**Department of Energy**

**Environmental Management**
**Consolidated Business Center**
**250 East 5th Street, Suite 500**
**Cincinnati, Ohio 45202**
**(513) 246-0500**

MAR 26 2007

Mr. James Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

EMCBC-00384-07

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

**TRANSMITTAL PAGE CHANGES TO THE DRAFT CERTIFICATION REPORT FOR AREA 6 SITEWIDE RAIL LINE SYSTEM**

Enclosed for your approval are page changes to the Final Certification Report for Area 6 Sitewide Rail Line System, Revision 1 based on verbal comments from the Ohio Environmental Protection Agency (OEPA) made during the weekly conference call.

Please contact me at (513) 648-3139, if you have any questions or require additional information.

Sincerely,

Johnny Reising

Johnny W. Reising
Director, Fernald Closure Project

Enclosures: As Stated

cc w/o enclosures
Jack Craig, EMCBC
Michelle Cullerton, Tetra Tech
Robert Everson, EMCBC
Frank Johnston, Stoller
Dennis Sizemore, Fluor Fernald, Inc.

# 5.0 CERTIFICATION EVALUATION AND CONCLUSIONS

Certification success or failure was based on sample data from each CU against criteria discussed in Section 2.2.4. Subsequent to any evaluation of preliminary data, full statistical analysis and evaluation was performed on all validated data. Final certification data are presented in Appendix B.

## 5.1 CERTIFICATION RESULTS AND EVALUATION

The following is a summary of the analytical results and statistical analyses of the data for each CU in the Sitewide Rail Line System:

RLS-C01

CU RLS-C01 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C02

CU RLS-C02 had one sample location above-FRL for radium-226, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C03

CU RLS-C03 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C04

CU RLS-C04 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C05

CU RLS-C06 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C06

CU RLS-C06 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C07

CU RLS-C07 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C08

CU RLS-C08 had one sample result above-FRL for thorium-232, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C09

Within CU RLS-09, one sample location was above-FRL for beryllium. Beryllium, as well as all other ASCOCs, passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C10

CU RLS-C10 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C11

CU RLS-C11 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C12

CU RLS-C12 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C13

CU RLS-C13 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C14

CU RLS-C14 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C15

Within CU RLS-C15, there were above-FRL sample locations for radium-226, thorium-228, and thorium-232, but each passed statistical analysis as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C16

CU RLS-C16 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

Stratified Fill CU

The stratified fill CU passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

Soil Under Rail Trestle

For the soil under the rail trestle, all primary and secondary ASCOCs passed the certification criteria with the exception of benzo(a)pyrene, which failed both the hot-spot criterion with a result of 4830 ug/kg where the FRL is 2000 ug/kg and the UCL on the mean criterion with a UCL on the mean of 3490 ug/kg. In addition to the benzo(a)pyrene, several other PAHs (Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, Pyrene) exhibited concentrations greater than the BTV, which requires further evaluation as to the impact to ecological receptors that may be caused by this condition.

This area requires added consideration prior to immediate excavation to remove the above-FRL soil and/or additional elevated PAHs when compared to the BTVs, as it is a very small area and is located on the banks of Paddys Run beneath the existing rail trestle, which is a potential habitat for the Indiana Bat. Excavation in this area could cause a larger impact to the environment than the conditions present in the soil due to these PAHs. The source of the PAHs is believed to be from the rail operation during the OU1 remediation. This source is a very typical rail operation, which can be found all over the country and is no longer present. Furthermore, there is no easy access to this area.

To evaluate the option of leaving the elevated PAHs in place, both the impact on human health and the impact on ecological receptors were assessed by conducting a risk assessment for human health, which is further discussed in Section 5.2 of this document and an evaluation of the impact to ecological receptors, which is presented in Section 5.3 of this document. Performing a risk assessment is consistent with the SEP protocols, which state that the need to excavate secondary COCs will be evaluated on a case-by-case basis. This was done to demonstrate that the residual contamination values in the CU remain protective of human health and the environment, per Section 10.1.1 of the OU5 ROD. This risk assessment and ecological evaluation determined that no further action was needed for this CU. Final certification data are presented in Appendix A with the BTV comparison comprising the last 3 pages of Appendix A.

Ballast West of Paddys Run

All ASCOCs in this CU passed the certification criteria discussed in Section 2.3. Final certification data are presented in Appendix B.

Ballast East of Paddys Run

With the exception of arsenic, all ASCOCs in this CU passed the certification criteria discussed in Section 2.3. The statistical analysis of the secondary COC arsenic from the ballast in this area showed indications of elevated conditions with the 90% UCL on the mean being 15.2 mg/kg as compared to the FRL of 12 mg/kg. Since the material being certified is ballast rather than soil, an investigation of the source material was conducted. The ballast in the rail yard was considered to be clean source material as it was constructed in the recent past and was therefore sampled for arsenic to establish background conditions. The maximum value for arsenic in the rail yard ballast was 16 mg/kg with a mean of 9.88 mg/kg (See Appendix B). Conversely, the maximum value for arsenic in the ballast east of Paddys Run was 15.2 mg/kg with a mean of 9.26 mg/kg, both of which are less then the rail yard values. However, there is a large standard deviation for the samples from the ballast east of Paddys Run with values ranging from 1.8 to 15.2 mg/kg of arsenic, which is one of the contributing factors that causes the 90% UCL on the mean for this dataset to be greater than the FRL. Although the 1.8 mg/kg value is not a statistical outlier, it is clearly background. As such, by analyzing the higher values of this dataset, if considered to be attributed to contamination, without the 1.8 mg/kg value, the 90% UCL on the mean is 11.6 mg/kg with a mean of 9.28 mg/kg, which is lower than the soil FRL that was developed based on background levels in soil. Although inconclusive due to the limited number of samples, it indicates that this area should not be of significant concern.

Subsequent evaluation of the characteristics of the ballast from east of Paddys Run shows that no other primary constituent of concern such as uranium, radium, or thorium, which would be indicative of contamination, was found to be elevated in this ballast. This supports the conclusion that the arsenic levels in the ballast east of Paddys Run are consistent with background conditions and are not related to site operations. Therefore, the ballast does not warrant further remediation. Final certification data are presented in Appendix B.

## 5.2 RISK EVALUATIONS FOR SOIL UNDER THE RAIL TRESTLE

Benzo(a)pyrene detected in the soil under the rail trestle CU failed the certification process (Appendix A). Therefore, a risk assessment was performed for the soil under the rail trestle (Figure 5-1) to demonstrate

that the residual contamination values in this CU remain protective of human health and the environment, per Section 10.1.1 of the OU5 ROD.

The area on Figure 5-1 represents the CU associated with the soil under the rail trestle. Although this area is a very small footprint for full-time recreation or grounds work, it is conservatively assumed that the undeveloped park user and groundskeeper/sampler spend 100% of their exposure time in this footprint. Soil results for the soil-under-rail-trestle CU (Appendix A) and surface-water results for the former waste-pit area are used as the contaminant concentrations in the exposure pathways.

The exposure parameters for the receptors evaluated in this assessment are provided in Tables 5.1 and 5.2. An undeveloped park user can be a child, youth, adult or senior adult, whereas the groundskeeper/sampler worker is an adult.

The exposure frequency is taken as 20 days per year, about every other week, for child and adult; and 40 days per year for youth and senior adult. A higher frequency for youth and senior adult is driven by the assumption that these receptors will have extra recreation time available to visit the park.

The exposure duration is the number of years over which an individual will visit the park. EPA (1989b) notes that national trends show individuals do not live in a region of the country for more than 30 years. Therefore, 30 years is used as the sum across the age groups, with the years partitioned into 3 years for child, 6 for youth, 14 for adult and 7 for senior adult.

Body weights are taken from EPA's Exposure Factors Handbook (EFH; EPA 1997). The adult and senior adult reflect the mean value in Table 7-11 of the EFH. Youth represents the mean values reported for ages 7 to 18 in Table 7-3 of the EFH, and child is derived from the mean values reported for ages 0 to 6 in Table 7-3 of the EFH.

TABLE 5-1
EXPOSURE PARAMETERS FOR THE UNDEVELOPED PARK USER

| Parameter (units) | Child (1 to 6 yr) | Youth (7 to 18 yr) | Adult (19 to 55 yr) | Senior Adult (56 to 70 yr) |
|---|---|---|---|---|
| Parameters applicable to all pathways, unless otherwise specified | | | | |
| EF (day/yr) | 20 | 40 | 20 | 40 |
| ED (yr) | 3 | 6 | 14 | 6 |
| BW (kg) | 15.5 | 46.9 | 71.8 | 71.8 |
| $AT_{nc}$ (day) | 2190 | 4380 | 13870 | 5110 |
| $AT_c$ (day) | 25550 | 25550 | 25550 | 25550 |
| Pathway: inhalation of dust, volatiles & radon | | | | |
| IR ($m^3$/hr) | 1.0 | 1.0 | 1.0 | 1.0 |
| ET (hr/day) | 2 | 2 | 2 | 2 |
| Pathway: incidental ingestion of soil | | | | |
| IR (g/day) | 0.1 | 0.075 | 0.05 | 0.05 |
| FI (unitless) | 0.75 | 0.75 | 0.75 | 0.75 |
| Pathway: dermal contact with soil | | | | |
| SA ($cm^2$) | 1730 | 3520 | 4850 | 4850 |
| AF ($mg/cm^2$) | 1.9 | 1.9 | 0.06 | 0.06 |
| ABS (unitless) | CSV | CSV | CSV | CSV |
| Pathway: external radiation | | | | |
| $ET_{outdoors}$ (hr/day) | 2 | 2 | 2 | 2 |
| $ET_{indoors}$ (hr/day) | NA | NA | NA | NA |
| $SH_{outdoors}$ (unitless) | 0.25 | 0.25 | 0.25 | 0.25 |
| $SH_{indoors}$ (unitless) | NA | NA | NA | NA |
| Pathway: incidental ingestion of surface water | | | | |
| IR (L/day) | .035 | .035 | .015 | .015 |
| ET (hr/day) | 1 | 1 | 1 | 1 |
| EF (day/yr) | 12 | 12 | 12 | 12 |
| ED (yr) | 6 | 12 | 20 | 20 |
| Pathway: dermal contact with surface water | | | | |
| SA ($cm^2$) | 2180 | 4470 | 6070 | 6070 |
| DA ($mg/cm^2$/event) | CSV | CSV | CSV | CSV |
| EF (day/yr) | 12 | 12 | 12 | 12 |
| ED (yr) | 6 | 12 | 20 | 20 |
| ET (hr/day) | 1 | 1 | 1 | 1 |

EF = exposure frequency
BW = body weight
$AT_c$ = averaging time for carcinogens
ET = exposure time
SA = surface area of skin
ABS = absorption factor
DA = dose absorbed per event
ED = exposure duration
$AT_{nc}$ = averaging time for noncarcinogens
IR = inhalation or ingestion rate
FI = fraction of ingested soil that is contaminated
AF = adherence factor for skin
SH = shielding factor
CSV = chemical specific value

The averaging time for non-carcinogens is the exposure duration multiplied by 365 days/yr. For carcinogens, the averaging time is an exposure duration of 70 yrs multiplied by 365 days/yr.

Inhalation rates are obtained from the EFH (EPA 1997). Child, youth, adult and senior adult values represent short-term exposure for light activities (Table 5-23 of the EFH), which are all equivalent in the cited EFH table. The receptor exposure time outdoors is two hours on each day spent at the undeveloped park. Activities include hiking off and on trails, sitting on the ground, and eating snacks.

Ingestion rates for soil are taken from the EFH (EPA 1997). The selected values for child and adult reflect the mean value for children and adult receptors in Table 4-23 of the EFH. A specific value is not reported for the youth receptor, and it is assumed to be 75 mg/day, which is the average of the child and adult values in Table 4-23.

The fraction of contaminated soil that is ingested by a receptor is assumed to be 0.75 of the total amount of soil ingested, as clean top soil and surface water cover the remedial footprint.

The dermal surface area in contact with soil is assumed to be the face, hands, forearms and lower legs. Values in Table 5-1 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004).

The soil adherence factors were taken from Exhibit C-3 in EPA Risk Assessment Guidance, Part E (EPA 2004). Exhibit C-3 reports 95$^{th}$ percentile values for children in dry (0.4 mg/cm2) and wet (3.3 mg/cm2) soil, and these values were averaged to derive the adherence factor of 1.9 for child and youth. The adult and senior were equated to the 95 percentile value for a residential grounds keeper.

An outdoor shielding factor of 0.25 is used to take credit for the shielding provided by large amount of riprap in the footprint and the presence of water (i.e. Paddys Run) over portions of the exposure area.

The EFH (EPA 1997) does not contain guidance on ingestion rates for surface water. An older version of the handbook (EPA 1989a) assigned 0.05 L/hr for an adult swimmer. However, swimming is not allowed and the incidental ingestion is attributed to wading and splashing in the water. Therefore, a rate of 0.025 L/hr is assumed for the child and youth. The adult and senior adult receptor is assumed to receive approximately half this dose, or 0.012 L/hr.

For all receptors, an exposure time of one hour is spent wading and splashing on each summer day spent at the undeveloped park. The exposure frequency for these receptors is taken as one day at the park each weekend of the 12 summer weeks (12 day/yr).

Exposure duration to surface water remains the same as soil for child, youth, adult and senior adult.

The dermal surface area in contact with surface water is assumed to be the face, hands, forearms, feet and lower legs, as swimming is not permitted at the site. Values in Table 5-1 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004).

In Table 5-2, a groundskeeper/sampler receptor is assumed to work 2 days/wk (100 days/yr) mowing, landscaping and collecting soil and water samples. As the site is designated as an undeveloped park, and soil and water samples are collected infrequently, the 100-day exposure frequency is considered reasonable. EPA (1991) has designated the exposure duration of a commercial worker as 25 years, and this is adopted for this assessment.

Body weight is taken from Table 7-11 of EPA's Exposure Factors Handbook (EFH; EPA 1997). The averaging time for non-carcinogens is the exposure duration multiplied by 365 days/yr. For carcinogens, the averaging time is an exposure duration of 70 yrs multiplied by 365 days/yr.

Inhalation rates for short-term exposures for outdoor workers are taken from Table 5-23 of the EFH (EPA 1997). The groundskeeper/sampler is assumed to perform heavy activities outdoors 7 hrs/day and 1 hr/day is spent indoors on breaks.

The ingestion rate for soil is taken from Table 4-23 in the EFH (EPA 1997), and the fraction ingested by the groundskeeper is assumed to be 0.75 of total amount of soil ingested, as clean top soil and surface water cover the remedial footprint.

TABLE 5-2

EXPOSURE PARAMETERS FOR THE GROUNDSKEEPER/SAMPLER

| Parameter (units) | Child | Youth | Adult | Sr. Adult |
|---|---|---|---|---|
| Parameters applicable to all pathways, unless otherwise specified | | | | |
| EF (day/yr) | NA | NA | 100 | NA |
| ED (yr) | NA | NA | 25 | NA |
| BW (kg) | NA | NA | 71.8 | NA |
| $AT_{nc}$ (day) | NA | NA | 9125 | NA |
| $AT_c$ (day) | NA | NA | 25550 | NA |
| Pathway: inhalation of dust, volatiles & radon | | | | |
| IR ($m^3$/hr) | NA | NA | 2.5 | NA |
| ET (hr/day) | NA | NA | 7 | NA |
| Pathway: incidental ingestion of soil | | | | |
| IR (g/day) | NA | NA | 0.05 | NA |
| FI (unitless) | NA | NA | 0.75 | NA |
| Pathway: dermal contact with soil | | | | |
| SA ($cm^2$) | NA | NA | 4850 | NA |
| AF (mg/$cm^2$) | NA | NA | 0.5 | NA |
| ABS (unitless) | NA | NA | CSV | NA |
| Pathway: external radiation | | | | |
| $ET_{outdoors}$ (hr/day) | NA | NA | 7 | NA |
| $ET_{indoors}$ (hr/day) | NA | NA | 1 | NA |
| $SH_{outdoors}$ (unitless) | NA | NA | 0.25 | NA |
| $SH_{indoors}$ (unitless) | NA | NA | 0.5 | NA |
| Pathway: incidental ingestion of surface water | | | | |
| IR (L/day) | NA | NA | 0.01 | NA |
| ET (hr/day) | NA | NA | 0.5 | NA |
| EF (day/yr) | NA | NA | 12 | NA |
| ED (yr) | NA | NA | 25 | NA |
| Pathway: dermal contact with surface water | | | | |
| SA ($cm^2$) | NA | NA | 5670 | NA |
| DA (mg/$cm^2$/event) | NA | NA | CSV | NA |
| EF (day/yr) | NA | NA | 12 | NA |
| ED (yr) | NA | NA | 25 | NA |
| ET (hr/day) | NA | NA | 1 | NA |

EF = exposure frequency
BW = body weight
$AT_c$ = averaging time for carcinogens
ET = exposure time
SA = surface area of skin exposed to soil or water
ABS = absorption factor
DA = dose absorbed per event
ED = exposure duration
$AT_{nc}$ = averaging time for non-carcinogens
IR = inhalation/ingestion rate
FI = fraction of ingested soil that is contaminated
AF = adherence factor for skin
SH = shielding factor
CSV = chemical specific value

Dermal surface area in contact with soil is assumed to be the face, hands, forearms and lower legs. Values in Table 5-2 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004). The soil adherence factor for the groundskeeper/sampler is equated to the 95 percentile value for a commercial gardener (Exhibit C-3, EPA 2004), which is the most conservative case.

An outdoor shielding factor of 0.25 is used to take credit for the shielding provided by the large amount of riprap in the footprint and the presence of water (i.e. Paddys Run) over portions of the exposure area.

The EFH (EPA 1997) does not contain guidance on ingestion rates for surface water. An older version of the handbook (EPA 1989a) assigned 0.05 L/hr for an adult swimmer. However, swimming is not pertinent to the site workers. The incidental ingestion to the groundskeeper/sampler is attributed to placing hands and arms in the water during sampling events, and repetitive touching of hands to the mouth is assumed to result in an incidental ingestion rate of 0.01 L/hr.

It is assumed that the groundskeeper/sampler spends one hour wading and collecting surface water samples each day that samples are collected, with a sampling frequency of once per month, or 12 days/yr. The sampler is assumed to contact surface water with the hands, forearms, feet and lower legs. Values in Table 5-2 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004).

Risk calculations were performed using the equations in the Comprehensive Response Action Risk Evaluation (CRARE; Appendix H of the Feasibility Study Report for OU5), which reflect the equations in EPA's Risk Assessment Guidance, Part A (EPA 1989b), the exposure parameters in Tables 5-1 and 5-2, and the November 2006 cancer slope factors and reference doses obtained from the EPA website (radionuclide tables and the Integrated Risk Information System database) and the Oak Ridge Risk Assessment Information System (RAIS). The affected target receptors for these calculations are the undeveloped park user and the groundskeeper/sampler, which is the reasonable maximum exposure for a site worker. All equations, slope factors, reference doses, and contaminant concentrations are provided in Appendix C.

Conservative assumptions were used in the calculations. First, the average soil concentration is the 95% UCL or maximum value (if 95% UCL was unavailable) of each contaminant listed in the under-rail-

trestle CU (Appendix A). This is conservative because the receptor is expected to spend 100% of their time exposed to the PAHs detected in this small CU, and the PAHs are not detected in the surrounding CUs. Second, if all sample results were below the detection limit for a given COC, the detection limit value was used, rather than one-half of the limit. Lastly, cancer slope factors reflect short-lived radioactive daughters in equilibrium with their parent isotope.

Risk calculations for every COC and each pathway are presented in Appendix C, and a summary of the cumulative results are presented in Table 5-3 in terms of the hazard quotient (HQ) and incremental lifetime cancer risk (ILCR) for each pathway and the sum of all pathways. Non-cancer health risks, due to exposure to non-radiological chemicals, are evaluated by application of a reference dose for oral and inhalation exposure routes. A reference dose estimates the upper bound chronic dose of a chemical that a human receptor can be exposed to without suffering ill effects. The contaminant intake for a receptor is divided by the appropriate reference dose factor to yield the HQ. If the HQ is greater than 1, a negative health impact to the receptor is anticipated. Cancer slope factors are published values that specify a cancer morbidity value (risk) to a receptor for a given quantity of contaminant intake, referred to as an ILCR. The resulting value determines whether post-remedial concentrations of contaminants will result in a cancer risk that is in compliance with CERCLA guidance and the OU5 ROD. Table 5-3 indicates that even if the receptors spending 100% of their time under the rail trestle are still in compliance with the CERCLA guidance and OU5 ROD (i.e., cumulative sum for HI is less than 1 and ILCR is less than $10^{-4}$). In reality, it is very unlikely that any person will spend any significant amount of time at this small location that has no easy access.

TABLE 5-3
SUMMARY OF RISK TO RECEPTORS UNDER THE RAIL TRESTLE

| PATHWAY | Undeveloped Park User | | Groundskeeper/Sampler | |
|---|---|---|---|---|
| | HQ | ILCR | HQ | ILCR |
| Inhale | 1.20E-04 | 1.18E-08 | 2.99E-03 | 2.74E-07 |
| Dermal Soil | 3.14E-03 | 9.21E-06 | 1.35E-02 | 3.29E-05 |
| Ingest Soil | 2.10E-02 | 6.25E-06 | 4.27E-02 | 1.07E-05 |
| Dermal Surface Water | 5.95E-02 | 4.83E-05 | 5.12E-02 | 3.46E-05 |
| Ingest Surface Water | 1.36E-03 | 1.38E-07 | 3.65E-04 | 3.80E-08 |
| External Radiation | NA | 1.45E-07 | NA | 1.47E-06 |
| SUM OF ALL PATHS | **8.52E-02** | **6.40E-05** | **1.11E-01** | **8.00E-05** |

NA = calculation not applicable for indicated pathway RB = radiological background

Each pathway in Table 5-3 produces a risk that is dependent on the contaminants present, and the contribution of each contaminant to the risk is provided in Appendix C. For the undeveloped park user, the pathways contributing the most to the sum HQ value are soil ingestion and dermal contact with surface water. Uranium and arsenic are the primary contaminants for the HQ ingest soil, and aroclor-1254 and aroclor-1260 for the HQ dermal surface water. ILCR for the undeveloped park user is driven primarily by exposure to the dermal surface water, dermal soil, and ingest soil pathways. The ILCR for dermal surface water is driven by benzo(a)pyrene and dibenzo(a,h)anthracene, for dermal soil by benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene, and for ingest soil by benzo(a)pyrene, arsenic, and benzo(b)fluoranthene.

The total HQ for the groundskeeper/sampler is driven by the dermal surface water, ingest soil and dermal soil pathways. HQ for dermal exposure to surface water is driven by aroclor-1260 and aroclor-1254. Arsenic and uranium are the key contaminants responsible for the soil-ingestion HQ, whereas the dermal soil HQ is due primarily to arsenic. The total ILCR value for the worker is largely derived from the same pathways discussed for HQ. Dermal exposure to surface water containing benzo(a)pyrene and dibenzo(a,h)anthracene accounts for most of the ILCR for this pathway. Dermal soil ILCR is driven by benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(a,h)anthracene. The ILCR for soil ingestion is due to benzo(a)pyrene, arsenic and benzo(b)fluoranthene.

## 5.3 ECOLOGICAL CONSIDERATIONS FOR SOIL UNDER THE RAIL TRESTLE

There are two potential concerns related to the soil concentration; exposure to terrestrial receptors and exposure to aquatic receptors from run-off into Paddys run. Given the screening-level process, bioavailability is not considered when evaluating exposure to terrestrial receptors. The mean concentrations associated with the rail trestle are not substantially higher than the conservative BTVs. While bioavailability of PAHs is dependent on a variety of factors, it is reasonable to assume that at least a portion of the soil concentration is not accessible to terrestrial receptors. This concept, coupled with the limited footprint of contamination, reduces the concern for impact to terrestrial receptors.

For surface water, only one sample appears to potentially impact aquatic receptors. Sample A6-UT-7 is located on the bank of Paddys Run at 553 MSL. This sample would be submerged during high water flows. All other samples are above the 2-year flood elevation. Therefore, exposure is extremely limited. Existing sediment data in the vicinity of the trestle supports this observation. No PAHs have been detected in sediment samples either upstream or downstream of the trestle. Therefore, the ecological risk due to PAH contamination under the rail trestle is limited.

As stated earlier, the rail trestle is in an area that is considered a suitable habitat for the Indiana bat, which is a federally endangered species. This area also contains the Sloan's crayfish, which is a state-threatened species. Due to the difficulty in accessing the area beneath the rail trestle, any remediation would cause significant damage to these ecological habitats, as well as, affect the long-term stability of the trestle itself. The expected impacts from remediation in terms of habitat loss and potential animal deaths far exceed any theoretical benefit from removal of this soil contamination. Based on these concerns, remediation in this isolated area is not warranted.

## 5.4 FORMER SITEWIDE RAIL LINE SYSTEM CERTIFICATION CONCLUSIONS

Based on the certification analytical results, precertification data, statistical analysis, and risk assessment, DOE has determined that the remedial objectives in the OU5 ROD have been achieved for the Rail Line System, and no further remedial actions are required.

# APPENDIX A
# STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
# RLS-SOIL UNDER RAIL TRESTLE CU

| **Sample ID** | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Cesium-137 | Technetium-99 | Thorium-230 | Antimony |
|---|---|---|---|---|---|---|---|---|---|
| A6-UT-1 | 1.02 - | 0.725 - | 0.697 - | 0.725 - | 2.68 U | 0.0622 J | 0.858 U | 1.27 - | 0.688 U |
| A6-UT-2 | 0.942 - | 0.813 - | 0.842 - | 0.813 - | 2.87 U | 0.091 U | 0.882 U | 0.973 - | 0.467 U |
| A6-UT-3 | 1.18 - | 0.952 - | 1.01 - | 0.952 - | 3.44 U | 0.066 J | 0.817 U | 1.18 - | 0.688 U |
| A6-UT-4 | 1.09 - | 0.994 - | 0.998 - | 0.994 - | 3.37 U | 0.0615 U | 0.797 U | 1.18 - | 0.462 U |
| A6-UT-5 | 1.04 - | 0.855 - | 0.883 - | 0.855 - | 3.73 U | 0.0712 U | 0.83 U | 1.08 - | 0.795 U |
| A6-UT-6 | 1.05 - | 0.903 - | 0.892 - | 0.903 - | 4.77 J | 0.19 - | 0.919 U | 1.13 - | 0.632 J |
| A6-UT-7 | 0.619 - | 0.637 - | 0.673 - | 0.637 - | 3.04 U | 0.0564 U | 0.81 U | 0.878 - | 0.422 U |
| A6-UT-8 | 0.874 - | 0.55 - | 0.54 - | 0.55 - | 2.61 U | 0.242 - | 0.77 U | 1.5 - | 0.482 U |
| A6-UT-9 | 0.775 - | 0.478 - | 0.492 - | 0.478 - | 2.42 U | 0.184 - | 8.16 - | 1.23 - | 0.406 U |
| A6-UT-10 | 0.676 - | 0.515 - | 0.513 - | 0.515 - | 3.67 J | 0.0579 U | 0.785 U | 0.994 - | 0.449 U |
| A6-UT-11 | 0.845 - | 0.681 - | 0.696 - | 0.681 - | 10.9 - | 0.232 - | 1.07 - | 1.87 - | 0.699 U |
| A6-UT-12 | 0.979 - | 0.647 - | 0.645 - | 0.647 - | 11 - | 0.284 - | 0.817 U | 2.66 - | 1.01 U |
| Limit | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 1.4 | 30 | 280 | 96 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | mg/kg | pCi/g | pCi/g | pCi/g | mg/kg |
| Conf. Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% | 90% |
| Max. Result | 1.18 | 0.994 | 1.01 | 0.994 | 11 | 0.284 | 8.16 | 2.66 | 0.632 |
| Max. > Limit | No | No | No | No | No | No | No | No | No |
| W-statistic Prob. # | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Test Procedure | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Nondetects | 0 | 0 | 0 | 0 | 8 | 5 | 10 | 0 | 11 |
| % Nondetects | 0% | 0% | 0% | 0% | 67% | 42% | 83% | 0% | 92% |
| Est. Mean* | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| UCL | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Prob. > Limit | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Pass / Fail | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| *a posteriori Sample* | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Size calculation | - - | - - | - - | - - | - - | - - | - - | - - | - - |

# APPENDIX A
# STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
# RLS-SOIL UNDER RAIL TRESTLE CU

| **Sample ID** | Arsenic | Beryllium | Cadmium | Silver | Fluoride | Benzo(a)anthracene | Benzo(a)pyrene | Benzo(b)fluoranthene |
|---|---|---|---|---|---|---|---|---|
| A6-UT-1 | 10.4 - | 0.728 - | 0.296 J | 0.147 U | 2.47 J | 1160 J | 1200 J | 4430 J |
| A6-UT-2 | 5.16 - | 0.749 - | 0.357 J | 0.148 U | 1.2 J | 2030 J | 1740 J | 6340 J |
| A6-UT-3 | 4.97 - | 0.604 - | 0.193 J | 0.142 U | 2.41 J | 3420 J | 2330 J | 7330 - |
| A6-UT-4 | 5.95 - | 0.798 - | 0.287 J | 0.147 U | 2.19 J | 672 J | 790 J | 2780 J |
| A6-UT-5 | 7.99 - | 0.873 - | 0.301 J | 0.137 U | 2.37 J | 594 J | 572 J | 2050 J |
| A6-UT-6 | 6.59 - | 0.747 - | 0.318 J | 0.139 U | 1 J | 1020 J | 798 J | 3510 J |
| A6-UT-7 | 4.37 - | 0.448 - | 0.19 J | 0.134 U | 0.85 J | 3310 J | 2280 J | 8290 J |
| A6-UT-8 | 5.62 - | 0.565 - | 0.311 J | 0.136 U | 0.627 J | 6540 J | 4830 J | 17300 J |
| A6-UT-9 | 5.04 - | 0.347 - | 0.295 J | 0.129 U | 0.449 J | 3030 J | 3140 J | 12800 J |
| A6-UT-10 | 5.39 - | 0.459 - | 0.38 J | 0.143 U | 0.609 J | 573 J | 552 J | 2620 J |
| A6-UT-11 | 11 - | 0.603 - | 0.345 J | 0.125 U | 0.903 J | 4730 J | 3420 J | 21700 J |
| A6-UT-12 | 8.57 - | 1.04 - | 0.684 J | 0.118 U | 0.673 J | 5810 J | 4240 J | 25900 J |
| Limit | 12 | 1.5 | 82 | 29000 | 78000 | 20000 | 2000 | 20000 |
| Units | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | ug/kg | ug/kg | ug/kg |
| Conf. Level | 90% | 90% | 90% | 90% | 90% | 90% | 0.9 | 0.9 |
| Max. Result | 11 | 1.04 | 0.684 | 0.148 U | 2.47 | 6540 | 4830 | 25900 |
| Max. > Limit | No | No | No | No | No | No | Yes | Yes |
| W-statistic Prob. # | - - | - - | - - | - - | - - | - - | 34.8% (LN) | 53.0% (LN) |
| Test Procedure | - - | - - | - - | - - | - - | - - | Lognormal | Lognormal |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Nondetects | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 |
| % Nondetects | 0% | 0% | 0% | 100% | 0% | 0% | 0% | 0% |
| Est. Mean* | - - | - - | - - | - - | - - | - - | 2271.135 | 9989.833 |
| UCL | - - | - - | - - | - - | - - | - - | 3490.448 | 16462.794 |
| Prob. > Limit | - - | - - | - - | - - | - - | - - | - - | - - |
| Pass / Fail | - - | - - | - - | - - | - - | - - | FAIL | pass |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *a posteriori Sample* | - - | - - | - - | - - | - - | - - | 88 | 4 |
| Size calculation | - - | - - | - - | - - | - - | - - | Fail | Pass |

# APPENDIX A
# STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
# RLS-SOIL UNDER RAIL TRESTLE CU

| **Sample ID** | Benzo(k)fluoranthene | Chrysene | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene | Aroclor-1254 | Aroclor-1260 | Dieldrin |
|---|---|---|---|---|---|---|---|
| A6-UT-1 | 37 U | 3790 J | 37 U | 1030 J | 18.5 U | 18.5 U | 29.6 U |
| A6-UT-2 | 38 U | 5310 J | 38 U | 1370 J | 26.8 - | 19 U | 30.4 U |
| A6-UT-3 | 34.3 U | 4980 J | 34.3 U | 1660 J | 17.2 U | 17.2 U | 27.5 U |
| A6-UT-4 | 37.9 U | 2200 J | 37.9 U | 592 J | 34.4 - | 19 U | 30.3 U |
| A6-UT-5 | 35 U | 1990 J | 35 U | 497 J | 17.5 U | 17.5 U | 28 U |
| A6-UT-6 | 38.7 U | 2690 J | 38.7 U | 788 J | 19.3 U | 19.3 U | 30.9 U |
| A6-UT-7 | 34.2 U | 7710 J | 34.2 U | 1700 J | 21.9 J | 28.6 J | 27.3 U |
| A6-UT-8 | 35.8 U | 15000 J | 35.8 U | 3610 - | 17.9 U | 17.9 U | 28.6 U |
| A6-UT-9 | 34.8 U | 9470 J | 34.8 U | 2690 - | 17.4 U | 17.4 U | 27.9 U |
| A6-UT-10 | 35.7 U | 2530 J | 35.7 U | 561 J | 17.9 U | 17.9 U | 28.6 U |
| A6-UT-11 | 34 U | 23000 J | 34 U | 3240 - | 20 - | 17 U | 27.2 U |
| A6-UT-12 | 21500 J | 26700 J | 817 - | 3720 - | 17.7 U | 17.7 U | 28.4 U |
| Limit | 200000 | 2000000 | 2000 | 20000 | 130 | 130 | 15 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Conf. Level | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Max. Result | 21500 | 26700 | 817 | 3720 | 34.4 | 28.6 | 30.9 U |
| Max. > Limit | No | No | No | No | No | No | No |
| W-statistic Prob. # | - - | - - | - - | - - | - - | - - | - - |
| Test Procedure | - - | - - | - - | - - | - - | - - | - - |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Nondetects | 11 | 0 | 11 | 0 | 8 | 11 | 12 |
| % Nondetects | 92% | 0% | 92% | 0% | 67% | 92% | 100% |
| Est. Mean* | - - | - - | - - | - - | - - | - - | - - |
| UCL | - - | - - | - - | - - | - - | - - | - - |
| Prob. > Limit | - - | - - | - - | - - | - - | - - | - - |
| Pass / Fail | - - | - - | - - | - - | - - | - - | - - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *a posteriori Sample* | - - | - - | - - | - - | - - | - - | - - |
| Size calculation | - - | - - | - - | - - | - - | - - | - - |

# APPENDIX A
# STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
# RLS-SOIL UNDER RAIL TRESTLE CU

| **Sample ID** | 1,1-Dichloroethene | Bromodichloromethane | Tetrachloroethene |
|---|---|---|---|
| A6-UT-1 | 1.2 U | 1.2 U | 1.2 UJ |
| A6-UT-2 | 1 U | 1 U | 1 UJ |
| A6-UT-3 | 1.1 U | 1.1 U | 1.1 UJ |
| A6-UT-4 | 1.1 U | 1.1 U | 1.1 UJ |
| A6-UT-5 | 1.3 U | 1.3 U | 1.3 UJ |
| A6-UT-6 | 1.1 U | 1.1 U | 1.1 UJ |
| A6-UT-7 | 1.3 U | 1.3 U | 1.3 UJ |
| A6-UT-8 | 1.1 U | 1.1 U | 1.1 UJ |
| A6-UT-9 | 1.1 U | 1.1 U | 1.1 UJ |
| A6-UT-10 | 1.2 U | 1.2 U | 1.2 UJ |
| A6-UT-11 | 1.5 U | 1.5 U | 1.5 UJ |
| A6-UT-12 | 1.5 U | 1.5 U | 1.5 UJ |
| Limit | 410 | 4000 | 3600 |
| Units | ug/kg | ug/kg | ug/kg |
| Conf. Level | 90% | 90% | 90% |
| Max. Result | 1.5 U | 1.5 U | 1.5 UJ |
| Max. > Limit | No | No | No |
| W-statistic Prob. # | - - | - - | - - |
| Test Procedure | - - | - - | - - |
| Sample Size | 12 | 12 | 12 |
| Nondetects | 12 | 12 | 12 |
| % Nondetects | 100% | 100% | 100% |
| Est. Mean* | - - | - - | - - |
| UCL | - - | - - | - - |
| Prob. > Limit | - - | - - | - - |
| Pass / Fail | - - | - - | - - |

| | | | |
|---|---|---|---|
| *a posteriori Sample* | - - | - - | - - |
| Size calculation | - - | - - | - - |

# APPENDIX A
# CERTIFICATION SAMPLING - SOIL
# RLS-SOIL UNDER RAIL TRESTLE CU
# BTV COMPARISON

| **Sample ID** | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Cesium-137 | Technetium-99 | Thorium-230 | Antimony | Arsenic |
|---|---|---|---|---|---|---|---|---|---|---|
| A6-UT-1 | 1.02 - | 0.725 - | 0.697 - | 0.725 - | 2.68 U | 0.0622 J | 0.858 U | 1.27 - | 0.688 U | 10.4 - |
| A6-UT-2 | 0.942 - | 0.813 - | 0.842 - | 0.813 - | 2.87 U | 0.091 U | 0.882 U | 0.973 - | 0.467 U | 5.16 - |
| A6-UT-3 | 1.18 - | 0.952 - | 1.01 - | 0.952 - | 3.44 U | 0.066 J | 0.817 U | 1.18 - | 0.688 U | 4.97 - |
| A6-UT-4 | 1.09 - | 0.994 - | 0.998 - | 0.994 - | 3.37 U | 0.0615 U | 0.797 U | 1.18 - | 0.462 U | 5.95 - |
| A6-UT-5 | 1.04 - | 0.855 - | 0.883 - | 0.855 - | 3.73 U | 0.0712 U | 0.83 U | 1.08 - | 0.795 U | 7.99 - |
| A6-UT-6 | 1.05 - | 0.903 - | 0.892 - | 0.903 - | 4.77 J | 0.19 - | 0.919 U | 1.13 - | 0.632 J | 6.59 - |
| A6-UT-7 | 0.619 - | 0.637 - | 0.673 - | 0.637 - | 3.04 U | 0.0564 U | 0.81 U | 0.878 - | 0.422 U | 4.37 - |
| A6-UT-8 | 0.874 - | 0.55 - | 0.54 - | 0.55 - | 2.61 U | 0.242 - | 0.77 U | 1.5 - | 0.482 U | 5.62 - |
| A6-UT-9 | 0.775 - | 0.478 - | 0.492 - | 0.478 - | 2.42 U | 0.184 - | 8.16 - | 1.23 - | 0.406 U | 5.04 - |
| A6-UT-10 | 0.676 - | 0.515 - | 0.513 - | 0.515 - | 3.67 J | 0.0579 U | 0.785 U | 0.994 - | 0.449 U | 5.39 - |
| A6-UT-11 | 0.845 - | 0.681 - | 0.696 - | 0.681 - | 10.9 - | 0.232 - | 1.07 - | 1.87 - | 0.699 U | 11 - |
| A6-UT-12 | 0.979 - | 0.647 - | 0.645 - | 0.647 - | 11 - | 0.284 - | 0.817 U | 2.66 - | 1.01 U | 8.57 - |
| Limit (BTV) | 670 | 340000 | 1400000 | 240000 | 230 | 12000 | 93000 | 210000 | 10 | 30 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | mg/kg | pCi/g | pCi/g | pCi/g | mg/kg | mg/kg |
| Max. Result | 1.18 | 0.994 | 1.01 | 0.994 | 11 | 0.284 | 8.16 | 2.66 | 0.632 | 11 |
| Max. > Limit | No | No | No | No | No | No | No | No | No | No |

# APPENDIX A
# CERTIFICATION SAMPLING - SOIL
# RLS-SOIL UNDER RAIL TRESTLE CU
# BTV COMPARISON

| Sample ID | Beryllium | Cadmium | Silver | Benzo(a)anthracene | Benzo(a)pyrene | Benzo(b)fluoranthene | Benzo(g,h,i)perylene | Benzo(k)fluoranthene |
|---|---|---|---|---|---|---|---|---|
| A6-UT-1 | 0.728 - | 0.296 J | 0.147 U | 1160 J | 1200 J | 4430 J | 955 - | 37 U |
| A6-UT-2 | 0.749 - | 0.357 J | 0.148 U | 2030 J | 1740 J | 6340 J | 1280 - | 38 U |
| A6-UT-3 | 0.604 - | 0.193 J | 0.142 U | 3420 J | 2330 J | 7330 - | 1580 - | 34.3 U |
| A6-UT-4 | 0.798 - | 0.287 J | 0.147 U | 672 J | 790 J | 2780 J | 562 - | 37.9 U |
| A6-UT-5 | 0.873 - | 0.301 J | 0.137 U | 594 J | 572 J | 2050 J | 502 - | 35 U |
| A6-UT-6 | 0.747 - | 0.318 J | 0.139 U | 1020 J | 798 J | 3510 J | 749 - | 38.7 U |
| A6-UT-7 | 0.448 - | 0.19 J | 0.134 U | 3310 J | 2280 J | 8290 J | 1580 - | 34.2 U |
| A6-UT-8 | 0.565 - | 0.311 J | 0.136 U | 6540 J | 4830 J | 17300 J | 3390 - | 35.8 U |
| A6-UT-9 | 0.347 - | 0.295 J | 0.129 U | 3030 J | 3140 J | 12800 J | 2480 - | 34.8 U |
| A6-UT-10 | 0.459 - | 0.38 J | 0.143 U | 573 J | 552 J | 2620 J | 508 - | 35.7 U |
| A6-UT-11 | 0.603 - | 0.345 J | 0.125 U | 4730 J | 3420 J | 21700 J | 2810 - | 34 U |
| A6-UT-12 | 1.04 - | 0.684 J | 0.118 U | 5810 J | 4240 J | 25900 J | 3220 - | 21500 J |
| Limit (BTV) | 56 | 5 | 10 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Units | mg/kg | mg/kg | mg/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Max. Result | 1.04 | 0.684 | 0.148 | 6540 | 4830 | 25900 | 3390 | 21500 |
| Max. > Limit | No | No | No | YES | YES | YES | YES | YES |

# APPENDIX A
# CERTIFICATION SAMPLING - SOIL
# RLS-SOIL UNDER RAIL TRESTLE CU
# BTV COMPARISON

| Sample ID | Chrysene | Fluoranthene | Indeno(1,2,3-cd)pyrene | Phenanthrene | Pyrene | Aroclor-1254 | Aroclor-1260 | Dieldrin | Tetrachloroethene |
|---|---|---|---|---|---|---|---|---|---|
| A6-UT-1 | 3790 J | 3350 J | 1030 J | 880 J | 3680 J | 18.5 U | 18.5 U | 29.6 U | 1.2 UJ |
| A6-UT-2 | 5310 J | 5890 J | 1370 J | 1130 J | 7150 J | 26.8 - | 19 U | 30.4 U | 1 UJ |
| A6-UT-3 | 4980 J | 6270 J | 1660 J | 1150 J | 7780 J | 17.2 U | 17.2 U | 27.5 U | 1.1 UJ |
| A6-UT-4 | 2200 J | 2470 J | 592 J | 528 J | 2260 J | 34.4 - | 19 U | 30.3 U | 1.1 UJ |
| A6-UT-5 | 1990 J | 2300 J | 497 J | 636 J | 2030 J | 17.5 U | 17.5 U | 28 U | 1.3 UJ |
| A6-UT-6 | 2690 J | 3730 J | 788 J | 576 J | 4020 J | 19.3 U | 19.3 U | 30.9 U | 1.1 UJ |
| A6-UT-7 | 7710 J | 16400 J | 1700 J | 9410 J | 14200 J | 21.9 J | 28.6 J | 27.3 U | 1.3 UJ |
| A6-UT-8 | 15000 J | 22600 J | 3610 - | 5450 J | 23000 J | 17.9 U | 17.9 U | 28.6 U | 1.1 UJ |
| A6-UT-9 | 9470 J | 12600 J | 2690 - | 2910 J | 12100 J | 17.4 U | 17.4 U | 27.9 U | 1.1 UJ |
| A6-UT-10 | 2530 J | 4070 J | 561 J | 1470 J | 4130 J | 17.9 U | 17.9 U | 28.6 U | 1.2 UJ |
| A6-UT-11 | 23000 J | 30600 J | 3240 - | 8410 J | 24900 J | 20 - | 17 U | 27.2 U | 1.5 UJ |
| A6-UT-12 | 26700 J | 35700 J | 3720 - | 10000 J | 32500 J | 17.7 U | 17.7 U | 28.4 U | 1.5 UJ |
| Limit (BTV) | 1000 | 10000 | 1000 | 5000 | 10000 | 1000 | 1000 | 40 | 25000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Max. Result | 26700 | 35700 | 3720 | 10000 | 32500 | 34.4 | 28.6 | 30.9 | 1.5 |
| Max. > Limit | YES | YES | YES | YES | YES | No | No | No | No |