kg	Q	PQL	Silver mg/kg	Q	PQL	Sodium mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL
2	J1P1R2	5/7/12	409	XN	5.6	0.16	U	0.16	266		58.3	44.1		0.093	41.7	X	0.39
2	J1P1R3	5/7/12	344	X	5.4	0.15	U	0.15	257		56.3	42.2		0.09	57.6	X	0.38
3	J1P1R4	5/7/12	392	X	5.1	0.14	U	0.14	238		52.7	36.9		0.084	39.7	X	0.36
4	J1P1R5	5/7/12	382	X	4.9	0.14	U	0.14	224		50.6	36.5		0.081	37.2	X	0.34
NA	J1P1R6	5/9/12	449	X	5.7	0.16	UN	0.16	309		59.5	53.5	X	0.095	56.6	X	0.4
NA	J1P1R7	5/9/12	496	X	5.7	0.16	UN	0.16	412		59.1	51.1	X	0.094	63.7	X	0.4
NA	J1P1R8	5/9/12	500	X	5.3	0.15	UN	0.15	298		55.1	51.7	X	0.088	46.5	X	0.37
NA	J1P1R9	5/9/12	424	X	5.4	0.15	UN	0.15	314		55.8	56.8	X	0.089	47.7	X	0.38
NA	J1P1T0	5/9/12	529	X	5.5	0.16	UN	0.16	320		57.3	54.7	X	0.091	45.7	X	0.39
NA	J1P1T1	5/9/12	540	X	5.7	0.16	UN	0.16	335		59.3	52.9	X	0.094	42.3	X	0.4
NA	J1P1T2	5/9/12	515	X	5.5	0.16	UN	0.16	357		57.5	56.4	X	0.092	45.7	X	0.39
NA	J1P1T3	5/9/12	532	X	5.6	0.16	UN	0.16	313		58.6	56.4	X	0.093	46.4	X	0.4
NA	J1P1T4	5/9/12	435	X	5.4	0.15	UN	0.15	324		56.2	56.7	X	0.09	47.5	X	0.38
NA	J1P1T5	5/9/12	425	X	5.5	0.15	UN	0.15	1470		56.9	55.1	X	0.091	43.1	X	0.38
NA	J1P1T6	5/9/12	487	X	5.7	0.16	UN	0.16	309		59.1	56	X	0.094	46.5	X	0.4
NA	J1P1T7	5/9/12	543	XN	5.7	0.16	UN	0.16	402		59.6	66.9	X	0.095	55.4	X	0.4

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

Location	HEIS Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154			Europium-155			Radium-226		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
2	J1P1R2	5/7/12	-0.0887	U	0.0906	0.000902	U	0.0293	0.00545	U	0.0316	0.0168	U	0.0733	-0.0698	U	0.0929	-0.0382	U	0.0703	0.496		0.0579
2	J1P1R3	5/7/12	0.00339	U	0.0158	-0.00446	U	0.0182	-0.00094	U	0.0216	-0.00171	U	0.0358	0.000713	U	0.0709	0.0163	U	0.0259	0.258		0.032
3	J1P1R4	5/7/12	-0.0176	U	0.11	0.0158	U	0.0239	-0.00807	U	0.0266	0.00511	U	0.0525	0.00963	U	0.0826	0.0275	U	0.0491	0.31		0.041
4	J1P1R5	5/7/12	0.0292	U	0.0748	0.00348	U	0.0304	-0.00362	U	0.0325	0.0307	U	0.0749	-0.0146	U	0.0995	0.0253	U	0.0608	0.342		0.0557
NA	J1P1R6	5/9/12	-0.00237	U	0.0407	0.000567	U	0.0253	-0.00358	U	0.0257	0.00738	U	0.06	0.00166	U	0.0902	0.0422	U	0.062	0.45		0.0431
NA	J1P1R7	5/9/12	0.0303	U	0.0413	0.0213	U	0.0262	0.037	U	0.0332	-0.0164	U	0.0597	0.00218	U	0.0836	0.0448	U	0.0632	0.439		0.045
NA	J1P1R8	5/9/12	0.0473	U	0.0714	0.0661		0.0404	0.0485	U	0.0493	0.000497	U	0.0904	-0.0466	U	0.0987	0.0953	U	0.105	0.471		0.0645
NA	J1P1R9	5/9/12	0.0185	U	0.0245	0.00618	U	0.0222	0.0148	U	0.0271	-0.00703	U	0.0417	0.000336	U	0.0757	0.0128	U	0.0356	0.4		0.0344
NA	J1P1T0	5/9/12	0.112	U	0.225	0.00957	U	0.0269	-0.00463	U	0.0277	-0.0305	U	0.0599	0.00497	U	0.0915	0.035	U	0.074	0.484		0.0452
NA	J1P1T1	5/9/12	0.0129	U	0.0304	-0.00246	U	0.0222	0.0104	U	0.0271	0.0142	U	0.0473	0.0211	U	0.0823	0.0416	U	0.0465	0.403		0.0359
NA	J1P1T2	5/9/12	-0.036	U	0.119	0.029	U	0.0299	-0.00401	U	0.0238	0.0255	U	0.0725	-0.0633	U	0.079	0.000207	U	0.0888	0.411		0.0491
NA	J1P1T3	5/9/12	0.019	U	0.109	0.0183	U	0.0372	0.0083	U	0.0363	-0.0244	U	0.0798	-0.00573	U	0.0944	0.0186	U	0.0807	0.42		0.0554
NA	J1P1T4	5/9/12	0.00973	U	0.0298	0.0197	U	0.0243	0.00333	U	0.0254	0.00198	U	0.0453	0.029	U	0.0833	0.0399	U	0.0452	0.423		0.0359
NA	J1P1T5	5/9/12	-0.0407	U	0.0598	0.0106	U	0.0386	0.00835	U	0.0342	0.0423	U	0.0934	-0.0621	U	0.104	0.0429	U	0.0898	0.42		0.0658
NA	J1P1T6	5/9/12	0.00419	U	0.0273	0.0145	U	0.0247	0.00573	U	0.026	0.00548	U	0.0447	-0.00364	U	0.0758	0.0343	U	0.0414	0.46		0.0371
NA	J1P1T7	5/9/12	0.000518	U	0.0372	0.00682	U	0.0253	0.0192	U	0.0292	0.0103	U	0.0575	-0.0342	U	0.0705	0.0404	U	0.0586	0.384		0.0414

Location	HEIS Number	Sample Date	Plutonium-238			Plutonium-239/240			Thorium-228			Thorium-230			Thorium-232			Uranium-234			Uranium-235		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
2	J1P1R2	5/7/12	0	U	0.0612	-0.00128	U	0.0612	0.322		0.128	0.327		0.0882	0.39		0.105	0.109		0.0491	0.0234	U	0.0491
2	J1P1R3	5/7/12	-0.00242	U	0.0656	0.0142	U	0.0576	0.508		0.1	0.365		0.0993	0.503		0.0993	0.0869		0.0505	0.0115	U	0.0505
3	J1P1R4	5/7/12	-0.00066	U	0.0595	0.0144	U	0.0706	0.398		0.218	0.298		0.182	0.29		0.24	0.18		0.047	-0.00155	U	0.0558
4	J1P1R5	5/7/12	0.013	U	0.0577	-0.0121	U	0.0994	0.25		0.153	0.0609	U	0.128	0.411		0.115	0.097		0.0712	0.018	U	0.0787
NA	J1P1R6	5/9/12	-0.00305	U	0.0731	0.00976	U	0.0839	0.471		0.127	0.194		0.0874	0.234		0.104	0.187		0.076	0.0102	U	0.0671
NA	J1P1R7	5/9/12	-0.00063	U	0.057	-0.00188	U	0.0676	0.391		0.0895	0.1		0.0888	0.326		0.0888	0.0902		0.0525	0.012	U	0.0525
NA	J1P1R8	5/9/12	-0.00067	U	0.061	0	U	0.061	0.321		0.201	0.324		0.168	0.407		0.222	0.154		0.0445	-0.00089	U	0.0445
NA	J1P1R9	5/9/12	0	U	0.0645	0.017	U	0.0645	0.308		0.143	0.225		0.114	0.425		0.104	0.35		0.0579	0.0299	U	0.0687
NA	J1P1T0	5/9/12	0	U	0.0512	-0.00056	U	0.0512	0.191		0.0863	0.36		0.0857	0.36		0.0857	0.249		0.0604	0.0449	U	0.0552
NA	J1P1T1	5/9/12	0	U	0.0622	-0.00068	U	0.0622	0.449		0.0698	0.222		0.0692	0.343		0.0626	0.211		0.0567	0.0513	U	0.0541
NA	J1P1T2	5/9/12	-0.00068	U	0.0615	-0.0027	U	0.0771	0.313		0.0775	0.274		0.0769	0.458		0.0769	0.203		0.0514	0.0373	U	0.0514
NA	J1P1T3	5/9/12	-0.00237	U	0.0643	0	U	0.0564	0.408		0.0751	0.0809		0.0594	0.441		0.0594	0.153		0.0644	-0.00169	U	0.0609
NA	J1P1T4	5/9/12	0.0164	U	0.0665	0.0163	U	0.0665	0.385		0.0519	0.354		0.0516	0.538		0.0516	0.111		0.0449	0.0214	U	0.0449
NA	J1P1T5	5/9/12	-0.00071	U	0.0645	-0.00213	U	0.0766	0.272		0.0716	0.289		0.0711	0.306		0.0711	0.161		0.0935	-0.00401	U	0.0637
NA	J1P1T6	5/9/12	0	U	0.0569	0.00205	U	0.098	0.435		0.0875	0.172		0.11	0.302		0.148	0.175		0.0782	-0.00111	U	0.0527
NA	J1P1T7	5/9/12	-0.00064	U	0.058	-0.00191	U	0.0689	0.245		0.0763	0.332		0.0705	0.262		0.0705	0.0944		0.0634	0.00819	U	0.0558

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

Location	HEIS Number	Sample Date	Uranium-238			Total beta radiostrontium			Carbon-14			Nickel-63			Tritium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
2	J1P1R2	5/7/12	0.242		0.0527	0.0428	U	0.148	0.155	U	0.448	6.9	U	13.5	0.00767	U	0.0265
2	J1P1R3	5/7/12	0.162		0.0542	0.0123	U	0.161	0.0818	U	0.448	3.8	U	14.6	0.0109	U	0.0347
3	J1P1R4	5/7/12	0.127		0.0619	0.028	U	0.163	0.0912	U	0.446	4.81	U	15	0.00571	U	0.0277
4	J1P1R5	5/7/12	0.134		0.0845	0.0708	U	0.151	0.033	U	0.448	3.33	U	13.1	0.0124	U	0.0542
NA	J1P1R6	5/9/12	0.0102		0.061	0.000733	U	0.155				5.26	U	13.4			
NA	J1P1R7	5/9/12	0.142		0.0563	0.00367	U	0.164				-0.775	U	12.7			
NA	J1P1R8	5/9/12	0.142		0.0478	0.0441	U	0.166				1.57	U	13.4			
NA	J1P1R9	5/9/12	0.0763		0.0762	0.0257	U	0.162				-3.28	U	14.3			
NA	J1P1T0	5/9/12	0.243		0.0552	0.0591	U	0.145				4.73	U	13			
NA	J1P1T1	5/9/12	0.192		0.0612	-0.021	U	0.177				1.44	U	13.6			
NA	J1P1T2	5/9/12	0.215		0.0552	0.0133	U	0.157				-1.04	U	13.1			
NA	J1P1T3	5/9/12	0.179		0.0729	0.0607	U	0.161				0.781	U	14			
NA	J1P1T4	5/9/12	0.266		0.0482	0.0245	U	0.171				-3.56	U	14.7			
NA	J1P1T5	5/9/12	0.0838		0.0822	-0.11	U	0.281				2.36	U	13.5			
NA	J1P1T6	5/9/12	0.165		0.0656	-0.025	U	0.173				1.85	U	14.1			
NA	J1P1T7	5/9/12	0.0504	U	0.0634	0.00491	U	0.186				6.07	U	13.5			

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

CONSTITUENT	CLASS	J1P1R2 5/7/12			J1P1R3 5/7/12			J1P1R4 5/7/12			J1P1R5 5/7/12			J1P1R6 5/9/12			J1P1R7 5/9/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	10	U	10	10	U	10	9.9	U	9.9	9.8	U	9.8	9.9	U	9.9
Acenaphthylene	PAH	9	U	9	9	U	9	9	U	9	8.9	U	8.9	8.9	U	8.9	8.9	U	8.9
Anthracene	PAH	45		3.1	89		3.1	66		3.1	34		3	80		3	130		3
Benzo(a)anthracene	PAH	160		3.2	270		3.2	140		3.2	98		3.2	290		3.1	400		3.2
Benzo(a)pyrene	PAH	100		6.4	180		6.4	110		6.4	64		6.4	190		6.3	320		6.4
Benzo(b)fluoranthene	PAH	120	X	4.2	210	X	4.2	110	X	4.2	78	X	4.2	210	X	4.1	370	X	4.2
Benzo(ghi)perylene	PAH	69		7.2	130		7.2	76		7.2	39		7.1	140		7.1	230		7.1
Benzo(k)fluoranthene	PAH	46		4	80		4	46		4	27		3.9	94		3.9	150		3.9
Chrysene	PAH	150		4.9	250		4.9	140		4.9	100		4.8	270		4.8	420		4.8
Dibenz[a,h]anthracene	PAH	21	JX	11	38	X	11	30	X	11	12	JX	11	40	X	11	61	X	11
Fluoranthene	PAH	220	X	13	410		13	250	X	13	140		13	400		13	630		13
Fluorene	PAH	25	JX	5.3	50		5.3	36		5.3	19	J	5.2	42	X	5.2	63	X	5.2
Indeno(1,2,3-cd)pyrene	PAH	59		12	100		12	62		12	27	J	12	110		12	170		12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	97		12	220		12	180		12	71		12	150		12	260		12
Pyrene	PAH	260		12	460	N	12	300		12	170		12	480		12	790		12
Aroclor-1016	PCB	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7
Aroclor-1221	PCB	7.6	U	7.6	7.8	U	7.8	7.9	U	7.9	7.9	U	7.9	7.8	U	7.8	7.8	U	7.8
Aroclor-1232	PCB	1.9	U	1.9	1.9	U	1.9	2	U	2	2	U	2	2	U	2	2	U	2
Aroclor-1242	PCB	4.4	U	4.4	4.5	U	4.5	4.6	U	4.6	4.6	U	4.6	4.5	U	4.5	4.5	U	4.5
Aroclor-1248	PCB	4.4	U	4.4	4.5	U	4.5	4.6	U	4.6	4.6	U	4.6	4.5	U	4.5	4.5	U	4.5
Aroclor-1254	PCB	8.6	JP	2.5	22		2.5	13	P	2.6	7.9	JP	2.6	8.8	JP	2.5	34		2.5
Aroclor-1260	PCB	4.5	JP	2.5	15		2.5	12		2.6	3.6	J	2.6	6.1	JP	2.5	30		2.5
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	26	U	26	27	U	27	28	U	28	28	U	28
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	21	U	21	22	U	22	22	U	22	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	11	U	11	12	U	12	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	13	U	13	13	U	13	13	U	13	13	U	13	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.4	U	9.4	9.8	U	9.8	9.9	U	9.9	9.8	U	9.8
2,4,6-Trichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.4	U	9.4	9.8	U	9.8	9.9	U	9.9	9.8	U	9.8
2,4-Dichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.4	U	9.4	9.8	U	9.8	9.9	U	9.9	9.8	U	9.8
2,4-Dimethylphenol	SVOA	65	U	65	65	U	65	62	U	62	65	U	65	65	U	65	65	U	65
2,4-Dinitrophenol	SVOA	330	UX	330	330	U	330	310	U	310	330	U	330	330	U	330	330	U	330
2,4-Dinitrotoluene	SVOA	65	U	65	65	U	65	62	U	62	65	U	65	65	U	65	65	U	65
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	26	U	26	27	U	27	28	U	28	28	U	28
2-Chloronaphthalene	SVOA	9.9	U	9.9	9.8	U	9.8	9.4	U	9.4	9.8	U	9.8	9.9	U	9.9	9.8	U	9.8
2-Chlorophenol	SVOA	21	U	21	21	U	21	20	U	20	21	U	21	21	U	21	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	18	U	18	19	U	19	19	U	19	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	12	U	12	13	U	13	13	U	13	13	U	13
2-Nitroaniline	SVOA	49	U	49	49	U	49	47	U	47	49	U	49	49	U	49	49	U	49
2-Nitrophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.4	U	9.4	9.8	U	9.8	9.9	U	9.9	9.8	U	9.8

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

CONSTITUENT	CLASS	J1P1R2			J1P1R3			J1P1R4			J1P1R5			J1P1R6			J1P1R7		
		5/7/12			5/7/12			5/7/12			5/7/12			5/9/12			5/9/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	31	U	31	32	U	32	33	U	33	33	U	33
3,3'-Dichlorobenzidine	SVOA	89	U	89	88	U	88	85	U	85	88	U	88	89	U	89	89	U	89
3-Nitroaniline	SVOA	72	U	72	71	U	71	69	U	69	71	U	71	72	U	72	72	U	72
4,6-Dinitro-2-methylphenol	SVOA	330	UX	330	320	U	320	310	U	310	320	U	320	330	U	330	330	U	330
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	18	U	18	19	U	19	19	U	19	19	U	19
4-Chloro-3-methylphenol	SVOA	65	U	65	65	U	65	62	U	62	65	U	65	65	U	65	65	U	65
4-Chloroaniline	SVOA	81	U	81	80	U	80	77	U	77	80	U	80	81	U	81	81	U	81
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	20	U	20	21	U	21	21	U	21	21	U	21
4-Nitroaniline	SVOA	72	U	72	71	U	71	68	U	68	71	U	71	72	U	72	71	U	71
4-Nitrophenol	SVOA	96	U	96	95	U	95	91	U	91	95	U	95	96	U	96	96	U	96
Acenaphthene	SVOA	18	J	10	38	J	10	14	J	9.7	10	U	10	10	U	10	43	J	10
Acenaphthylene	SVOA	17	U	17	17	U	17	16	U	16	17	U	17	17	U	17	17	U	17
Anthracene	SVOA	36	J	17	91	J	17	30	J	16	20	J	17	19	J	17	69	J	17
Benzo(a)anthracene	SVOA	150	J	20	310	J	20	180	J	19	130	J	20	89	J	20	300	J	20
Benzo(a)pyrene	SVOA	120	J	20	280	J	20	170	J	19	100	J	20	75	J	20	280	J	20
Benzo(b)fluoranthene	SVOA	220	JX	26	470	X	26	300	JX	25	170	JX	26	140	JX	26	480	X	26
Benzo(ghi)perylene	SVOA	60	J	16	140	J	16	85	J	15	43	J	16	47	J	16	150	J	16
Benzo(k)fluoranthene	SVOA	40	UX	40	39	UX	39	38	UX	38	39	UX	39	40	UX	40	39	UX	39
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	22	U	22	23	U	23	23	U	23	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	22	U	22	23	U	23	23	U	23	23	U	23
Bis(2-chloroethyl) ether	SVOA	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	45	U	45	45	U	45	43	U	43	45	U	45	45	U	45	45	U	45
Butylbenzylphthalate	SVOA	43	U	43	42	U	42	40	U	40	42	U	42	42	U	42	42	U	42
Carbazole	SVOA	36	U	36	47	J	35	34	U	34	35	U	35	36	U	36	35	U	35
Chrysene	SVOA	190	J	27	380		26	220	J	25	160	J	26	110	J	27	370		27
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	27	U	27	28	U	28	29	U	29	29	U	29
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Dibenz[a,h]anthracene	SVOA	19	U	19	39	J	19	25	J	18	19	U	19	19	U	19	19	U	19
Dibenzofuran	SVOA	20	U	20	20	U	20	19	U	19	20	U	20	20	U	20	20	U	20
Diethyl phthalate	SVOA	26	U	26	25	U	25	24	U	24	25	U	25	26	U	26	26	U	26
Dimethyl phthalate	SVOA	23	U	23	23	U	23	22	U	22	23	U	23	23	U	23	23	U	23
Fluoranthene	SVOA	260	J	36	560		35	260	J	34	200	J	35	160	J	36	560		35
Fluorene	SVOA	18	U	18	32	J	18	17	U	17	18	U	18	18	U	18	26	J	18
Hexachlorobenzene	SVOA	29	U	29	28	U	28	27	U	27	28	U	28	29	U	29	29	U	29
Hexachlorobutadiene	SVOA	9.9	U	9.9	9.8	U	9.8	9.4	U	9.4	9.8	U	9.8	9.9	U	9.9	9.8	U	9.8
Hexachlorocyclopentadiene	SVOA	49	U	49	49	U	49	47	U	47	49	U	49	49	U	49	49	U	49
Hexachloroethane	SVOA	21	U	21	21	U	21	20	U	20	21	U	21	21	U	21	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	49	J	22	120	J	22	72	J	21	35	J	22	41	J	22	130	J	22
Isophorone	SVOA	17	U	17	17	U	17	16	U	16	17	U	17	17	U	17	17	U	17
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	29	U	29	30	U	30	31	U	31	31	U	31
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	20	U	20	21	U	21	21	U	21	21	U	21
Naphthalene	SVOA	31	U	31	30	U	30	29	U	29	30	U	30	31	U	31	31	U	31
Nitrobenzene	SVOA	22	U	22	22	U	22	21	U	21	22	U	22	22	U	22	22	U	22
Pentachlorophenol	SVOA	330	U	330	320	U	320	310	U	310	320	U	320	330	U	330	330	U	330
Phenanthrene	SVOA	140	J	17	360		17	130	J	16	67	J	17	87	J	17	320	J	17
Phenol	SVOA	18	U	18	18	U	18	17	U	17	18	U	18	18	U	18	18	U	18
Pyrene	SVOA	290	J	12	620		12	300	J	11	230	J	12	170	J	12	570		12

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

CONSTITUENT	CLASS	J1P1R8 5/9/12			J1P1R9 5/9/12			J1P1T0 5/9/12			J1P1T1 5/9/12			J1P1T2 5/9/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.7	UN	9.7	9.5	U	9.5	140	X	9.6	10	U	10	9.8	U	9.8
Acenaphthylene	PAH	8.7	U	8.7	8.6	U	8.6	8.7	U	8.7	9	U	9	8.9	U	8.9
Anthracene	PAH	110	N	3	39		2.9	340		2.9	3	U	3	28		3
Benzo(a)anthracene	PAH	190	N	3.1	130		3	730		3.1	29		3.2	110		3.1
Benzo(a)pyrene	PAH	150	N	6.2	96		6.1	340		6.2	20		6.4	71		6.3
Benzo(b)fluoranthene	PAH	130	NX	4.1	91	X	4	380	X	4	21		4.2	90	X	4.1
Benzo(ghi)perylene	PAH	86	N	7	62		6.9	170		6.9	12	JX	7.2	45		7.1
Benzo(k)fluoranthene	PAH	57	N	3.8	39		3.8	170		3.8	8.8	J	3.9	32		3.9
Chrysene	PAH	180	N	4.7	120		4.6	720		4.7	29	J	4.8	110		4.8
Dibenz[a,h]anthracene	PAH	25	JX	11	18	JX	11	45	X	11	11	U	11	12	JX	11
Fluoranthene	PAH	370	N	13	200		12	1300		13	28	J	13	130	X	13
Fluorene	PAH	53	N	5.1	21	J	5	150		5.1	5.3	U	5.3	15	JX	5.2
Indeno(1,2,3-cd)pyrene	PAH	71	N	12	52		11	140		12	12	U	12	37		12
Naphthalene	PAH	17	JX	12	11	U	11	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	280	N	12	88		11	660		12	12	U	12	42		12
Pyrene	PAH	440	N	12	240		11	1500		12	37	J	12	150		12
Aroclor-1016	PCB	2.6	U	2.6	2.8	U	2.8	2.7	U	2.7	2.8	U	2.8	2.7	U	2.7
Aroclor-1221	PCB	7.6	U	7.6	8	U	8	7.9	U	7.9	8	U	8	7.7	U	7.7
Aroclor-1232	PCB	1.9	U	1.9	2	U	2	2	U	2	2	U	2	1.9	U	1.9
Aroclor-1242	PCB	4.4	U	4.4	4.7	U	4.7	4.6	U	4.6	4.7	U	4.7	4.5	U	4.5
Aroclor-1248	PCB	38		4.4	4.7	U	4.7	80		4.6	48		4.7	4.5	U	4.5
Aroclor-1254	PCB	2.5	U	2.5	15	P	2.6	2.6	U	2.6	2.6	U	2.6	15	P	2.5
Aroclor-1260	PCB	8.5	J	2.5	9.4	J	2.6	21		2.6	5.5	J	2.6	8.6	J	2.5
1,2,4-Trichlorobenzene	SVOA	27	U	27	27	U	27	26	U	26	28	U	28	26	U	26
1,2-Dichlorobenzene	SVOA	21	U	21	21	U	21	21	U	21	22	U	22	21	U	21
1,3-Dichlorobenzene	SVOA	12	U	12	11	U	11	11	U	11	12	U	12	11	U	11
1,4-Dichlorobenzene	SVOA	13	U	13	13	U	13	13	U	13	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	9.8	U	9.8	9.5	U	9.5	9.4	U	9.4	9.9	U	9.9	9.4	U	9.4
2,4,6-Trichlorophenol	SVOA	9.8	U	9.8	9.5	U	9.5	9.4	U	9.4	9.9	U	9.9	9.4	U	9.4
2,4-Dichlorophenol	SVOA	9.8	U	9.8	9.5	U	9.5	9.4	U	9.4	9.9	U	9.9	9.4	U	9.4
2,4-Dimethylphenol	SVOA	64	U	64	63	U	63	62	U	62	65	U	65	62	U	62
2,4-Dinitrophenol	SVOA	330	U	330	320	U	320	310	U	310	330	U	330	310	U	310
2,4-Dinitrotoluene	SVOA	64	U	64	63	U	63	62	U	62	65	U	65	62	U	62
2,6-Dinitrotoluene	SVOA	27	U	27	27	U	27	26	U	26	28	U	28	26	U	26
2-Chloronaphthalene	SVOA	9.8	U	9.8	9.5	U	9.5	9.4	U	9.4	9.9	U	9.9	9.4	U	9.4
2-Chlorophenol	SVOA	21	U	21	20	U	20	20	U	20	21	U	21	20	U	20
2-Methylnaphthalene	SVOA	19	U	19	18	U	18	18	U	18	19	U	19	18	U	18
2-Methylphenol (cresol, o-)	SVOA	13	U	13	12	U	12	12	U	12	13	U	13	12	U	12
2-Nitroaniline	SVOA	49	U	49	48	U	48	47	U	47	49	U	49	47	U	47
2-Nitrophenol	SVOA	9.8	U	9.8	9.5	U	9.5	9.4	U	9.4	9.9	U	9.9	9.4	U	9.4

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

CONSTITUENT	CLASS	J1P1R8			J1P1R9			J1P1T0			J1P1T1			J1P1T2		
		5/9/12			5/9/12			5/9/12			5/9/12			5/9/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3+4 Methylphenol (cresol, m+p)	SVOA	32	U	32	32	U	32	31	U	31	33	U	33	31	U	31
3,3'-Dichlorobenzidine	SVOA	88	U	88	86	U	86	85	U	85	89	U	89	85	U	85
3-Nitroaniline	SVOA	71	U	71	70	U	70	69	U	69	72	U	72	69	U	69
4,6-Dinitro-2-methylphenol	SVOA	320	U	320	320	U	320	310	U	310	330	U	330	310	U	310
4-Bromophenylphenyl ether	SVOA	19	U	19	18	U	18	18	U	18	19	U	19	18	U	18
4-Chloro-3-methylphenol	SVOA	64	U	64	63	U	63	62	U	62	65	U	65	62	U	62
4-Chloroaniline	SVOA	80	U	80	78	U	78	77	U	77	81	U	81	77	U	77
4-Chlorophenylphenyl ether	SVOA	21	U	21	20	U	20	20	U	20	21	U	21	20	U	20
4-Nitroaniline	SVOA	71	U	71	69	U	69	68	U	68	72	U	72	69	U	69
4-Nitrophenol	SVOA	95	U	95	93	U	93	91	U	91	96	U	96	92	U	92
Acenaphthene	SVOA	10	U	10	9.8	U	9.8	18	J	9.7	10	U	10	9.7	U	9.7
Acenaphthylene	SVOA	17	U	17	16	U	16	16	U	16	17	U	17	16	U	16
Anthracene	SVOA	17	U	17	16	J	16	79	J	16	17	U	17	16	J	16
Benzo(a)anthracene	SVOA	37	J	20	120	J	19	280	J	19	20	U	20	120	J	19
Benzo(a)pyrene	SVOA	34	J	20	99	J	19	170	J	19	20	U	20	92	J	19
Benzo(b)fluoranthene	SVOA	59	JX	26	180	JX	25	320	X	25	26	JX	26	170	JX	25
Benzo(ghi)perylene	SVOA	21	J	16	49	J	15	69	J	15	16	U	16	39	J	15
Benzo(k)fluoranthene	SVOA	39	UX	39	38	UX	38	38	UX	38	40	UX	40	38	UX	38
Bis(2-chloro-1-methylethyl)ether	SVOA	22	U	22	22	U	22	22	U	22	23	U	23	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	22	U	22	22	U	22	22	U	22	23	U	23	22	U	22
Bis(2-chloroethyl) ether	SVOA	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	45	U	45	44	U	44	43	U	43	45	U	45	43	U	43
Butylbenzylphthalate	SVOA	42	U	42	41	U	41	40	U	40	43	U	43	41	U	41
Carbazole	SVOA	35	U	35	34	U	34	43	J	34	36	U	36	34	U	34
Chrysene	SVOA	43	J	26	150	J	26	310		25	27	U	27	150	J	26
Di-n-butylphthalate	SVOA	28	U	28	28	U	28	27	U	27	29	U	29	27	U	27
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Dibenz[a,h]anthracene	SVOA	19	U	19	18	U	18	18	U	18	19	U	19	18	U	18
Dibenzofuran	SVOA	20	U	20	19	U	19	19	U	19	20	U	20	19	U	19
Diethyl phthalate	SVOA	25	U	25	25	U	25	24	U	24	26	U	26	25	U	25
Dimethyl phthalate	SVOA	22	U	22	22	U	22	22	U	22	23	U	23	22	U	22
Fluoranthene	SVOA	41	J	35	180	J	34	550		34	36	U	36	200	J	34
Fluorene	SVOA	18	U	18	17	U	17	22	J	17	18	U	18	17	U	17
Hexachlorobenzene	SVOA	28	U	28	28	U	28	27	U	27	29	U	29	27	U	27
Hexachlorobutadiene	SVOA	9.8	U	9.8	9.5	U	9.5	9.4	U	9.4	9.9	U	9.9	9.4	U	9.4
Hexachlorocyclopentadiene	SVOA	49	U	49	48	U	48	47	U	47	49	U	49	47	U	47
Hexachloroethane	SVOA	21	U	21	20	U	20	20	U	20	21	U	21	20	U	20
Indeno(1,2,3-cd)pyrene	SVOA	21	U	21	50	J	21	64	J	21	22	U	22	37	J	21
Isophorone	SVOA	17	U	17	16	U	16	16	U	16	17	U	17	16	U	16
N-Nitroso-di-n-dipropylamine	SVOA	30	U	30	30	U	30	29	U	29	31	U	31	29	U	29
N-Nitrosodiphenylamine	SVOA	21	U	21	20	U	20	20	U	20	21	U	21	20	U	20
Naphthalene	SVOA	30	U	30	30	U	30	29	U	29	31	U	31	29	U	29
Nitrobenzene	SVOA	21	U	21	21	U	21	21	U	21	22	U	22	21	U	21
Pentachlorophenol	SVOA	320	U	320	320	U	320	310	U	310	330	U	330	310	U	310
Phenanthrene	SVOA	17	U	17	72	J	16	290	J	16	17	U	17	73	J	16
Phenol	SVOA	18	U	18	17	U	17	17	U	17	18	U	18	17	U	17
Pyrene	SVOA	49	J	12	210	J	12	530		11	22	J	12	230	J	11

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

CONSTITUENT	CLASS	J1P1T3 5/9/12			J1P1T4 5/9/12			J1P1T5 5/9/12			J1P1T6 5/9/12			J1P1T7 5/9/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	180	X	9.6	9.4	U	9.4	9.7	U	9.7	9.8	U	9.8	10	U	10
Acenaphthylene	PAH	8.6	U	8.6	8.5	U	8.5	8.7	U	8.7	8.8	U	8.8	9	U	9
Anthracene	PAH	140		2.9	28		2.9	50		3	56		3	92		3.1
Benzo(a)anthracene	PAH	550		3	150		3	170		3.1	150		3.1	250		3.2
Benzo(a)pyrene	PAH	230		6.1	120		6.1	150		6.2	100		6.3	190		6.4
Benzo(b)fluoranthene	PAH	330	X	4	120	X	4	180	X	4.1	120	X	4.1	220		4.2
Benzo(ghi)perylene	PAH	110	X	6.9	74		6.8	82		7	68		7.1	130		7.2
Benzo(k)fluoranthene	PAH	140		3.8	46		3.7	68		3.8	48	X	3.9	80		4
Chrysene	PAH	490		4.6	140		4.6	200		4.7	140		4.8	270		4.9
Dibenz[a,h]anthracene	PAH	38		11	21	JX	10	23	J	11	21	JX	11	56	X	11
Fluoranthene	PAH	1100		12	220		12	170	X	13	210		13	440		13
Fluorene	PAH	69		5	25	J	5	24	JX	5.1	31	X	5.2	54		5.3
Indeno(1,2,3-cd)pyrene	PAH	110		11	62		11	64		12	54		12	120		12
Naphthalene	PAH	11	U	11	11	U	11	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	350		11	86		11	69		12	130		12	220		12
Pyrene	PAH	1100		11	290		11	240		12	220		12	540		12
Aroclor-1016	PCB	2.8	U	2.8	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7
Aroclor-1221	PCB	8	U	8	7.9	U	7.9	7.9	U	7.9	7.9	U	7.9	7.8	U	7.8
Aroclor-1232	PCB	2	U	2	2	U	2	2	U	2	2	U	2	1.9	U	1.9
Aroclor-1242	PCB	4.7	U	4.7	4.6	U	4.6	4.6	U	4.6	4.6	U	4.6	4.5	U	4.5
Aroclor-1248	PCB	4.7	U	4.7	4.6	U	4.6	43		4.6	120		4.6	4.5	U	4.5
Aroclor-1254	PCB	18	P	2.6	16	P	2.6	2.6	U	2.6	2.6	U	2.6	9	J	2.5
Aroclor-1260	PCB	16		2.6	13		2.6	5.6	J	2.6	12		2.6	5.8	J	2.5
1,2,4-Trichlorobenzene	SVOA	26	U	26	27	U	27	28	U	28	27	U	27	26	U	26
1,2-Dichlorobenzene	SVOA	20	U	20	21	U	21	22	U	22	21	U	21	21	U	21
1,3-Dichlorobenzene	SVOA	11	U	11	11	U	11	12	U	12	12	U	12	11	U	11
1,4-Dichlorobenzene	SVOA	13	U	13	13	U	13	14	U	14	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	9.3	U	9.3	9.6	U	9.6	10	U	10	9.7	U	9.7	9.4	U	9.4
2,4,6-Trichlorophenol	SVOA	9.3	U	9.3	9.6	U	9.6	10	U	10	9.7	U	9.7	9.4	U	9.4
2,4-Dichlorophenol	SVOA	9.3	U	9.3	9.6	U	9.6	10	U	10	9.7	U	9.7	9.4	U	9.4
2,4-Dimethylphenol	SVOA	61	U	61	63	U	63	66	U	66	64	U	64	62	U	62
2,4-Dinitrophenol	SVOA	310	U	310	320	U	320	330	U	330	320	U	320	310	U	310
2,4-Dinitrotoluene	SVOA	61	U	61	63	U	63	66	U	66	64	U	64	62	U	62
2,6-Dinitrotoluene	SVOA	26	U	26	27	U	27	28	U	28	27	U	27	26	U	26
2-Chloronaphthalene	SVOA	9.3	U	9.3	9.6	U	9.6	10	U	10	9.7	U	9.7	9.4	U	9.4
2-Chlorophenol	SVOA	19	U	19	20	U	20	21	U	21	20	U	20	20	U	20
2-Methylnaphthalene	SVOA	18	U	18	18	U	18	19	U	19	18	U	18	18	U	18
2-Methylphenol (cresol, o-)	SVOA	12	U	12	12	U	12	13	U	13	13	U	13	12	U	12
2-Nitroaniline	SVOA	46	U	46	48	U	48	50	U	50	49	U	49	47	U	47
2-Nitrophenol	SVOA	9.3	U	9.3	9.6	U	9.6	10	U	10	9.7	U	9.7	9.4	U	9.4

Table B-4. 100-N Pipelines Overburden May 2012 In-Process Sample Results. (11 Pages)

CONSTITUENT	CLASS	J1P1T3 5/9/12			J1P1T4 5/9/12			J1P1T5 5/9/12			J1P1T6 5/9/12			J1P1T7 5/9/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3+4 Methylphenol (cresol, m+p)	SVOA	31	U	31	32	U	32	33	U	33	32	U	32	31	U	31
3,3'-Dichlorobenzidine	SVOA	83	U	83	86	U	86	90	U	90	87	U	87	85	U	85
3-Nitroaniline	SVOA	68	U	68	70	U	70	73	U	73	71	U	71	69	U	69
4,6-Dinitro-2-methylphenol	SVOA	310	U	310	320	U	320	330	U	330	320	U	320	310	U	310
4-Bromophenylphenyl ether	SVOA	18	U	18	18	U	18	19	U	19	18	U	18	18	U	18
4-Chloro-3-methylphenol	SVOA	61	U	61	63	U	63	66	U	66	64	U	64	62	U	62
4-Chloroaniline	SVOA	76	U	76	78	U	78	82	U	82	80	U	80	77	U	77
4-Chlorophenylphenyl ether	SVOA	19	U	19	20	U	20	21	U	21	20	U	20	20	U	20
4-Nitroaniline	SVOA	67	U	67	69	U	69	73	U	73	70	U	70	68	U	68
4-Nitrophenol	SVOA	90	U	90	93	U	93	97	U	97	94	U	94	91	U	91
Acenaphthene	SVOA	9.5	U	9.5	21	J	9.8	55	J	10	98	J	10	21	J	9.7
Acenaphthylene	SVOA	16	U	16	16	U	16	17	U	17	17	U	17	16	U	16
Anthracene	SVOA	16	U	16	48	J	16	84	J	17	200	J	17	59	J	16
Benzo(a)anthracene	SVOA	37	J	19	230	J	19	350		20	350		19	270	J	19
Benzo(a)pyrene	SVOA	29	J	19	180	J	19	230	J	20	280	J	19	220	J	19
Benzo(b)fluoranthene	SVOA	56	JX	24	310	JX	25	420	X	26	440	X	25	380	X	25
Benzo(ghi)perylene	SVOA	15	J	15	88	J	15	99	J	16	130	J	16	100	J	15
Benzo(k)fluoranthene	SVOA	37	UX	37	38	UX	38	40	UX	40	39	UX	39	38	UX	38
Bis(2-chloro-1-methylethyl)ether	SVOA	21	U	21	22	U	22	23	U	23	22	U	22	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	21	U	21	22	U	22	23	U	23	22	U	22	22	U	22
Bis(2-chloroethyl) ether	SVOA	15	U	15	16	U	16	17	U	17	16	U	16	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	43	U	43	44	U	44	46	U	46	45	U	45	43	U	43
Butylbenzylphthalate	SVOA	40	U	40	41	U	41	43	U	43	42	U	42	40	U	40
Carbazole	SVOA	33	U	33	37	J	34	43	J	36	84	J	35	34	U	34
Chrysene	SVOA	43	J	25	290	J	26	350		27	420		26	310		25
Di-n-butylphthalate	SVOA	27	U	27	28	U	28	29	U	29	28	U	28	27	U	27
Di-n-octylphthalate	SVOA	13	U	13	14	U	14	14	U	14	14	U	14	14	U	14
Dibenz[a,h]anthracene	SVOA	18	U	18	18	U	18	19	U	19	18	U	18	18	U	18
Dibenzofuran	SVOA	19	U	19	19	U	19	20	U	20	37	J	19	19	U	19
Diethyl phthalate	SVOA	24	U	24	25	U	25	26	U	26	25	U	25	24	U	24
Dimethyl phthalate	SVOA	21	U	21	22	U	22	23	U	23	22	U	22	22	U	22
Fluoranthene	SVOA	68	J	33	440		34	660		36	830		35	480		34
Fluorene	SVOA	17	U	17	17	U	17	33	J	18	70	J	17	17	U	17
Hexachlorobenzene	SVOA	27	U	27	28	U	28	29	U	29	28	U	28	27	U	27
Hexachlorobutadiene	SVOA	9.3	U	9.3	9.6	U	9.6	10	U	10	9.7	U	9.7	9.4	U	9.4
Hexachlorocyclopentadiene	SVOA	46	U	46	48	U	48	50	U	50	49	U	49	47	U	47
Hexachloroethane	SVOA	20	U	20	20	U	20	21	U	21	21	U	21	20	U	20
Indeno(1,2,3-cd)pyrene	SVOA	20	U	20	79	J	21	94	J	22	120	J	21	95	J	21
Isophorone	SVOA	16	U	16	16	U	16	17	U	17	17	U	17	16	U	16
N-Nitroso-di-n-dipropylamine	SVOA	29	U	29	30	U	30	31	U	31	30	U	30	29	U	29
N-Nitrosodiphenylamine	SVOA	19	U	19	20	U	20	21	U	21	20	U	20	20	U	20
Naphthalene	SVOA	29	U	29	30	U	30	31	U	31	30	U	30	29	U	29
Nitrobenzene	SVOA	20	U	20	21	U	21	22	U	22	21	U	21	21	U	21
Pentachlorophenol	SVOA	310	U	310	320	U	320	330	U	330	320	U	320	310	U	310
Phenanthrene	SVOA	31	J	16	220	J	16	370		17	770		17	220	J	16
Phenol	SVOA	17	U	17	17	U	17	18	U	18	17	U	17	17	U	17
Pyrene	SVOA	67	J	11	440		12	640		12	860		12	510		11

Table B-5. 100-N Pipelines Overburden December 2012 In-Process Sample Results. (6 Pages)

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
BCL 1	J1R7X9	12/31/12	6080		14.6	1.75	U	1.75	1.99	B	2.92	50.7		1.46	0.265	B	0.584	5.84	U	5.84	0.584	U	0.584
BCL 2	J1R800	12/31/12	6820		12.7	1.53	U	1.53	2.37	B	2.55	65.3		1.27	0.282	B	0.509	5.09	U	5.09	0.144	B	0.509
BCL 3	J1R801	12/31/12	6900		14.5	1.74	U	1.74	2.19	B	2.89	60.4		1.45	0.261	B	0.579	5.79	U	5.79	0.579	U	0.579
BCL 4	J1R802	12/31/12	6410		13.2	1.58	U	1.58	2.84		2.63	74.5		1.32	0.288	B	0.527	5.27	U	5.27	0.527	U	0.527
BCL 5	J1R803	12/31/12	7910		15.6	1.87	U	1.87	2.28	B	3.12	59.1		1.56	0.273	B	0.624	6.24	U	6.24	0.624	U	0.624
BCL 6	J1R804	12/31/12	6710		13	1.56	U	1.56	1.96	B	2.6	65.6		1.3	0.259	B	0.519	5.19	U	5.19	0.519	U	0.519
BCL 7	J1R805	12/31/12	7600		16	1.92	U	1.92	2.33	B	3.2	65.6		1.6	0.296	B	0.64	6.4	U	6.4	0.64	U	0.64
BCL 8	J1R806	12/31/12	7820		14.4	1.73	U	1.73	3.81		2.89	69.7		1.44	0.276	B	0.578	1.45	B	5.78	0.578	U	0.578
BCL 9	J1R807	12/31/12	5660		15.4	1.84	U	1.84	2.08	B	3.07	58.2		1.54	0.227	B	0.614	6.14	U	6.14	0.614	U	0.614
BCL 10	J1R808	12/31/12	7380		14.1	1.69	U	1.69	2.9		2.82	59.7		1.41	0.273	B	0.563	5.63	U	5.63	0.563	U	0.563
BCL 11	J1R809	12/31/12	5730		13.4	1.6	U	1.6	2.37	B	2.67	51.3		1.34	0.252	B	0.534	5.34	U	5.34	0.534	U	0.534
BCL 12	J1R810	12/31/12	6220		12.4	1.49	U	1.49	2.3	B	2.48	58.5		1.24	0.284	B	0.496	4.96	U	4.96	0.13	B	0.496

Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
BCL 1	J1R7X9	12/31/12	7000		292	14.2		0.584	10.2		5.84	15.7		2.92	25100		58.4	4.3		1.46	4600		219
BCL 2	J1R800	12/31/12	6620		255	9.79		0.509	8.22		5.09	15.8		2.55	25300		50.9	14.9		1.27	4260		191
BCL 3	J1R801	12/31/12	6350		289	10.9		0.579	7.91		5.79	13.9		2.89	23900		57.9	3.29		1.45	4820		217
BCL 4	J1R802	12/31/12	7140		263	7.59		0.527	8.56		5.27	24.6		2.63	25900		52.7	6.05		1.32	4420		198
BCL 5	J1R803	12/31/12	7190		312	10.9		0.624	8.02		6.24	15.2		3.12	24300		62.4	3.55		1.56	4780		234
BCL 6	J1R804	12/31/12	6950		260	8.64		0.519	8.6		5.19	15.5		2.6	24400		51.9	3.18		1.3	4440		195
BCL 7	J1R805	12/31/12	7960		320	10.8		0.64	7.95		6.4	17		3.2	24200		64	4.3		1.6	4500		240
BCL 8	J1R806	12/31/12	8620		289	13.9		0.578	7.12		5.78	14.5		2.89	21000		57.8	4.78		1.44	4990		217
BCL 9	J1R807	12/31/12	7000		307	8.67		0.614	10		6.14	16.2		3.07	27500		61.4	3.46		1.54	5000		230
BCL 10	J1R808	12/31/12	6120		282	10.2		0.563	8.2		5.63	15.4		2.82	24100		56.3	6.5		1.41	5060		211
BCL 11	J1R809	12/31/12	6600		267	8.21		0.534	7.69		5.34	17.4		2.67	23700		53.4	7.25		1.34	4380		200
BCL 12	J1R810	12/31/12	6850		248	7.77		0.496	8.42		4.96	16.7		2.48	26800		49.6	11.3		1.24	4790		186

Table B-5. 100-N Pipelines Overburden December 2012 In-Process Sample Results. (6 Pages)

Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
BCL 1	J1R7X9	12/31/12	332		14.6	0.0258	U	0.0258	5.84	U	5.84	8.85	B	11.7	921	B	1170	0.875	U	0.875	813		5.84
BCL 2	J1R800	12/31/12	322		12.7	0.0292	U	0.0292	5.09	U	5.09	9.16	B	10.2	1190		1020	0.764	U	0.764	665		5.09
BCL 3	J1R801	12/31/12	326		14.5	0.0285	U	0.0285	5.79	U	5.79	10.5	B	11.6	1230		1160	0.868	U	0.868	938		5.79
BCL 4	J1R802	12/31/12	311		13.2	0.028	U	0.028	1.71	B	5.27	8.93	B	10.5	893	B	1050	0.79	U	0.79	413		5.27
BCL 5	J1R803	12/31/12	334		15.6	0.0295	U	0.0295	6.24	U	6.24	10.7	B	12.5	1170	B	1250	0.936	U	0.936	1060		6.24
BCL 6	J1R804	12/31/12	369		13	0.0297	U	0.0297	5.19	U	5.19	9.45	B	10.4	915	B	1040	0.779	U	0.779	788		5.19
BCL 7	J1R805	12/31/12	331		16	0.0524		0.0263	6.4	U	6.4	13.8		12.8	1060	B	1280	0.96	U	0.96	884		6.4
BCL 8	J1R806	12/31/12	328		14.4	0.0423		0.0287	5.78	U	5.78	12.8		11.6	1310		1160	0.867	U	0.867	902		5.78
BCL 9	J1R807	12/31/12	352		15.4	0.0317	U	0.0317	6.14	U	6.14	9.24	B	12.3	922	B	1230	0.921	U	0.921	795		6.14
BCL 10	J1R808	12/31/12	323		14.1	0.0271	B	0.0285	5.63	U	5.63	11.8		11.3	1120	B	1130	0.845	U	0.845	561		5.63
BCL 11	J1R809	12/31/12	309		13.4	0.0279	U	0.0279	5.34	U	5.34	11.4		10.7	883	B	1070	0.801	U	0.801	418		5.34
BCL 12	J1R810	12/31/12	342		12.4	0.0254	U	0.0254	4.96	U	4.96	10.8		9.92	944	B	992	0.744	U	0.744	399		4.96

Location	HEIS Number	Sample Date	Silver			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
BCL 1	J1R7X9	12/31/12	0.584	U	0.584	330		146	68.1		7.29	49		29.2
BCL 2	J1R800	12/31/12	0.509	U	0.509	295		127	74.5		6.37	51.5		25.5
BCL 3	J1R801	12/31/12	0.579	U	0.579	305		145	63.5		7.24	43.7		28.9
BCL 4	J1R802	12/31/12	0.527	U	0.527	363		132	70.6		6.58	56.5		26.3
BCL 5	J1R803	12/31/12	0.624	U	0.624	414		156	63.4		7.8	46.3		31.2
BCL 6	J1R804	12/31/12	0.519	U	0.519	366		130	70.7		6.49	46.3		26
BCL 7	J1R805	12/31/12	0.64	U	0.64	403		160	63.7		8	46.8		32
BCL 8	J1R806	12/31/12	0.578	U	0.578	272		144	52.3		7.22	43.4		28.9
BCL 9	J1R807	12/31/12	0.614	U	0.614	457		154	68.6		7.68	58.4		30.7
BCL 10	J1R808	12/31/12	0.563	U	0.563	459		141	60.2		7.04	61.5		28.2
BCL 11	J1R809	12/31/12	0.534	U	0.534	335		134	66.8		6.68	46.1		26.7
BCL 12	J1R810	12/31/12	0.496	U	0.496	357		124	75.9		6.2	52		24.8

Table B-5. 100-N Pipelines Overburden December 2012 In-Process Sample Results. (6 Pages)

CONSTITUENT	CLASS	J1R7X9			J1R800			J1R801			J1R802			J1R803			J1R804		
		12/31/12			12/31/12			12/31/12			12/31/12			12/31/12			12/31/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	759	D	14.4	78.8		3.67	94.3	UD	94.3	140		3.6	3.56	U	3.56	179	UD	179
Acenaphthylene	PAH	14.4	UD	14.4	3.67	U	3.67	94.3	UD	94.3	1.26	J	3.6	3.56	U	3.56	179	UD	179
Anthracene	PAH	13.3	JD	14.4	3.42	J	3.67	94.3	UD	94.3	8.93		3.6	25.7		3.56	179	UD	179
Benzo(a)anthracene	PAH	101	D	14.4	38.4		3.67	378	D	94.3	61.4		3.6	145		3.56	380	D	179
Benzo(a)pyrene	PAH	130	D	14.4	43.8		3.67	377	D	94.3	69.1		3.6	122		3.56	403	D	179
Benzo(b)fluoranthene	PAH	65.9	D	14.4	20.9		3.67	270	D	94.3	35.1		3.6	91.7		3.56	384	D	179
Benzo(ghi)perylene	PAH	14.4	UD	14.4	34.6		3.67	94.3	UD	94.3	39.9		3.6	119		3.56	179	UD	179
Benzo(k)fluoranthene	PAH	49.6	D	14.4	15		3.67	160	D	94.3	23.5		3.6	48.2		3.56	198	D	179
Chrysene	PAH	99.6	D	14.4	28		3.67	328	D	94.3	61.9		3.6	139		3.56	526	D	179
Dibenz[a,h]anthracene	PAH	10.4	JD	14.4	3.27	J	3.67	94.3	UD	94.3	4.36		3.6	7.05		3.56	52	JD	179
Fluoranthene	PAH	216	D	14.4	52		3.67	542	D	94.3	84.1		3.6	231		3.56	506	D	179
Fluorene	PAH	5.67	JD	14.4	3.48	J	3.67	94.3	UD	94.3	2.52	J	3.6	3.73		3.56	179	UD	179
Indeno(1,2,3-cd)pyrene	PAH	49.4	D	14.4	18.5		3.67	94.3	UD	94.3	21.7		3.6	44.2		3.56	141	JD	179
Naphthalene	PAH	95.5	D	14.4	16.1		3.67	94.3	UD	94.3	27.8		3.6	73.3		3.56	179	UD	179
Phenanthrene	PAH	95.4	D	14.4	20		3.67	121	D	94.3	24.9		3.6	65.7		3.56	76.5	JD	179
Pyrene	PAH	213	D	14.4	51.1		3.67	539	D	94.3	91.3		3.6	247		3.56	601	D	179
1,2,4-Trichlorobenzene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
1,2-Dichlorobenzene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
1,3-Dichlorobenzene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
1,4-Dichlorobenzene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2,4,5-Trichlorophenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2,4,6-Trichlorophenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2,4-Dichlorophenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2,4-Dimethylphenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2,4-Dinitrophenol	SVOA	1790	U	1790	1780	U	1780	3690	U	3690	1770	U	1770	1760	U	1760	1770	U	1770
2,4-Dinitrotoluene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2,6-Dinitrotoluene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2-Chloronaphthalene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2-Chlorophenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2-Methylnaphthalene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2-Methylphenol (cresol, o-)	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
2-Nitroaniline	SVOA	1790	U	1790	1780	U	1780	3690	U	3690	1770	U	1770	1760	U	1760	1770	U	1770
2-Nitrophenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353

Table B-5. 100-N Pipelines Overburden December 2012 In-Process Sample Results. (6 Pages)

CONSTITUENT	CLASS	J1R7X9			J1R800			J1R801			J1R802			J1R803			J1R804		
		12/31/12			12/31/12			12/31/12			12/31/12			12/31/12			12/31/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3+4 Methylphenol (cresol, m+p)	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
3,3'-Dichlorobenzidine	SVOA	715	U	715	713	U	713	1480	U	1480	709	U	709	705	U	705	707	U	707
3-Nitroaniline	SVOA	1790	U	1790	1780	U	1780	3690	U	3690	1770	U	1770	1760	U	1760	1770	U	1770
4,6-Dinitro-2-methylphenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
4-Bromophenylphenyl ether	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
4-Chloro-3-methylphenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
4-Chloroaniline	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
4-Chlorophenylphenyl ether	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
4-Nitroaniline	SVOA	1790	U	1790	1780	U	1780	3690	U	3690	1770	U	1770	1760	U	1760	1770	U	1770
4-Nitrophenol	SVOA	1790	U	1790	1780	U	1780	3690	U	3690	1770	U	1770	1760	U	1760	1770	U	1770
Acenaphthene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Acenaphthylene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Anthracene	SVOA	357	U	357	357	U	357	173	JD	738	355	U	355	353	U	353	178	J	353
Benzo(a)anthracene	SVOA	91.8	J	357	357	U	357	1020	D	738	56.9	J	355	77.6	J	353	692		353
Benzo(a)pyrene	SVOA	82.5	J	357	357	U	357	727	JD	738	355	U	355	56.7	J	353	530		353
Benzo(b)fluoranthene	SVOA	69.8	J	357	357	U	357	602	JD	738	355	U	355	353	U	353	453		353
Benzo(ghi)perylene	SVOA	357	U	357	357	U	357	264	JD	738	355	U	355	353	U	353	204	J	353
Benzo(k)fluoranthene	SVOA	93.9	J	357	357	U	357	807	D	738	355	U	355	64.6	J	353	528		353
methylethyl)ether	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Bis(2-Chloroethoxy)methane	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Bis(2-chloroethyl) ether	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Bis(2-ethylhexyl) phthalate	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Butylbenzylphthalate	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Carbazole	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	61.8	J	353
Chrysene	SVOA	130	J	357	357	U	357	1240	D	738	64.9	J	355	98.3	J	353	844		353
Di-n-butylphthalate	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Di-n-octylphthalate	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Dibenz[a,h]anthracene	SVOA	357	U	357	357	U	357	147	JD	738	355	U	355	353	U	353	114	J	353
Dibenzofuran	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Diethyl phthalate	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Dimethyl phthalate	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Fluoranthene	SVOA	165	J	357	357	U	357	1630	D	738	80.7	J	355	136	J	353	1100		353
Fluorene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Hexachlorobenzene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Hexachlorobutadiene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Hexachlorocyclopentadiene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Hexachloroethane	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Indeno(1,2,3-cd)pyrene	SVOA	357	U	357	357	U	357	257	JD	738	355	U	355	353	U	353	213	J	353
Isophorone	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
N-Nitroso-di-n-dipropylamine	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
N-Nitrosodiphenylamine	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Naphthalene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Nitrobenzene	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Pentachlorophenol	SVOA	1790	U	1790	1780	U	1780	3690	U	3690	1770	U	1770	1760	U	1760	1770	U	1770
Phenanthrene	SVOA	86.1	J	357	357	U	357	514	JD	738	355	U	355	59.9	J	353	453		353
Phenol	SVOA	357	U	357	357	U	357	738	U	738	355	U	355	353	U	353	353	U	353
Pyrene	SVOA	184	J	357	357	U	357	1650	D	738	88.4	J	355	162	J	353	1090		353

Table B-5. 100-N Pipelines Overburden December 2012 In-Process Sample Results. (6 Pages)

CONSTITUENT	CLASS	J1R805 12/31/12			J1R806 12/31/12			J1R807 12/31/12			J1R808 12/31/12			J1R809 12/31/12			J1R810 12/31/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	182	UD	182	185	UD	185	14.6	UD	14.6	184	UD	184	179	UD	179	14.1	UD	14.1
Acenaphthylene	PAH	215	D	182	185	UD	185	14.6	UD	14.6	184	UD	184	179	UD	179	14.1	UD	14.1
Anthracene	PAH	292	D	182	185	UD	185	14.6	UD	14.6	184	UD	184	186	D	179	29.1	D	14.1
Benzo(a)anthracene	PAH	967	D	182	603	D	185	64.6	D	14.6	94.7	JD	184	829	D	179	154	D	14.1
Benzo(a)pyrene	PAH	863	D	182	973	D	185	88.3	D	14.6	108	JD	184	756	D	179	155	D	14.1
Benzo(b)fluoranthene	PAH	596	D	182	635	D	185	48.1	D	14.6	94.8	JD	184	404	D	179	86.8	D	14.1
Benzo(ghi)perylene	PAH	637	D	182	185	UD	185	14.6	UD	14.6	184	UD	184	179	UD	179	123	D	14.1
Benzo(k)fluoranthene	PAH	341	D	182	379	D	185	34.5	D	14.6	184	UD	184	292	D	179	68.7	D	14.1
Chrysene	PAH	995	D	182	536	D	185	71.4	D	14.6	115	JD	184	866	D	179	159	D	14.1
Dibenz[a,h]anthracene	PAH	71.4	JD	182	78.7	JD	185	7.08	JD	14.6	184	UD	184	58.9	JD	179	14.1	D	14.1
Fluoranthene	PAH	2870	D	182	493	D	185	110	D	14.6	243	D	184	2180	D	179	309	D	14.1
Fluorene	PAH	168	JD	182	185	UD	185	3.7	JD	14.6	184	UD	184	64.9	JD	179	5.58	JD	14.1
Indeno(1,2,3-cd)pyrene	PAH	354	D	182	427	D	185	33.2	D	14.6	47.1	JD	184	251	D	179	72.4	D	14.1
Naphthalene	PAH	1620	D	182	185	UD	185	51	D	14.6	184	UD	184	583	D	179	102	D	14.1
Phenanthrene	PAH	1720	D	182	153	JD	185	43.8	D	14.6	89.4	JD	184	987	D	179	120	D	14.1
Pyrene	PAH	2260	D	182	445	D	185	136	D	14.6	163	JD	184	1730	D	179	307	D	14.1
1,2,4-Trichlorobenzene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
1,2-Dichlorobenzene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
1,3-Dichlorobenzene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
1,4-Dichlorobenzene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2,4,5-Trichlorophenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2,4,6-Trichlorophenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2,4-Dichlorophenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2,4-Dimethylphenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2,4-Dinitrophenol	SVOA	1780	U	1780	3610	U	3610	1850	U	1850	1810	U	1810	3500	U	3500	3490	U	3490
2,4-Dinitrotoluene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2,6-Dinitrotoluene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2-Chloronaphthalene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2-Chlorophenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2-Methylnaphthalene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2-Methylphenol (cresol, o-)	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
2-Nitroaniline	SVOA	1780	U	1780	3610	U	3610	1850	U	1850	1810	U	1810	3500	U	3500	3490	U	3490
2-Nitrophenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698

Table B-5. 100-N Pipelines Overburden December 2012 In-Process Sample Results. (6 Pages)

CONSTITUENT	CLASS	J1R805 12/31/12			J1R806 12/31/12			J1R807 12/31/12			J1R808 12/31/12			J1R809 12/31/12			J1R810 12/31/12		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3+4 Methylphenol (cresol,	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
3,3'-Dichlorobenzidine	SVOA	713	U	713	1450	U	1450	741	U	741	724	U	724	1400	U	1400	1400	U	1400
3-Nitroaniline	SVOA	1780	U	1780	3610	U	3610	1850	U	1850	1810	U	1810	3500	U	3500	3490	U	3490
4,6-Dinitro-2-methylphenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
4-Bromophenylphenyl ether	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
4-Chloro-3-methylphenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
4-Chloroaniline	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
4-Chlorophenylphenyl ether	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
4-Nitroaniline	SVOA	1780	U	1780	3610	U	3610	1850	U	1850	1810	U	1810	3500	U	3500	3490	U	3490
4-Nitrophenol	SVOA	1780	U	1780	3610	U	3610	1850	U	1850	1810	U	1810	3500	U	3500	3490	U	3490
Acenaphthene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Acenaphthylene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Anthracene	SVOA	109	J	356	723	U	723	371	U	371	362	U	362	137	JD	699	481	JD	698
Benzo(a)anthracene	SVOA	492		356	655	JD	723	371	U	371	68.5	J	362	315	JD	699	1800	D	698
Benzo(a)pyrene	SVOA	292	J	356	600	JD	723	371	U	371	362	U	362	222	JD	699	1540	D	698
Benzo(b)fluoranthene	SVOA	277	J	356	701	JD	723	371	U	371	362	U	362	183	JD	699	1200	D	698
Benzo(ghi)perylene	SVOA	125	J	356	332	JD	723	371	U	371	362	U	362	699	U	699	811	D	698
Benzo(k)fluoranthene	SVOA	333	J	356	527	JD	723	371	U	371	362	U	362	238	JD	699	1350	D	698
Bis(2-chloro-1-	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Bis(2-Chloroethoxy)methane	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Bis(2-chloroethyl) ether	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Bis(2-ethylhexyl) phthalate	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Butylbenzylphthalate	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Carbazole	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Chrysene	SVOA	551		356	1030	D	723	371	U	371	77.9	J	362	375	JD	699	2140	D	698
Di-n-butylphthalate	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Di-n-octylphthalate	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Dibenz[a,h]anthracene	SVOA	70.1	J	356	149	JD	723	371	U	371	362	U	362	699	U	699	355	JD	698
Dibenzofuran	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Diethyl phthalate	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Dimethyl phthalate	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Fluoranthene	SVOA	963		356	471	JD	723	63.9	J	371	145	J	362	747	D	699	3460	D	698
Fluorene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Hexachlorobenzene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Hexachlorobutadiene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Hexachlorocyclopentadiene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Hexachloroethane	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Indeno(1,2,3-cd)pyrene	SVOA	128	J	356	310	JD	723	371	U	371	362	U	362	699	U	699	813	D	698
Isophorone	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
N-Nitroso-di-n-dipropylamine	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
N-Nitrosodiphenylamine	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Naphthalene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Nitrobenzene	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Pentachlorophenol	SVOA	1780	U	1780	3610	U	3610	1850	U	1850	1810	U	1810	3500	U	3500	3490	U	3490
Phenanthrene	SVOA	386		356	133	JD	723	371	U	371	65.7	J	362	531	JD	699	1300	D	698
Phenol	SVOA	356	U	356	723	U	723	371	U	371	362	U	362	699	U	699	698	U	698
Pyrene	SVOA	822		356	583	JD	723	76.3	J	371	154	J	362	729	D	699	3630	D	698

APPENDIX C

CALCULATIONS

APPENDIX C

CALCULATION BRIEF

The calculations provided in this appendix are copies of originals that are kept in the active Washington Closure Hanford project files and are available upon request. When the project is completed, the file will be stored in a U.S. Department of Energy, Richland Operations Office, repository. These calculations has been prepared in accordance with ENG-1, *Engineering Services*, ENG-1-4.5, "Project Calculations," Washington Closure Hanford, Richland, Washington. The calculations provided in this appendix include:

100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations, 0100N-CA-V0219, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-N-61:4 Subsite and South Staging Pile Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations, 0100N-CA-V0220, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-N-61:4 Subsite and South Staging Pile Area Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater, 0100N-CA-V0221, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-N Pipelines Overburden Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater, 0100N-CA-V0231, Rev. 0, Washington Closure Hanford, Richland, Washington.

DISCLAIMER FOR CALCULATIONS

The calculations that are provided in this appendix have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-N Field Remediation **Job No. 14655**

Area: 100-N

Discipline: Environmental *Calculation No: 0100N-CA-V0219

Subject: 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines OB Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 36 Attm. 1 = 24 Attm. 2 = 3 Total = 64	J. D. Skoglie	C. H. Dobie	N. K. Schiffern	D. F. Obenauer	8/21/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie	**Date** 06/06/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** C. H. Dobie	**Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			**Sheet No.** 1 of 36

Summary

Purpose:

Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the subject site. Also, perform the *Washington Administrative Code* (WAC) 173-340-740(7)(e) Model Toxics Control Act (MTCA) 3-part test for nonradionuclide analytes and calculate the relative percent difference (RPD) for primary-duplicate sample pairs for each contaminant of concern (COC) and contaminant of potential concern (COPC), as necessary.

Table of Contents:

Given/References:

1) Sample Results (Attachment 1 and 2).
2) DOE-RL, 2006a, 100-N Area Sampling and Analysis Plan for CERCLA Waste Sites, DOE/RL-2005-92, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) DOE-RL, 2006b, Remedial Design Report/Remedial Action Work Plan for the 100-N Area, DOE/RL-2005-93, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) Ecology, 1992, Statistical Guidance for Ecology Site Managers, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
5) Ecology, 1993, Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets), Publication #92-54, Washington Department of Ecology, Olympia, Washington.
6) Ecology, 2011, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
7) EPA, 1989, Risk Assessment Guidance for Superfund: Volume 1, Human Health Evaluation Manual, Part A; Interim Final, EPA/540/1-89/002, U.S. Environmental Protection Agency, Washington, D. C.
8) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," Washington Administrative Code.

Solution:

Calculation methodology is described in Ecology Pub. #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2006b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations for each COC/COPC. The hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Remaining Sites Verification Package (RSVP).

Calculation Description:

The subject calculations were performed on statistical data from soil verification samples (Attachment 1) from the 100-N-61:4 subsite. The data were entered into an EXCEL 2003 spreadsheet and calculations performed by using the built-in spreadsheet functions and/or creating formulae within the cells. The statistical evaluation of data for use in accordance with the RDR/RAWP (DOE-RL 2006b) is documented by this calculation. Duplicate RPD results are used in evaluation of data quality within the RSVP for this site.

Methodology:

The 100-N-61:4 subsite excavation (EXC), south staging pile (SSP), and 100-N pipelines overburden (OB) are separate decisions units that each underwent statistical sampling, Pre-existing asphalt contamination in excess of remedial action goals (RAGs) existed at an area used for the SSP. Therefore, the concentrations of polycyclic aromatic hydrocarbons (PAH) analytes determined using the semivolatile organic compounds (SVOC) analytical method (EPA Method 8270) (acenaththene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) are reported for information only, and not evaluated for compliance with RAGs at the SSP. Also, total petroleum hydrocarbons (TPH) and PAHs data in the 100-N-61:4 subsite excavation decision unit are reported for information only and not evaluated for compliance with RAGs as presented in the RSVP. All information only data is shown in Attachment 2. .

Analytical results for all sampling locations are summarized in the tables provided on sheets 5 and 6. Further information of the sample data quality is presented in the data quality assessment section of the associated RSVP.

Washington Closure Hanford — **CALCULATION SHEET**

Originator J. D. Skoglie	**Date** 06/06/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** C. H. Dobie	**Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			**Sheet No.** 2 of 36

Summary (continued)

Methodology, continued:

For nonradioactive analytes with ≤50% of the data below detection limits, the statistical value calculated to evaluate the effectiveness of cleanup is the 95% UCL. For nonradioactive analytes with >50% of the data below detection limits, as determined by direct inspection of the sample results (Attachment 1), the maximum detected value for the data set (which includes primary and duplicate samples) is used instead of the 95% UCL, and no further calculations are performed for those data sets. For convenience, these maximum detected values are included in the summary tables that follow. The 95% UCL was not calculated for data sets with no reported detections. Calculated cleanup levels are not available in (Ecology 2011) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's *Risk Assessment Guidance for Superfund* (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COCs/COPCs and are also not included in these calculations. The 95% UCL values were not calculated for potassium-40, radium-226, radium-228, thorium-228, and thorium-232 based on natural occurrence at the Hanford Site.

All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above. For radionuclide data, calculation of the statistics is done using the reported value. In cases where the laboratory does not report a value below the minimum detectable activity (MDA), half of the MDA is used in the calculation. For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets (n < 10), the calculations are performed assuming nonparametric distribution, so no tests for distribution are performed. For nonradionuclide data sets of ten or greater, as for the subject site, distributional testing is done using Ecology's MTCAStat software (Ecology 1993). Due to differences in addressing censored data between the RDR/RAWP (DOE-RL 2006b) and MTCAStat coding and due to a limitation in the MTCAStat coding (no direct capability to address variable quantitation limits within a data set), substitutions for censored data are performed before software input and the resulting data set treated as uncensored.

The WAC 173-340-740(7)(e) 3-part test is performed for nonradionuclide analytes only and determines if:
1) the 95% UCL exceeds the most stringent cleanup limit for each COPC/COC,
2) greater than 10% of the raw data exceed the most stringent cleanup limit for each COPC/COC,
3) the maximum value of the raw data set exceeds two times the most stringent cleanup limit for each COPC/COC.

The RPD is calculated when both the primary value and either the duplicate or split value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed in Table 2-1 of the SAP (DOE-RL 2006a) for certain constituents. All other constituents will have their own pre-determined TDL's based on the laboratory and method used. Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

$$RPD = [\,|M-S|/((M+S)/2)]*100$$

where, M = Main Sample Value S = Split (or duplicate) Sample Value

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30%, further investigation regarding the usability of the data is performed. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split result exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. Additional discussion as necessary is provided in the data quality assessment section of the applicable RSVP.

Summary (continued)

QUALIFIER LIST

B = estimated result. Result is less than the RL, but greater than MDL.
D = dilution
J = estimate
M = sample duplicate precision not met
N = recovery exceeds upper or lower control limits.
P = Aroclor target analyte with greater than 40% difference between column analysis.
R = rejected
U = undetected
X = more than 40% difference between columns, lower result reported (organics).
X = serial dilution in the analytical batch indicates that physical and chemical interferences are present (metals).

ACRONYM LIST

-- = not applicable
DE = direct exposure
EXC = excavation
GW = groundwater
MDA = minimal detectable activity
MTCA = *Model Toxics Control Act*
OB = overburden
PAH = polycyclic aromatic hydrocarbons
PQL = practical quantitation limit
Q = qualifier
QA/QC = quality assurance/quality control
RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = sampling and analysis plan
SSP = south staging pile
TDL = target detection limit
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = Washington Administrative Code

Washington Closure Hanford **CALCULATION SHEET**

Originator J. D. Skoglie Date 06/11/13 Calc. No. 0100N-CA-V0219 Rev. No. 0
Project 100-N Field Remediation Job No. 14655 Checked C. H. Dobie Date 06/11/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations Sheet No. 4 of 36

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the 95% UCL calculations and maximum results for the excavation, south staging pile, overburden, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for this site.

Results Summary - Excavation (EXC), South Staging Pile (SSP), and Overburden (OB) Areas[a]

	EXC		SSP		OB		UNITS
	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	
Cesium-137	--	--	0.0539	--	--	--	pCi/g
Nickel-63	--	--	6.82	--	--	--	pCi/g
Plutonium-239/240	--	--	0.0381	--	--	--	pCi/g
Tritium	--	--	0.0131	--	--	--	pCi/g
Uranium-234	--	--	0.204	--	--	--	pCi/g
Uranium-238	--	--	0.222	--	--	--	pCi/g
Antimony	0.85	--	0.49	--	0.76	--	mg/kg
Arsenic	3.4	--	3.3	--	2.3	--	mg/kg
Barium	63.9	--	81.1	--	58.4	--	mg/kg
Beryllium	0.091	--	0.25	--	0.14	--	mg/kg
Boron	--	1.0	1.6	--	--	--	mg/kg
Cadmium	0.17	--	0.27	--	0.31	--	mg/kg
Chromium	11.8	--	13.9	--	9.4	--	mg/kg
Cobalt	8.7	--	8.7	--	9.4	--	mg/kg
Copper	17.1	--	17.2	--	18.2	--	mg/kg
Hexavalent chromium	0.190	--	0.185	--	0.231	--	mg/kg
Lead	12.1	--	17.6	--	15.1	--	mg/kg
Manganese	325	--	348	--	319	--	mg/kg
Mercury	0.065	--	0.11	--	1.0	--	mg/kg
Molybdenum	--	0.63	--	0.35	--	0.43	mg/kg
Nickel	13.1	--	16.7	--	11.7	--	mg/kg
Vanadium	55.5	--	49.5	--	53.9	--	mg/kg
Zinc	47.7	--	55.7	--	59.7	--	mg/kg
Chloride	6.9	--	43.5	--	11.3	--	mg/kg
Fluoride	--	1.1	1.9	--	--	0.91	mg/kg
Nitrogen in nitrate	7.7	--	91.7	--	1.2	--	mg/kg
Nitrogen in nitrate and nitrite	25.9	--	198	--	0.68	--	mg/kg
Sulfate	60.2	--	137	--	31.1	--	mg/kg
TPH - Diesel Range	--	--	--	--	36	--	mg/kg

Continued on next page

Washington Closure Hanford **CALCULATION SHEET**

Originator J. D. Skoglie **Date** 06/06/13 **Calc. No.** 0100N-CA-V0219 **Rev. No.** 0
Project 100-N Field Remediation **Job No.** 14655 **Checked** C. H. Dobie **Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations **Sheet No.** 5 of 36

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the 95% UCL calculations and maximum results for the excavation, south staging pile, overburden, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for this site.

Results Summary - Excavation (EXC), South Staging Pile (SSP), and Overburden (OB) Areas [a]

	EXC		SSP		OB		
	95% UCL Result	**Maximum Result**	**95% UCL Result**	**Maximum Result**	**95% UCL Result**	**Maximum Result**	**UNITS**
TPH - Diesel Range EXT	--	--	--	--	61	--	mg/kg
4-4'DDD	--	--	--	0.0013	--	--	mg/kg
4-4'-DDE	--	--	--	0.0013	--	0.0012	mg/kg
4-4'-DDT	--	--	0.012	--	--	0.0015	mg/kg
Acenaphthene (Method 8270)	--	--	--	--	0.083	--	mg/kg
Acenaphthene (Method 8310)	--	--	--	--	5.8	--	mg/kg
Anthracene (Method 8270)	--	--	--	--	1.0	--	mg/kg
Anthracene (Method 8310)	--	--	--	--	61	--	mg/kg
Benzo(a)anthracene (Method 8270)	--	--	--	--	3.4	--	mg/kg
Benzo(a)anthracene (Method 8310)	--	--	--	--	1.8	--	mg/kg
Benzo(a)pyrene (Method 8270)	--	--	--	--	2.6	--	mg/kg
Benzo(a)pyrene (Method 8310)	--	--	--	--	6.8	--	mg/kg
Benzo(b)fluoranthene (Method 8270)	--	--	--	--	5.6	--	mg/kg
Benzo(b)fluoranthene (Method 8310)	--	--	--	--	7.5	--	mg/kg
Benzo(ghi)perylene (Method 8270)	--	--	--	--	0.24	--	mg/kg
Benzo(ghi)perylene (Method 8310)	--	--	--	--	2.5	--	mg/kg
Benzo(k)fluoranthene (Method 8270)	--	--	--	--	--	0.11	mg/kg
Benzo(k)fluoranthene (Method 8310)	--	--	--	--	4.9	--	mg/kg
Carbazole	--	--	--	0.49	--	0.43	mg/kg
Chrysene (Method 8270)	--	--	--	--	3.5	--	mg/kg
Chrysene (Method 8310)	--	--	--	--	9.9	--	mg/kg
Dibenz(a,h)anthracene (Method 8270)	--	--	--	--	--	0.13	mg/kg
Dibenz(a,h)anthracene (Method 8310)	--	--	--	--	--	0.17	mg/kg
Dibenzofuran	--	--	--	0.16	--	0.073	mg/kg
Dieldrin	--	--	--	0.00035	--	0.0026	mg/kg
Fluoranthene (Method 8270)	--	--	--	--	7.4	--	mg/kg
Fluoranthene (Method 8310)	--	--	--	--	69	--	mg/kg
Fluorene (Method 8270)	--	--	--	--	--	0.23	mg/kg
Fluorene (Method 8310)	--	--	--	--	6.5	--	mg/kg
Indeno(1,2,3-cd)pyrene (Method 8270)	--	--	--	--	1.4	--	mg/kg
Indeno(1,2,3-cd)pyrene (Method 8310)	--	--	--	--	2.0	--	mg/kg
Phenanthrene (Method 8270)	--	--	--	--	8.2	--	mg/kg
Phenanthrene (Method 8310)	--	--	--	--	117	--	mg/kg
Pyrene (Method 8270)	--	--	--	--	7.3	--	mg/kg
Pyrene (Method 8310)	--	--	--	--	31	--	mg/kg
Alpha-chlordane	--	--	--	0.0011	--	--	mg/kg
Endosulfan II	--	--	--	--	--	0.00033	mg/kg
Gamma-chlordane	--	--	--	0.0017	--	--	mg/kg
Aroclor-1254	--	--	0.086	--	0.23	--	mg/kg
Aroclor-1260	--	--	0.133	--	0.12	--	mg/kg
Total PCB			0.219		0.35		mg/kg

3-Part Test Evaluation:

	EXC		SSP		OB	
95% UCL or maximum [a] > Cleanup Limit?	YES	NO	YES	YES	YES	YES
> 10% above Cleanup Limit?	YES	NO	YES	NO	YES	YES
Any sample > 2x Cleanup Limit?	YES	NO	YES	NO	YES	YES

[a] The 95% UCL result or maximum value, depending on data censorship, as described in the methodology section.

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie **Date** 06/06/13 **Calc. No.** 0100N-CA-V0219 **Rev. No.** 0
Project 100-N Field Remediation **Job No.** 14655 **Checked** C. H. Dobie **Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations **Sheet No.** 6 of 36

Summary (continued)

Results:

The results presented in the tables that follow include the summary of the 95% UCL calculations and maximum results for the excavation, south staging pile, overburden, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for this site.

Results and QA/QC

Analyte	EXC		SSP		OB	
	Duplicate	**Split**	**Duplicate**	**Split**	**Duplicate**	**Split**
Potassium-40	---	---	3.9%	---	0.6%	---
Radium-226	---	---	0.8%	---	---	---
Aluminum	15.0%	20.7%	17.0%	16.8%	7.8%	19.9%
Barium	8.0%	4.2%	17.5%	4.1%	10.0%	9.0%
Calcium	17.8%	30.0%	10.4%	21.4%	***50.7%***	11.6%
Chromium	12.8%	20.4%	16.9%	21.4%	10.1%	22.7%
Copper	4.8%	10.7%	12.8%	12.0%	8.6%	10.2%
Iron	11.8%	18.9%	12.5%	6.1%	1.7%	8.4%
Magnesium	15.3%	15.6%	16.7%	13.2%	9.1%	14.3%
Manganese	14.4%	2.7%	14.5%	10.3%	3.8%	2.9%
Silicon	1.8%	***94.5%***	***59.2%***	***147.8%***	***34.7%***	***148.4%***
Vanadium	6.7%	15.6%	8.3%	5.9%	1.5%	16.3%
Zinc	7.7%	5.0%	9.9%	12.1%	0.3%	13.1%
Nitrogen in ntirate	6.3%	13.0%	---	---	---	---
Nitrogen in ntirate and nitrite	25.6%	7.1%	---	---	---	---
Sulfate	6.8%	8.8%	---	---	---	---

[a]RPD listed where result produced, based on criteria. If RPD not required, no value is listed. The significance of the reported RPD values, including values greater than 30%, is addressed in the data quality assessment section of the RSVP.

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date	06/06/13	Calc. No.	0100N-CA-V0219	Rev. No.	0
Project	100-N Field Remediation	Job No.	14655	Checked	C. H. Dobie	Date	06/06/13
Subject	100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations					Sheet No.	7 of 36

100-N-61:4 Subsite Statistical Calculations

Verification Data - Excavation (EXC)

Sample Area	Sample Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Hexavalent Chromium			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	0.62	JB	0.40	2.6		0.7	69.8	X	0.080	0.10	B	0.035	0.17	B	0.043	10.8	X	0.061	6.8	X	0.11	12.8		0.23	0.155	U	0.155	4.4		0.29
Duplicate of J1RL18	J1RL28	4/25/13	0.38	UJ	0.38	2.2		0.66	64.4	X	0.076	0.095	B	0.033	0.15	B	0.041	9.5	X	0.058	6.4	X	0.10	12.2		0.22	0.231		0.155	4.1		0.27
EXC-1	J1RL16	4/25/13	0.75	J	0.37	3.0		0.64	54.1	X	0.073	0.032	U	0.032	0.14	B	0.039	6.6	X	0.056	9.0	X	0.096	16.7		0.21	0.155	U	0.155	5.9		0.26
EXC-2	J1RL17	4/25/13	0.80	J	0.37	4.0		0.65	50.0	X	0.074	0.13	B	0.032	0.15	B	0.040	9.2	X	0.057	8.6	X	0.098	17.7		0.21	0.155	U	0.155	8.6		0.26
EXC-4	J1RL19	4/25/13	0.68	J	0.37	5.2		0.63	74.5	X	0.073	0.061	B	0.032	0.18	B	0.039	16.7	X	0.056	9.1	X	0.096	23.3		0.21	0.331		0.155	19.3		0.26
EXC-5	J1RL20	4/25/13	1.1	J	0.36	2.2		0.63	47.0	X	0.072	0.031	U	0.031	0.18	B	0.039	6.1	X	0.055	8.7	X	0.095	14.6		0.21	0.176		0.155	4.2		0.26
EXC-6	J1RL21	4/25/13	0.94	J	0.34	2.1		0.59	52.6	X	0.068	0.029	U	0.029	0.19		0.036	8.0	X	0.052	7.8	X	0.089	15.8		0.19	0.254		0.155	30.9		0.24
EXC-7	J1RL22	4/25/13	0.63	J	0.34	2.4		0.59	63.3	X	0.067	0.082	B	0.029	0.17	B	0.036	8.8	X	0.051	8.2	X	0.089	14.1		0.19	0.214		0.155	4.5		0.24
EXC-8	J1RL23	4/25/13	0.55	J	0.34	1.5		0.60	49.3	X	0.069	0.080	B	0.030	0.12	B	0.037	10.2	X	0.053	7.1	X	0.091	15.3		0.20	0.155	U	0.155	3.9		0.24
EXC-9	J1RL24	4/25/13	0.35	UJ	0.35	2.9		0.61	66.9	X	0.070	0.15	B	0.030	0.15	B	0.038	12.4	X	0.053	5.8	X	0.092	10.4		0.20	0.155	U	0.155	4.2		0.25
EXC-10	J1RL25	4/25/13	0.45	JB	0.38	2.8		0.66	66.2	X	0.076	0.12	B	0.033	0.17	B	0.041	12.9	X	0.058	6.4	X	0.10	15.0		0.22	0.155	U	0.155	4.7		0.27
EXC-11	J1RL26	4/25/13	1.0	J	0.34	2.6		0.59	52.2	X	0.068	0.030	U	0.030	0.14	B	0.037	7.7	X	0.052	9.4	X	0.090	14.9		0.19	0.194		0.155	3.9		0.24
EXC-12	J1RL27	4/25/13	0.99	J	0.36	1.4		0.63	62.3	X	0.072	0.031	U	0.031	0.15	B	0.039	4.4	X	0.055	8.9	X	0.095	14.4		0.21	0.155	U	0.155	2.6		0.26

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg	Lead mg/kg
EXC-3	J1RL18/ J1RL28	4/25/13	0.41	2.4	67.1	0.098	0.16	10.2	6.6	12.5	0.154	4.3
EXC-1	J1RL16	4/25/13	0.75	3.0	54.1	0.016	0.14	6.6	9.0	16.7	0.0775	5.9
EXC-2	J1RL17	4/25/13	0.80	4.0	50.0	0.13	0.15	9.2	8.6	17.7	0.0775	8.6
EXC-4	J1RL19	4/25/13	0.68	5.2	74.5	0.061	0.18	16.7	9.1	23.3	0.331	19.3
EXC-5	J1RL20	4/25/13	1.1	2.2	47.0	0.016	0.18	6.1	8.7	14.6	0.176	4.2
EXC-6	J1RL21	4/25/13	0.94	2.1	52.6	0.015	0.19	8.0	7.8	15.8	0.254	30.9
EXC-7	J1RL22	4/25/13	0.63	2.4	63.3	0.082	0.17	8.8	8.2	14.1	0.214	4.5
EXC-8	J1RL23	4/25/13	0.55	1.5	49.3	0.080	0.12	10.2	7.1	15.3	0.0775	3.9
EXC-9	J1RL24	4/25/13	0.18	2.9	66.9	0.15	0.15	12.4	5.8	10.4	0.0775	4.2
EXC-10	J1RL25	4/25/13	0.45	2.8	66.2	0.12	0.17	12.9	6.4	15.0	0.0775	4.7
EXC-11	J1RL26	4/25/13	1.0	2.6	52.2	0.015	0.14	7.7	9.4	14.9	0.194	3.9
EXC-12	J1RL27	4/25/13	0.99	1.4	62.3	0.016	0.15	4.4	8.9	14.4	0.0775	2.6

Statistical Computations

	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Hexavalent Chromium	Lead
95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12	12	12
% < Detection limit	8%	0%	0%	42%	0%	0%	0%	0%	50%	0%
Mean	0.71	2.7	58.8	0.066	0.16	9.4	8.0	15.4	0.149	8.1
Standard deviation	0.28	1.0	8.9	0.051	0.020	3.4	1.2	3.1	0.0862	8.5
95% UCL on mean	0.85	3.4	63.9	0.091	0.17	11.8	8.7	17.1	0.190	12.1
Maximum value	1.1	5.2	74.5	0.15	0.19	16.7	9.4	23.3	0.331	30.9
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	5 GW & River Protection	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	32 GW Protection	22.0 River Protection	2 River Protection	10.2 GW & River Protection
WAC 173-340 3-PART TEST										
95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO	NO	YES
> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO	NO	YES
Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO	NO	YES
WAC 173-340 Compliance?	Because all values are below background (5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/06/13 **Calc. No.** 0100N-CA-V0219 **Rev. No.** 0
Project 100-N Field Remediation **Job No.** 14655 **Checked** C. H. Dobie **Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations **Sheet No.** 8 of 36

100-N-61:4 Subsite Statistical Calculations

Verification Data - Excavation (EXC)

Sample Area	Sample Number	Sample Date	Manganese mg/kg	Q	PQL	Mercury mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	297	X	0.11	0.0052	U	0.0052	11.0	X	0.13	40.0	X	0.099
Duplicate of J1RL18	J1RL28	4/25/13	257	X	0.10	0.0056	U	0.0056	10.0	X	0.12	37.4	X	0.094
EXC-1	J1RL16	4/25/13	331	X	0.096	0.059	N	0.0058	10.3	X	0.12	56.9	X	0.091
EXC-2	J1RL17	4/25/13	340	X	0.098	0.0072	B	0.0059	11.7	X	0.12	48.3	X	0.092
EXC-4	J1RL19	4/25/13	312	X	0.096	0.0093	B	0.0055	19.2	X	0.12	46.2	X	0.090
EXC-5	J1RL20	4/25/13	305	X	0.095	0.0051	U	0.0051	8.7	X	0.12	65.0	X	0.089
EXC-6	J1RL21	4/25/13	279	X	0.089	0.052		0.0048	10.7	X	0.11	53.3	X	0.084
EXC-7	J1RL22	4/25/13	313	X	0.089	0.0052	U	0.0052	10.2	X	0.11	44.4	X	0.083
EXC-8	J1RL23	4/25/13	309	X	0.091	0.0073	B	0.0055	13.9	X	0.11	39.1	X	0.085
EXC-9	J1RL24	4/25/13	248	X	0.092	0.0062	U	0.0062	12.4	X	0.11	32.3	X	0.087
EXC-10	J1RL25	4/25/13	287	X	0.10	0.24		0.0048	12.7	X	0.12	37.5	X	0.094
EXC-11	J1RL26	4/25/13	351	X	0.09	0.0057	U	0.0057	11.0	X	0.11	64.2	X	0.084
EXC-12	J1RL27	4/25/13	340	X	0.095	0.0062	U	0.0062	9.7	X	0.12	58.3	X	0.089

Sample Area	Sample Number	Sample Date	Zinc mg/kg	Q	PQL	Chloride mg/kg	Q	PQL	Nitrogen in Nitrate mg/kg	Q	PQL	Nitrogen in Nitrate and Nitrite mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	36.6	X	0.42	7.8		2.1	24.5	J	0.34	32.3	J	0.34	84.7		1.9
Duplicate of J1RL18	J1RL28	4/25/13	33.9	X	0.40	8.2		2.1	26.1	J	0.34	41.8	JN	0.34	90.7		1.9
EXC-1	J1RL16	4/25/13	46.1	X	0.38	6.8		2.0	7.3	J	0.31	9.3	JMN	0.32	58.2		1.7
EXC-2	J1RL17	4/25/13	45.5	X	0.39	6.3		2.0	1.9	JB	0.32	1.5	J	0.31	76.5		1.7
EXC-4	J1RL19	4/25/13	46.8	X	0.38	12.5		2.0	2.2	JB	0.32	1.8	J	0.30	149		1.8
EXC-5	J1RL20	4/25/13	49.5	X	0.38	3.9	B	2.0	0.78	JB	0.32	0.32	JB	0.31	7.2		1.8
EXC-6	J1RL21	4/25/13	49.7	X	0.35	5.3		2.0	1.6	JB	0.31	1.1	J	0.31	27.9		1.7
EXC-7	J1RL22	4/25/13	39.1	X	0.35	4.9	B	2.0	1.4	JB	0.31	1.3	J	0.30	13.6		1.7
EXC-8	J1RL23	4/25/13	33.3	X	0.36	4.0	B	2.0	0.78	JB	0.32	0.44	JB	0.30	6.8		1.7
EXC-9	J1RL24	4/25/13	34.4	X	0.37	4.2	B	2.0	0.89	JB	0.32	0.36	JB	0.31	6.7		1.8
EXC-10	J1RL25	4/25/13	56.5	X	0.40	4.7	BN	2.0	1.9	JBN	0.31	2.9	J	0.30	11.6	NM	1.7
EXC-11	J1RL26	4/25/13	44.7	X	0.36	5.4		1.9	1.3	JB	0.31	0.70	JB	0.31	9.3		1.7
EXC-12	J1RL27	4/25/13	41.3	X	0.38	3.7	B	1.9	0.31	UR	0.31	0.31	UR	0.31	9.6		1.7

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Manganese mg/kg	Mercury mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	Chloride mg/kg	Nitrogen in Nitrate mg/kg	Nitrogen in Nitrate and Nitrite mg/kg	Sulfate mg/kg
EXC-3	J1RL18/ J1RL28	4/25/13	277	0.0027	10.5	38.7	35.3	8.0	25.3	37.1	87.7
EXC-1	J1RL16	4/25/13	331	0.059	10.3	56.9	46.1	6.8	7.3	9.3	58.2
EXC-2	J1RL17	4/25/13	340	0.0072	11.7	48.3	45.5	6.3	1.9	1.5	76.5
EXC-4	J1RL19	4/25/13	312	0.0093	19.2	46.2	46.8	12.5	2.2	1.8	149
EXC-5	J1RL20	4/25/13	305	0.0026	8.7	65.0	49.5	3.9	0.78	0.32	7.2
EXC-6	J1RL21	4/25/13	279	0.052	10.7	53.3	49.7	5.3	1.6	1.1	27.9
EXC-7	J1RL22	4/25/13	313	0.0026	10.2	44.4	39.1	4.9	1.4	1.3	13.6
EXC-8	J1RL23	4/25/13	309	0.0073	13.9	39.1	33.3	4.0	0.78	0.44	6.8
EXC-9	J1RL24	4/25/13	248	0.0031	12.4	32.3	34.4	4.2	0.89	0.36	6.7
EXC-10	J1RL25	4/25/13	287	0.24	12.7	37.5	56.5	4.7	1.9	2.9	11.6
EXC-11	J1RL26	4/25/13	351	0.0029	11.0	64.2	44.7	5.4	1.3	0.70	9.3
EXC-12	J1RL27	4/25/13	340	0.0031	9.7	58.3	41.3	3.7			9.6

Statistical Computations

	Manganese	Mercury	Nickel	Vanadium	Zinc	Chloride	Nitrogen in Nitrate	Nitrogen in Nitrate and Nitrite	Sulfate
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	11	11	12
% < Detection limit	0%	50%	0%	0%	0%	0%	9%	9%	0%
Mean	308	0.033	11.8	48.7	43.5	5.8	4.1	5.2	38.7
Standard deviation	30.6	0.068	2.7	10.9	7.04	2.5	7.3	10.9	45.3
95% UCL on mean	325	0.065	13.1	55.5	47.7	6.9	7.7	25.9	60.2
Maximum value	351	0.24	19.2	65.0	56.5	12.5	26.1	41.8	149
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	512 GW Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	25000 GW Protection	1000 GW Protection	1000 GW Protection	25000 GW Protection
WAC 173-340 3-PART TEST									
95% UCL > Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO	NO	NA
> 10% above Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO	NO	NA
Any sample > 2X Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO	NO	NA
WAC 173-340 Compliance?	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (100 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (237 mg/kg) the WAC 173-340 3-part test is not required.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-N Field Remediation
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Date 06/06/13
Job No. 14655

Calc. No. 0100N-CA-V0219
Checked C. H. Dobie

Rev. No. 0
Date 06/06/13
Sheet No. 9 of 36

100-N-61:4 Subsite Maximum Calculations
Verification Data - Excavation (EXC)

Sample Area	Sample Number	Sample Date	Boron			Molybdenum			Fluoride		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	1.0	B	1.0	0.27	U	0.27	1.1	B	0.89
Duplicate of J1RL18	J1RL28	4/25/13	0.98	U	0.98	0.26	U	0.26	0.95	B	0.89
EXC-1	J1RL16	4/25/13	0.94	U	0.94	0.36	B	0.25	1.1	BNM	0.81
EXC-2	J1RL17	4/25/13	0.99	B	0.96	0.40	B	0.25	1.0	B	0.83
EXC-4	J1RL19	4/25/13	0.99	B	0.94	0.63	B	0.25	0.84	U	0.84
EXC-5	J1RL20	4/25/13	0.93	U	0.93	0.25	U	0.25	0.84	U	0.84
EXC-6	J1RL21	4/25/13	0.87	U	0.87	0.23	U	0.23	0.82	U	0.82
EXC-7	J1RL22	4/25/13	0.92	B	0.87	0.23	U	0.23	0.84	B	0.81
EXC-8	J1RL23	4/25/13	0.89	U	0.89	0.24	U	0.24	0.83	U	0.83
EXC-9	J1RL24	4/25/13	0.99	B	0.90	0.24	U	0.24	0.84	U	0.84
EXC-10	J1RL25	4/25/13	0.98	U	0.98	0.26	U	0.26	1.1	BN	0.82
EXC-11	J1RL26	4/25/13	0.88	U	0.88	0.23	U	0.23	0.80	U	0.80
EXC-12	J1RL27	4/25/13	0.93	U	0.93	0.25	U	0.25	0.81	U	0.81

Statistical Computations

	Boron	Molybdenum	Fluoride
% < Detection limit	58%	75%	58%
Maximum value	1.0	0.63	1.1
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	320 GW Protection	8 GW Protection	96 GW Protection
3-PART TEST			
Maximum > Cleanup Limit?	NO	NO	NA
> 10% above Cleanup Limit?	NO	NO	NA
Any sample > 2X Cleanup Limit?	NO	NO	NA
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (2.81 mg/kg) the 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/06/13 **Calc. No.** 0100N-CA-V0219 **Rev. No.** 0
Project 100-N Field Remediation **Job No.** 14655 **Checked** C. H. Dobie **Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations **Sheet No.** 10 of 36

100-N-61:4 Subsite Statistical Calculations

Verification Data - South Staging Pile (SSP)

Sample Area	Sample Number	Sample Date	Cesium-137			Nickel-63			Plutonium-239/240			Tritium			Uranium-234			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SSP-2	J1RL91	4/30/13	0.00297	U	0.0249	11.3	U	12.6	-0.00907	U	0.0873	0.00596	U	0.0237	0.187		0.0951	0.249		0.0873
Duplicate of J1RL91	J1RLC2	4/30/13	-0.00698	U	0.0239	4.29	U	10.7	-0.00236	U	0.0850	0.0131	U	0.0228	0.400		0.0958	0.301		0.0827
SSP-1	J1RL90	4/30/13	0.161		0.0328	6.28	U	10.8	-0.00276	U	0.0787	0.00696	U	0.0366	0.360		0.0848	0.185		0.0848
SSP-3	J1RL92	4/30/13	0.0161	U	0.0236	-0.436	U	11.0	-0.00261	U	0.0746	0.0201		0.0185	0.0349	U	0.0759	0.159		0.0614
SSP-4	J1RL93	4/30/13	0.00867	U	0.0245	6.44	U	11.2	-0.00391	U	0.0723	0.0153	U	0.0305	0.125		0.0562	0.236		0.0562
SSP-5	J1RL94	4/30/13	-0.0169	U	0.0229	11.2	U	11.3	0.0311	U	0.0715	0.00951	U	0.0222	0.123		0.0643	0.174		0.0807
SSP-6	J1RL95	4/30/13	0.0735		0.0296	0.927	U	10.7	-0.00288	U	0.0821	0.00293	U	0.0214	0.0824		0.0645	0.113		0.0514
SSP-7	J1RL96	4/30/13	0.0451		0.0229	15.3		11.2	-0.00468	U	0.134	0.00388	U	0.0175	0.0528	U	0.0666	0.151		0.0635
SSP-8	J1RL97	4/30/13	0.0230	U	0.0282	0.311	U	10.7	-0.00242	U	0.0690	-0.00236	U	0.0255	0.167		0.0644	0.0975		0.0567
SSP-9	J1RL98	4/30/13	-0.0133	U	0.0304	3.16	U	10.9	-0.00123	U	0.0619	0.0198	U	0.0362	0.153		0.0713	0.341		0.0713
SSP-10	J1RL99	4/30/13	0.0514		0.0400	0.584	U	10.6	0.00445	U	0.0911	0.000641	U	0.0189	0.153		0.0622	0.107		0.0622
SSP-11	J1RLC0	4/30/13	0.0220	U	0.0292	1.26	U	10.7	0.169		0.106	0.0228		0.0204	0.176		0.112	0.278		0.112
SSP-12	J1RLC1	4/30/13	-0.00197	U	0.0276	0.297	U	10.6	-0.00474	U	0.0875	-0.00352	U	0.0220	0.200		0.0844	0.0727	U	0.0893

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Cesium-137 pCi/g	Nickel-63 pCi/g	Plutonium-239/240 pCi/g	Tritium pCi/g	Uranium-234 pCi/g	Uranium-238 pCi/g
SSP-2	J1RL91/ J1RLC2	4/30/13	-0.00201	7.80	-0.00572	0.00953	0.294	0.275
SSP-1	J1RL90	4/30/13	0.161	6.28	-0.00276	0.00696	0.360	0.185
SSP-3	J1RL92	4/30/13	0.0161	-0.436	-0.00261	0.0201	0.0349	0.159
SSP-4	J1RL93	4/30/13	0.00867	6.44	-0.00391	0.0153	0.125	0.236
SSP-5	J1RL94	4/30/13	-0.0169	11.2	0.0311	0.00951	0.123	0.174
SSP-6	J1RL95	4/30/13	0.0735	0.927	-0.00288	0.00293	0.0824	0.113
SSP-7	J1RL96	4/30/13	0.0451	15.3	-0.00468	0.00388	0.0528	0.151
SSP-8	J1RL97	4/30/13	0.0230	0.311	-0.00242	-0.00236	0.167	0.0975
SSP-9	J1RL98	4/30/13	-0.0133	3.16	-0.00123	0.0198	0.153	0.341
SSP-10	J1RL99	4/30/13	0.0514	0.584	0.00445	0.000641	0.153	0.107
SSP-11	J1RLC0	4/30/13	0.0220	1.26	0.169	0.0228	0.176	0.278
SSP-12	J1RLC1	4/30/13	-0.00197	0.297	-0.00474	-0.00352	0.200	0.0727

Statistical Computations

	Cesium-137	Nickel-63	Plutonium-239/240	Tritium	Uranium-234	Uranium-238
95% UCL based on	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.
N	12	12	12	12	12	12
% < Detection limit	67%	92%	92%	83%	17%	8%
Mean	0.0305	4.43	0.0145	0.00880	0.160	0.182
Standard deviation	0.0492	5.04	0.0497	0.00901	0.0932	0.0837
Z-statistic	1.64	1.64	1.64	1.64	1.64	1.64
95% UCL on mean	0.0539	6.82	0.0381	0.0131	0.204	0.222
Maximum value	0.161	15.3	0.169	0.0228	0.400	0.341

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/06/13 **Calc. No.** 0100N-CA-V0219 **Rev. No.** 0
Project 100-N Field Remediation **Job No.** 14655 **Checked** C. H. Dobie **Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations **Sheet No.** 11 of 36

100-N-61:4 Subsite Statistical Calculations

Verification Data - South Staging Pile (SSP)

Sample Area	Sample Number	Sample Date	Antimony mg/kg	Antimony Q	Antimony PQL	Arsenic mg/kg	Arsenic Q	Arsenic PQL	Barium mg/kg	Barium Q	Barium PQL	Beryllium mg/kg	Beryllium Q	Beryllium PQL
SSP-2	J1RL91	4/30/13	0.32	U	0.32	2.0		0.56	69.4		0.065	0.24		0.028
Duplicate of J1RL91	J1RLC2	4/30/13	0.42	B	0.35	2.3		0.61	82.7		0.070	0.27		0.030
SSP-1	J1RL90	4/30/13	0.36	U	0.36	3.1		0.62	84.8		0.071	0.27		0.031
SSP-3	J1RL92	4/30/13	0.43	B	0.34	2.8		0.58	63.5		0.067	0.19		0.029
SSP-4	J1RL93	4/30/13	0.36	U	0.36	2.0		0.63	77.4		0.073	0.26		0.032
SSP-5	J1RL94	4/30/13	0.52	B	0.37	2.3		0.65	50.7		0.075	0.16	B	0.033
SSP-6	J1RL95	4/30/13	0.46	B	0.35	4.9		0.60	81.9		0.070	0.22		0.030
SSP-7	J1RL96	4/30/13	0.57		0.35	2.9		0.60	67.2		0.070	0.21		0.030
SSP-8	J1RL97	4/30/13	0.48	B	0.36	2.5		0.62	67.3		0.072	0.18	B	0.031
SSP-9	J1RL98	4/30/13	0.35	U	0.35	2.5		0.62	99.7		0.071	0.30		0.031
SSP-10	J1RL99	4/30/13	0.64		0.36	3.7		0.62	75.6		0.071	0.22		0.031
SSP-11	J1RLC0	4/30/13	0.41	B	0.33	2.5		0.58	71.0		0.066	0.19		0.029
SSP-12	J1RLC1	4/30/13	0.53	B	0.34	2.9		0.59	71.7		0.068	0.24		0.029

Sample Area	Sample Number	Sample Date	Boron mg/kg	Boron Q	Boron PQL	Cadmium mg/kg	Cadmium Q	Cadmium PQL	Chromium mg/kg	Chromium Q	Chromium PQL	Cobalt mg/kg	Cobalt Q	Cobalt PQL	Copper mg/kg	Copper Q	Copper PQL	Hexavalent Chromium mg/kg	Hexavalent Chromium Q	Hexavalent Chromium PQL
SSP-2	J1RL91	4/30/13	1.4	B	0.83	0.15	B	0.035	11.4		0.049	8.9	X	0.085	13.2		0.18	0.155	U	0.155
Duplicate of J1RL91	J1RLC2	4/30/13	1.4	B	0.91	0.17	B	0.038	13.5		0.054	9.0	X	0.092	15.0		0.20	0.155	U	0.155
SSP-1	J1RL90	4/30/13	2.1		0.92	0.22		0.038	18.1		0.054	9.2	X	0.094	14.4		0.20	0.155	U	0.155
SSP-3	J1RL92	4/30/13	1.2	B	0.87	0.51		0.036	11.7		0.051	7.6	X	0.089	15.3		0.19	0.217		0.155
SSP-4	J1RL93	4/30/13	1.4	B	0.94	0.16	B	0.039	13.4		0.055	8.0	X	0.096	13.7		0.21	0.161		0.155
SSP-5	J1RL94	4/30/13	0.97	U	0.97	0.13	B	0.040	11.9		0.057	7.2	X	0.099	19.1		0.21	0.155	U	0.155
SSP-6	J1RL95	4/30/13	1.6	B	0.90	0.30		0.038	12.8		0.053	8.5	X	0.092	16.5		0.20	0.177		0.155
SSP-7	J1RL96	4/30/13	1.0	B	0.90	0.15	B	0.038	12.1		0.053	7.8	X	0.092	14.2		0.20	0.155	U	0.155
SSP-8	J1RL97	4/30/13	0.99	B	0.92	0.21		0.039	11.5		0.055	8.3	X	0.094	17.8		0.20	0.199		0.155
SSP-9	J1RL98	4/30/13	1.8	B	0.91	0.19		0.038	14.8		0.054	9.1	X	0.093	14.2		0.20	0.262		0.155
SSP-10	J1RL99	4/30/13	2.0		0.92	0.25		0.039	12.6		0.054	9.1	X	0.094	20.1		0.20	0.196		0.155
SSP-11	J1RLC0	4/30/13	1.2	B	0.86	0.19		0.036	12.8		0.051	8.1	X	0.087	16.3		0.19	0.178		0.155
SSP-12	J1RLC1	4/30/13	1.4	B	0.88	0.16	B	0.037	12.4		0.052	8.5	X	0.089	16.8		0.19	0.159		0.155

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg
SSP-2	J1RL91/ J1RLC2	4/30/13	0.29	2.2	76.1	0.26	1.4	0.16	12.5	9.0	14.1	0.0775
SSP-1	J1RL90	4/30/13	0.18	3.1	84.8	0.27	2.1	0.22	18.1	9.2	14.4	0.0775
SSP-3	J1RL92	4/30/13	0.43	2.8	63.5	0.19	1.2	0.51	11.7	7.6	15.3	0.217
SSP-4	J1RL93	4/30/13	0.18	2.0	77.4	0.26	1.4	0.16	13.4	8.0	13.7	0.161
SSP-5	J1RL94	4/30/13	0.52	2.3	50.7	0.16	0.49	0.13	11.9	7.2	19.1	0.0775
SSP-6	J1RL95	4/30/13	0.46	4.9	81.9	0.22	1.6	0.30	12.8	8.5	16.5	0.177
SSP-7	J1RL96	4/30/13	0.57	2.9	67.2	0.21	1.0	0.15	12.1	7.8	14.2	0.0775
SSP-8	J1RL97	4/30/13	0.48	2.5	67.3	0.18	0.99	0.21	11.5	8.3	17.8	0.199
SSP-9	J1RL98	4/30/13	0.18	2.5	99.7	0.30	1.8	0.19	14.8	9.1	14.2	0.262
SSP-10	J1RL99	4/30/13	0.64	3.7	75.6	0.22	2.0	0.25	12.6	9.1	20.1	0.196
SSP-11	J1RLC0	4/30/13	0.41	2.5	71.0	0.19	1.2	0.19	12.8	8.1	16.3	0.178
SSP-12	J1RLC1	4/30/13	0.53	2.9	71.7	0.24	1.4	0.16	12.4	8.5	16.8	0.159

Statistical Computations

	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Hexavalent Chromium
95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12	12	12
% < Detection limit	25%	0%	0%	0%	8%	0%	0%	0%	0%	33%
Mean	0.41	2.9	73.9	0.22	1.4	0.22	13.0	8.4	16.0	0.155
Standard deviation	0.16	0.79	12.1	0.042	0.46	0.10	1.8	0.65	2.1	0.0632
95% UCL on mean	0.49	3.3	81.1	0.25	1.6	0.27	13.9	8.7	17.2	0.185
Maximum value	0.64	4.9	99.7	0.30	2.1	0.51	18.1	9.2	20.1	0.262
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	5 GW & River Protection	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	320 GW Protection	0.81 GW & River Protection	18.5 GW & River Protection	32 GW Protection	22.0 River Protection	2 River Protection
WAC 173-340 3-PART TEST										
95% UCL > Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NA	NA	NO
> 10% above Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NA	NA	NO
Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NA	NA	NO
WAC 173-340 Compliance?	Because all values are below background (5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	**Date**	06/11/13	**Calc. No.**	0100N-CA-V0219
Project	100-N Field Remediation	**Job No.**	14655	**Checked**	C. H. Dobie
Rev. No.	0	**Date**	06/11/13	**Sheet No.**	12 of 36

Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

100-N-61:4 Subsite Statistical Calculations

Verification Data - South Staging Pile (SSP)

Sample Area	Sample Number	Sample Date	Lead			Manganese			Mercury			Nickel			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	4.3		0.23	321	X	0.085	0.007	B	0.0049	11.7	X	0.10	45.0		0.080
Duplicate of J1RL91	J1RLC2	4/30/13	5.2		0.25	371	X	0.092	0.012	B	0.0056	13.7	X	0.11	48.9		0.087
SSP-1	J1RL90	4/30/13	11.6		0.25	357	X	0.094	0.025	M	0.0054	30.3	XMN	0.12	44.3		0.088
SSP-3	J1RL92	4/30/13	14.3		0.24	290	X	0.089	0.029		0.0052	11.7	X	0.11	44.4		0.083
SSP-4	J1RL93	4/30/13	4.6		0.26	334	X	0.096	0.013	B	0.0056	13.3	X	0.12	44.1		0.090
SSP-5	J1RL94	4/30/13	4.0		0.27	291	X	0.099	0.005	U	0.0050	11.8	X	0.12	45.4		0.093
SSP-6	J1RL95	4/30/13	32.4		0.25	341	X	0.092	0.054		0.0053	12.7	X	0.11	49.9		0.086
SSP-7	J1RL96	4/30/13	6.8		0.25	306	X	0.092	0.011	B	0.0046	12.1	X	0.11	46.5		0.086
SSP-8	J1RL97	4/30/13	8.9		0.25	292	X	0.094	0.17		0.0060	12.8	X	0.12	49.7		0.089
SSP-9	J1RL98	4/30/13	5.2		0.25	404	X	0.093	0.0062	U	0.0062	13.7	X	0.11	47.6		0.088
SSP-10	J1RL99	4/30/13	39.5		0.25	340	X	0.094	0.039		0.0050	14.3	X	0.12	55.4		0.088
SSP-11	J1RLC0	4/30/13	7.4		0.24	313	X	0.087	0.018		0.0054	13.0	X	0.11	46.8		0.082
SSP-12	J1RLC1	4/30/13	6.0		0.24	340	X	0.089	0.0083	B	0.0054	12.9	X	0.11	51.7		0.084

Sample Area	Zinc			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate		
	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	42.2	X	0.34	5.8		2.0	1.2	B	0.82	3.3		0.31	1.3		0.30
Duplicate of J1RL91	46.6	X	0.37	7.6		1.9	1.4	B	0.80	1.8	B	0.31	1.1		0.29
SSP-1	53.6	X	0.37	29.8		2.0	0.84	U	0.84	263	D	1.6	321	D	1.5
SSP-3	51.0	X	0.35	5.3		1.9	1.2	B	0.80	2.1	B	0.30	1.8		0.29
SSP-4	42.5	X	0.38	17.6		2.0	1.2	B	0.84	12.8		0.32	15.1		0.31
SSP-5	38.1	X	0.39	4.5	B	2.0	0.82	U	0.82	0.85	B	0.31	0.30	U	0.30
SSP-6	54.4	X	0.36	74.5		1.9	1.5	B	0.81	233	D	1.6	231	D	1.5
SSP-7	49.8	X	0.36	34.3		1.9	1.9	B	0.81	26.7		0.31	29.2		0.30
SSP-8	68.9	X	0.38	8.2		2.0	0.82	U	0.82	1.4	B	0.31	1.0		0.30
SSP-9	49.1	X	0.37	12.7		2.0	1.2	B	0.85	2.7		0.32	2.6		0.31
SSP-10	63.7	X	0.37	9.1		1.9	0.84	B	0.79	7.5		0.30	8.3		0.29
SSP-11	47.2	X	0.35	27.5		2.0	1.0	B	0.83	6.8		0.32	7.6		0.30
SSP-12	47.6	X	0.36	23.5		2.0	2.8	BN	0.83	3.1		0.32	3.0	M	0.30

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Lead mg/kg	Manganese mg/kg	Mercury mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	Chloride mg/kg	Fluoride mg/kg	Nitrogen in Nitrate mg/kg	Nitrogen in Nitrite and Nitrate mg/kg
SSP-2	J1RL91/ J1RLC2	4/30/13	4.8	346	0.010	12.7	47.0	44.4	6.7	1.3	2.6	1.2
SSP-1	J1RL90	4/30/13	11.6	357	0.025	30.3	44.3	53.6	29.8	0.42	263	321
SSP-3	J1RL92	4/30/13	14.3	290	0.029	11.7	44.4	51.0	5.3	1.2	2.1	1.8
SSP-4	J1RL93	4/30/13	4.6	334	0.013	13.3	44.1	42.5	17.6	1.2	12.8	15.1
SSP-5	J1RL94	4/30/13	4.0	291	0.0025	11.8	45.4	38.1	4.5	0.41	0.85	0.15
SSP-6	J1RL95	4/30/13	32.4	341	0.054	12.7	49.9	54.4	74.5	1.5	233	231
SSP-7	J1RL96	4/30/13	6.8	306	0.011	12.1	46.5	49.8	34.3	1.9	26.7	29.2
SSP-8	J1RL97	4/30/13	8.9	292	0.17	12.8	49.7	68.9	8.2	0.41	1.4	1.0
SSP-9	J1RL98	4/30/13	5.2	404	0.0031	13.7	47.6	49.1	12.7	1.2	2.7	2.6
SSP-10	J1RL99	4/30/13	39.5	340	0.039	14.3	55.4	63.7	9.1	0.84	7.5	8.3
SSP-11	J1RLC0	4/30/13	7.4	313	0.018	13.0	46.8	47.2	27.5	1.0	6.8	7.6
SSP-12	J1RLC1	4/30/13	6.0	340	0.0083	12.9	51.7	47.6	23.5	2.8	3.1	3.0

Statistical Computations

	Lead	Manganese	Mercury	Nickel	Vanadium
95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	12	12	12	12	12
% < Detection limit	0%	0%	17%	0%	0%
Mean	12.1	330	0.032	14.3	47.7
Standard deviation	11.6	33.3	0.046	5.1	3.4
95% UCL on mean	17.6	348	0.11	16.7	49.5
Maximum value	39.5	404	0.17	30.3	55.4
Most Stringent Cleanup Limit for nonradionuclide and RAG type mg/kg	10.2 GW & River Protection	512 GW Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection
WAC 173-340 3-PART TEST					
95% UCL > Cleanup Limit?	YES	NA	NA	NO	NA
> 10% above Cleanup Limit?	YES	NA	NA	NO	NA
Any sample > 2X Cleanup Limit?	YES	NA	NA	NO	NA
WAC 173-340 Compliance?	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.

	Zinc	Chloride	Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use ProUCL Gamma distribution.
N	12	12	12	12	12
% < Detection limit	0%	0%	25%	0%	8%
Mean	50.9	21.1	1.2	46.9	51.8
Standard deviation	8.6	19.7	0.69	94.4	107
95% UCL on mean	55.7	43.5	1.9	91.7	198
Maximum value	68.9	74.5	2.8	263	321
Most Stringent Cleanup Limit for nonradionuclide and RAG type mg/kg	67.8 River Protection	25000 GW Protection	96 GW Protection	1000 GW Protection	1000 GW Protection
WAC 173-340 3-PART TEST					
95% UCL > Cleanup Limit?	NO	NA	NA	NO	NO
> 10% above Cleanup Limit?	NO	NA	NA	NO	NO
Any sample > 2X Cleanup Limit?	NO	NA	NA	NO	NO
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (100 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (2.81 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford			
Originator J. D. Skoglie	Date 06/06/13	Calc. No. 0100N-CA-V0219	Rev. No. 0
Project 100-N Field Remediation	Job No. 14655	Checked C. H. Dobie	Date 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			Sheet No. 13 of 36

100-N-61:4 Subsite Statistical Calculations

Verification Data - South Staging Pile (SSP)

Sample Area	Sample Number	Sample Date	Sulfate mg/kg	Q	PQL	Aroclor-1254 ug/kg	Q	PQL	Aroclor-1260 ug/kg	Q	PQL	4-4'-DDT ug/kg	Q	PQL
SSP-2	J1RL91	4/30/13	11.3		1.7	2.5	U	2.5	8.9	J	2.5	0.59	U	0.59
Duplicate of J1RL91	J1RLC2	4/30/13	9.4		1.7	6.5	J	2.5	6.3	J	2.5	0.58	U	0.58
SSP-1	J1RL90	4/30/13	184		1.8	11	P	2.7	7.1	J	2.7	1.3	JX	0.58
SSP-3	J1RL92	4/30/13	9.8		1.7	72		2.6	35	P	2.6	10	JD	5.6
SSP-4	J1RL93	4/30/13	33.1		1.8	2.7	U	2.7	2.7	U	2.7	0.59	U	0.59
SSP-5	J1RL94	4/30/13	5.9		1.7	2.6	U	2.6	2.6	U	2.6	0.97	JX	0.56
SSP-6	J1RL95	4/30/13	138		1.7	110		2.6	60		2.6	7.1	JXD	5.7
SSP-7	J1RL96	4/30/13	64.4		1.7	25		2.6	12	P	2.6	2.6	X	0.58
SSP-8	J1RL97	4/30/13	11.5		1.7	26		2.7	16	P	2.7	1.5	JX	0.60
SSP-9	J1RL98	4/30/13	9.1		1.8	2.7	U	2.7	2.7	U	2.7	0.59	U	0.59
SSP-10	J1RL99	4/30/13	48.8		1.7	72		2.5	33	P	2.5	2.2	X	0.57
SSP-11	J1RLC0	4/30/13	20.9		1.7	120		2.6	60	P	2.6	7.3	JXD	5.6
SSP-12	J1RLC1	4/30/13	20.5		1.8	5.0	JP	2.6	4.6	J	2.6	0.59	J	0.59

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Sulfate mg/kg	Aroclor-1254 ug/kg	Aroclor-1260 ug/kg	4-4'-DDT ug/kg
SSP-2	J1RL91/ J1RLC2	4/30/13	10.4	3.9	7.6	0.29
SSP-1	J1RL90	4/30/13	184	11	7.1	1.3
SSP-3	J1RL92	4/30/13	9.8	72	35	10
SSP-4	J1RL93	4/30/13	33.1	1.4	1.4	0.30
SSP-5	J1RL94	4/30/13	5.9	1.3	1.3	0.97
SSP-6	J1RL95	4/30/13	138	110	60	7.1
SSP-7	J1RL96	4/30/13	64.4	25	12	2.6
SSP-8	J1RL97	4/30/13	11.5	26	16	1.5
SSP-9	J1RL98	4/30/13	9.1	1.4	1.4	0.30
SSP-10	J1RL99	4/30/13	48.8	72	33	2.2
SSP-11	J1RLC0	4/30/13	20.9	120	60	7.3
SSP-12	J1RLC1	4/30/13	20.5	5.0	4.6	0.59

Statistical Computations

	Sulfate		Aroclor-1254		Aroclor-1260		4-4'-DDT	
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use ProUCL Gamma distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.	
N	12		12		12		12	
% < Detection limit	0%		25%		25%		25%	
Mean	46.4		37		20		2.9	
Standard deviation	57.2		44		22		3.3	
95% UCL on mean	137		86		133		12	
Maximum value	184		120		60		10	
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	25000	GW Protection	17 ug/kg	GW and River Protection	17 ug/kg	GW and River Protection	5 ug/kg	River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA		YES		YES		YES	
> 10% above Cleanup Limit?	NA		YES		YES		YES	
Any sample > 2X Cleanup Limit?	NA		YES		YES		NO	
WAC 173-340 Compliance?	Because all values are below background (237 mg/kg) the WAC 173-340 3-part test is not required.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/06/13 **Calc. No.** 0100N-CA-V0219 **Rev. No.** 0
Project 100-N Field Remediation **Job No.** 14655 **Checked** C. H. Dobie **Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations **Sheet No.** 14 of 36

1 **100-N-61:4 Subsite Maximum Calculations**
2 **Verification Data - South Staging Pile (SSP)**

Row	Sample Area	Sample Number	Sample Date	Molybdenum mg/kg	Q	PQL	4-4'-DDD ug/kg	Q	PQL	4-4'-DDE ug/kg	Q	PQL	Dieldrin ug/kg	Q	PQL	alpha-Chlordane ug/kg	Q	PQL	gamma-Chlordane ug/kg	Q	PQL	Carbazole ug/kg	Q	PQL	Dibenzofuran ug/kg	Q	PQL
5	SSP-2	J1RL91	4/30/13	0.22	U	0.22	0.55	U	0.55	0.24	U	0.24	0.21	U	0.21	0.32	U	0.32	0.27	U	0.27	36	U	36	20	U	20
6	Duplicate of J1RL91	J1RLC2	4/30/13	0.24	U	0.24	0.54	U	0.54	0.23	U	0.23	0.21	U	0.21	0.32	U	0.32	0.26	U	0.26	35	U	35	20	U	20
7	SSP-1	J1RL90	4/30/13	0.35	B	0.24	0.54	U	0.54	1.3	J	0.23	0.21	U	0.21	0.32	U	0.32	0.26	U	0.26	37	U	37	20	U	20
8	SSP-3	J1RL92	4/30/13	0.23	U	0.23	5.2	UD	5.2	2.3	UD	2.3	2.0	UD	2.0	3.1	UD	3.1	2.5	UD	2.5	490		34	160	J	19
9	SSP-4	J1RL93	4/30/13	0.25	U	0.25	0.55	U	0.55	0.24	U	0.24	0.21	U	0.21	0.32	U	0.32	0.27	U	0.27	37	U	37	21	U	21
10	SSP-5	J1RL94	4/30/13	0.35	B	0.26	0.52	U	0.52	0.23	U	0.23	0.2	U	0.2	0.31	U	0.31	0.25	U	0.25	180	J	36	46	J	20
11	SSP-6	J1RL95	4/30/13	0.24	U	0.24	5.3	UD	5.3	2.3	UD	2.3	2.0	UD	2.0	3.1	UD	3.1	2.6	UD	2.6	120	J	35	19	U	19
12	SSP-7	J1RL96	4/30/13	0.24	U	0.24	1.3	JX	0.54	0.42	JX	0.23	0.21	U	0.21	0.32	U	0.32	1.7	X	0.26	98	J	35	21	J	19
13	SSP-8	J1RL97	4/30/13	0.25	U	0.25	0.55	U	0.55	0.24	U	0.24	0.24	JX	0.21	0.33	U	0.33	0.27	U	0.27	36	U	36	20	U	20
14	SSP-9	J1RL98	4/30/13	0.24	U	0.24	0.55	U	0.55	0.24	U	0.24	0.21	U	0.21	0.33	U	0.33	0.27	U	0.27	38	U	38	21	U	21
15	SSP-10	J1RL99	4/30/13	0.25	B	0.24	0.53	U	0.53	0.57	JX	0.23	0.35	JX	0.2	1.1	J	0.31	1.4	JX	0.26	36	U	36	20	U	20
16	SSP-11	J1RLC0	4/30/13	0.23	U	0.23	5.2	UD	5.2	2.2	UD	2.2	2.0	UD	2.0	3.1	UD	3.1	2.5	UD	2.5	240	J	35	20	U	20
17	SSP-12	J1RLC1	4/30/13	0.23	U	0.23	0.54	U	0.54	0.24	U	0.24	0.21	U	0.21	0.32	U	0.32	0.26	U	0.26	35	U	35	20	U	20

18 **Statistical Computations**

Row		Molybdenum	4-4'-DDD	4-4'-DDE	Dieldrin	alpha-Chlordane	gamma-Chlordane	Carbazole	Dibenzofuran
20	% < Detection limit	75%	92%	75%	83%	92%	83%	58%	75%
21	Maximum value	0.35	1.3	1.3	0.35	1.1	1.7	490	160
22	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	8 GW Protection	5 ug/kg River Protection	5 ug/kg River Protection	3 ug/kg GW and River Protection	16.5 ug/kg River Protection	16.5 ug/kg River Protection	437 ug/kg GW River Protection	3200 ug/kg GW River Protection
23	**3-PART TEST**								
24	Maximum > Cleanup Limit?	NO	NO	NO	NO	NO	NO	YES	NO
25	> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
26	Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
27	**3-Part Test Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie | Date 06/06/13 | Calc. No. 0100N-CA-V0219 | Rev. No. 0
Project 100-N Field Remediation | Job No. 14655 | Checked C. H. Dobie | Date 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations | Sheet No. 15 of 36

1 **100-N-61:4 Subsite Statistical Calculations**

2 **Verification Data - Overburden (OB)**

Row	Sample Area	Sample Number	Sample Date	Antimony mg/kg	Q	PQL	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL
5	OB-5	J1RL49	4/30/13	0.37	U	0.37	2.3		0.65	58.1	X	0.075	0.16	B	0.033	0.17	B	0.040
6	Duplicate of J1RL49	J1RL57	4/30/13	0.37	U	0.37	2.9		0.65	64.2	X	0.075	0.17	B	0.033	0.15	B	0.040
7	OB-1	J1RL45	4/30/13	0.79		0.35	2.4		0.60	53.0	X	0.069	0.087	B	0.030	0.85		0.037
8	OB-2	J1RL46	4/30/13	0.74		0.35	2.0		0.60	58.8	X	0.070	0.13	B	0.030	0.22		0.038
9	OB-3	J1RL47	4/30/13	0.80		0.36	2.3		0.63	53.7	X	0.072	0.15	B	0.031	0.15	B	0.039
10	OB-4	J1RL48	4/30/13	0.58	B	0.38	2.0		0.66	57.7	X	0.076	0.12	B	0.033	0.16	B	0.041
11	OB-6	J1RL50	4/30/13	1.0		0.36	1.4		0.63	55.1	X	0.073	0.11	B	0.032	0.13	B	0.039
12	OB-7	J1RL51	4/30/13	0.36	B	0.34	2.0		0.59	56.9	X	0.068	0.15	B	0.029	0.12	B	0.037
13	OB-8	J1RL52	4/30/13	0.64		0.38	2.4		0.66	54.5	X	0.075	0.13	B	0.033	0.13	B	0.041
14	OB-9	J1RL53	4/30/13	0.65		0.37	2.3		0.64	60.0	X	0.073	0.099	B	0.032	0.15	B	0.039
15	OB-10	J1RL54	4/30/13	0.58	B	0.39	2.2		0.67	58.5	X	0.077	0.15	B	0.034	0.15	B	0.042
16	OB-11	J1RL55	4/30/13	0.91		0.33	1.8		0.57	56.6	X	0.065	0.092	B	0.028	0.13	B	0.035
17	OB-12	J1RL56	4/30/13	0.48	B	0.37	1.6		0.64	58.9	X	0.074	0.10	B	0.032	0.17	B	0.040

Row	Sample Number	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Hexavalent Chromium mg/kg	Q	PQL	Lead mg/kg	Q	PQL
5	J1RL49	10.3	X	0.057	7.2	X	0.099	14.4	X	0.21	0.161		0.155	3.7	X	0.27
6	J1RL57	11.4	X	0.057	7.1	X	0.098	15.7	X	0.21	0.155	U	0.155	3.8	X	0.27
7	J1RL45	8.5	X	0.053	9.8	X	0.091	24.6	XMN	0.20	0.219		0.155	24.8	XM	0.25
8	J1RL46	8.2	X	0.053	9.8	X	0.092	18.3	X	0.20	0.276		0.155	11.3	X	0.25
9	J1RL47	10.8	X	0.055	9.8	X	0.095	17.6	X	0.21	0.200		0.155	10.4	X	0.26
10	J1RL48	9.6	X	0.058	8.7	X	0.10	15.6	X	0.22	0.178		0.155	4.7	X	0.27
11	J1RL50	7.9	X	0.055	9.1	X	0.096	15.8	X	0.21	0.180		0.155	18.7	X	0.26
12	J1RL51	9.2	X	0.052	8.7	X	0.089	16.3	X	0.19	0.162		0.155	12.3	X	0.24
13	J1RL52	7.0	X	0.058	8.8	X	0.099	16.3	X	0.22	0.155	U	0.155	3.8	X	0.27
14	J1RL53	8.0	X	0.056	9.4	X	0.096	16.1	X	0.21	0.199		0.155	3.7	X	0.26
15	J1RL54	9.3	X	0.059	8.7	X	0.10	16.1	X	0.22	0.259		0.155	8.1	X	0.27
16	J1RL55	8.3	X	0.050	9.0	X	0.086	15.4	X	0.19	0.293		0.155	7.1	X	0.23
17	J1RL56	7.4	X	0.056	9.8	X	0.097	16.1	X	0.21	0.218		0.155	5.5	X	0.26

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19 **Statistical Computation Input Data**

Row	Sample Area	Sample Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg	Lead mg/kg
22	OB-5	J1RL49/ J1RL57	4/30/13	0.19	2.6	61.2	0.17	0.16	10.9	7.2	15.1	0.119	3.8
23	OB-1	J1RL45	4/30/13	0.79	2.4	53.0	0.087	0.85	8.5	9.8	24.6	0.219	24.8
24	OB-2	J1RL46	4/30/13	0.74	2.0	58.8	0.13	0.22	8.2	9.8	18.3	0.276	11.3
25	OB-3	J1RL47	4/30/13	0.80	2.3	53.7	0.15	0.15	10.8	9.8	17.6	0.200	10.4
26	OB-4	J1RL48	4/30/13	0.58	2.0	57.7	0.12	0.16	9.6	8.7	15.6	0.178	4.7
27	OB-6	J1RL50	4/30/13	1.0	1.4	55.1	0.11	0.13	7.9	9.1	15.8	0.180	18.7
28	OB-7	J1RL51	4/30/13	0.36	2.0	56.9	0.15	0.12	9.2	8.7	16.3	0.162	12.3
29	OB-8	J1RL52	4/30/13	0.64	2.4	54.5	0.13	0.13	7.0	8.8	16.3	0.0775	3.8
30	OB-9	J1RL53	4/30/13	0.65	2.3	60.0	0.099	0.15	8.0	9.4	16.1	0.199	3.7
31	OB-10	J1RL54	4/30/13	0.58	2.2	58.5	0.15	0.15	9.3	8.7	16.1	0.259	8.1
32	OB-11	J1RL55	4/30/13	0.91	1.8	56.6	0.092	0.13	8.3	9.0	15.4	0.293	7.1
33	OB-12	J1RL56	4/30/13	0.48	1.6	58.9	0.10	0.17	7.4	9.8	16.1	0.218	5.5

34 **Statistical Computations**

Row		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Hexavalent Chromium	Lead
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
37	N	12	12	12	12	12	12	12	12	12	12
38	% < Detection limit	8%	0%	0%	0%	0%	0%	0%	0%	8%	0%
39	Mean	0.64	2.1	57.1	0.12	0.21	8.8	9.1	16.9	0.198	9.5
40	Standard deviation	0.23	0.35	2.6	0.026	0.20	1.2	0.76	2.6	0.062	6.6
41	95% UCL on mean	0.76	2.3	58.4	0.14	0.31	9.4	9.4	18.2	0.231	15.1
42	Maximum value	1.0	2.9	64.2	0.17	0.85	11.4	9.8	24.6	0.293	24.8
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	5 GW & River Protection	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	32 GW Protection	22.0 River Protection	2 River Protection	10.2 GW & River Protection
44	**WAC 173-340 3-PART TEST**										
45	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NO	NO	YES
46	> 10% above Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NO	NO	YES
47	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NO	NO	YES
48	**WAC 173-340 Compliance?**	Because all values are below background (5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.

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CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100-N Field Remediation
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Date 06/06/13
Job No. 14655

Calc. No. 0100N-CA-V0219
Checked C. H. Dobie *CD*

Rev. No. 0
Date 06/06/13
Sheet No. 16 of 36

1 **100-N-61:4 Subsite Statistical Calculations**
2 **Verification Data - Overburden (OB)**

	Sample	Sample	Sample	Manganese			Mercury			Nickel			Vanadium			Zinc			Chloride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate			Sulfate			TPH - Diesel		
3-4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
5	OB-5	J1RL49	4/30/13	281	X	0.099	0.0048	B	0.0048	10.3	X	0.12	40.5	X	0.093	38.1	X	0.39	3.5	B	2.0	0.87	B	0.32	0.30	U	0.30	3.3	B	1.7	3200	J	670
6	Duplicate of J1RL49	J1RL57	4/30/13	292	X	0.098	0.0055	U	0.0055	11.5	X	0.12	41.1	X	0.093	38.0	X	0.39	3.6	B	1.9	0.89	B	0.30	0.31	U	0.31	3.1	B	1.7	1800	J	660
7	OB-1	J1RL45	4/30/13	323	X	0.091	0.70		0.029	10.8	X	0.11	54.0	X	0.086	95.2	XMN	0.36	5.5		2.0	0.77	B	0.32	0.30	U	0.30	14.6		1.8	51000		690
8	OB-2	J1RL46	4/30/13	314	X	0.092	0.20		0.0061	12.7	X	0.11	55.1	X	0.086	61.4	X	0.36	24.6		2.0	1.0	B	0.32	0.34	B	0.29	26.1		1.7	18000		640
9	OB-3	J1RL47	4/30/13	335	X	0.095	0.075		0.0051	12.0	X	0.12	57.5	X	0.089	55.6	X	0.38	7.3		2.0	1.4	B	0.32	0.73	B	0.30	24.8		1.8	17000		680
10	OB-4	J1RL48	4/30/13	299	X	0.10	0.0085	B	0.0053	10.9	X	0.12	47.9	X	0.094	43.5	X	0.40	3.8	B	2.0	1.3	B	0.32	0.65	B	0.31	4.4	B	1.7	5000		660
11	OB-6	J1RL50	4/30/13	304	X	0.096	0.0056	U	0.0056	10.5	X	0.12	54.2	X	0.090	53.6	X	0.38	6.8		1.9	1.8	B	0.31	0.81		0.32	11.0		1.7	3900		650
12	OB-7	J1RL51	4/30/13	313	X	0.089	0.0056	U	0.0056	11.9	X	0.11	47.9	X	0.084	42.1	X	0.36	4.0	B	2.0	1.8	B	0.31	1.5		0.30	4.6	B	1.7	4800		680
13	OB-8	J1RL52	4/30/13	311	X	0.099	0.0058	B	0.0057	9.4	X	0.12	54.6	X	0.093	44.4	X	0.40	5.3		2.0	1.1	B	0.32	0.74	B	0.32	6.1		1.8	5700		700
14	OB-9	J1RL53	4/30/13	317	X	0.096	0.0055	U	0.0055	10.7	X	0.12	53.3	X	0.091	43.1	X	0.38	5.0		2.0	0.31	U	0.31	0.31	U	0.31	8.5		1.7	7300		690
15	OB-10	J1RL54	4/30/13	311	X	0.10	0.027		0.0056	12.2	X	0.12	50.4	X	0.095	46.1	X	0.40	6.9		1.9	0.30	U	0.30	0.31	U	0.31	13.2		1.7	42000		670
16	OB-11	J1RL55	4/30/13	306	X	0.086	0.020		0.0053	11.4	X	0.11	54.6	X	0.081	44.4	X	0.34	18.2		2.0	0.32	U	0.32	0.32	U	0.32	61.6		1.8	18000		690
17	OB-12	J1RL56	4/30/13	328	X	0.097	0.021		0.0055	10.8	X	0.12	50.9	X	0.091	60.3	X	0.39	7.9		2.0	0.84	B	0.32	0.29	U	0.29	9.2		1.7	10000		660

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19 **Statistical Computation Input Data**

	Sample	Sample	Sample	Manganese	Mercury	Nickel	Vanadium	Zinc	Chloride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	Sulfate	TPH - Diesel
20-21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
22	OB-5	J1RL49/ J1RL57	4/30/13	287	0.0038	10.9	40.8	38.1	3.6	0.88	0.15	3.2	2500
23	OB-1	J1RL45	4/30/13	323	0.70	10.8	54.0	95.2	5.5	0.77	0.15	14.6	51000
24	OB-2	J1RL46	4/30/13	314	0.20	12.7	55.1	61.4	24.6	1.0	0.34	26.1	18000
25	OB-3	J1RL47	4/30/13	335	0.075	12.0	57.5	55.6	7.3	1.4	0.73	24.8	17000
26	OB-4	J1RL48	4/30/13	299	0.0085	10.9	47.9	43.5	3.8	1.3	0.65	4.4	5000
27	OB-6	J1RL50	4/30/13	304	0.0028	10.5	54.2	53.6	6.8	1.8	0.81	11.0	3900
28	OB-7	J1RL51	4/30/13	313	0.0028	11.9	47.9	42.1	4.0	1.8	1.5	4.6	4800
29	OB-8	J1RL52	4/30/13	311	0.0058	9.4	54.6	44.4	5.3	1.1	0.74	6.1	5700
30	OB-9	J1RL53	4/30/13	317	0.0028	10.7	53.3	43.1	5.0	0.16	0.16	8.5	7300
31	OB-10	J1RL54	4/30/13	311	0.027	12.2	50.4	46.1	6.9	0.15	0.16	13.2	42000
32	OB-11	J1RL55	4/30/13	306	0.020	11.4	54.6	44.4	18.2	0.16	0.16	61.6	18000
33	OB-12	J1RL56	4/30/13	328	0.021	10.8	50.9	60.3	7.9	0.84	0.15	9.2	10000

34 **Statistical Computations**

35		Manganese	Mercury	Nickel	Vanadium	Zinc	Chloride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	Sulfate	TPH - Diesel
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
37	N	12	12	12	12	12	12	12	12	12	12
38	% < Detection limit	0%	25%	0%	0%	0%	0%	25%	50%	0%	0%
39	Mean	312	0.089	11.2	51.8	52.3	8.2	0.95	0.47	15.6	15433
40	Standard deviation	13.0	0.20	0.90	4.5	15.5	6.5	0.58	0.42	16.3	15664
41	95% UCL on mean	319	1.0	11.7	53.9	59.7	11.3	1.2	0.68	31.1	35695
42	Maximum value	335	0.70	12.7	57.5	95.2	24.6	1.8	1.5	61.6	51000
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	512 GW Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	25000 GW Protection	1000 GW Protection	1000 GW Protection	25000 GW Protection	200000 ug/kg GW & River Protection
44	**WAC 173-340 3-PART TEST**										
45	95% UCL > Cleanup Limit?	NA	YES	NA	NA	NO	NA	NA	NA	NA	NO
46	> 10% above Cleanup Limit?	NA	NO	NA	NA	NO	NA	NA	NA	NA	NO
47	Any sample > 2X Cleanup Limit?	NA	YES	NA	NA	NO	NA	NA	NA	NA	NO
48	**WAC 173-340 Compliance?**	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (100 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (237 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie | **Date** 06/06/13 | **Calc. No.** 0100N-CA-V0219 | **Rev. No.** 0

Project 100-N Field Remediation | **Job No.** 14655 | **Checked** C. H. Dobie | **Date** 06/06/13

Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations | **Sheet No.** 17 of 36

1 **100-N-61:4 Subsite Statistical Calculations**

2 **Verification Data - Overburden (OB)**

	Sample	Sample	Sample	TPH - Diesel Ext			Acenaphthene (Method 8310)			Anthracene (Method 8310)			Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)			Benzo(ghi)perylene (Method 8310)			Benzo(k)fluoranthene (Method 8310)			Chrysene (Method 8310)			Fluoranthene (Method 8310)		
3																																	
4	Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	OB-5	J1RL49	4/30/13	5200		980	9.6	U	9.6	3.3	J	2.9	45		3.1	28		6.2	26		4.0	15	J	6.9	8.4	J	3.8	29	JX	4.7	45		12
6	Duplicate of J1RL49	J1RL57	4/30/13	3300	J	970	10	U	10	3.1	U	3.1	4.3	JNX	3.3	9.4	J	6.5	9.5	J	4.3	7.4	U	7.4	4.0	UN	4.0	15	JN	4.9	27	JN	13
7	OB-1	J1RL45	4/30/13	74000		1000	670	X	9.8	700		3.0	1200		3.1	1500		6.3	1100	X	4.1	600	X	7.1	420		3.9	1700		4.7	3000		13
8	OB-2	J1RL46	4/30/13	34000		950	130	X	9.8	110		3.0	330		3.1	280		6.3	290	X	4.1	160		7.1	110		3.9	380	X	4.8	540		13
9	OB-3	J1RL47	4/30/13	30000		1000	74	JX	10	54		3.0	320		3.2	200		6.4	220		4.2	81	X	7.2	83		3.9	280	X	4.8	440		13
10	OB-4	J1RL48	4/30/13	9300		960	66	JX	9.2	85		2.8	210		2.9	140		5.9	130	X	3.9	60	X	6.6	60		3.6	190		4.5	460		12
11	OB-6	J1RL50	4/30/13	5800		950	9.9	U	9.9	3.0	U	3.0	3.2	U	3.2	11	J	6.4	9.8	JX	4.2	7.1	U	7.1	3.9	U	3.9	16	J	4.8	13	U	13
12	OB-7	J1RL51	4/30/13	9600		1000	10	U	10	3.1	U	3.1	4.9	JX	3.2	16		6.5	14	JX	4.3	14	JX	7.3	4.6	J	4.0	25	J	4.9	33	J	13
13	OB-8	J1RL52	4/30/13	8200		1000	22	JX	10	29		3	270		3.2	190		6.4	150	X	4.2	63		7.2	69		3.9	210		4.8	230		13
14	OB-9	J1RL53	4/30/13	11000		1000	92	JX	10	210		3.1	400		3.3	190		6.5	230		4.3	95		7.3	82		4.0	300		4.9	1000		13
15	OB-10	J1RL54	4/30/13	81000		990	110	X	9.6	220		2.9	540		3.1	420		6.2	320	X	4.0	220		6.9	140		3.8	650		4.7	800		13
16	OB-11	J1RL55	4/30/13	28000		1000	2300	DX	97	2900	D	30	6900	D	31	3100	D	62	3900	DX	41	1100	D	70	1400	D	38	5200	DX	47	13000	D	130
17	OB-12	J1RL56	4/30/13	17000		970	86	JX	10	84		3.1	310		3.2	230		6.5	220	X	4.2	120	X	7.3	75		4.0	310		4.9	490		13

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19 **Statistical Computation Input Data**

	Sample	Sample	Sample	TPH - Diesel Ext	Acenaphthene (Method 8310)	Anthracene (Method 8310)	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)	Benzo(ghi)perylene (Method 8310)	Benzo(k)fluoranthene (Method 8310)	Chrysene (Method 8310)	Fluoranthene (Method 8310)
20													
21	Area	Number	Date	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
22	OB-5	J1RL49/ J1RL57	4/30/13	4250	4.9	2.4	25	19	18	9.4	5.2	22	36
23	OB-1	J1RL45	4/30/13	74000	670	700	1200	1500	1100	600	420	1700	3000
24	OB-2	J1RL46	4/30/13	34000	130	110	330	280	290	160	110	380	540
25	OB-3	J1RL47	4/30/13	30000	74	54	320	200	220	81	83	280	440
26	OB-4	J1RL48	4/30/13	9300	66	85	210	140	130	60	60	190	460
27	OB-6	J1RL50	4/30/13	5800	5.0	1.5	1.6	11	9.8	3.6	2.0	16	6.5
28	OB-7	J1RL51	4/30/13	9600	5.0	1.6	4.9	16	14	14	4.6	25	33
29	OB-8	J1RL52	4/30/13	8200	22	29	270	190	150	63	69	210	230
30	OB-9	J1RL53	4/30/13	11000	92	210	400	190	230	95	82	300	1000
31	OB-10	J1RL54	4/30/13	81000	110	220	540	420	320	220	140	650	800
32	OB-11	J1RL55	4/30/13	28000	2300	2900	6900	3100	3900	1100	1400	5200	13000
33	OB-12	J1RL56	4/30/13	17000	86	84	310	230	220	120	75	310	490

34 **Statistical Computations**

		TPH - Diesel Ext	Acenaphthene (Method 8310)	Anthracene (Method 8310)	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)	Benzo(ghi)perylene (Method 8310)	Benzo(k)fluoranthene (Method 8310)	Chrysene (Method 8310)	Fluoranthene (Method 8310)
35											
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
37	N	12	12	12	12	12	12	12	12	12	12
38	% < Detection limit	0%	25%	17%	8%	0%	0%	8%	8%	0%	8%
39	Mean	26013	297	366	876	525	550	210	204	774	1670
40	Standard deviation	26050	656	821	1924	904	1094	323	393	1467	3658
41	95% UCL on mean	61382	5812	61297	1790	6824	7451	2450	4920	9919	68632
42	Maximum value	81000	2300	2900	6900	3100	3900	1100	1400	5200	13000
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)**	200000 GW & River Protection	96,000 GW Protection	240,000 GW Protection	15 GW & River Protection	15 GW & River Protection	15 GW & River Protection	48,000 GW Protection	15 River Protection	100 River Protection	18,000 River Protection
44	**WAC 173-340 3-PART TEST**										
45	95% UCL > Cleanup Limit?	NO	NO	NO	YES	YES	YES	NO	YES	YES	YES
46	> 10% above Cleanup Limit?	NO	NO	NO	YES	YES	YES	NO	YES	YES	NO
47	Any sample > 2X Cleanup Limit?	NO	NO	NO	YES	YES	YES	NO	YES	YES	NO
48	**WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie JS
Project 100-N Field Remediation
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Date 06/06/13
Job No. 14655

Calc. No. 0100N-CA-V0219
Checked C. H. Dobie CD

Rev. No. 0
Date 06/06/13
Sheet No. 18 of 36

100-N-61:4 Subsite Statistical Calculations

Verification Data - Overburden (OB)

Sample	Sample	Sample	Fluorene (Method 8310)			Indeno(1,2,3-cd)pyrene (Method 8310)			Phenanthrene (Method 8310)			Pyrene (Method 8310)			Acenaphthene (Method 8270)			Anthracene (Method 8270)			Benzo(a)anthracene (Method 8270)			Benzo(a)pyrene (Method 8270)			Benzo(b)fluoranthene (Method 8270)			Benzo(ghi)perylene (Method 8270)		
Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
OB-5	J1RL49	4/30/13	5.1	U	5.1	26	J	12	12	U	12	64		12	10	U	10	17	U	17	26	J	20	20	U	20	26	U	26	16	U	16
Duplicate of J1RL49	J1RL57	4/30/13	5.4	U	5.4	12	U	12	12	UN	12	49	N	12	10	U	10	19	J	17	67	J	20	37	J	20	70	JX	26	16	U	16
OB-1	J1RL45	4/30/13	490		5.2	470	X	12	2100		12	3300		12	210	J	10	380		17	1100		20	1000		20	1700	X	27	570		16
OB-2	J1RL46	4/30/13	88		5.2	280		12	350		12	630		12	42	J	10	170	J	17	640		20	480		20	870	X	26	230	J	16
OB-3	J1RL47	4/30/13	49		5.3	140		12	160		12	520		12	41	J	9.8	110	J	16	520		19	400		19	730	X	25	190	J	15
OB-4	J1RL48	4/30/13	42		4.9	68		11	220		11	540		11	9.7	U	9.7	16	J	16	110	J	19	84	J	19	110	J	25	15	U	15
OB-6	J1RL50	4/30/13	5.2	U	5.2	12	U	12	12	U	12	15	J	12	10	U	10	17	U	17	20	U	20	20	U	20	26	U	26	16	U	16
OB-7	J1RL51	4/30/13	5.4	U	5.4	12	U	12	12	U	12	40	J	12	10	U	10	17	U	17	48	J	20	34	J	20	58	J	26	16	U	16
OB-8	J1RL52	4/30/13	25	JX	5.3	53		12	38	J	12	320		12	11	U	11	18	U	18	92	J	21	47	J	21	52	J	27	17	U	17
OB-9	J1RL53	4/30/13	84		5.4	83		12	560		12	870		12	10	U	10	66	J	17	230	J	20	140	J	20	220	J	26	71	J	16
OB-10	J1RL54	4/30/13	110		5.1	160		12	350		12	910		12	200	J	10	800		17	1800		20	1200		20	2000	X	26	470		16
OB-11	J1RL55	4/30/13	1500	D	51	840	D	120	8500	D	120	12000	D	120	14	J	10	65	J	17	360		20	240	J	20	380		26	110	J	16
OB-12	J1RL56	4/30/13	68		5.3	160		12	210		12	560		12	25	J	9.8	56	J	16	250	J	19	220	J	19	370	X	25	120	J	15

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Fluorene (Method 8310) ug/kg	Indeno(1,2,3-cd)pyrene (Method 8310) ug/kg	Phenanthrene (Method 8310) ug/kg	Pyrene (Method 8310) ug/kg	Acenaphthene (Method 8270) ug/kg	Anthracene (Method 8270) ug/kg	Benzo(a)anthracene (Method 8270) ug/kg	Benzo(a)pyrene (Method 8270) ug/kg	Benzo(b)fluoranthene (Method 8270) ug/kg	Benzo(ghi)perylene (Method 8270) ug/kg
OB-5	J1RL49/ J1RL57	4/30/13	2.6	16	6.00	57	5.0	14	47	24	42	8
OB-1	J1RL45	4/30/13	490	470	2100	3300	210	380	1100	1000	1700	570
OB-2	J1RL46	4/30/13	88	280	350	630	42	170	640	480	870	230
OB-3	J1RL47	4/30/13	49	140	160	520	41	110	520	400	730	190
OB-4	J1RL48	4/30/13	42	68	220	540	4.9	16	110	84	110	8
OB-6	J1RL50	4/30/13	2.6	6.0	6.0	15	5.0	8.5	10	10	13	8.0
OB-7	J1RL51	4/30/13	2.7	6.0	6.0	40	5.0	8.5	48	34	58	8
OB-8	J1RL52	4/30/13	25	53	38	320	5.5	9.0	92	47	52	9
OB-9	J1RL53	4/30/13	84	83	560	870	5.0	66	230	140	220	71
OB-10	J1RL54	4/30/13	110	160	350	910	200	800	1800	1200	2000	470
OB-11	J1RL55	4/30/13	1500	840	8500	12000	14	65	360	240	380	110
OB-12	J1RL56	4/30/13	68	160	210	560	25	56	250	220	370	120

Statistical Computations

	Fluorene (Method 8310)	Indeno(1,2,3-cd)pyrene (Method 8310)	Phenanthrene (Method 8310)	Pyrene (Method 8310)	Acenaphthene (Method 8270)	Anthracene (Method 8270)	Benzo(a)anthracene (Method 8270)	Benzo(a)pyrene (Method 8270)	Benzo(b)fluoranthene (Method 8270)	Benzo(ghi)perylene (Method 8270)
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12	12	12
% < Detection limit	25%	17%	25%	0%	50%	25%	8%	8%	8%	42%
Mean	205	190	1042	1647	47	142	434	323	545	150
Standard deviation	429	244	2418	3375	75	233	534	395	672	190
95% UCL on mean	6492	1986	116834	31376	83	1039	3413	2627	5648	240
Maximum value	1500	840	8500	12000	210	800	1800	1200	2000	570
Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)	64,000 GW Protection	15 GW & River Protection	240,000 GW Protection	48,000 GW Protection	96,000 GW Protection	240,000 GW Protection	330 GW & River Protection	330 DE, GW & River Protection	330 GW & River Protection	48,000 GW Protection
WAC 173-340 3-PART TEST										
95% UCL > Cleanup Limit?	NO	YES	NO	NO	NO	NO	YES	YES	YES	NO
> 10% above Cleanup Limit?	NO	YES	NO	NO	NO	NO	YES	YES	YES	NO
Any sample > 2X Cleanup Limit?	NO	YES	NO	NO	NO	NO	YES	YES	YES	NO
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie	**Date** 06/06/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** C. H. Dobie	**Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			**Sheet No.** 19 of 36

100-N-61:4 Subsite Statistical Calculations

Verification Data - Overburden (OB)

Sample Area	Sample Number	Sample Date	Chrysene (Method 8270) ug/kg	Q	PQL	Fluoranthene (Method 8270) ug/kg	Q	PQL	Indeno(1,2,3-cd)pyrene (Method 8270) ug/kg	Q	PQL	Phenanthrene (Method 8270) ug/kg	Q	PQL	Pyrene (Method 8270) ug/kg	Q	PQL	Aroclor-1254 ug/kg	Q	PQL	Aroclor-1260 ug/kg	Q	PQL
OB-5	J1RL49	4/30/13	30	J	27	36	U	36	22	U	22	17	U	17	44	J	12	72	P	2.6	18	P	2.6
Duplicate of J1RL49	J1RL57	4/30/13	73	J	27	170	J	36	22	U	22	61	J	17	220	J	12	59		2.5	18	P	2.5
OB-1	J1RL45	4/30/13	1400		27	2100		37	610		22	1600		17	2400		12	28	P	2.6	30		2.6
OB-2	J1RL46	4/30/13	690		27	1200	X	36	250	J	22	640		17	1300		12	29		2.6	27		2.6
OB-3	J1RL47	4/30/13	580		26	860		34	200	J	21	340		16	920		12	110		2.7	51		2.7
OB-4	J1RL48	4/30/13	130	J	25	190	J	34	44	J	21	73	J	16	230	J	11	44		2.5	17	P	2.5
OB-6	J1RL50	4/30/13	27	U	27	36	U	36	22	U	22	17	U	17	22	J	12	5.4	JP	2.6	2.6	U	2.6
OB-7	J1RL51	4/30/13	58	J	27	66	J	36	22	U	22	21	J	17	73	J	12	31		2.7	15		2.7
OB-8	J1RL52	4/30/13	110	J	28	140	J	37	23	U	23	35	J	18	170	J	12	430	DP	21	92	DP	21
OB-9	J1RL53	4/30/13	230	J	27	410		36	61	J	22	150	J	17	420		12	5.1	JP	2.6	2.6	U	2.6
OB-10	J1RL54	4/30/13	2000		27	4200		36	530		22	3300		17	4400		12	12		2.7	5.4	J	2.7
OB-11	J1RL55	4/30/13	410		27	550		36	120	J	22	200	J	17	650		12	12		2.6	6.3	JN	2.6
OB-12	J1RL56	4/30/13	300	J	26	420		34	120	J	21	210	J	16	540		12	15	P	2.6	7.1	J	2.6

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Chrysene (Method 8270) ug/kg	Fluoranthene (Method 8270) ug/kg	Indeno(1,2,3-cd)pyrene (Method 8270) ug/kg	Phenanthrene (Method 8270) ug/kg	Pyrene (Method 8270) ug/kg	Aroclor-1254 ug/kg	Aroclor-1260 ug/kg
OB-5	J1RL49/ J1RL57	4/30/13	52	94	11	35	132	66	18
OB-1	J1RL45	4/30/13	1400	2100	610	1600	2400	28	30
OB-2	J1RL46	4/30/13	690	1200	250	640	1300	29	27
OB-3	J1RL47	4/30/13	580	860	200	340	920	110	51
OB-4	J1RL48	4/30/13	130	190	44	73	230	44	17
OB-6	J1RL50	4/30/13	14	18	11	8.5	22	5.4	1.3
OB-7	J1RL51	4/30/13	58	66	11	21	73	31	15
OB-8	J1RL52	4/30/13	110	140	12	35	170	430	92
OB-9	J1RL53	4/30/13	230	410	61	150	420	5.1	1.3
OB-10	J1RL54	4/30/13	2000	4200	530	3300	4400	12	5.4
OB-11	J1RL55	4/30/13	410	550	120	200	650	12	6.3
OB-12	J1RL56	4/30/13	300	420	120	210	540	15	7.1

Statistical Computations

	Chrysene (Method 8270)	Fluoranthene (Method 8270)	Indeno(1,2,3-cd)pyrene (Method 8270)	Phenanthrene (Method 8270)	Pyrene (Method 8270)	Aroclor-1254	Aroclor-1260
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	12	12	12	12	12	12	12
% < Detection limit	8%	8%	33%	8%	0%	0%	17%
Mean	498	854	165	551	938	66	23
Standard deviation	614	1213	205	975	1282	119	26
95% UCL on mean	3528	7434	1374	8182	7280	230	116
Maximum value	2000	4200	610	3300	4400	430	92
Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)	330 River Protection	18,000 River Protection	330 GW & River Protection	240,000 GW Protection	48,000 GW Protection	17 GW & River Protection	17 GW & River Protection
WAC 173-340 3-PART TEST							
95% UCL > Cleanup Limit?	YES	NO	YES	NO	NO	YES	YES
> 10% above Cleanup Limit?	YES	NO	YES	NO	NO	YES	YES
Any sample > 2X Cleanup Limit?	YES	NO	NO	NO	NO	YES	YES
WAC 173-340 Compliance?	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-N Field Remediation
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Date 06/06/13
Job No. 14655

Calc. No. 0100N-CA-V0219
Checked C. H. Dobie

Rev. No. 0
Date 06/06/13
Sheet No. 20 of 36

100-N-61:4 Subsite Maximum Calculations

Verification Data - Overburden (OB)

Sample Area	Sample Number	Sample Date	Molybdenum			Fluoride			Dibenz[a,h]anthracene (Method 8310)			Benzo(k)fluoranthene (Method 8270)			Dibenz[a,h]anthracene (Method 8270)		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
OB-5	J1RL49	4/30/13	0.26	U	0.26	0.83	U	0.83	11	U	11	40	U	40	19	U	19
Duplicate of J1RL49	J1RL57	4/30/13	0.26	U	0.26	0.79	U	0.79	11	U	11	40	UX	40	19	U	19
OB-1	J1RL45	4/30/13	0.43	B	0.24	0.87	BN	0.84	160		11	41	UX	41	130	J	19
OB-2	J1RL46	4/30/13	0.38	B	0.24	0.83	U	0.83	35	X	11	40	UX	40	50	J	19
OB-3	J1RL47	4/30/13	0.25	U	0.25	0.83	U	0.83	11	U	11	38	UX	38	51	J	18
OB-4	J1RL48	4/30/13	0.26	U	0.26	0.83	U	0.83	10	U	10	55	J	38	18	U	18
OB-6	J1RL50	4/30/13	0.25	U	0.25	0.81	U	0.81	11	U	11	40	U	40	19	U	19
OB-7	J1RL51	4/30/13	0.23	U	0.23	0.91	B	0.82	11	U	11	40	U	40	19	U	19
OB-8	J1RL52	4/30/13	0.26	U	0.26	0.87	B	0.84	11	U	11	41	U	41	20	U	20
OB-9	J1RL53	4/30/13	0.25	U	0.25	0.81	U	0.81	11	U	11	75	J	40	19	U	19
OB-10	J1RL54	4/30/13	0.26	U	0.26	0.80	U	0.80	42	X	11	40	UX	40	120	J	19
OB-11	J1RL55	4/30/13	0.22	U	0.22	0.83	U	0.83	170	JD	110	110	J	40	19	U	19
OB-12	J1RL56	4/30/13	0.25	U	0.25	0.83	U	0.83	18	JX	11	38	UX	38	36	J	18

Sample Area	Fluorene (Method 8270)			Carbazole			Dibenzofuran			4-4'-DDE			4-4'-DDT			Dieldrin			Endosulfan II		
	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
OB-5	18	U	18	36	U	36	20	U	20	0.24	U	0.24	0.59	U	0.59	0.21	U	0.21	0.29	U	0.29
Duplicate of J1RL49	18	U	18	36	U	36	20	U	20	0.24	U	0.24	0.59	U	0.59	0.30	JX	0.21	0.29	U	0.29
OB-1	150	J	18	200	J	37	73	J	20	0.24	U	0.24	1.5	J	0.60	0.43	JX	0.21	0.29	U	0.29
OB-2	33	J	18	79	J	36	20	U	20	0.24	U	0.24	1.4	J	0.60	0.64	J	0.21	0.33	JX	0.29
OB-3	27	J	17	34	J	34	19	U	19	0.24	U	0.24	0.60	U	0.60	0.27	JX	0.21	0.29	U	0.29
OB-4	17	U	17	34	U	34	19	U	19	0.23	U	0.23	0.58	U	0.58	0.21	U	0.21	0.28	U	0.28
OB-6	18	U	18	36	U	36	20	U	20	0.24	U	0.24	0.59	U	0.59	0.21	U	0.21	0.29	U	0.29
OB-7	18	U	18	36	U	36	20	U	20	0.24	U	0.24	0.61	U	0.61	0.22	U	0.22	0.30	U	0.30
OB-8	19	U	19	37	U	37	21	U	21	1.2	JX	0.24	0.59	U	0.59	2.6		0.21	0.29	U	0.29
OB-9	18	U	18	37	J	36	20	U	20	0.24	U	0.24	0.60	U	0.60	0.21	U	0.21	0.29	U	0.29
OB-10	230	J	18	430		36	73	J	20	0.24	U	0.24	0.60	U	0.60	0.21	U	0.21	0.29	U	0.29
OB-11	18	U	18	36	U	36	20	U	20	0.24	U	0.24	1.1	JY	0.59	0.21	U	0.21	0.29	U	0.29
OB-12	17	U	17	34	U	34	19	U	19	0.24	U	0.24	0.59	U	0.59	0.21	U	0.21	0.29	U	0.29

Statistical Computations

	Molybdenum	Fluoride	Dibenz[a,h]anthracene (Method 8310)	Benzo(k)fluoranthene (Method 8270)	Dibenz[a,h]anthracene (Method 8270)	Fluorene (Method 8270)
% < Detection limit	83%	75%	58%	75%	58%	67%
Maximum value	0.43	0.91	170	110	130	230
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted	8 GW Protection	96 GW Protection	30 ug/kg GW & River Protection	330 ug/kg GW & River Protection	330 ug/kg DE, GW & River Protection	64,000 ug/kg GW Protection
3-PART TEST						
Maximum > Cleanup Limit?	NO	NA	YES	NO	NO	NO
> 10% above Cleanup Limit?	NO	NA	YES	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	NA	YES	NO	NO	NO
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (2.81 mg/kg) the 3-part test is not required.	A detailed assessment will be performed. The data set does NOT meet the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

	Carbazole	Dibenzofuran	4-4'-DDE	4-4'-DDT	Dieldrin	Endosulfan II
% < Detection limit	58%	83%	92%	75%	58%	92%
Maximum value	430	73	1.2	1.5	2.6	0.33
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted	437 ug/kg GW Protection	3,200 ug/kg GW Protection	5 ug/kg River Protection	5 ug/kg River Protection	3 ug/kg GW & River Protection	11.2 ug/kg River Protection
3-PART TEST						
Maximum > Cleanup Limit?	NO	NO	NO	NO	NO	NO
> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie	**Date** 06/06/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** C. H. Dobie	**Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			**Sheet No.** 21 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Excavation (EXC)

Antimony 95% UCL Calculation

DATA	ID
0.41	J1RL18/ J1RL28
0.75	J1RL16
0.80	J1RL17
0.68	J1RL19
1.1	J1RL20
0.94	J1RL21
0.63	J1RL22
0.55	J1RL23
0.18	J1RL24
0.45	J1RL25
1.0	J1RL26
0.99	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	0.71
Censored		Lognormal mean	0.73
Detection limit or PQL		Std. devn.	0.28
Method detection limit		Median	0.72
TOTAL	12	Min.	0.18
		Max.	1.1

Lognormal distribution? r-squared is: 0.862
Normal distribution? r-squared is: 0.975
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.85

Arsenic 95% UCL Calculation

DATA	ID
2.4	J1RL18/ J1RL28
3.0	J1RL16
4.0	J1RL17
5.2	J1RL19
2.2	J1RL20
2.1	J1RL21
2.4	J1RL22
1.5	J1RL23
2.9	J1RL24
2.8	J1RL25
2.6	J1RL26
1.4	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	2.7
Censored		Lognormal mean	2.7
Detection limit or PQL		Std. devn.	1.0
Method detection limit		Median	2.5
TOTAL	12	Min.	1.4
		Max.	5.2

Lognormal distribution? r-squared is: 0.956
Normal distribution? r-squared is: 0.883
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3.4

Barium 95% UCL Calculation

DATA	ID
67.1	J1RL18/ J1RL28
54.1	J1RL16
50.0	J1RL17
74.5	J1RL19
47.0	J1RL20
52.6	J1RL21
63.3	J1RL22
49.3	J1RL23
66.9	J1RL24
66.2	J1RL25
52.2	J1RL26
62.3	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	58.8
Censored		Lognormal mean	58.8
Detection limit or PQL		Std. devn.	8.9
Method detection limit		Median	58.2
TOTAL	12	Min.	47.0
		Max.	74.5

Lognormal distribution? r-squared is: 0.935
Normal distribution? r-squared is: 0.930
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 63.9

Beryllium 95% UCL Calculation

DATA	ID
0.098	J1RL18/ J1RL28
0.016	J1RL16
0.13	J1RL17
0.061	J1RL19
0.016	J1RL20
0.015	J1RL21
0.082	J1RL22
0.080	J1RL23
0.15	J1RL24
0.12	J1RL25
0.015	J1RL26
0.016	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	0.066
Censored		Lognormal mean	0.074
Detection limit or PQL		Std. devn.	0.051
Method detection limit		Median	0.071
TOTAL	12	Min.	0.015
		Max.	0.15

Lognormal distribution? r-squared is: 0.827
Normal distribution? r-squared is: 0.888
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.091

Cadmium 95% UCL Calculation

DATA	ID
0.16	J1RL18/ J1RL28
0.14	J1RL16
0.15	J1RL17
0.18	J1RL19
0.18	J1RL20
0.19	J1RL21
0.17	J1RL22
0.12	J1RL23
0.15	J1RL24
0.17	J1RL25
0.14	J1RL26
0.15	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	0.16
Censored		Lognormal mean	0.16
Detection limit or PQL		Std. devn.	0.020
Method detection limit		Median	0.16
TOTAL	12	Min.	0.12
		Max.	0.19

Lognormal distribution? r-squared is: 0.954
Normal distribution? r-squared is: 0.966
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.17

Chromium 95% UCL Calculation

DATA	ID
10.2	J1RL18/ J1RL28
6.6	J1RL16
9.2	J1RL17
16.7	J1RL19
6.1	J1RL20
8.0	J1RL21
8.8	J1RL22
10.2	J1RL23
12.4	J1RL24
12.9	J1RL25
7.7	J1RL26
4.4	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	9.4
Censored		Lognormal mean	9.5
Detection limit or PQL		Std. devn.	3.4
Method detection limit		Median	9.0
TOTAL	12	Min.	4.4
		Max.	16.7

Lognormal distribution? r-squared is: 0.985
Normal distribution? r-squared is: 0.957
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.8

Cobalt 95% UCL Calculation

DATA	ID
6.6	J1RL18/ J1RL28
9.0	J1RL16
8.6	J1RL17
9.1	J1RL19
8.7	J1RL20
7.8	J1RL21
8.2	J1RL22
7.1	J1RL23
5.8	J1RL24
6.4	J1RL25
9.4	J1RL26
8.9	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	8.0
Censored		Lognormal mean	8.0
Detection limit or PQL		Std. devn.	1.2
Method detection limit		Median	8.4
TOTAL	12	Min.	5.8
		Max.	9.4

Lognormal distribution? r-squared is: 0.902
Normal distribution? r-squared is: 0.920
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.7

Copper 95% UCL Calculation

DATA	ID
12.5	J1RL18/ J1RL28
16.7	J1RL16
17.7	J1RL17
23.3	J1RL19
14.6	J1RL20
15.8	J1RL21
14.1	J1RL22
15.3	J1RL23
10.4	J1RL24
15.0	J1RL25
14.9	J1RL26
14.4	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	15.4
Censored		Lognormal mean	15.4
Detection limit or PQL		Std. devn.	3.1
Method detection limit		Median	15.0
TOTAL	12	Min.	10.4
		Max.	23.3

Lognormal distribution? r-squared is: 0.900
Normal distribution? r-squared is: 0.850
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 17.1

Hexavalent chromium 95% UCL Calculation

DATA	ID
0.154	J1RL18/ J1RL28
0.0775	J1RL16
0.0775	J1RL17
0.331	J1RL19
0.176	J1RL20
0.254	J1RL21
0.214	J1RL22
0.0775	J1RL23
0.0775	J1RL24
0.0775	J1RL25
0.194	J1RL26
0.0775	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	0.149
Censored		Lognormal mean	0.151
Detection limit or PQL		Std. devn.	0.0862
Method detection limit		Median	0.116
TOTAL	12	Min.	0.0775
		Max.	0.331

Lognormal distribution? r-squared is: 0.829
Normal distribution? r-squared is: 0.833
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.190

CALCULATION SHEET

Washington Closure Hanford			
Originator J. D. Skoglie	**Date** 06/06/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** C. H. Dobie	**Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			**Sheet No.** 22 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Excavation (EXC)

Lead 95% UCL Calculation

DATA	ID
4.3	J1RL18/ J1RL28
5.9	J1RL16
8.6	J1RL17
19.3	J1RL19
4.2	J1RL20
30.9	J1RL21
4.5	J1RL22
3.9	J1RL23
4.2	J1RL24
4.7	J1RL25
3.9	J1RL26
2.6	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	8.1
Censored		Lognormal mean	7.7
Detection limit or PQL		Std. devn.	8.5
Method detection limit		Median	4.4
TOTAL	12	Min.	2.6
		Max.	30.9

Lognormal distribution? r-squared is: 0.783
Normal distribution? r-squared is: 0.600
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 12.1

Manganese 95% UCL Calculation

DATA	ID
277	J1RL18/ J1RL28
331	J1RL16
340	J1RL17
312	J1RL19
305	J1RL20
279	J1RL21
313	J1RL22
309	J1RL23
248	J1RL24
287	J1RL25
351	J1RL26
340	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	308
Censored		Lognormal mean	308
Detection limit or PQL		Std. devn.	30.6
Method detection limit		Median	311
TOTAL	12	Min.	248
		Max.	351

Lognormal distribution? r-squared is: 0.950
Normal distribution? r-squared is: 0.963
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 325

Mercury 95% UCL Calculation

DATA	ID
0.0027	J1RL18/ J1RL28
0.059	J1RL16
0.0072	J1RL17
0.0093	J1RL19
0.0026	J1RL20
0.052	J1RL21
0.0026	J1RL22
0.0073	J1RL23
0.0031	J1RL24
0.24	J1RL25
0.0029	J1RL26
0.0031	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	0.033
Censored		Lognormal mean	0.028
Detection limit or PQL		Std. devn.	0.068
Method detection limit		Median	0.0052
TOTAL	12	Min.	0.0026
		Max.	0.24

Lognormal distribution? r-squared is: 0.801
Normal distribution? r-squared is: 0.485
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.065

Nickel 95% UCL Calculation

DATA	ID
10.5	J1RL18/ J1RL28
10.3	J1RL16
11.7	J1RL17
19.2	J1RL19
8.7	J1RL20
10.7	J1RL21
10.2	J1RL22
13.9	J1RL23
12.4	J1RL24
12.7	J1RL25
11.0	J1RL26
9.7	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	11.8
Censored		Lognormal mean	11.8
Detection limit or PQL		Std. devn.	2.7
Method detection limit		Median	10.9
TOTAL	12	Min.	8.7
		Max.	19.2

Lognormal distribution? r-squared is: 0.879
Normal distribution? r-squared is: 0.788
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 13.1

Vanadium 95% UCL Calculation

DATA	ID
38.7	J1RL18/ J1RL28
56.9	J1RL16
48.3	J1RL17
46.2	J1RL19
65.0	J1RL20
53.3	J1RL21
44.4	J1RL22
39.1	J1RL23
32.3	J1RL24
37.5	J1RL25
64.2	J1RL26
58.3	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	48.7
Censored		Lognormal mean	48.8
Detection limit or PQL		Std. devn.	10.9
Method detection limit		Median	47.3
TOTAL	12	Min.	32.3
		Max.	65.0

Lognormal distribution? r-squared is: 0.969
Normal distribution? r-squared is: 0.966
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 55.5

Zinc 95% UCL Calculation

DATA	ID
35.3	J1RL18/ J1RL28
46.1	J1RL16
45.5	J1RL17
46.8	J1RL19
49.5	J1RL20
49.7	J1RL21
39.1	J1RL22
33.3	J1RL23
34.4	J1RL24
56.5	J1RL25
44.7	J1RL26
41.3	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	43.5
Censored		Lognormal mean	43.6
Detection limit or PQL		Std. devn.	7.0
Method detection limit		Median	45.1
TOTAL	12	Min.	33.3
		Max.	56.5

Lognormal distribution? r-squared is: 0.956
Normal distribution? r-squared is: 0.961
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 47.7

Chloride 95% UCL Calculation

DATA	ID
8.0	J1RL18/ J1RL28
6.8	J1RL16
6.3	J1RL17
12.5	J1RL19
3.9	J1RL20
5.3	J1RL21
4.9	J1RL22
4.0	J1RL23
4.2	J1RL24
4.7	J1RL25
5.4	J1RL26
3.7	J1RL27

Number of samples		Uncensored values	
Uncensored	12	Mean	5.8
Censored		Lognormal mean	5.8
Detection limit or PQL		Std. devn.	2.5
Method detection limit		Median	5.1
TOTAL	12	Min.	3.7
		Max.	12.5

Lognormal distribution? r-squared is: 0.898
Normal distribution? r-squared is: 0.767
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 6.9

Nitrogen in nitrate 95% UCL Calculation

DATA	ID
25.3	J1RL18/ J1RL28
7.3	J1RL16
1.9	J1RL17
2.2	J1RL19
0.78	J1RL20
1.6	J1RL21
1.4	J1RL22
0.78	J1RL23
0.89	J1RL24
1.9	J1RL25
1.3	J1RL26
	J1RL27

Number of samples		Uncensored values	
Uncensored	11	Mean	4.1
Censored		Lognormal mean	3.5
Detection limit or PQL		Std. devn.	7.3
Method detection limit		Median	1.6
TOTAL	11	Min.	0.78
		Max.	25.3

Lognormal distribution? r-squared is: 0.799
Normal distribution? r-squared is: 0.477
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 7.7

Nitrogen in nitrate and nitrite 95% UCL Calculation

DATA	ID
37.1	J1RL18/ J1RL28
9.3	J1RL16
1.5	J1RL17
1.8	J1RL19
0.32	J1RL20
1.1	J1RL21
1.3	J1RL22
0.44	J1RL23
0.36	J1RL24
2.9	J1RL25
0.70	J1RL26
	J1RL27

Number of samples		Uncensored values	
Uncensored	11	Mean	5.2
Censored		Lognormal mean	4.4
Detection limit or PQL		Std. devn.	10.9
Method detection limit		Median	1.3
TOTAL	11	Min.	0.32
		Max.	37.1

Lognormal distribution? r-squared is: 0.902
Normal distribution? r-squared is: 0.470
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 25.9

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-N Field Remediation
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Date 06/06/13
Job No. 14655

Calc. No. 0100N-CA-V0219
Checked C. H. Dobie

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Date 06/06/13
Sheet No. 23 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Excavation (EXC)

1	**DATA**	**ID**	**Sulfate 95% UCL Calculation**			
2	87.7	J1RL18/ J1RL28				
3	58.2	J1RL16				
4	76.5	J1RL17	Number of samples		Uncensored values	
5	149	J1RL19	Uncensored	12	Mean	38.7
6	7.2	J1RL20	Censored		Lognormal mean	40.1
7	27.9	J1RL21	Detection limit or PQL		Std. devn.	45.3
8	13.6	J1RL22	Method detection limit		Median	12.6
9	6.8	J1RL23	TOTAL	12	Min.	6.7
10	6.7	J1RL24			Max.	149
11	11.6	J1RL25				
12	9.3	J1RL26				
13	9.6	J1RL27				
14						
15			Lognormal distribution?		Normal distribution?	
16			r-squared is: 0.882		r-squared is: 0.753	
17			Recommendations:			
18			Reject BOTH lognormal and normal distributions			
19						
20			UCL (based on Z-statistic) is	60.2		

CALCULATION SHEET

Washington Closure Hanford			
Originator J. D. Skoglie	**Date** 06/06/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** C. H. Dobie	**Date** 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			**Sheet No.** 24 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite South Staging Pile (SSP)

Antimony 95% UCL Calculation

DATA	ID				
0.29	J1RL91/ J1RLC2				
0.18	J1RL90				
0.43	J1RL92	Number of samples		Uncensored values	
0.18	J1RL93	Uncensored	12	Mean	0.41
0.52	J1RL94	Censored		Lognormal mean	0.41
0.46	J1RL95	Detection limit or PQL		Std. devn.	0.16
0.57	J1RL96	Method detection limit		Median	0.45
0.48	J1RL97	TOTAL	12	Min.	0.18
0.18	J1RL98			Max.	0.64
0.64	J1RL99				
0.41	J1RLC0				
0.53	J1RLC1				

Lognormal distribution? r-squared is: 0.855
Normal distribution? r-squared is: 0.923
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.49

Arsenic 95% UCL Calculation

DATA	ID				
2.2	J1RL91/ J1RLC2				
3.1	J1RL90				
2.8	J1RL92	Number of samples		Uncensored values	
2.0	J1RL93	Uncensored	12	Mean	2.9
2.3	J1RL94	Censored		Lognormal mean	2.9
4.9	J1RL95	Detection limit or PQL		Std. devn.	0.79
2.9	J1RL96	Method detection limit		Median	2.7
2.5	J1RL97	TOTAL	12	Min.	2.0
2.5	J1RL98			Max.	4.9
3.7	J1RL99				
2.5	J1RLC0				
2.9	J1RLC1				

Lognormal distribution? r-squared is: 0.913
Normal distribution? r-squared is: 0.822
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3.3

Barium 95% UCL Calculation

DATA	ID				
76.1	J1RL91/ J1RLC2				
84.8	J1RL90				
63.5	J1RL92	Number of samples		Uncensored values	
77.4	J1RL93	Uncensored	12	Mean	73.9
50.7	J1RL94	Censored		Lognormal mean	74.0
81.9	J1RL95	Detection limit or PQL		Std. devn.	12.1
67.2	J1RL96	Method detection limit		Median	73.7
67.3	J1RL97	TOTAL	12	Min.	50.7
99.7	J1RL98			Max.	99.7
75.6	J1RL99				
71.0	J1RLC0				
71.7	J1RLC1				

Lognormal distribution? r-squared is: 0.941
Normal distribution? r-squared is: 0.946
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 81.1

Beryllium 95% UCL Calculation

DATA	ID				
0.26	J1RL91/ J1RLC2				
0.27	J1RL90				
0.19	J1RL92	Number of samples		Uncensored values	
0.26	J1RL93	Uncensored	12	Mean	0.22
0.16	J1RL94	Censored		Lognormal mean	0.22
0.22	J1RL95	Detection limit or PQL		Std. devn.	0.042
0.21	J1RL96	Method detection limit		Median	0.22
0.18	J1RL97	TOTAL	12	Min.	0.16
0.30	J1RL98			Max.	0.30
0.22	J1RL99				
0.19	J1RLC0				
0.24	J1RLC1				

Lognormal distribution? r-squared is: 0.985
Normal distribution? r-squared is: 0.982
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.25

Boron 95% UCL Calculation

DATA	ID				
1.4	J1RL91/ J1RLC2				
2.1	J1RL90				
1.2	J1RL92	Number of samples		Uncensored values	
1.4	J1RL93	Uncensored	12	Mean	1.4
0.49	J1RL94	Censored		Lognormal mean	1.4
1.6	J1RL95	Detection limit or PQL		Std. devn.	0.46
1.0	J1RL96	Method detection limit		Median	1.4
1.0	J1RL97	TOTAL	12	Min.	0.49
1.8	J1RL98			Max.	2.1
2.0	J1RL99				
1.2	J1RLC0				
1.4	J1RLC1				

Lognormal distribution? r-squared is: 0.877
Normal distribution? r-squared is: 0.967
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 1.6

Cadmium 95% UCL Calculation

DATA	ID				
0.16	J1RL91/ J1RLC2				
0.22	J1RL90				
0.51	J1RL92	Number of samples		Uncensored values	
0.16	J1RL93	Uncensored	12	Mean	0.22
0.13	J1RL94	Censored		Lognormal mean	0.22
0.30	J1RL95	Detection limit or PQL		Std. devn.	0.10
0.15	J1RL96	Method detection limit		Median	0.19
0.21	J1RL97	TOTAL	12	Min.	0.13
0.19	J1RL98			Max.	0.51
0.25	J1RL99				
0.19	J1RLC0				
0.16	J1RLC1				

Lognormal distribution? r-squared is: 0.871
Normal distribution? r-squared is: 0.712
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.27

Chromium 95% UCL Calculation

DATA	ID				
12.5	J1RL91/ J1RLC2				
18.1	J1RL90				
11.7	J1RL92	Number of samples		Uncensored values	
13.4	J1RL93	Uncensored	12	Mean	13.0
11.9	J1RL94	Censored		Lognormal mean	13.0
12.8	J1RL95	Detection limit or PQL		Std. devn.	1.8
12.1	J1RL96	Method detection limit		Median	12.5
11.5	J1RL97	TOTAL	12	Min.	11.5
14.8	J1RL98			Max.	18.1
12.6	J1RL99				
12.8	J1RLC0				
12.4	J1RLC1				

Lognormal distribution? r-squared is: 0.765
Normal distribution? r-squared is: 0.711
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 13.9

Cobalt 95% UCL Calculation

DATA	ID				
9.0	J1RL91/ J1RLC2				
9.2	J1RL90				
7.6	J1RL92	Number of samples		Uncensored values	
8.0	J1RL93	Uncensored	12	Mean	8.4
7.2	J1RL94	Censored		Lognormal mean	8.4
8.5	J1RL95	Detection limit or PQL		Std. devn.	0.65
7.8	J1RL96	Method detection limit		Median	8.4
8.3	J1RL97	TOTAL	12	Min.	7.2
9.1	J1RL98			Max.	9.2
9.1	J1RL99				
8.1	J1RLC0				
8.5	J1RLC1				

Lognormal distribution? r-squared is: 0.958
Normal distribution? r-squared is: 0.961
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.7

Copper 95% UCL Calculation

DATA	ID				
14.1	J1RL91/ J1RLC2				
14.4	J1RL90				
15.3	J1RL92	Number of samples		Uncensored values	
13.7	J1RL93	Uncensored	12	Mean	16.0
19.1	J1RL94	Censored		Lognormal mean	16.1
16.5	J1RL95	Detection limit or PQL		Std. devn.	2.1
14.2	J1RL96	Method detection limit		Median	15.8
17.8	J1RL97	TOTAL	12	Min.	13.7
14.2	J1RL98			Max.	20.1
20.1	J1RL99				
16.3	J1RLC0				
16.8	J1RLC1				

Lognormal distribution? r-squared is: 0.927
Normal distribution? r-squared is: 0.914
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 17.2

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	**Date**	06/06/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project	100-N Field Remediation	**Job No.**	14655	**Checked** C. H. Dobie	**Date** 06/06/13
Subject	100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations				**Sheet No.** 25 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite South Staging Pile (SSP)

Hexavalent Chromium 95% UCL Calculation

DATA	ID
0.0775	J1RL91/ J1RLC2
0.0775	J1RL90
0.217	J1RL92
0.161	J1RL93
0.0775	J1RL94
0.177	J1RL95
0.0775	J1RL96
0.199	J1RL97
0.262	J1RL98
0.196	J1RL99
0.178	J1RLC0
0.159	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	0.155
Censored		Lognormal mean	0.158
Detection limit or PQL		Std. devn.	0.0632
Method detection limit		Median	0.169
TOTAL	12	Min.	0.0775
		Max.	0.262

Lognormal distribution? r-squared is: 0.839
Normal distribution? r-squared is: 0.897
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.185

Lead 95% UCL Calculation

DATA	ID
4.8	J1RL91/ J1RLC2
11.6	J1RL90
14.3	J1RL92
4.6	J1RL93
4.0	J1RL94
32.4	J1RL95
6.8	J1RL96
8.9	J1RL97
5.2	J1RL98
39.5	J1RL99
7.4	J1RLC0
6.0	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	12.1
Censored		Lognormal mean	11.8
Detection limit or PQL		Std. devn.	11.6
Method detection limit		Median	7.1
TOTAL	12	Min.	4.0
		Max.	39.5

Lognormal distribution? r-squared is: 0.883
Normal distribution? r-squared is: 0.693
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 17.6

Manganese 95% UCL Calculation

DATA	ID
346	J1RL91/ J1RLC2
357	J1RL90
290	J1RL92
334	J1RL93
291	J1RL94
341	J1RL95
306	J1RL96
292	J1RL97
404	J1RL98
340	J1RL99
313	J1RLC0
340	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	330
Censored		Lognormal mean	330
Detection limit or PQL		Std. devn.	33
Method detection limit		Median	337
TOTAL	12	Min.	290
		Max.	404

Lognormal distribution? r-squared is: 0.920
Normal distribution? r-squared is: 0.905
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 348

Mercury 95% UCL Calculation

DATA	ID
0.010	J1RL91/ J1RLC2
0.025	J1RL90
0.029	J1RL92
0.013	J1RL93
0.0025	J1RL94
0.054	J1RL95
0.011	J1RL96
0.17	J1RL97
0.0031	J1RL98
0.039	J1RL99
0.018	J1RLC0
0.0083	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	0.032
Censored		Lognormal mean	0.033
Detection limit or PQL		Std. devn.	0.046
Method detection limit		Median	0.016
TOTAL	12	Min.	0.0025
		Max.	0.17

Lognormal distribution? r-squared is: 0.976
Normal distribution? r-squared is: 0.593
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.11

Nickel 95% UCL Calculation

DATA	ID
12.7	J1RL91/ J1RLC2
30.3	J1RL90
11.7	J1RL92
13.3	J1RL93
11.8	J1RL94
12.7	J1RL95
12.1	J1RL96
12.8	J1RL97
13.7	J1RL98
14.3	J1RL99
13.0	J1RLC0
12.9	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	14.3
Censored		Lognormal mean	14.2
Detection limit or PQL		Std. devn.	5.1
Method detection limit		Median	12.9
TOTAL	12	Min.	11.7
		Max.	30.3

Lognormal distribution? r-squared is: 0.510
Normal distribution? r-squared is: 0.431
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 16.7

Vanadium 95% UCL Calculation

DATA	ID
47.0	J1RL91/ J1RLC2
44.3	J1RL90
44.4	J1RL92
44.1	J1RL93
45.4	J1RL94
49.9	J1RL95
46.5	J1RL96
49.7	J1RL97
47.6	J1RL98
55.4	J1RL99
46.8	J1RLC0
51.7	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	47.7
Censored		Lognormal mean	47.7
Detection limit or PQL		Std. devn.	3.4
Method detection limit		Median	46.9
TOTAL	12	Min.	44.1
		Max.	55.4

Lognormal distribution? r-squared is: 0.919
Normal distribution? r-squared is: 0.903
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 49.5

Zinc 95% UCL Calculation

DATA	ID
44.4	J1RL91/ J1RLC2
53.6	J1RL90
51.0	J1RL92
42.5	J1RL93
38.1	J1RL94
54.4	J1RL95
49.8	J1RL96
68.9	J1RL97
49.1	J1RL98
63.7	J1RL99
47.2	J1RLC0
47.6	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	50.9
Censored		Lognormal mean	50.9
Detection limit or PQL		Std. devn.	8.6
Method detection limit		Median	49.5
TOTAL	12	Min.	38.1
		Max.	68.9

Lognormal distribution? r-squared is: 0.962
Normal distribution? r-squared is: 0.931
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 55.7

Chloride 95% UCL Calculation

DATA	ID
6.7	J1RL91/ J1RLC2
29.8	J1RL90
5.3	J1RL92
17.6	J1RL93
4.5	J1RL94
74.5	J1RL95
34.3	J1RL96
8.2	J1RL97
12.7	J1RL98
9.1	J1RL99
27.5	J1RLC0
23.5	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	21.1
Censored		Lognormal mean	21.7
Detection limit or PQL		Std. devn.	19.7
Method detection limit		Median	15.2
TOTAL	12	Min.	4.5
		Max.	74.5

Lognormal distribution? r-squared is: 0.970
Normal distribution? r-squared is: 0.771
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 43.5

Fluoride 95% UCL Calculation

DATA	ID
1.3	J1RL91/ J1RLC2
0.42	J1RL90
1.2	J1RL92
1.2	J1RL93
0.41	J1RL94
1.5	J1RL95
1.9	J1RL96
0.41	J1RL97
1.2	J1RL98
0.84	J1RL99
1.0	J1RLC0
2.8	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	1.2
Censored		Lognormal mean	1.2
Detection limit or PQL		Std. devn.	0.69
Method detection limit		Median	1.2
TOTAL	12	Min.	0.41
		Max.	2.8

Lognormal distribution? r-squared is: 0.917
Normal distribution? r-squared is: 0.887
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.9

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie	**Date** 06/11/13	**Calc. No.** 0100N-CA-V0219	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** C. H. Dobie	**Date** 06/11/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			**Sheet No.** 26 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite South Staging Pile (SSP)

Nitrogen in nitrate 95% UCL Calculation

DATA	ID
2.6	J1RL91/ J1RLC2
263	J1RL90
2.1	J1RL92
12.8	J1RL93
0.85	J1RL94
233	J1RL95
26.7	J1RL96
1.4	J1RL97
2.7	J1RL98
7.5	J1RL99
6.8	J1RLC0
3.1	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	46.9
Censored		Lognormal mean	45.3
Detection limit or PQL		Std. devn.	94.4
Method detection limit		Median	5.0
TOTAL	12	Min.	0.85
		Max.	263

Lognormal distribution? r-squared is: 0.886
Normal distribution? r-squared is: 0.526
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 91.7

Nitrogen in nitrate and nitrite 95% UCL Calculation

DATA	ID
1.2	J1RL91/ J1RLC2
321	J1RL90
1.8	J1RL92
15.1	J1RL93
0.15	J1RL94
231	J1RL95
29.2	J1RL96
1.0	J1RL97
2.6	J1RL98
8.3	J1RL99
7.6	J1RLC0
3.0	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	51.8
Censored		Lognormal mean	77.4
Detection limit or PQL		Std. devn.	107
Method detection limit		Median	5.3
TOTAL	12	Min.	0.15
		Max.	321

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.533
Recommendations:
Use gamma distribution.

UCL (Adjusted Gamma) is 198

Sulfate 95% UCL Calculation

DATA	ID
10.4	J1RL91/ J1RLC2
184	J1RL90
9.8	J1RL92
33.1	J1RL93
5.9	J1RL94
138	J1RL95
64.4	J1RL96
11.5	J1RL97
9.1	J1RL98
48.8	J1RL99
20.9	J1RLC0
20.5	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	46.4
Censored		Lognormal mean	47.4
Detection limit or PQL		Std. devn.	57.2
Method detection limit		Median	20.7
TOTAL	12	Min.	5.9
		Max.	184

Lognormal distribution? r-squared is: 0.941
Normal distribution? r-squared is: 0.718
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 137

Aroclor-1254 95% UCL Calculation

DATA	ID
3.9	J1RL91/ J1RLC2
11.0	J1RL90
72.0	J1RL92
1.4	J1RL93
1.3	J1RL94
110	J1RL95
25.0	J1RL96
26.0	J1RL97
1.4	J1RL98
72.0	J1RL99
120	J1RLC0
5.0	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	37.4
Censored		Lognormal mean	61.4
Detection limit or PQL		Std. devn.	44.3
Method detection limit		Median	18.0
TOTAL	12	Min.	1.3
		Max.	120

Lognormal distribution? r-squared is: 0.918
Normal distribution? r-squared is: 0.812
Recommendations:
Use gamma distribution.

UCL (Adjusted Gamma) is 86

Aroclor-1260 95% UCL Calculation

DATA	ID
7.6	J1RL91/ J1RLC2
7.1	J1RL90
35	J1RL92
1.4	J1RL93
1.3	J1RL94
60	J1RL95
12	J1RL96
16	J1RL97
1.4	J1RL98
33	J1RL99
60	J1RLC0
4.6	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	19.9
Censored		Lognormal mean	26.2
Detection limit or PQL		Std. devn.	21.9
Method detection limit		Median	9.8
TOTAL	12	Min.	1.3
		Max.	60.0

Lognormal distribution? r-squared is: 0.933
Normal distribution? r-squared is: 0.818
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 133

4-4'-DDT 95% UCL Calculation

DATA	ID
0.29	J1RL91/ J1RLC2
1.3	J1RL90
10	J1RL92
0.30	J1RL93
1.0	J1RL94
7.1	J1RL95
2.6	J1RL96
1.5	J1RL97
0.30	J1RL98
2.2	J1RL99
7.3	J1RLC0
0.59	J1RLC1

Number of samples		Uncensored values	
Uncensored	12	Mean	2.9
Censored		Lognormal mean	3.3
Detection limit or PQL		Std. devn.	3.3
Method detection limit		Median	1.4
TOTAL	12	Min.	0.29
		Max.	10

Lognormal distribution? r-squared is: 0.941
Normal distribution? r-squared is: 0.775
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12

CALCULATION SHEET

Washington Closure Hanford

Originator: J. D. Skoglie
Project: 100-N Field Remediation
Subject: 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Date: 06/06/13
Job No.: 14655

Calc. No.: 0100N-CA-V0219
Checked: C. H. Dobie

Rev. No.: 0
Date: 06/06/13
Sheet No.: 27 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Overburden (OB)

Antimony 95% UCL Calculation

DATA	ID
0.19	J1RL49/ J1RL57
0.79	J1RL45
0.74	J1RL46
0.80	J1RL47
0.58	J1RL48
1.0	J1RL50
0.36	J1RL51
0.64	J1RL52
0.65	J1RL53
0.58	J1RL54
0.91	J1RL55
0.48	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	0.64
Censored		Lognormal mean	0.66
Detection limit or PQL		Std. devn.	0.23
Method detection limit		Median	0.65
TOTAL	12	Min.	0.19
		Max.	1.0

Lognormal distribution? r-squared is: 0.852
Normal distribution? r-squared is: 0.976
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.76

Arsenic 95% UCL Calculation

DATA	ID
2.6	J1RL49/ J1RL57
2.4	J1RL45
2.0	J1RL46
2.3	J1RL47
2.0	J1RL48
1.4	J1RL50
2.0	J1RL51
2.4	J1RL52
2.3	J1RL53
2.2	J1RL54
1.8	J1RL55
1.6	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	2.1
Censored		Lognormal mean	2.1
Detection limit or PQL		Std. devn.	0.35
Method detection limit		Median	2.1
TOTAL	12	Min.	1.4
		Max.	2.6

Lognormal distribution? r-squared is: 0.924
Normal distribution? r-squared is: 0.955
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.3

Barium 95% UCL Calculation

DATA	ID
61.2	J1RL49/ J1RL57
53.0	J1RL45
58.8	J1RL46
53.7	J1RL47
57.7	J1RL48
55.1	J1RL50
56.9	J1RL51
54.5	J1RL52
60.0	J1RL53
58.5	J1RL54
56.6	J1RL55
58.9	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	57.1
Censored		Lognormal mean	57.1
Detection limit or PQL		Std. devn.	2.6
Method detection limit		Median	57.3
TOTAL	12	Min.	53.0
		Max.	61.2

Lognormal distribution? r-squared is: 0.976
Normal distribution? r-squared is: 0.978
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 58.4

Beryllium 95% UCL Calculation

DATA	ID
0.17	J1RL49/ J1RL57
0.087	J1RL45
0.13	J1RL46
0.15	J1RL47
0.12	J1RL48
0.11	J1RL50
0.15	J1RL51
0.13	J1RL52
0.10	J1RL53
0.15	J1RL54
0.092	J1RL55
0.10	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	0.12
Censored		Lognormal mean	0.12
Detection limit or PQL		Std. devn.	0.026
Method detection limit		Median	0.13
TOTAL	12	Min.	0.087
		Max.	0.17

Lognormal distribution? r-squared is: 0.951
Normal distribution? r-squared is: 0.949
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.14

Cadmium 95% UCL Calculation

DATA	ID
0.16	J1RL49/ J1RL57
0.85	J1RL45
0.22	J1RL46
0.15	J1RL47
0.16	J1RL48
0.13	J1RL50
0.12	J1RL51
0.13	J1RL52
0.15	J1RL53
0.15	J1RL54
0.13	J1RL55
0.17	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	0.21
Censored		Lognormal mean	0.20
Detection limit or PQL		Std. devn.	0.20
Method detection limit		Median	0.15
TOTAL	12	Min.	0.12
		Max.	0.85

Lognormal distribution? r-squared is: 0.568
Normal distribution? r-squared is: 0.403
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.31

Chromium 95% UCL Calculation

DATA	ID
10.9	J1RL49/ J1RL57
8.5	J1RL45
8.2	J1RL46
10.8	J1RL47
9.6	J1RL48
7.9	J1RL50
9.2	J1RL51
7.0	J1RL52
8.0	J1RL53
9.3	J1RL54
8.3	J1RL55
7.4	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	8.8
Censored		Lognormal mean	8.8
Detection limit or PQL		Std. devn.	1.2
Method detection limit		Median	8.4
TOTAL	12	Min.	7.0
		Max.	10.9

Lognormal distribution? r-squared is: 0.966
Normal distribution? r-squared is: 0.948
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.4

Cobalt 95% UCL Calculation

DATA	ID
7.2	J1RL49/ J1RL57
9.8	J1RL45
9.8	J1RL46
9.8	J1RL47
8.7	J1RL48
9.1	J1RL50
8.7	J1RL51
8.8	J1RL52
9.4	J1RL53
8.7	J1RL54
9.0	J1RL55
9.8	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	9.1
Censored		Lognormal mean	9.1
Detection limit or PQL		Std. devn.	0.76
Method detection limit		Median	9.1
TOTAL	12	Min.	7.2
		Max.	9.8

Lognormal distribution? r-squared is: 0.791
Normal distribution? r-squared is: 0.822
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 9.4

Copper 95% UCL Calculation

DATA	ID
15.1	J1RL49/ J1RL57
24.6	J1RL45
18.3	J1RL46
17.6	J1RL47
15.6	J1RL48
15.8	J1RL50
16.3	J1RL51
16.3	J1RL52
16.1	J1RL53
16.1	J1RL54
15.4	J1RL55
16.1	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	16.9
Censored		Lognormal mean	16.9
Detection limit or PQL		Std. devn.	2.6
Method detection limit		Median	16.1
TOTAL	12	Min.	15.1
		Max.	24.6

Lognormal distribution? r-squared is: 0.655
Normal distribution? r-squared is: 0.598
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 18.2

Hexavalent chromium 95% UCL Calculation

DATA	ID
0.119	J1RL49/ J1RL57
0.219	J1RL45
0.276	J1RL46
0.200	J1RL47
0.178	J1RL48
0.180	J1RL50
0.162	J1RL51
0.078	J1RL52
0.199	J1RL53
0.259	J1RL54
0.293	J1RL55
0.218	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	0.198
Censored		Lognormal mean	0.201
Detection limit or PQL		Std. devn.	0.062
Method detection limit		Median	0.200
TOTAL	12	Min.	0.078
		Max.	0.293

Lognormal distribution? r-squared is: 0.890
Normal distribution? r-squared is: 0.971
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.231

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	**Date**	06/06/13	**Calc. No.**	0100N-CA-V0219
Project	100-N Field Remediation	**Job No.**	14655	**Checked**	C. H. Dobie
Subject	100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations	**Rev. No.**	0	**Date**	06/06/13
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Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Overburden (OB)

Lead 95% UCL Calculation

DATA	ID
3.8	J1RL49/ J1RL57
24.8	J1RL45
11.3	J1RL46
10.4	J1RL47
4.7	J1RL48
18.7	J1RL50
12.3	J1RL51
3.8	J1RL52
3.7	J1RL53
8.1	J1RL54
7.1	J1RL55
5.5	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	9.5
Censored		Lognormal mean	9.6
Detection limit or PQL		Std. devn.	6.6
Method detection limit		Median	7.6
TOTAL	12	Min.	3.7
		Max.	24.8

Lognormal distribution? r-squared is: 0.949
Normal distribution? r-squared is: 0.845
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 15.1

Manganese 95% UCL Calculation

DATA	ID
287	J1RL49/ J1RL57
323	J1RL45
314	J1RL46
335	J1RL47
299	J1RL48
304	J1RL50
313	J1RL51
311	J1RL52
317	J1RL53
311	J1RL54
306	J1RL55
328	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	312
Censored		Lognormal mean	312
Detection limit or PQL		Std. devn.	13
Method detection limit		Median	312
TOTAL	12	Min.	287
		Max.	335

Lognormal distribution? r-squared is: 0.972
Normal distribution? r-squared is: 0.975
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 319

Mercury 95% UCL Calculation

DATA	ID
0.0038	J1RL49/ J1RL57
0.70	J1RL45
0.20	J1RL46
0.075	J1RL47
0.0085	J1RL48
0.0028	J1RL50
0.0028	J1RL51
0.0058	J1RL52
0.0028	J1RL53
0.027	J1RL54
0.020	J1RL55
0.021	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	0.089
Censored		Lognormal mean	0.086
Detection limit or PQL		Std. devn.	0.20
Method detection limit		Median	0.014
TOTAL	12	Min.	0.0028
		Max.	0.70

Lognormal distribution? r-squared is: 0.905
Normal distribution? r-squared is: 0.472
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.0

Nickel 95% UCL Calculation

DATA	ID
10.9	J1RL49/ J1RL57
10.8	J1RL45
12.7	J1RL46
12.0	J1RL47
10.9	J1RL48
10.5	J1RL50
11.9	J1RL51
9.4	J1RL52
10.7	J1RL53
12.2	J1RL54
11.4	J1RL55
10.8	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	11.2
Censored		Lognormal mean	11.2
Detection limit or PQL		Std. devn.	0.90
Method detection limit		Median	10.9
TOTAL	12	Min.	9.4
		Max.	12.7

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.942
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.7

Vanadium 95% UCL Calculation

DATA	ID
40.8	J1RL49/ J1RL57
54.0	J1RL45
55.1	J1RL46
57.5	J1RL47
47.9	J1RL48
54.2	J1RL50
47.9	J1RL51
54.6	J1RL52
53.3	J1RL53
50.4	J1RL54
54.6	J1RL55
50.9	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	51.8
Censored		Lognormal mean	51.8
Detection limit or PQL		Std. devn.	4.5
Method detection limit		Median	53.7
TOTAL	12	Min.	40.8
		Max.	57.5

Lognormal distribution? r-squared is: 0.835
Normal distribution? r-squared is: 0.867
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 53.9

Zinc 95% UCL Calculation

DATA	ID
38.1	J1RL49/ J1RL57
95.2	J1RL45
61.4	J1RL46
55.6	J1RL47
43.5	J1RL48
53.6	J1RL50
42.1	J1RL51
44.4	J1RL52
43.1	J1RL53
46.1	J1RL54
44.4	J1RL55
60.3	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	52.3
Censored		Lognormal mean	52.3
Detection limit or PQL		Std. devn.	15.5
Method detection limit		Median	45.3
TOTAL	12	Min.	38.1
		Max.	95.2

Lognormal distribution? r-squared is: 0.836
Normal distribution? r-squared is: 0.734
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 59.7

Chloride 95% UCL Calculation

DATA	ID
3.6	J1RL49/ J1RL57
5.5	J1RL45
24.6	J1RL46
7.3	J1RL47
3.8	J1RL48
6.8	J1RL50
4.0	J1RL51
5.3	J1RL52
5.0	J1RL53
6.9	J1RL54
18.2	J1RL55
7.9	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	8.2
Censored		Lognormal mean	8.1
Detection limit or PQL		Std. devn.	6.5
Method detection limit		Median	6.2
TOTAL	12	Min.	3.6
		Max.	24.6

Lognormal distribution? r-squared is: 0.862
Normal distribution? r-squared is: 0.679
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 11.3

Nitrogen in nitrate 95% UCL Calculation

DATA	ID
0.88	J1RL49/ J1RL57
0.77	J1RL45
1.0	J1RL46
1.4	J1RL47
1.3	J1RL48
1.8	J1RL50
1.8	J1RL51
1.1	J1RL52
0.16	J1RL53
0.15	J1RL54
0.16	J1RL55
0.84	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	0.95
Censored		Lognormal mean	1.1
Detection limit or PQL		Std. devn.	0.58
Method detection limit		Median	0.94
TOTAL	12	Min.	0.15
		Max.	1.8

Lognormal distribution? r-squared is: 0.809
Normal distribution? r-squared is: 0.939
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 1.2

Nitrogen in nitrate and nitrite 95% UCL Calculation

DATA	ID
0.15	J1RL49/ J1RL57
0.15	J1RL45
0.34	J1RL46
0.73	J1RL47
0.65	J1RL48
0.81	J1RL50
1.5	J1RL51
0.74	J1RL52
0.16	J1RL53
0.16	J1RL54
0.16	J1RL55
0.15	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	0.47
Censored		Lognormal mean	0.49
Detection limit or PQL		Std. devn.	0.42
Method detection limit		Median	0.25
TOTAL	12	Min.	0.15
		Max.	1.5

Lognormal distribution? r-squared is: 0.832
Normal distribution? r-squared is: 0.781
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.68

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date	06/06/13	Calc. No.	0100N-CA-V0219
Project	100-N Field Remediation	Job No.	14655	Checked	C. H. Dobie CB
Subject	100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			Rev. No.	0
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Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Overburden (OB)

Sulfate 95% UCL Calculation

DATA	ID
3.2	J1RL49/ J1RL57
14.6	J1RL45
26.1	J1RL46
24.8	J1RL47
4.4	J1RL48
11.0	J1RL50
4.6	J1RL51
6.1	J1RL52
8.5	J1RL53
13.2	J1RL54
61.6	J1RL55
9.2	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	15.6
Censored		Lognormal mean	15.6
Detection limit or PQL		Std. devn.	16.3
Method detection limit		Median	10.1
TOTAL	12	Min.	3.2
		Max.	61.6

Lognormal distribution? r-squared is: 0.968
Normal distribution? r-squared is: 0.698
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 31.1

TPH - Diesel 95% UCL Calculation

DATA	ID
2500	J1RL49/ J1RL57
51000	J1RL45
18000	J1RL46
17000	J1RL47
5000	J1RL48
3900	J1RL50
4800	J1RL51
5700	J1RL52
7300	J1RL53
42000	J1RL54
18000	J1RL55
10000	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	15433
Censored		Lognormal mean	15885
Detection limit or PQL		Std. devn.	15664
Method detection limit		Median	8650
TOTAL	12	Min.	2500
		Max.	51000

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.767
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 35695

TPH - Diesel EXT 95% UCL Calculation

DATA	ID
4250	J1RL49/ J1RL57
74000	J1RL45
34000	J1RL46
30000	J1RL47
9300	J1RL48
5800	J1RL50
9600	J1RL51
8200	J1RL52
11000	J1RL53
81000	J1RL54
28000	J1RL55
17000	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	26013
Censored		Lognormal mean	26938
Detection limit or PQL		Std. devn.	26050
Method detection limit		Median	14000
TOTAL	12	Min.	4250
		Max.	81000

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.777
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 61382

Acenaphthene (Method 8310) 95% UCL Calculation

DATA	ID
4.9	J1RL49/ J1RL57
670	J1RL45
130	J1RL46
74	J1RL47
66	J1RL48
5.0	J1RL50
5.0	J1RL51
22	J1RL52
92	J1RL53
110	J1RL54
2300	J1RL55
86	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	297
Censored		Lognormal mean	373
Detection limit or PQL		Std. devn.	656
Method detection limit		Median	80
TOTAL	12	Min.	4.9
		Max.	2300

Lognormal distribution? r-squared is: 0.919
Normal distribution? r-squared is: 0.462
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5812

Anthracene (Method 8310) 95% UCL Calculation

DATA	ID
2.4	J1RL49/ J1RL57
700	J1RL45
110	J1RL46
54	J1RL47
85	J1RL48
1.5	J1RL50
1.6	J1RL51
29	J1RL52
210	J1RL53
220	J1RL54
2900	J1RL55
84	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	366
Censored		Lognormal mean	935
Detection limit or PQL		Std. devn.	821
Method detection limit		Median	85
TOTAL	12	Min.	1.5
		Max.	2900

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.460
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 61297

Benzo(a)anthracene (Method 8310) 95% UCL Calculation

DATA	ID
25	J1RL49/ J1RL57
1200	J1RL45
330	J1RL46
320	J1RL47
210	J1RL48
1.6	J1RL50
4.9	J1RL51
270	J1RL52
400	J1RL53
540	J1RL54
6900	J1RL55
310	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	876
Censored		Lognormal mean	2520
Detection limit or PQL		Std. devn.	1924
Method detection limit		Median	315
TOTAL	12	Min.	1.6
		Max.	6900

Lognormal distribution? r-squared is: 0.880
Normal distribution? r-squared is: 0.430
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 1790

Benzo(a)pyrene (Method 8310) 95% UCL Calculation

DATA	ID
19	J1RL49/ J1RL57
1500	J1RL45
280	J1RL46
200	J1RL47
140	J1RL48
11	J1RL50
16	J1RL51
190	J1RL52
190	J1RL53
420	J1RL54
3100	J1RL55
230	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	525
Censored		Lognormal mean	720
Detection limit or PQL		Std. devn.	904
Method detection limit		Median	195
TOTAL	12	Min.	11
		Max.	3100

Lognormal distribution? r-squared is: 0.924
Normal distribution? r-squared is: 0.569
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6824

Benzo(b)fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
18	J1RL49/ J1RL57
1100	J1RL45
290	J1RL46
220	J1RL47
130	J1RL48
10	J1RL50
14	J1RL51
150	J1RL52
230	J1RL53
320	J1RL54
3900	J1RL55
220	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	550
Censored		Lognormal mean	722
Detection limit or PQL		Std. devn.	1094
Method detection limit		Median	220
TOTAL	12	Min.	10
		Max.	3900

Lognormal distribution? r-squared is: 0.921
Normal distribution? r-squared is: 0.483
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7451

Benzo(ghi)perylene (Method 8310) 95% UCL Calculation

DATA	ID
9.4	J1RL49/ J1RL57
600	J1RL45
160	J1RL46
81	J1RL47
60	J1RL48
3.6	J1RL50
14	J1RL51
63	J1RL52
95	J1RL53
220	J1RL54
1100	J1RL55
120	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	210
Censored		Lognormal mean	299
Detection limit or PQL		Std. devn.	323
Method detection limit		Median	88
TOTAL	12	Min.	3.6
		Max.	1100

Lognormal distribution? r-squared is: 0.966
Normal distribution? r-squared is: 0.636
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2450

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date	06/06/13	Calc. No.	0100N-CA-V0219
Project	100-N Field Remediation	Job No.	14655	Checked	C. H. Dobie
Rev. No.	0	Date	06/06/13	Sheet No.	30 of 36

Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Overburden (OB)

Benzo(k)fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
5.2	J1RL49/ J1RL57
420	J1RL45
110	J1RL46
83	J1RL47
60	J1RL48
2.0	J1RL50
4.6	J1RL51
69	J1RL52
82	J1RL53
140	J1RL54
1400	J1RL55
75	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	204
Censored		Lognormal mean	333
Detection limit or PQL		Std. devn.	393
Method detection limit		Median	79
TOTAL	12	Min.	2.0
		Max.	1400

Lognormal distribution? r-squared is: 0.909
Normal distribution? r-squared is: 0.498
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4920

Chrysene (Method 8310) 95% UCL Calculation

DATA	ID
22	J1RL49/ J1RL57
1700	J1RL45
380	J1RL46
280	J1RL47
190	J1RL48
16	J1RL50
25	J1RL51
210	J1RL52
300	J1RL53
650	J1RL54
5200	J1RL55
310	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	774
Censored		Lognormal mean	1015
Detection limit or PQL		Std. devn.	1467
Method detection limit		Median	290
TOTAL	12	Min.	16
		Max.	5200

Lognormal distribution? r-squared is: 0.932
Normal distribution? r-squared is: 0.516
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9919

Fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
36	J1RL49/ J1RL57
3000	J1RL45
540	J1RL46
440	J1RL47
460	J1RL48
6.5	J1RL50
33	J1RL51
230	J1RL52
1000	J1RL53
800	J1RL54
13000	J1RL55
490	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	1670
Censored		Lognormal mean	2894
Detection limit or PQL		Std. devn.	3658
Method detection limit		Median	475
TOTAL	12	Min.	6.5
		Max.	13000

Lognormal distribution? r-squared is: 0.940
Normal distribution? r-squared is: 0.453
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 68632

Fluorene (Method 8310) 95% UCL Calculation

DATA	ID
2.6	J1RL49/ J1RL57
490	J1RL45
88	J1RL46
49	J1RL47
42	J1RL48
2.6	J1RL50
2.7	J1RL51
25	J1RL52
84	J1RL53
110	J1RL54
1500	J1RL55
68	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	205
Censored		Lognormal mean	320
Detection limit or PQL		Std. devn.	429
Method detection limit		Median	59
TOTAL	12	Min.	2.6
		Max.	1500

Lognormal distribution? r-squared is: 0.923
Normal distribution? r-squared is: 0.490
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6492

Indeno(1,2,3-cd)pyrene (Method 8310) 95% UCL Calculation

DATA	ID
16	J1RL49/ J1RL57
470	J1RL45
280	J1RL46
140	J1RL47
68	J1RL48
6.0	J1RL50
6.0	J1RL51
53	J1RL52
83	J1RL53
160	J1RL54
840	J1RL55
160	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	190
Censored		Lognormal mean	282
Detection limit or PQL		Std. devn.	244
Method detection limit		Median	112
TOTAL	12	Min.	6.0
		Max.	840

Lognormal distribution? r-squared is: 0.949
Normal distribution? r-squared is: 0.734
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1986

Phenanthrene (Method 8310) 95% UCL Calculation

DATA	ID
6.0	J1RL49/ J1RL57
2100	J1RL45
350	J1RL46
160	J1RL47
220	J1RL48
6.0	J1RL50
6.0	J1RL51
38	J1RL52
560	J1RL53
350	J1RL54
8500	J1RL55
210	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	1042
Censored		Lognormal mean	2154
Detection limit or PQL		Std. devn.	2418
Method detection limit		Median	215
TOTAL	12	Min.	6.0
		Max.	8500

Lognormal distribution? r-squared is: 0.932
Normal distribution? r-squared is: 0.449
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 116834

Pyrene (Method 8310) 95% UCL Calculation

DATA	ID
57	J1RL49/ J1RL57
3300	J1RL45
630	J1RL46
520	J1RL47
540	J1RL48
15	J1RL50
40	J1RL51
320	J1RL52
870	J1RL53
910	J1RL54
12000	J1RL55
560	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	1647
Censored		Lognormal mean	2353
Detection limit or PQL		Std. devn.	3375
Method detection limit		Median	550
TOTAL	12	Min.	15
		Max.	12000

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.475
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 31376

Acenaphthene (Method 8270) 95% UCL Calculation

DATA	ID
5.0	J1RL49/ J1RL57
210	J1RL45
42	J1RL46
41	J1RL47
4.9	J1RL48
5.0	J1RL50
5.0	J1RL51
5.5	J1RL52
5.0	J1RL53
200	J1RL54
14	J1RL55
25	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	47
Censored		Lognormal mean	47
Detection limit or PQL		Std. devn.	75
Method detection limit		Median	10
TOTAL	12	Min.	4.9
		Max.	210

Lognormal distribution? r-squared is: 0.824
Normal distribution? r-squared is: 0.603
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 83

Anthracene (Method 8270) 95% UCL Calculation

DATA	ID
14	J1RL49/ J1RL57
380	J1RL45
170	J1RL46
110	J1RL47
16	J1RL48
8.5	J1RL50
8.5	J1RL51
9.0	J1RL52
66	J1RL53
800	J1RL54
65	J1RL55
56	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	142
Censored		Lognormal mean	162
Detection limit or PQL		Std. devn.	233
Method detection limit		Median	61
TOTAL	12	Min.	8.5
		Max.	800

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.616
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1039

CALCULATION SHEET

Washington Closure Hanford			
Originator J. D. Skoglie	Date 06/06/13	Calc. No. 0100N-CA-V0219	Rev. No. 0
Project 100-N Field Remediation	Job No. 14655	Checked C. H. Dobie	Date 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations			Sheet No. 31 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Overburden (OB)

Benzo(a)anthracene (Method 8270) 95% UCL Calculation

DATA	ID
47	J1RL49/ J1RL57
1100	J1RL45
640	J1RL46
520	J1RL47
110	J1RL48
10	J1RL50
48	J1RL51
92	J1RL52
230	J1RL53
1800	J1RL54
360	J1RL55
250	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	434
Censored		Lognormal mean	595
Detection limit or PQL		Std. devn.	534
Method detection limit		Median	240
TOTAL	12	Min.	10
		Max.	1800

Lognormal distribution? r-squared is: 0.977
Normal distribution? r-squared is: 0.767
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3413

Benzo(a)pyrene (Method 8270) 95% UCL Calculation

DATA	ID
24	J1RL49/ J1RL57
1000	J1RL45
480	J1RL46
400	J1RL47
84	J1RL48
10	J1RL50
34	J1RL51
47	J1RL52
140	J1RL53
1200	J1RL54
240	J1RL55
220	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	323
Censored		Lognormal mean	438
Detection limit or PQL		Std. devn.	395
Method detection limit		Median	180
TOTAL	12	Min.	10
		Max.	1200

Lognormal distribution? r-squared is: 0.981
Normal distribution? r-squared is: 0.780
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2627

Benzo(b)fluoranthene (Method 8270) 95% UCL Calculation

DATA	ID
42	J1RL49/ J1RL57
1700	J1RL45
870	J1RL46
730	J1RL47
110	J1RL48
13	J1RL50
58	J1RL51
52	J1RL52
220	J1RL53
2000	J1RL54
380	J1RL55
370	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	545
Censored		Lognormal mean	783
Detection limit or PQL		Std. devn.	672
Method detection limit		Median	295
TOTAL	12	Min.	13
		Max.	2000

Lognormal distribution? r-squared is: 0.970
Normal distribution? r-squared is: 0.786
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5648

Benzo(ghi)perylene (Method 8270) 95% UCL Calculation

DATA	ID
8.0	J1RL49/ J1RL57
570	J1RL45
230	J1RL46
190	J1RL47
7.5	J1RL48
8.0	J1RL50
8.0	J1RL51
8.5	J1RL52
71	J1RL53
470	J1RL54
110	J1RL55
120	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	150
Censored		Lognormal mean	235
Detection limit or PQL		Std. devn.	190
Method detection limit		Median	91
TOTAL	12	Min.	7.5
		Max.	570

Lognormal distribution? r-squared is: 0.862
Normal distribution? r-squared is: 0.779
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 240

Chrysene (Method 8270) 95% UCL Calculation

DATA	ID
52	J1RL49/ J1RL57
1400	J1RL45
690	J1RL46
580	J1RL47
130	J1RL48
14	J1RL50
58	J1RL51
110	J1RL52
230	J1RL53
2000	J1RL54
410	J1RL55
300	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	498
Censored		Lognormal mean	658
Detection limit or PQL		Std. devn.	614
Method detection limit		Median	265
TOTAL	12	Min.	14
		Max.	2000

Lognormal distribution? r-squared is: 0.983
Normal distribution? r-squared is: 0.765
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3528

Fluoranthene (Method 8270) 95% UCL Calculation

DATA	ID
94	J1RL49/ J1RL57
2100	J1RL45
1200	J1RL46
860	J1RL47
190	J1RL48
18	J1RL50
66	J1RL51
140	J1RL52
410	J1RL53
4200	J1RL54
550	J1RL55
420	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	854
Censored		Lognormal mean	1141
Detection limit or PQL		Std. devn.	1213
Method detection limit		Median	415
TOTAL	12	Min.	18
		Max.	4200

Lognormal distribution? r-squared is: 0.990
Normal distribution? r-squared is: 0.687
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7434

Indeno(1,2,3-cd)pyrene (Method 8270) 95% UCL Calculation

DATA	ID
11	J1RL49/ J1RL57
610	J1RL45
250	J1RL46
200	J1RL47
44	J1RL48
11	J1RL50
11	J1RL51
12	J1RL52
61	J1RL53
530	J1RL54
120	J1RL55
120	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	165
Censored		Lognormal mean	220
Detection limit or PQL		Std. devn.	205
Method detection limit		Median	91
TOTAL	12	Min.	11
		Max.	610

Lognormal distribution? r-squared is: 0.914
Normal distribution? r-squared is: 0.770
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1374

Phenanthrene (Method 8270) 95% UCL Calculation

DATA	ID
35	J1RL49/ J1RL57
1600	J1RL45
640	J1RL46
340	J1RL47
73	J1RL48
8.5	J1RL50
21	J1RL51
35	J1RL52
150	J1RL53
3300	J1RL54
200	J1RL55
210	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	551
Censored		Lognormal mean	729
Detection limit or PQL		Std. devn.	975
Method detection limit		Median	175
TOTAL	12	Min.	8.5
		Max.	3300

Lognormal distribution? r-squared is: 0.986
Normal distribution? r-squared is: 0.595
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8182

Pyrene (Method 8270) 95% UCL Calculation

DATA	ID
132	J1RL49/ J1RL57
2400	J1RL45
1300	J1RL46
920	J1RL47
230	J1RL48
22	J1RL50
73	J1RL51
170	J1RL52
420	J1RL53
4400	J1RL54
650	J1RL55
540	J1RL56

Number of samples		Uncensored values	
Uncensored	12	Mean	938
Censored		Lognormal mean	1234
Detection limit or PQL		Std. devn.	1282
Method detection limit		Median	480
TOTAL	12	Min.	22
		Max.	4400

Lognormal distribution? r-squared is: 0.991
Normal distribution? r-squared is: 0.705
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7280

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie

Project 100-N Field Remediation

Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations

Date 06/06/13

Job No. 14655

Calc. No. 0100N-CA-V0219

Checked C. H. Dobie

Rev. No. 0

Date 06/06/13

Sheet No. 32 of 36

Ecology Software (MTCAStat) Results, 100-N-61:4 Subsite Overburden (OB)

DATA	ID	Aroclor-1254 95% UCL Calculation				DATA	ID	Aroclor-1260 95% UCL Calculation			
66	J1RL49/ J1RL57					18	J1RL49/ J1RL57				
28	J1RL45					30	J1RL45				
29	J1RL46	Number of samples		Uncensored values		27	J1RL46	Number of samples		Uncensored values	
110	J1RL47	Uncensored	12	Mean	66	51	J1RL47	Uncensored	12	Mean	23
44	J1RL48	Censored		Lognormal mean	62	17	J1RL48	Censored		Lognormal mean	28
5.4	J1RL50	Detection limit or PQL		Std. devn.	119	1.3	J1RL50	Detection limit or PQL		Std. devn.	26
31	J1RL51	Method detection limit		Median	29	15	J1RL51	Method detection limit		Median	16
430	J1RL52	TOTAL	12	Min.	5.1	92	J1RL52	TOTAL	12	Min.	1.3
5	J1RL53			Max.	430	1.3	J1RL53			Max.	92
12	J1RL54					5.4	J1RL54				
12	J1RL55					6.3	J1RL55				
15	J1RL56					7.1	J1RL56				
		Lognormal distribution?		Normal distribution?				Lognormal distribution?		Normal distribution?	
		r-squared is: 0.949		r-squared is: 0.502				r-squared is: 0.957		r-squared is: 0.762	
		Recommendations:						Recommendations:			
		Use lognormal distribution.						Use lognormal distribution.			
		UCL (Land's method) is		230				UCL (Land's method) is		116	

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie Date 06/06/13 Calc. No. 0100N-CA-V0219 Rev. No. 0
Project 100-N Field Remediation Job No. 14655 Checked C. H. Dobie Date 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations Sheet No. 33 of 36

Duplicate/Split Analysis - 100-N-61:4 Subsite Excavation (EXC)

Sampling	Sample	Sample	Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt			Copper		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	7610	X	1.6	2.6		0.70	69.8	X	0.080	0.10	B	0.035	0.17	B	0.043	5330	X	14.9	10.8	X	0.061	6.8	X	0.11	12.8		0.23
Duplicate of J1RL18	J1RL28	4/25/13	6550	X	1.6	2.2		0.66	64.4	X	0.076	0.095	B	0.033	0.15	B	0.041	4460	X	14.2	9.5	X	0.058	6.4	X	0.10	12.2		0.22
Split of J1RL18	J1N152	4/25/13	6180		30.3	3.1		0.68	66.9		0.54	0.37	U	0.37	0.22	U	0.22	3940	N	28.7	8.8		0.66	6.2	B	2.0	11.5		1.6

Analysis:

		Aluminum	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper
	TDL		10	2	0.2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	15.0%		8.0%			17.8%	12.8%		4.8%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)			Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	20.7%		4.2%			30.0%	20.4%		10.7%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate/Split Analysis - 100-N-61:4 Subsite Excavation (EXC)

Sampling	Sample	Sample	Hexavalent Chromium			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon			Sodium		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	0.155	U	0.155	19700	X	4.0	4.4		0.29	4420	X	3.9	297	X	0.11	11.0	X	0.13	1420		43.3	276		6.0	208		62.3
Duplicate of J1RL18	J1RL28	4/25/13	0.231		0.155	17500	X	3.8	4.1		0.27	3790	X	3.7	257	X	0.10	10.0	X	0.12	1220		41.2	271		5.7	177		59.2
Split of J1RL18	J1N152	4/25/13	0.120	B	0.110	16300		6.4	5.0		0.37	3780	N	18	289		0.33	11.2		0.49	1310		728	770	N	3.3	133	B	102

Analysis:

		Hexavalent Chromium	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Silicon	Sodium
	TDL	0.5	5	5	75	5	4	400	2	50
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?		Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD		11.8%		15.3%	14.4%			1.8%	
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable
Split Analysis	Both > PQL?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?		Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD		18.9%		15.6%	2.7%			94.5%	
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable

Duplicate/Split Analysis - 100-N-61:4 Subsite Excavation (EXC)

Sampling	Sample	Sample	Vanadium			Zinc			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrate and Nitrite			Sulfate		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	40.0	X	0.099	36.6	X	0.42	7.8		2.1	1.1	B	0.89	24.5	J	0.34	32.3	J	0.34	84.7		1.9
Duplicate of J1RL18	J1RL28	4/25/13	37.4	X	0.094	33.9	X	0.40	8.2		2.1	0.95	B	0.89	26.1	J	0.34	41.8	JN	0.34	90.7		1.9
Split of J1RL18	J1N152	4/25/13	34.2		2.7	34.8		4.3	4.7		0.23	0.71	B	0.12	27.9		0.46	30.1		0.19	92.5		0.58

Analysis:

		Vanadium	Zinc	Chloride	Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrate and Nitrite	Sulfate
	TDL	2.5	1	2	5	0.75	0.75	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	6.7%	7.7%			6.3%	25.6%	6.8%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	Not applicable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	15.6%	5.0%			13.0%	7.1%	8.8%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	Not applicable

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date	06/06/13	Calc. No.	0100N-CA-V0219
Project	100-N Field Remediation	Job No.	14655	Checked	C. H. Dobie
Subject	100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations				

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Date 06/06/13
Sheet No. 34 of 36

Duplicate/Split Analysis - 100-N-61:4 Subsite South Staging Pile (SSP)

Sampling	Sample	Sample	Potassium-40			Radium-226			Uranium-234			Uranium-238			Aluminum			Arsenic			Barium			Beryllium			Boron		
Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	15.6		0.256	0.629		0.0430	0.187		0.0951	0.249		0.0873	8240		1.3	2.0		0.56	69.4		0.065	0.24		0.028	1.4	B	0.83
Duplicate of J1RL91	J1RLC2	4/30/13	15.0		0.256	0.624		0.0412	0.400		0.0958	0.301		0.0827	9770		1.4	2.3		0.61	82.7		0.070	0.27		0.030	1.4	B	0.91
Split of J1RL91	J1RLD8	4/30/13				0	U	2.83	0.370		0.0813	0.288		0.0684	6960		28	2.6		0.63	72.3		0.50	0.34	U	0.34	3.0	U	3.0

Analysis:

		Potassium-40	Radium-226	Uranium-234	Uranium-238	Aluminum	Arsenic	Barium	Beryllium	Boron
TDL		0.5	0.1	1	1	5	10	2	0.2	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	3.9%	0.8%		-	17.0%		17.5%		
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?		No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?			No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)		
	RPD					16.8%		4.1%		
	Difference > 2 TDL?		Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable

Duplicate/Split Analysis - 100-N-61:4 Subsite South Staging Pile (SSP)

Sampling	Sample	Sample	Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	0.15	B	0.035	3730		12.0	11.4		0.049	8.9	X	0.085	13.2		0.18	20300		3.2	4.3		0.23	4270		3.1	321	X	0.085
Duplicate of J1RL91	J1RLC2	4/30/13	0.17	B	0.038	4140		13.0	13.5		0.054	9.0	X	0.092	15.0		0.20	23000		3.5	5.2		0.25	5050		3.4	371	X	0.092
Split of J1RL91	J1RLD8	4/30/13	0.20	U	0.20	3010	N	26.6	9.2		0.61	7.3	B	1.9	11.7		1.5	19100		5.9	5.1		0.34	3740	N	16.6	356		0.31

Analysis:

		Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese
TDL		0.2	100	1	2	1	5	5	75	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD		10.4%	16.9%		12.8%	12.5%		16.7%	14.5%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable
Split Analysis	Both > PQL?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?		Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD		21.4%	21.4%		12.0%	6.1%		13.2%	10.3%
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable

Duplicate/Split Analysis - 100-N-61:4 Subsite South Staging Pile (SSP)

Sampling	Sample	Sample	Mercury			Nickel			Potassium			Silicon			Sodium			Vanadium			Zinc			Chloride			Fluoride		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	0.007	B	0.0049	11.7	X	0.10	1690		34.9	138		4.8	190		50.2	45.0		0.080	42.2	X	0.34	5.8		2.0	1.2	B	0.82
Duplicate of J1RL91	J1RLC2	4/30/13	0.012	B	0.0056	13.7	X	0.11	2000		37.9	254		5.2	223		54.5	48.9		0.087	46.6	X	0.37	7.6		1.9	1.4	B	0.80
Split of J1RL91	J1RLD8	4/30/13	0.011	U	0.011	9.4		0.45	1570		673	920	N	3.1	128	B	94.1	42.4		2.5	37.4		4.0	3.2		0.2	0.88	B	0.10

Analysis:

		Mercury	Nickel	Potassium	Silicon	Sodium	Vanadium	Zinc	Chloride	Fluoride
TDL		0.2	4	400	2	50	2.5	1	2	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD				*59.2%*		8.3%	9.9%		
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?		No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD				*147.8%*		5.9%	12.1%		
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Duplicate/Split Analysis - 100-N-61:4 Subsite South Staging Pile (SSP)

Sampling	Sample	Sample	Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate			Phosphorous in phosphate			Sulfate			Aroclor-1260		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
SSP-2	J1RL91	4/30/13	3.3		0.31	1.3		0.3	1.2	B	1.2	11.3		1.7	8.9	J	2.5
Duplicate of J1RL91	J1RLC2	4/30/13	1.8	B	0.31	1.1		0.29	1.7	B	1.2	9.4		1.7	6.3	J	2.5
Split of J1RL91	J1RLD8	4/30/13	1.3		0.041	1.9		0.047				7.1		0.51	5.6	U	5.6

Analysis:

		Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	Phosphorous in phosphate	Sulfate	Aroclor-1260
TDL		0.75	0.75	5	5	20
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)
	RPD					
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)		Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)	
	RPD					
	Difference > 2 TDL?	Yes - assess further	No - acceptable		No - acceptable	Not applicable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie   Date 06/06/13   Calc. No. 0100N-CA-V0219   Rev. No. 0
Project 100-N Field Remediation   Job No. 14655   Checked C. H. Dobie   Date 06/06/13
Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations   Sheet No. 35 of 36

Duplicate/Split Analysis - 100-N-61:4 Subsite Overburden (OB)

Sampling	Sample	Sample	Potassium-40			Radium-226			Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt		
Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	15.5		0.243	0.472		0.0383	6400	X	1.5	2.3		0.65	58.1	X	0.075	0.16	B	0.033	0.17	B	0.040	8400	X	13.9	10.3	X	0.057	7.2	X	0.099
Duplicate of J1RL49	J1RL57	4/30/13	15.4		0.253	0.504		0.0525	6920	X	1.5	2.9		0.65	64.2	X	0.075	0.17	B	0.033	0.15	B	0.040	14100	X	13.9	11.4	X	0.057	7.1	X	0.098
Split of J1RL49	J1RL73	4/30/13				0.936	U	1.12	5240		27.1	3.0		0.61	53.1		0.48	0.33	U	0.33	0.19	U	0.19	7480		25.7	8.2		0.59	6.2	B	1.8

Analysis:

	TDL	0.5	0.1	5	10	2	0.5	0.2	100	1	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	0.6%		7.8%		10.0%			*50.7%*	10.1%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable
Split Analysis	Both > PQL?		No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?			Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)			Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD			19.9%		9.0%			11.6%	22.7%	
	Difference > 2 TDL?		Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable

Duplicate/Split Analysis - 100-N-61:4 Subsite Overburden (OB)

Sampling	Sample	Sample	Copper			Hexavalent Chromium			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon			Sodium		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	14.4	X	0.21	0.161		0.155	17300	X	3.7	3.7	X	0.27	4500	X	3.6	281	X	0.099	10.3	X	0.12	1210		40.4	119		5.6	189		58.2
Duplicate of J1RL49	J1RL57	4/30/13	15.7	X	0.21	0.155	U	0.155	17600	X	3.7	3.8	X	0.27	4930	X	3.6	292	X	0.098	11.5	X	0.12	1230		40.4	169		5.6	222		58.1
Split of J1RL49	J1RL73	4/30/13	13.0		1.4	0.130	B	0.100	15900		5.7	4.4		0.33	3900		16.1	273		0.30	8.8		0.44	970		652	804	N	3.0	146	B	91.1

Analysis:

	TDL	1	0.5	5	5	75	5	4	400	2	50
Duplicate Analysis	Both > PQL?	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)		Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	8.6%		1.7%		9.1%	3.8%			*34.7%*	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	10.2%		8.4%		14.3%	2.9%			*148.4%*	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable

Duplicate/Split Analysis - 100-N-61:4 Subsite Overburden (OB)

Sampling	Sample	Sample	Vanadium			Zinc			Chloride			Nitrogen in Nitrate			Sulfate			TPH - Diesel Ext			TPH - Diesel			Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
OB-5	J1RL49	4/30/13	40.5	X	0.093	38.1	X	0.39	3.5	B	2.0	0.87	B	0.32	3.3	B	1.7	5200		980	3200	J	670	45		3.1	28		6.2	26		4.0
Duplicate of J1RL49	J1RL57	4/30/13	41.1	X	0.093	38.0	X	0.39	3.6	B	1.9	0.89	B	0.30	3.1	B	1.7	3300	J	970	1800	J	660	4.3	JNX	3.3	9.4	J	6.5	9.5	J	4.3
Split of J1RL49	J1RL73	4/30/13	34.4		2.4	33.4		3.8	0.58	B	0.20	0.55		0.041	2.0	B	0.51				340	U	340	25	N	3.1	39	N	3.1	28	N	3.1

Analysis:

	TDL	2.5	1	2	0.75	5	5000	5000	15	15	15
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	1.5%	0.3%								
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)		No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)			No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	16.3%	13.1%								
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable		Not applicable	No - acceptable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/06/13 **Calc. No.** 0100N-CA-V0219 **Rev. No.** 0

Project 100-N Field Remediation **Job No.** 14655 **Checked** C. H. Dobie **Date** 06/06/13

Subject 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Cleanup Verification 95% UCL Calculations **Sheet No.** 36 of 36

Duplicate/Split Analysis - 100-N-61:4 Subsite Overburden (OB)

Sampling Area	Sample Number	Sample Date	Chrysene (Method 8310)			Fluoranthene (Method 8310)			Pyrene (Method 8310)			Benzo(a)anthracene (Method 8270)			Chrysene (Method 8270)			Pyrene (Method 8270)			Aroclor-1254			Aroclor-1260		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
OB-5	J1RL49	4/30/13	29	JX	4.7	45		12	64		12	26	J	20	30	J	27	44	J	12	72	P	2.6	18	P	2.6
Duplicate of J1RL49	J1RL57	4/30/13	15	JN	4.9	27	JN	13	49	N	12	67	J	20	73	J	27	220	J	12	59		2.5	18	P	2.5
Split of J1RL49	J1RL73	4/30/13	44	N	3.1	72	N	6.1	52	N	3.1	360		34	380		34	680		34	5.6	U	5.6	14	J	5.6

Analysis:

TDL		Chrysene (Method 8310)	Fluoranthene (Method 8310)	Pyrene (Method 8310)	Benzo(a)anthracene (Method 8270)	Chrysene (Method 8270)	Pyrene (Method 8270)	Aroclor-1254	Aroclor-1260
TDL		15	15	15	660	660	660	20	20
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD								
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)
	RPD								
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Radionuclides)

Sample Location	HEIS Number	Sample Date	Americium-241			Carbon-14			Cesium-137			Cobalt-60			Europium-152		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SSP-2	J1RL91	4/30/13	-0.0153	U	0.0334	0.0145	U	0.788	0.00297	U	0.0249	-0.00105	U	0.0290	0.00738	U	0.0549
Duplicate of J1RL91	J1RLC2	4/30/13	-0.00897	U	0.0334	-0.549	U	0.797	-0.00698	U	0.0239	0.00236	U	0.0278	0.0171	U	0.0524
SSP-1	J1RL90	4/30/13	0.00326	U	0.201	-0.445	U	0.796	0.161		0.0328	0.0137	U	0.0370	0.000338	U	0.0773
SSP-3	J1RL92	4/30/13	-0.00038	U	0.0297	0.0592	U	0.797	0.0161	U	0.0236	0.0210	U	0.0274	0.0100	U	0.0461
SSP-4	J1RL93	4/30/13	-0.0101	U	0.0337	0.102	U	0.788	0.00867	U	0.0245	-0.0044	U	0.0271	0.0019	U	0.0496
SSP-5	J1RL94	4/30/13	-0.00124	U	0.0325	0.386	U	0.791	-0.0169	U	0.0229	-0.0145	U	0.0224	-0.0433	U	0.0493
SSP-6	J1RL95	4/30/13	-0.00145	U	0.0492	0.191	U	0.795	0.0735		0.0296	0.0106	U	0.0329	-0.0155	U	0.0695
SSP-7	J1RL96	4/30/13	0.0125	U	0.0321	-0.114	U	0.803	0.0451		0.0229	0.00892	U	0.0277	-0.00349	U	0.0528
SSP-8	J1RL97	4/30/13	-0.00791	U	0.0328	0.600	U	0.792	0.0230	U	0.0282	0.00109	U	0.0285	0.00828	U	0.0524
SSP-9	J1RL98	4/30/13	0.0520	U	0.163	0.625	U	0.801	-0.0133	U	0.0304	-0.00682	U	0.0319	0.118	U	0.0906
SSP-10	J1RL99	4/30/13	0.0128	U	0.131	0.290	U	0.790	0.0514		0.0400	-0.00235	U	0.0391	-0.0399	U	0.0966
SSP-11	J1RLC0	4/30/13	-0.00279	U	0.0349	-0.259	U	0.782	0.0220	U	0.0292	-0.00112	U	0.0299	0.00226	U	0.0539
SSP-12	J1RLC1	4/30/13	0.000898	U	0.164	0.525	U	0.800	-0.00197	U	0.0276	0.000971	U	0.0274	-0.00785	U	0.0610
Split of J1RL91	J1RLD8	4/30/13	0.0493	U	0.255	-0.045	U	1.21	-0.0250	U	0.128	0	U	0.0747	0.0229	U	0.358

Sample Location	HEIS Number	Sample Date	Europium-154			Europium-155			Nickel-63			Plutonium-238			Plutonium-239/240		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SSP-2	J1RL91	4/30/13	0.0314	U	0.0912	0.0267	U	0.0501	11.3	U	12.6	-0.00374	U	0.0690	-0.00907	U	0.0873
Duplicate of J1RL91	J1RLC2	4/30/13	-0.0258	U	0.0868	0.0237	U	0.0491	4.29	U	10.7	-0.000788	U	0.0716	-0.00236	U	0.0850
SSP-1	J1RL90	4/30/13	-0.0154	U	0.0965	0.0213	U	0.0831	6.28	U	10.8	-0.00138	U	0.0694	-0.00276	U	0.0787
SSP-3	J1RL92	4/30/13	-0.000197	U	0.0757	0.0333	U	0.0451	-0.436	U	11.0	0.0300	U	0.0746	-0.00261	U	0.0746
SSP-4	J1RL93	4/30/13	0.0480	U	0.0870	0.0474	U	0.0502	6.44	U	11.2	0	U	0.0509	-0.00391	U	0.0723
SSP-5	J1RL94	4/30/13	0.0616	U	0.0941	0.0687	U	0.0524	11.2	U	11.3	-0.000663	U	0.0603	0.0311	U	0.0715
SSP-6	J1RL95	4/30/13	0.0195	U	0.0943	0.0290	U	0.0706	0.927	U	10.7	-0.00216	U	0.0777	-0.00288	U	0.0821
SSP-7	J1RL96	4/30/13	-0.0244	U	0.0772	0.0401	U	0.0472	15.3		11.2	0.0257	U	0.126	-0.00468	U	0.134
SSP-8	J1RL97	4/30/13	0.0311	U	0.0869	0.00989	U	0.0496	0.311	U	10.7	0.0145	U	0.0550	-0.00242	U	0.0690
SSP-9	J1RL98	4/30/13	-0.0364	U	0.100	0.0013	U	0.116	3.16	U	10.9	-0.00185	U	0.0665	-0.00123	U	0.0619
SSP-10	J1RL99	4/30/13	-0.0407	U	0.123	0.0976	U	0.103	0.584	U	10.6	0.0100	U	0.0720	0.00445	U	0.0911
SSP-11	J1RLC0	4/30/13	-0.0239	U	0.0801	0.0720	U	0.0527	1.26	U	10.7	0.0206	U	0.112	0.169		0.106
SSP-12	J1RLC1	4/30/13	-0.0380	U	0.0827	0.0351	U	0.0737	0.297	U	10.6	-0.000678	U	0.0616	-0.00474	U	0.0875
Split of J1RL91	J1RLD8	4/30/13	0.0972	U	1.24	0.111	U	0.269	-1.70	U	2.62	-0.0310	U	0.103	0.00262	U	0.0608

Attachment	1	Sheet No.	1 of 24
Originator	J. D. Skoglie	Date	6/10/13
Checked	C. H. Dobie	Date	6/10/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Note: Data qualified with B, C, and/or J are considered acceptable values.

[a] Total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) from the excavation decision unit are for information only. Also for information only are the semivolatile organic constituents (SVOC) that are associated with both Method 8310 and 8270 (acenaphthene, acenapthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, flouranthene, flourene, indeno(1,2,3-cd)pyrene, naphthalene, phenathrene, and pyrene). Information only samples are located in Attachment 2 and discussed further in the RSVP.

B = blank contamination (inorganic constituents)
C = </= 5x blank concentration
D = reported from a dilution.
EXC = excavation
HEIS = Hanford Environmental Information System
J = estimate
M = duplicate precision not met.
MDA = minimal detectable activity
N = recovery outside control limits
OB = overburden
P = target analyte with >40% difference between column analyses.
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls
PQL = practical quantitation limit
Q = qualifier
R = rejected
SSP = south staging pile
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons
U = undetected
X (metals) = physical and chemical interferences are present.
X (organics) = >40% difference between primary and confirmation detector results.

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Radionuclides)

Sample Location	HEIS Number	Sample Date	Potassium-40			Radium-226			Total beta radiostrontium			Tritium			Uranium-234		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SSP-2	J1RL91	4/30/13	15.6		0.256	0.629		0.0430	-0.0154	U	0.177	0.00596	U	0.0237	0.187		0.0951
Duplicate of J1RL91	J1RLC2	4/30/13	15.0		0.256	0.624		0.0412	0.0811	U	0.163	0.0131	U	0.0228	0.400		0.0958
SSP-1	J1RL90	4/30/13	15.9		0.270	0.664		0.0547	0.118	U	0.185	0.00696	U	0.0366	0.360		0.0848
SSP-3	J1RL92	4/30/13	13.9		0.225	0.505		0.0350	0.0684	U	0.173	0.0201		0.0185	0.0349	U	0.0759
SSP-4	J1RL93	4/30/13	15.1		0.205	0.561		0.0415	0.0666	U	0.181	0.0153	U	0.0305	0.125		0.0562
SSP-5	J1RL94	4/30/13	14.7		0.202	0.445		0.0416	0.0783	U	0.174	0.00951	U	0.0222	0.123		0.0643
SSP-6	J1RL95	4/30/13	14.5		0.222	0.611		0.0525	0.0383	U	0.168	0.00293	U	0.0214	0.0824		0.0645
SSP-7	J1RL96	4/30/13	14.7		0.216	0.530		0.0428	0.0834	U	0.187	0.00388	U	0.0175	0.0528	U	0.0666
SSP-8	J1RL97	4/30/13	14.4		0.199	0.473		0.0407	0.0737	U	0.176	-0.00236	U	0.0255	0.167		0.0644
SSP-9	J1RL98	4/30/13	15.6		0.168	0.670		0.0620	-0.0323	U	0.167	0.0198	U	0.0362	0.153		0.0713
SSP-10	J1RL99	4/30/13	13.6		0.335	0.633		0.0674	0.146	U	0.174	0.000641	U	0.0189	0.153		0.0622
SSP-11	J1RLC0	4/30/13	15.1		0.207	0.526		0.0431	0.00768	U	0.176	0.0228		0.0204	0.176		0.112
SSP-12	J1RLC1	4/30/13	12.9		0.211	0.497		0.0454	-0.0138	U	0.175	-0.00352	U	0.0220	0.200		0.0844
Split of J1RL91	J1RLD8	4/30/13				0	U	2.83	-0.0880	U	0.208	0.00966	U	0.132	0.370		0.0813

Sample Location	HEIS Number	Sample Date	Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA
SSP-2	J1RL91	4/30/13	-0.00181	U	0.0651	0.249		0.0873
Duplicate of J1RL91	J1RLC2	4/30/13	0.0129	U	0.0632	0.301		0.0827
SSP-1	J1RL90	4/30/13	0.0159	U	0.0578	0.185		0.0848
SSP-3	J1RL92	4/30/13	-0.00161	U	0.0580	0.159		0.0614
SSP-4	J1RL93	4/30/13	-0.00112	U	0.0562	0.236		0.0562
SSP-5	J1RL94	4/30/13	-0.00354	U	0.0846	0.174		0.0807
SSP-6	J1RL95	4/30/13	-0.00113	U	0.0568	0.113		0.0514
SSP-7	J1RL96	4/30/13	0.0122	U	0.0601	0.151		0.0635
SSP-8	J1RL97	4/30/13	0	U	0.0513	0.0975		0.0567
SSP-9	J1RL98	4/30/13	0.0156	U	0.0568	0.341		0.0713
SSP-10	J1RL99	4/30/13	-0.00124	U	0.0622	0.107		0.0622
SSP-11	J1RLC0	4/30/13	-0.00164	U	0.0822	0.278		0.112
SSP-12	J1RLC1	4/30/13	0	U	0.0575	0.0727	U	0.0893
Split of J1RL91	J1RLD8	4/30/13	0.0102	U	0.0533	0.288		0.0684

Attachment	1	Sheet No.	2 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Radionuclides)

Sample Location	HEIS	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
OB-5	J1RL49	4/30/13	-0.0158	U	0.0294	0.0170	U	0.0263	0.00718	U	0.0297	0.0196	U	0.0498	-0.0129	U	0.0846
Duplicate of J1RL49	J1RL57	4/30/13	-0.0851	U	0.141	0.0155	U	0.0323	0.00627	U	0.0325	0.0363	U	0.0859	0.00799	U	0.0973
OB-1	J1RL45	4/30/13	-0.00464	U	0.0234	-0.00443	U	0.0182	0.0118	U	0.0245	-0.0273	U	0.0390	-0.00624	U	0.0642
OB-2	J1RL46	4/30/13	-0.000577	U	0.0274	0.00900	U	0.0221	0.00901	U	0.0254	0.0245	U	0.0467	0.00697	U	0.0704
OB-3	J1RL47	4/30/13	0.00238	U	0.0262	0.00931	U	0.0213	-0.00680	U	0.0212	-0.0139	U	0.0417	0.00884	U	0.0745
OB-4	J1RL48	4/30/13	0.0328	U	0.160	0.0111	U	0.0252	0.00771	U	0.0261	0.0118	U	0.0608	-0.0412	U	0.0684
OB-6	J1RL50	4/30/13	0.0230	U	0.0379	-0.000131	U	0.0256	0.000158	U	0.0254	-0.00164	U	0.0571	-0.0308	U	0.0750
OB-7	J1RL51	4/30/13	-0.0204	U	0.130	0.0111	U	0.0307	0.00911	U	0.0287	-0.0848	U	0.0781	-0.0106	U	0.0886
OB-8	J1RL52	4/30/13	0.0887	U	0.118	0.000460	U	0.0370	0.000686	U	0.0394	0.0138	U	0.0920	0.0442	U	0.124
OB-9	J1RL53	4/30/13	0.00696	U	0.0296	0.000682	U	0.0216	-0.00936	U	0.0221	0.00947	U	0.0472	0.00648	U	0.0762
OB-10	J1RL54	4/30/13	-0.00957	U	0.177	0.0116	U	0.0278	0.00938	U	0.0285	-0.0354	U	0.0604	0.00400	U	0.0824
OB-11	J1RL55	4/30/13	-0.00746	U	0.0282	0.00454	U	0.0226	-0.00832	U	0.0240	-0.0121	U	0.0455	-0.0028	U	0.0802
OB-12	J1RL56	4/30/13	0.00059	U	0.0381	-0.00844	U	0.0245	0.00576	U	0.0252	0.0251	U	0.0611	-0.00268	U	0.0866
Split of J1RL49	J1RL73	4/30/13	-0.0230	U	0.134	0.0130	U	0.0584	0.0108	U	0.0590	0.0183	U	0.135	0.0290	U	0.365

Sample Location	HEIS	Sample Date	Europium-155			Potassium-40			Radium-226			Total beta radiostrontium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
OB-5	J1RL49	4/30/13	0.0198	U	0.0436	15.5		0.243	0.472		0.0383	0.00416	U	0.134
Duplicate of J1RL49	J1RL57	4/30/13	-0.000976	U	0.101	15.4		0.253	0.504		0.0525	0.0463	U	0.132
OB-1	J1RL45	4/30/13	0.0433	U	0.0392	10.8		0.176	0.312		0.0318	0.0551	U	0.140
OB-2	J1RL46	4/30/13	0.0219	U	0.0438	12.4		0.169	0.380		0.0358	0.0345	U	0.126
OB-3	J1RL47	4/30/13	0.0277	U	0.0406	12.2		0.173	0.376		0.0341	0.0356	U	0.139
OB-4	J1RL48	4/30/13	0.00630	U	0.0684	12.5		0.190	0.369		0.0415	0.126	U	0.135
OB-6	J1RL50	4/30/13	-0.00887	U	0.0566	11.7		0.182	0.402		0.0403	-0.00587	U	0.128
OB-7	J1RL51	4/30/13	0.0151	U	0.0954	13.6		0.216	0.476		0.0513	0.0416	U	0.140
OB-8	J1RL52	4/30/13	-0.00949	U	0.0840	14.3		0.297	0.481		0.0666	0.0285	U	0.131
OB-9	J1RL53	4/30/13	0.0509	U	0.0482	12.8		0.164	0.426		0.0361	0.0401	U	0.126
OB-10	J1RL54	4/30/13	0.0352	U	0.0750	13.8		0.155	0.437		0.0445	0.0477	U	0.125
OB-11	J1RL55	4/30/13	0.0376	U	0.0426	13.0		0.237	0.456		0.0365	-0.00819	U	0.132
OB-12	J1RL56	4/30/13	-0.0105	U	0.0557	11.7		0.198	0.368		0.0432	0.0788	U	0.131
Split of J1RL49	J1RL73	4/30/13	0.0645	U	0.128				0.936	U	1.12	0.00958	U	0.202

Attachment	1	Sheet No.	3 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Metals)

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	7610	X	1.6	0.62	JB	0.40	2.6		0.7	69.8	X	0.080	0.10	B	0.035
Duplicate of J1RL18	J1RL28	4/25/13	6550	X	1.6	0.38	UJ	0.38	2.2		0.66	64.4	X	0.076	0.095	B	0.033
EXC-1	J1RL16	4/25/13	7040	X	1.5	0.75	J	0.37	3.0		0.64	54.1	X	0.073	0.032	U	0.032
EXC-2	J1RL17	4/25/13	7740	X	1.5	0.80	J	0.37	4.0		0.65	50.0	X	0.074	0.13	B	0.032
EXC-4	J1RL19	4/25/13	6990	X	1.5	0.68	J	0.37	5.2		0.63	74.5	X	0.073	0.061	B	0.032
EXC-5	J1RL20	4/25/13	5510	X	1.5	1.1	J	0.36	2.2		0.63	47.0	X	0.072	0.031	U	0.031
EXC-6	J1RL21	4/25/13	5750	X	1.4	0.94	J	0.34	2.1		0.59	52.6	X	0.068	0.029	U	0.029
EXC-7	J1RL22	4/25/13	7160	X	1.4	0.63	J	0.34	2.4		0.59	63.3	X	0.067	0.082	B	0.029
EXC-8	J1RL23	4/25/13	6250	X	1.4	0.55	J	0.34	1.5		0.60	49.3	X	0.069	0.080	B	0.030
EXC-9	J1RL24	4/25/13	7550	X	1.4	0.35	UJ	0.35	2.9		0.61	66.9	X	0.070	0.15	B	0.030
EXC-10	J1RL25	4/25/13	7160	X	1.5	0.45	JB	0.38	2.8		0.66	66.2	X	0.076	0.12	B	0.033
EXC-11	J1RL26	4/25/13	5930	X	1.4	1.0	J	0.34	2.6		0.59	52.2	X	0.068	0.030	U	0.030
EXC-12	J1RL27	4/25/13	4600	X	1.5	0.99	J	0.36	1.4		0.63	62.3	X	0.072	0.031	U	0.031
Split of J1RL18	J1N152	4/25/13	6180		30.3	1.4	UN	1.4	3.1		0.68	66.9		0.54	0.37	U	0.37
Equipment Blank	J1RL29	4/25/13	170	X	1.5	0.36	U	0.36	0.62	U	0.62	1.9	X	0.072	0.031	U	0.031

Sample Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	1.0	B	1.0	0.17	B	0.043	5330	X	14.9	10.8	X	0.061	6.8	X	0.11
Duplicate of J1RL18	J1RL28	4/25/13	0.98	U	0.98	0.15	B	0.041	4460	X	14.2	9.5	X	0.058	6.4	X	0.10
EXC-1	J1RL16	4/25/13	0.94	U	0.94	0.14	B	0.039	7200	X	13.6	6.6	X	0.056	9.0	X	0.096
EXC-2	J1RL17	4/25/13	0.99	B	0.96	0.15	B	0.040	10500	X	13.8	9.2	X	0.057	8.6	X	0.098
EXC-4	J1RL19	4/25/13	0.99	B	0.94	0.18	B	0.039	8990	X	13.5	16.7	X	0.056	9.1	X	0.096
EXC-5	J1RL20	4/25/13	0.93	U	0.93	0.18	B	0.039	9550	X	13.4	6.1	X	0.055	8.7	X	0.095
EXC-6	J1RL21	4/25/13	0.87	U	0.87	0.19		0.036	6700	X	12.5	8.0	X	0.052	7.8	X	0.089
EXC-7	J1RL22	4/25/13	0.92	B	0.87	0.17	B	0.036	6110	X	12.5	8.8	X	0.051	8.2	X	0.089
EXC-8	J1RL23	4/25/13	0.89	U	0.89	0.12	B	0.037	6240	X	12.8	10.2	X	0.053	7.1	X	0.091
EXC-9	J1RL24	4/25/13	0.99	B	0.90	0.15	B	0.038	4820	X	13.0	12.4	X	0.053	5.8	X	0.092
EXC-10	J1RL25	4/25/13	0.98	U	0.98	0.17	B	0.041	7310	X	14.1	12.9	X	0.058	6.4	X	0.10
EXC-11	J1RL26	4/25/13	0.88	U	0.88	0.14	B	0.037	5040	X	12.7	7.7	X	0.052	9.4	X	0.090
EXC-12	J1RL27	4/25/13	0.93	U	0.93	0.15	B	0.039	5850	X	13.4	4.4	X	0.055	8.9	X	0.095
Split of J1RL18	J1N152	4/25/13	3.2	U	3.2	0.22	U	0.22	3940	N	28.7	8.8		0.66	6.2	B	2.0
Equipment Blank	J1RL29	4/25/13	0.92	U	0.92	0.039	U	0.039	36.7	BX	13.3	0.12	BX	0.055	0.11	BX	0.094

Sample Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Lithium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	12.8		0.23	0.155	U	0.155	19700	X	4.0	4.4		0.29			
Duplicate of J1RL18	J1RL28	4/25/13	12.2		0.22	0.231		0.155	17500	X	3.8	4.1		0.27			
EXC-1	J1RL16	4/25/13	16.7		0.21	0.155	U	0.155	25000	X	3.7	5.9		0.26			
EXC-2	J1RL17	4/25/13	17.7		0.21	0.155	U	0.155	22000	X	3.7	8.6		0.26			
EXC-4	J1RL19	4/25/13	23.3		0.21	0.331		0.155	25700	X	3.7	19.3		0.26			
EXC-5	J1RL20	4/25/13	14.6		0.21	0.176		0.155	25000	X	3.6	4.2		0.26			
EXC-6	J1RL21	4/25/13	15.8		0.19	0.254		0.155	22600	X	3.4	30.9		0.24			
EXC-7	J1RL22	4/25/13	14.1		0.19	0.214		0.155	20600	X	3.4	4.5		0.24			
EXC-8	J1RL23	4/25/13	15.3		0.20	0.155	U	0.155	17600	X	3.4	3.9		0.24			
EXC-9	J1RL24	4/25/13	10.4		0.20	0.155	U	0.155	16200	X	3.5	4.2		0.25			
EXC-10	J1RL25	4/25/13	15.0		0.22	0.155	U	0.155	17200	X	3.8	4.7		0.27			
EXC-11	J1RL26	4/25/13	14.9		0.19	0.194		0.155	24900	X	3.4	3.9		0.24			
EXC-12	J1RL27	4/25/13	14.4		0.21	0.155	U	0.155	24400	X	3.6	2.6		0.26			
Split of J1RL18	J1N152	4/25/13	11.5		1.6	0.120	B	0.110	16300		6.4	5.0		0.37	6.2	B	1.4
Equipment Blank	J1RL29	4/25/13	0.20	U	0.20				256	X	3.6	0.29	B	0.25			

Attachment	1	Sheet No.	4 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Metals)

Sample Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	4420	X	3.9	297	X	0.11	0.0052	U	0.0052	0.27	U	0.27	11.0	X	0.13
Duplicate of J1RL18	J1RL28	4/25/13	3790	X	3.7	257	X	0.10	0.0056	U	0.0056	0.26	U	0.26	10.0	X	0.12
EXC-1	J1RL16	4/25/13	5290	X	3.6	331	X	0.096	0.059	N	0.0058	0.36	B	0.25	10.3	X	0.12
EXC-2	J1RL17	4/25/13	5640	X	3.6	340	X	0.098	0.0072	B	0.0059	0.40	B	0.25	11.7	X	0.12
EXC-4	J1RL19	4/25/13	4710	X	3.6	312	X	0.096	0.0093	B	0.0055	0.63	B	0.25	19.2	X	0.12
EXC-5	J1RL20	4/25/13	5080	X	3.5	305	X	0.095	0.0051	U	0.0051	0.25	U	0.25	8.7	X	0.12
EXC-6	J1RL21	4/25/13	4300	X	3.3	279	X	0.089	0.052		0.0048	0.23	U	0.23	10.7	X	0.11
EXC-7	J1RL22	4/25/13	4380	X	3.3	313	X	0.089	0.0052	U	0.0052	0.23	U	0.23	10.2	X	0.11
EXC-8	J1RL23	4/25/13	3980	X	3.4	309	X	0.091	0.0073	B	0.0055	0.24	U	0.24	13.9	X	0.11
EXC-9	J1RL24	4/25/13	4430	X	3.4	248	X	0.092	0.0062	U	0.0062	0.24	U	0.24	12.4	X	0.11
EXC-10	J1RL25	4/25/13	4570	X	3.7	287	X	0.10	0.24		0.0048	0.26	U	0.26	12.7	X	0.12
EXC-11	J1RL26	4/25/13	4760	X	3.3	351	X	0.09	0.0057	U	0.0057	0.23	U	0.23	11.0	X	0.11
EXC-12	J1RL27	4/25/13	4690	X	3.5	340	X	0.095	0.0062	U	0.0062	0.25	U	0.25	9.7	X	0.12
Split of J1RL18	J1N152	4/25/13	3780	N	18	289		0.33	0.012	U	0.012	0.68	U	0.68	11.2		0.49
Equipment Blank	J1RL29	4/25/13	20.4	X	3.5	5.0	X	0.094	0.0058	U	0.0058	0.25	U	0.25	0.12	UX	0.12

Sample Location	HEIS Number	Sample Date	Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	1420		43.3	0.91	U	0.91	276	J	6.0	0.17	U	0.17	208		62.3
Duplicate of J1RL18	J1RL28	4/25/13	1220		41.2	0.86	U	0.86	271	J	5.7	0.16	U	0.16	177		59.2
EXC-1	J1RL16	4/25/13	1120		39.5	0.83	U	0.83	257	J	5.4	0.15	U	0.15	448		56.8
EXC-2	J1RL17	4/25/13	1320		40.1	0.84	U	0.84	283	J	5.5	0.16	U	0.16	515		57.7
EXC-4	J1RL19	4/25/13	1240		39.4	0.83	U	0.83	300	J	5.4	0.15	U	0.15	286		56.7
EXC-5	J1RL20	4/25/13	864		39.0	0.82	U	0.82	161	J	5.4	0.15	U	0.15	259		56.1
EXC-6	J1RL21	4/25/13	925		36.4	0.76	U	0.76	266	J	5.0	0.14	U	0.14	233		52.4
EXC-7	J1RL22	4/25/13	1210		36.4	0.76	U	0.76	296	J	5.0	0.14	U	0.14	237		52.3
EXC-8	J1RL23	4/25/13	754		37.1	0.78	U	0.78	204	J	5.1	0.14	U	0.14	181		53.4
EXC-9	J1RL24	4/25/13	1410		37.8	0.79	U	0.79	312	J	5.2	0.15	U	0.15	164		54.4
EXC-10	J1RL25	4/25/13	1150		41.0	0.86	U	0.86	268	J	5.7	0.16	U	0.16	204		59.0
EXC-11	J1RL26	4/25/13	1020		36.8	0.77	U	0.77	186	J	5.1	0.14	U	0.14	253		53.0
EXC-12	J1RL27	4/25/13	719		38.9	0.82	U	0.82	170	J	5.4	0.15	U	0.15	278		56.0
Split of J1RL18	J1N152	4/25/13	1310		728	0.62	U	0.62	770	N	3.3	0.51	UN	0.51	133	B	102
Equipment Blank	J1RL29	4/25/13	41.2	B	38.7	0.81	U	0.81	121		5.3	0.15	U	0.15	55.7	U	55.7

Sample Location	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	40.0	X	0.099	36.6	X	0.42
Duplicate of J1RL18	J1RL28	4/25/13	37.4	X	0.094	33.9	X	0.40
EXC-1	J1RL16	4/25/13	56.9	X	0.091	46.1	X	0.38
EXC-2	J1RL17	4/25/13	48.3	X	0.092	45.5	X	0.39
EXC-4	J1RL19	4/25/13	46.2	X	0.090	46.8	X	0.38
EXC-5	J1RL20	4/25/13	65.0	X	0.089	49.5	X	0.38
EXC-6	J1RL21	4/25/13	53.3	X	0.084	49.7	X	0.35
EXC-7	J1RL22	4/25/13	44.4	X	0.083	39.1	X	0.35
EXC-8	J1RL23	4/25/13	39.1	X	0.085	33.3	X	0.36
EXC-9	J1RL24	4/25/13	32.3	X	0.087	34.4	X	0.37
EXC-10	J1RL25	4/25/13	37.5	X	0.094	56.5	X	0.40
EXC-11	J1RL26	4/25/13	64.2	X	0.084	44.7	X	0.36
EXC-12	J1RL27	4/25/13	58.3	X	0.089	41.3	X	0.38
Split of J1RL18	J1N152	4/25/13	34.2		2.7	34.8		4.3
Equipment Blank	J1RL29	4/25/13	0.19	BX	0.089	1.2	X	0.38

Attachment	1	Sheet No.	5 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Metals)

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	8240		1.3	0.32	U	0.32	2.0		0.56	69.4		0.065	0.24		0.028
Duplicate of J1RL91	J1RLC2	4/30/13	9770		1.4	0.42	B	0.35	2.3		0.61	82.7		0.070	0.27		0.030
SSP-1	J1RL90	4/30/13	9220		1.5	0.36	U	0.36	3.1		0.62	84.8		0.071	0.27		0.031
SSP-3	J1RL92	4/30/13	7320		1.4	0.43	B	0.34	2.8		0.58	63.5		0.067	0.19		0.029
SSP-4	J1RL93	4/30/13	9060		1.5	0.36	U	0.36	2.0		0.63	77.4		0.073	0.26		0.032
SSP-5	J1RL94	4/30/13	6380		1.5	0.52	B	0.37	2.3		0.65	50.7		0.075	0.16	B	0.033
SSP-6	J1RL95	4/30/13	8420		1.4	0.46	B	0.35	4.9		0.60	81.9		0.070	0.22		0.030
SSP-7	J1RL96	4/30/13	8170		1.4	0.57		0.35	2.9		0.60	67.2		0.070	0.21		0.030
SSP-8	J1RL97	4/30/13	7470		1.5	0.48	B	0.36	2.5		0.62	67.3		0.072	0.18	B	0.031
SSP-9	J1RL98	4/30/13	10600		1.4	0.35	U	0.35	2.5		0.62	99.7		0.071	0.30		0.031
SSP-10	J1RL99	4/30/13	8620		1.5	0.64		0.36	3.7		0.62	75.6		0.071	0.22		0.031
SSP-11	J1RLC0	4/30/13	8100		1.4	0.41	B	0.33	2.5		0.58	71.0		0.066	0.19		0.029
SSP-12	J1RLC1	4/30/13	8900		1.4	0.53	B	0.34	2.9		0.59	71.7		0.068	0.24		0.029
Split of J1RL91	J1RLD8	4/30/13	6960		28	1.3	UN	1.3	2.6		0.63	72.3		0.50	0.34	U	0.34
Equipment Blank	J1RLC3	4/30/13	157		1.5	0.37	U	0.37	0.65	U	0.65	4.0		0.075	0.032	U	0.032

Sample Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	1.4	B	0.83	0.15	B	0.035	3730		12.0	11.4		0.049	8.9	X	0.085
Duplicate of J1RL91	J1RLC2	4/30/13	1.4	B	0.91	0.17	B	0.038	4140		13.0	13.5		0.054	9.0	X	0.092
SSP-1	J1RL90	4/30/13	2.1		0.92	0.22		0.038	4270		13.2	18.1		0.054	9.2	X	0.094
SSP-3	J1RL92	4/30/13	1.2	B	0.87	0.51		0.036	7320		12.5	11.7		0.051	7.6	X	0.089
SSP-4	J1RL93	4/30/13	1.4	B	0.94	0.16	B	0.039	3790		13.5	13.4		0.055	8.0	X	0.096
SSP-5	J1RL94	4/30/13	0.97	U	0.97	0.13	B	0.040	5640		13.9	11.9		0.057	7.2	X	0.099
SSP-6	J1RL95	4/30/13	1.6	B	0.90	0.30		0.038	7110		12.9	12.8		0.053	8.5	X	0.092
SSP-7	J1RL96	4/30/13	1.0	B	0.90	0.15	B	0.038	5810		12.9	12.1		0.053	7.8	X	0.092
SSP-8	J1RL97	4/30/13	0.99	B	0.92	0.21		0.039	8220		13.3	11.5		0.055	8.3	X	0.094
SSP-9	J1RL98	4/30/13	1.8	B	0.91	0.19		0.038	3760		13.2	14.8		0.054	9.1	X	0.093
SSP-10	J1RL99	4/30/13	2.0		0.92	0.25		0.039	8230		13.2	12.6		0.054	9.1	X	0.094
SSP-11	J1RLC0	4/30/13	1.2	B	0.86	0.19		0.036	6470		12.3	12.8		0.051	8.1	X	0.087
SSP-12	J1RLC1	4/30/13	1.4	B	0.88	0.16	B	0.037	6310		12.6	12.4		0.052	8.5	X	0.089
Split of J1RL91	J1RLD8	4/30/13	3.0	U	3.0	0.20	U	0.20	3010	N	26.6	9.2		0.61	7.3	B	1.9
Equipment Blank	J1RLC3	4/30/13	0.96	U	0.96	0.040	U	0.040	36.1	B	13.8	0.19	B	0.057	0.098	UX	0.098

Sample Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Lithium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	13.2		0.18	0.155	U	0.155	20300		3.2	4.3		0.23			
Duplicate of J1RL91	J1RLC2	4/30/13	15.0		0.20	0.155	U	0.155	23000		3.5	5.2		0.25			
SSP-1	J1RL90	4/30/13	14.4		0.20	0.155	U	0.155	20300		3.6	11.6		0.25			
SSP-3	J1RL92	4/30/13	15.3		0.19	0.217		0.155	18900		3.4	14.3		0.24			
SSP-4	J1RL93	4/30/13	13.7		0.21	0.161		0.155	20000		3.6	4.6		0.26			
SSP-5	J1RL94	4/30/13	19.1		0.21	0.155	U	0.155	19800		3.7	4.0		0.27			
SSP-6	J1RL95	4/30/13	16.5		0.20	0.177		0.155	21200		3.5	32.4		0.25			
SSP-7	J1RL96	4/30/13	14.2		0.20	0.155	U	0.155	20100		3.5	6.8		0.25			
SSP-8	J1RL97	4/30/13	17.8		0.20	0.199		0.155	20500		3.6	8.9		0.25			
SSP-9	J1RL98	4/30/13	14.2		0.20	0.262		0.155	23200		3.5	5.2		0.25			
SSP-10	J1RL99	4/30/13	20.1		0.20	0.196		0.155	22900		3.6	39.5		0.25			
SSP-11	J1RLC0	4/30/13	16.3		0.19	0.178		0.155	20000		3.3	7.4		0.24			
SSP-12	J1RLC1	4/30/13	16.8		0.19	0.159		0.155	21700		3.4	6.0		0.24			
Split of J1RL91	J1RLD8	4/30/13	11.7		1.5	0.180	B	0.100	19100		5.9	5.1		0.34	6.5	B	1.3
Equipment Blank	J1RLC3	4/30/13	0.26	B	0.21				228		3.7	0.28	B	0.26			

Attachment	1	Sheet No.	6 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Metals)

Sample Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	4270		3.1	321	X	0.085	0.007	B	0.0049	0.22	U	0.22	11.7	X	0.10
Duplicate of J1RL91	J1RLC2	4/30/13	5050		3.4	371	X	0.092	0.012	B	0.0056	0.24	U	0.24	13.7	X	0.11
SSP-1	J1RL90	4/30/13	6060		3.5	357	X	0.094	0.025	M	0.0054	0.35	B	0.24	30.3	XMN	0.12
SSP-3	J1RL92	4/30/13	4540		3.3	290	X	0.089	0.029		0.0052	0.23	U	0.23	11.7	X	0.11
SSP-4	J1RL93	4/30/13	4500		3.5	334	X	0.096	0.013	B	0.0056	0.25	U	0.25	13.3	X	0.12
SSP-5	J1RL94	4/30/13	4430		3.6	291	X	0.099	0.005	U	0.0050	0.35	B	0.26	11.8	X	0.12
SSP-6	J1RL95	4/30/13	4810		3.4	341	X	0.092	0.054		0.0053	0.24	U	0.24	12.7	X	0.11
SSP-7	J1RL96	4/30/13	4710		3.4	306	X	0.092	0.011	B	0.0046	0.24	U	0.24	12.1	X	0.11
SSP-8	J1RL97	4/30/13	4940		3.5	292	X	0.094	0.17		0.0060	0.25	U	0.25	12.8	X	0.12
SSP-9	J1RL98	4/30/13	4840		3.5	404	X	0.093	0.0062	U	0.0062	0.24	U	0.24	13.7	X	0.11
SSP-10	J1RL99	4/30/13	5370		3.5	340	X	0.094	0.039		0.0050	0.25	B	0.24	14.3	X	0.12
SSP-11	J1RLC0	4/30/13	4870		3.2	313	X	0.087	0.018		0.0054	0.23	U	0.23	13.0	X	0.11
SSP-12	J1RLC1	4/30/13	4870		3.3	340	X	0.089	0.0083	B	0.0054	0.23	U	0.23	12.9	X	0.11
Split of J1RL91	J1RLD8	4/30/13	3740	N	16.6	356		0.31	0.011	U	0.011	0.63	U	0.63	9.4		0.45
Equipment Blank	J1RLC3	4/30/13	18.7	B	3.6	4.3	X	0.098	0.0053	U	0.0053	0.25	U	0.25	0.14	BX	0.12

Sample Location	HEIS Number	Sample Date	Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	1690		34.9	0.73	U	0.73	138		4.8	0.14	U	0.14	190		50.2
Duplicate of J1RL91	J1RLC2	4/30/13	2000		37.9	0.79	U	0.79	254		5.2	0.15	U	0.15	223		54.5
SSP-1	J1RL90	4/30/13	1760		38.5	0.81	U	0.81	167		5.3	0.15	U	0.15	213		55.4
SSP-3	J1RL92	4/30/13	1350		36.3	0.76	U	0.76	125		5.0	0.14	U	0.14	291		52.2
SSP-4	J1RL93	4/30/13	1900		39.2	0.82	U	0.82	144		5.4	0.15	U	0.15	188		56.4
SSP-5	J1RL94	4/30/13	1070		40.4	0.85	U	0.85	107		5.6	0.16	U	0.16	182		58.1
SSP-6	J1RL95	4/30/13	1720		37.5	0.79	U	0.79	145		5.2	0.15	U	0.15	292		54.0
SSP-7	J1RL96	4/30/13	1340		37.6	0.79	U	0.79	181		5.2	0.15	U	0.15	277		54.1
SSP-8	J1RL97	4/30/13	1290		38.7	0.81	U	0.81	200		5.3	0.15	U	0.15	330		55.7
SSP-9	J1RL98	4/30/13	2340		38.3	0.80	U	0.80	224		5.3	0.15	U	0.15	205		55.1
SSP-10	J1RL99	4/30/13	1910		38.5	0.81	U	0.81	225		5.3	0.15	U	0.15	318		55.4
SSP-11	J1RLC0	4/30/13	1470		35.8	0.75	U	0.75	210		4.9	0.14	U	0.14	278		51.6
SSP-12	J1RLC1	4/30/13	1710		36.6	0.77	U	0.77	177		5.1	0.14	U	0.14	265		52.7
Split of J1RL91	J1RLD8	4/30/13	1570		673	0.58	U	0.58	920	N	3.1	0.47	UN	0.47	128	B	94.1
Equipment Blank	J1RLC3	4/30/13	40.2	U	40.2	0.84	U	0.84	110		5.5	0.16	U	0.16	57.8	U	57.8

Sample Location	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	45.0		0.080	42.2	X	0.34
Duplicate of J1RL91	J1RLC2	4/30/13	48.9		0.087	46.6	X	0.37
SSP-1	J1RL90	4/30/13	44.3		0.088	53.6	X	0.37
SSP-3	J1RL92	4/30/13	44.4		0.083	51.0	X	0.35
SSP-4	J1RL93	4/30/13	44.1		0.090	42.5	X	0.38
SSP-5	J1RL94	4/30/13	45.4		0.093	38.1	X	0.39
SSP-6	J1RL95	4/30/13	49.9		0.086	54.4	X	0.36
SSP-7	J1RL96	4/30/13	46.5		0.086	49.8	X	0.36
SSP-8	J1RL97	4/30/13	49.7		0.089	68.9	X	0.38
SSP-9	J1RL98	4/30/13	47.6		0.088	49.1	X	0.37
SSP-10	J1RL99	4/30/13	55.4		0.088	63.7	X	0.37
SSP-11	J1RLC0	4/30/13	46.8		0.082	47.2	X	0.35
SSP-12	J1RLC1	4/30/13	51.7		0.084	47.6	X	0.36
Split of J1RL91	J1RLD8	4/30/13	42.4		2.5	37.4		4.0
Equipment Blank	J1RLC3	4/30/13	0.21	B	0.092	1.1	CX	0.39

Attachment	1	Sheet No.	7 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Metals)

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	6400	X	1.5	0.37	U	0.37	2.3		0.65	58.1	X	0.075	0.16	B	0.033
Duplicate of J1RL49	J1RL57	4/30/13	6920	X	1.5	0.37	U	0.37	2.9		0.65	64.2	X	0.075	0.17	B	0.033
OB-1	J1RL45	4/30/13	6030	X	1.4	0.79		0.35	2.4		0.60	53.0	X	0.069	0.087	B	0.030
OB-2	J1RL46	4/30/13	6260	X	1.4	0.74		0.35	2.0		0.60	58.8	X	0.070	0.13	B	0.030
OB-3	J1RL47	4/30/13	6860	X	1.5	0.80		0.36	2.3		0.63	53.7	X	0.072	0.15	B	0.031
OB-4	J1RL48	4/30/13	6640	X	1.5	0.58	B	0.38	2.0		0.66	57.7	X	0.076	0.12	B	0.033
OB-6	J1RL50	4/30/13	6330	X	1.5	1.0		0.36	1.4		0.63	55.1	X	0.073	0.11	B	0.032
OB-7	J1RL51	4/30/13	6650	X	1.4	0.36	B	0.34	2.0		0.59	56.9	X	0.068	0.15	B	0.029
OB-8	J1RL52	4/30/13	6130	X	1.5	0.64		0.38	2.4		0.66	54.5	X	0.075	0.13	B	0.033
OB-9	J1RL53	4/30/13	6540	X	1.5	0.65		0.37	2.3		0.64	60.0	X	0.073	0.099	B	0.032
OB-10	J1RL54	4/30/13	6910	X	1.6	0.58	B	0.39	2.2		0.67	58.5	X	0.077	0.15	B	0.034
OB-11	J1RL55	4/30/13	5830	X	1.3	0.91		0.33	1.8		0.57	56.6	X	0.065	0.092	B	0.028
OB-12	J1RL56	4/30/13	6580	X	1.5	0.48	B	0.37	1.6		0.64	58.9	X	0.074	0.10	B	0.032
Split of J1RL49	J1RL73	4/30/13	5240		27.1	1.2	U	1.2	3.0		0.61	53.1		0.48	0.33	U	0.33
Equipment Blank	J1RL58	4/30/13	185	X	1.5	0.38	U	0.38	0.65	U	0.65	2.1	X	0.075	0.035	B	0.033

Sample Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	0.97	U	0.97	0.17	B	0.040	8400	X	13.9	10.3	X	0.057	7.2	X	0.099
Duplicate of J1RL49	J1RL57	4/30/13	0.97	U	0.97	0.15	B	0.040	14100	X	13.9	11.4	X	0.057	7.1	X	0.098
OB-1	J1RL45	4/30/13	0.89	U	0.89	0.85		0.037	6890	X	12.8	8.5	X	0.053	9.8	X	0.091
OB-2	J1RL46	4/30/13	0.90	U	0.90	0.22		0.038	6990	X	12.9	8.2	X	0.053	9.8	X	0.092
OB-3	J1RL47	4/30/13	0.93	U	0.93	0.15	B	0.039	8770	X	13.4	10.8	X	0.055	9.8	X	0.095
OB-4	J1RL48	4/30/13	0.98	U	0.98	0.16	B	0.041	7070	X	14.1	9.6	X	0.058	8.7	X	0.10
OB-6	J1RL50	4/30/13	0.94	U	0.94	0.13	B	0.039	6750	X	13.5	7.9	X	0.055	9.1	X	0.096
OB-7	J1RL51	4/30/13	0.88	U	0.88	0.12	B	0.037	6220	X	12.6	9.2	X	0.052	8.7	X	0.089
OB-8	J1RL52	4/30/13	0.97	U	0.97	0.13	B	0.041	7770	X	14.0	7.0	X	0.058	8.8	X	0.099
OB-9	J1RL53	4/30/13	0.94	U	0.94	0.15	B	0.039	7110	X	13.6	8.0	X	0.056	9.4	X	0.096
OB-10	J1RL54	4/30/13	1.0	U	1.0	0.15	B	0.042	7030	X	14.3	9.3	X	0.059	8.7	X	0.10
OB-11	J1RL55	4/30/13	0.84	U	0.84	0.13	B	0.035	6970	X	12.1	8.3	X	0.050	9.0	X	0.086
OB-12	J1RL56	4/30/13	0.95	U	0.95	0.17	B	0.040	6900	X	13.7	7.4	X	0.056	9.8	X	0.097
Split of J1RL49	J1RL73	4/30/13	2.9	U	2.9	0.19	U	0.19	7480		25.7	8.2		0.59	6.2	B	1.8
Equipment Blank	J1RL58	4/30/13	0.97	U	0.97	0.041	U	0.041	51.8	X	14.0	0.12	BXC	0.057	0.12	BX	0.099

Sample Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Lithium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	14.4	X	0.21	0.161		0.155	17300	X	3.7	3.7	X	0.27			
Duplicate of J1RL49	J1RL57	4/30/13	15.7	X	0.21	0.155	U	0.155	17600	X	3.7	3.8	X	0.27			
OB-1	J1RL45	4/30/13	24.6	XMN	0.20	0.219		0.155	23700	X	3.5	24.8	XM	0.25			
OB-2	J1RL46	4/30/13	18.3	X	0.20	0.276		0.155	22100	X	3.5	11.3	X	0.25			
OB-3	J1RL47	4/30/13	17.6	X	0.21	0.200		0.155	23900	X	3.6	10.4	X	0.26			
OB-4	J1RL48	4/30/13	15.6	X	0.22	0.178		0.155	20700	X	3.8	4.7	X	0.27			
OB-6	J1RL50	4/30/13	15.8	X	0.21	0.180		0.155	22700	X	3.6	18.7	X	0.26			
OB-7	J1RL51	4/30/13	16.3	X	0.19	0.162		0.155	21300	X	3.4	12.3	X	0.24			
OB-8	J1RL52	4/30/13	16.3	X	0.22	0.155	U	0.155	22300	X	3.8	3.8	X	0.27			
OB-9	J1RL53	4/30/13	16.1	X	0.21	0.199		0.155	22900	X	3.7	3.7	X	0.26			
OB-10	J1RL54	4/30/13	16.1	X	0.22	0.259		0.155	21700	X	3.9	8.1	X	0.27			
OB-11	J1RL55	4/30/13	15.4	X	0.19	0.293		0.155	21800	X	3.3	7.1	X	0.23			
OB-12	J1RL56	4/30/13	16.1	X	0.21	0.218		0.155	23500	X	3.7	5.5	X	0.26			
Split of J1RL49	J1RL73	4/30/13	13.0		1.4	0.130	B	0.100	15900		5.7	4.4		0.33	5.9	B	1.3
Equipment Blank	J1RL58	4/30/13	0.34	BX	0.21				313	X	3.8	0.52	X	0.27			

Attachment	1	Sheet No.	8 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Metals)

Sample Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	4500	X	3.6	281	X	0.099	0.0048	B	0.0048	0.26	U	0.26	10.3	X	0.12
Duplicate of J1RL49	J1RL57	4/30/13	4930	X	3.6	292	X	0.098	0.0055	U	0.0055	0.26	U	0.26	11.5	X	0.12
OB-1	J1RL45	4/30/13	4660	X	3.4	323	X	0.091	0.70		0.029	0.43	B	0.24	10.8	X	0.11
OB-2	J1RL46	4/30/13	4620	X	3.4	314	X	0.092	0.20		0.0061	0.38	B	0.24	12.7	X	0.11
OB-3	J1RL47	4/30/13	5250	X	3.5	335	X	0.095	0.075		0.0051	0.25	U	0.25	12.0	X	0.12
OB-4	J1RL48	4/30/13	4610	X	3.7	299	X	0.10	0.0085	B	0.0053	0.26	U	0.26	10.9	X	0.12
OB-6	J1RL50	4/30/13	4560	X	3.5	304	X	0.096	0.0056	U	0.0056	0.25	U	0.25	10.5	X	0.12
OB-7	J1RL51	4/30/13	4850	X	3.3	313	X	0.089	0.0056	U	0.0056	0.23	U	0.23	11.9	X	0.11
OB-8	J1RL52	4/30/13	4850	X	3.7	311	X	0.099	0.0058	B	0.0057	0.26	U	0.26	9.4	X	0.12
OB-9	J1RL53	4/30/13	4690	X	3.6	317	X	0.096	0.0055	U	0.0055	0.25	U	0.25	10.7	X	0.12
OB-10	J1RL54	4/30/13	4630	X	3.8	311	X	0.10	0.027		0.0056	0.26	U	0.26	12.2	X	0.12
OB-11	J1RL55	4/30/13	4490	X	3.2	306	X	0.086	0.020		0.0053	0.22	U	0.22	11.4	X	0.11
OB-12	J1RL56	4/30/13	4880	X	3.6	328	X	0.097	0.021		0.0055	0.25	U	0.25	10.8	X	0.12
Split of J1RL49	J1RL73	4/30/13	3900		16.1	273		0.30	0.011	UN	0.011	0.61	U	0.61	8.8		0.44
Equipment Blank	J1RL58	4/30/13	25.3	X	3.7	6.1	X	0.099	0.0048	U	0.0048	0.26	U	0.26	0.12	BX	0.12

Sample Location	HEIS Number	Sample Date	Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	1210		40.4	0.85	U	0.85	119		5.6	0.16	U	0.16	189		58.2
Duplicate of J1RL49	J1RL57	4/30/13	1230		40.4	0.85	U	0.85	169		5.6	0.16	U	0.16	222		58.1
OB-1	J1RL45	4/30/13	1020		37.3	0.78	U	0.78	269	MN	5.2	0.15	U	0.15	322		53.7
OB-2	J1RL46	4/30/13	1080		37.5	0.79	U	0.79	109		5.2	0.15	U	0.15	314		54.0
OB-3	J1RL47	4/30/13	1150		38.8	0.81	U	0.81	113		5.4	0.15	U	0.15	317		55.9
OB-4	J1RL48	4/30/13	1210		40.9	0.86	U	0.86	132		5.7	0.16	U	0.16	223		58.9
OB-6	J1RL50	4/30/13	1060		39.2	0.82	U	0.82	117		5.4	0.15	U	0.15	272		56.4
OB-7	J1RL51	4/30/13	1210		36.6	0.77	U	0.77	116		5.1	0.14	U	0.14	246		52.7
OB-8	J1RL52	4/30/13	976		40.7	0.85	U	0.85	93.5		5.6	0.16	U	0.16	254		58.6
OB-9	J1RL53	4/30/13	1130		39.5	0.83	U	0.83	135		5.4	0.15	U	0.15	298		56.8
OB-10	J1RL54	4/30/13	1150		41.7	0.87	U	0.87	110		5.7	0.16	U	0.16	302		59.9
OB-11	J1RL55	4/30/13	975		35.3	0.74	U	0.74	89.1		4.9	0.14	U	0.14	258		50.7
OB-12	J1RL56	4/30/13	997		39.9	0.84	U	0.84	117		5.5	0.16	U	0.16	329		57.4
Split of J1RL49	J1RL73	4/30/13	970		652	0.56	U	0.56	804	N	3.0	0.45	U	0.45	146	B	91.1
Equipment Blank	J1RL58	4/30/13	40.6	U	40.6	0.85	U	0.85	87.7		5.6	0.16	U	0.16	58.5	U	58.5

Sample Location	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	40.5	X	0.093	38.1	X	0.39
Duplicate of J1RL49	J1RL57	4/30/13	41.1	X	0.093	38.0	X	0.39
OB-1	J1RL45	4/30/13	54.0	X	0.086	95.2	XMN	0.36
OB-2	J1RL46	4/30/13	55.1	X	0.086	61.4	X	0.36
OB-3	J1RL47	4/30/13	57.5	X	0.089	55.6	X	0.38
OB-4	J1RL48	4/30/13	47.9	X	0.094	43.5	X	0.40
OB-6	J1RL50	4/30/13	54.2	X	0.090	53.6	X	0.38
OB-7	J1RL51	4/30/13	47.9	X	0.084	42.1	X	0.36
OB-8	J1RL52	4/30/13	54.6	X	0.093	44.4	X	0.40
OB-9	J1RL53	4/30/13	53.3	X	0.091	43.1	X	0.38
OB-10	J1RL54	4/30/13	50.4	X	0.095	46.1	X	0.40
OB-11	J1RL55	4/30/13	54.6	X	0.081	44.4	X	0.34
OB-12	J1RL56	4/30/13	50.9	X	0.091	60.3	X	0.39
Split of J1RL49	J1RL73	4/30/13	34.4		2.4	33.4		3.8
Equipment Blank	J1RL58	4/30/13	0.31	BX	0.093	1.7	X	0.39

Attachment	1	Sheet No.	9 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Anions, TPH, & Physical) [a]

Sample Location	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrate and Nitrite		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1RL18	4/25/13	0.42	U	0.42	7.8		2.1	1.1	B	0.89	24.5	J	0.34	32.3	J	0.34
Duplicate of J1RL18	J1RL28	4/25/13	0.42	U	0.42	8.2		2.1	0.95	B	0.89	26.1	J	0.34	41.8	JN	0.34
EXC-1	J1RL16	4/25/13	0.38	U	0.38	6.8		2	1.1	BNM	0.81	7.3	J	0.31	9.3	JMN	0.32
EXC-2	J1RL17	4/25/13	0.39	U	0.39	6.3		2	1	B	0.83	1.9	JB	0.32	1.5	J	0.31
EXC-4	J1RL19	4/25/13	0.4	U	0.4	12.5		2	0.84	U	0.84	2.2	JB	0.32	1.8	J	0.3
EXC-5	J1RL20	4/25/13	0.39	U	0.39	3.9	B	2	0.84	U	0.84	0.78	JB	0.32	0.32	JB	0.31
EXC-6	J1RL21	4/25/13	0.39	U	0.39	5.3		2	0.82	U	0.82	1.6	JB	0.31	1.1	J	0.31
EXC-7	J1RL22	4/25/13	0.38	U	0.38	4.9	B	2	0.84	B	0.81	1.4	JB	0.31	1.3	J	0.3
EXC-8	J1RL23	4/25/13	0.39	U	0.39	4	B	2	0.83	U	0.83	0.78	JB	0.32	0.44	JB	0.3
EXC-9	J1RL24	4/25/13	0.4	U	0.4	4.2	B	2	0.84	U	0.84	0.89	JB	0.32	0.36	JB	0.31
EXC-10	J1RL25	4/25/13	0.39	U	0.39	4.7	BN	2	1.1	BN	0.82	1.9	JBN	0.31	2.9	J	0.3
EXC-11	J1RL26	4/25/13	0.38	U	0.38	5.4		1.9	0.8	U	0.8	1.3	JB	0.31	0.7	JB	0.31
EXC-12	J1RL27	4/25/13	0.38	U	0.38	3.7	B	1.9	0.81	U	0.81	0.31	UR	0.31	0.31	UR	0.31
Split of J1RL18	J1N152	4/25/13	0.29	B	0.29	4.7		0.23	0.71	B	0.12	27.9		0.46	30.1		0.19

Sample Location	HEIS Number	Sample Date	Nitrogen in Nitrite			Phosphate			Phosphorous in phosphate			Sulfate			Percent Solids		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	%	Q	PQL
EXC-3	J1RL18	4/25/13	0.37	UR	0.37				1.3	UR	1.3	84.7		1.9			
Duplicate of J1RL18	J1RL28	4/25/13	0.36	UR	0.36				1.3	UR	1.3	90.7		1.9			
EXC-1	J1RL16	4/25/13	0.33	UR	0.33				1.2	UR	1.2	58.2		1.7			
EXC-2	J1RL17	4/25/13	0.34	UR	0.34				1.2	UR	1.2	76.5		1.7			
EXC-4	J1RL19	4/25/13	0.34	UR	0.34				1.3	UR	1.3	149		1.8			
EXC-5	J1RL20	4/25/13	0.34	UR	0.34				1.3	UR	1.3	7.2		1.8			
EXC-6	J1RL21	4/25/13	0.34	UR	0.34				1.2	UR	1.2	27.9		1.7			
EXC-7	J1RL22	4/25/13	0.33	UR	0.33				1.2	UR	1.2	13.6		1.7			
EXC-8	J1RL23	4/25/13	0.34	UR	0.34				1.2	UR	1.2	6.8		1.7			
EXC-9	J1RL24	4/25/13	0.34	UR	0.34				1.4	JB	1.3	6.7		1.8			
EXC-10	J1RL25	4/25/13	0.34	URN	0.34				1.2	UR	1.2	11.6	NM	1.7			
EXC-11	J1RL26	4/25/13	0.33	UR	0.33				1.2	UR	1.2	9.3		1.7			
EXC-12	J1RL27	4/25/13	0.33	UR	0.33				1.2	UR	1.2	9.6		1.7			
Split of J1RL18	J1N152	4/25/13	0.035	U	0.035	5.3	B	0.45				92.5		0.58	86.8		0.1

Sample Location	HEIS Number	Sample Date	Percent moisture (wet sample)		
			%	Q	PQL
EXC-3	J1RL18	4/25/13	10.7		0
Duplicate of J1RL18	J1RL28	4/25/13	10.3		0
EXC-1	J1RL16	4/25/13	2		0
EXC-2	J1RL17	4/25/13	2.6		0
EXC-4	J1RL19	4/25/13	1.8		0
EXC-5	J1RL20	4/25/13	2.5		0
EXC-6	J1RL21	4/25/13	1.3		0
EXC-7	J1RL22	4/25/13	1.1		0
EXC-8	J1RL23	4/25/13	1.4		0
EXC-9	J1RL24	4/25/13	4.8		0
EXC-10	J1RL25	4/25/13	0.93		0
EXC-11	J1RL26	4/25/13	1.4		0
EXC-12	J1RL27	4/25/13	2.5		0
Split of J1RL18	J1N152	4/25/13	13.2		0
Equipment Blank	J1RL29	4/25/13	0.1	U	0
Re-Sample EXC-10	J1RMR0	5/16/13	1.6		0

Attachment	1	Sheet No.	10 of 24
Originator	J. D. Skoglie	Date	6/17/13
Checked	C. H. Dobie	Date	6/17/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Anions, TPH, & Physical) [a]

Sample Location	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SSP-2	J1RL91	4/30/13	0.39	U	0.39	5.8		2.0	1.2	B	0.82	3.3		0.31	1.3		0.3
Duplicate of J1RL91	J1RLC2	4/30/13	0.38	U	0.38	7.6		1.9	1.4	B	0.80	1.8	B	0.31	1.1		0.29
SSP-1	J1RL90	4/30/13	0.40	U	0.40	29.8		2.0	0.84	U	0.84	263	D	1.6	321	D	1.5
SSP-3	J1RL92	4/30/13	0.38	U	0.38	5.3		1.9	1.2	B	0.80	2.1	B	0.30	1.8		0.29
SSP-4	J1RL93	4/30/13	0.40	U	0.40	17.6		2.0	1.2	B	0.84	12.8		0.32	15.1		0.31
SSP-5	J1RL94	4/30/13	0.39	U	0.39	4.5	B	2.0	0.82	U	0.82	0.85	B	0.31	0.3	U	0.30
SSP-6	J1RL95	4/30/13	0.38	U	0.38	74.5		1.9	1.5	B	0.81	233	D	1.6	231	D	1.5
SSP-7	J1RL96	4/30/13	0.38	U	0.38	34.3		1.9	1.9	B	0.81	26.7		0.31	29.2		0.30
SSP-8	J1RL97	4/30/13	0.39	U	0.39	8.2		2.0	0.82	U	0.82	1.4	B	0.31	1.0		0.30
SSP-9	J1RL98	4/30/13	0.40	U	0.40	12.7		2.0	1.2	B	0.85	2.7		0.32	2.6		0.31
SSP-10	J1RL99	4/30/13	0.37	U	0.37	9.1		1.9	0.84	B	0.79	7.5		0.30	8.3		0.29
SSP-11	J1RLC0	4/30/13	0.39	U	0.39	27.5		2.0	1.0	B	0.83	6.8		0.32	7.6		0.30
SSP-12	J1RLC1	4/30/13	0.39	U	0.39	23.5		2.0	2.8	BN	0.83	3.1		0.32	3.0	M	0.30
Split of J1RL91	J1RLD8	4/30/13	0.25	U	0.25	3.2		0.2	0.88	B	0.10	1.3		0.041	1.9		0.047

Sample Location	HEIS Number	Sample Date	Nitrogen in Nitrite			Phosphate			Phosphorous in phosphate			Sulfate			Percent Solids		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	%	Q	PQL
SSP-2	J1RL91	4/30/13	0.34	UR	0.34				1.2	B	1.2	11.3		1.7			
Duplicate of J1RL91	J1RLC2	4/30/13	0.33	UR	0.33				1.7	B	1.2	9.4		1.7			
SSP-1	J1RL90	4/30/13	0.34	UR	0.34				1.3	UR	1.3	184		1.8			
SSP-3	J1RL92	4/30/13	0.33	UR	0.33				1.2	UR	1.2	9.8		1.7			
SSP-4	J1RL93	4/30/13	0.34	UR	0.34				2	B	1.3	33.1		1.8			
SSP-5	J1RL94	4/30/13	0.33	UR	0.33				1.2	URN	1.2	5.9		1.7			
SSP-6	J1RL95	4/30/13	0.33	UR	0.33				1.3	B	1.2	138		1.7			
SSP-7	J1RL96	4/30/13	0.33	UR	0.33				1.6	B	1.2	64.4		1.7			
SSP-8	J1RL97	4/30/13	0.34	UR	0.34				1.2	UR	1.2	11.5		1.7			
SSP-9	J1RL98	4/30/13	0.35	UR	0.35				1.9	B	1.3	9.1		1.8			
SSP-10	J1RL99	4/30/13	0.32	UR	0.32				4.3	B	1.2	48.8		1.7			
SSP-11	J1RLC0	4/30/13	0.34	UR	0.34				1.7	B	1.2	20.9		1.7			
SSP-12	J1RLC1	4/30/13	0.34	UR	0.34				1.3	URN	1.3	20.5		1.8			
Split of J1RL91	J1RLD8	4/30/13	0.037	B	0.031	5.4		0.40				7.1		0.51	98.4		0.10

Sample Location	HEIS Number	Sample Date	Percent moisture (wet sample)		
			%	Q	PQL
SSP-2	J1RL91	4/30/13	2.0		0
Duplicate of J1RL91	J1RLC2	4/30/13	1.6		0
SSP-1	J1RL90	4/30/13	2.2		0
SSP-3	J1RL92	4/30/13	0.91		0
SSP-4	J1RL93	4/30/13	4.1		0
SSP-5	J1RL94	4/30/13	1.5		0
SSP-6	J1RL95	4/30/13	0.73		0
SSP-7	J1RL96	4/30/13	0.79		0
SSP-8	J1RL97	4/30/13	2.8		0
SSP-9	J1RL98	4/30/13	5.2		0
SSP-10	J1RL99	4/30/13	0.49		0
SSP-11	J1RLC0	4/30/13	1.4		0
SSP-12	J1RLC1	4/30/13	3.5		0
Split of J1RL91	J1RLD8	4/30/13	1.6		0
Equipment Blank	J1RLC3	4/30/13	0.1	U	0

Attachment	1	Sheet No.	11 of 24
Originator	J. D. Skoglie	Date	6/17/13
Checked	C. H. Dobie	Date	6/17/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Anions, TPH, & Physical) [a]

Sample Location	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-5	J1RL49	4/30/13	0.39	U	0.39	3.5	B	2.0	0.83	U	0.83	0.87	B	0.32	0.30	U	0.30
Duplicate of J1RL49	J1RL57	4/30/13	0.37	U	0.37	3.6	B	1.9	0.79	U	0.79	0.89	B	0.30	0.31	U	0.31
OB-1	J1RL45	4/30/13	0.40	U	0.40	5.5		2.0	0.87	BN	0.84	0.77	B	0.32	0.30	U	0.30
OB-2	J1RL46	4/30/13	0.39	U	0.39	24.6		2.0	0.83	U	0.83	1.0	B	0.32	0.34	B	0.29
OB-3	J1RL47	4/30/13	0.39	U	0.39	7.3		2.0	0.83	U	0.83	1.4	B	0.32	0.73	B	0.30
OB-4	J1RL48	4/30/13	0.39	U	0.39	3.8	B	2.0	0.83	U	0.83	1.3	B	0.32	0.65	B	0.31
OB-6	J1RL50	4/30/13	0.38	U	0.38	6.8		1.9	0.81	U	0.81	1.8	B	0.31	0.81		0.32
OB-7	J1RL51	4/30/13	0.39	U	0.39	4.0	B	2.0	0.91	B	0.82	1.8	B	0.31	1.5		0.30
OB-8	J1RL52	4/30/13	0.40	U	0.40	5.3		2.0	0.87	B	0.84	1.1	B	0.32	0.74	B	0.32
OB-9	J1RL53	4/30/13	0.38	U	0.38	5.0		2.0	0.81	U	0.81	0.31	U	0.31	0.31	U	0.31
OB-10	J1RL54	4/30/13	0.38	U	0.38	6.9		1.9	0.80	U	0.80	0.30	U	0.30	0.31	U	0.31
OB-11	J1RL55	4/30/13	0.39	U	0.39	18.2		2.0	0.83	U	0.83	0.32	U	0.32	0.32	U	0.32
OB-12	J1RL56	4/30/13	0.39	U	0.39	7.9		2.0	0.83	U	0.83	0.84	B	0.32	0.29	U	0.29
Split of J1RL49	J1RL73	4/30/13	0.26	U	0.26	0.58	B	0.20	0.45	B	0.10	0.55		0.041	0.40	B	0.047

Sample Location	HEIS Number	Sample Date	Nitrogen in Nitrite			Phosphate			Phosphorous in phosphate			Sulfate			TPH - Diesel Ext		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
OB-5	J1RL49	4/30/13	0.34	U	0.34				1.2	U	1.2	3.3	B	1.7	5200		980
Duplicate of J1RL49	J1RL57	4/30/13	0.32	U	0.32				1.3	B	1.2	3.1	B	1.7	3300	J	970
OB-1	J1RL45	4/30/13	0.34	U	0.34				1.3	U	1.3	14.6		1.8	74000		1000
OB-2	J1RL46	4/30/13	0.34	U	0.34				1.4	B	1.2	26.1		1.7	34000		950
OB-3	J1RL47	4/30/13	0.34	U	0.34				1.3	U	1.3	24.8		1.8	30000		1000
OB-4	J1RL48	4/30/13	0.34	U	0.34				1.3	B	1.3	4.4	B	1.7	9300		960
OB-6	J1RL50	4/30/13	0.33	U	0.33				1.6	B	1.2	11.0		1.7	5800		950
OB-7	J1RL51	4/30/13	0.34	U	0.34				1.6	B	1.2	4.6	B	1.7	9600		1000
OB-8	J1RL52	4/30/13	0.34	U	0.34				1.3	U	1.3	6.1		1.8	8200		1000
OB-9	J1RL53	4/30/13	0.33	U	0.33				1.2	U	1.2	8.5		1.7	11000		1000
OB-10	J1RL54	4/30/13	0.33	U	0.33				1.2	U	1.2	13.2		1.7	81000		990
OB-11	J1RL55	4/30/13	0.34	U	0.34				1.3	U	1.3	61.6		1.8	28000		1000
OB-12	J1RL56	4/30/13	0.34	U	0.34				1.3	U	1.3	9.2		1.7	17000		970
Split of J1RL49	J1RL73	4/30/13	0.071	B	0.031	4.2	B	0.40				2.0	B	0.51			

Sample Location	HEIS Number	Sample Date	TPH - Diesel			TPH - motor oil			Percent Solids			Percent moisture (wet sample)		
			ug/kg	Q	PQL	mg/kg	Q	PQL	%	Q	PQL	%	Q	PQL
OB-5	J1RL49	4/30/13	3200	J	670							2.4		0
Duplicate of J1RL49	J1RL57	4/30/13	1800	J	660							2.4		0
OB-1	J1RL45	4/30/13	51000		690							2.0		0
OB-2	J1RL46	4/30/13	18000		640							1.6		0
OB-3	J1RL47	4/30/13	17000		680							2.3		0
OB-4	J1RL48	4/30/13	5000		660							0.85		0
OB-6	J1RL50	4/30/13	3900		650							2.2		0
OB-7	J1RL51	4/30/13	4800		680							2.7		0
OB-8	J1RL52	4/30/13	5700		700							4.1		0
OB-9	J1RL53	4/30/13	7300		690							2.0		0
OB-10	J1RL54	4/30/13	42000		670							2.5		0
OB-11	J1RL55	4/30/13	18000		690							1.5		0
OB-12	J1RL56	4/30/13	10000		660							2.1		0
Split of J1RL49	J1RL73	4/30/13	340	U	340	62000	J	650	97.7		0.10	2.3		0
Equipment Blank	J1RL58	4/30/13										0.1	U	0

Attachment	1	Sheet No.	12 of 24
Originator	J. D. Skoglie	Date	6/17/13
Checked	C. H. Dobie	Date	6/17/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	SSP-2 - J1RL91			Duplicate of J1RL91 J1RLC2			SSP-1 - J1RL90			SSP-3 - J1RL92			SSP-4 - J1RL93		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.7	U	2.7	2.7	U	2.7	2.8	U	2.8	2.7	U	2.7	2.9	U	2.9
Aroclor-1221	PCB	7.7	U	7.7	7.8	U	7.8	8.2	U	8.2	8.0	U	8.0	8.4	U	8.4
Aroclor-1232	PCB	1.9	U	1.9	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.1	U	2.1
Aroclor-1242	PCB	4.5	U	4.5	4.6	U	4.6	4.8	U	4.8	4.6	U	4.6	4.9	U	4.9
Aroclor-1248	PCB	4.5	U	4.5	4.6	U	4.6	4.8	U	4.8	4.6	U	4.6	4.9	U	4.9
Aroclor-1254	PCB	2.5	U	2.5	6.5	J	2.5	11	P	2.7	72		2.6	2.7	U	2.7
Aroclor-1260	PCB	8.9	J	2.5	6.3	J	2.5	7.1	J	2.7	35	P	2.6	2.7	U	2.7
Aldrin	PEST	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	2.4	UD	2.4	0.25	U	0.25
Alpha-BHC	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	2.0	UD	2.0	0.22	U	0.22
alpha-Chlordane	PEST	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	3.1	UD	3.1	0.32	U	0.32
Beta-BHC	PEST	0.66	U	0.66	0.65	U	0.65	0.65	U	0.65	6.3	UD	6.3	0.67	U	0.67
Delta-BHC	PEST	0.40	U	0.40	0.40	U	0.40	0.39	U	0.39	3.8	UD	3.8	0.40	U	0.40
4-4'-DDD	PEST	0.55	U	0.55	0.54	U	0.54	0.54	U	0.54	5.2	UD	5.2	0.55	U	0.55
4-4'-DDE	PEST	0.24	U	0.24	0.23	U	0.23	1.3	J	0.23	2.3	UD	2.3	0.24	U	0.24
4-4'-DDT	PEST	0.59	U	0.59	0.58	U	0.58	1.3	JX	0.58	10	JD	5.6	0.59	U	0.59
Dieldrin	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	2.0	UD	2.0	0.21	U	0.21
Endosulfan I	PEST	0.18	U	0.18	0.17	U	0.17	0.17	U	0.17	1.7	UD	1.7	0.18	U	0.18
Endosulfan II	PEST	0.29	U	0.29	0.28	U	0.28	0.28	U	0.28	2.7	UD	2.7	0.29	U	0.29
Endosulfan sulfate	PEST	0.28	U	0.28	0.27	U	0.27	0.27	U	0.27	2.6	UD	2.6	0.28	U	0.28
Endrin	PEST	0.31	U	0.31	0.30	U	0.30	0.30	U	0.30	2.9	UD	2.9	0.31	U	0.31
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	1.6	UD	1.6	0.17	U	0.17
Endrin ketone	PEST	0.49	U	0.49	0.48	U	0.48	0.48	U	0.48	4.7	UD	4.7	0.49	U	0.49
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.46	U	0.46	0.46	U	0.46	4.4	UD	4.4	0.47	U	0.47
gamma-Chlordane	PEST	0.27	U	0.27	0.26	U	0.26	0.26	U	0.26	2.5	UD	2.5	0.27	U	0.27
Heptachlor	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	2.0	UD	2.0	0.22	U	0.22
Heptachlor epoxide	PEST	0.43	U	0.43	0.42	U	0.42	0.42	U	0.42	4.1	UD	4.1	0.43	U	0.43
Methoxychlor	PEST	0.45	U	0.45	0.44	U	0.44	0.44	U	0.44	4.3	UD	4.3	0.45	U	0.45
Toxaphene	PEST	16	U	16	16	U	16	16	U	16	150	UD	150	16	U	16

CONSTITUENT	CLASS	SSP-5 - J1RL94			SSP-6 - J1RL95			SSP-7 - J1RL96			SSP-8 - J1RL97			SSP-9 - J1RL98		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	2.8	U	2.8	2.7	U	2.7	2.8	U	2.8	2.9	U	2.9
Aroclor-1221	PCB	8.0	U	8.0	8.0	U	8.0	8.0	U	8.0	8.3	U	8.3	8.5	U	8.5
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Aroclor-1242	PCB	4.7	U	4.7	4.6	U	4.6	4.6	U	4.6	4.8	U	4.8	4.9	U	4.9
Aroclor-1248	PCB	4.7	U	4.7	4.6	U	4.6	4.6	U	4.6	4.8	U	4.8	4.9	U	4.9
Aroclor-1254	PCB	2.6	U	2.6	110		2.6	25		2.6	26		2.7	2.7	U	2.7
Aroclor-1260	PCB	2.6	U	2.6	60		2.6	12	P	2.6	16	P	2.7	2.7	U	2.7
Aldrin	PEST	0.24	U	0.24	2.4	UD	2.4	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Alpha-BHC	PEST	0.20	U	0.20	2.1	UD	2.1	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22
alpha-Chlordane	PEST	0.31	U	0.31	3.1	UD	3.1	0.32	U	0.32	0.33	U	0.33	0.33	U	0.33
Beta-BHC	PEST	0.63	U	0.63	6.5	UD	6.5	0.65	U	0.65	0.67	U	0.67	0.67	U	0.67
Delta-BHC	PEST	0.38	U	0.38	3.9	UD	3.9	0.39	U	0.39	0.41	U	0.41	0.40	U	0.40
4-4'-DDD	PEST	0.52	U	0.52	5.3	UD	5.3	1.3	JX	0.54	0.55	U	0.55	0.55	U	0.55
4-4'-DDE	PEST	0.23	U	0.23	2.3	UD	2.3	0.42	JX	0.23	0.24	U	0.24	0.24	U	0.24
4-4'-DDT	PEST	0.97	JX	0.56	7.1	JXD	5.7	2.6	X	0.58	1.5	JX	0.6	0.59	U	0.59
Dieldrin	PEST	0.20	U	0.20	2.0	UD	2.0	0.21	U	0.21	0.24	JX	0.21	0.21	U	0.21
Endosulfan I	PEST	0.17	U	0.17	1.7	UD	1.7	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18
Endosulfan II	PEST	0.27	U	0.27	2.8	UD	2.8	0.28	U	0.28	0.29	U	0.29	0.29	U	0.29
Endosulfan sulfate	PEST	0.26	U	0.26	2.7	UD	2.7	0.27	U	0.27	0.28	U	0.28	0.28	U	0.28
Endrin	PEST	0.29	U	0.29	3.0	UD	3.0	0.30	U	0.30	0.31	U	0.31	0.31	U	0.31
Endrin aldehyde	PEST	0.16	U	0.16	1.7	UD	1.7	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.46	U	0.46	4.8	UD	4.8	0.48	U	0.48	0.50	U	0.50	0.49	U	0.49
Gamma-BHC (Lindane)	PEST	0.44	U	0.44	4.5	UD	4.5	0.46	U	0.46	0.47	U	0.47	0.47	U	0.47
gamma-Chlordane	PEST	0.25	U	0.25	2.6	UD	2.6	1.7	X	0.26	0.27	U	0.27	0.27	U	0.27
Heptachlor	PEST	0.20	U	0.20	2.1	UD	2.1	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22
Heptachlor epoxide	PEST	0.40	U	0.40	4.1	UD	4.1	0.42	U	0.42	0.43	U	0.43	0.43	U	0.43
Methoxychlor	PEST	0.43	U	0.43	4.4	UD	4.4	0.44	U	0.44	0.46	U	0.46	0.45	U	0.45
Toxaphene	PEST	15	U	15	150	UD	150	16	U	16	16	U	16	16	U	16

Attachment	1	Sheet No.	13 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	SSP-10 - J1RL99			SSP-11 - J1RLC0			SSP-12 - J1RLC1			Split of J1RL91 - J1RLD8		
		4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.7	U	2.7	2.8	U	2.8	2.8	U	2.8	8.8	U	8.8
Aroclor-1221	PCB	7.8	U	7.8	8.1	U	8.1	8.1	U	8.1	8.8	U	8.8
Aroclor-1232	PCB	1.9	U	1.9	2.0	U	2.0	2.0	U	2.0	8.8	U	8.8
Aroclor-1242	PCB	4.5	U	4.5	4.7	U	4.7	4.7	U	4.7	8.8	U	8.8
Aroclor-1248	PCB	4.5	U	4.5	4.7	U	4.7	4.7	U	4.7	8.8	U	8.8
Aroclor-1254	PCB	72		2.5	120		2.6	5.0	JP	2.6	5.6	U	5.6
Aroclor-1260	PCB	33	P	2.5	60	P	2.6	4.6	J	2.6	5.6	U	5.6
Aldrin	PEST	0.24	U	0.24	2.4	UD	2.4	0.25	U	0.25	0.31	U	0.31
Alpha-BHC	PEST	0.21	U	0.21	2.0	UD	2.0	0.21	U	0.21	0.19	U	0.19
alpha-Chlordane	PEST	1.1	J	0.31	3.1	UD	3.1	0.32	U	0.32	0.57	U	0.57
Beta-BHC	PEST	0.65	U	0.65	6.3	UD	6.3	0.66	U	0.66	0.30	U	0.30
Chlordane	PEST										3.8	U	3.8
Delta-BHC	PEST	0.39	U	0.39	3.8	UD	3.8	0.40	U	0.40	0.25	U	0.25
4-4'-DDD	PEST	0.53	U	0.53	5.2	UD	5.2	0.54	U	0.54	0.22	U	0.22
4-4'-DDE	PEST	0.57	JX	0.23	2.2	UD	2.2	0.24	U	0.24	0.40	U	0.40
4-4'-DDT	PEST	2.2	X	0.57	7.3	JXD	5.6	0.59	J	0.59	0.64	U	0.64
Dieldrin	PEST	0.35	JX	0.20	2.0	UD	2.0	0.21	U	0.21	0.22	U	0.22
Endosulfan I	PEST	0.17	U	0.17	1.7	UD	1.7	0.18	U	0.18	0.58	U	0.58
Endosulfan II	PEST	0.28	U	0.28	2.7	UD	2.7	0.29	U	0.29	0.24	U	0.24
Endosulfan sulfate	PEST	0.27	U	0.27	2.6	UD	2.6	0.27	U	0.27	0.34	U	0.34
Endrin	PEST	0.30	U	0.30	2.9	UD	2.9	0.30	U	0.30	0.16	U	0.16
Endrin aldehyde	PEST	0.17	U	0.17	1.6	UD	1.6	0.17	U	0.17	0.39	U	0.39
Endrin ketone	PEST	0.48	U	0.48	4.6	UD	4.6	0.49	U	0.49	0.42	U	0.42
Gamma-BHC (Lindane)	PEST	0.45	U	0.45	4.4	UD	4.4	0.46	U	0.46	0.17	U	0.17
gamma-Chlordane	PEST	1.4	JX	0.26	2.5	UD	2.5	0.26	U	0.26	0.16	U	0.16
Heptachlor	PEST	0.21	U	0.21	2.0	UD	2.0	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.41	U	0.41	4.0	UD	4.0	0.42	U	0.42	0.44	U	0.44
Methoxychlor	PEST	0.44	U	0.44	4.3	UD	4.3	0.45	U	0.45	0.73	U	0.73
Toxaphene	PEST	15	U	15	150	UD	150	16	U	16	15	U	15

Attachment	1	Sheet No.	14 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)[a]

CONSTITUENT	CLASS	SSP-2 - J1RL91			Duplicate of J1RL91 J1RLC2			SSP-1 - J1RL90			SSP-3 - J1RL92			SSP-4 - J1RL93		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	28	U	28	29	U	29	27	U	27	29	U	29
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	23	U	23	21	U	21	23	U	23
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	12	U	12	11	U	11	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	14	U	14	13	U	13	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	10	U	10	9.6	U	9.6	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	10	U	10	9.6	U	9.6	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	9.8	U	9.8	10	U	10	9.6	U	9.6	10	U	10
2,4-Dimethylphenol	SVOA	66	U	66	65	U	65	68	U	68	63	U	63	68	U	68
2,4-Dinitrophenol	SVOA	330	U	330	330	U	330	340	U	340	320	U	320	340	U	340
2,4-Dinitrotoluene	SVOA	66	U	66	65	U	65	68	U	68	63	U	63	68	U	68
2,6-Dinitrotoluene	SVOA	28	U	28	28	U	28	29	U	29	27	U	27	29	U	29
2-Chloronaphthalene	SVOA	10	U	10	9.8	U	9.8	10	U	10	9.6	U	9.6	10	U	10
2-Chlorophenol	SVOA	21	U	21	21	U	21	21	U	21	20	U	20	22	U	22
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	19	U	19	18	U	18	20	U	20
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	13	U	13	12	U	12	13	U	13
2-Nitroaniline	SVOA	50	U	50	49	U	49	51	U	51	48	U	48	52	U	52
2-Nitrophenol	SVOA	10	U	10	9.8	U	9.8	10	U	10	9.6	U	9.6	10	U	10
3,3'-Dichlorobenzidine	SVOA	90	U	90	88	U	88	92	U	92	86	U	86	93	U	93
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	34	U	34	32	U	32	34	U	34
3-Nitroaniline	SVOA	73	U	73	72	U	72	75	U	75	70	U	70	76	U	76
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	320	U	320	340	U	340	320	U	320	340	U	340
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	19	U	19	18	U	18	20	U	20
4-Chloro-3-methylphenol	SVOA	66	U	66	65	U	65	68	U	68	63	U	63	68	U	68
4-Chloroaniline	SVOA	82	U	82	81	U	81	84	U	84	78	U	78	85	U	85
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	21	U	21	20	U	20	22	U	22
4-Nitroaniline	SVOA	73	U	73	71	U	71	74	U	74	69	U	69	75	U	75
4-Nitrophenol	SVOA	97	U	97	95	U	95	99	U	99	93	U	93	100	U	100
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	24	U	24	22	U	22	24	U	24
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	24	U	24	22	U	22	24	U	24
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	17	U	17	16	U	16	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	45	U	45	47	U	47	44	U	44	48	U	48
Butylbenzylphthalate	SVOA	43	U	43	42	U	42	44	U	44	41	U	41	45	U	45
Carbazole	SVOA	36	U	36	35	U	35	37	U	37	490		34	37	U	37
Dibenzofuran	SVOA	20	U	20	20	U	20	20	U	20	160	J	19	21	U	21
Diethylphthalate	SVOA	26	U	26	26	U	26	27	U	27	25	U	25	27	U	27
Dimethyl phthalate	SVOA	23	U	23	23	U	23	24	U	24	22	U	22	24	U	24
Di-n-butylphthalate	SVOA	29	U	29	29	U	29	30	U	30	28	U	28	30	U	30
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	15	U	15	14	U	14	15	U	15
Hexachlorobenzene	SVOA	29	U	29	29	U	29	30	U	30	28	U	28	30	U	30
Hexachlorobutadiene	SVOA	10	U	10	9.8	U	9.8	10	U	10	9.6	U	9.6	10	U	10
Hexachlorocyclopentadiene	SVOA	50	U	50	49	U	49	51	U	51	48	U	48	52	U	52
Hexachloroethane	SVOA	21	U	21	21	U	21	22	U	22	20	U	20	22	U	22
Isophorone	SVOA	17	U	17	17	U	17	17	U	17	16	U	16	18	U	18
Nitrobenzene	SVOA	22	U	22	22	U	22	23	U	23	21	U	21	23	U	23
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	32	U	32	30	U	30	32	U	32
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	21	U	21	20	U	20	22	U	22
Pentachlorophenol	SVOA	330	U	330	320	U	320	340	U	340	320	U	320	340	U	340
Pyrene	SVOA	12	U	12	24	J	12	130	J	12	4800		12	45	J	13

Attachment	1	Sheet No.	15 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	SSP-5 - J1RL94			SSP-6 - J1RL95			SSP-7 - J1RL96			SSP-8 - J1RL97			SSP-9 - J1RL98		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	27	U	27	28	U	28	29	U	29
1,2-Dichlorobenzene	SVOA	22	U	22	21	U	21	21	U	21	22	U	22	23	U	23
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	12	U	12	12	U	12	13	U	13
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	13	U	13	14	U	14	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.6	U	9.6	10	U	10	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.6	U	9.6	10	U	10	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.6	U	9.6	10	U	10	10	U	10
2,4-Dimethylphenol	SVOA	66	U	66	64	U	64	63	U	63	67	U	67	69	U	69
2,4-Dinitrophenol	SVOA	330	U	330	320	U	320	320	U	320	340	U	340	350	U	350
2,4-Dinitrotoluene	SVOA	66	U	66	64	U	64	63	U	63	67	U	67	69	U	69
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	27	U	27	28	U	28	29	U	29
2-Chloronaphthalene	SVOA	10	U	10	9.7	U	9.7	9.6	U	9.6	10	U	10	10	U	10
2-Chlorophenol	SVOA	21	U	21	20	U	20	20	U	20	21	U	21	22	U	22
2-Methylnaphthalene	SVOA	19	U	19	18	U	18	18	U	18	19	U	19	20	U	20
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	12	U	12	13	U	13	14	U	14
2-Nitroaniline	SVOA	50	U	50	48	U	48	48	U	48	51	U	51	52	U	52
2-Nitrophenol	SVOA	10	U	10	9.7	U	9.7	9.6	U	9.6	10	U	10	10	U	10
3,3'-Dichlorobenzidine	SVOA	90	U	90	87	U	87	86	U	86	91	U	91	94	U	94
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	32	U	32	33	U	33	35	U	35
3-Nitroaniline	SVOA	73	U	73	70	U	70	70	U	70	74	U	74	76	U	76
4,6-Dinitro-2-methylpheno	SVOA	330	U	330	320	U	320	320	U	320	330	U	330	350	U	350
4-Bromophenylphenyl ethei	SVOA	19	U	19	18	U	18	18	U	18	19	U	19	20	U	20
4-Chloro-3-methylpheno	SVOA	66	U	66	64	U	64	63	U	63	67	U	67	69	U	69
4-Chloroaniline	SVOA	82	U	82	79	U	79	79	U	79	83	U	83	86	U	86
4-Chlorophenylphenyl ethei	SVOA	21	U	21	20	U	20	20	U	20	21	U	21	22	U	22
4-Nitroaniline	SVOA	72	U	72	70	U	70	70	U	70	73	U	73	76	U	76
4-Nitrophenol	SVOA	97	U	97	94	U	94	93	U	93	98	U	98	100	U	100
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	22	U	22	22	U	22	23	U	23	24	U	24
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	22	U	22	22	U	22	23	U	23	24	U	24
Bis(2-chloroethyl) ethei	SVOA	17	U	17	16	U	16	16	U	16	17	U	17	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	44	U	44	44	U	44	47	U	47	48	U	48
Butylbenzylphthalate	SVOA	43	U	43	42	U	42	41	U	41	44	U	44	45	U	45
Carbazole	SVOA	180	J	36	120	J	35	98	J	35	36	U	36	38	U	38
Dibenzofuran	SVOA	46	J	20	19	U	19	21	J	19	20	U	20	21	U	21
Diethylphthalate	SVOA	26	U	26	25	U	25	25	U	25	26	U	26	27	U	27
Dimethyl phthalate	SVOA	23	U	23	22	U	22	22	U	22	23	U	23	24	U	24
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	28	U	28	29	U	29	30	U	30
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	15	U	15	15	U	15
Hexachlorobenzene	SVOA	29	U	29	28	U	28	28	U	28	29	U	29	30	U	30
Hexachlorobutadiene	SVOA	10	U	10	9.7	U	9.7	9.6	U	9.6	10	U	10	10	U	10
Hexachlorocyclopentadiene	SVOA	50	U	50	48	U	48	48	U	48	51	U	51	52	U	52
Hexachloroethane	SVOA	21	U	21	21	U	21	20	U	20	22	U	22	22	U	22
Isophorone	SVOA	17	U	17	16	U	16	16	U	16	17	U	17	18	U	18
Nitrobenzene	SVOA	22	U	22	21	U	21	21	U	21	22	U	22	23	U	23
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	30	U	30	31	U	31	32	U	32
N-Nitrosodiphenylamine	SVOA	21	U	21	20	U	20	20	U	20	21	U	21	22	U	22
Pentachlorophenol	SVOA	330	U	330	320	U	320	320	U	320	330	U	330	350	U	350
Phenol	SVOA	18	U	18	17	U	17	17	U	17	18	U	18	19	U	19

Attachment	1	Sheet No.	16 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)[a]

CONSTITUENT	CLASS	SSP-10 - J1RL99			SSP-11 - J1RLC0			SSP-12 - J1RLC1			Split of J1RL91 - J1RLD8			Equipment Blank - J1RLC3		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	27	U	27	34	U	34	28	U	28
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	21	U	21	34	U	34	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	12	U	12	34	U	34	12	U	12
1,4-Dichlorobenzene	SVOA	13	U	13	13	U	13	13	U	13	34	U	34	14	U	14
1,4-Dioxane	SVOA										34	U	34			
2,4,5-Trichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.8	U	9.8	34	U	34	10	U	10
2,4,6-Trichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.8	U	9.8	34	U	34	10	U	10
2,4-Dichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.8	U	9.8	34	U	34	10	U	10
2,4-Dimethylphenol	SVOA	65	U	65	65	U	65	64	U	64	34	U	34	66	U	66
2,4-Dinitrophenol	SVOA	330	U	330	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dinitrotoluene	SVOA	65	U	65	65	U	65	64	U	64	34	U	34	66	U	66
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	27	U	27	34	U	34	28	U	28
2-Chloronaphthalene	SVOA	9.9	U	9.9	9.8	U	9.8	9.8	U	9.8	34	U	34	10	U	10
2-Chlorophenol	SVOA	21	U	21	21	U	21	21	U	21	34	U	34	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	19	U	19	34	U	34	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	13	U	13	34	U	34	13	U	13
2-Nitroaniline	SVOA	49	U	49	49	U	49	49	U	49	34	U	34	50	U	50
2-Nitrophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.8	U	9.8	34	U	34	10	U	10
3,3'-Dichlorobenzidine	SVOA	89	U	89	88	U	88	88	U	88	330	U	330	90	U	90
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	32	U	32	67	U	67	33	U	33
3-Nitroaniline	SVOA	72	U	72	72	U	72	71	U	71	34	U	34	73	U	73
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	320	U	320	320	U	320	330	U	330	330	U	330
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	19	U	19	34	U	34	19	U	19
4-Chloro-3-methylphenol	SVOA	65	U	65	65	U	65	64	U	64	34	U	34	66	U	66
4-Chloroaniline	SVOA	81	U	81	80	U	80	80	U	80	34	U	34	82	U	82
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	21	U	21	34	U	34	21	U	21
4-Nitroaniline	SVOA	72	U	72	71	U	71	71	U	71	330	U	330	73	U	73
4-Nitrophenol	SVOA	96	U	96	95	U	95	95	U	95	330	U	330	97	U	97
Aniline	SVOA										61	U	61			
Benzyl alcohol	SVOA										52	U	52			
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	22	U	22	34	U	34	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	22	U	22	34	U	34	23	U	23
Bis(2-chloroethyl) ether	SVOA	16	U	16	16	U	16	16	U	16	34	U	34	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	45	U	45	45	U	45	45	U	45	46	U	46	46	U	46
Butylbenzylphthalate	SVOA	43	U	43	42	U	42	42	U	42	34	U	34	43	U	43
Carbazole	SVOA	36	U	36	240	J	35	35	U	35	34	U	34	36	U	36
Dibenzofuran	SVOA	20	U	20	20	U	20	20	U	20	34	U	34	20	U	20
Diethylphthalate	SVOA	26	U	26	26	U	26	25	U	25	34	U	34	26	U	26
Dimethyl phthalate	SVOA	23	U	23	23	U	23	22	U	22	54	J	34	23	U	23
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	28	U	28	34	U	34	29	U	29
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	34	U	34	14	U	14
Hexachlorobenzene	SVOA	29	U	29	28	U	28	28	U	28	34	U	34	29	U	29
Hexachlorobutadiene	SVOA	9.9	U	9.9	9.8	U	9.8	9.8	U	9.8	34	U	34	10	U	10
Hexachlorocyclopentadiene	SVOA	49	U	49	49	U	49	49	U	49	330	U	330	50	U	50
Hexachloroethane	SVOA	21	U	21	21	U	21	21	U	21	34	U	34	21	U	21
Isophorone	SVOA	17	U	17	17	U	17	17	U	17	34	U	34	17	U	17
Nitrobenzene	SVOA	22	U	22	22	U	22	21	U	21	34	U	34	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	30	U	30	34	U	34	31	U	31
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	21	U	21	34	U	34	21	U	21
Pentachlorophenol	SVOA	330	U	330	320	U	320	320	U	320	330	U	330	330	U	330
Phenol	SVOA	18	U	18	18	U	18	18	U	18	34	U	34	18	U	18
Pyridine	SVOA										67	U	67			

Attachment	1	Sheet No.	17 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	OB-5 - J1RL49			Duplicate of J1RL49 J1RL57			OB-1 - J1RL45			OB-2 - J1RL46			OB-3 - J1RL47		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.6	U	9.6	10	U	10	670	X	9.8	130	X	9.8	74	JX	10
Acenaphthylene	PAH	8.6	U	8.6	9.2	U	9.2	8.8	U	8.8	8.9	U	8.9	9.0	U	9.0
Anthracene	PAH	3.3	J	2.9	3.1	U	3.1	700		3.0	110		3.0	54		3.0
Benzo(a)anthracene	PAH	45		3.1	4.3	JNX	3.3	1200		3.1	330		3.1	320		3.2
Benzo(a)pyrene	PAH	28		6.2	9.4	J	6.5	1500		6.3	280		6.3	200		6.4
Benzo(b)fluoranthene	PAH	26		4.0	9.5	J	4.3	1100	X	4.1	290	X	4.1	220		4.2
Benzo(ghi)perylene	PAH	15	J	6.9	7.4	U	7.4	600	X	7.1	160		7.1	81	X	7.2
Benzo(k)fluoranthene	PAH	8.4	J	3.8	4.0	UN	4.0	420		3.9	110		3.9	83		3.9
Chrysene	PAH	29	JX	4.7	15	JN	4.9	1700		4.7	380	X	4.8	280	X	4.8
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	160		11	35	X	11	11	U	11
Fluoranthene	PAH	45		12	27	JN	13	3000		13	540		13	440		13
Fluorene	PAH	5.1	U	5.1	5.4	U	5.4	490		5.2	88		5.2	49		5.3
Indeno(1,2,3-cd)pyrene	PAH	26	J	12	12	U	12	470	X	12	280		12	140		12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	12	U	12	12	UN	12	2100		12	350		12	160		12
Pyrene	PAH	64		12	49	N	12	3300		12	630		12	520		12
Aroclor-1016	PCB	2.8	U	2.8	2.7	U	2.7	2.8	U	2.8	2.8	U	2.8	2.8	U	2.8
Aroclor-1221	PCB	8.1	U	8.1	7.8	U	7.8	8.2	U	8.2	8.1	U	8.1	8.2	U	8.2
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0
Aroclor-1242	PCB	4.7	U	4.7	4.5	U	4.5	4.7	U	4.7	4.7	U	4.7	4.8	U	4.8
Aroclor-1248	PCB	4.7	U	4.7	4.5	U	4.5	4.7	U	4.7	4.7	U	4.7	4.8	U	4.8
Aroclor-1254	PCB	72	P	2.6	59		2.5	28	P	2.6	29		2.6	110		2.7
Aroclor-1260	PCB	18	P	2.6	18	P	2.5	30		2.6	27		2.6	51		2.7
Aldrin	PEST	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.26	U	0.26
Alpha-BHC	PEST	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
alpha-Chlordane	PEST	0.32	U	0.32	0.32	U	0.32	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
Beta-BHC	PEST	0.67	U	0.67	0.67	U	0.67	0.67	U	0.67	0.67	U	0.67	0.68	U	0.68
Delta-BHC	PEST	0.40	U	0.40	0.40	U	0.40	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41
4-4'-DDD	PEST	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.56	U	0.56
4-4'-DDE	PEST	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
4-4'-DDT	PEST	0.59	U	0.59	0.59	U	0.59	1.5	J	0.6	1.4	J	0.6	0.6	U	0.6
Dieldrin	PEST	0.21	U	0.21	0.30	JX	0.21	0.43	JX	0.21	0.64	J	0.21	0.27	JX	0.21
Endosulfan I	PEST	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18
Endosulfan II	PEST	0.29	U	0.29	0.29	U	0.29	0.29	U	0.29	0.33	JX	0.29	0.29	U	0.29
Endosulfan sulfate	PEST	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Endrin	PEST	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.49	U	0.49	0.49	U	0.49	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50
Gamma-BHC (Lindane)	PEST	0.47	U	0.47	0.47	U	0.47	0.47	U	0.47	0.47	U	0.47	0.47	U	0.47
gamma-Chlordane	PEST	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27
Heptachlor	PEST	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Heptachlor epoxide	PEST	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.44	U	0.44
Methoxychlor	PEST	0.45	U	0.45	0.45	U	0.45	0.46	U	0.46	0.46	U	0.46	0.46	U	0.46
Toxaphene	PEST	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16

Attachment	1	Sheet No.	18 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	OB-4 - J1RL48			OB-6 - J1RL50			OB-7 - J1RL51			OB-8 - J1RL52			OB-9 - J1RL53		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	66	JX	9.2	9.9	U	9.9	10	U	10	22	JX	10	92	JX	10
Acenaphthylene	PAH	8.3	U	8.3	8.9	U	8.9	9.1	U	9.1	9.0	U	9.0	9.2	U	9.2
Anthracene	PAH	85		2.8	3.0	U	3.0	3.1	U	3.1	29		3	210		3.1
Benzo(a)anthracene	PAH	210		2.9	3.2	U	3.2	4.9	JX	3.2	270		3.2	400		3.3
Benzo(a)pyrene	PAH	140		5.9	11	J	6.4	16		6.5	190		6.4	190		6.5
Benzo(b)fluoranthene	PAH	130	X	3.9	9.8	JX	4.2	14	JX	4.3	150	X	4.2	230		4.3
Benzo(ghi)perylene	PAH	60	X	6.6	7.1	U	7.1	14	JX	7.3	63		7.2	95		7.3
Benzo(k)fluoranthene	PAH	60		3.6	3.9	U	3.9	4.6	J	4	69		3.9	82		4
Chrysene	PAH	190		4.5	16	J	4.8	25	J	4.9	210		4.8	300		4.9
Dibenz[a,h]anthracene	PAH	10	U	10	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	460		12	13	U	13	33	J	13	230		13	1000		13
Fluorene	PAH	42		4.9	5.2	U	5.2	5.4	U	5.4	25	JX	5.3	84		5.4
Indeno(1,2,3-cd)pyrene	PAH	68		11	12	U	12	12	U	12	53		12	83		12
Naphthalene	PAH	11	U	11	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	220		11	12	U	12	12	U	12	38	J	12	560		12
Pyrene	PAH	540		11	15	J	12	40	J	12	320		12	870		12
Aroclor-1016	PCB	2.7	U	2.7	2.8	U	2.8	2.8	U	2.8	22	UD	22	2.7	U	2.7
Aroclor-1221	PCB	7.8	U	7.8	8	U	8	8.2	U	8.2	64	UD	64	7.9	U	7.9
Aroclor-1232	PCB	1.9	U	1.9	2	U	2	2.1	U	2.1	16	UD	16	2	U	2
Aroclor-1242	PCB	4.5	U	4.5	4.6	U	4.6	4.8	U	4.8	37	UD	37	4.6	U	4.6
Aroclor-1248	PCB	4.5	U	4.5	4.6	U	4.6	4.8	U	4.8	37	UD	37	4.6	U	4.6
Aroclor-1254	PCB	44		2.5	5.4	JP	2.6	31		2.7	430	DP	21	5.1	JP	2.6
Aroclor-1260	PCB	17	P	2.5	2.6	U	2.6	15		2.7	92	DP	21	2.6	U	2.6
Aldrin	PEST	0.25	U	0.25	0.25	U	0.25	0.26	U	0.26	0.25	U	0.25	0.26	U	0.26
Alpha-BHC	PEST	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22
alpha-Chlordane	PEST	0.32	U	0.32	0.32	U	0.32	0.33	U	0.33	0.32	U	0.32	0.33	U	0.33
Beta-BHC	PEST	0.65	U	0.65	0.67	U	0.67	0.68	U	0.68	0.66	U	0.66	0.68	U	0.68
Delta-BHC	PEST	0.39	U	0.39	0.40	U	0.40	0.41	U	0.41	0.40	U	0.40	0.41	U	0.41
4-4'-DDD	PEST	0.54	U	0.54	0.55	U	0.55	0.56	U	0.56	0.55	U	0.55	0.56	U	0.56
4-4'-DDE	PEST	0.23	U	0.23	0.24	U	0.24	0.24	U	0.24	1.2	JX	0.24	0.24	U	0.24
4-4'-DDT	PEST	0.58	U	0.58	0.59	U	0.59	0.61	U	0.61	0.59	U	0.59	0.60	U	0.60
Dieldrin	PEST	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22	2.6		0.21	0.21	U	0.21
Endosulfan I	PEST	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18
Endosulfan II	PEST	0.28	U	0.28	0.29	U	0.29	0.30	U	0.30	0.29	U	0.29	0.29	U	0.29
Endosulfan sulfate	PEST	0.27	U	0.27	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Endrin	PEST	0.30	U	0.30	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17	0.18	U	0.18	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.48	U	0.48	0.49	U	0.49	0.50	U	0.50	0.49	U	0.49	0.50	U	0.50
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.47	U	0.47	0.48	U	0.48	0.46	U	0.46	0.47	U	0.47
gamma-Chlordane	PEST	0.26	U	0.26	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27
Heptachlor	PEST	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22
Heptachlor epoxide	PEST	0.42	U	0.42	0.43	U	0.43	0.44	U	0.44	0.43	U	0.43	0.43	U	0.43
Methoxychlor	PEST	0.44	U	0.44	0.45	U	0.45	0.46	U	0.46	0.45	U	0.45	0.46	U	0.46
Toxaphene	PEST	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16

Attachment	1	Sheet No.	19 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	OB-10 - J1RL54			OB-11 - J1RL55			OB-12 - J1RL56			Split of J1RL49 - J1RL73		
		4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	110	X	9.6	2300	DX	97	86	JX	10	120	N	20
Acenaphthylene	PAH	8.7	U	8.7	87	UD	87	9.1	U	9.1	45	J	27
Anthracene	PAH	220		2.9	2900	D	30	84		3.1	10	JN	3.1
Benzo(a)anthracene	PAH	540		3.1	6900	D	31	310		3.2	25	N	3.1
Benzo(a)pyrene	PAH	420		6.2	3100	D	62	230		6.5	39	N	3.1
Benzo(b)fluoranthene	PAH	320	X	4.0	3900	DX	41	220	X	4.2	28	N	3.1
Benzo(ghi)perylene	PAH	220		6.9	1100	D	70	120	X	7.3	13	JN	3.1
Benzo(k)fluoranthene	PAH	140		3.8	1400	D	38	75		4	8.4	JN	3.1
Chrysene	PAH	650		4.7	5200	DX	47	310		4.9	44	N	3.1
Dibenz[a,h]anthracene	PAH	42	X	11	170	JD	110	18	JX	11	12	J	6.1
Fluoranthene	PAH	800		13	13000	D	130	490		13	72	N	6.1
Fluorene	PAH	110		5.1	1500	D	51	68		5.3	10	J	6.1
Indeno(1,2,3-cd)pyrene	PAH	160		12	840	D	120	160		12	17	N	3.1
Naphthalene	PAH	12	U	12	120	UD	120	12	U	12	97	J	22
Phenanthrene	PAH	350		12	8500	D	120	210		12	46	N	6.1
Pyrene	PAH	910		12	12000	D	120	560		12	52	N	3.1
Aroclor-1016	PCB	2.8	U	2.8	2.8	U	2.8	2.7	U	2.7	8.9	U	8.9
Aroclor-1221	PCB	8.2	U	8.2	8.0	U	8.0	7.9	U	7.9	8.9	U	8.9
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.0	U	2.0	8.9	U	8.9
Aroclor-1242	PCB	4.8	U	4.8	4.6	U	4.6	4.6	U	4.6	8.9	U	8.9
Aroclor-1248	PCB	4.8	U	4.8	4.6	U	4.6	4.6	U	4.6	120		8.9
Aroclor-1254	PCB	12		2.7	12		2.6	15	P	2.6	5.6	U	5.6
Aroclor-1260	PCB	5.4	J	2.7	6.3	JN	2.6	7.1	J	2.6	14	J	5.6
Aldrin	PEST	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.31	U	0.31
Alpha-BHC	PEST	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21	0.19	U	0.19
alpha-Chlordane	PEST	0.33	U	0.33	0.33	U	0.33	0.32	U	0.32	0.58	U	0.58
Beta-BHC	PEST	0.67	U	0.67	0.67	U	0.67	0.67	U	0.67	0.31	U	0.31
Chlordane	PEST										3.8	U	3.8
Delta-BHC	PEST	0.41	U	0.41	0.40	U	0.40	0.40	U	0.40	0.25	U	0.25
4-4'-DDD	PEST	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.23	U	0.23
4-4'-DDE	PEST	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	1.2	J	0.4
4-4'-DDT	PEST	0.60	U	0.60	1.1	JY	0.59	0.59	U	0.59	0.64	U	0.64
Dieldrin	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22
Endosulfan I	PEST	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.58	U	0.58
Endosulfan II	PEST	0.29	U	0.29	0.29	U	0.29	0.29	U	0.29	0.24	U	0.24
Endosulfan sulfate	PEST	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.35	U	0.35
Endrin	PEST	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.16	U	0.16
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.40	U	0.40
Endrin ketone	PEST	0.50	U	0.50	0.49	U	0.49	0.49	U	0.49	0.43	U	0.43
Gamma-BHC (Lindane)	PEST	0.47	U	0.47	0.47	U	0.47	0.46	U	0.46	0.17	U	0.17
gamma-Chlordane	PEST	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27	0.16	U	0.16
Heptachlor	PEST	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.44	U	0.44
Methoxychlor	PEST	0.46	U	0.46	0.45	U	0.45	0.45	U	0.45	0.73	U	0.73
Toxaphene	PEST	16	U	16	16	U	16	16	U	16	15	U	15

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Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	OB-5 - J1RL49			Duplicate of J1RL49 J1RL57			OB-1 - J1RL45			OB-2 - J1RL46			OB-3 - J1RL47		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	28	U	28	28	U	28	28	U	28	27	U	27
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	22	U	22	22	U	22	21	U	21
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	12	U	12	12	U	12	11	U	11
1,4-Dichlorobenzene	SVOA	14	U	14	14	U	14	14	U	14	14	U	14	13	U	13
2,4,5-Trichlorophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10	9.5	U	9.5
2,4,6-Trichlorophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10	9.5	U	9.5
2,4-Dichlorophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10	9.5	U	9.5
2,4-Dimethylphenol	SVOA	66	U	66	66	U	66	67	U	67	66	U	66	63	U	63
2,4-Dinitrophenol	SVOA	330	U	330	330	U	330	340	U	340	340	UX	340	320	U	320
2,4-Dinitrotoluene	SVOA	66	U	66	66	U	66	67	U	67	66	U	66	63	U	63
2,6-Dinitrotoluene	SVOA	28	U	28	28	U	28	28	U	28	28	U	28	27	U	27
2-Chloronaphthalene	SVOA	10	U	10	10	U	10	10	U	10	10	U	10	9.5	U	9.5
2-Chlorophenol	SVOA	21	U	21	21	U	21	21	U	21	21	U	21	20	U	20
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	19	U	19	19	U	19	18	U	18
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	13	U	13	13	U	13	12	U	12
2-Nitroaniline	SVOA	50	U	50	50	U	50	51	U	51	50	U	50	48	U	48
2-Nitrophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10	9.5	U	9.5
3,3'-Dichlorobenzidine	SVOA	90	U	90	90	U	90	92	U	92	91	U	91	86	U	86
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	33	U	33	34	U	34	33	U	33	31	U	31
3-Nitroaniline	SVOA	73	U	73	73	U	73	74	U	74	73	U	73	70	U	70
4,6-Dinitro-2-methylpheno	SVOA	330	U	330	330	U	330	340	U	340	330	U	330	310	U	310
4-Bromophenylphenyl ethei	SVOA	19	U	19	19	U	19	19	U	19	19	U	19	18	U	18
4-Chloro-3-methylpheno	SVOA	66	U	66	66	U	66	67	U	67	66	U	66	63	U	63
4-Chloroaniline	SVOA	82	U	82	82	U	82	83	U	83	82	U	82	78	U	78
4-Chlorophenylphenyl ethei	SVOA	21	U	21	21	U	21	21	U	21	21	U	21	20	U	20
4-Nitroaniline	SVOA	72	U	72	73	U	73	74	U	74	73	U	73	69	U	69
4-Nitrophenol	SVOA	97	U	97	97	U	97	99	U	99	98	U	98	92	U	92
Acenaphthene	SVOA	10	U	10	10	U	10	210	J	10	42	J	10	41	J	9.8
Acenaphthylene	SVOA	17	U	17	17	U	17	17	U	17	17	U	17	16	U	16
Anthracene	SVOA	17	U	17	19	J	17	380		17	170	J	17	110	J	16
Benzo(a)anthracene	SVOA	26	J	20	67	J	20	1100		20	640		20	520		19
Benzo(a)pyrene	SVOA	20	U	20	37	J	20	1000		20	480		20	400		19
Benzo(b)fluoranthene	SVOA	26	U	26	70	JX	26	1700	X	27	870	X	26	730	X	25
Benzo(ghi)perylene	SVOA	16	U	16	16	U	16	570		16	230	J	16	190	J	15
Benzo(k)fluoranthene	SVOA	40	U	40	40	UX	40	41	UX	41	40	UX	40	38	UX	38
Bis(2-chloro-1-methylethyl)ethe	SVOA	23	U	23	23	U	23	23	U	23	23	U	23	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	23	U	23	23	U	23	22	U	22
Bis(2-chloroethyl) ethei	SVOA	17	U	17	17	U	17	17	U	17	17	U	17	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	46	U	46	47	U	47	46	U	46	44	U	44
Butylbenzylphthalate	SVOA	43	U	43	43	U	43	44	U	44	43	U	43	41	U	41
Carbazole	SVOA	36	U	36	36	U	36	200	J	37	79	J	36	34	J	34
Chrysene	SVOA	30	J	27	73	J	27	1400		27	690		27	580		26
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	130	J	19	50	J	19	51	J	18
Dibenzofuran	SVOA	20	U	20	20	U	20	73	J	20	20	U	20	19	U	19
Diethylphthalate	SVOA	26	U	26	26	U	26	26	U	26	26	U	26	25	U	25
Dimethyl phthalate	SVOA	23	U	23	23	U	23	23	U	23	23	U	23	22	U	22
Di-n-butylphthalate	SVOA	29	U	29	29	U	29	29	U	29	29	U	29	28	U	28
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	15	U	15	14	U	14	14	U	14
Fluoranthene	SVOA	36	U	36	170	J	36	2100		37	1200	X	36	860		34
Fluorene	SVOA	18	U	18	18	U	18	150	J	18	33	J	18	27	J	17
Hexachlorobenzene	SVOA	29	U	29	29	U	29	29	U	29	29	U	29	28	U	28
Hexachlorobutadiene	SVOA	10	U	10	10	U	10	10	U	10	10	U	10	9.5	U	9.5
Hexachlorocyclopentadiene	SVOA	50	U	50	50	U	50	51	U	51	50	U	50	48	U	48
Hexachloroethane	SVOA	21	U	21	21	U	21	22	U	22	21	U	21	20	U	20
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	22	U	22	610		22	250	J	22	200	J	21
Isophorone	SVOA	17	U	17	17	U	17	17	U	17	17	U	17	16	U	16
Naphthalene	SVOA	31	U	31	31	U	31	32	U	32	31	U	31	30	U	30
Nitrobenzene	SVOA	22	U	22	22	U	22	22	U	22	22	U	22	21	U	21
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	31	U	31	32	U	32	31	U	31	30	U	30
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	21	U	21	21	U	21	20	U	20
Pentachlorophenol	SVOA	330	U	330	330	U	330	340	U	340	330	U	330	310	U	310
Phenanthrene	SVOA	17	U	17	61	J	17	1600		17	640		17	340		16
Phenol	SVOA	18	U	18	18	U	18	18	U	18	18	U	18	17	U	17
Pyrene	SVOA	44	J	12	220	J	12	2400		12	1300		12	920		12

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Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	OB-4 - J1RL48			OB-6 - J1RL50			OB-7 - J1RL51			OB-8 - J1RL52			OB-9 - J1RL53		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	26	U	26	28	U	28	28	U	28	29	U	29	28	U	28
1,2-Dichlorobenzene	SVOA	21	U	21	22	U	22	22	U	22	23	U	23	22	U	22
1,3-Dichlorobenzene	SVOA	11	U	11	12	U	12	12	U	12	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	13	U	13	14	U	14	14	U	14	14	U	14	14	U	14
2,4,5-Trichlorophenol	SVOA	9.4	U	9.4	10	U	10	10	U	10	10	U	10	10	U	10
2,4,6-Trichlorophenol	SVOA	9.4	U	9.4	10	U	10	10	U	10	10	U	10	10	U	10
2,4-Dichlorophenol	SVOA	9.4	U	9.4	10	U	10	10	U	10	10	U	10	10	U	10
2,4-Dimethylphenol	SVOA	62	U	62	66	U	66	67	U	67	68	U	68	67	U	67
2,4-Dinitrophenol	SVOA	310	U	310	330	U	330	340	U	340	340	U	340	340	U	340
2,4-Dinitrotoluene	SVOA	62	U	62	66	U	66	67	U	67	68	U	68	67	U	67
2,6-Dinitrotoluene	SVOA	26	U	26	28	U	28	28	U	28	29	U	29	28	U	28
2-Chloronaphthalene	SVOA	9.4	U	9.4	10	U	10	10	U	10	10	U	10	10	U	10
2-Chlorophenol	SVOA	20	U	20	21	U	21	21	U	21	22	U	22	21	U	21
2-Methylnaphthalene	SVOA	18	U	18	19	U	19	19	U	19	20	U	20	19	U	19
2-Methylphenol (cresol, o-)	SVOA	12	U	12	13	U	13	13	U	13	13	U	13	13	U	13
2-Nitroaniline	SVOA	47	U	47	50	U	50	51	U	51	52	U	52	51	U	51
2-Nitrophenol	SVOA	9.4	U	9.4	10	U	10	10	U	10	10	U	10	10	U	10
3,3'-Dichlorobenzidine	SVOA	85	U	85	90	U	90	91	U	91	93	U	93	91	U	91
3+4 Methylphenol (cresol, m+p)	SVOA	31	U	31	33	U	33	33	U	33	34	U	34	33	U	33
3-Nitroaniline	SVOA	69	U	69	73	U	73	74	U	74	75	U	75	74	U	74
4,6-Dinitro-2-methylpheno	SVOA	310	U	310	330	U	330	330	U	330	340	U	340	330	U	330
4-Bromophenylphenyl ether	SVOA	18	U	18	19	U	19	19	U	19	20	U	20	19	U	19
4-Chloro-3-methylpheno	SVOA	62	U	62	66	U	66	67	U	67	68	U	68	67	U	67
4-Chloroaniline	SVOA	77	U	77	82	U	82	83	U	83	85	U	85	83	U	83
4-Chlorophenylphenyl ether	SVOA	20	U	20	21	U	21	21	U	21	22	U	22	21	U	21
4-Nitroaniline	SVOA	68	U	68	72	U	72	73	U	73	75	U	75	73	U	73
4-Nitrophenol	SVOA	91	U	91	97	U	97	98	U	98	100	U	100	98	U	98
Acenaphthene	SVOA	9.7	U	9.7	10	U	10	10	U	10	11	U	11	10	U	10
Acenaphthylene	SVOA	16	U	16	17	U	17	17	U	17	18	U	18	17	U	17
Anthracene	SVOA	16	J	16	17	U	17	17	U	17	18	U	18	66	J	17
Benzo(a)anthracene	SVOA	110	J	19	20	U	20	48	J	20	92	J	21	230	J	20
Benzo(a)pyrene	SVOA	84	J	19	20	U	20	34	J	20	47	J	21	140	J	20
Benzo(b)fluoranthene	SVOA	110	J	25	26	U	26	58	J	26	52	J	27	220	J	26
Benzo(ghi)perylene	SVOA	15	U	15	16	U	16	16	U	16	17	U	17	71	J	16
Benzo(k)fluoranthene	SVOA	55	J	38	40	U	40	40	U	40	41	U	41	75	J	40
Bis(2-chloro-1-methylethyl)ether	SVOA	22	U	22	23	U	23	23	U	23	24	U	24	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	22	U	22	23	U	23	23	U	23	24	U	24	23	U	23
Bis(2-chloroethyl) ether	SVOA	16	U	16	17	U	17	17	U	17	17	U	17	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	43	U	43	46	U	46	47	U	47	47	U	47	46	U	46
Butylbenzylphthalate	SVOA	40	U	40	43	U	43	43	U	43	44	U	44	43	U	43
Carbazole	SVOA	34	U	34	36	U	36	36	U	36	37	U	37	37	J	36
Chrysene	SVOA	130	J	25	27	U	27	58	J	27	110	J	28	230	J	27
Dibenz[a,h]anthracene	SVOA	18	U	18	19	U	19	19	U	19	20	U	20	19	U	19
Dibenzofuran	SVOA	19	U	19	20	U	20	20	U	20	21	U	21	20	U	20
Diethylphthalate	SVOA	24	U	24	26	U	26	26	U	26	27	U	27	26	U	26
Dimethyl phthalate	SVOA	22	U	22	23	U	23	23	U	23	24	U	24	23	U	23
Di-n-butylphthalate	SVOA	27	U	27	29	U	29	29	U	29	30	U	30	29	U	29
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	15	U	15	15	U	15	15	U	15
Fluoranthene	SVOA	190	J	34	36	U	36	66	J	36	140	J	37	410		36
Fluorene	SVOA	17	U	17	18	U	18	18	U	18	19	U	19	18	U	18
Hexachlorobenzene	SVOA	27	U	27	29	U	29	29	U	29	30	U	30	29	U	29
Hexachlorobutadiene	SVOA	9.4	U	9.4	10	U	10	10	U	10	10	U	10	10	U	10
Hexachlorocyclopentadiene	SVOA	47	U	47	50	U	50	51	U	51	52	U	52	51	U	51
Hexachloroethane	SVOA	20	U	20	21	U	21	22	U	22	22	U	22	22	U	22
Indeno(1,2,3-cd)pyrene	SVOA	44	J	21	22	U	22	22	U	22	23	U	23	61	J	22
Isophorone	SVOA	16	U	16	17	U	17	17	U	17	18	U	18	17	U	17
Naphthalene	SVOA	29	U	29	31	U	31	31	U	31	32	U	32	31	U	31
Nitrobenzene	SVOA	21	U	21	22	U	22	22	U	22	23	U	23	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	29	U	29	31	U	31	31	U	31	32	U	32	31	U	31
N-Nitrosodiphenylamine	SVOA	20	U	20	21	U	21	21	U	21	22	U	22	21	U	21
Pentachlorophenol	SVOA	310	U	310	330	U	330	330	U	330	340	U	340	330	U	330
Phenanthrene	SVOA	73	J	16	17	U	17	21	J	17	35	J	18	150	J	17
Phenol	SVOA	17	U	17	18	U	18	18	U	18	19	U	19	18	U	18
Pyrene	SVOA	230	J	11	22	J	12	73	J	12	170	J	12	420		12

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Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Organics)

CONSTITUENT	CLASS	OB-10 - J1RL54			OB-11 - J1RL55			OB-12 - J1RL56			Split of J1RL49 - J1RL73			Equipment Blank - J1RL58		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	28	U	28	27	U	27	34	U	34	27	U	27
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	21	U	21	34	U	34	21	U	21
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	11	U	11	34	U	34	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	14	U	14	13	U	13	34	U	34	13	U	13
1,4-Dioxane	SVOA										34	U	34			
2,4,5-Trichlorophenol	SVOA	9.9	U	9.9	10	U	10	9.5	U	9.5	34	U	34	9.7	U	9.7
2,4,6-Trichlorophenol	SVOA	9.9	U	9.9	10	U	10	9.5	U	9.5	34	U	34	9.7	U	9.7
2,4-Dichlorophenol	SVOA	9.9	U	9.9	10	U	10	9.5	U	9.5	34	U	34	9.7	U	9.7
2,4-Dimethylphenol	SVOA	66	U	66	66	U	66	63	U	63	34	U	34	64	U	64
2,4-Dinitrophenol	SVOA	330	U	330	330	U	330	320	U	320	340	U	340	320	U	320
2,4-Dinitrotoluene	SVOA	66	U	66	66	U	66	63	U	63	34	U	34	64	U	64
2,6-Dinitrotoluene	SVOA	28	U	28	28	U	28	27	U	27	34	U	34	27	U	27
2-Chloronaphthalene	SVOA	9.9	U	9.9	10	U	10	9.5	U	9.5	34	U	34	9.7	U	9.7
2-Chlorophenol	SVOA	21	U	21	21	U	21	20	U	20	34	U	34	20	U	20
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	18	U	18	34	U	34	18	U	18
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	12	U	12	34	U	34	13	U	13
2-Nitroaniline	SVOA	50	U	50	50	U	50	48	U	48	34	U	34	48	U	48
2-Nitrophenol	SVOA	9.9	U	9.9	10	U	10	9.5	U	9.5	34	U	34	9.7	U	9.7
3,3'-Dichlorobenzidine	SVOA	89	U	89	90	U	90	86	U	86	340	U	340	87	U	87
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	33	U	33	32	U	32	68	U	68	32	U	32
3-Nitroaniline	SVOA	72	U	72	73	U	73	70	U	70	34	U	34	70	U	70
4,6-Dinitro-2-methylpheno	SVOA	330	U	330	330	U	330	320	U	320	340	U	340	320	U	320
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	18	U	18	34	U	34	18	U	18
4-Chloro-3-methylpheno	SVOA	66	U	66	66	U	66	63	U	63	34	U	34	64	U	64
4-Chloroaniline	SVOA	81	U	81	82	U	82	78	U	78	34	U	34	79	U	79
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	20	U	20	34	U	34	20	U	20
4-Nitroaniline	SVOA	72	U	72	73	U	73	69	U	69	340	U	340	70	U	70
4-Nitrophenol	SVOA	96	U	96	97	U	97	93	U	93	340	U	340	94	U	94
Acenaphthene	SVOA	200	J	10	14	J	10	25	J	9.8	34	U	34	9.9	U	9.9
Acenaphthylene	SVOA	17	U	17	17	U	17	16	U	16	34	U	34	16	U	16
Aniline	SVOA										61	U	61			
Anthracene	SVOA	800		17	65	J	17	56	J	16	90	J	34	16	U	16
Benzo(a)anthracene	SVOA	1800		20	360		20	250	J	19	360		34	19	U	19
Benzo(a)pyrene	SVOA	1200		20	240	J	20	220	J	19	170	J	34	19	U	19
Benzo(b)fluoranthene	SVOA	2000	X	26	380		26	370	X	25	250	J	34	25	U	25
Benzo(ghi)perylene	SVOA	470		16	110	J	16	120	J	15	54	J	34	15	U	15
Benzo(k)fluoranthene	SVOA	40	UX	40	110	J	40	38	UX	38	100	J	34	39	U	39
Benzyl alcohol	SVOA										53	U	53			
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	22	U	22	34	U	34	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	22	U	22	34	U	34	22	U	22
Bis(2-chloroethyl) ether	SVOA	16	U	16	17	U	17	16	U	16	34	U	34	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	46	U	46	44	U	44	46	U	46	44	U	44
Butylbenzylphthalate	SVOA	43	U	43	43	U	43	41	U	41	34	U	34	42	U	42
Carbazole	SVOA	430		36	36	U	36	34	U	34	34	U	34	35	U	35
Chrysene	SVOA	2000		27	410		27	300	J	26	380		34	26	U	26
Dibenz[a,h]anthracene	SVOA	120	J	19	19	U	19	36	J	18	34	U	34	18	U	18
Dibenzofuran	SVOA	73	J	20	20	U	20	19	U	19	34	U	34	19	U	19
Diethylphthalate	SVOA	26	U	26	26	U	26	25	U	25	34	U	34	25	U	25
Dimethyl phthalate	SVOA	23	U	23	23	U	23	22	U	22	34	U	34	22	U	22
Di-n-butylphthalate	SVOA	29	U	29	29	U	29	28	U	28	34	U	34	28	U	28
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	34	U	34	14	U	14
Fluoranthene	SVOA	4200		36	550		36	420		34	770		34	35	U	35
Fluorene	SVOA	230	J	18	18	U	18	17	U	17	34	U	34	17	U	17
Hexachlorobenzene	SVOA	29	U	29	29	U	29	28	U	28	34	U	34	28	U	28
Hexachlorobutadiene	SVOA	9.9	U	9.9	10	U	10	9.5	U	9.5	34	U	34	9.7	U	9.7
Hexachlorocyclopentadiene	SVOA	50	U	50	50	U	50	48	U	48	340	U	340	48	U	48
Hexachloroethane	SVOA	21	U	21	21	U	21	20	U	20	34	U	34	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	530		22	120	J	22	120	J	21	59	J	34	21	U	21
Isophorone	SVOA	17	U	17	17	U	17	16	U	16	34	U	34	16	U	16
Naphthalene	SVOA	31	U	31	31	U	31	30	U	30	34	U	34	30	U	30
Nitrobenzene	SVOA	22	U	22	22	U	22	21	U	21	34	U	34	21	U	21
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	31	U	31	30	U	30	34	U	34	30	U	30
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	20	U	20	34	U	34	20	U	20
Pentachlorophenol	SVOA	330	U	330	330	U	330	320	U	320	340	U	340	320	U	320
Phenanthrene	SVOA	3300		17	200	J	17	210	J	16	290	J	34	16	U	16
Phenol	SVOA	18	U	18	18	U	18	17	U	17	34	U	34	17	U	17
Pyrene	SVOA	4400		12	650		12	540		12	680		34	12	U	12
Pyridine	SVOA										68	U	68			

Attachment	1	Sheet No.	23 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 1. 100-N-61:4 Subsite, South Staging Pile, and 100-N Pipelines Overburden Verification Sample Results (Asbestos) [a].

Sample Location	HEIS Number	Sample Date	Sample Matrix	Chrysotile %	Amosite %	Crocidolite %	Tremolite %	Actinolite %	Anthophyllite %
EXC-3	J1RL32	4/25/13	Soil	ND	ND	ND	ND	ND	ND
Duplicate of J1RL18	J1RL42	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-1	J1RL30	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-2	J1RL31	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-4	J1RL33	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-5	J1RL34	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-6	J1RL35	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-7	J1RL36	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-8	J1RL37	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-9	J1RL38	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-10	J1RL39	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-11	J1RL40	4/25/13	Soil	ND	ND	ND	ND	ND	ND
EXC-12	J1RL41	4/25/13	Soil	ND	ND	ND	ND	ND	ND
Split of J!RL18	J1NL44	4/25/13	Soil	ND	ND	ND	ND	ND	ND
SSP-2	J1RLC5	4/30/13	Soil	ND	ND	ND	ND	ND	ND
Duplicate of J1RL91	J1RLD6	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-1	J1RLC4	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-3	J1RLC6	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-4	J1RLC7	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-5	J1RLC8	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-6	J1RLC9	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-7	J1RLD0	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-8	J1RLD1	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-9	J1RLD2	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-10	J1RLD3	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-11	J1RLD4	4/30/13	Soil	ND	ND	ND	ND	ND	ND
SSP-12	J1RLD5	4/30/13	Soil	ND	ND	ND	ND	ND	ND
Split of J1RL91	J1RLD9	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-5	J1RL63	4/30/13	Soil	ND	ND	ND	ND	ND	ND
Duplicate of J1RL63	J1RL71	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-1	J1RL59	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-2	J1RL60	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-3	J1RL61	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-4	J1RL62	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-6	J1RL64	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-7	J1RL65	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-8	J1RL66	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-9	J1RL67	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-10	J1RL68	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-11	J1RL69	4/30/13	Soil	ND	ND	ND	ND	ND	ND
OB-12	J1RL70	4/30/13	Soil	ND	ND	ND	ND	ND	ND
Split of J1RL63	J1RL74	4/30/13	Soil	ND	ND	ND	ND	ND	ND

[a] the required detection limit for asbestos is 1%.

Attachment	1	Sheet No.	24 of 24
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 2. 100-N-61:4 Subsite and 100-N Pipelines Overburden Verification Sample Information Only (Organics)[a]

CONSTITUENT	CLASS	EXC-3 - J1RL18			Duplicate of J1RL18 - J1RL28			EXC-1 - J1RL16			EXC-2 - J1RL17			EXC-4 - J1RL19		
		4/25/13			4/25/13			4/25/13			4/25/13			4/25/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	11	UJ	11	11	UJ	11	9.9	UJ	9.9	430	JX	10	44000	JDX	490
Acenaphthylene	PAH	9.8	U	9.8	9.7	U	9.7	8.9	U	8.9	9.0	U	9.0	440	UD	440
Anthracene	PAH	3.3	UJ	3.3	3.3	UJ	3.3	3.0	UJ	3.0	800	J	3.0	81000	JD	150
Benzo(a)anthracene	PAH	25	J	3.5	24	JX	3.5	3.2	UJ	3.2	1700	J	3.2	99000	JD	160
Benzo(a)pyrene	PAH	15	J	7.0	31	J	6.9	6.4	UJ	6.4	1100	J	6.4	48000	JD	320
Benzo(b)fluoranthene	PAH	16	J	4.6	88	J	4.5	4.2	UJ	4.2	1100	JX	4.2	43000	JDX	210
Benzo(ghi)perylene	PAH	7.8	UJ	7.8	30	J	7.8	7.2	UJ	7.2	410	J	7.2	13000	JD	350
Benzo(k)fluoranthene	PAH	6.0	J	4.3	32	J	4.3	3.9	UJ	3.9	540	J	3.9	14000	JDX	190
Chrysene	PAH	20	JX	5.3	39	J	5.2	6.0	J	4.8	1600	JX	4.8	87000	JD	240
Dibenz[a,h]anthracene	PAH	12	UJ	12	12	UJ	12	11	UJ	11	91	JX	11	3600	JDX	540
Fluoranthene	PAH	54	J	14	14	UJ	14	13	UJ	13	3900	J	13	240000	JD	640
Fluorene	PAH	5.8	UJ	5.8	5.7	UJ	5.7	5.2	UJ	5.2	350	JX	5.3	33000	JD	260
Indeno(1,2,3-cd)pyrene	PAH	43	JX	13	30	J	13	12	UJ	12	300	J	12	11000	JD	590
Naphthalene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	590	UD	590
Phenanthrene	PAH	13	UJ	13	13	UJ	13	12	UJ	12	1600	J	12	200000	JD	590
Pyrene	PAH	55	J	13	13	UJ	13	12	J	12	3800	J	12	240000	JD	590

CONSTITUENT	CLASS	EXC-5 - J1RL20			EXC-6 - J1RL21			EXC-7 - J1RL22			EXC-8 - J1RL23			EXC-9 - J1RL24		
		4/25/13			4/25/13			4/25/13			4/25/13			4/25/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.9	UJ	9.9	4600	JXD	190	23	JX	9.9	14	JX	9.3	9.8	UJ	9.8
Acenaphthylene	PAH	8.9	U	8.9	170	UD	170	8.9	U	8.9	8.4	U	8.4	8.9	U	8.9
Anthracene	PAH	3.0	UJ	3.0	10000	JD	58	29	J	3.0	20	J	2.8	3.0	UJ	3.0
Benzo(a)anthracene	PAH	3.1	UJ	3.1	20000	JD	61	140	J	3.1	58	J	3.0	3.1	UJ	3.1
Benzo(a)pyrene	PAH	6.3	UJ	6.3	7800	JD	120	110	J	6.3	31	J	6.0	6.3	UJ	6.3
Benzo(b)fluoranthene	PAH	4.1	UJ	4.1	8900	JD	81	96	JX	4.1	30	JX	3.9	4.1	UJ	4.1
Benzo(ghi)perylene	PAH	7.1	UJ	7.1	3400	JD	140	16	JX	7.1	15	J	6.7	7.1	UJ	7.1
Benzo(k)fluoranthene	PAH	3.9	UJ	3.9	3700	JD	76	42	J	3.9	13	J	3.7	3.9	UJ	3.9
Chrysene	PAH	4.8	UJ	4.8	16000	JD	93	160	J	4.8	59	J	4.5	4.8	UJ	4.8
Dibenz[a,h]anthracene	PAH	11	UJ	11	550	JDX	210	11	UJ	11	10	UJ	10	11	UJ	11
Fluoranthene	PAH	13	UJ	13	41000	JD	250	230	J	13	97	J	12	13	UJ	13
Fluorene	PAH	5.2	UJ	5.2	4300	JDX	100	22	JX	5.2	11	J	4.9	5.2	UJ	5.2
Indeno(1,2,3-cd)pyrene	PAH	12	UJ	12	2700	JD	230	35	J	12	14	J	11	12	UJ	12
Naphthalene	PAH	12	U	12	230	UD	230	12	U	12	11	U	11	12	U	12
Phenanthrene	PAH	12	UJ	12	22000	JD	230	45	J	12	48	J	11	12	UJ	12
Pyrene	PAH	12	UJ	12	40000	JD	230	240	J	12	110	J	11	12	UJ	12

CONSTITUENT	CLASS	EXC-10 Re-Sample - J1RMR0			EXC-11 - J1RL26			EXC-12 - J1RL27			EXC-10 - J1RL25			Split of J1RL18 - J1N152		
		5/16/13			4/25/13			4/25/13			4/25/13			4/25/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.9	U	9.9	9.9	UJ	9.9	9.5	UJ	9.5	140	X	9.9	25	JN	22
Acenaphthylene	PAH	8.9	U	8.9	8.9	U	8.9	8.6	U	8.6	8.9	U	8.9	31	U	31
Anthracene	PAH	4.3	JX	3.0	3.0	UJ	3.0	2.9	UJ	2.9	98		3	3.5	U	3.5
Benzo(a)anthracene	PAH	52	N	3.2	3.2	UJ	3.2	3.0	UJ	3.0	350		3.2	15	JN	3.5
Benzo(a)pyrene	PAH	20		6.4	6.3	UJ	6.3	6.1	UJ	6.1	270		6.3	14	JN	3.5
Benzo(b)fluoranthene	PAH	21	X	4.2	4.1	UJ	4.1	4.0	UJ	4.0	260		4.2	15	J	3.5
Benzo(ghi)perylene	PAH	8.6	JNX	7.1	7.1	UJ	7.1	6.9	UJ	6.9	190		7.1	5.8	J	3.5
Benzo(k)fluoranthene	PAH	11	J	3.9	3.9	UJ	3.9	3.8	UJ	3.8	97		3.9	6.0	J	3.5
Chrysene	PAH	39	J	4.8	7.1	J	4.8	4.6	UJ	4.6	370		4.8	18	N	3.5
Dibenz[a,h]anthracene	PAH	11	U	11	11	UJ	11	10	UJ	10	11	U	11	6.9	U	6.9
Fluoranthene	PAH	98	N	13	13	UJ	13	12	UJ	12	660		13	24	JN	6.9
Fluorene	PAH	5.2	U	5.2	5.2	UJ	5.2	5.0	UJ	5.0	62	X	5.2	6.9	U	6.9
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	12	UJ	12	11	UJ	11	190		12	5.7	JN	3.5
Naphthalene	PAH	12	U	12	12	U	12	11	U	11	12	U	12	25	U	25
Phenanthrene	PAH	30	J	12	12	UJ	12	11	UJ	11	390		12	8.1	JN	6.9
Pyrene	PAH	100		12	13	J	12	11	UJ	11	730		12	23	JN	3.5

Attachment	2	Sheet No.	1 of 3
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

[a] total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) from the excavation decision unit are for information only. Also for information only are the semivolatile organic constituents (SVOC) that are associated with both Method 8310 and 8270 (acenaphthene, acenapthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, flouranthene, flourene, indeno(1,2,3-cd)pyrene, naphthalene, phenathrene, and pyrene). Information only samples are located in Attachment 2 and discussed further in the RSVP.

Attachment 2. 100-N-61:4 Subsite and 100-N Pipelines Overburden Verification Sample Information Only (Organics)[a]

CONSTITUENT	CLASS	SSP-2 - J1RL91			Duplicate of J1RL91 - J1RLC2			SSP-1 - J1RL90			SSP-3 - J1RL92			SSP-4 - J1RL93		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	SVOA	10	U	10	10	U	10	11	U	11	270	J	9.9	11	U	11
Acenaphthylene	SVOA	17	U	17	17	U	17	17	U	17	16	U	16	18	U	18
Anthracene	SVOA	17	U	17	17	U	17	17	U	17	1100		16	18	U	18
Benzo(a)anthracene	SVOA	20	U	20	20	U	20	76	J	20	2500		19	27	J	21
Benzo(a)pyrene	SVOA	20	U	20	20	U	20	43	J	20	1700		19	21	U	21
Benzo(b)fluoranthene	SVOA	26	U	26	26	U	26	98	JX	27	3400	X	25	43	JX	27
Benzo(ghi)perylene	SVOA	16	U	16	16	U	16	16	U	16	700		15	17	U	17
Benzo(k)fluoranthene	SVOA	40	U	40	39	U	39	41	UX	41	38	UX	38	41	UX	41
Chrysene	SVOA	27	U	27	27	U	27	85	J	28	2700		26	28	J	28
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	19	U	19	280	J	18	20	U	20
Fluoranthene	SVOA	36	U	36	35	U	35	130	J	37	5500		34	38	J	37
Fluorene	SVOA	18	U	18	18	U	18	18	U	18	360		17	19	U	19
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	22	U	22	23	U	23	860		21	23	U	23
Naphthalene	SVOA	31	U	31	30	U	30	32	U	32	30	U	30	32	U	32
Phenanthrene	SVOA	17	U	17	17	U	17	36	J	17	3500		16	22	J	18
Phenol	SVOA	18	U	18	18	U	18	18	U	18	17	U	17	19	U	19

CONSTITUENT	CLASS	SSP-5 - J1RL94			SSP-6 - J1RL95			SSP-7 - J1RL96			SSP-8 - J1RL97			SSP-9 - J1RL98		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	SVOA	160	J	10	30	J	9.9	53	J	9.9	11	J	10	11	U	11
Acenaphthylene	SVOA	17	U	17	16	U	16	16	U	16	17	U	17	18	U	18
Anthracene	SVOA	470		17	240	J	16	220	J	16	36	J	17	18	U	18
Benzo(a)anthracene	SVOA	1200		20	1100		19	610		19	310	J	20	21	U	21
Benzo(a)pyrene	SVOA	1000		20	720		19	370		19	370		20	21	U	21
Benzo(b)fluoranthene	SVOA	1800	X	26	1500	X	25	500		25	680	X	27	27	U	27
Benzo(ghi)perylene	SVOA	530		16	290	J	15	130	J	15	160	J	16	17	U	17
Benzo(k)fluoranthene	SVOA	40	UX	40	39	UX	39	210	J	38	40	UX	40	42	U	42
Chrysene	SVOA	1400		27	1200		26	710		26	400		27	28	U	28
Dibenz[a,h]anthracene	SVOA	230	J	19	160	J	18	110	J	18	120	J	19	20	U	20
Fluoranthene	SVOA	2500		36	1900		35	1300		35	330		36	38	U	38
Fluorene	SVOA	120	J	18	38	J	17	52	J	17	18	U	18	19	U	19
Indeno(1,2,3-cd)pyrene	SVOA	670		22	420		21	250	J	21	230	J	22	23	U	23
Naphthalene	SVOA	31	U	31	30	U	30	30	U	30	31	U	31	32	U	32
Phenanthrene	SVOA	2000		17	870		16	720		16	120	J	17	18	U	18
Pyrene	SVOA	3000		12	2100		12	1300		12	460		12	13	U	13

CONSTITUENT	CLASS	SSP-10 - J1RL99			SSP-11 - J1RLC0			SSP-12 - J1RLC1			Split of J1RL91 - J1RLD8			Equipment Blank - J1RLC3		
		4/30/13			4/30/13			4/30/13			4/30/13			4/30/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	SVOA	10	U	10	41	J	10	10	U	10	34	U	34	10	U	10
Acenaphthylene	SVOA	17	U	17	17	U	17	17	U	17	34	U	34	17	U	17
Anthracene	SVOA	17	U	17	420		17	17	U	17	34	U	34	17	U	17
Benzo(a)anthracene	SVOA	86	J	20	1400		20	20	U	20	34	U	34	20	U	20
Benzo(a)pyrene	SVOA	85	J	20	820		20	20	U	20	34	U	34	20	U	20
Benzo(b)fluoranthene	SVOA	130	J	26	1700	X	26	26	U	26	34	U	34	26	U	26
Benzo(ghi)perylene	SVOA	53	J	16	310	J	16	16	U	16	34	U	34	16	U	16
Benzo(k)fluoranthene	SVOA	55	J	40	39	UX	39	39	U	39	34	U	34	40	U	40
Chrysene	SVOA	110	J	27	1600		26	26	U	26	34	U	34	27	U	27
Dibenz[a,h]anthracene	SVOA	19	U	19	190	J	19	19	U	19	34	U	34	19	U	19
Fluoranthene	SVOA	130	J	36	3000		35	35	U	35	35	J	34	36	U	36
Fluorene	SVOA	18	U	18	55	J	18	18	U	18	34	U	34	18	U	18
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	430		22	21	U	21	34	U	34	22	U	22
Naphthalene	SVOA	31	U	31	30	U	30	30	U	30	34	U	34	31	U	31
Phenanthrene	SVOA	37	J	17	1300		17	17	U	17	34	U	34	17	U	17
Pyrene	SVOA	140	J	12	3200		12	12	J	12	36	J	34	12	U	12

Attachment	2	Sheet No.	2 of 3
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Attachment 2. 100-N-61:4 Subsite and 100-N Pipelines Overburden Verification Sample Information Only (Organics)[a]

Sample Location	HEIS Number	Sample Date	TPH - Diesel Range EXT			TPH - Diesel Range			TPH - motor oil (high boiling)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1RL18	4/25/13	4400	J	1100	3100	J	720			
Duplicate of J1RL18	J1RL28	4/25/13	5800	J	1100	3800	J	740			
EXC-1	J1RL16	4/25/13	4900	J	1000	4400	J	690			
EXC-2	J1RL17	4/25/13	410000	JN	1000	340000	JN	680			
EXC-4	J1RL19	4/25/13	420000	J	990	330000	J	670			
EXC-5	J1RL20	4/25/13	5000	J	1000	4000	J	700			
EXC-6	J1RL21	4/25/13	950000	JD	4900	790000	JD	3300			
EXC-7	J1RL22	4/25/13	5700	J	940	4000	J	640			
EXC-8	J1RL23	4/25/13	5000	J	980	3700	J	670			
EXC-9	J1RL24	4/25/13	4200	J	990	2300	J	680			
EXC-10	J1RL25	4/25/13	9400	J	940	6200	J	640			
EXC-11	J1RL26	4/25/13	3700	J	920	3000	J	620			
EXC-12	J1RL27	4/25/13	2900	J	950	2200	J	650			
Split of J1RL18	J1N152	4/25/13				380	U	380	730	U	730

Attachment	2	Sheet No.	3 of 3
Originator	J. D. Skoglie	Date	6/6/13
Checked	C. H. Dobie	Date	6/6/13
Calc. No.	0100N-CA-V0219	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-N Field Remediation Job No. 14655

Area: 100-N

Discipline: Environmental Calculation No: 0100N-CA-V0220

Subject: 100-N-61:4 Subsite and South Staging Pile Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Summary = 3 Total = 4	J. D. Skoglie [signature]	N. K. Schiffern N K. Schiffern	C. H. Dobie [signature]	D. F. Obenauer D. F. Obenauer	8/21/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007)

DE01-437.03

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	6/11/2013	Calc. No.:	0100N-CA-V0220	Rev.:	0
Project:	100-N Field Remediation	Job No:	14655	Checked:	N. K. Schiffern	Date:	6/11/2013
Subject:	100-N-61:4 Subsite and South Staging Pile Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 3	

PURPOSE:

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk for the 100-N-61:4 subsite and south staging pile waste site. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2006b), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) DOE-RL, 2006a, *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites*, DOE/RL-2005-92, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) DOE-RL, 2006b, *Remedial Design Report/Remedial Action Work Plan for the 100-N Area*, DOE/RL-2005-93, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

3) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

4) WCH, 2013, *Remaining Sites Verification Package for the 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N Subsite, South Staging Pile, and 100-N Pipelines Overburden*, Attachment to Waste Site Reclassification Forms 2013-051, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2006b).

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the excess cancer risk of $<1 \times 10^{-6}$ (DOE-RL 2006b).

4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of $<1 \times 10^{-5}$.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	6/11/2013	Calc. No.:	0100N-CA-V0220	Rev.:	0
Project:	100-N Field Remediation	Job No:	14655	Checked:	N. K. Schiffern	Date:	6/11/2013
Subject:	100-N-61:4 Subsite and South Staging Pile Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 3	

METHODOLOGY:

The 100-N-61:4 subsite and south staging pile waste site are comprised of two decision units for verification sampling consisting of the 100-N-61:4 excavation and the south staging pile. The direct contact hazard quotient and carcinogenic risk calculations for the 100-N-61:4 subsite and south staging pile waste site were conservatively calculated for the entire waste site using the greater of the maximum or statistical verification soil sample results (WCH 2013). Of the contaminants of potential concern (COPCs) for this site, boron, hexavalent chromium, molybdenum, detected semivolatiles, detected pesticides, and the detected polychlorinated biphenyls (PCB) require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Nitrogen in nitrate and nitrite requires HQ and risk calculations because these analytes were detected above a Washington State or Hanford Site background value. Lead was detected above background; however, lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. All other site nonradionuclide COPCs were not detected or were quantified below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the statistical value for boron is 1.6 mg/kg, divided by the noncarcinogenic RAG value of 16,000 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), is 1.0×10^{-4}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation. The sum of the HQ values is 5.9×10^{-2}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, then multiplied by 1.0×10^{-6}. For example, the maximum value for carbazole is 0.49 mg/kg, divided by 50 mg/kg, and multiplied as indicated, is 9.8×10^{-9}. Comparing this value, and all other individual values, to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual cancer risk values prior to rounding are used for this calculation. The sum of the excess cancer risk values is 5.5×10^{-7}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk $>1 \times 10^{-6}$: None
4) List the cumulative excess cancer risk for carcinogens $>1 \times 10^{-5}$: None

Table 1 shows the results of the hazard quotient and excess cancer risk calculations.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	6/11/2013	Calc. No.:	0100N-CA-V0220	Rev.:	0
Project:	100-N Field Remediation	Job No:	14655	Checked:	N. K. Schiffern	Date:	6/11/2013
Subject:	100-N-61:4 Subsite and South Staging Pile Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 3	

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 100-N-61:4 Subsite and South Staging Pile Waste Site

Contaminants of Potential Concern	Maximum or Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	1.6	16,000	1.0E-04	--	--
Chromium, hexavalent[c]	0.190	240	7.9E-04	2.1	9.0E-08
Lead[d]	17.6	353	--	--	--
Molybdenum	0.63	400	1.6E-03	--	--
Semivolatiles					
Carbazole	0.49	--	--	50	9.8E-09
Dibenzofuran	0.16	160	1.0E-03	--	--
Anions					
Nitrogen in nitrate and nitrite	198	128,000	1.5E-03	--	--
Pesticides					
Chlordane (alpha, gamma)	0.0028	40	7.0E-05	2.86	9.8E-10
DDD, 4,4'-	0.0013	--	--	4.17	3.1E-10
DDE, 4,4'-	0.0013	--	--	2.94	4.4E-10
DDT, 4,4'-	0.012	40	3.0E-04	2.94	4.1E-09
Dieldrin	0.00035	4	8.8E-05	0.0625	5.6E-09
Polychlorinated Biphenyls					
Aroclor-1254	0.086	1.6	5.4E-02	0.5	1.7E-07
Aroclor-1260	0.133	--	--	0.5	2.7E-07
Totals					
Cumulative Hazard Quotient:			**5.9E-02**		
Cumulative Excess Cancer Risk:					**5.5E-07**

Notes:

[a] = From WCH (2013).

[b] = Value obtained from the RDR/RAWP (DOE-RL 2006b) or *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.

[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.

[d] = Value for the noncarcinogenic RAG calculated using Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA/540/R 93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

-- = not applicable

RAG = remedial action goal

CONCLUSION:

The calculations in Table 1 demonstrates that the 100-N-61:4 subsite and south staging pile waste site meet the requirements for the direct contact hazard quotients and carcinogenic (excess cancer) risk, respectively, as identified in the RDR/RAWP (DOE-RL 2006b) and SAP (DOE-RL 2006a). The direct contact hazard quotients and carcinogenic (excess cancer) risk calculations are for use in the RSVP for these sites.

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-N Field Remediation **Job No. 14655**

Area: 100-N

Discipline: Environmental *Calculation No: 0100N-CA-V0221

Subject: 100-N-61:4 Subsite and South Staging Pile Area Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 3 Total = 4	J. D. Skoglie	C. H. Dobie	N. K. Schiffern	D. F. Obenauer	8/21/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	06/11/13	Calc. No.:	0100N-CA-V0221	Rev.:	0
Project:	100-N Area Field Remediation	Job No:	14655	Checked:	C. H. Dobie	Date:	06/11/13
Subject:	100-N-61:4 Subsite and South Staging Pile Area Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 1 of 3	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk associated with soil contaminant levels compared to soil cleanup levels for protection of groundwater for the 100-N-61:4 subsite and south staging pile area. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) for the 100-N Area (DOE-RL 2006), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) DOE-RL, 2006, *Remedial Design Report/Remedial Action Work Plan for the 100-N Area,* DOE/RL-2005-93, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

3) WAC 173-340-740 (3)(a)(ii)(A), "Groundwater Protection".

4) WCH, 2013, *Remaining Sites Verification Package for the 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N Subsite, South Staging Pile, and 100-N Pipelines Overburden*, Attachment to Waste Site Reclassification Form 2013-051, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate a HQ for each noncarcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (DOE-RL 2006).

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (DOE-RL 2006).

4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of $<1 \times 10^{-5}$.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	06/11/13	Calc. No.:	0100N-CA-V0221	Rev.:	0
Project:	100-N Area Field Remediation	Job No:	14655	Checked:	C. H. Dobie	Date:	06/11/13
Subject:	100-N-61:4 Subsite and South Staging Pile Area Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 2 of 3	

METHODOLOGY:

The 100-N-61:4 subsite and south staging pile area is comprised of two decision units for verification sampling, consisting of the excavation area and south staging pile area. The protection of groundwater hazard quotient and carcinogenic risk calculations for the 100-N-61:4 subsite and south staging pile area were conservatively calculated for the entire waste site using the statistical or maximum value for each analyte (WCH 2013). Based on the generic site RESRAD model (DOE-RL 2006) and a vadose zone of approximately 10.5 m (34.5 ft) thickness, a K_d of 7.2 or greater is required to show no predicted migration to groundwater in 1,000 years. Nitrogen in nitrate and nitrite requires HQ and risk calculations because it is detected above a Washington State or Hanford Site background value, and has a K_d of less than 7.2. Boron and hexavalent chromium are included because they have a K_d of less than 7.2, and no Hanford background value has been established. All other site nonradionuclide COPCs were undetected, quantified below background levels, or have a K_d greater than or equal to 7.2. An example of the HQ and risk calculations for soil constituents with a potential impact to groundwater is presented below:

1) The hazard quotient is defined as the ratio of the dose of a substance obtained over a specified time (mg/kg/day) to a reference dose for the same substance derived over the same specified time (mg/kg/day). The hazard quotient can also be calculated as the ratio of the concentration in soil (maximum or statistical value) (mg/kg) to the soil RAG (mg/kg) for protection of groundwater, where the RAG is the groundwater cleanup level (µg/L) (calculated with, and related to the hazard quotient through, WAC 173-340-720 (3)(a)(ii)(A), (1996) x 100 x 1 mg/1000 µg (conversion factor). This is based on the "100 times rule" of WAC 173-340-740(3)(a)(ii) (A) (1996). For example, the statistical value for boron of 1.6 mg/kg, divided by the noncarcinogenic RAG value of 320 mg/kg is 5.0×10^{-3}. Comparing this value to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The cumulative HQ for the 100-N-61:4 subsite and south staging pile area is 1.2×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1×10^{-6}. There were no detected constituents with a carcinogenic RAG. Therefore, comparing 0.0×10^{-0} to the requirement of $<1 \times 10^{-6}$, this criterion is met. The criterion for cumulative excess cancer risk for carcinogens is also met.

4) The soil cleanup RAGs for protection of groundwater are based on the "100 times" provision in WAC 173-340-740(3)(a)(ii)(A). WAC 173-340-740(3)(a)(ii)(A) (1996) provides the "100 times rule" but also states "unless it can be demonstrated that a higher soil concentration is protective of ground water at the site." When the "100 times rule" values are exceeded, RESRAD was used to demonstrate that higher soil concentrations may be protective of groundwater.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	06/11/13	Calc. No.:	0100N-CA-V0221	Rev.:	0
Project:	100-N Area Field Remediation	Job No:	14655	Checked:	C. H. Dobie	Date:	06/11/13
Subject:	100-N-61:4 Subsite and South Staging Pile Area Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 3 of 3	

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations.

Table 1. Direct Hazard Quotient and Excess Cancer Risk for the Protection of Groundwater Results for the 100-N-61:4 Subsite and South Staging Pile Area.

Contaminants of Potential Concern	Maximum or Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	1.6	320	5.0E-03	--	--
Chromium, hexavalent	0.190	4.8	4.0E-02	--	--
Anions					
Nitrogen in Nitrate and Nitrite	198	2,560	7.7E-02	--	--
Totals					
Cumulative Hazard Quotient:			**1.2E-01**		
Cumulative Excess Cancer Risk:					**0.0E+00**

Notes:
[a] = From WCH (2013).
[b] = Value obtained from the Cleanup Levels and Risk Calculations (CLARC) database using Groundwater, Method B, results and the "100 times" model.
-- = not applicable
RAG = remedial action goal

CONCLUSION:

This calculation demonstrates that the 100-N-61:4 subsite and south staging pile area meet the requirements for the hazard quotients and excess carcinogenic risk for protection of groundwater as identified in the RDR/RAWP (DOE-RL 2006).

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-N Field Remediation **Job No. 14655**

Area: 100-N

Discipline: Environmental *Calculation No: 0100N-CA-V0231

Subject: 100-N Pipelines Overburden Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 3 Total = 4	J. D. Skoglie	C. H. Dobie	N. K. Schiffern	D. F. Obenauer	8/21/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	06/12/13	Calc. No.:	0100N-CA-V0231	Rev.:	0
Project:	100-N Area Field Remediation	Job No:	14655	Checked:	C. H. Dobie	Date:	06/12/13
Subject:	100-N Pipelines Overburden Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 1 of 3	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk associated with soil contaminant levels compared to soil cleanup levels for protection of groundwater for the 100-N Pipelines Overburden. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) for the 100-N Area (DOE-RL 2006), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) DOE-RL, 2006, *Remedial Design Report/Remedial Action Work Plan for the 100-N Area*, DOE/RL-2005-93, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

3) WAC 173-340-740 (3)(a)(ii)(A), "Groundwater Protection".

4) WCH, 2013, *Remaining Sites Verification Package for the 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N Subsite, South Staging Pile, and 100-N Pipelines Overburden*, Attachment to Waste Site Reclassification Form 2013-051, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate a HQ for each noncarcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (DOE-RL 2006).

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (DOE-RL 2006).

4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of $<1 \times 10^{-5}$.

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Subject:	100-N Pipelines Overburden Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 2 of 3	

METHODOLOGY:

The 100-N Pipelines Overburden is comprised of one decision unit for verification sampling, consisting of the overburden soil. The protection of groundwater hazard quotient and carcinogenic risk calculations for the 100-N Pipelines Overburden was conservatively calculated for the entire waste site using the statistical or maximum value for each analyte (WCH 2013). Based on the generic site RESRAD model (DOE-RL 2006) and a vadose zone of approximately 3 m (10 ft) thickness, a K_d of 20 mL/g or greater is required to show no predicted migration to groundwater in 1,000 years. Hexavalent chromium, acenaphthene, fluorene, dibenzofuran, and endosulfan (I, II, sulfate) are included because they have a K_d of less than 20 mL/g, and no Hanford background value has been established. All other site nonradionuclide COPCs were undetected, quantified below background levels, or have a K_d greater than or equal to 20 mL/g. An example of the HQ and risk calculations for soil constituents with a potential impact to groundwater is presented below:

1) The hazard quotient is defined as the ratio of the dose of a substance obtained over a specified time (mg/kg/day) to a reference dose for the same substance derived over the same specified time (mg/kg/day). The hazard quotient can also be calculated as the ratio of the concentration in soil (maximum or statistical value) (mg/kg) to the soil RAG (mg/kg) for protection of groundwater, where the RAG is the groundwater cleanup level (µg/L) (calculated with, and related to the hazard quotient through, WAC 173-340-720 (3)(a)(ii)(A), (1996) x 100 x 1 mg/1000 µg (conversion factor). This is based on the "100 times rule" of WAC 173-340-740(3)(a)(ii) (A) (1996). For example, the maximum value for fluorene of 6.5 mg/kg, divided by the noncarcinogenic RAG value of 64 mg/kg is 1.0×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The cumulative HQ for the 100-N Pipelines Overburden is 2.3×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1×10^{-6}. There were not any detected constituents in this calculation with a carcinogenic RAG. Therefore, comparing the value of 0.0×10^{-0} to the requirement of $<1 \times 10^{-6}$, this criterion is met. The criterion for cumulative excess cancer risk for carcinogens of $<1 \times 10^{-5}$ is also met.

4) The soil cleanup RAGs for protection of groundwater are based on the "100 times" provision in WAC 173-340-740(3)(a)(ii)(A). WAC 173-340-740(3)(a)(ii)(A) (1996) provides the "100 times rule" but also states "unless it can be demonstrated that a higher soil concentration is protective of ground water at the site." When the "100 times rule" values are exceeded, RESRAD was used to demonstrate that higher soil concentrations may be protective of groundwater.

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Subject:	100-N Pipelines Overburden Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 3 of 3	

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations.

Table 1. Direct Hazard Quotient and Excess Cancer Risk for the Protection of Groundwater Results for the 100-N Pipelines Overburden.

Contaminants of Potential Concern	Maximum or Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Chromium, hexavalent	0.231	4.8	4.8E-02	--	--
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	5.8	96	6.0E-02	--	--
Fluorene	6.5	64	1.0E-01	--	--
Semivolatiles					
Dibenzofuran	0.073	3.2	2.3E-02	--	--
Pesticides					
Endosulfan (I, II, sulfate)	0.00033	9.6	3.4E-05	--	--
Totals					
Cumulative Hazard Quotient:			**2.3E-01**		
Cumulative Excess Cancer Risk:					**0.0E+00**

Notes:
[a] From WCH (2013).
[b] Value obtained from the Cleanup Levels and Risk Calculations (CLARC) database using Groundwater, Method B, results and the "100 times" model.
-- = not applicable
RAG = remedial action goal

CONCLUSION:

This calculation demonstrates that the 100-N Pipelines Overburden meets the requirements for the hazard quotients and excess carcinogenic risk for protection of groundwater as identified in the RDR/RAWP (DOE-RL 2006).

APPENDIX D

DATA QUALITY ASSESSMENT

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VERIFICATION SAMPLING

A data quality assessment (DQA) was performed to compare the verification sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2013b). This DQA was performed in accordance with site-specific data quality objectives found in the *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites* (100-N Area SAP) (DOE-RL 2006).

A review of the sample design (WCH 2013b), the field logbook (WCH 2013a), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the SAP data assurance requirements and the data validation procedures for chemical analysis and radiochemical analysis (BHI 2000a, 2000b) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Verification sample data collected at the 100-N-61:4 subsite, south staging pile (SSP), and 100-N Pipelines Overburden were provided by the laboratories in sample delivery groups (SDGs) JP0526, JP0529, JP0531, JP0568, ZP0007, ZP0008, ZP0009, MA06340, MA06362, MA06363, D1312022, D1312302, and D1312301. SDG JP0526 was submitted for third-party validation. The major and minor deficiencies identified in the 100-N-61:4, SSP, and 100-N Pipelines Overburden analytical data sets are discussed as follows. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

MAJOR DEFICIENCIES

In the ion chromatograph (IC) anions analysis, the holding times for nitrate, nitrite, and orthophosphate in method 300.0 were exceeded by more than twice the limit in SDGs JP0526, JP0531, ZP0007, and ZP0008. All undetected nitrate, nitrite and orthophosphate results in these SDGs were qualified as rejected with "R" flags. These results were anticipated by the project. To obtain usable nitrate and nitrite data method 353.2 was also run, which has longer allowable holding time. These data effectively replace the rejected method 300.0 nitrate and nitrite data. Orthophosphate is not a regulated compound. Therefore, the resulting data set is sufficient for decision-making purposes.

MINOR DEFICIENCIES

100-N-61:4 Subsite Verification Sample Data

SDG JP0526

This SDG is composed of 13 statistical verification soil samples (J1RL16 through J1RL28 and J1RJM0 through J1RJM6) from the 100-N-61:4 excavation collected on April 25, 2013. Samples J1RL18 and J1RL28 comprise a field duplicate pair. All samples were analyzed for inductively coupled plasma (ICP) metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, polycyclic aromatic hydrocarbons (PAH), and total petroleum hydrocarbons (TPH). In addition, one equipment blank (J1RL29) was analyzed for ICP metals and mercury. SDG JP0526 was submitted for third-party validation. Minor deficiencies are as follows:

In the ICP metals analysis, the matrix spike (MS) recoveries were outside of project acceptance criteria for aluminum (1,424%), antimony (51%), iron (2,180%), manganese (199%), and silicon (27%). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample and these data may be considered estimated. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. All antimony and silicon results were qualified as estimated and flagged "J" by third-party validation due to the MS recoveries outside the quality control (QC) limits. Although not qualified for MS recovery outside of QC limits, all aluminum, iron, and manganese results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, all silicon results were considered qualified as estimated and flagged "J" by third-party validation due to a laboratory control sample (LCS) recovery below QC limits at 20%. Estimated data are usable for decision-making purposes.

In the PAH analysis, the surrogate recoveries were outside of the laboratory QC limits in samples J1RL17, J1RL19, and J1RL21. The laboratory reported elevated concentrations of target compounds were evident in these samples. All detected PAH results in these samples were qualified as estimated by third-party validation and flagged with a "J." Estimated data are usable for decision-making purposes.

In the PAH analysis, the MS/matrix spike duplicate (MSD) recoveries, as well as the MS/MSD surrogate recoveries, were outside of QC limits for all PAH analytes except acenaphthylene and naphthalene. Elevated concentrations of target compounds were evident in the sample used for the QC analysis (J1RL19). Third-party validation qualified all PAH results except acenaphthylene and naphthalene as estimated and flagged with a "J." Estimated data are usable for decision-making purposes.

In the PAH analysis, the MS/MSD relative percent difference (RPD) calculations were outside of QC limits for acenaphthene (43%), benzo(a)anthracene (55%), benzo(a)pyrene (106%), benzo(g,h,i)perylene (73%), chrysene (34%), dibenzo(a,h)anthracene (64%), and pyrene (31%).

Elevated concentrations of target compounds were evident in the sample used for the QC analysis (J1RL19). Due to RPD calculations outside of QC limits, all acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, and pyrene data were qualified as estimated by third-party validation and flagged with a "J." Estimated data are usable for decision-making purposes.

In the TPH analysis, the surrogate recoveries were outside of the laboratory QC limits in samples J1RL17, J1RL19, and J1RL21. The laboratory reported elevated concentrations of target compounds were evident in these samples. All diesel range organic results in these samples were qualified as estimated by third-party validation and flagged with a "J." Estimated data are usable for decision-making purposes.

In the TPH analysis, the MS/MSD recoveries for diesel range (-235% and -231%) and diesel range extended (-302% and -295%) hydrocarbons, as well as the MS/MSD surrogate (245% and 231%), were outside of QC limits. Elevated concentrations of target compounds were evident in the sample used for the QC analysis (J1RL17). All diesel range organic results in these samples were qualified as estimated by third-party validation and flagged with a "J." Estimated data are usable for decision-making purposes

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Third-party validation qualified all undetected nitrate, nitrite and orthophosphate as rejected with "UR" flags. All detected nitrate, nitrite, and orthophosphate results were qualified as estimated and flagged with a "J" by third-party validation. Estimated data are usable for decision-making purposes.

In the nitrate/nitrite as nitrogen analysis, the MS recoveries were outside of QC limits at -3% and 36%. All nitrate/nitrite as nitrogen results were qualified as estimated and flagged with a "J" by third-party validation. Estimated data are usable for decision-making purposes.

SDG JP0568

This SDG is composed of one statistical verification soil sample (J1RMR0) from the 100-N-61:4 excavation collected on May 16, 2013. The sample was analyzed for PAH. No deficiencies were identified in the data package.

SDG ZP0007

This SDG is composed of one soil sample (J1N152) from the 100-N-61:4 excavation collected on April 25, 2013. Sample J1N152 is a split of sample J1RL18 collected on April 25, 2013. The sample was analyzed for GEA, ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, PAH, and TPH. Minor deficiencies are as follows:

In the PAH analysis, the surrogate recovery in the MS was outside of the laboratory QC limits. The MS recoveries were above QC limits for benzo(a)anthracene (184%), benzo(a)pyrene (151%), chrysene (199%), dibenz(a,h)anthracene (220%), and pyrene (371%). The MS/MSD

RPD calculations were outside of QC limits for acenaphthene (52%), anthracene (37%), benzo(a)anthracene (81%), benzo(a)pyrene (71%), benzo(b)fluoranthene (37%), benzo(k)fluoranthene (39%), chrysene (86%), fluoranthene (94%), indeno(1,2,3-cd)pyrene (39%), phenanthrene (62%), and pyrene (124%). The laboratory report attributed the elevated recoveries to sample heterogeneity and an abundance of target analytes. The laboratory reported evidence of matrix interference was observed in the chromatograms of J1N152, MS, and MSD. The laboratory qualified all detected PAH analytes with an "N" due to the MS recoveries. Although not qualified by the project for surrogate/MS recoveries and/or RPD calculations outside of QC limits, the acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, silicon was detected at less than twice the method detection limit (MDL) in the method blank (MB). Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC project criteria for aluminum (62%) and antimony (61%). Although not qualified for the LCS recovery outside of QC limits, all aluminum and antimony data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS/MSD recoveries for aluminum (283% and 270%), antimony (59% and 60%), calcium (145% and 178%), iron (241% [MSD only]), and silicon (58% and 47%) were outside of QC limits. For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony, calcium, and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all aluminum, antimony, calcium, iron, and silicon results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the hexavalent chromium analysis, contamination was detected in the MB at just over 10 times the MDL. The contamination is less than one half of the reporting limit. The hexavalent chromium result in the field sample was of similar concentration. Method blank contamination of this magnitude has no significant impact on the field sample result and will not impact evaluation of the 100-N-61:4 subsite. The data are usable for decision-making purposes.

In the nitrate/nitrite as total nitrogen analysis, contamination was detected in the MB at less than twice the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the nitrate/nitrite as total nitrogen analysis, the MS recovery was outside of QC limits at 196%. The spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. Although not qualified for MS recoveries outside of

QC limits, the nitrate/nitrite as total nitrogen result may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section and were qualified as rejected with an "R" flag. Although not qualified for a holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are usable for decision-making purposes.

In the IC anions analysis, phosphate was detected in the MB at less than five times the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

SDG MA06340

This SDG is composed of 13 statistical samples (J1RL30 through J1RL42) from the 100-N-61:4 excavation collected on April 25, 2013. This SDG includes one field duplicate pair (J1RL32/J1RL42). The samples were analyzed for bulk asbestos. No minor deficiencies were found in SDG MA06340. The data are usable for decision-making purposes.

SDG D1312022

This SDG is composed of one split sample (J1RL44) from the 100-N-61:4 excavation collected on April 25, 2013. This sample is a split of J1RL32 and was analyzed for bulk asbestos. No minor deficiencies were found in SDG D1312022. The data are usable for decision-making purposes.

South Staging Pile (SSP) Verification Sample Data

SDG JP0529

This SDG is composed of 13 statistical verification soil samples (J1RL90 through J1RL99 and J1RLC0 through J1RLC3) from the SSP collected on April 30, 2013. Samples J1RL91 and J1RLC2 comprise a field duplicate pair. All samples were analyzed for gamma energy analysis (GEA), isotopic plutonium, isotopic uranium, carbon-14, nickel-63, strontium-90, tritium, ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides. In addition, one equipment blank (J1RLC3) was analyzed for ICP metals, mercury, and SVOCs. Minor deficiencies are as follows:

In the carbon-14 and tritium analyses, no MS was performed. In the isotopic plutonium and isotopic uranium analyses, no LCS analysis was performed for plutonium-238 and uranium-235. Although not qualified for a lack of MS or LCS, all carbon-14, tritium, plutonium-238, and uranium-235 results may be considered estimated. Estimated data are usable for decision-making purposes.

In the GEA and isotopic uranium analyses, the RPD determined for the laboratory duplicates was above QC limits for cesium-137 (35.8%), uranium-234 (33.9%), and uranium-238 (41.6%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs above QC limits, all cesium-137, uranium-234, and uranium-238 results may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, the laboratory reported that benzo(b)fluoranthene and benzo(k)fluoranthene were unresolved in several samples due to matrix interferences.

The combined peak was reported as benzo(b)fluoranthene, while benzo(k)fluoranthene was reported as undetected even though it may have been present. The laboratory flagged associated results with a "K." The data are usable for decision-making purposes.

In the SVOC analysis, the LCS recovery for 3,3'-dichlorobenzidine (43%) was outside of QC limits. Although not qualified for the LCS recovery outside of QC limits, all 3,3'-dichlorobenzidine results may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, the MS/MSD recoveries for 4-chloroaniline (48% [MS only]) and 3,3'-dichlorobenzidine (46% and 49%) were outside of QC limits. Although not qualified for the MS recovery outside of QC limits, all 4-chloroaniline and 3,3'-dichlorobenzidine results may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticides analysis, the surrogate recoveries were outside of laboratory QC criteria for J1RL92, J1RL94, J1RL95, and J1RLC0. The laboratory reported that samples J1RL92, J1RL95, and J1RLC0 had each required dilution due to matrix interferences. Although not qualified for the surrogate recovery outside of QC limits, all pesticide results in J1RL92, J1RL94, J1RL95, and J1RLC0 may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticides analysis, the laboratory noted that samples J1RL92, J1RL93, J1RL94, J1RL95, J1RL96, J1RL97, J1RL99, and J1RLC0 had nontarget peaks due to matrix interference. Detections of pesticides in the samples were generally low and there is no significant impact on the field sample results. The data are usable for decision-making purposes.

In the PCB analysis, the laboratory noted that samples J1RL90, J1RL92, J1RL95, J1RL96, J1RL97, J1RL99, J1RLC0, J1RLC1, and J1RLC2 appeared to contain PCBs; however, due to weathering or other environmental processes, the PCBs in the samples do not closely match any of the aroclor standards used for instrument calibration. The samples were quantified and reported as a mixture of aroclor-1254 and aroclor-1260; however, due to the poor match with the aroclor standard(s), there was increased uncertainty associated with these results. The data are usable for decision-making purposes.

In the PCB analysis, the surrogate recovery was below the laboratory QC limits for sample J1RL92. Although not qualified for the surrogate recovery outside of QC limits, all PCB results in J1RL92 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, aluminum and zinc detected at less than twice the MDL in the MB. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was outside of QC limits for silicon (10%). Although not qualified for the LCS recovery outside of QC limits, the silicon data may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for aluminum (1,914%), antimony (38%), iron (1,979%), nickel (53%), and silicon (20%) were outside of QC limits. For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony, nickel, and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all aluminum, antimony, iron, nickel, and silicon results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the RPDs calculated from the laboratory duplicate analysis were above QC limits for chromium (32%) and nickel (78%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for the RPDs outside of QC limits, all chromium and nickel results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section and were qualified as rejected with an "R" flag. Although not qualified for a holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are usable for decision-making purposes.

In the IC anions analysis, the MS recovery for orthophosphate was above QC limits at 158%. Although not qualified for a MS recovery above QC limits, all orthophosphate results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG ZP0008

This SDG is composed of one soil sample (J1RLD8) from the SSP collected on April 30, 2013. Sample J1RLD8 is a split of sample J1RL91. The sample was analyzed for GEA, nickel-63, carbon-14, isotopic uranium, isotopic plutonium, tritium, strontium-90, ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, PCBs, SVOCs, and pesticides. Minor deficiencies are as follows:

In the isotopic uranium analyses, no LCS analysis was performed for uranium-235 analysis. Although not qualified for a lack of an LCS, all uranium-235 results may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, one of the surrogate recoveries for sample J1RLD8, MS, and MB were outside of the laboratory QC limits. Although not qualified for surrogate recovery outside of the laboratory QC limits, the analytes associated with this surrogate (acenaphthylene, acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) data may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, the MS/MSD recoveries were outside of QC limits for 4-chloroaniline (45% and 48%), 2,4-dinitrophenol (26% and 29%), and isophorone (48% [MS only]). Although not qualified for MS/MSD recoveries outside of QC limits, all 4-chloroaniline, 2,4-dinitrophenol, and isophorone data may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, silicon was detected at less than three times the MDL in the MB. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC project criteria for aluminum (69%). Although not qualified for the LCS recovery outside of QC limits, all aluminum and antimony data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS/MSD recoveries for aluminum (337% and 421%), antimony (51% and 51%), calcium (161% and 171%), iron (214% and 209%), and magnesium (150% [MSD only]) were outside of QC limits. For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony, calcium, and magnesium did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all aluminum, antimony, calcium, iron, and magnesium results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the nitrate/nitrite as total nitrogen analysis, contamination was detected in the MB at less than twice the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the nitrate/nitrite as total nitrogen analysis, the MS recovery was outside of QC limits at 196%. Although not qualified for the MS recovery outside of QC limits, the nitrate/nitrite as total nitrogen result may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. Each of these analytes was detected in the sample, therefore, none of the data was rejected. Although not qualified for a holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG MA06362

This SDG is composed of 13 statistical samples (J1RLC4 through J1RLC9 and J1RLD0 through J1RLD6) from the SSP collected on April 30, 2013. This SDG includes one field duplicate pair (J1RLC5/J1RLD6). The samples were analyzed for bulk asbestos. No minor deficiencies were found in SDG MA06362. The data are usable for decision-making purposes.

SDG D1312302

This SDG is composed of one split sample (J1RLD9) from the SSP collected on April 30, 2013. This sample is a split of J1RLC5 and was analyzed for bulk asbestos. No minor deficiencies were found in SDG D1312302. The data are usable for decision-making purposes.

100-N Pipelines Overburden Verification Sample Data

SDG JP0531

This SDG is composed of 13 statistical verification soil samples (J1RL45 through J1RL57) from the 100-N pipelines overburden collected on April 30, 2013. Samples J1RL49 and J1RL57 comprise a field duplicate pair. All samples were analyzed for GEA, strontium-90, ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, PAH, TPH, SVOCs, PCBs, and pesticides. In addition, one equipment blank (J1RL58) was analyzed for ICP metals, mercury, and SVOCs. Minor deficiencies are as follows:

In the PAH analysis, the surrogate recovery for sample J1RL55 was outside of laboratory QC limits. The sample had elevated concentrations of target analytes and required dilution for analyte quantification. Although not qualified for surrogate recovery outside of the laboratory QC limits, the PAH results for sample J1RL55 may be considered estimated. Estimated data are usable for decision-making purposes.

In the PAH analysis, the MSD recovery for benzo(a)anthracene (166%), fluoranthene (165%), phenanthrene (8%), and pyrene (174%) were outside of QC limits. The MS/MSD RPDs were outside of QC limits for benzo(a)anthracene (49%), benzo(k)anthracene (42%), fluoranthene (45%), phenanthrene (169%), and pyrene (51%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for the MSD recovery and RPDs outside of the QC limits, all benzo(a)anthracene, benzo(k)anthracene, fluoranthene, phenanthrene, and pyrene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the TPH analysis, the surrogate recovery for sample J1RL45 was outside of laboratory QC limits. The laboratory noted that the recovery issue was due to obvious matrix interference. Although not qualified for surrogate recovery outside of the laboratory QC limits, the TPH results for sample J1RL45 may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, the MS/MSD recoveries for 2,4-dinitrophenol were outside of QC limits at 29% and 27%. Although not qualified for MS/MSD recoveries outside of the laboratory QC limits, all 2,4-dinitrophenol results may be considered estimated. Estimated data are usable for decision-making purposes.

In the PCB analysis, the MS recovery outside of QC limits for aroclor-1260 (42%). The MS/MSD RPD calculation was outside of QC limits for aroclor-1260 (34%). Although not qualified for the MS recovery and RPD outside of the QC limits, all aroclor-1260 results may be considered estimated. Estimated data are usable for decision-making purposes.

In the PCB analysis, the laboratory noted that samples J1RL45, J1RL46, J1RL47, J1RL48, J1RL49, J1RL50, J1RL51, J1RL52, J1RL53, J1RL54, J1RL56 and J1RL57 appeared to contain PCBs; however, due to weathering or other environmental processes, the PCBs in the samples do not closely match any of the aroclor standards used for instrument calibration. The samples were quantified and reported as a mixture of aroclor-1254 and aroclor-1260; however, due to the poor match with the aroclor standard(s), there was increased uncertainty associated with these results. The data are usable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, aluminum, barium, chromium, iron, and manganese were detected at less than three times the MDL in the MB. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (11%) was below the QC project criteria. Although not qualified for the LCS recovery outside of QC limits, the mercury data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for aluminum (1,507%), antimony (54%), copper (253%), iron (1,570%), manganese (147%), silicon (16%), and zinc (204%) were outside of QC limits. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony, copper, silicon, and zinc did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all aluminum, antimony, copper, iron, manganese, silicon, and zinc results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the RPDs calculated from the laboratory duplicate analysis were above QC limits for copper (51%), lead (108%), silicon (76%), and zinc (58%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for the RPDs outside of QC limits, all copper, lead, silicon, and zinc results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the hexavalent chromium analysis, the RPD calculated from the laboratory duplicate analysis were above QC limits at 42.4%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for the RPDs outside of QC limits, the hexavalent chromium result may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by less than twice the specified holding time for nitrate, nitrite, and orthophosphate. Although not qualified for the hold time exceedance, the detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG ZP0009

This SDG is composed of one soil sample (J1RL73) collected on April 30, 2013 from the 100-N pipelines overburden. Sample J1RL73 is a split of sample J1RL49. The sample was analyzed for GEA, strontium-90, ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, PAH, TPH, SVOCs, PCBs, and pesticides. Minor deficiencies are as follows:

In the PAH analysis, the surrogate recovery for sample J1RL73 was outside of laboratory QC limits. The laboratory reported that matrix interference was evident in the sample. Although not qualified for surrogate recovery outside of the laboratory QC limits, the PAH results for sample J1RL73 may be considered estimated. Estimated data are usable for decision-making purposes.

In the PAH analysis, the MS recovery for phenanthrene (21%) was outside of QC limits. The MSD recovery for acenaphthene (166%), benzo(a)anthracene (489%), benzo(a)pyrene (411%), benzo(b)fluoranthene (211%), benzo(k)fluoranthene (211%), chrysene (486%), fluoranthene (334%), indeno(1,2,3-cd)pyrene (204%), naphthalene (48%), pyrene (740%), and the surrogate (189%) were outside of QC limits. The MS/MSD RPDs were outside of QC limits for acenaphthene (85%), anthracene (57%), benzo(a)anthracene (127%), benzo(a)pyrene (120%), benzo(b)fluoranthene (84%), benzo(k)fluoranthene (82%), benzo(g,h,i)perylene (46%), chrysene (125%), fluoranthene (109%), fluorene (40%), indeno(1,2,3-cd)pyrene (70%), phenanthrene (55%), and pyrene (135%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Additionally, the laboratory reported that the samples showed evidence of matrix interference. Although not qualified for the MS/MSD recoveries and RPDs outside of the QC limits, all acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)anthracene, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene naphthalene, phenanthrene, and pyrene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, one of the surrogate recoveries for the MB and MS were outside of the laboratory QC limits. Although not qualified for surrogate recovery outside of the laboratory QC limits, the analytes associated with this surrogate (acenaphthylene, acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) data may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, the MS/MSD recoveries were outside of QC limits for 4-chloroaniline (45% and 48%), 2,4-dinitrophenol (26% and 29%), and isophorone (48% [MS only]). Although not qualified for MS/MSD recoveries outside of QC limits, all 4-chloroaniline, 2,4-dinitrophenol, and isophorone data may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, silicon was detected at less than three times the MDL in the MB. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for aluminum (69%) was below the QC limits. Although not qualified for the LCS recovery outside of QC limits, the aluminum data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS/MSD recoveries for aluminum (337% and 421%), antimony (51% and 51%), calcium (161% and 171%), iron (214% and 209%), and manganese (150% [MSD only]) were outside of QC limits. For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and calcium did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all aluminum, antimony, iron, and manganese results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by less than twice the specified holding time for nitrate, nitrite, and orthophosphate. Although not qualified for the hold time exceedance, the detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are usable for decision-making purposes.

In the nitrate/nitrite as total nitrogen analysis, the MS recovery was outside of QC limits at 196%. Although not qualified for the MS recovery outside of QC limits, the nitrate/nitrite as total nitrogen result may be considered estimated. Estimated data are acceptable for decision-making purposes.

SDG MA06363

This SDG is composed of 13 statistical samples (J1RL59 through J1RL71) from the 100-N pipelines overburden collected on April 30, 2013. This SDG includes one field duplicate pair (J1RL63/J1RL71). The samples were analyzed for bulk asbestos. No minor deficiencies were found in SDG MA06363. The data are usable for decision-making purposes.

SDG D1312301

This SDG is composed of one split sample (J1RL74) from the 100-N pipelines overburden collected on April 30, 2013. This sample is a split of J1RL63 and was analyzed for bulk asbestos. No minor deficiencies were found in SDG D1312301. The data are usable for decision-making purposes.

FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference (RPD) evaluations of main sample(s) versus the laboratory duplicate(s) are routinely performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field quality assurance (QA)/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples, listed in the field logbook (WCH 2013a), are shown in Table D-1. The main and QA/QC sample results are presented in Appendix C.

Table D-1. Field Quality Assurance/Quality Control Samples.

Sample Area	Main Sample	Duplicate Sample	Split Sample
EXC-3	J1RL18/J1RL32	J1RL28/J1RL42	J1N152/J1RL44
SSP-2	J1RL91/J1RLC5	J1RLC2/J1RLD6	J1RLD8/J1RLD9
OB-5	J1RL49/J1RL63	J1RL57/J1RL71	J1RL73/J1RL74

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each contaminant of potential concern (COPC). Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit (TDL). Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix B provides details on duplicate pair evaluation and RPD calculation.

Split samples are collected to provide a relative measure of the variability in the sampling, sample handling, and analytical techniques used by commercial laboratories. The field main and split samples are evaluated by computing the RPD of the split samples for each COPC to determine the usability of the verification data. The U.S. Environmental Protection Agency Contract Laboratory Program duplicate sample comparison methodology, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 2004), is used as an initial test of the data from the splits. Only analytes that had values above five times the contract-required quantitation limit for both the main and split sample were compared. The calculation brief in Appendix B provides details on split pair RPD calculation. The RPD acceptance criteria for project-split samples is ≤35% (less than or equal to 35%).

The RPD calculations for the field duplicate samples are above the acceptance criteria (30%) for calcium in the 100-N pipelines overburden (50.7%) and silicon in the SSP (59.2%) and 100-N pipelines overburden (34.7%) data sets. The RPD calculations for the field split samples are above the acceptance criteria (35%) for silicon at the 100-N-61:4 excavation (94.5%), SSP (147.8%), and 100-N pipelines overburden (148.4%) data sets. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the TDL, including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix C) to indicate that a visual check of the data is required by the reviewer. For the field duplicate, this check was required for benzo(a)anthracene in the 100-N pipelines overburden data set. For the field split, this check was required for nitrogen in nitrate in the SSP data set. This result is attributed to heterogeneities in the sample matrix from which the samples were collected. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

Summary

Limited, random, or sample matrix-specific influenced batch QC issues such as those discussed above are a potential for any analysis. The number and types seen in these data sets are within expectations for the matrix types and analyses performed. The DQA review of the 100-N-61:4 subsite, SSP, and 100-N pipelines overburden verification sampling data found that the analytical results are accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for the 100-N-61:4 subsite, SSP, and 100-N pipelines overburden concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. The analytical data were found acceptable for decision-making purposes. The verification sample analytical data are stored in the Environmental Restoration project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System database. The verification sample analytical data are also summarized in Appendix C.

REFERENCES

BHI, 2000a, *Data Validation Procedure for Chemical Analysis*, BHI-01435, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

BHI, 2000b, *Data Validation Procedure for Radiochemical Analysis*, BHI-01433, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

DOE-RL, 2006, *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites*, DOE/RL-2005-92, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

WCH, 2013a, *100-N Field Remediation Sampling*, Logbook EL-1652-09, pp. 20-28 and 50-52, Washington Closure Hanford, Richland, Washington.

WCH, 2013b, *Work Instruction for Verification Sampling of the 100-N-61:4, Water Treatment and Storage Facilities Underground Pipelines South of 182-N and Co-located Segments of the 100-N-84:4, 100-N Area Steam and Condensate Pipeline and 100-N-84:6, 100-N Area Chemical and Process Sewer Pipelines; South Staging Pile Area; and 100-N Pipelines Overburden,* 0100N-WI-G0063, Rev. 0, Washington Closure Hanford, Richland, Washington.