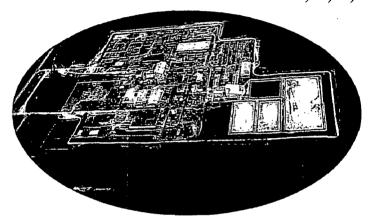
HONEYWELL INTERNATIONAL, INC. METROPOLIS WORKS METROPOLIS, IL

LICENSE AMENDMENT REQUEST REPORT US NRC LICENSE NUMBER SUB-526 CLOSURE OF RETENTION PONDS B, C, D, and E



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LIST OF ACRONYMS

ANL Argonne National Laboratory

ALARA As Low As Reasonably Achievable

CaF₂ Calcium Fluoride

CFR Code of Federal Regulations

DCGL Derived Concentration Guideline Levels

DOE United States Department of Energy

EA Environmental Assessment

EPA United States Environmental Protection Agency

HF Hydrogen Fluoride

IEPA Illinois Environmental Protection Agency

KOH Potassium Hydroxide

LTR License Termination Rule

MTW Honeywell Metropolis Works

NAAQS National Ambient Air Quality Standards

NRC United States Nuclear Regulatory Commission

RCRA Resource Conservation and Recovery Act

RESRAD RESidual RADioactivity Family of Codes developed by Argonne National

Laboratory

TEDE Total Effective Dose Equivalent

UF₆ Uranium Hexafluoride



EXECUTIVE SUMMARY

Honeywell Metropolis Works (Honeywell or MTW) located in Metropolis, Illinois has four calcium fluoride surface impoundments, or ponds, known as Ponds B, C, D, and E. Honeywell operates the ponds in accordance with its Part B Permit No. B-65R (RCRA permit) issued pursuant to Part 703 of Title 35 of the Illinois Administrative Code. The Permit requires that Honeywell close the ponds by 2020. Honeywell is proposing to do so through in-situ stabilization and construction of an engineered cover system.

The ponds also are included on Source Materials License SUB-526 and contain small amounts of natural uranium and other isotopes. At the time that Honeywell closes the ponds in accordance with the Permit, Honeywell also is proposing to obtain a license amendment to release the closed ponds from Honeywell's NRC license.

In support of its license amendment request, Honeywell has performed a comprehensive characterization study of the ponds and their contents. This characterization study provides radiological and other data of sufficient quality and quantity to meet MARSSIM requirements for a final status survey.

The concentrations of detected isotopes from the characterization study were averaged and used as input values for a detailed, site-specific dose model using RESRAD Version 6.5. This detailed dose model was performed using parameters representative of an industrial worker scenario. Of the four ponds, Pond C yielded the highest annual does at 1.46E-07 mrem for an industrial worker. The cumulative annual dose for all four ponds was 1.83E-07 mrem for an industrial worker, a dose that is indistinguishable from background.

To demonstrate the protectiveness of the in-situ stabilization and engineered cover system, a dose model also was performed using parameters representative of a resident farmer scenario. This model yielded a cumulative annual dose of 6.66E-07 mrem which, like the does modeled in the industrial worker scenario, is indistinguishable from background. An analysis which considered the total failure of the cover system was completed by performing the dose model with the cover removed. This dose model resulted in a cumulative dose of 23.8 mrem.



1.0 General Information

1.1 Background

Honeywell International, Inc. (Honeywell or the Licensee) is the holder of Source Materials License No. SUB-526 (NRC License), a 10 Code of Federal Regulations (CFR) Part 40 license last renewed by the U.S. Nuclear Regulatory Commission (NRC) in 2007. Under this license, the licensee operates its Honeywell Metropolis Works, Inc. (MTW) formerly "Allied Signal" (Allied) plant at Metropolis, Illinois, where it converts uranium ore concentrates to uranium hexafluoride (UF₆) by the "fluoride volatility process." The UF₆ product is sold as the feed material for uranium enrichment plants. MTW has the capacity to convert approximately 14,000 metric tons of uranium per year from ore concentrates into UF₆.

This license amendment request relates to an area of the MTW site known as the CaF₂ Pond Area, where MTW formerly precipitated calcium fluoride (CaF₂). The CaF₂ Pond Area includes four surface impoundments known as Ponds B, C, D, and E. Pond A was closed in 2001 and the CaF₂ materials removed from the site.

Ponds B, C, D, and E were constructed from 1974 through 1979 and currently store CaF₂ materials which contain trace amounts of natural radioactive isotopes including, but not limited to uranium and thorium. This material was generated prior to 1982 when MTW used a fluoride removal process that involved use of calcium hydroxide to precipitate calcium fluoride in the ponds. The installation of a CaF₂ recovery system in 1982 curtailed the use of the ponds for calcium fluoride precipitation. Currently, no material is discharged to Ponds B, C and E, and Pond D only receives flow from MTW's National Pollutant Discharge Elimination System (NPDES) permitted wastewater treatment system prior to discharge at permitted Outfall 002.

MTW is required by its RCRA permit to close Ponds B, C, D and E by 2020. As part of the closure process, MTW has submitted to the Illinois Environmental Protection Agency (IEPA) an application to modify MTW's RCRA permit to close the ponds in place using in situ sludge stabilization with a pozzolanic cement material, construction of an engineered cap and long-term maintenance. As set forth more fully in the modification application, Honeywell believes that closing the ponds in place will be protective of human health and the environment.



1.2 Objective and Scope

This report has been prepared to support a license amendment request that would release the CaF₂ Pond Area from Honeywell's NRC license. This report models the radiological dose associated with Ponds B, C, D, and E after closure in-place, and describes how the modeled radiological dose compares with requirements of 10 CFR 20.1402 for unrestricted release.

1.3 Release Criteria

The dose criterion for unrestricted release is provided in 10 CFR 20.1402. This regulation indicates the following:

A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels which are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal.

1.4 Computational Model Used for Dose Calculations

RESRAD Version 6.5 has been used to perform site-specific dose modeling for the pond closure dose assessment. Argonne National Laboratory (ANL) developed the RESRAD computer code under the sponsorship of the U.S. Department of Energy (DOE). The code has been widely used by the DOE and its contractors, the U.S. Nuclear Regulatory Commission (NRC), U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers, industrial firms, universities, and foreign government agencies and institutions. This code is a pathway analysis model designed to evaluate potential radiological doses to an average member of a specific critical group. RESRAD is equipped with probabilistic sampling and analytical capabilities to allow implementation of a risk based modeling approach if determined to be appropriate.

1.5 Site Description

The MTW site is located on a 1,000-acre tract of land in Massac County at the southern tip of Illinois along the Ohio River. The primary site perimeter is formed by U.S. Highway 45 to the north, the Ohio River to the south, an industrial coal blending plant to the west and privately-owned developed land to the east. Honeywell also owns approximately 100 acres of land directly across U.S. Highway 45, north/northeast of the plant. Figure 1-1 shows the MTW site location.



Plant operations are conducted in a fenced restricted area covering approximately 59 acres in the north-central portion of the site. The primary facilities located in the operations area are the Feed Materials Building, Sampling and Storage Facility, Pretreatment Facility, Ore Calcining Facility, Storage Pads, Cylinder Wash Facility, and Waste Dryer. Additional facilities which are involved in the UF₆ manufacturing process, but do not involve the handling of any significant (licensable) quantities of source material, include a fluorine manufacturing building, a calcium fluoride recovery plant to recycle synthetic CaF₂, a power plant, an incinerator, two small settling ponds, and a former fluoride waste treatment facility with four large settling ponds (Ponds B, C, D, and E). The locations of Ponds B, C, D, and E within the operations area are shown in **Figure 1-2**.

1.6 Geology and Groundwater

Site geology has been determined based on previous subsurface investigations including the installation of the RCRA permit groundwater monitoring wells, and wells associated with the RCRA Groundwater Investigation interim groundwater monitoring program.

The MTW facility is located in the northern section of the Coastal Plains physiographic province and is underlain by deposits of Mesozoic age and younger. Although the area was not glaciated it was subject to glacially-related processes such as aeolian and meltwater deposition and erosion. The facility is situated on a 370- to 380-feet above mean sea level bluff top overlooking the Ohio River. The bluff is dissected by multiple ravines, which have an average depth of 30 to 40 feet that grade into a terrace that sits 30 to 50 feet above the river elevation. The river terrace is underlain by Cahokia Alluvium composed primarily of poorly sorted sand, silt or clay with sandy gravel locally. The upper 10 to 20 feet of the bluff may contain Peoria Loess and Roxanna Silt under which the Carmi Member of the Equality Formation is found. The Carmi is composed of quiet-water lake sediments dominated by well-bedded silts and clays. Below the Carmi is the Mackinaw Member of the Henry Formation, which is a glacial outwash deposit made up of well sorted sand and gravel with lenses of clay. The first bedrock unit encountered is the McNairy Sand. It is a poorly to moderately indurated, white to light gray sandstone approximately 150 to 200 feet in thickness with a 70-foot gray to black lignitic shale or siltstone sequence known as the Levings Member. This formation is unconformably underlain by a limestone of Mississippian age, believed to be the St. Louis Limestone.



Figure 1-1: Site Location Map

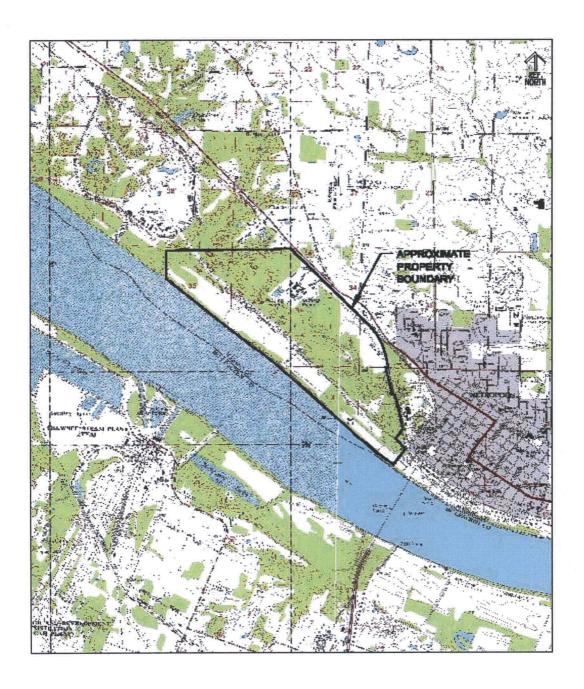
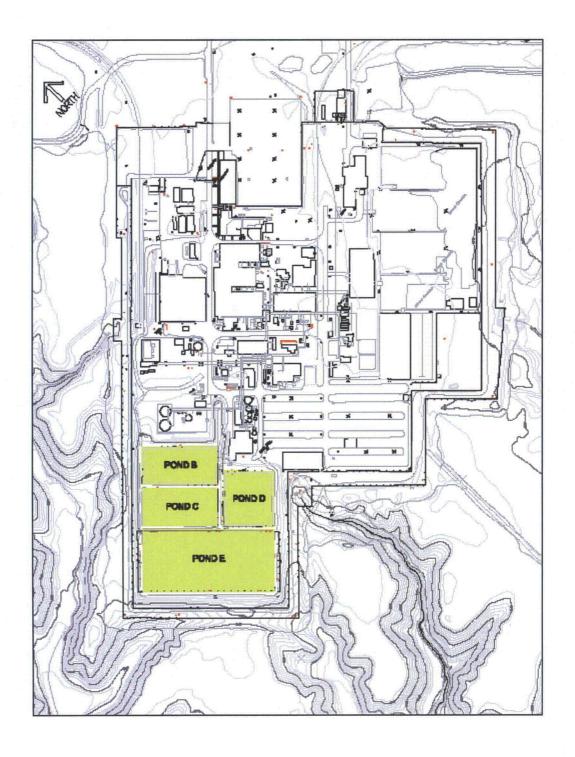




Figure 1-2: Pond Location Map





1.6.1 Site Geology

The uppermost geologic unit on the bluff overlooking the Ohio River Valley, on which the facility is located, is a deposit of clayey silt to silty clay that ranges from 25 to 55 feet in thickness. This material, for the most part, is believed to be the Carmi Member of the Equality Formation but may include Peoria Loess and Roxanna Silt. It also grades into fluvial/floodplain deposits near the river. Distinguishing between the acolian and lacustrine deposits was not possible with the available data. These sediments were found to be thicker towards the center of the bluff than towards its edges.

The surficial deposit is underlain by a sand and gravel deposit that is approximately 35- to 65-feet thick with multiple lenses of silty clay. This deposit is believed to be outwash from a distal valley train of the Mackinaw Member of the Henry Formation. These sediments are generally thinner and finer grained inland than towards the edge of the river.

Beneath the unconsolidated sand is a sandstone deposit correlating with the McNairy Formation. The formation is encountered at a depth of approximately 90 to 95 feet and contains interbedded shale. The McNairy formation extends to a depth of 240- to 260-feet below the ground surface. No groundwater investigation boring/well encountered the bedrock formation. The bedrock contact was based on boring information from the installation of onsite production wells which are screened in bedrock deposits.

1.6.2 Site Hydrogeology

Groundwater elevations are obtained quarterly from wells within the RCRA permit groundwater monitoring program to determine groundwater flow characteristics within the unconsolidated sand and gravel deposits as described above. Each well is screened in the saturated sand and gravel deposit associated with the Mackinaw Member of the Henry Formation. Perched or shallow groundwater has not been encountered during the various groundwater well installations. A letter from the IEPA to MTW dated January 4, 1985 supports this by stating it is their conclusion that there is no perched water at the site suitable for monitoring and/or sampling.

Most recent groundwater elevations in the RCRA permit wells ranged from a high of 324.24 to a low of 310.63 feet MSL. The aquifer nearest to the ground surface is the Mackinaw Member of the Henry Formation. It is an unconfined aquifer with an upper boundary that is co-incident with the water table and maintains a direct hydraulic connection with the upper sandstone unit of the McNairy Formation. The lower sandstone unit of the McNairy Formation is bound by the Levings Member and the fractured zones



of the St. Louis Limestone, which are bound by dense, cherty zones near the top of the formation. The cherty zones create confined conditions.

1.6.3 Site Groundwater

Groundwater flow varies slightly with season, but the prevailing flow is from plant north to plant south, from the bluff (plant location) to the Ohio River. Potentiometric surface maps indicating groundwater elevations and hydraulic gradients are submitted to the IEPA quarterly as part of the routine groundwater monitoring reports. The contours indicate a very consistent flow direction from plant north to plant south.

Precipitation that infiltrates the silty soils of the Carmi Member of the Equality Formation will eventually recharge the aquifer nearest to the ground surface, but due to the proximity of the Ohio River that water likely remains near the water table in the local flow system. Water found deeper within the Mackinaw Member is likely recharged farther upgradient and may be flowing slightly downward towards the McNairy sandstone in an intermediate flow regime. Water that is found in the confined aquifers should be generally flowing upward towards the upper McNairy sandstone in a regional flow system. The discharge point for all three systems would be the Ohio River due to its size, location and elevation. Based on data obtained from previous investigations and RCRA permit groundwater monitoring network, the groundwater flow characteristics beneath the facility have been adequately identified.



2.0 Calcium Fluoride Pond Characterization

An extensive pond characterization program was completed in 2009 by Andrews Engineering. The purpose of the characterization sampling was to determine unknown or undocumented data regarding the physical characteristics and composition of the contents of the CaF₂ ponds. The results of the sampling program are contained in Appendix T *Calcium Fluoride Sludge Pond Sampling Report*, September 2009 (Characterization Report).

Sampling was performed in a random grid pattern specific to each pond in accordance with EPA SW-846, Chapter 9, *Sampling Plan*. The random grid patterns resulted in 36 grid nodes for Ponds B, C, and D, and 105 grid nodes for Pond E. Samples were collected at grid nodes. Grid dimensions were approximately 34 feet by 37 feet but varied slightly from pond to pond.

Samples were collected using a 2 $\frac{1}{4}$ " sludge sampler advanced within a 3" PVC pipe which was driven into the CaF₂ to minimize collapse of the sample hole. Multiple samples were collected from each grid location at varying depths. Samples were documented on a Chain of Custody form for shipment to the chosen laboratory for analysis.

Among the information collected were several parameters of value to the dose model including isotopic radionuclide content, material density, and moisture content. Other physical parameters were also obtained such as the dimensions and depths of each pond. Use of the radiological and physical data obtained from the pond characterization effort is described in the dose modeling section of this report (Section 5.0).

A composite sample was collected in each grid. At a minimum, each composite sample was analyzed for the following:

Table 2-1 Characterization Analyses and Methods

Analysis Type	Method		
Total Uranium	EPA SW-846, Method 6010C (ICP)		
U-234, U-235, U-238	Alpha Spectroscopy (A-01-R)		
Th-232, Th230-Pa231, Th232, Th-234, Pa-234m, Ra-226, Pb-212, Pb-214, Bi-214	Gamma Spectroscopy (Ga-01-R)		



Analysis Type	Method
RCRA TCLP Metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag)	EPA SW-846, Method 1311/6010C
Paint Filter Test	EPA SW-846, Method 9095B
Moisture Content	ASTM D2216

2.1 <u>Total Uranium Characterization Results</u>

A total of 283 samples were analyzed for total uranium. These 283 samples consisted of:

- 244 grid composite samples
- 35 discrete samples of material of different color
- 4 pond-wide composite samples (i.e., pond-wide composite samples from Ponds B, C, D, and E)

Several approaches were used or considered in the data reduction process. These approaches were:

- 1. Weighted combinations to result in one concentration per core sample
- 2. Removal of data associated with severe defects in quality control samples as reported by the laboratory
- 3. Data transformations to normalize the data

Table 2-2 summarizes the total uranium statistical procedures and analyses. A full discussion of the statistical procedures and analyses are included in the Andrews Engineering *Calcium Fluoride Sludge Pond Sampling Report* (Appendix T).

Table 2-2 Total Uranium Results Ponds B-E

$\widehat{}$		Pond E	Pond D	Pond C	Pond B
$(Ln(x_i))$	Mean Uranium (mg/kg) (as-is basis)	203	245	287	240
les	N (all data)	105	34	36	26
Individual Samples	Distribution	Ln Normal	Ln Normal	Ln Normal	Ln Normal
	95% Upper Confidence Limit Uranium (mg/kg) (one-tailed test) (as-is basis)	223	347	365	320
Indi	Result	95% UCL < 500 mg/kg	95% UCL < 500 mg/kg	95% UCL < 500 mg/kg	95% UCL < 500 mg/kg



2.2 <u>Isotopic Analysis Characterization Results</u>

The RESRAD dose models use the results of the isotopic analyses as input values for the concentrations of radionuclides. This approach is more appropriate than utilizing calculated values of radionuclides derived from the total uranium values. Isotopic analysis were performed on the composite grid sample locations and for discrete samples collected during the characterization phase. The number of samples used for the dose modeling of each pond is summarized in Table 4-2. These results are averaged by pond using actual reported values. Quality assurance duplicates; blanks; and spike samples were excluded from the results prior to averaging. A summary of the concentrations of the radionuclides of concern used in the RESRAD models are presented in Table 5-3. A discussion of the radionuclides of concern that are used in the RESRAD dose models are presented in Section 5.5 of this report.

U-235 results were obtained from gamma spectroscopy. Alpha spectroscopy analysis reported combined results for U-235/U-236. The more conservative gamma spectroscopy U-235 results were used in the RESRAD dose model for this radionuclide. Although U-236 is not expected to be present in the pond materials, it was entered into the RESRAD model to ensure a conservative evaluation. This was accomplished by using one-half of the reported U-235/U-236 alpha spectroscopy results as U-236 input values in the RESRAD model.



3.0 Proposed Pond Closure Action

MTW has managed its CaF₂ wastewater in surface impoundments under the facility's RCRA Part B Permit. Under the current requirements of the Permit, the impoundments must be closed by 2020. The current closure schedule, provided to IEPA in a letter dated April 10, 2003, indicated pond closure targets for all ponds by 2020.

As part of the engineering evaluations for pond closure, recycling was evaluated and found to be technically not feasible, while off-site disposal was evaluated and found to be financially infeasible. One option, stabilization of the ponds and closure in place, was evaluated and determined to be both technically and financially feasible.

Bench studies were completed to assess the viability of stabilizing the pond material. These tests concluded that the addition of Portland cement or similar pozzolanic material would provide a technical approach that achieves several key design objectives such as:

- Eliminating free liquids through removal or solidification
- Stabilizing the pond material to achieve a bearing capacity sufficient to support final cover
- Allowing construction of an engineered cover system that achieves the following:
 - Long-term minimization of the migration of liquids through the closed impoundment
 - Minimal or no maintenance
 - Proper surface water drainage and erosion protection of the final cover

Constructability reviews of this concept were solicited from several remediation contractors, who confirmed Honeywell's preliminary engineering evaluation and bench studies showing the technical viability of pozzolanic materials to stabilize the ponds.

Following stabilization of the pond contents, an engineered cover will be constructed on each pond. The cover system design is described in detail in *Honeywell–Metropolis Works Surface Impoundment Closure*, prepared by CH2M HILL (Appendix V). In summary, cover construction will begin by placing soil fill material directly on top of the stabilized material to bring the pond content area up to grade with the existing berm. It is expected that the fill material will be obtained from both onsite and offsite borrow sources and will consist primarily of Clayey Silt/Silty Clay which is prevalent in near surface layers throughout the site. The thickness of the fill will vary from pond to pond. A multi-layer engineered



cover system will then be placed directly on the fill material. It is expected that the cover system above the borrow soil will include the following layers from top to bottom:

- Vegetated topsoil and support soil 2 feet thick
- Granular filter/drainage layer (sand and gravel): 1 foot thick
- Composite drainage net: <0.5 inch thick
- HDPE textured geomembrane: 0.06 inch thick
- Geosynthetic clay liner: <0.5 inch thick
- Common fill soil on top the stabilized pond material to provide a provide a subgrade for the cover system at or above the existing pond berm crest

The minimum thickness of the engineered cover system is approximately 3 feet. The average total thickness of the borrow soil plus the engineered cover system in each of the four ponds will range from 4.95 feet (1.51 meters) in Pond C to 9.05 feet (2.76 meters) in Pond D. The engineered cover system is designed to protect and contain the contents of the pond. The cover system design will minimize erosion by directing water flow off the relatively flat (4 percent slope) top cover to the designed riprap protected berm sideslopes and perimeter drainage ditches, and will prevent vegetative intrusion into the contaminated zone. The cover system soils consist of topsoil, vegetation support layer (clay and silt), and filter layer (sand with gravel). Due to the coarse-grained composition of the filter layer, it does not provide habitat for ecological receptors of concern (small burrowing mammals). Further, the coarsegrained material will provide a measure of resistance to deeper root penetration. The geosynthetics (CDN, geomembrane liner, and GCL) all provide additional barriers to prevent mammals from burrowing into the impounded materials and from root penetration into the stabilized material. Stabilization of the pond contents will minimize the risk of damage due to seismic events. Although the cover system design does not specifically include a radon barrier or a frost/freeze barrier, the proposed cover system design will act as an effective frost freeze barrier given the frost depth and erosion rate in the geographic region and the amount of material that will remain after 1,000 years. Similarly, the materials used for the cover system are comparable to those used for cover systems designed specifically as radon barriers at Uranium Mill Tailings Remedial Action (UMTRA) sites. Consequently, the cover system will act as an effective radon barrier.

As part of the closure, IEPA will impose land use restrictions (e.g., deed restrictions) and will require monitoring and maintenance of the cover system. However, consistent with NRC guidance in NUREG-1757, only the passive performance of the cover system to mitigate radiological impacts may be credited (i.e., performance of the barrier without monitoring, inspection, and maintenance) in the dose assessment



to demonstrate compliance with the LTR dose criteria. In addition, the assessment of performance of the cover system considers the reasonableness of a breach and the potential degradation of the barriers over time because monitoring and maintenance are assumed to not be active. Other reasonably foreseeable disruptive conditions from humans or natural events and processes were evaluated, and uncertainty in projecting the passive performance of the barriers was considered. Thus, the existence of the IEPA requirements is intended only to provide additional assurance (and a measure of conservatism) in the dose analysis.

This pond closure approach, after verification of its technical viability and IEPA regulatory compliance, has been assessed for compliance with 10 CFR 20.1402 closure criteria. Engineering design details associated with pond closure were considered in the selection of appropriate input parameters for a dose modeling evaluation using RESRAD. The results of this assessment are detailed in this report.



4.0 Final Status Survey Plan

MARSSIM provides detailed guidance on planning, execution, evaluation and documentation of Final Status Surveys to demonstrate compliance with a dose or risk based approach to decommissioning a radiological facility. The process described within MARSSIM addresses development of DCGLs; design and performance of surveys in support of decommissioning, and; evaluation and analysis of survey results to determine compliance with criteria.

The overall process for a MARSSIM-based decommissioning approach is as follows:

- Scoping surveys
- Characterization surveys
- DCGL development
- Post-remediation surveys
- Final status surveys
- Survey data evaluation

This approach is typical for a facility where the dose impact to an average member of a defined critical group may be significant due to residual radioactivity and/or where the residual radioactivity is sporadic and not well defined. In such cases, DCGL development is important to the process. For the MTW pond closure project, neither situation exists. The low radioactivity of the pond contents coupled with a well-established knowledge of the contents allows for a direct dose assessment to demonstrate compliance with dose criterion for unrestricted release as provided in 10 CFR 20.1402. Use of a direct dose assessment to demonstrate compliance bypasses the need to develop and use DCGLs in the decommissioning process. This dose assessment has been performed using available characterization information.

To confirm that the available characterization data is sufficient for use in an unrestricted release criteria compliance demonstration, the data has been evaluated with respect to the MARSSIM Final Status Survey (FSS) design process. The approach within MARSSIM involves non-parametric hypothesis testing in order to decide whether a survey unit meets release criteria to a defined degree of certainty. The design process begins by identifying radionuclides of concern and defining areas according to their contamination potential as impacted or not impacted. Impacted areas are further classified as Class 1, Class 2, or Class 3 based on the potential level of contamination. The smallest area for evaluation is a survey unit. Survey units are contiguous areas of similar radiological history or potential and of similar physical characteristics of which the size is typically defined during the FSS design process. Class 1 areas are most likely to be contaminated in excess of DCGLs in some areas, Class 2 areas are expected to have residual radioactivity in excess of background, and Class 3 areas are expected to be similar to background



areas. Then an appropriate non-parametric statistical test is selected for evaluation of each survey. The Wilcoxon Rank Sum (WRS) test is used for contaminants that are present in background, and the Sign Test is used for contaminants that are not present in background. Part of the FSS design process is to determine the quantity of minimum data points within a survey unit. The number of data points required to satisfy these non-parametric tests is based on the DCGL, the expected standard deviation of the contaminant in background and in the survey unit and the acceptable probability of making Type I and Type II decision errors.

Under the most restrictive impacted classification, Class 1, there is known radioactivity with potential to exceed the DCGL. Given the known levels of radioactivity within the ponds, and the DCGL assumed, a Class 1 definition is conservatively selected for the pond areas. Under a Class 1 definition, the recommended survey unit size is a surface area of 2,000 m². The size of the survey unit may be enlarged provided the number of data points is increased proportionally. Evaluation of the characterization data for use in the dose assessment includes an evaluation of the quantity of survey points required by MARSSIM. This has been calculated and compared with the number of radiological samples tested from the pond characterization program.

Evaluation of survey results by survey unit is done on both average and maximum values. If the maximum value is less than the defined DCGL then the survey unit is assured of passing the statistical test. Pond D has the highest radioactive concentrations, therefore utilizing data associated with this pond provides a bounding case applicable to the remaining ponds. Since DCGL development has not been performed, evaluation of the statistical acceptance of the characterization data will use the DCGL values determined by and reported in the RESRAD industrial worker scenario dose model for Pond D. These assumed DCGL values are calculated by RESRAD as a single nuclide DCGL which must also undergo an evaluation for unity to complete the analysis. A unity value is a measure of the ratio of a radionuclide to its DCGL when compared to the acceptance criteria and assures that the specific combination of radionuclides at their specific concentrations do not exceed the dose criteria. The basic formula for unity is:

Unity calculation:
$$UNITY = \frac{C_1}{DCGL_1} + \frac{C_2}{DCGL_2} + ... + \frac{C_n}{DCGL_n}$$



Where:

 C_x = radionuclide concentration

DCGL = guideline level for that nuclide

To pass unity evaluation, the result of the unity formula must be less than 1. Applying this formula to the known values for the pond D concentrations results in the unity values presented in Table 4-1:

Table 4-1: Unity Calculations

	Average Wet (as-is) Concentration	Maximum Wet (as-is) Concentration	DCGL	Unity Value using Average	Unity Value using Maximum
Radionuclide	(pCi/g)	(pCi/g)	(pCi/g)	Concentration	Concentration
Protactinium 231	0.25	0.58	4.72E+10	5.29E-12	1.23E-11
Radium 226	0.46	0.92	9.89E+11	4.65E-13	9.31E-13
Thorium 228	0.28	1.38	2.29E+13	1.22E-14	6.04E-14
Thorium 230	1.14	4.74	2.02E+10	5.65E-11	2.35E-10
Thorium 232	0.07	1.24	1.10E+05	6.38E-07	1.13E-05
Uranium 234	480.78	6242.70	6.25E+09	7.70E-08	9.99E-07
Uranium 235	8.68	27.44	2.16E+06	4.02E-06	1.27E-05
Uranium 236	12.87	171.80	6.47E+07	1.99E-07	2.66E-06
Uranium 238	503.83	6629.84	3.36E+05	1.50E-03	1.97E-02
		U	nity Value:	1.50E-03	1.98E-02
		Standard	Deviation:	4.99E-04	6.57E-03

An evaluation of the concentration data shows that both the average and maximum concentrations for each radionuclide are significantly below the assumed DCGL values. The unity values as calculated are also both less than 1 and are therefore acceptable.

Demonstrating a 95% certainty of meeting the acceptance criteria is evaluated by applying the formula for relative shift and using that result with the MARSSIM Table I.2a to determine the minimum number of required samples. This number of samples is then compared to the actual number of samples collected to verify compliance.

Within the MARSSIM methodology, relative shift (Δ/σ) is a calculated value where delta (Δ) is equal to the DCGL minus the Lower Boundary of the Gray Region (LBGR) and sigma (σ) is standard deviation. For this evaluation, DCGL is defined as unity (1) and the LBGR is defined as the calculated unity value from the maximum concentration (1.98E-02) for each radionuclide. The sigma (σ) used for the relative



shift calculation is the standard deviation of the maximum concentration unity values in the table above (6.57E-03). Using these values, a relative shift of 149.1 is calculated.

Higher relative shift values result in a lower number of required samples. MARSSIM's recommended range for relative shift is between 1 and 3. It is common to administratively limit the maximum relative shift to a value of 3 in order to establish an absolute minimum quantity of data points per survey unit. Taking this approach and using Table I.2a from MARSSIM for a relative shift of 3, a minimum of 11 samples per survey unit is identified as the required number of samples to demonstrate a 95% certainty of compliance. Adjusting for the additional surface area of the ponds results in 22 samples required for Ponds B, C, and D, and 66 samples for Pond E. The dose model utilizes a compiled set of isotopic results for each pond. This compiled set and comparison with the statistically determined quantity of samples is summarized in Table 4-2.

Table 4-2: Sample Requirements

Pond	Minimum # Required Samples per Survey Unit	Pond Surface Area (m²)	Proportional Factor	Minimum Number Samples with Proportional Increase	Number of Isotopic Analysis Samples Evaluated
В	11	4000	2	22	43
С	11	4000	2	22	39
D	11	3900	1.95	22	36
E	11	12000	6	66	78

Based on this evaluation using the MARSSIM statistical process, it is concluded that the sample quantities collected from each pond during the characterization activities exceed the minimum sample quantity requirements to demonstrate the pond radionuclide values are less than the assumed DCGL values. Overall, it is concluded that the sample sets from each pond obtained during characterization are acceptable for use as a final status data set for pond closure.



5.0 Dose Modeling Analysis

5.1 Source Terms

The objective of this dose modeling effort is to calculate the radiological dose consequence associated with four retention ponds at the MTW Site. These ponds, identified as Ponds B, C, D, and E contain CaF₂ material with trace amounts of natural radioactive isotopes. The proposed RCRA closure plan for Ponds B, C, D, and E involves in-place stabilization of the CaF₂ material with pozzolanic cement followed by construction of an engineered cover for each pond. The primary objective of the pozzolanic additive is to provide increased strength and stability to the materials in the ponds, not to immobilize radionuclides. It is expected that the stabilization will also somewhat reduce the permeability of the CaF₂ material, and therefore reduce the flux of liquids through the stabilized mass, which should already be negligible because of the cover system. Pozzolanic additives are commonly used to increase the bearing capacity of materials for other types of projects. Additional information regarding the stabilization and cover system is included in Appendix V, *Honeywell–Metropolis Works Surface Impoundment Closure*. Nevertheless, to be conservative, the model does not take credit for any reduced permeability. The stabilized CaF₂ material is the source term for this dose assessment.

The source term configuration was established for each pond using information provided in Andrews Engineering, Inc. calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b – Ponds B, C, D, and E", which is provided in Appendix A. This calculation was prepared specifically to estimate the average cover thickness for each pond but also provides the source term configuration data necessary to establish the contaminated zone (CZ) Area and CZ Thickness for each pond as presented in Table 5-1. The CZ Area, CZ Thickness, and Cover Thickness values presented in Table 5-1 were used in the RESRAD dose assessments for Ponds B, C, D, and E. It is assumed that radionuclides are uniformly distributed within the Pond B, C, D, and E contaminated zones. This is a reasonable assumption because the mixing of the pozzolanic materials into the pond results in a more uniform distribution of radionuclides. Radionuclide distributions have been derived for each Pond as described in Section 5.5.



Table 5-1: Source	Term Con	figurations for	Ponds B,	C, D, and E

Pond	Material Volume ⁽¹⁾ (ft ³)	5% Material Bulking Volume ⁽¹⁾ (ft ³)	Stabilized Material Volume ⁽²⁾ (ft ³)	Material Surface Area ⁽¹⁾ (ft ²)	Material Surface Area (m²)	Estimated CZ Area ⁽³⁾ (m ²)	Material Surface Length ⁽⁴⁾ (m)	Material Surface Width ⁽⁴⁾ (m)	CZ Thickness ⁽⁵⁾ (m)	Average Cover Thickness ⁽¹⁾ (m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b - Ponds B, C, D, and E" provided in Appendix A

5.2 Hydrogeologic Scenario

RESRAD requires that the hydrogeological conditions of the site be described from the surface down to the first saturated potable groundwater zone. The hydrogeologic setting for the model has been estimated as presented in Figure 5-1. This conceptual model is based upon the source terms described in Section 5.1 and a geologic cross section prepared by Andrews Environmental Engineering, Inc. provided in Appendix A. As indicated in Figure 5-1, the hydrogeologic setting consists of the following layers listed from the ground surface down to the groundwater table:

- A clayey silt/silty clay cover of varying thickness for each pond (See Table 5-1)
- A contaminated zone of varying thickness for each pond (See Table 5-1)
- A 6.86 m thick clayey silt/silty clay layer (Unsaturated Zone 1)
- A 1.71 m thick sandy silt/silty sand layer (Unsaturated Zone 2)
- A 1.71 m thick sand layer (Unsaturated Zone 3)
- A 4.00 m thick sandy silt/silty sand layer (Unsaturated Zone 4)
- A 1.14 m thick sand layer (Unsaturated Zone 5)
- A saturated sand layer (Saturated Zone)

The existing pond liner system is modeled as Unsaturated Zone 1. The existing pond liner system includes both an EPDM liner and a layer of natural clay materials. In the dose assessment, the existing EPDM liner was excluded from the unsaturated zone. Effectively, the model assumes that the EPDM liner does not exist. In fact, the long-term performance of the pond liner system can be assessed tough existing monitoring data. Early in their design lives the pond liners were substantially intact, though the sumps beneath the liner system indicate some minor leakage (probably along seams) that has remained

⁽²⁾ Stabilized Material Volume = Material Volume + 5% Material Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Material Surface Area.

⁽⁴⁾ Approximate material surface dimensions estimated with reference to material surface areas and the pond dimensions provided in Section 1.2 of the Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

⁽⁵⁾ CZ Thickness = (Stabilized Material Volume / Material Surface Area) x 0.3048 m/ft



relatively constant of over time. This indicates that there has been no significant deterioration of the liner system over time. In addition, once a pond was no longer in active use, the leakage was reduced to negligible levels. Based on the above, the conceptual model for the existing pond liner system is considered conservative.

Based on data obtained from previous investigations and currently permitted Part B groundwater monitoring network, the groundwater flow characteristics beneath the facility have been adequately identified. Site groundwater is well below the bottom of the ponds. The depth to the closest groundwater is approximately 45-60 feet. Water at this depth is not used for drinking water or process water. Locally and regionally an aquifer approximately 400 feet below the existing ground surface is used for drinking water. This aquifer was selected as the groundwater drinking water source.

5.3 Exposure Scenario

The critical group is based on the reasonably foreseeable land use scenario. The reasonably foreseeable future was defined as the next few decades (possibly as many as 100 years). The reasonably foreseeable land use at the MTW site was determined to be industrial use. The site is currently and will remain for the foreseeable future an industrial facility. Evaluation of an industrial worker scenario for the MTW pond closure project is appropriate based on both historical usage and future planned usage of the facility. The *Historical Site Assessment*, April 2009 (HSA) and the *Environmental Report Renewal of Source Material License SUB-526 Docket 40-3392 for HONEYWELL SPECIALTY MATERIALS*, May 25, 2005 (ER) provide discussions regarding the role MTW plays in the nuclear power industry, the land use and local trends of land use surrounding MTW. MTW's critical role in the nuclear power industry supports conclusion that the likely future use of the site is industrial.

As indicated in the HAS, initial construction of the facility was completed in 1958 and the first UF₆ was produced in 1959. In 1961, a UF₆ pilot plant was installed but the conversion contract with the Atomic Energy Commission (AEC) expired in 1964 and the conversion process was mothballed. Demand for conversion services increased and resulted in rehabilitation of the UF₆ facility in 1967 and the beginning of commercial conversion in 1968. In 1968-69 capacity for the facility was expanded to 9,000 metric tons. Further increases in capacity occurred in 1975 to 11,500 metric tons and in 1995 to 12,700 metric tons. The most recent re-engineering in 2001 increased capacity to approximately 14,000 metric tons. Thus, production has consistently increased from the start of operations in 1958 with the exception of the



period from 1964 to 1967. Overall, the site has had continued operations with multiple expansions for nearly 45 years.

It is likely that MTW will continue operations into the foreseeable future considering the important service MTW provides for the commercial nuclear power industry and inclusion of nuclear power within the long range energy strategy of the United States. According to the United States Energy Information Administration, 50 of the existing 104 nuclear power plants currently operating in the United States possess renewed operating licenses. An additional 36 have either applied, or intend to apply for such a renewal. There have been no plans announced at this time to retire any of the currently operating domestic nuclear power plants. As of May 2010, there have been 16 new construction/operating license applications filed with the NRC. There are currently 13 of these under active NRC review which encompass up to 22 reactors. The existence of numerous new license applications; expectancy of new operating plants; and further anticipated trends for even more new plants strongly suggests a future moderate to significant increase in demand for the UF₆ product, thereby assuring continued industrial operation of MTW. This demonstrates a stable or increasing demand for the UF₆ product into the future and supports classification of the MTW as an industrial site and selection of the industrial worker scenario for the pond closure project.

Other characteristics of the site also make industrial use the reasonably and likely land use scenario. U.S. Highway 45 and a Burlington Northern railroad right-of-way border the site to the northeast. An American Electric Power Company coal blending plant is located immediately northwest of the site. An electrical transmission line crosses the property about half-way between the Ohio River and the southwestern border of the exclusion zone. A buried natural gas pipeline, crossing the property about 150 meters (500 feet) north of the administration building, provides gas to the MTW plant and continues east to serve the City of Metropolis. Conversion of the engineered cover system to agricultural use is also unlikely given the widespread availability of graded agricultural land in the surrounding area. Ground water in the vicinity of the site is not used as a source for drinking water and is unlikely to be used in this way in the future. And, no residences are adjacent to or immediately near the site.

The resident farmer was determined not be an appropriate scenario. Deed restrictions will be required by IEPA. Even if deed restrictions are not considered sufficient to ensure that institutional controls will remain in place for 1,000 years, the controls may reasonably be considered in determining the critical group based on foreseeable land use. In addition, the stabilized CaF₂ material will not support plant

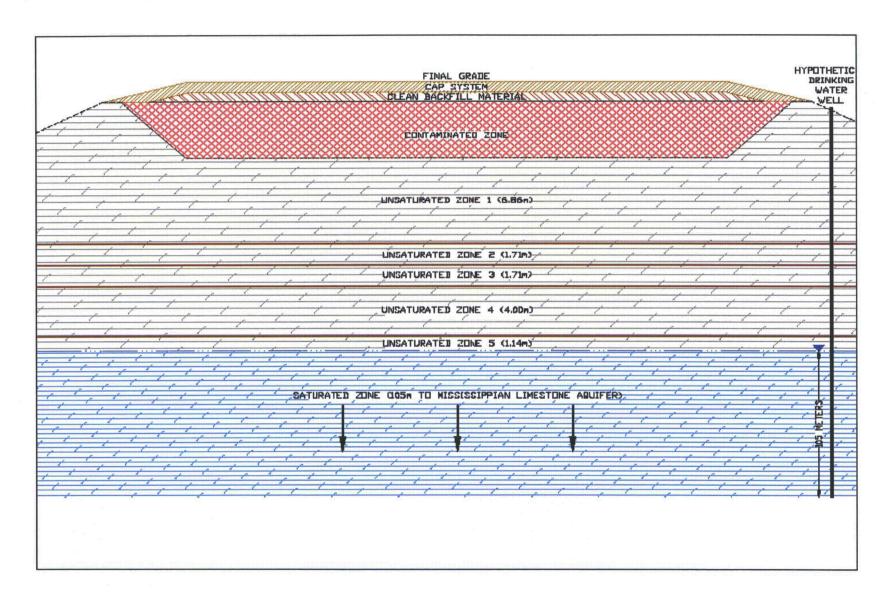


growth and, as a result, pathways such as plant growth and use, food pathways, and animal plant consumption are not reasonable. Nevertheless, as a means of demonstrating the overall conservatism in the proposed closure approach, the dose assessment modeled the residential farmer scenario. The calculated doses under the residential farmer scenario are still within NRC limits.

An industrial worker scenario will be considered for evaluation of the source terms in Ponds B through E. In the industrial scenario, industrial workers usually work 8 hours a day and do not ingest meat and milk from livestock raised on site. However, an industrial worker may have a higher inhalation rate than a resident farmer. The industrial worker scenario is the most plausible scenario for the ponds based historical and future site usage considerations. Since this portion of the site is owned and controlled by Honeywell, long term occupancy of the area is not a credible scenario. In addition, the recreationist scenario is implausible because there are no recreational opportunities afforded by this area.



Figure 5-1: Site Conceptual Model





5.4 Exposure Pathways

In the industrial worker scenario, an individual may receive radiation dose by direct external gamma radiation, inhalation of dust, inhalation of radon and its decay products, and ingestion of contaminated soil. In addition, the drinking water pathway has been activated in order to assess the hypothetical use of groundwater as a drinking water source in an industrial scenario. Based on these considerations, the pathways presented in Table 5-2 were used for the RESRAD dose assessment.

Table 5-2: Pathways Considered for the Industrial Worker Scenario

Pathway	Industrial Worker Scenario		
External Gamma	Active		
Inhalation	Active		
Plant Ingestion	Suppressed		
Meat Ingestion	Suppressed		
Milk Ingestion	Suppressed		
Aquatic Foods	Suppressed		
Drinking Water	Active		
Soil Ingestion	Active		
Radon ⁽¹⁾	Suppressed		

⁽¹⁾ Radon will be suppressed because it is not considered in the dose criteria.

The external gamma exposure is the pathway whereby the receptor receives gamma radiation directly from the source of contamination. This pathway is selected whenever the receptor may be situated in a location where the gamma rays would directly impact the body. For the pond closure project, considering the receptor to be located on the cap of the closure cell is conservative yet realistic, therefore the pathway should be enabled.

Inhalation of dust occurs when the receptor is in a location where dust from the source of contamination may become suspended in the air and then inhaled. RESRAD takes into account clean cover material and erosion rates when determining the quantity of suspended dust particles. Enabling this pathway for the pond closure project dose model is realistically conservative.

The radon inhalation pathway is generally not enabled in any scenario because of the difficulty determining natural background concentrations for the radon. It is typically only used when radon would be a primary dose contributor either as a principal radionuclide or as a progeny. Radon is not expected to be a significant contributor to the pond closure project because of the relatively low levels of uranium



present and the attenuating effect of the cover system (even over the 1000 year compliance period); therefore the pathway should not be enabled.

The pathways for ingestion of plants, meat, milk, and fish are typically enabled when a contaminated zone would affect, directly or indirectly, the location from which that particular foodstuff would be collected for human consumption. In an industrial scenario, plants, meat, and milk will not be raised for human consumption. Therefore, these pathways should be excluded from consideration.

Soil ingestion occurs when the receptor is in a location where soil from the source of contamination may be ingested, much the same as inhalation of dust. Enabling this pathway for the pond closure project dose model is realistically conservative.

Ingestion of water occurs when the receptor drinks water taken from an aquifer impacted by the contaminated zone. RESRAD uses drinking water intake and the fraction of water that is contaminated to determine the exposure from drinking water intake. Currently, the MTW process water supply is pumped from wells bored into the Mississippian limestone aquifer. Process Wells 1, 2 and 3 are 455 feet, 520 feet and 500 feet deep, respectively. The plant sanitary well is 412 feet deep. MTW drinking water is obtained from the City of Metropolis public water system.

There are no other private water wells within the boundaries of the site. Public water use is obtained from the Massac County Water District (county residents) and the City of Metropolis. Both of these sources withdraw their water from wells in the Mississippian limestone aquifer.

The current groundwater use demonstrates that MTW has not in the past used groundwater for drinking water purposes; MTW does not have any future plans for groundwater use as a drinking water source since a public water source is available. Surrounding land residents do not use and do not have a need to use groundwater as a drinking water source. This information on past and projected future groundwater use further supports excluding drinking water as an exposure pathway. However, the drinking water pathway has been included because the Mississippian limestone aquifer is used by both the Massac County Water District and the City of Metropolis. This is a highly conservative assumption considering that the wells used by both public water supplies are located a significant distance from the site.



In summary, pathways enabled for the RESRAD dose model given the land and water use at and around MTW are direct gamma exposure, dust inhalation, soil ingestion, and drinking water. These are conservative, yet realistic pathways which may affect the receptor. The remaining pathways are disabled for the dose model of the MTW pond closure project.

5.5 Radionuclides of Concern

The Metropolis plant was designed to convert natural uranium ore concentrate (U_3O_8) into uranium hexafluoride (UF_6) , which is then shipped to U.S. and foreign plants for enrichment. The facility uses the fluoride volatility process for this conversion. In addition to the natural Uranium, daughter radionuclides of Uranium are present. No fission radionuclides are contributed by MTW.

Industry standard dose modeling protocol only considers radionuclides with half-lives greater than 6 months because shorter-lived isotopes will not contribute significantly to future dose exposures. Using data collected in the pond characterization process, uranium isotopes and uranium decay daughter radionuclides were selected as the radionuclides of concern for RESRAD dose modeling.

Radionuclides of concern and associated radionuclide concentrations for each pond are listed in Table 5-3. These distributions were derived from analytical data presented in Calcium Fluoride Sludge Sampling Report prepared by Andrews Engineering after adjustment for moisture content and source term bulking that will occur due to the pond material stabilization process. Moisture content of the samples collected during the pond characterization activities was determined by ASTM method D2216. This method determines moisture content by mass. This analysis shows that the contents of the ponds have significant water content. Isotopic analyses of these samples were performed on a dry-weight basis; therefore an accurate dose model needs to account for the moisture content during the dose analysis. To accomplish this, the averaged dry-weight isotopic results from each pond were multiplied by the percent solids (i.e. that portion of the pond contents that is not water) to obtain an adjusted concentration result. Such a result maintains the total radionuclide inventory while providing the appropriate concentration result for use in the RESRAD dose model.



Table 5-3: Radionuclides of Concern

Wet (as-is) Concentration pCi/g									
Radionuclide	Pond B	Pond C	Pond D	Pond E					
Pa-231	0.04	0.13	0.25	0.07					
Ra-226	0.42	0.31	0.46	0.34					
Th-228	0.08	0.05	0.28	0.03					
Th-230	2.30	1.56	1.14	0.83					
Th-232	0.07	0.05	0.07	0.03					
U-234	69.50	136.83	480.78	118.57					
U-235	4.48	7.31	8.68	5.11					
U-236	1.86	3.27	12.87	2.91					
U-238	71.59	141.58	503.83	122.69					

5.6 Failure Modes

Two potential failure modes have been identified that may affect the dose consequence to an average member of the critical group. The first is failure of a portion of the existing pond liner system. In the RESRAD model, the existing EPDM liner was excluded from the unsaturated zones and therefore its failure is of no consequence to the model results. The second is failure of the engineered cover system.

Because the pond materials will be stabilized prior to closure, intentional removal of the pond materials cannot occur without significant effort. As a result, inadvertent intruders are unlikely. While unlikely, the possibility exists where the cover system may be removed unintentionally due to an uncontrolled natural event. The cover system is designed to handle the design basis seismic and flooding events with tolerable displacements – such that complete removal would not occur for the design basis events, i.e. credible natural events, in accordance with IEPA and EPA requirements. The ponds are located approximately 1/3 of a mile from the Ohio River. The site is located on a bluff that sits 30 to 50 feet above the Ohio River elevation. The probable elevation of a 100-year flood in the area is approximately 337 feet. The plant site elevation is 375 feet and is considerably above the most extreme flood level projected for the Ohio River. In addition, the berms will be protected with riprap, so even if there is localized flooding, adverse impacts to the cover system would not be expected. Nevertheless, the dose assessment conservatively assumes that uncontrollable natural events, such as a severe seismic event, cover system erosion, or localized flood, could remove all or a portion of the cover system for a short period of time. Because of IEPA closure maintenance and monitoring requirements, it is reasonable to assume that should such an event occur, the cover system would be repaired or replaced in a timely fashion. Nevertheless, the dose assessment conservatively modeled the compliance scenario with the



cover removed. The dose model indicates that, should such an event occur, the maximum dose consequence to an industrial worker would potentially increase to 13.7 mrem annual dose, which remains below the release criteria.



6.0 RESRAD Calculations

6.1 Approach

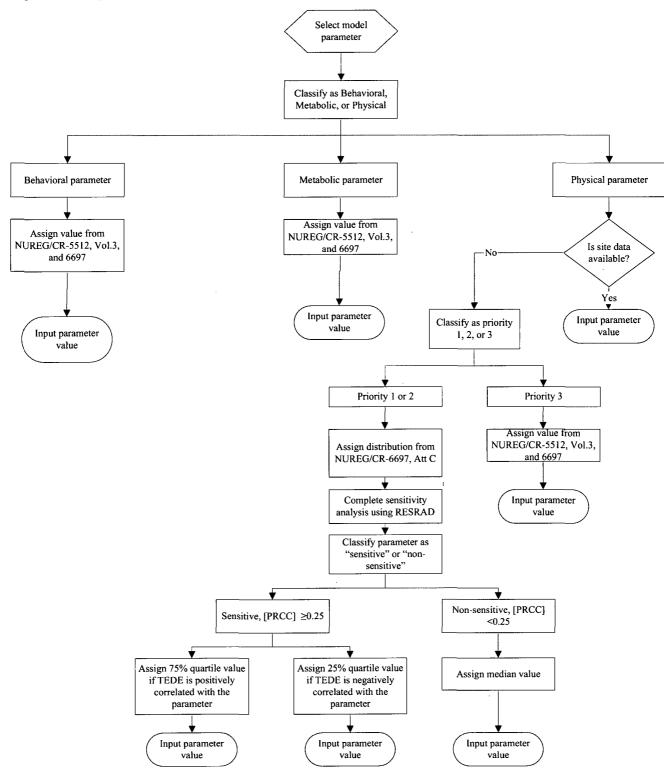
Dose assessments have been performed for Ponds B through E. RESRAD Version 6.5 was used to perform required analyses for each pond. The following steps were used in the analysis of each pond:

- 1. An input parameter treatment assessment was performed as part of a sensitivity analysis to determine which parameters should be treated deterministically (assigned single input values) and which should be treated stochastically (assigned probability distributions).
- 2. A statistical sensitivity analysis was performed for each radionuclide distribution using the uncertainty analysis features of RESRAD 6.5 to assess which parameters are the major contributors to the variation or uncertainty in the calculated dose.
- 3. Sensitive parameters were assigned conservative input values for dose calculations. These values replaced the probabilistic input distributions used in the sensitivity analysis.
- 4. Nonsensitive parameters were assigned median values from the relevant probabilistic distributions. These values replaced the probabilistic input distributions used in the sensitivity analysis.
- 5. The RESRAD model was run in the deterministic mode to determine dose for each pond.

The RESRAD Input Parameter Treatment Process is shown schematically in Figure 6-1 and described in more detail in the following sections.



Figure 6-1: Input Parameter Treatment Process





6.2 Input Parameter Treatment Assessment

RESRAD 6.5 input parameters were evaluated to determine whether they should be treated deterministically or stochastically for the pond dose assessment. Deterministic modules of the code use single values for input parameters and generate a single value for dose. Probabilistic modules of the code use probability distributions for input parameters and generate a range of doses. Stochastic parameters are parameters that are defined by a probability distribution. Parameter treatment for dose assessment for Ponds B through E was based on an assessment of parameter classification and ranking and the availability of site-specific data for the parameters.

6.2.1 Input Parameter Classification and Ranking

RESRAD input parameter classifications and rankings established by ANL were used in the dose assessment process for Ponds B through E. ANL classified and ranked RESRAD input parameters as part of the process of enhancing the deterministic RESRAD and RESRAD-BUILD codes for probabilistic dose analysis.

The ANL classification process identified each parameter as physical, behavioral, metabolic, or a combination of these types. The parameter classifications developed by ANL are documented in Attachment A of NUREG/CR-6697, "Development of Probabilistic RESRAD 6.0 and RESRAD-BUILD 3.0 Computer Codes." ANL classified parameters as follows:

Physical parameters include any parameter whose value would not change if a different group of receptors was considered. Physical parameters would be determined by the source, its location, and geological characteristics of the site (i.e., these parameters are source-specific and site-specific).

Behavioral parameters include any parameter whose value would depend on the receptor's behavior and the scenario definition. For the same group of receptors, a parameter value could change if the scenario changed (e.g., parameters for recreational use could be different from those for residential use).

Metabolic parameters include any parameter that represents the metabolic characteristics of the potential receptor and is independent of scenario. These parameter values may be different in different population age groups. Parameters representing metabolic characteristics are defined by average values for the general population. These values are not expected to be modified for a site-specific analysis because the parameter values would not depend on site conditions.



The ANL ranking process prioritized parameters for data collection and distribution analysis. Parameter rankings were based on the following four attributes of each parameter:

- 1. Relevance in dose calculations
- 2. Influence on dose variability
- 3. Parameter classification
- 4. Data availability

Based on these factors, ANL assigned priority rankings to each input parameter. Priority 1 was high priority, Priority 2 was medium priority, and Priority 3 was low priority. ANL ultimately developed probabilistic distributions for Priority 1 and 2 parameters. In general, the Priority 1 and 2 parameters were selected by ANL for data collection and distribution analysis because they had the following attributes:

- 1. High relevance to dose calculations
- 2. Medium to high influence on dose variability
- 3. Classified as physical parameters rather than behavioral or metabolic
- 4. Medium to high data availability for development of probabilistic distributions

ANL's input parameter rankings are documented in Attachment B to NUREG/CR-6697.

6.2.2 Input Parameter Treatment

Considering ANL classifications and rankings, each input parameter was evaluated to determine whether it should be treated deterministically or stochastically. As indicated in Figure 6-1, behavioral and metabolic parameters were typically treated deterministically, and physical parameters may have been treated in either manner depending on site-specific data availability and ANL priority rankings. Input parameter treatment may vary from the process indicated in Figure 6-1 depending on site-specific considerations.

The behavioral and metabolic parameters are typically treated deterministically because the range of possible values for these parameters is expected to be limited. The behavioral parameter values are limited to those that are appropriate for the chosen exposure scenario, while the metabolic parameters are not expected to vary for site-specific analysis. The behavioral and metabolic parameters were typically



assigned values from NUREG/CR-5512, Volume 3, NUREG/CR-6697, or an appropriate RESRAD default library.

The physical parameters were treated deterministically or stochastically depending on a number of factors. If site-specific values were available for a parameter, then that parameter was treated deterministically and the appropriate value was used. The remaining physical parameters, for which no site-specific data are available, were further evaluated to identify appropriate treatment.

To determine appropriate treatment for the remaining physical parameters, the ANL priority rankings were reviewed. The remaining Priority 1 and Priority 2 physical parameters were treated stochastically based on their high potential to affect dose. Conversely, the remaining Priority 3 physical parameters were treated deterministically based on their low potential to affect dose. ANL statistical parameter distributions documented in NUREG/CR-6697, Attachment C was used for the Priority 1 and 2 parameters. Priority 3 physical parameters were assigned values from NUREG/CR-5512, Volume 3, NUREG/CR-6697, or an appropriate RESRAD default library.

The parameter values, distributions, and other settings used in the sensitivity analyses for Ponds B, C, D, and E are summarized in Appendix B, Appendix C, Appendix D, and Appendix E, respectively.

6.3 Statistical Sensitivity Analysis

After appropriate values or distributions were assigned for each RESRAD input parameter, a statistical sensitivity analysis was performed for each pond using the uncertainty analysis capabilities of RESRAD. The objective of the sensitivity analysis was to identify those parameters that are major contributors to the variation or uncertainty in the calculated dose for each contaminated area. Once the sensitivity analyses were complete, conservative input values were assigned to the sensitive parameters and median input values were assigned to the non-sensitive parameters for the final DCGL_w calculations.

To perform the sensitivity analysis for each pond, the site-specific dose model was loaded with the selected values and statistical distributions summarized in Appendix B, Appendix C, Appendix D, and Appendix E. The radionuclide distributions presented in Section 5.5 were used. The model was then run in the probabilistic mode.



RESRAD reports generated for the Pond B, C, D, and E sensitivity analyses are presented electronically on CD in Appendix F, Appendix G, Appendix H, and Appendix I, respectively. These reports were evaluated to identify sensitive parameters. Sensitive parameters were identified for each pond based on partial ranked correlation coefficient (PRCC) analysis following the guidance of NUREG/CR-6676, "Probabilistic Dose Analysis Using Parameter Distributions Developed for RESRAD and RESRAD-BUILD Computer." The absolute value of the calculated PRCC obtained from the appropriate RESRAD report was used to classify the parameters with statistical distributions as sensitive or non-sensitive. PRCC was used because NUREG/CR-6692, "Probabilistic Modules for the RESRAD and RESRAD-BUILD Computer Codes," recommends that it be used when nonlinear relationships, widely disparate scales, or long tails are present in the input and output. If the absolute value of the PRCC is greater than or equal to 0.25, then the parameter was classified as sensitive. If the absolute value of the PRCC is less than 0.25, then the parameter was classified as non-sensitive. These thresholds were selected based on guidance included in NUREG/CR-6676 and 6692.

Based on the sensitivity analysis, conservative input values were identified for each sensitive parameter. These conservative values replaced probabilistic distributions in the subsequent dose calculations for each pond. Specific replacement values were selected for each sensitive parameter based on the parameter to dose correlation. If the PRCC value calculated during the sensitivity analysis was negative, the parameter value to dose correlation was negative, and the parameter value at the 25% quartile of the cumulative density function was selected. If the PRCC value was positive, the parameter value to dose correlation was positive, and the parameter value at the 75% quartile of the cumulative density function was selected. The median value (50% quartile) of the cumulative density function was selected for replacement of probabilistic distributions for non-sensitive parameters.

The sensitive and non-sensitive parameter replacement values were obtained from the RESRAD sensitivity calculation results using the interactive output feature of the uncertainty results. A double click on the left mouse button opens the interactive output dropdown window. From the interactive output dropdown window, the "Results" folder is selected. From the "Results" folder, the "Graphics" subfolder is selected. The "Cumulative Density" is then selected as the Plot Type and the "Input Vector" is selected as the Primary Object. The parameter value is determined by a right mouse button click on the plot and selecting "Edit Chart Data" from the dropdown window. This opens the Data Grid Editor dropdown window. From this window, 0.25, 0.50, or 0.75 is selected, as appropriate from the C2



column, which represents the appropriate quartile value. The corresponding parameter value is contained in the C1 column.

Appendix J presents sensitivity analysis results for each pond. The sensitivity analysis results summary tables list PRCC values for each parameter and identify conservative replacement values for each sensitive parameter. In addition, the summaries identify median (50%) values for each non-sensitive parameter. These replacement values were used in subsequent dose calculations.

6.4 **Dose Assessment Calculations**

6.4.1 Compliance Scenario – Industrial Worker

Dose assessments were performed for each pond using RESRAD to estimate the peak annual total effective dose equivalent to the average member of the critical group expected within the first 1,000 years after decommissioning, in accordance with 10 CFR 20.1401(d). The site-specific RESRAD dose model used in the sensitivity analysis for each pond was modified to replace all probabilistic distributions with conservative or median values as determined during the sensitivity analysis. The parameter values used for the dose calculations are summarized in Appendix K, Appendix L, Appendix M, and Appendix N for Pond B, C, D, and E, respectively.

RESRAD was then run in the deterministic mode to calculate dose for each pond. The RESRAD Summary Reports for each pond are provided in Appendix O, Appendix P, Appendix Q, and Appendix R for Pond B, C, D, and E respectively. The maximum total dose values obtained from the RESRAD Summary Reports are presented in Table 6-1. These results demonstrate that the 25 mrem/year dose criterion is not exceeded in any of the subject ponds in the foreseeable future.

Table 6-1: Maximum Total Dose – Industrial Worker Scenario

Pond	Time of Maximum Total Dose (years)	Maximum Total Dose (mrem/year)
В	1,000	9.93E-09
С	1,000	1.46E-07
D	1,000	3.11E-13
Е	1,000	2.69E-08



6.4.2 Alternate Scenario – Residential Farmer

Dose assessments were performed for each pond using RESRAD to estimate the peak annual total effective dose equivalent using a resident farmer scenario expected within the first 1,000 years after decommissioning, in accordance with 10 CFR 20.1401(d). This scenario used the relevant deterministic values as determined from the probabilistic runs for the industrial worker; added the appropriate pathways, i.e. meat, milk, fish, and plant ingestion, and; modified specific parameter values to those more appropriate for a resident farmer such as inhalation rate and indoor and outdoor time fractions.

The maximum total dose values obtained from the RESRAD Summary Reports for the resident farmer scenario are presented Table 6-2. These results demonstrate that the 25 mrem/year dose criterion is not exceeded in any of the subject ponds in the foreseeable future when considering a resident farmer.

Table 6-2: Maximum Total Dose - Resident Farmer Scenario

Pond	Time of Maximum Total Dose (years)	Maximum Total Dose (mrem/year)	
В	1,000	3.61E-08	
С	1,000	5.32E-07	
D	1,000	1.09E-12	
Е	1,000	9.79E-08	

6.4.3 Alternate Scenario – Failure Modes

There are two failure modes were identified for consideration in the dose models: failure of the EPDM liner, and failure of the engineered cover system. The RESRAD models did not utilize the EPDM liner as one of the unsaturated zones, therefore this failure mode is eliminated from consideration. Failure of the engineered cover system was modeled using the industrial worker scenario modified to exclude the cover layer.

The maximum total dose values obtained from the RESRAD Summary Reports for the failure of the engineered cover system are presented Table 6-3. These results demonstrate that the 25 mrem/year dose criterion is not exceeded in any of the subject ponds in the foreseeable future when considering a resident farmer.



Pond	Time of Maximum Total Dose (years)	Maximum Total Dose (mrem/year)
В	1,000	2.6
С	1,000	4.1
D	0	13.7
Е	18.71	3.4

6.5 **Pond Closure ALARA Evaluation**

In order to terminate a license, a licensee should demonstrate that the dose criteria in Subpart E have been met, and should demonstrate whether it is feasible to further reduce the levels of residual radioactivity to levels below those necessary to meet the dose criteria (i.e., to levels that are ALARA). Per NUREG 1757 Volume 2, Appendix N, the following definition applies:

"'Reasonably achievable' is judged by considering the state of technology and the economics of improvements in relation to all the benefits from these improvements. (However, a comprehensive consideration of risks and benefits will include risks from nonradiological hazards. An action taken to reduce radiation risks should not result in a significantly larger risk from other hazards.) NRC Regulatory Guide 8.8, Revision 3 (1978)." [Quotes in original.]

Subpart E contains specific requirements for a demonstration that residual radioactivity has been reduced to a level that is ALARA (10 CFR 20.1402, 20.1403(a), 20.1403(e), and 20.1404(a)(3)). NUREG-1757 Volume 2 Appendix N provides specific examples showing an ALARA demonstration. The ALARA demonstration for proposed pond closure at MTW is demonstrated using equation shown below.

$$\frac{Conc}{DCGLw} = \frac{Costr}{\$2000 \ x \ P_D \ x \ 0.025 \ x \ F \ x \ A} x \ \frac{r + \lambda}{1 - e^{-(r \lambda)N}}$$

The residual radioactivity level that is ALARA is the concentration, Conc, at which the benefit from removal equals the cost of removal. The ratio of the concentration, Conc, to the $DCGL_w$ can be determined to show that the proposed action meets ALARA. Ratios values less than 1 demonstrate that further action should be considered or taken. Ratio values above 1 demonstrate that the proposed action meets ALARA. Factors in this equation are defined below.

 P_D = population density for the critical group scenario in people/m². For the MTW facility, the plant area is approximately 59 acres. MTW's work



		force is approximately 350. Thus, the value a P_D of 0.0015 people/m ² is calculated.	
A	=	area being evaluated in square meters (m ²). The evaluated total pond area is approximately 10 acres, or 40,470 m ² .	
0.025	=	annual dose to an average member of the critical group from residual radioactivity at the Derived Concentration Guideline Level ($DCGL_w$) concentration in rem/y. To obtain a conservative analysis, the annual dose from remaining uranium in the closed ponds was allowed to remain at 0.025 rem/year instead of the much lower industrial worker dose value.	
F	=	effectiveness, or fraction of the residual radioactivity removed by the remediation action. The effectiveness was assumed to be 1 (complete removal).	
Conc	=•	average concentration of residual radioactivity in the area being evaluated in units of activity per unit area for buildings or activity per unit volume for soils;	
$DCGL_{W}$	=	derived concentration guideline equivalent to the average concentration of residual radioactivity that would give a dose of 0.25 mSv/y (25 mrem/y) to the average member of the critical group, in the same units as "Conc";	
r	=	monetary discount rate in units per year. For durations exceeding 100 years, the NRC approved value is 0.03.	
λ	=	radiological decay constant for the radionuclide in units per year. The radiological decay constant for uranium is 4.47×10^9	
N	=	number of years over which the collective dose will be calculated, or 1,000 years.	

For the ALARA analysis, $Cost_T$ can include all of the costs shown in the equation below.

$$Cost_T = Cost_R + Cost_{WD} + Cost_{ACC} + Cost_{TF} + Cost_{WDose} + Cost_{PDose} + Cost_{other}$$

where

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	CostR =	monetary cost of the remediation action (may include "mobilization" costs);
	CostWD =	monetary cost for transport and disposal of the waste generated by the action;
	CostAcc	= monetary cost of worker accidents during the remediation action;
	CostTF =	monetary cost of traffic fatalities during transporting of the waste;
	CostWDose	= monetary cost of dose received by workers performing the remediation action and transporting waste to the disposal facility;



CostPDose = monetary cost of the dose to the public from excavation,

transport, and disposal of the waste; and

Costother = other costs as appropriate for the particular situation.

Honeywell has developed preliminary engineering estimates to complete pond closure as described in the preliminary engineering closure design report. As part of the evaluation and selection of this approach, preliminary engineering estimates to excavate, transport, and disposal of the pond materials off-site were also developed. These estimated costs are \$32,000,000 (closure in place using the RCRA required engineered cover) and \$61,300,000 (off-site disposal). Thus, a conservative estimate of the value of $Cost_T$ for the ALARA analysis is the difference between these values, or \$29,300,000. This value is conservatively limited since it only includes remediation, transportation, and disposal cost without adding the additional projected cost of worker accidents, traffic fatalities during transportation, worker exposure during transportation, regulatory interface costs, and other appropriate costs if identified.

Using these values gives:

$$\frac{Conc}{DCGL_{W}} = \frac{\$29,300,000}{\$2000 \times 0.0015 \times 0.025 \times 1 \times 40470} \times \frac{0.03 + 1.55 \times 10^{-10}}{1 - e^{-(0.03 + 1.55 \times 10^{-10})/1,000}}$$

or

$$\frac{Conc}{DCGL_{w}} = 9,653,241$$

The ratio is significantly greater than 1, and shows that the proposed pond closure action meets the ALARA criteria by a wide margin. There is significant additional conservatism in the analysis because of the following:

- Dose limit for the selected industrial worker scenario is significantly lower than 25 mrem/year and in fact is shown to be indistinguishable from background.
- Other potential Honeywell costs as part of excavation, transportation and off-site disposal were not included in the total cost.

Overall, the ALARA analysis shows that the selected pond closure meets the regulatory ALARA criteria.



7.0 Environmental Report Supplement

This section describes the environmental effects specifically related to the partial site release of the Ponds B though E at MTW. This section was prepared in accordance with the guidance provided in Chapter 6.0 of the Office of Nuclear Material and Safety and Safeguards (NMSS) NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs (NRC 2003b). This section provides justification to the NRC that will support an environmental assessment in accordance with the National Environmental Policy Act (NEPA) of 1969 as outlined in 10 CFR Part 51. This section incorporates by reference relevant information in the May 2005 Environmental Report (Docket 40-3392) filed to support license renewal for MTW.

7.1 Purpose and Need for the Pond Closures

The four ponds at MTW are regulated by IEPA under a RCRA permit. MTW and IEPA have reached a preliminary agreement regarding status of the retention ponds. This agreement requires MTW to close the retention ponds by 2020. Under the Atomic Energy Act, the NRC has the statutory authority to protect public health and safety and the environment related to the use of source, byproduct, and special nuclear material. One aspect of the responsibility is to ensure safe and timely decommissioning of the nuclear facilities that it licenses. Once licensed activities have ceased, licensees are required by NRC regulations to decommission their facilities and have their licenses terminated. The criteria for allowing the release of sites for unrestricted use are listed in the NRC's License Termination Rule (LTR), codified in Subpart E of 10 CFR 20. 10 CFR 20.1402 states, in part, that a site will be considered acceptable for unrestricted use following decommissioning if the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent (TEDE) to an average member of the critical group that is less than 25 mrem (0.25 mSv) per year and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). These criteria require that, through the decommissioning process, the residual radioactivity in buildings, equipment, soil, ground water, and surface water at the facility and its environs be reduced to such low levels that the TEDE limits are satisfied.

7.2 Description of the Proposed Action

MTW plans to close the retention ponds by stabilizing the contents of the ponds, and constructing an engineered cover system that meets RCRA Title C design criteria and NRC dose criteria for unrestricted release. The use of a cover system is appropriate in light of the low radionuclide concentrations in the



pond and the fact that the radionuclides are currently in a controlled location (*i.e.*, the materials are in existing surface impoundments underlain by natural clay, the uranium materials have a very low solubility, and the materials will be stabilized in place). This action makes the ponds area unsuitable for operations involving the nuclear materials license thus justifying release of this area from source material license SUB-526.

7.3 Applicable Regulatory Requirements, Permits, and Required Consultations

Partial site release of the retention ponds area requires adherence to numerous federal and state regulations. Guidance for identifying the applicable federal and state requirements is stated below. This information is a broad overview of applicable regulations and is not intended to be all-inclusive. The licensee, Honeywell International, is responsible for compliance with applicable federal and state regulations.

7.3.1 Federal Requirements

Decommissioning activities that are subject to federal regulations, permits, licenses, notification, approvals, or acknowledgments may include:

- Handling, packaging, and shipment of radioactive waste
- Worker radiation protection
- License termination and final site release
- Worker, contractor, and the general public's health and safety
- Liquid effluent releases
- Hazardous waste generation and disposition

7.3.1.1 Nuclear Regulatory Commission

Radiological activities fall under Title 10 of the CFR and are administered by the NRC. Applicable portions of Title 10 regulations are included within the following Parts:

- Part 20 "Standards For Protection Against Radiation"
- Part 40 "Domestic Licensing Of Source Material"
- Part 51 "Environmental Protection Regulations For Domestic Licensing And Related Functions"

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- Part 61 "Licensing Requirements For Land Disposal Of Radioactive Waste"
- Part 71 "Packaging and Transportation of Radioactive Material"



Decommissioning requirements that involve activities for site control, characterization, and final status surveys are found within the following Parts of Title 10 of the CFR and are administered by the NRC. The Parts include:

- Part 20.1401 "General provisions and scope"
- Part 20.1402 "Radiological criteria for unrestricted use"
- Part 20.1403 "Criteria for license termination under restricted conditions"
- Part 20.1404 "Alternate criteria for license termination"
- Part 20.1405 "Public notification and public participation"
- Part 20.1406 "Minimization of contamination"
- Subpart F—"Surveys and Monitoring" Part 20.1501 "General"
- Part 30.36 "Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas"
- Part 40.42 "Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas"
- Part 70.38 "Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas"
- Part 72.54 "Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas"

7.3.1.2 Department Of Transportation

Radioactive material transportation activities falls under Title 49 of the CFR and are administered by the Department Of Transportation. Applicable portions of Title 49 regulations are included within Subtitle B – "Other Regulations Relating to Transportation" Parts 100 To 185, as applicable,

7.3.1.3 Environmental Protection Agency

The EPA regulations outlined in Title 40 of the CFR apply as follows:

• Part 61 – "National Emissions Standards For Hazardous Air Pollutants"



- Part 122 "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System" (NPDES) and Parts 123 to 125 in support of the NPDES
- Parts 129 to 132 –Clean Water Act
- Part 190 "Environmental Radiation Protection Standards For Nuclear Power Operations"
- Parts 260 to 272 –hazardous waste disposal and solid waste disposal as included in the RCRA

7.3.2 State of Illinois Regulations

The IEPA regulations generally follow those of Federal EPA regulations contained in 40 CFR Part 264. The pertinent State of Illinois regulations are as follows:

- Conditions II.F.2 and II.H of MTW's RCRA Part B permit (Permit No. B-65R) minimum technology closure requirements and the overall closure requirement for the surface impoundments
- 415 ILCS 5/ Illinois Environmental Protection Act, Section 21(d) Requirement to Conduct Operations in Accordance with a Permit Issued by Illinois EPA
- 35 Illinois Administrative Code 724.211 Closure Performance Standard
- 35 Illinois Administrative Code 724.328 Closure and Post-closure Care
- 35 Illinois Administrative Code 722.111 Hazardous Waste Determination

7.4 Pond Closure Alternatives

The proposed action is the partial site release of Ponds B through E from source materials license SUB-526. Five alternatives are associated with this action. MTW has evaluated these options regarding ultimate disposition of the pond area and their contents. The options identified are:

- No action
- Removal and disposal of the pond contents followed by closure of Ponds B through E
- Removal and recycling of the pond contents followed by closure of Ponds B through E
- In-situ closure of Ponds B through E leaving the contents in the current condition
- In-situ stabilization followed by closure of Ponds B through E

Each alternative is discussed below.



7.4.1 No Action

Under the no action alternative, MTW would not initiate decommissioning activities at the ponds. MTW would be required to maintain current radiological controls, site security, all applicable licenses and permits, and utilities. The no-action alternative requires MTW apply for and obtain an extension to the current IEPA permits and reach an agreement with IEPA as to the status of the retention ponds. The no-action alternative would also be non-compliant with the 10 CFR 40.42 (timeliness rule). The purpose of the timeliness rule is to reduce potential risk to the public and the environment. Moreover, the ponds will require decommissioning eventually. Thus, the no action alternative merely delays, rather than avoids, the impacts associated with the action alternatives.

7.4.2 Removal and Disposal of the Pond Contents

The off-site disposal alternative was considered but is not the preferred alternative on the basis of the cost/benefit analysis. Under this alternative, radiologically-contaminated materials would be removed from the facility and disposed of at a facility licensed to accept the materials. On-site radioactive contamination would be reduced to levels considered acceptable for release for unrestricted use. The radiologically-contaminated materials would be transported from the facility via railcar. Construction/rehabilitation of roadways to support truck traffic between the ponds and the railroad staging area would also be required. This alternative would result in increased noise and air emissions levels during the construction period. Because use of the pond area would be unrestricted following removal of the radiologically-impacted materials, the area could be redeveloped for additional industrial use. The long-term ecological value and aesthetic value of the area after release for unrestricted use are difficult to define as the site will continue in operation as an industrial facility after release of the ponds from the license. The potential for accidents during transport and high disposal cost significantly outweigh the minimal benefit to the plant from possible re-use of the pond areas. The potential impacts associated with this alternative are discussed below. This alternative is not environmentally preferable to the proposed action.

7.4.3 Removal and Recycling of the Pond Contents

This action requires removal and transportation of the pond contents to a recycling facility or construction of a recycling facility at MTW. Recycling would then be followed by closure of Ponds B through E. Engineering evaluations for pond closure found that recycling was not technically feasible. As a result, this option is not a reasonable alternative to the proposed action.



7.4.4 <u>In-place Closure of Ponds B through E</u>

This action requires construction of an engineered RCRA cover system while leaving the pond contents in their current condition. Physical property tests show that the pond contents without stabilization may not be able to remain cohesive in certain extreme seismic events. As a result, this option is less desirable than the proposed action.

7.4.5 Stabilization and In-place Closure of Ponds B through E

This action requires stabilization of the pond contents with Portland cement or similar pozzolanic material. Following stabilization of the pond contents, an engineered RCRA cover system will be constructed on each pond. This approach meets regulatory requirements by:

- Eliminating free liquids through adding pozzolanic materials
- Stabilizing the pond material to achieve a bearing capacity sufficient to support an engineered RCRA cover that provides:
 - Long-term minimization of the infiltration of water
 - No maintenance to meet NRC closure requirements for unrestricted release
 - Proper surface water drainage and erosion protection of the engineered RCRA cover

7.5 Cumulative Effects

The cumulative effects of the implementation of the proposed action will result in no short term cumulative impacts. It is likely that long-term site use restrictions under RCRA will be assigned to the pond areas. These restrictions are likely to prohibit future residential development of the property, regardless of its radiological status.

7.6 Description of the Affected Environment

7.6.1 **Land Use**

A description of land use in the vicinity of MTW was included in the Environmental Report associated with renewal of source material license SUB-526 (Renewal ER). That description is incorporated by reference.



7.6.2 Transportation

A description of transportation in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.3 Geology and Soils

A description of geology in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.4 Hydrology

A description of hydrology in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.5 Ecological Resources

A description of ecological resources in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.6 Air Quality, Meteorology and Climatology

A description of air quality and meteorology and in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.7 **Noise**

A description of noise in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.8 Historic and Cultural Resources

A description of historical and cultural resources in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.9 Visual/Scenic Resources

A description of visual/scenic resources in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.



7.6.10 Socioeconomic

A description of socioeconomics in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.11 Public and Occupational Health

A description of public and occupational health in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.6.12 Waste Management

A description of waste management in the vicinity of MTW can be found in the Renewal ER and is incorporated by reference.

7.7 Description of Impacts to the Environment for Proposed Action

The following sections describe specific areas of the environment that may be affected as a result of the proposed activities.

7.7.1 Land Use

Ponds B through E are located at the southwest corner of the plant footprint within the existing controlled area. The existing plant footprint is in the central portion of the land owned and controlled by MTW. Construction activities associated with the pond closure will be limited to on-site actions. Therefore, no adverse impacts on neighboring land use, including residential or agricultural land uses, would result. Dust and noise impacts associated with this alternative are not expected to significantly impact off-site land use. On-site land use impacts during decommissioning would be minimal, as current industrial activities in construction area would not be affected. Off-site activities associated with decommissioning would include the identification of suitable sources of engineered barrier materials and the transport of those materials to the MTW facility. It is expected that commercial local sources of soil borrow materials would be identified. Similarly, the source of the rock cover materials is a commercial quarry. Therefore, off-site land use impacts associated with the, acquisition, removal and transport of engineered barrier materials from their respective source areas to the MTW facility would likely be minimal.

The only land use impacted by the decommissioning activities under the proposed action would be the future use of the closed ponds within the MTW facility. IEPA requires institutional controls related to future use of the area in which the engineered cover system is constructed regardless of its radiological



status. Long-term land use impacts are difficult to predict, as future land use needs are dependent upon many factors. Isolation of the radioactive materials in place provides a greater degree of environmental protection than the existing conditions at the MTW facility and therefore is in keeping with the protection of the environment. The institutional controls that would limit future use of the restricted area would be in keeping with current industrial use. Therefore, the implementation of future use restrictions in the engineered barrier area would not significantly impact future development of currently undeveloped areas of the facility. Similarly, no adverse indirect off-site land use impacts would be expected following completion of decommissioning activities.

7.7.2 Transportation

The MTW facility is located approximately one mile west of Metropolis. US Highway 45 and Burlington North Railroad border the facility to the north, and Ohio River bounds the MTW facility to the south. Interstate 24 is located approximately 4.5 miles east of the facility and provides access from Paducah, KY across the Ohio River into Metropolis, IL. The proposed action would involve minimal on-site transportation impacts. An on-site roadway system to the ponds currently exists that could support the on-site truck traffic. A minor short-term increase in traffic to and from the facility would occur due to the transport of engineered cover system materials to the site but would require no modification of the local transportation system. To bring the estimated 80,000 cubic yards of engineered cover system materials and pozzolanic additives on-site, approximately 4,000 dump truck loads of soil, rock, and pozzolanic material (based on standard-sized 15-cubic meter [20-cubic yard] trucks) will be transported to the ponds from a combination of on-site borrow and offsite borrow sources. Assuming that these materials are transported to the facility over period of 18 months, the average round trip traffic to/from the facility would be approximately 10 trucks per day.

7.7.3 Geology and Soils

The MTW Site is located near the northern end of the Mississippian Embayment, an extension of the Gulf Coastal Plain and a depositional basin filled in with weakly lithified Cretaceous, Tertiary, and Quaternary clastic sediments, which overlap Paleozoic bedrock. Under this alternative, materials would be stabilized within the area in which they are currently located. Impacts to the geology and soils due to the proposed action would be limited to the immediate area within the footprint of Ponds B through E. Therefore, the impacts of the preferred alternative on existing geologic and soil features of the facility would be minimal. The greatest potential impact would be construction of an engineered barrier designed to provide protection against erosion, even under intense meteorological conditions. Other baseline geologic



and soil features (underlying soil compaction, disruption of natural drainage patterns, etc.) are not expected to be significantly impacted, due to the presence of the existing ponds. Also, the existing ponds have demonstrated long-term stability. The engineering cover will exhibit even greater stability. The stability of the engineered barrier design under both static and seismic loadings is demonstrated by the stability analysis conducted as part of the engineering design of the engineered barrier (Appendix V). The maximum slopes of the cover system are also consistent with the design standard in the waste disposal industry and have been demonstrated to be protective against slope failures for highly variable waste materials. Therefore, the potential for slope failures of the engineering barriers are not a major concern.

7.7.4 <u>Hydrology</u>

The MTW Site is bound on the south by the Ohio River in the vicinity of River Mile 946 (USGS, 1982). The Ohio River at the plant site is about 910 meters (3,000 feet) wide with a normal pool elevation of 88 meters (290 feet) above mean sea level. The Ohio River drains 203,940 square miles (ORSANCO, 2004). The site is located along the Ohio River at a point approximately 35 miles upstream from its confluence with the Mississippi River.

Effluent from settling Pond D is mixed with other plant effluents before discharge at Outfall 002. Outfall 002, which is used to discharge the plant's treated sanitary, process waste waters, non-contact cooling water, and storm water, is located on one of the on-site drainages about 610 meters (2,000 feet) from the Ohio River. According to NPDES permit data, Outfall 002 is located at latitude 3710090, longitude – 08845290 within USGS hydrologic basin code 05140206 (USEPA, 2005). With the pond closure, discharges from Pond D to Outfall 002 will end.

Implementation of the preferred alternative will not require the use of water (other than potentially for dust control or equipment decontamination purposes), so there will be no significant project-related withdrawals of surface water or ground water. Similarly, no direct discharges to surface water will be associated with the implementation of this alternative. The only potential indirect discharges would be discharges to surface water via stormwater flow and infiltration of precipitation, with subsequent discharge to the ground water. All construction activities will comply with stormwater discharge requirements applicable to construction projects. Run-on and run-off controls will be used in construction areas to minimize the impact of construction activities on stormwater quality. Existing impacts to ground water associated with the presence of the ponds are not significant. Localized drainage controls would be placed to direct surface water flow from the engineered barriers to the desired points for control prior to



off-site discharge. In addition, the berms will be protected with riprap, so even if there is localized flooding, adverse impacts to the cover system would not be expected. Once the engineered cover system is in place, direct contact between the consolidated radioactive materials and stormwater will no longer occur, preventing any associated stormwater impacts. The features of the engineered cover system will inhibit the potential infiltration of precipitation through the engineered cover system. These features, combined with the low leachability of the stockpiled materials, will inhibit any potential future impacts to ground water quality. Therefore, none of the alternatives are expected to have significant impacts on surface or ground water quality.

7.7.5 Ecological Resources

Developing the existing plant required clearing all natural vegetation from the site to allow construction of buildings, ponds, and other plant-related facilities. The plant site occupies only about 5% of applicant's property that has otherwise remained mostly undeveloped through the years. Review of topographic maps suggests that the plant site was historically devoid of aquatic features of interest, including ephemeral streams. Accordingly, like terrestrial habitats and biota, the plant has had little or no affect on the area's aquatic biotic resources. Potential ecological resource impacts from pond closure include impacts that could result from on-site construction activities. However, construction activities within the ponds area will for the most part occur in an area that is already relatively clear of existing vegetation and that has no significant ecological value. Over the long-term, ecological resources could be impacted by a change in the long-term habitat value of the areas affected by the cover system. There are no anticipated impacts to the ecological resources due to the proposed pond closure action.

7.7.6 Air Quality, Meteorology and Climatology

The Meteorology and Climate of the MTW UF₆ conversion plant near Metropolis, Illinois, was summarized in a 1995 Environmental Assessment (EA) (USNRC, 1995). This report referenced meteorological data from the National Weather Service at Paducah, Kentucky, which is on the far bank of the Ohio River just 6.8 miles south of the MTW UF₆ site. It is reasonable to assume that the climate at Paducah adequately describes the weather at the plant. There are no anticipated impacts to the meteorology and climatology due to the proposed pond closure action.

Construction activities associated with the preferred alternative could impact air quality through dust and emissions from construction equipment. Although dust from the pond contents would not occur due to the moisture content, dust from the surrounding soils and from installation of the cover system could be



generated. Should this occur, dust suppression measures will be implemented, as necessary, during construction. Emissions from plant equipment during closure are expected to be minor and of limited duration. Overall, pond closure is not expected to alter the existing air quality and would comply with the National Ambient Air Quality Standards (NAAQS).

7.7.7 Noise

There are no ambient noise survey data available for the area around the MTW site nor has Honeywell performed any noise surveys at the boundary of the exclusion area. There are no known noise-sensitive receptors in close proximity to the site with the exception of Category B rural residences typically assigned a NAC of 72dBA. Common outdoor noise levels in the range of 60-70dBA are heavy highway traffic at 300 feet (60dBA) to a gas-powered lawn mower at 100 feet (75dBA). The potential noise impacts associated with the proposed action would be short-term impacts associated with construction activities. However, these impacts are not expected to be significant in light of the current noise levels at the site, which are typical of an industrial facility. Thus, there are no anticipated impacts to the noise conditions due to the proposed pond closure action beyond short-term general constructions noises typical of any operational industrial area. Following completion of the proposed action, no additional noise-generating activities would occur, with the possible exception of infrequent maintenance activities.

7.7.8 Historic and Cultural Resources

There are no known records of archeological or cultural surveys available for the previous development at the site. No registered Federal or State archaeological sites were identified within the boundaries of the site. There are no anticipated impacts to historical and cultural resources due to the proposed pond closure action, which will take place in a previously-disturbed area.

7.7.9 Visual/Scenic Resources

The MTW site lies in a rural region of extreme southern Illinois adjacent to the Ohio River. Generally, southern Illinois is an area of swampy, forested bottomlands and low clay and gravel hills. Away from well-traveled roadways, the area affords pastoral viewsheds where rural residences and undeveloped agricultural land and deciduous forests are the dominant visual features.

U.S. Highway 45 and a Burlington Northern railroad right-of-way border MTW to the northeast. Viewed from the air, MTW has the typical appearance of an industrial complex with interconnected industrial looking buildings, storage of material, exhaust stacks with pollution control equipment, parking lots,



railroad spurs, and other operational support areas. Cleared ground on the property is minimal. The plant buildings and operational areas are surrounded by two nine-foot high chain-link and barbed wire security fences approximately 50 feet apart. The majority of the site buildings are visible from U.S. Highway 45 northeast of the plant structures. While Massac County is mainly rural, the area in the immediate vicinity of the MTW site contains other substantial industrial and urban development on both sides of the Ohio River.

Impacts due to the proposed closure action will be limited to the appearance of the engineered RCRA cover system within the confines of the MTW owned and controlled land. The impact will not significantly alter the current visual/scenic resource.

7.7.10 Socioeconomic

The plant site is located in a predominantly agricultural area of low average population density with widely scattered villages and small cities in Massac County, Illinois, and across the Ohio River in McCracken County, Kentucky. The workforce required to implement the preferred alternative would be limited in size. Some of the work will require special qualifications and may therefore require the temporary importation of qualified workers from other areas. Workers that do not require special qualifications should be available locally. Overall, the potential individual and cumulative impacts on local population, housing, and health, social, and educational services are expected to be minimal. The presence of the construction workers will result in slight increases in the amount of income taxes collected. Purchase of materials of construction (e.g., soil) could potentially provide a positive local economic benefit during the construction period provided suitable materials are available locally.

The presence of the engineered barrier and associated institutional controls would prevent future development of the pond areas for commercial or industrial purposes. However, it is likely that land use across the facility will be limited to non-residential uses given the existing industrial facilities present. Therefore, restrictions on future development of the pond areas will have a limited impact on the potential development of the rest of the facility. Therefore, it is not expected that the implementation of the preferred alternative will have adverse socioeconomic impacts on the area.

7.7.11 Public and Occupational Health

External background radiation levels in the vicinity of Metropolis, Illinois, are primarily from natural sources of cosmic and terrestrial origin. The total effective dose equivalent from cosmic rays is about



.43 mSv (43 mrem) per year, while terrestrial sources contribute about .46 mSv (46 mrem) per year (Oakley). Radon progeny doses are highly variable, with an average effective dose equivalent of 2.0 mSv (200 mrem) per year (US National Council on Radiation Protection and Measurements). The impacts to the public and occupational radiological dose are discussed in detail in the dose modeling discussion in this report.

No liquid discharges are expected to be associated with this alternative. Stormwater management features associated with the design of the engineered barrier would contain the 100-year storm and would withstand temporary inundation during larger storm events without damage. Releases to the air associated with the construction of the engineered barrier would consist of the generation of air and particulate emissions. Exposures to on-site workers during the limited construction would mainly consist of exposures to fugitive dust and direct radiation associated with material stabilization activities. Cumulatively, onsite workers would be subject to the combined impacts of air emissions, direct radiation and noise. These impacts could be mitigated through the use of appropriate personal protection equipment and dust suppression materials.

Off-site cumulative impacts would mainly consist of air emissions and noise. These impacts would be short-term impacts incurred during the construction period. Risks associated with transportation activities are limited to the risks involved in the shipment of cover materials to the MTW facility. Dose to members of the public would be non-existent because the pond area will remain within the proprietor owned area and under the control of MTW. Due to the absence of projected impacts of the alternative on ground water quality, potable water use and use of ground water for irrigation purposes would not be impacted by this alternative. Even though no impacts on ground water quality are expected, this alternative would provide a greater degree of protection than the existing conditions because the engineered barrier will isolate the underlying materials from the infiltration of precipitation in the future.

7.7.12 Waste Management

The preferred alternative is not expected to result in the generation of significant amounts of waste requiring off-site management. The proposed closure action will eliminate use of the Pond D as a receptor for water. By stabilizing the radioactive materials beneath an engineered barrier on-site, there will be minimal, if any, impact on off-site waste management systems. Additional waste materials potentially generated under this alternative include personal protection equipment wastes (e.g., disposable protective



clothing), which would be minimal. Waste generated during the closure process will be monitored as necessary for radiological contamination and dispositioned accordingly. No other impacts are anticipated.

7.8 Description of Impacts to the Environment for Alternate Off-Site Disposal Action

The following sections describe specific areas of the environment that may be affected as a result of the alternate off-site disposal activities.

7.8.1 Land Use

Ponds B through E are located at the southwest corner of the plant footprint within the existing controlled area. The existing plant footprint is in the central portion of the land owned and controlled by MTW. The off-site disposal alternative would result in the area remaining available for industrial uses. Dust and noise impacts associated with this alternative are not expected to significantly impact off-site land use. On-site land use impacts during decommissioning would be moderate, as current industrial activities in the construction area would be limited by increased activities specifically associated with the removal and disposal of the pond contents. Off-site activities associated with this alternative would include transport of construction equipment to and from the facility; construction/rehabilitation of roadways to support truck traffic from the ponds to the railroad staging area; and actual transport of the waste materials to the railroad staging area. It is expected that off-site land use impacts associated with the removal and transport of waste materials from the ponds to the disposal facility would be moderate.

The local land use impacted by the activities under the alternate off-site disposal action would be the future use of the pond area within the MTW facility and the road system to the railroad staging area. In addition, potential land impacts at the site receiving the excavated pond materials would be minimal, as the disposal site will be licensed to receive these types of material. This alternative would also have minimal indirect land use impacts.

7.8.2 Transportation

The alternate off-site disposal action would involve on-site and off-site transportation impacts. An on-site roadway system to the ponds currently exists that could support the on-site truck traffic. An increase in traffic to and from the facility would occur due to the transport of waste materials from the site to the railroad staging area and may also require modification/rehabilitation of the local transportation system. Transport of the waste materials off-site would require an estimated 4,410 dump truck loads waste material (based on standard-sized 15-cubic meter [20-cubic yard] trucks) to be transported to the railroad



staging facility. Assuming that these materials are transported over period of 24 months, the average round trip traffic to/from the facility would be approximately 9 trucks per day. In addition, following the removal of the radioactive materials for off-site disposal, the excavation areas would be covered with clean topsoil. This would result in additional truck traffic.

7.8.3 Geology and Soils

Under this alternative, materials would be removed from the area in which they are currently located. Impacts to the geology and soils due to the alternate off-site disposal action could extend to the road system between MTW and the railroad staging area. Therefore, there may be minor impacts of the alternate off-site disposal on existing geologic and soil features of the facility roads. Other baseline geologic and soil features (underlying soil compaction, disruption of natural drainage patterns, etc.) are not expected to be significantly impacted, due to the presence of the existing ponds. The disposal site that would receive the decommissioning wastes was required to go through a rigorous geologic evaluation during the permitting process and, the disposal facility permit was issued based on demonstrated protectiveness of geology and soil conditions.

7.8.4 Hydrology

Implementation of the alternate off-site disposal action will not require the use of water (other than potentially for dust control or equipment decontamination purposes), so there will be no significant project-related withdrawals of surface water or ground water. Similarly, no direct discharges to surface water will be associated with the implementation of this alternative. The only potential indirect discharges would be discharges to surface water via stormwater flow and infiltration of precipitation, with subsequent discharge to the ground water. All construction activities will comply with stormwater discharge requirements applicable to construction projects. Run-on and run-off controls will be used in construction areas to minimize the impact of construction activities on stormwater quality. Existing impacts to ground water associated with the presence of the ponds are not significant. Localized drainage controls would be placed to direct surface water flow from the construction area to the desired points for control prior to off-site discharge. Therefore, none of the alternatives are expected to have significant impacts on local surface or ground water quality.

Transport of the materials via railcar to the disposal facility would occur in covered railcars, therefore potential impacts on surface and ground water quality during the transport process would be minimal, unless an unexpected accident were to occur. Even then, the nature of the



materials would not present a significant risk to surface water or ground water quality. The containment features of the ultimate disposal facility were constructed in accordance with applicable regulations and would be expected to be protective of surface and ground water quality.

7.8.5 Ecological Resources

Potential ecological resource impacts from the alternate off-site disposal action would include impacts resulting from on-site construction activities and off-site transportation of waste materials. However, construction activities within the ponds area will for the most part occur in an area that is already relatively barren of existing vegetation and that has no ecological value. Over the long-term, ecological resources could be impacted by a change in the long-term habitat value of the areas affected by the demolition of the pond surface impoundments.

7.8.6 Air Quality, Meteorology and Climatology

There are no anticipated impacts to the meteorology and climatology due to the alternate off-site disposal action.

Construction activities associated with the alternate off-site disposal action could impact air quality through dust and emissions from excavation and construction equipment. Releases to the air associated with the demolition of the pond surface impoundments would consist of the generation of air and particulate emissions. Exposures to on-site workers during the limited construction would mainly consist of exposures to fugitive dust associated with material removal activities and possibly dust from the pond contents (though significant dust would not be expected due to the moisture content of the materials). Dust suppression measures will be implemented, as necessary, during waste excavation. Emissions from plant equipment during closure are expected to be minor and of limited duration. Overall, operations associated with the alternate off-site disposal action are not expected to alter the existing air quality and would comply with the NAAQS.

7.8.7 Noise

The potential noise impacts associated with the alternate off-site disposal action would be short-term impacts associated with construction activities. However, these impacts are not expected to be significant in light of the current noise levels at the site, which are typical of an industrial facility. Thus, there are no anticipated impacts to the noise conditions due to the alternate off-site disposal action beyond short-term



general construction noises typical of any operational industrial area. Following completion of the alternate off-site disposal action, no additional noise-generating activities would occur.

7.8.8 Historic and Cultural Resources

There are no anticipated impacts to historical and cultural resources due to the alternate off-site disposal action, which will take place in a previously-disturbed area.

7.8.9 <u>Visual/Scenic Resources</u>

Impacts due to the alternate off-site disposal action will be limited to the change in scenery associated with the demolition and removal of the pond surface impoundments within the confines of the MTW owned and controlled land. The impact will not significantly alter the current off-site visual/scenic resource.

7.8.10 Socioeconomic

The socioeconomic impacts associated with this alternative would be comparable to the preferred alternative. The workforce required to implement the alternate off-site disposal action would be limited in size. Some of the work will require special qualifications and may therefore require the temporary importation of qualified workers from other areas. Workers that do not require special qualifications should be available locally. Overall, the potential individual and cumulative impacts on local population, housing, and health, social, and educational services are expected to be minimal. The presence of the construction workers will result in slight increases in the amount of income taxes collected. Purchase of materials for construction (e.g., soil) could potentially provide a positive local economic benefit during the construction period provided suitable materials are available locally.

The removal of the pond surface impoundments would potentially allow for future development of the pond areas for commercial or industrial purposes. However, it is likely that land use across the facility will be limited to non-residential uses given the existing industrial facilities present. Therefore, the availability of the pond area for future development will have a limited impact on the potential development of the rest of the facility. Therefore, it is not expected that the implementation of the alternate off-site disposal action will have adverse socioeconomic impacts on the area.



7.8.11 Public and Occupational Health

The impacts to the public and occupational radiological dose associated with the alternate off-site disposal action would be a result of the removal and transport of the waste materials. Given the low radioactivity of the material, exposure rates of the waste material would be minimal, and therefore of little significance when compared to background radiation exposure levels.

No liquid discharges are expected to be associated with this alternative. Releases to the air associated with the demolition of the pond surface impoundments would consist of the generation of air and particulate emissions. Exposures to on-site workers during the limited construction would mainly consist of exposures to fugitive dust and direct radiation associated with material removal activities. Cumulatively, onsite workers would be subject to the combined impacts of air emissions, direct radiation and noise. These impacts could be mitigated through the use of appropriate personal protection equipment and dust suppression materials.

Off-site cumulative impacts would mainly consist of air emissions, noise, direct radiation, and risks associated with the transport of the waste materials to the disposal facility and shipment of clean cover fill to MTW. These impacts would be short-term impacts incurred during the construction period. Even though no impacts on ground water quality are expected, this alternative would provide a greater degree of protection than the existing conditions because the removal of the pond contents will eliminate the underlying materials from the infiltration of precipitation in the future.

7.8.12 Waste Management

The alternate off-site disposal action is expected to result in the generation of significant amounts of waste requiring off-site management. Under this alternative, the radioactive materials will be transported to a licensed facility for final disposal. The waste disposal facility will have sufficient capacity to receive the described waste materials. This option consumes limited licensed waste disposal capacity. Additional waste materials potentially generated under this alternative include personal protection equipment wastes (e.g., disposable protective clothing), which would be minimal.

7.9 <u>Mitigation Measures</u>

Mitigation measures are those measures taken to minimize adverse impacts, such as the impacts of construction activities or potential post-closure actions. Mitigation measures associated with each of the alternatives are outlined below.



7.9.1 On Site Closure

Mitigation measures under the preferred alternative include:

- The development and implementation of effective health and safety measures to maintain a safe environment during construction.
- The implementation of a Quality Assurance/Quality Control Construction Plan to assure that decommissioning activities are performed in a manner consistent with the decommissioning plan, regulatory requirements and license conditions.
- The development and implementation of an environmental monitoring and control program to reduce exposures to radioactive materials and direct radiation. Such a program will include the following:
 - o Sediment control measures, including run-off control measures as defined in the engineered cover system design.
 - O Dust suppression measures, such as water spray, calcium chloride, or other dust suppression materials, to minimize the release of airborne materials from material excavation, transport and consolidation activities.
 - O Air monitoring to monitor dust generation in the work area.
- The development and implementation of a long-term maintenance, monitoring and institutional control program, as required by IEPA, that will ensure the engineered cover system is adequately maintained following construction and to ensure that institutional controls limiting future site use are enforced. Such a program will include the following:
 - o Inspection program to ensure the integrity of the engineered barrier, associated surface water management systems and site security;
 - o Maintenance of the engineered barrier, surface water management systems, and site security measures;
 - o Implementation of deed restrictions and maintenance of associated land use restrictions as required by IEPA.

7.9.2 Off Site Disposal

Mitigation measures under the off-site disposal alternative would include:

- The development and implementation of effective health and safety measures to maintain a safe environment during construction.
- The development and implementation of a Quality Assurance program to assure that decommissioning activities are performed in a manner consistent with regulatory requirements and license conditions.



- The development and implementation of an environmental monitoring and control program to reduce exposures to radioactive materials and direct radiation during decommissioning. Such a program would include the following:
 - Sediment control measures, including run-on and run-off control measures utilizing perimeter drainage swales, silt fences, hay bales and other stormwater and erosion control features, as necessary and stormwater collection and treatment in the staging area.
 - O Dust suppression measures, such as water spray, calcium chloride, or other dust suppression materials, to minimize the release of airborne materials from material excavation, transport and material management (railcar loading) activities.
 - O Air monitoring to monitor dust generation in the work area.
- The development and implementation of a transportation and contingency program, to ensure that the waste hauler (i.e., rail carrier) is knowledgeable of the materials being carried, and the associated health and safety/spill prevention and control issues and actions to be taken in the event of a transportation accident during shipment of the radioactive materials to the off-site disposal facility.

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7.10 Environmental Impact Summary

Impacts to the environment and mitigation measures are summarized in the table below:

Affected Environment	No Action	Proposed Action	Offsite Disposal Alternative
Land Use	No Impacts	Possible Impact:	Possible Impact:
		The engineered cover system and	Elimination of the pond surface impoundments
		institutional controls would limit future	would allow for future development of the
		use of the pond area.	pond area for additional industrial use. The
			land used by the off-site disposal facility
			would not be available for future use.
Transportation	No Impacts	Possible Impact:	Possible Impact:
		Significant increase in truck traffic to	Significant increase in truck traffic to and from
		and from the facility to transport waste	the facility to transport waste materials would
		materials would occur; may result in a	occur; may result in a need for
		need for modification/rehabilitation of	modification/rehabilitation of the local road
		the local road system.	system.
Geology and Soils	No Impacts	Possible Impact:	Possible Impact:
		Construction/modification of local	Impacts associated with the
		drainage system to properly direct runoff	modification/rehabilitation of the local road
		water from the pond area to outfall	system.
		locations.	
Hydrology	No Impacts	Possible Impact:	Possible Impact:
		Discharge from the surface	Discharge from the surface impoundments to
		impoundments to outfall 002 will be	outfall 002 will be eliminated.
		eliminated.	
Air Quality	No Impacts	Possible Impact:	Possible Impact:
		The placement of the soil materials	The removal of the pond materials and loading
		associated with the engineered cover	of rail cars associated with this alternative will
		system will result in some increased air	result in increased air emissions. Emissions
		emissions.	would be greater than those expected to occur
		Dust suppression measure will be	under the proposed action. Dust suppression
		implemented, as necessary, during	measure will be implemented, as necessary,
T 1 1 1 D	N. T.	construction.	during construction.
Ecological Resources	No Impacts	No Impacts	No Impacts

Affected Environment	No Action	Proposed Action	Offsite Disposal Alternative
Noise	No Impacts	Possible Impact: Possible temporary noise increase due to construction activities at the surface impoundment location.	Possible Impact: Possible temporary noise increase due to construction activities at the surface impoundment location. Use of additional equipment (e.g., excavator, locomotives) results in slightly higher noise levels when compared to proposed action.
Cultural and Historic Resources	No Impacts	No Impacts	No Impacts
Visual/Scenic Resources	No Impacts	Possible impact: Change in appearance of the surface impoundments due to the placement of the engineered cover system.	Possible impact: Change in appearance of the surface impoundments due to the removal of the pond surface impoundments.
Socioeconomic	No Impacts	No Impacts	No Impacts
Public and Occupational Health	No Impacts	Possible Impact: Radiological dose consequence, which is very low, is detailed within this report	Possible Impact: Radiological dose consequence and transport accident risk would be increased as a result of the alternate off-site disposal action.
Waste Management	No Impacts	Possible Impact: Elimination of the pond area for liquid waste collection.	Possible Impact: Elimination of the pond area for liquid waste collection. Significant cost associated with transport and disposal of the waste materials. Consumes limited radioactive waste disposal capacity.



8.0 References

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9.0 List of Preparers

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Supporting Documentation

APPENDIX A-1

Calculation of Average Cover Soil Thickness over Sludge Closure Option 2b - Ponds B, C, D, and E

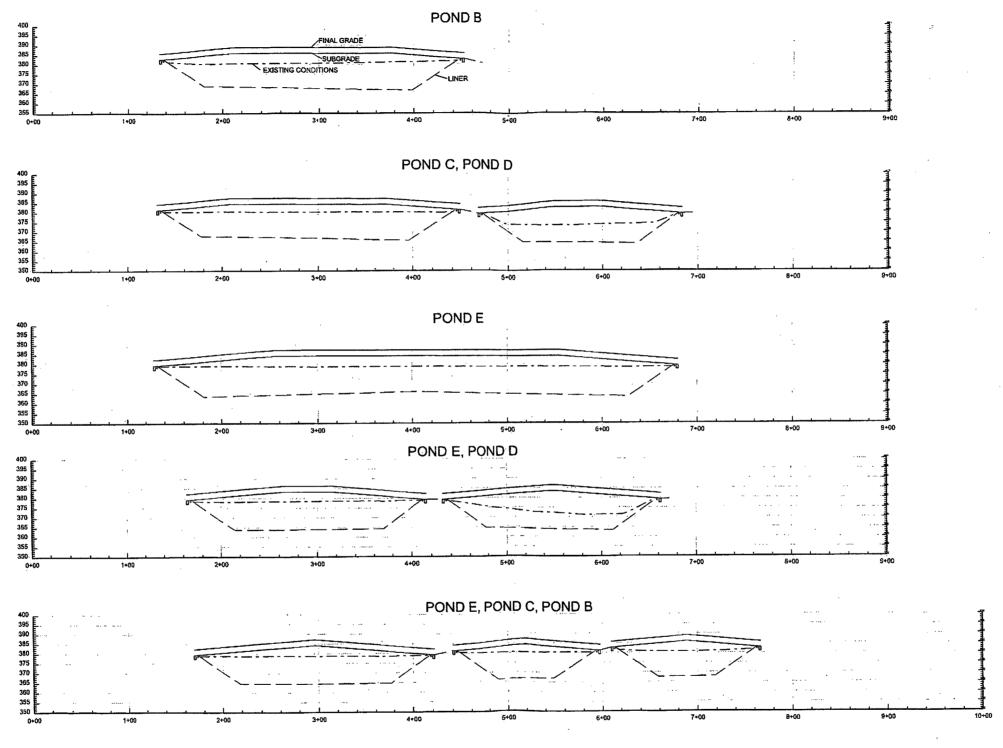
Description	Pond B	Pond C	Pond D	Pond E
Volume Subgrade Fill Above Sludge (cu. ft.)	134450	102859	268162	360698
Volume of 3' Cover Above Subgrade (cu. ft.)	129463	129728	124716	390354
TOTAL Volume of Cover Soils (fill and cover) Above Sludge (cu. ft.)	263913	232587	392878	751052
Volume of Sludge (cu. yd.)	13027	13632	9518	52017
Volume of Sludge (cu. ft.)	351729	368064	256986	1404459
Bulking Increase of Sludge during In-Situ Mixing (assume 5%) (cu. ft.)	17586	18403	12849	70223
Surface Area of Sludge (sq. ft.)	43169	43244	41980	130156
Average Thickness of Cover Soil Over Current Sludge Surface (ft)	6.11	5.38	9.36	5.77
Reduction in Cover Soil Thickness due to 5% Sludge Bulking (ft)	0.41	0.43	0.31	0.54
BEST ESTIMATE: Average Cover Thickness (ft)	5.71	4.95	9.05	5.23

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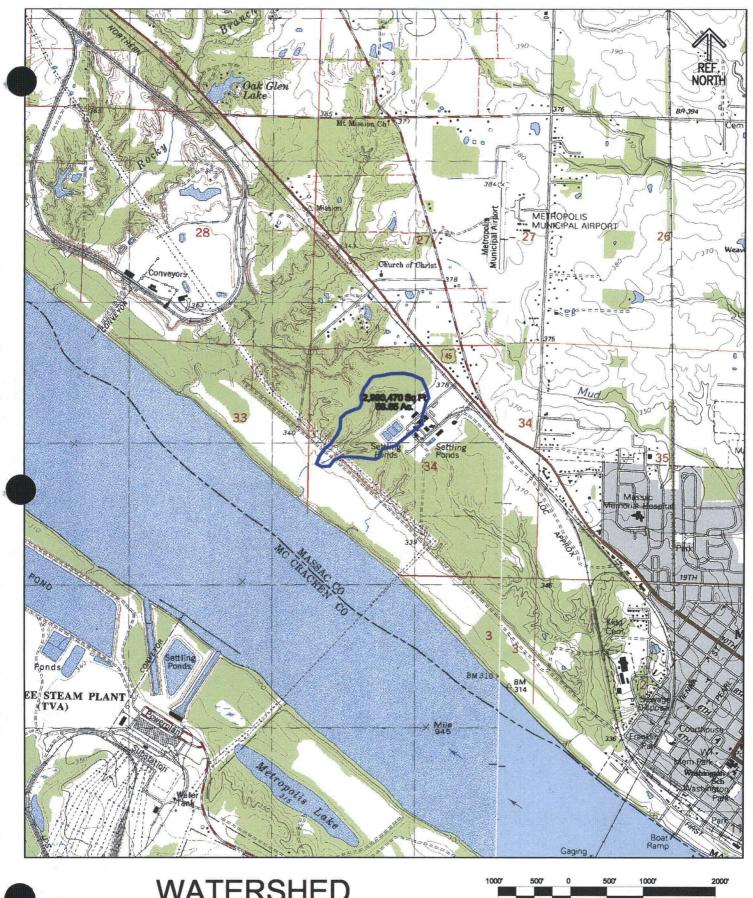


HONEYWELL METROPOLIS SITE CROSS SECTIONS



APPENDIX A-2

APPENDIX A-3



WATERSHED MAP



APPENDIX B

Pond B Probabilistic Sensitivity Analysis Input Summary

							Distribution	Distribution	Distribution	Distribution	,
		RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Contaminated Zone	Onits	Delauit	Type	FIIOTITY	rrealment	DISTIDUTION		- 2	3	4	
Area of contaminated		0.00		aryanyanyanya				***************************************	33.38	EV.C. SHOUGHHARDSHOOT	
zone	m²	10000	Р	2	D	4,000	NR	NR	NR	NR	See Table B-2.
Thickness of				<u>├</u> ─		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			3.11		
contaminated zone	m	2	Р	2	D	2.608	NR	NR	NR	NR	See Table B-2.
											Length of longest side of
Length parallel to the				İ							contaminated zone. See Table B
aquifer flow	m	100	Р	2	D	94	NR	NR	NR	NR	2.
Basic Radiation Dose											Unrestricted release criteria in
Limit	mrem/year	30	Ρ	3	D	25	NR	NR	NR	NR	10 CFR 20.1402
Time since placement	yr	0	Р	3	D	0	NR	NR _	NR	NR	RESRAD default
Times for calculations	yr	1	P	3	Ď	1	NR	NR NR	NR	NR	RESRAD default
Times for calculations	yr	3	Р	3	D	3	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	10	P	3	D	10	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	30	P	3	D	30	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	100	P	3	D	100 300	NR	NR_	NR	NR NR	RESRAD default
Times for calculations	yr	300 1000	- F	3	D D	1000	NR NR	NR NR	NR NR	NR	RESRAD default
Times for calculations	yr		<u> </u>	<u> </u>	ט	1000	INH		NA .	NR	HESHAD detault
Initial Principle Radionuclio Soil: Ac-227	pCi/g	ons 0	P	2	D	0	NR	NR	NR	NR	See Table B-3
Soil: Pa-231	pCi/g	0	P	2	D	0.04	NR NR	NR NR	NR	NR	See Table B-3
Soil: Pb-210	pCi/g	0	P	2	D	0.04	NR NR	NR NR	NR NR	NR	See Table B-3
Soil: Ra-226	pCi/g	0 -	P	2	D	0.42	NR	NR NR	NR	NR NR	See Table B-3
Soil: Ra-228	pCi/g	0	P	2	D	0.42	NR	NR	NR NR	NR	See Table B-3
Soil: Th-228	pCi/g	0	P	2	<u>b</u>	0.08	NR	NR	NR	NR	See Table B-3
Soil: Th-230	pCi/g	0	P	2	D	2.30	NR NR	NR	NR	NR.	See Table B-3
Soil: Th-232	pCi/g	0	P	2	D	0.07	NR	NR	NR	NR	See Table B-3
Soil: U-234	pCi/g	0	P	2	D	69.50	NR	NR	NR	NR	See Table B-3
Soil: U-235	pCi/g	0	Р	2	D	4.48	NR	NR	NR	NR	See Table B-3
Soil: U-236	pCi/g	0	P	2	D	1.86	ŇR	NB	NR	NA	See Table B-3
Soil: U-238	pCi/g	0	P	2	D	71.59	NR	NR	NR	NR	See Table B-3
											Not used for calculation of
Groundwater: Ac-227	pCi/L	0	P	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Pa-231	pCi/L	0_	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Pb-210	pCi/L	0	ρ	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Ra-226	pCi/L	0	Р	3	NA	Not used	NR _	NR_	NR	NR	distribution coefficients
<u> </u>								,			Not used for calculation of
Groundwater: Ra-228	pCi/L	0	Р	3	NA NA	Not used	NR NR	NR_	NR	NR	distribution coefficients
D TI. 200	-0:#	_	_	_							Not used for calculation of
Groundwater: Th-228	pCi/L	0	Р	3	NA.	Not used	_NR	NR	NR	NR	distribution coefficients
Crawadowstan Th 220	-0:4		P		NIA I	Netwood	l ND	\ ND			Not used for calculation of
Groundwater: Th-230	pCi/L_	0	<u> </u>	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
C	-0:4	0	P	3		81-4	l ND	NO			Not used for calculation of
Groundwater: Th-232	pCi/L				NA .	Not used	NR	NR	NR	NR NR	distribution coefficients Not used for calculation of
Groundwater: U-234	pCi/L	0	Р	3	NA !	Not used	NR	NR	NR	NR	distribution coefficients
Groundwater, 0-234	POVL	`			- NA	Notused	<u> </u>	- NO	IND	INFI	Not used for calculation of
Groundwater: U-235	pCi/L	0	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
Groundwater. 6 265	POUL		<u> </u>	H	14/4	1401 0300		1411	1413	INIT	Not used for calculation of
Groundwater: U-236	pCi/L	0	P	3	NA '	Not used	NR	NR	NR	NR	distribution coefficients
Groundwater. o 200	- PO # E	-		<u> </u>		1101 0000	1211			- ''' '	Not used for calculation of
Groundwater: U-238	pCi/L	0 !	Р	3	NA I	Not used	NR	NR	NR	NR	distribution coefficients
Cover and Contaminated		ical Data								100	
Cover depth	m	0	Р	2	D	1.74	NR	NR	NR	NR	See Table B-2
						Bounded					NUREG/CR-6697 Att. C, Table
Density of cover material	g/cm ³	1.5	Р	1 1	s	Normal	1.696	0.1855	1.123	2.269	3.1-1, Silty Clay
		<u> </u>									
	1	l l	ļ				1			ļ	Uniform distribution derived
					·		ł				from NUREG/CR-6697 Att.C.
	1				ľ						Section 3.8 for permanent
	J	j l	l	ļ]]]	pasture with maximum 5%
	l]									slope. Design maximum
Cover erosion rate	m/yr	0.001	P,B	2	s	Uniform	0.00003	0.00018	-		slope is 4%
Density of contaminated	l		- '-				1				1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
zone	g/cm ³	1.5	Р	1	D	1.575	NR	NR	NR I	NR	See Table B-5
	33	 						· · · · · ·	· · · · · · ·		
											Uniform distribution derived
}	ł	1 :		1			1				from NUREG/CR-6697 Att.C,
]									Section 3.8 for permanent
Contaminated zone		1	1						·		pasture with assumed 2%
erosion rate	m/yr	0.001	P,B	2	s	Uniform	0.00001	0.00006			slope after cover erosion.
J. J		0.001			<u> </u>	0111101111	0.00001	0.00000			Torobo arior poster erosioni

						14-1	Distribution	Distribution	Distribution	Distribution	
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value or Distribution⁴	Parameter 1	Parameter 2	Parameter 3	Parameter	Basis
Contaminated zone total	Units	Detault	Type	Priority	Treatment	Bounded			3	4	NUREG/CR-6697 Att. C, Table
porosity		0.4	Р	2	s	Normal	0.41	0.09	0.1319	0.6881	3.2-1, Loamy Sand
Contaminated zone field capacity	-	0.2	P	3	ם	0.2	NR	NR	NR	NR	RESRAD default
											Average Kh from dilatometer
]		,						(DMT) pressure dissipation tests
Carte minate dans											performed on in-situ Pond E
Contaminated zone hydraulic conductivity	m/yr	10	Р	2	D	1.6	NR I	NR	NR	NR	sludge by In-Situ Testing LC, August 5-7, 2009
Contaminated zone b	11441		<u> </u>			Bounded	1911			1461	NUREG/CR-6697 Att. C, Table
parameter	-	5.3	Р	2	s	lognormal-n	0.305	0.258	0.61	3.01	3.5-1, Loamy Sand
											This parameter only used if
Humidity in air	g/m³	8	Р	3	NA _	Not used	NR_	NR NR	NR	NR	Tritium is present in soil
Evapotranspiration coefficient		0.5	Р	2	s	Uniform	0.5	0.75	_	_	NUREG/CR-6697 Att. C, Section 4.3
COGINCIEII		0.5	'- -	-	3	Official	0.5	0.73	-		3601011 4.3
											Average annual wind speed for
											Paducah, KY (NOAA),7.4 mph
Average annual wind											http://iwf.ncdc.noaa.gov/oa/clima
speed	m/s	2	Р '	2	D	3.3	NR_	NR	NR	NR	te/online/ccd/avgwind.html NUREG/CR-6697 Att. C, Table
Precipitation rate	m/yr	1	P	2	D	1.25	NR	NR	NR	NR	4.1-1, Paducah, KY
Troophauor tato	,.	<u>i</u> -				1.20			- 1111	1411	Not applicable for industrial
Irrigation rate	m/yr	0.2	В	3	D	0	NR	NR	NR	NR	scenario
											RESRAD default. Method is
Irrigation mode		Overhead	В	3	D	Overhead	NR_	NR	NR	NR	used in Illinois.
											NUREG/CR-6697 Att. C, Table 4.2-1 method. Assume $c_1 \approx 0.3$,
Runoff coefficient		0.2	_P	2	D 1	0.4	NR	NR	NR	NR	$c_2 = 0.2$, and $c_3 = 0.1$
Watershed area for											Pond area watershed. See
nearby stream or pond	m²	1.00E+06	P	3	ם	277817	NR	NR	NR	_NR	Appendix A.
Accuracy for water soil	_										
computation Saturated Zone Hydrologic	-	1.00E-03	NA	3	D	1.00E-03	NR	NR	NR	NR	RESRAD default
Saturated Zone Hydrologic	ai Dala		07 Victoria	88880-731303		Bounded		2.200			NUREG/CR-6697 Att. C, Table
Density of saturated zone	g/cm ³	1.5	P	1	s	Normal	1.5105	0.159	1.019	2.002	3.1-1, Sand
Saturated zone total						Bounded					NUREG/CR-6697 Att. C, Table
porosity		0.4_	Р	1	S	Normal	0.43	0.06	0.2446	0.6154	3.2-1, Sand
Saturated zone effective		0.2	P	١.		Bounded	0.383	0.064	0.105	0.570	NUREG/CR-6697 Att. C, Table
porosity Saturated zone field		0.2		11	s	Normal	0.363	0.061	0.195	0.572	3.3-1, Sand
capacity		0.2	P	3	D .	0.2	NR	NR	NR	NR	RESRAD default
Saturated zone hydraulic											NUREG/CR-6697 Att. C, Table
conductivity	m/yr	100	Р	1	S	Beta	110	5870	1.398	1.842	3.4-1, Sand
					· ·						Andrews Engr. Geologic Cross
Saturated zone hydraulic		1		1	}						Section Sheet A-A' (El. 319.24 – El. 298.54)/ 4320 ft. See
gradient	-	0.02	Р	2	D	0.0048	NR	NR	NR	NR	Appendix A.
Saturated zone soil-						Bounded					NUREG/CR-6697 Att. C, Table
specific b parameter	-	5.3	Р	2	S	lognormal-n	-0.0253	0.216	0.501	1.9	3.5-1, Sand
Water table drop rate	m/yr	1.00E-03	Р	_3	D	1.00E-03	NR	NR	NR	NR	RESRAD default Honeywell Sanitary Well Depth
Well-pump intake depth		}		1	}						from HSA - depth to saturated
(below water table)	m	10	Р	2	D	105	NR	NR	NR	NR	zone.
,		ĺ			i						ND Model is used for larger
											contaminated areas (e.g. more
Model: non-dispersion or mass balance		ND	Р	3	D	ND	NR	NR	NR	NR	than 1,000 m ²) per RESRAD Users Manual Section E.3.1.
mass paramee		IND		-3-	- ·	ND	INIT	IVIT	INFI	NM	This parameter is not used in the
Well pumping rate	m³/yr	250	В, Р	2	D	Not used	NR	NR	NR	NR	non-dispersion model
Unsaturated Zone Hydrolo	gical Data 🌉				45.00		2000				
											Andrews Engineering Project ID
Number of unsaturated]]							91-135 cross section Sheet Number A-A', January 2007.
zones	_	1	Р	3	D	5	NR	NR	NR	NR	See Appendix A.
		 	···		_ <u>~</u> _		7.51		1311	1411	Andrews Engineering Project ID
Unsaturated zone 1]			1					91-135 cross section Sheet
Later total controls						_					Number A-A', January 2007.
thickness (Clayey Silt/Silty		4	Р	1 1	D	6.86	NR	NR	NR	NR	See Appendix A.
Clay)	_m	<u> </u>		<u> </u>							AULDEO OD COCE TO C
Clay) Unsaturated zone 1 soil	_					Bounded					NUREG/CR-6697 Att. C, Table
Clay)	m g/cm³	1.5	P	2	s		1.696	0.1855	1.123		NUREG/CR-6697 Att. C, Table 3.1-1, Silty Clay NUREG/CR-6697 Att. C, Table

Parameter	Units	RESRAD Default	Type¹	Priority ²	Treatment ³	Value or Distribution⁴	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Unsaturated zone 1	Offics	Delault	туре	FIIOTILY	Heatinetit	Bounded					NUREG/CR-6697 Att. C. Table
effective porosity	<u> </u>	0.2	Р	2	s	Normal	0.289	0.0735	0.0623	0.517	3.3-1, Silty Clay
Unsaturated zone 1 field capacity		0.2	Р	3	D	0.2	NR NR	NR	NR	NR	RESRAD default
Unsaturated zone 1 hydraulic conductivity	m/yr	10	Р	2	D	126	NR	NR	NR	NR	See Table B-4
Unsaturated zone 1 soil- specific b parameter		5.3	Р	2	S	Bounded lognormal-n	2.29	0.259	4.43	22	NUREG/CR-6697 Att. C, Table 3.5-1, Silty Clay
Unsaturated zone 2 thickness (Sandy Silt/Silty Sand)		4	ı P		D	1.71	NR	NR	ND	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
Unsaturated zone 2 soil	m	4	- P	1		Bounded	NH	NH	NR_	NH	See Appendix A. NUREG/CR-6697 Att. C, Table
density	g/cm ³	1.5	Р	2	s	Normal	1.5635	0.2385	0.827	2.3	3.1-1, Loamy Sand
Unsaturated zone 2 total porosity	. '	0.4	Р	2	s	Bounded Normal	0.41	0.09	0.1319	0.6881	NUREG/CR-6697 Att. C, Table 3.2-1, Loamy Sand
Unsaturated zone 2 effective porosity		0.2	Р	2	S	Bounded Normal	0.353	0.0913	0.0711	0.635	NUREG/CR-6697 Att. C, Table 3.3-1, Loamy Sand
Unsaturated zone 2 field capacity	<u>-</u>	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 2		40					40.0	4000	0.7000	4.04	NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr_	10	P	2	S	Beta	12.3	4230	0.7992	1.91	3.4-1, Loamy Sand
Unsaturated zone 2 soil- specific b parameter		5.3	Р	2	S	Bounded lognormal-n	0.305	0.258	0.61	3.01	NUREG/CR-6697 Att. C, Table 3.5-1, Loamy Sand
Unsaturated zone 3											Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
thickness (Sand)	m	4	Р	1	D	1.71	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 3 soil density	g/cm ³	1.5	Р	2	s	Bounded Normal	1.5105	0.159	1.019	2.002	NUREG/CR-6697 Att. C, Table 3.1-1, Sand
Unsaturated zone 3 total porosity		0.4	P	2	s	Bounded Normal	0.43	0.06	0.2446	0.6154	NUREG/CR-6697 Att. C, Table 3.2-1, Sand
Unsaturated zone 3						Bounded					NUREG/CR-6697 Att. C, Table
Unsaturated zone 3 field	•	0.2	Р	2	S	Normal	0.383	0.061	0.195	0.572	3.3-1, Sand
capacity Unsaturated zone 3	-	0.2	Р	3	D	0.2	NR	NR_	NR	NR	RESRAD default NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	Р	2	S	Beta	110	5870	1.398	1.842	3.4-1, Sand
Unsaturated zone 3 soil- specific b parameter		5.3	P	2	s	Bounded lognormal-n	-0.0253	0.216	0.501	1.9	NUREG/CR-6697 Att. C, Table 3.5-1, Sand
Unsaturated zone 4 thickness (Sandy Silt/Silty Sand)	m	4	P	. 1	D	4	NR	NR	NR	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 4 soil density	g/cm ³	1.5	P	2	s	Bounded Normal	1.5635	0.2385	0.827	2.3	NUREG/CR-6697 Att. C, Table 3.1-1, Loamy Sand
Unsaturated zone 4 total			P			Bounded Normal					NUREG/CR-6697 Att. C, Table
porosity Unsaturated zone 4		0.4	<u> </u>	2	S	Bounded	0.41	0.09	0.1319	0.6881	3.2-1, Loamy Sand NUREG/CR-6697 Att. C, Table
effective porosity Unsaturated zone 4 field	-	0.2	Р	2	S	Normal	0.353	0.0913	0.0711	0.635	3.3-1, Loamy Sand
capacity Unsaturated zone 4		0.2	Р	3	D	0.2	NR_	NR	_ NR	NR	RESRAD default NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	Р	2	s	Beta	12.3	4230	0.7992	1.91	3.4-1, Loamy Sand
Unsaturated zone 4 soil- specific b parameter		5.3	P	2	s	Bounded lognormal-n	0.305	0.258	0.61	3.01	NUREG/CR-6697 Att. C, Table 3.5-1, Loamy Sand
Unsaturated zone 5 thickness (Sand)	m	4	P	1	D	1.14	l NR	NR I	NR	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 5 soil						Bounded					NUREG/CR-6697 Att. C, Table
density Unsaturated zone 5 total	g/cm ³	1,5	Р _	2	S	Normal Bounded	1.5105	0.159	1.019	2.002	3.1-1, Sand NUREG/CR-6697 Att. C, Table
porosity Unsaturated zone 5	-	0.4	Р	2		Normal Bounded	0.43	0.06	0.2446	0.6154	3.2-1, Sand NUREG/CR-6697 Att. C, Table
effective porosity Unsaturated zone 5 field	-	0.2	Р	. 2	S	Normal	0.383	0.061	0.195	0.572	3.3-1, Sand
capacity Unsaturated zone 5		0.2	Р	3	D	0.2	NR	NR	NR_	NR	RESRAD default NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	Р	2	S	Beta	110	5870	1.398	1.842	3.4-1, Sand

	1		1				Distribution	Distribution	Distribution	Distribution	
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value or Distribution⁴	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Basis
Unsaturated zone 5 soil-	-	5.3	Р	2	s	Bounded lognormal-n	-0.0253	0.216	0.501	1.9	NUREG/CR-6697 Att. C, Table 3.5-1. Sand
Distribution Coefficients (c	ontaminated, u	ınsaturated, ar	nd satura	ted zones)							
Ac-227	cm³/g	20	Р	1	S	Truncated lognormal-n	6.72	3.22	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Pa-231	cm³/g	50	P	1	s	Truncated lognormal-n	5.94	3.22	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Pb-210	cm³/g	100	Р	1	s	Truncated lognormal-n	7.78	2.76	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Ra-226	cm³/g	70	Р	_ 1	s	Truncated lognormal-n	8.17	1.7	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Ra-228	cm³/g	70	P	1	s	Truncated lognormal-n	8.17	1.7	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Th-228	cm³/g	60000	Р	1	S	Truncated lognormal-n	8.68	3.62	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Th-230	cm³/g	60000	Р	1	S	Truncated lognormal-n	8.68	3.62	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Th-232	cm³/g	60000	Р	_1	S	Truncated lognormal-n	8.68	3.62	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
U-234	cm³/g	50	Р	1	S	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
U-235	cm³/g	50	Р	1	S	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
U-236	cm³/g	50	Р	1	s	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
U-238	cm³/g	50	Р	1	s	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Transport Factor Options				25.0		iog.io.iida		5.10	5.00	0.000	5.0.0.000
Leach rate	1/yr	0_	Р	3	D	0	NR	NR	NR	NR	RESRAD default, parameter is not used for calculation of distribution coefficients. Value of 0 not used for calculation of distribution coefficients.
Solubility limit	mol/L	0	Р	3	D	2.94E-06	NR	NR	NR	NR	Value used for Uranium nuclides only
Use plant/soil ratio	Check box	Yes/No	NA	3	NA	No	NR	NR	NR	l NR	RESRAD default, parameter not used for calculation of distribution coefficients.
Occupancy							7.0				\$ 10 m
Inhalation rate	m³/yr	8400	M, B	3	D_	11400	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Mass loading for inhalation	g/m³	0.0001	P.B	2	s	Continuous linear	_		_	_	NUREG/CR-6697 Att. C, Section 4.6
Exposure duration	yr	30	В	3		25	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Indoor dust filtration factor (shielding factor, inhalation)	_	0.4	P, B	2	s	Uniform	0.15	0.95	-	-	NUREG/CR-6697 Att. C, Section 7.1
Shielding factor, external gamma		0.7	Р	2	s	Bounded lognormal-n	-1.3	0.59	0.044	1	NUREG/CR-6697 Att. C, Section 7.10
Indoor time fraction		0.5	- B	3	D	0.17	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Outdoor (on site) time fraction	_	0.25	В	3	D	0.06	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Shape of the contaminated zone	,	1	Р	3	D	Non-circular	NR	NR_	NR	NR	Shape representative of pond (rectangular)
Ingestion, Dietary Fruit, vegetable, and					166						Pathway suppressed for
grain consumption rate Leafy vegetable	kg/yr	160	М, В_	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
consumption	kg/yr	14	М, В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Milk consumption Meat and poultry	L/yr	92	М, В	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
consumption	kg/yr	63	M, B	3	NA	Not used	NR	NR NR	NR	NR	industrial worker scenario Pathway suppressed for
Fish consumption rate Other seafood	kg/yr	5.4	M, B	3	NA	Not used	NR_	NR	NR	NR	industrial worker scenario Pathway suppressed for
consumption rate	kg/yr	0.9	M, B	3	NA .	Not used	NR	NR	NR	NR	industrial worker scenario RESRAD Manual, Table 2.3
Soil ingestion rate	g/yr	36.5	м, в	2	D	36.5	NR	NR_	NR	NR	based on EPA suggested value of 100 mg/day
Drinking water intake	L/yr	510	М, В	2	D	478.5	NR	NR	NR	NR	NUREG/CR-5512, V3 Table 6.87

Parameter Contamination fraction of drinking water Contamination fraction of household water	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Contamination fraction of drinking water Contamination fraction of	Units		Type ¹	Briority ²	3		i arameter	i arameter	I didilible		
Contamination fraction of drinking water Contamination fraction of		Doragit			l reatment*	Distribution ⁴	1	2	3	4	Basis
drinking water Contamination fraction of				FIIOTILY	Heatment	Distribution	'				RESRAD default, all drinking
drinking water Contamination fraction of	1										water assumed from
Contamination fraction of	- (1	B, P	3	NA	1	NR	NR	NR	NR	groundwater
household water											Pathway suppressed for
I TOUGHTON HORE	- 1	1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of											Pathway suppressed for
livestock water		1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of											Pathway suppressed for
irrigation water		1	В, Р	3	NA	Not used	NR NR	NR	NR	NR	industrial worker scenario
Contamination fraction of											Pathway suppressed for
aquatic food		0.5	B, P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of plant food		-1	امما			\$1	NO				Pathway suppressed for
Contamination fraction of			B, P	3	NA .	Not used	NR	NR	NR	NR	industrial worker scenario
meat		-1	В,Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of			Б, Г		INA	Not used	INIT	INT	IND_	1917	Pathway suppressed for
milk	. 1	-1	B, P	3	NΑ	Not used	NR	NR	NR	NR	industrial worker scenario
Ingestion, Non-Dietary			G CHANGE			1401 0000				- 1111	and delian worker cooking
Livestock fodder intake			- HONGGOOD - H		TO THE BOOK OF THE PARTY.	Magnetic Control of the Control of t		Control of the contro			Pathway suppressed for
rate for meat	kg/d	68	м	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Livestock fodder intake											Pathway suppressed for
rate for milk	kg/d	55	М	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Livestock water intake											Pathway suppressed for
rate for meat	L/d	50	M	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Livestock water intake			_								Pathway suppressed for
rate for milk	L/d	160	M	3	NA	Not used	NR NR	NR	NR	NR	industrial worker scenario
l.,											Pathway suppressed for
Livestock soil intake	kg/d	0.5	М	3	NA NA	Not used	NR	NR	NR	NR_	industrial worker scenario
Mass loading for foliar	g/m³	1.00E-04	Р	3	NA	Not used	NR	110	NO	ND	Pathway suppressed for
deposition	9/111	1.00=-04	<u> </u>	- 3	INA	Not used	INFA	NR	NR	NR	industrial worker scenario NUREG/CR-6697 Att. C,
Depth of soil mixing layer	m	0.15	Р	2	s	Triangular	0	0.15	0.6	_	Section 3.12
Depart of son mixing layer		0.13				mangulai		0.13	0.0		Pathway suppressed for
Depth of roots	m	0.9	Р		NA	Not used	NR	NR	NR	NR	industrial worker scenario
			_					,			RESRAD default, all drinking
Drinking water fraction	1										water assumed from
from groundwater	- 1	1	В, Р	3	ם	1	NR	NR	NR	NR	groundwater
T T											
Household water fraction					ļ ,						Parameter applies to Radon
from groundwater		11	B, P	3	NA	Not used	NR	NR	NR	NR_	only.
Livestock water fraction	1			_							Pathway suppressed for
from groundwater		1	B, P	3	NA	Not used	NR	NR	NR	NR_	industrial worker scenario
Irrigation fraction from			B, P	_		Nakaad		AUD.	410	ND	Pathway suppressed for
groundwater Wet weight crop yield for		1	В, Р	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
non-leafy plants	kg/m²	0.7	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Wet weight crop yield for	Ng/III	0.7				1401 0360	INIT	1417	IND	- NE	Pathway suppressed for
leafy plants	kg/m²	1.5	Р	3	NA	Not used	NA	NR	NR	NR	industrial worker scenario
Wet weight crop yield for					7.1.			- 200			Pathway suppressed for
fodder	kg/m²	1.1	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Growing season for non-											Pathway suppressed for
leafy vegetables	yr	0.17	Р	3	NA.	Not used	NR	NR	NR	NR	industrial worker scenario
Growing season for leafy											Pathway suppressed for
vegetables	yr	0.25	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Growing season for	}										Pathway suppressed for
fodder	yr	0.08	P	3	NA	Not used_	NR	NR	NR		industrial worker scenario
Translocation factor for											Pathway suppressed for
non-leafy vegetables		0.1	Р	3	NA	Not used	NR	NR	<u>NR</u>	NR	industrial worker scenario
Translocation factor for		4	Р			Markingal	ND			ND	Pathway suppressed for
leafy vegetables Translocation factor for		1		3	NA	Not used	NŘ	NR	NR	NR	industrial worker scenario Pathway suppressed for
fodder	-	1	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Dry foliar interception		<u>-</u> _			140	1401 0300		- MII	1411		industrial Worker Scenario
fraction for non-leafy				[Ì		Pathway suppressed for
vegetables		0.25	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ory foliar interception								,			
fraction for leafy											Pathway suppressed for
vegetables	-	0.25	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Dry foliar interception											Pathway suppressed for
fraction for fodder		0.25	Р	_3_	NA _	Not used	NR	NR	NR	NR	industrial worker scenario
Wet foliar interception											La
		0.25	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario

											
		DECEMB				Value or	Distribution	Distribution	Distribution	Distribution	
Paramatar	Unita	RESRAD	Time!	Priority ²	Treatment ³	Distribution ⁴	Parameter 1	Parameter 2	Parameter 3	Parameter	Pagia
Parameter Wet foliar interception	Units	Default	Type ¹	Priority	Treatment	Distribution	!		3	4	Basis
fraction for leafy											Pathway suppressed for
vegetables	_	0.25	Р	2	NA .	Not used	NR :	NR	NR	NR	industrial worker scenario
Wet foliar interception											Pathway suppressed for
fraction for fodder	-	0.25	Р	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Weathering removal											Pathway suppressed for
constant for vegetation	1/yr	20	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Special Radionuclides (C-	14)		N. N.						20 S		284
C-12 concentration in											Applicable for C-14 exposure
water	g/cm ³	2.00E-05	P	3	NA NA	Not used	NR	NR	NR	NR	only
C-12 concentration in	,										Applicable for C-14 exposure
contaminated soil	g/g	3.00E-02	Р	3	NA .	Not used	NR	NR	NR	NR	only
Fraction of vegetation carbon from soil		2.00E-02	þ	3	NA NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
Fraction of vegetation		2.00E-02	-	-3-	INA.	Not useu	INIT	INF	INIT	IND.	Applicable for C-14 exposure
carbon from air	_	0.98	P	3	NA !	Not used	NR	NR	NR	NR	lonly
C⊞14 evasion layer		0.90			130	1401 0360	INI	INI	1913	MIL	Applicable for C-14 exposure
thickness in soil	m .	0.3	Р	2	NA .	Not used	NR	NR	NR	NR	lonly
C-14 evasion flux rate										- 1111	Applicable for C-14 exposure
from soil	1/s	7.00E-07	Р	3	NA	Not used	NR	NR	NR	NR	only
C-12 evasion flux rate											Applicable for C-14 exposure
from soil	1/s	1.00E-10	Р	3	NA	Not used	NR	NR	NR	NR	only
Fraction of grain in beef							-				Applicable for C-14 exposure
cattle feed		0.8	В	3	NA NA	Not used	NR	NB	NR	NR	only
Fraction of grain in milk		_									Applicable for C-14 exposure
cow feed		0.2	В	3	NA	Not used	NR	NR	NR	NR	only
Storage Times of Contami	nated Foodstu	ffs	7 255					/38			
Storage time for fruits,											
non-leafy vegetables, and											Pathway suppressed for
grain	d	14	В	3	NA	Not used	NA	NB	NR	NR	industrial worker scenario Pathway suppressed for
Storage time for leafy vegetables	d	1	В	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
vegetables	u		_ <u> </u>		INA	Not used	NIT	Nn	INH	NA	Pathway suppressed for
Storage time for milk	d	1	В	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Giorago unio 101 min		-				1101 0000		1,111		- 1111	Pathway suppressed for
Storage time for meat	d	20	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
										1211	Pathway suppressed for
Storage time for fish	d	7	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for							,				Pathway suppressed for
crustacea and mollusks	d	7	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for well											Pathway suppressed for
water	d	1	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for surface				_							Pathway suppressed for
water	d	11	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for livestock	_ '	45		_		Nina	NG	NO.	ND		Pathway suppressed for
fodder	d	45	В	3	NA	Not used	NR	NR	NR	NR_	industrial worker scenario
Radon Thickness of building	A 100 March 1980	(C)		×30000000000		90 90 CC 10125 CC 800000	200000000000000000000000000000000000000				Applicable for Radon exposure
foundation	m	0.15	Р	3	NA	Not used	NR	NR	NR	NR	only
Bulk density building		0.13		<u> </u>	- IVA	1401 0300	1111		1313	INIT	Applicable for Radon exposure
foundation	g/m³	2.4	Р	3	NA	Not used	NR	NR	NR	NR	ioniv
Total porosity of cover											Applicable for Radon exposure
material	-	0.4	Р	3	NA	Not used	NR	NR	NR	NR	only
Total porosity of building		1									Applicable for Radon exposure
foundation	-	0.1	_ P	3	NA	Not used	NR	NR	NR	NR	only
Volumetric water content								['		Applicable for Radon exposure
of cover material		0.05	Р	3	NA	Not used	NR	NR	NR	NR	only
I]]]
Volumetric water content			ا ۔	_	l						Applicable for Radon exposure
of building foundation	<u> </u>	0.03	Р	3	NA NA	Not used	NR	NR	NR	NR	only
Radon diffusion]]			Analisable for D. Harris
coefficient in cover		2.005.00			NA	Notreed	ND.	N.D.	ND	N.C.	Applicable for Radon exposure
material Radon diffusion	m/s	2.00E-06	P	3	NA	Not used	NR	NR	NR	NR	only
coefficient in foundation					,	ļ ,					Applicable for Radon exposure
material	m/s	3.00E-07	Р	3	NA	Not used	NR	NR	NR	NR	only
Radon diffusion	11/13	0.00E-07			14/5	1101 0300	140	INIT	ixu	1417	Vinj.
coefficient in	}					1			1		Applicable for Radon exposure
contaminated zone soil	m/s	2.00E-06	Р	3	NA	Not used	NR	NR	NR	NR	only
Radon vertical dimension		2.002.00		_ <u> </u>					-,11	1411	Applicable for Radon exposure
of mixing	m	2	Р	3	NA	Not used	NR	NR	NR	NR	only
Average building air					<u> </u>						Applicable for Radon exposure
exchange rate	1/hr	0.5	P, B	3	NA	Not used	NR	NR	NR	NR	only

	,						Distribution	Distribustion	Dietribution	Disasila attan	
}	}	RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	}
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
T didilleter	Office	Delault	туре	Filotity	Healthent	Distribution	· ·				Applicable for Radon exposure
Building (room) height	m I	2.5	Р	3	NA	Not used	NR	NR '	NR	NR	only
Building interior area											Applicable for Radon exposure
factor	,	0	Р	3	NA	Not used	NR	NR .	NR	NR	only
Building depth below											Applicable for Radon exposure
ground surface	m	-1	Р	3	NA NA	Not used	NR	NR	NR	NR	only
Radon-222 emanation	ł		_					1			Applicable for Radon exposure
coefficient		0.25	Р	3	NA	Not used	NR	NR	NR	NR	only
Radon-220 emanation coefficient		0.45	P			81-4a				NO.	Applicable for Radon exposure
	-	0.15		3	NA	Not used	NR	NR	NR	NR	only
Risk Conversion Factors	(right/ur)/	Nuclide		2000							
Slope factor ~ external	(risk/yr)/ (pCi/g)	specific	м	3	NA	Not used	NR	NR	NR	NR	RESRAD Default
Siope factor - external	(pc/g/	Nuclide	- 101		NA.	1101 0360	INIT	NA	IND	NB	TESTAD Delault
Slope factor - inhalation	risk/pCi	specific	м	3	NA	Not used	NR	NR	NR	NR	RESRAD Default
Olopo laotor Illinaianon	11010 / 01	Nuclide			- '\"	1101 0500			.,,,,		T LEGITAL BOILDIN
Slope factor - ingestion	risk/pCi	specific	M	3	NA	Not used	NR	NR	NR	NR	RESRAD Default
Inhalation dose conversion				2000							2.00
Ac-227	mrem/pCi	6.7	М	3	D	6.7	NR	NR	NR	NR	FGR-11, RESRAD Library
Pa-231	mrem/pCi	1.28	М	3	D	1.28	NR	NR	NR	NR	FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.0136	М	3	D	0.0136	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00858	М	3	D	0.00858	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00477	М	3	D	0.00477	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-228	mrem/pCi	0.342	М	3	D	0.342	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-230	mrem/pCi	0.326	М	3	D	0.326	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-232	mrem/pCi	1.64	М	3	D	1.64	NR	NR	NR	NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.132	М	3	D	0.132	NR	NR	NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.123	M	3_	D	0.123	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.125	M	3	Б	0.125	NR	NR	NR	NR	FGR-11, RESRAD Library
U-238	mrem/pCi	0.118	М	3	D	0.118	NR	NR	NR ·	NR	FGR-11, RESRAD Library
Ingestion Dose Donversio Ac-227		0.0141	М	3	-	0.0141	000000.75	NR	7.0		FCD 11 BECDAD Library
Pa-231	mrem/pCi mrem/pCi	0.0141	M	3	D D	0.0141	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.00537	M	3	D D	0.0106	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00337	M	3	D D	0.00337	NR	NR	NR NR	NR	FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00132	М	3	- 5 -	0.00132	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-228	mrem/pCi	0.000396	M	3	<u> </u>	0.000396	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-230	mrem/pCi	0.000548	M	3	D	0.000548	NB	NR	NR	NR	FGR-11, RESRAD Library
Th-232	mrem/pCi	0.00273	М	3	D	0.00273	NR	NR	NR	NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.000283	М	3	D	0.000283	NR	NR	NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.000266	M	3	D	0.000266	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.000269	М	3	D	0.000269	NR	NR	NR	NR	FGR-11, RESRAD Library
U-238	mrem/pCi	0.000255	М	3	D	0.000255	NR	NR	NR	NR	FGR-11, RESRAD Library
Plant Transfer Factors (pC	i/g plant (wet)]	[pCi/g soil (dr)	/)]2/3				and the second		79.00		
											Pathway suppressed for
Ac-227		0.0025	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	i i		_								Pathway suppressed for
Pa-231	·	0.01	Р	1	NA	Not used	NR	NR	NR NR	NR	industrial worker scenario
DL 040	}	201	P				4/5	N/D		4/5	Pathway suppressed for
Pb-210	-	0.01	P-	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-226		0.04	P	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
11a-220	 	0.04		<u>'</u>		Not used	INIT	INFA	INT	ININ	Pathway suppressed for
Ra-228		0.04	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	 	<u> </u>	-					.,,,	.,,,,,		Pathway suppressed for
Th-228		0.001	P	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
		2.201					,		.,,,,	,,	Pathway suppressed for
Th-230	- '	0.001	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
											Pathway suppressed for
Th-232		0.001	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
											Pathway suppressed for
U-234	-	0.0025	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	[Pathway suppressed for
U-235	-	0.0025	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
			_								Pathway suppressed for
U-236		0.0025	P	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(0.000	_		.,.						Pathway suppressed for
U-238	-	0.0025	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Meat Transfer Factor	(-C:())/										(0-1)
A0 227	(pCi/kg)/	0.00000	Р		N/A	Notured	l ME	NO	,,,,,,	NIPS	Pathway suppressed for
Ac-227	(pCi/d)	0.00002	 -	2	NA	Not used	NR	NR	NR	NR	Industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/d)	0.005	Р	2	NA	Not used	No	ND	NIE	Nin	Pathway suppressed for industrial worker scenario
1 4-231	(pCi/kg)/	0.005		٤	IVA	ixot asea	NR	NR	_NR	NR	Pathway suppressed for
Pb-210	(pCi/d)	0.0008	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
P = E10	(50,0)	0.0000	<u> </u>		14/7	,10. 0000	1411	7411	1411	1411	

		RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units (pCi/kg)/	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis Pathway suppressed for
Ra-226	(pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/d)	0.001	Р	2	. NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-228	(pCi/d) (pCi/kg)/	0.0001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-230	(pCi/d) (pCi/kg)/	0.0001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-232	(pCi/d)	0.0001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
U-234	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	l NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-235	(pCi/d) (pCi/kg)/	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-236	(pCi/d) (pCi/kg)/	0.00034	P	2	NA .	Not used	NR	NR	NR	NR NR	industrial worker scenario Pathway suppressed for
U-238	(pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Milk Transfer Factor	(pCi/L)/							39.6			Pathway suppressed for
Ac-227	(pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pa-231	(ρCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/L)/ (pCi/d)	0.0003	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/		· · · -								Pathway suppressed for
Ra-226	(pCi/d) (pCi/L)/	0.001	Р_	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Ra-228	(pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Th-228	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-230	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/										Pathway suppressed for
Th-232	(pCi/d) (pCi/L)/	0.000005	Р	2	NA	Not used	NR	NR	NR	NR NR	industrial worker scenario Pathway suppressed for
U-234	(pCi/d)	0.0006	Р	2	NA	Not used	NR	NR	NR	NR_	industrial worker scenario
U-235	(pCi/L)/ (pCi/d)	0.0006	Р	2_	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-236	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/						-				Pathway suppressed for
U-238 Bioaccumulation factor to	(pCi/d) or fish	0.0006	P	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/	1-	Р								Pathway suppressed for
Ac-227	(pCi/L) (pCi/kg)/	15		2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Pa-231	(pCi/L)	10	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Pb-210	(pCi/L)	300	P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/L)	50	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/L)	50	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/	30			NA .	Not used	ND_	INFL	INT	NIT	Pathway suppressed for
Th-228	(pCi/kg)/	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-230	(pCi/L)	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Th-232	(pCi/kg)/ (pCi/L)	100	Ρ	2_	NA NA	Not used	NR	NR	NR	NR_	Pathway suppressed for industrial worker scenario
U-234	(pCi/kg)/ (pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NŘ	Pathway suppressed for industrial worker scenario
	(pCi/kg)/								-		Pathway suppressed for
U-235	(pCi/L) (pCi/kg)/	10	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-236	(pCi/L) (pCi/kg)/	10	Р	2	NA NA	Not used	NR_	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-238	(pCi/L)	10	P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Bioaccumulation factor for	r crustacea and (pCi/kg)/	mollusks							100		Pathway suppressed for
Ac-227	(pCi/L)	1000	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/L)	110	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/		Р								Pathway suppressed for
Pb-210	(pCi/L)	100	<u> </u>	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario

	1	RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type1	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
, aramotor	(pCi/kg)/	Doigan	1,750	1 1.07.1.9	TTO GRANTONIA	Biotribution					Pathway suppressed for
Ra-226	(pCi/L)	250	P	3	NA .	Not used	NR .	NR .	NR .	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Ra-228	(pCi/L)	250	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-228	(pCi/L)	500	_ P	3	NA	Not used	NR _	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-230	(pCi/L)	500	Р	3	NA	Not used	NR_	NR	NR	NR	industrial worker scenario
	(pCi/kg)/						i				Pathway suppressed for
Th-232	(pCi/L)	500	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-234	(pCi/L)	60	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-235	(pCi/L)	60	P	3	NA	Not used	NR NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		1								Pathway suppressed for
U-236	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		· -	[.]						_	Pathway suppressed for
U-238	(pCi/L)	60	Р	3	NA_	Not used	NR	NR	NR	NR	industrial worker scenario
Graphics Parameters			100						7.4		
			ŀ								
Nils and a section of the	l										Value greater than default
Number of points	ļ <u> </u>	32	NA	NA	NA NA	1024	NR	NR	NR		provides more evaluation points
Spacing	-	Log	NA	NA	NA	Log	NR	NR	NR	NR	RESRAD Default
Time Integration Parame	nters										
Maximum number of	1]	1			47					DE0040 5 ()
points for dose		17	NA NA	NA	NA	17	NR NR	NR	NR	NR	RESRAD Default

Notes:

¹P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A, Table 2.1)

⁴Distribution Statistical Parameters:

Lognormal-n: 1 = mean, 2 = standard deviation

Bounded lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit Truncated lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower quantile, 4 = upper quantile

Bounded normal: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit

Beta: 1 = minimum, 2 = maximum, 3 = P-value, 4 = Q-value

Triangular: 1 = minimum, 2 = mode (most likely), 3 = maximum

Uniform: 1 = minimum, 2 = maximum

Continuous logarithmic: RESRAD default statistical parameters

Continuous linear: RESRAD default statistical parameters

NR = not required

Additional Sensitivity Analysis Data:

Sampling Technique = Latin Hypercube
Random Seed = 1000

Number of observations = 300 Number of repetitions = 1

Grouping of Correlations = correlated or uncorrelated

 $^{^2}$ 1 = high priority, 2 = medium priority, 3 = low priority (NUREG/CR-6697, Att. B, Table 4.2)

³D = deterministic, S = stochastic

Table B-2 Honeywell Metropolis Works Pond B Dose Assessment Industrial Worker Scenario Source Configuration Summary

		5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
	Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
	Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area	CZ Area ⁽³⁾	Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m ²)	(m ²)	(m)	(m)	(m)	(m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b – Ponds B, C, D, and E" provided in Appendix A

⁽²⁾ Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond dimensions provided in Section 1.2 of the Andrews Engineering "Calcium Fluoride Sludge Pond. Sampling Report"

Table B-3
Honeywell Metropolis Works
Pond B Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

	Radion	uclide Concentration	ı (pCi/g)
Radionuclide	Average Dry	Corrected for 5% Bulking Factor	Corrected for % Solids
Protactinium 231	0.08	0.07	0.04
Radium 226	0.77	0.73	0.42
Thorium 228	0.15	0.15	0.08
Thorium 230	4.23	4.02	2.30
Thorium 232	0.13	0.12	0.07
Uranium 234	127.98	121.58	69.50
Uranium 235	8.24	7.83	4.48
Uranium 236	3.43	3.25	1.86
Uranium 238	131.84	125.25	71.59

Pond Solids: 57.16%

Table B-4 Honeywell Metropolis Works Pond B Dose Assessment Industrial Worker Scenario Hydraulic Conductivity of Silty Clay

Pressure	Hydraulic Conductivity	Hydraulic Conductivity
(psf)	(cm/sec)	(m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table B-5
Honeywell Metropolis Works
Pond B Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

		Bulk	Average
	• •	Density	Bulk Density
Pond	Sample ID	(g/ml)	(g/ml)
В	B-18 Lower	1.6	-
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В	-	-	1.575
С	C-2	1.6	-
С	C-5	1.7	-
С	C-19 Lower	1.6	-
С	C-19 Upper	1.5	-
С	-	-	1.6
D	D-8 Lower	1.5	-
D	D-8 Upper	1.6	-
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	-
D	D-17 Lower	1.5	-
D	D-17 Upper	1.6	-
D	D-26 Lower	1.8	-
D	D-26 Upper	1.9	-
D	-	-	1.6
Е	E-65 Lower	1.3	-
E	E-65 Upper	1.5	-
E	E-80 Lower	1.5	-
E	E-80 Upper	1.5	-
Ē	E-97 Lower	1.2	-
E	E-97 Upper	1.1	-
E	E-103 Lower	1.7	-
E	E-103 Upper	1.7	-
Ε	-	-	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX C

Pond C Probabilistic Sensitivity Analysis Input Summary

			ı——		,		Diatribta-	Distribution	Diotribution	Distribution	
ł		RESRAD	ł	}		Value or	Distribution Parameter	Parameter	Distribution Parameter	Parameter	ľ
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Contaminated Zone	£79~102.50	10 12 17 18 18 18 18 18 18 18 18 18 18 18 18 18		PARKINE	SENTES	1860 18 CYS.A.S.	25,85033	10000000000	13 Y 18 10 12 1	Magazini (19	NATIONAL PROPERTY.
Area of contaminated											
zone	m²	10000	Р	2	D	4,000	NR	NR	NR	NR	See Table C-2.
Thickness of			P			0.704	١.,_				See Table C-2.
contaminated zone	m	2	<u> </u>	2	D	2.724	NR	NR	NR	NR	Length of longest side of
Length parallel to the		i									contaminated zone. See Table
aguifer flow	m '	100	Р	2	D D	94	NR	NR	NR	NR	C-2.
Basic Radiation Dose											Unrestricted release criteria in
Limit	mrem/year	30	Р	3	D	25	NR	NR	NR	NR	10 CFR 20.1402
Time since placement	yr	0	Р	3	D	0	NR	NR	NR	NR.	RESRAD default
Times for calculations Times for calculations	yr	3	P	3	D D	3	NR NR	NR NR	NR NR	NR NR	RESRAD default
Times for calculations	yr	10	P	3	 0	10	NR	NA	NR	NR NR	RESRAD default
Times for calculations	yr	30	P	3	D –	30	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	100	Р	3	D	100	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	300	Р	3	D	300	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	1000	P	3	D	1000	NR	NR	NR	NR	RESRAD default
Initial Principle Radionuclic			N. 2280	KWEELS	6-6 3 0.100	ACRES SEALS	MASS CONTRACT	\$7.4 PM 2.7%	CONCRE	225.70.2000	88. 612. 1802.
Soil: Ac-227	pCi/g	0	P	2	D	0	NR	NR	NR	NR	See Table C-3
Soil: Pa-231 Soil: Pb-210	pCi/g pCi/g	0	P	2	D D	0.13	NR NR	NR NR	NR NR	NR NR	See Table C-3 See Table C-3
Soil: Ra-226	oCi/a	0	P	2	D D	0.31	NR NR	NR NR	NR	NR	See Table C-3
Soil: Ra-228	pCi/g	- 0	P	2	D	0.31	NR	NR	NR	NR.	See Table C-3
Soil: Th-228	pCi/g	ō	P	2	0	0.05	NR	NR	NR	NR	See Table C-3
Soil: Th-230	pCi/g	0	P	2	D	1.56	NR	NR	NR	NR	See Table C-3
Soil: Th-232	pCi/g	0_	Р	2	D	0.05	NR	NR	NA	NA	See Table C-3
Soil: U-234	pCi/g	0	Р	2	D	136.83	NR	NR	NR	NR	See Table C-3
Soil: U-235	pCi/g	0	Р	2	D	7.31	NR	NR	NR	NR	See Table C-3
Soil: U-236	ρCi/g	0	Р	2	D	3.27	NR_	NR	NR	NR	See Table C-3
Soil: U-238	pCi/g	0	Р	2	D	141.58	NR	NR	NR	NR	See Table C-3 Not used for calculation of
Groundwater: Ac-227	pCi/L	o	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Groundwaldi. Fio 227	- POVE	<u>*</u>	<u> </u>	 		1401.0300	1311	- '''	1311		Not used for calculation of
Groundwater: Pa-231	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Pb-210	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
			_								Not used for calculation of
Groundwater: Ra-226	pCi/L	0	P	3	NA .	Not used	NR NR	NR_	NŘ	NR	distribution coefficients
Groundwater: Ra-228	pCi/L	0	Р	3	NA NA	Not used	l NR	NR ·	NR	NR	Not used for calculation of distribution coefficients
Giodilowaler. Ha-226	POVE			-	170	Not used	IND	INA	INIT	ND.	Not used for calculation of
Groundwater: Th-228	pCi/L	o	ρ	3	NA .	Not used	NR	NR	NR	NR	distribution coefficients
					<u> </u>						Not used for calculation of
Groundwater: Th-230	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
			_								Not used for calculation of
Groundwater: Th-232	pCi/L	0	Р	3	NA.	Not used	NR	NR NR	NR	NR	distribution coefficients
Croundwoter II 224	-C://	0	Р	١ ,		Netwood		ND.	NO	\ \n	Not used for calculation of
Groundwater: U-234	pCi/L	<u> </u>	<u> </u>	3	NA NA	Not used_	NR NR	NR_	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-235	pCi/L	0	Р	3	NA NA	Not used	NR	NA	NR	NR	distribution coefficients
0.00.00.00.00.00			 	<u>~</u>	- · · · · ·	110.000	- · · · · ·	11.1	- / (1)	- '''	Not used for calculation of
Groundwater: U-236	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: U-238	pCi/L	0	P	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Cover and Contaminated 2			\$1000 C		WALL SOLVE		2000	380 USERVI 1/40	£555478.6		
Cover depth	m	0	Р	2	D	1.51	NR	NR	NR	NR	See Table C-2 NUREG/CR-6697 Att. C, Table
Density of cover material	g/cm ³	1.5	Р	1	s	Bounded Normal	1.696	0.1855	1.123	2.269	3.1-1, Silty Clay
Donaity of cover material	9/0111	1.3	 -	- '-		140111141	1.090	0.1033	1.123	2.209	3.1-1, Sity Clay
											Uniform distribution derived from NUREG/CR-6697 Att.C,
ĺ	'		ĺ	1			[Section 3.8 for permanent
		'		İ							pasture with maximum 5%
1	'			[[slope. Design maximum
Cover erosion rate	m/yr	0.001	P,B	2	S	Uniform	0.00003	0.00018		<u> </u>	slope is 4%
Density of contaminated									· <u>-</u>		0
zone	g/cm³	1.5	Р_	11	D	1.6	NR	NR	NR	NR	See Table C-5
							·				Uniform distribution derived
			}	1		1					from NUREG/CR-6697 Att.C.
				ŀ							Section 3.8 for permanent
Contaminated zone			}		_	l					pasture with assumed 2%
erosion rate	m/yr	0.001	P,B	2	S	Uniform	0.00001	0.00006			slope after cover erosion.

Parameter Units	
Parameter	
Contaminated zone field	ės
Contaminated zone field	
Contaminated zone Cont	
Contaminated zone	
hydraulic conductivity my/r 10 P 2 D 1.6 NR NR NR NR August 57, 2009 Conteminated one b parameter - 5.3 P 2 Sounded lognormal-in 0.305 0.258 0.61 3.01 3.5-1; Loamy San Humidity in air gm² 8 P 3 NA Not used NR NR NR NR This parameter or Number of This parameter or This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of This parameter or Number of Numbe	issipation test: itu Pond E
Contaminated zone b parameter - 5.3 P 2 S Bounded parameter - 5.3 P 2 S lognomein 0.305 0.258 0.61 3.01 3.51 L.amy Sparameter myrameter myra	resting LC,
parameter -	Att C Table
Humidity in air	d
Average annual wind speed	in soil
Average annual wind speed	Att. C,
Average annual wind speed	
Percepitation rate	AA),7.4 mph a.gov/oa/clima
Precipitation rate	
Irrigation rate	
Irrigation mode	industrial
Irrigation mode	Method is
Runoff coefficient	
Runoff coefficient -	
Reathy stream or pond m² 1.00E+06 P 3 D 277817 NR NR NR NR Appendix A	
Computation - 1.00E-03 NA 3 D 1.00E-03 NR NR NR NR RESRAD default	ned. See
Saturated Zone Hydrological Data Saturated Zone Great Saturated Zone Great Saturated Zone Great Saturated Zone Great Saturated Zone Satur	
Density of saturated zone g/cm³ 1.5 P 1 S Bounded Normal 1.5105 0.159 1.019 2.002 3.1-1, Sand NUREG/CR-6697 Saturated zone total Dorosity - 0.4 P 1 S Normal 0.43 0.06 0.2446 0.6154 3.2-1, Sand NUREG/CR-6697 Normal 0.43 0.06 0.2446 0.6154 3.2-1, Sand NUREG/CR-6697 Normal 0.393 0.061 0.195 0.572 3.3-1, Sand NUREG/CR-6697 NORMAL	Cultura November
Saturated zone total porosity	
Dorosity	
Saturated zone effective	Att. C, Table
Saturated zone field capacity - 0.2 P 3 D 0.2 NR NR NR NR NR RESRAD default	Att. C, Table
Capacity	
Saturated zone hydraulic conductivity	
Conductivity	Att C Table
Section Sheet A-A El. 298.54/ 4320 ft	71111 0, 14010
Saturated zone soil-specific b parameter -	ı' (Eİ. 319.24 –
Specific b parameter -	Att. C. Table
Well-pump intake depth (below water table) m 10 P 2 D 105 NR NR NR NR NR NR NR NR NR ND Model is used in contaminated area of than 1,000 m²) per mass balance - ND P 3 D ND NR NR NR NR NR NR NR NR NR Users Manual Section of the contaminated area o	
Well-pump intake depth (below water table) m 10 P 2 D 105 NR NR NR NR NR NR NR ND Model: contaminated area than 1,000 m²) per mass balance ND P 3 D ND NR	
Well pumping rate m³/yr 250 B, P 2 D Not used NR NR NR NR non-dispersion mo	as (e.g. more r RESRAD tion E.3.1.
Andrews Engineer 91-135 cross section Number of unsaturated zones - 1 P 3 D 5 NR NR NR NR NR See Appendix A.	on Sheet uary 2007.
Unsaturated zone 1 Unsaturated zone 1 Unsaturated zone 1 Unsaturated zone 1 Unsaturated zone 1 Unsaturated zone 1 Unsaturated zone 1 Unsaturated zone 1 Unsaturated zone 1	on Sheet
Clay) m 4 P 1 D 6.86 NR NR NR NR See Appendix A. Unsaturated zone 1 soil Bounded NUREG/CR-6697 NUREG/CR-66	Att. C. Table
density g/cm³ 1.5 P 2 S Normal 1.696 0.1855 1.123 2.269 3.1-1, Silty Clay	
Unsaturated zone 1 total Bounded NUREG/CR-6697 Dorosity - 0.4 P 2 S Normal 0.36 0.07 0.144 0.576 3.2-1, Silty Clay	Att. C, Table

			, ,					F 60	D	B2 4 2 2 2	r
]		RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Unsaturated zone 1	00	Boilden	1,750		11001011	Bounded	<u> </u>			·	NUREG/CR-6697 Att. C, Table
effective porosity	-	0.2	Р	2	S	Normal	0.289	0.0735	0.0623	0.517	3.3-1, Silty Clay
Unsaturated zone 1 field capacity	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 1 hydraulic conductivity	m/yr	10	Р	2	D	126	NR	NR	NR	NR	See Table C-4
Unsaturated zone 1 soil- specific b parameter	-	5.3	Р	2	s	Bounded lognormal-n	2.29	0.259	4,43	22	NUREG/CR-6697 Att. C, Table 3.5-1, Silty Clay
Unsaturated zone 2 thickness (Sandy Silt/Silty											Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
Sand)	m	4	Р	1	D	1.71	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 2 soil density	g/cm³	1.5	Р	2	s	Bounded Normal	1.5635	0.2385	0.827	2.3	NUREG/CR-6697 Att. C, Table 3.1-1, Loamy Sand
Unsaturated zone 2 total		2.4	,			Bounded	0.44	0.00	0.4040	0.0004	NUREG/CR-6697 Att. C, Table
porosity Unsaturated zone 2		0.4	Р	2	S	Normal Bounded	0.41	0.09	0.1319	0.6881	3.2-1, Loamy Sand NUREG/CR-6697 Att. C, Table
effective porosity Unsaturated zone 2 field	-	0.2	Р	2	s	Normal	0.353	0.0913	0.0711	0.635	3.3-1, Loamy Sand
capacity	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 2 hydraulic conductivity	m/yr	10	Р	2	s	Beta	12.3	4230	0.7992	1.91	NUREG/CR-6697 Att. C, Table 3.4-1, Loamy Sand
Tryoraulic conductivity	11491	,,,			<u>_</u>	56.14	74.0	1200	0.7502		o.v i, codiny odira
Unsaturated zone 2 soil- specific b parameter	-	5.3	Р	2	s	Bounded lognormal-n	0.305	0.258	0.61	3.01	NUREG/CR-6697 Att. C, Table 3.5-1, Loamy Sand
Unsaturated zone 3											Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
thickness (Sand)	m	4	Р	1	D	1.71	NR	NR	NA	NR	See Appendix A.
Unsaturated zone 3 soil			_		_	Bounded					NUREG/CR-6697 Att. C, Table
density Unsaturated zone 3 total	g/cm ³	1.5	Р	2	S	Normal Bounded	1.5105	0.159	1.019	2.002	3.1-1, Sand NUREG/CR-6697 Att. C, Table
porosity	_	0.4	Р	2	s	Normal	0.43	0.06	0.2446	0.6154	3.2-1, Sand
Unsaturated zone 3 effective porosity	_	0.2	Р	2	s	Bounded Normal	0.383	0.061	0.195	0.572	NUREG/CR-6697 Att. C, Table 3.3-1, Sand
Unsaturated zone 3 field	· · · · · ·	0.2		-		Homai	0.000	0.001	0.133	0.572	0.0-1, Sand
capacity Unsaturated zone 3	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	Р	2	S	Beta	110	5870	1.398	1.842	3.4-1, Sand
Unsaturated zone 3 soil-						Bounded					NUREG/CR-6697 Att. C, Table
specific b parameter	-	5.3	Р	2	s	lognormal-n	-0.0253	0.216	0.501	1.9	3.5-1, Sand
Unsaturated zone 4 thickness (Sandy Silt/Silty											Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
Sand)	m	4	Р	1	D	4	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 4 soil density	g/cm ³	1.5	Р	2	s	Bounded Normal	1.5635	0.2385	0.827	2.3	NUREG/CR-6697 Att. C, Table 3.1-1, Loamy Sand
Unsaturated zone 4 total porosity	-	0.4	Р	2	S	Bounded Normal	0.41	0.09	0.1319	0.6881	NUREG/CR-6697 Att. C, Table 3.2-1, Loamy Sand
Unsaturated zone 4						Bounded					NUREG/CR-6697 Att. C, Table
effective porosity Unsaturated zone 4 field	-	0.2	P	2	S	Normal	0.353	0.0913	0.0711	0.635	3.3-1, Loamy Sand
capacity		0.2	Ρ	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 4 hydraulic conductivity	m/yr	10	Р	2	s	Beta	12.3	4230	0.7992	1.91	NUREG/CR-6697 Att. C, Table 3.4-1, Loamy Sand
Unsaturated zone 4 soil-						Bounded					NUREG/CR-6697 Att. C, Table
specific b parameter		5.3	Р	2	s	lognormal-n	0.305	0.258	0.61	3.01	3.5-1, Loamy Sand
Unsaturated zone 5	:										Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
thickness (Sand)	m	4	Р	1	D	1.14	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 5 soil density	g/cm ³	1.5	Р	2	s	Bounded Normal	1.5105	0.159	1.019	2.002	NUREG/CR-6697 Att. C, Table 3.1-1, Sand
Unsaturated zone 5 total						Bounded					NUREG/CR-6697 Att. C, Table
porosity Unsaturated zone 5	<u> </u>	0.4	Р	2	S	Normal Bounded	0.43	0.06	0.2446	0.6154	3.2-1, Sand NUREG/CR-6697 Att. C. Table
effective porosity	-	0.2	Р	2	s	Normal	0.383	0.061	0.195	0.572	3.3-1, Sand
Unsaturated zone 5 field capacity	•	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 5 hydraulic conductivity	mhr	10	Р	2	s	Beta	110	5870	1.398	1.842	NUREG/CR-6697 Att. C, Table 3.4-1, Sand
Hydraulic conductivity	m/yr	1 10	لستسا			Dela	,10	3070	1.030	1.042	U.T. I, Gallu

			τ'''				Distribution	Distribution	Distribution	Distribution	· · · · · · · · · · · · · · · · · · ·
	·	RESRAD				Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Unsaturated zone 5 soil- specific b parameter	_	5.3	Р	2	s	Bounded lognormal-n	-0.0253	0.216	0.501	1.9	NUREG/CR-6697 Att. C, Table 3.5-1, Sand
Distribution Coefficients (c	ontaminated, u	nsaturated, a	nd satura	ed zones	midde (1) soft		Water Trans			West present	100 CHANGO CO CO CO CO CO CO CO CO CO CO CO CO CO
Ac-227	cm³/g	20	Р	1	s	Truncated lognormal-n	6.72	3.22	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Pa-231	cm³/g	50	Р	1	s	Truncated lognormal-n	5.94	3.22	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Pb-210	cm³/g	100	Р	1	s	Truncated lognormal-n	7.78	2.76	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Ra-226	cm³/g	70	Р	. 1	s	Truncated lognormal-n	8.17	1.7	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Ra-228	cm³/g	70	Р	1	s	Truncated lognormal-n	8.17	1.7	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Th-228	cm³/g	60000	Р_	1	s	Truncated lognormal-n	8.68	3.62	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Th-230	cm³/g	60000	Р	1	s	Truncated lognormal-n	8.68	3.62	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Th-232	cm³/g	60000	Р	1	s	Truncated lognormal-n	8.68	3.62	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
U-234	cm³/g	50	Р	1	s	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-2
U-235	cm³/g	50	Р	1	S	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-3 NUREG/CR-6697 Att. C.
U-236	cm³/g	50	Р	1	s	Truncated lognormal-n Truncated	4.84	3.13	0.001	0.999	Section 3.9, Table 3.9-4 NUREG/CR-6697 Att. C,
U-23 8	cm ³ /g	50	P	1	s	lognormal-n	4.84	3.13	0.001	0.999	Section 3.9, Table 3.9-5
Transport Factor Options	WATER LAND		755,4487		34 VS. (842		07.459 M/S	200 (2.57 (3.5)	W(3/0/12)	\$\$\$\$\$\$\$\$£55	Garage Color State (STATE)
Leach rate	1/yr	0	Р	3	D	0	NR	NR	NR	NR	RESRAD default, parameter is not used for calculation of distribution coefficients. Value of 0 not used for calculation of distribution coefficients. Value used for Uranium nuclides
Solubility limit	mol/L	0	Р	3	D	2.94E-06	NR	NR	NR	NR	only
Use plant/soil ratio	Check box	Yes/No	NA	3	NA NA	No	NR	NR	NR NR	NR_	RESRAD default, parameter not used for calculation of distribution coefficients.
Occupancy Inhalation rate	m³/yr	8400	M, B	3	D	11400	NR	AUD.	NR	NR	RESRAD Manual, Table 2.3
Mass loading for	111 /yi	8400	М, Б			Continuous	INT	NR	INFI	INFI	NUREG/CR-6697 Att. C,
inhalation	g/m³	0.0001	P,B	2	s	linear					Section 4.6
Exposure duration	yr	30	В	3	D	25	NR	NR .	NR	NR	RESRAD Manual, Table 2.3
Indoor dust filtration factor (shielding factor, inhalation)	<u>-</u>	0.4	P, B	2	S	Uniform	0.15	0.95	-		NUREG/CR-6697 Att. C, Section 7.1
Shielding factor, external gamma	_	0.7	Р	2	s	Bounded lognormal-n	-1.3	0.59	0.044	1	NUREG/CR-6697 Att. C, Section 7.10
Indoor time fraction		0.5	В	3	D	0.17	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Outdoor (on site) time fraction	-	0.25	В	3	D	0.06	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Shape of the contaminated zone	_	1	Р	3	D	Non-circular	NR	NR	NR	NR	Shape representative of pond (rectangular)
Ingestion, Dietary Fruit, vegetable, and	*	enort Karibi	1887 J. J.				SECONOMIA PAR	1 (14 (14 (14 (14 (14 (14 (14 (14 (14 (1	XX-7-3X(8)**		Pathway suppressed for
grain consumption rate	kg/yr	160	М, В	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Leafy vegetable											Pathway suppressed for
consumption	kg/yr	14	М, В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
consumption Milk consumption	kg/yr L/yr	14 92	м, в м, в	3 2	NA NA	Not used	NR NR	NR NR	NR NR		Pathway suppressed for industrial worker scenario
consumption											Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario
consumption Milk consumption Meat and poultry consumption Fish consumption rate	L∕yr	92	м, в	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario
consumption Milk consumption Meat and poultry consumption	L/yr kg/yr	92 63	м, в м, в	2	NA NA	Not used	NR NR	NR NR	NR NR	NR NR NR	Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario
consumption Milk consumption Meat and poultry consumption Fish consumption rate Other seafood	L/yr kg/yr kg/yr	92 63 5.4	M, B M, B	3	NA NA NA	Not used Not used Not used	NR NR NR	NR NR NR	NR NR NR	NR NR NR NR	Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario Pathway suppressed for industrial worker scenario Pathway suppressed for

r 	T	T					Distribution	Distribution	Distribution	Distribution	
		RESRAD				Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
· · · · · · · · · · · · · · · · · · ·		1	<u> </u>								RESRAD default, all drinking
Contamination fraction of											water assumed from
drinking water	<u> </u>	1	B, P	3	NA	1	NR	NR	NR	NR	groundwater
Contamination fraction of		١.	l	_							Pathway suppressed for
household water	<u> </u>	1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of	1	1 1		,	NA	Makusasi	ND		NO		Pathway suppressed for
livestock water Contamination fraction of	<u> </u>	<u> </u>	B, P	3	NA ·	Not used	NR	NR	NR	NR	industrial worker scenario
irrigation water	1 .	1	ВР	3	NA '	Notuced	ND	NO	ND	NO	Pathway suppressed for
Contamination fraction of	 		В, Г	3	INA	Not used	NR	NR	NR	NR	industrial worker scenario
aquatic food		0.5	ВР	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of	<u> </u>				7.0	1101 0000	1377	1411	.,,,,	1313	Pathway suppressed for
plant food	-	-1	B, P	3	NA	Not used	NR	NR :	NR	NR	industrial worker scenario
Contamination fraction of											Pathway suppressed for
meat	-	-1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of						-					Pathway suppressed for
milk	-	-1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ingestion, Non-Dietary	REPRESENTATION OF	96.534	3.0% (A. C.	PSPSSIQUE	04-66-18-04-7	2000 PM 100 C	SOUTH STATE	XXX (00) 19-0 5-1	Salanen.	2000 × 2000	
Livestock fodder intake	164		١ ا	ا ۾ ا							Pathway suppressed for
rate for meat	kg/d	68	М	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Livestock fodder intake rate for milk	kg/d	55	м	3	NA	Maturan		ND		NO	Pathway suppressed for
Livestock water intake	kg/a	35	IVI		INA	Not used	NR	NR	NR	NA	Industrial worker scenario
rate for meat	L∕a	50	м	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Livestock water intake	- 55	30				1101 0300	INIT	1417	MIL	NI	Pathway suppressed for
rate for milk	L∕a	160	м	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
										101	Pathway suppressed for
Livestock soil intake	kg/d	0.5	м	З	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Mass loading for foliar											Pathway suppressed for
deposition	g/m³	1.00E-04	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
		_									NUREG/CR-6697 Att. C,
Depth of soil mixing layer	m	0.15	Р	2	S	Triangular	0	0.15	0.6		Section 3.12
			_	1				[Pathway suppressed for
Depth of roots	m	0.9	Р	1	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Drinking water fraction			i l							i	RESRAD default, all drinking
Drinking water fraction from groundwater		1	В.Р	3	D	1	NR	NR	NR	NŘ	water assumed from
nom groundwater		<u>'</u>	В, г	3	U	'	INF	NH	INH	NH	groundwater
Household water fraction											Parameter applies to Radon
from groundwater	- 1	1	B, P	3	NA	Not used	NR	NR	NA	NR	only.
Livestock water fraction											Pathway suppressed for
from groundwater	-	11	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Irrigation fraction from											Pathway suppressed for
groundwater	-	1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet weight crop yield for	, , 2				[1			Pathway suppressed for
non-leafy plants	kg/m²	0.7	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet weight crop yield for leafy plants	kg/m²	1.5	P	3	NA	Notuced	AUD.	ND			Pathway suppressed for
Wet weight crop yield for	. Kg/m	1.5		3	- NA	Not used	NR	NR	NR	NR	industrial worker scenario
fodder	kg/m²	1.1	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Growing season for non-					- '''	1401 0360	INFI	INIT	NIT	Nn	Pathway suppressed for
leafy vegetables	yr	0.17	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Growing season for leafy						-					Pathway suppressed for
vegetables	yr	0.25	P	3	NA	Not used	NR	NR	NR .	NR	industrial worker scenario
Growing season for											Pathway suppressed for
fodder	yr	0.08	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Translocation factor for					ĺ	·					Pathway suppressed for
non-leafy vegetables	•	0.1	Р	3	NA NA	Not used	NR	NR	NR		industrial worker scenario
Translocation factor for			ا ہا	_	,, l	NI-A.					Pathway suppressed for
leafy vegetables Translocation factor for	· · · · · · · · · · · · · · · · · · ·	1	ρ	3	NA	Not used	NR	NR	NR		industrial worker scenario
fodder		1	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Dry foliar interception		· · · · · · · · · · · · · · · · · · ·				1401 0360	NIT	N/A	IND	IND	industrial worker scenario
fraction for non-leafy								ļ			Pathway suppressed for
vegetables	-	0.25	Р	3	NA	Not used	NR	NR	NR		industrial worker scenario
Dry foliar interception											The state of the s
fraction for leafy				ĺ	1			1			Pathway suppressed for
vegetables	-	0.25	Р	3	NA	Not used	NR	NR	NR	NA	industrial worker scenario
Dry foliar interception								1			Pathway suppressed for
fraction for fodder	-	0.25	Ρ	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet foliar interception				Ī							
•											
fraction for non-leafy vegetables	_	0.25	Р	3	NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario

							Distribution	Distribution	Distribution	Distribution	
ļ		RESRAD	١.,	,		Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution⁴	1	· 2	3	4	Basis
Wet foliar interception											
fraction for leafy				ł							Pathway suppressed for
vegetables	-	0.25	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet foliar interception			1						·		Pathway suppressed for
fraction for fodder	-	0.25	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Weathering removal											Pathway suppressed for
constant for vegetation	1/yr	20	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Special Radionuclides (C-	14)	OF THE		200 M. A	44.74.74.76.	\$60 PM \$100 PM	8.5741.8874	STOCKEDIYO	944543545	2006	15348-2015 (4.5)
C-12 concentration in	١ .										Applicable for C-14 exposure
water	g/cm ³	2.00E-05	Р	3	NA	Not used	NR	NR	NR	NR	only
C-12 concentration in				1 _							Applicable for C-14 exposure
contaminated soil	g/g	3.00E-02	Р	3	NA	Not used	NA	NR	NR	NR	only
Fraction of vegetation				1							Applicable for C-14 exposure
carbon from soil	-	2.00E-02	Р	3	NA	Not used	NR	NR	NR	NR	only
Fraction of vegetation			_	_ i							Applicable for C-14 exposure
carbon from air	-	0.98	Р	3	NA	Not used	NR	NR	NR	NR	only
Cti 14 evasion layer											Applicable for C-14 exposure
thickness in soil	m	0.3	P	2	NA	Not used	NR	NR	NR	NR	only
C-14 evasion flux rate			_ !	_							Applicable for C-14 exposure
from soil	1/s	7.00E-07	Р	3	NA	Not used	NR	NR	NR	NR	only
C-12 evasion flux rate											Applicable for C-14 exposure
from soil	1/s	1.00E-10	Ρ	3	NA	Not used	NR	NR	NR	NR	only
Fraction of grain in beef			_	_							Applicable for C-14 exposure
cattle feed	-	0.8	В	3	NA	Not used	NR	NA	NĤ	NR	only
Fraction of grain in milk	İ		_	_							Applicable for C-14 exposure
cow feed	-	0.2	В	3	NA	Not used	NR	NR	NR	NR	only
Storage Times of Contami	nated Foodstu	ffs:(XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	AKKE.	V-12000			SECURITY	549753	Novamento.		#32.000 FS TWARF C
Storage time for fruits,	i										
non-leafy vegetables, and				_							Pathway suppressed for
grain	d	14	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for leafy		_				N1.14					Pathway suppressed for
vegetables	d	1	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
			اما	_		Managed					Pathway suppressed for
Storage time for milk	d	1	В	3	NA	Not used	NR	NR	NR		industrial worker scenario
	l			_							Pathway suppressed for
Storage time for meat	. q	20	В	3	NA	Not used	NR	NŘ	NR		industrial worker scenario
la		_	ایا								Pathway suppressed for
Storage time for fish	d	7	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Stavana tima tau											Datha. a
Storage time for	ایا	7	в	3	NIA	Motured	ND.	ND			Pathway suppressed for
crustacea and mollusks	d		-		NA NA	Not used	NR	NR	NR		industrial worker scenario
Storage time for well	d		в	3	NA	Notuced	NR	NR	NR		Pathway suppressed for
water	0	1			INA	Not used	NH	NH NH	NH		industrial worker scenario
Storage time for surface	d	1	В	3	NA	Not used	NO	NR	NR		Pathway suppressed for
water Storage time for livestock	u	<u> </u>	В	3	INA	NOLUSEG	NA	NH	NH		industrial worker scenario
fodder	d	45	в	3	NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario
	20623886	-15/13/ 12/28/27/6 /3	2007A	150 40 30 30 50 50 50 50 50 50 50 50 50 50 50 50 50	25.202.20	1401 0340	IND	Nn Nation	INFI INFI	INFI	industrial worker scenario
Radon Thickness of building	\$6.738-12003000000	ALPPOOT COMMUNICATION	\$2,000 C. 59	USA (M. MARSEN)	ACYARMANDACY S	3730 MARK SEVEN CONT.	A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A	National Section of the state of	900000000000000000000000000000000000000	in handles & being the in a	Applicable for Radon exposure
foundation	m	0.15	Р	3	NA NA	Not used	NR	NR	NR		only
Bulk density building		0.13		<u>_</u>	'''	Not used	1813	INIT	NO.		Applicable for Radon exposure
foundation	g/m³	2.4	Р	3	NA	Not used	NR	NR	NR		only
Total porosity of cover	9/11	2.7			144	1101 0300	- IND	7411			Applicable for Radon exposure
material		0.4	P	3	NA	Not used	NR	NR	NR		only
Total porosity of building	-	<u> </u>				1,0,000	30	1461	19/1		Applicable for Radon exposure
1		0.1	Р	3	NA	Notused	ND.	ND	ND }		
foundation		J.,			170	Not used	NR	NR	NR.	NR	only
Volumetric water content											Applicable for Radon exposure
of cover material		0.05	Р	3	NA	Not used	NR	NR	NR		only
C. COTOL Material					, 40		1913			740	···,
Volumetric water content								ļ	ŀ		Applicable for Radon exposure
of building foundation	_	0.03	Р	3	NA	Not used	NR	NR	NR		only
Radon diffusion		3.00	<u> </u>		1771		1711	- 1711	- /111	(1)1	,
coefficient in cover										1	Applicable for Radon exposure
material	m/s	2.00E-06	Р	з [NA	Not used	NR	NR	NR		only
Radon diffusion	1100	2.002.00	··· ·	Ť							Sily
coefficient in foundation					,			l	ŀ		Applicable for Radon exposure
material	m/s	3.00E-07	Р	3	NA	Not used	NR	NR	NR		only
Radon diffusion		3.002-07			.10	.,	1941	2313	19/1	1317	v,
coefficient in						İ			1		Applicable for Radon exposure
contaminated zone soil	m/s	2.00E-06	Р	3	NA	Not used	NR	NR	NR	1	only
Radon vertical dimension	11//3	2.002-00			11/	110, 0360	- '''	1313	1417		Applicable for Radon exposure
of mixing	· m	2	Р	3	NA	Not used	NR	NR	NR		only
Average building air							19/1	731.1	197		Applicable for Radon exposure
exchange rate	1/hr	0.5	Р, В	3	NA	Not used	NR	NR	NR		only
andriango rate		J. J. J	.,,				14/1	, ,,, 1		7313	,

· · · · · · · · · · · · · · · · · · ·	 	Γ	Γ	Γ			Distribution	Distribution	Distribution	Distribution	I
		RESRAD		Ι,	,	Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type	Priority ²	Treatment ³	Distribution ⁴	11	2	3	4	Basis Applicable for Radon exposure
Building (room) height	m	2.5	Р	3	NA -	Not used	NR	NR	NR	NR	Inphicable for Hadon exposure
Building interior area											Applicable for Radon exposure
factor	<u> </u>	0	Р	3	NA	Not used	NR	NR	NR	NR	only
Building depth below ground surface	m	-1	Р	3	NA NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon-222 emanation			<u> </u>	Ť		1101 0000					Applicable for Radon exposure
coefficient		0.25	Р	3	NA	Not used	NR	NR	NR.	NR	only
Radon-220 emanation		0.15	Р	3	NA NA	Not used		,,,			Applicable for Radon exposure
coefficient Risk Conversion Factors	DEADLE COMES	0.15	y jak	enissi it	MA MA	Not used	NR	NR	NR	NR	only
	(risk/yr)/	Nuclide		77.333.33.33							
Slope factor - external	(pCi/g)	specific	M	3	NA NA	Not used	NR	NR	NR	NR	RESRAD Default
Slope factor - inhalation	risk/pCi	Nuclide specific	м	3	NA	Not used	NR	NR	NR	NR	RESRAD Default
Slope factor - infraiation	Пакрог	Nuclide			1973	140, 0360	- 2711	1411	INF	, IND	TIESTIAD Delaut
Slope factor - ingestion	risk/pCi	specific	M	3	NA	Not used	NR	NR	NR	NR	RESRAD Default
Inhalation dose conversio		*1987 (1981)	M	(%) Y	D	2 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	C-97/2012	3/3/86/30X		100000000000000000000000000000000000000	COD 14 DECDAR Univers
Ac-227 Pa-231	mrem/pCi mrem/pCi	6.7 1.28	M	3	D	6.7 1.28	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.0136	M	3	D	0.0136	NR	NR	NR	NR	FGR-11, RESRAD Library
Pa-226	mrem/pCi	0.00858	М	3	Ď	0.00858	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-228 Th-228	mrem/pCi mrem/pCi	0.00477 0.342	M	3	0 0	0.00477	NR NR	NR NR	NR	NR	FGR-11, RESRAD Library
Th-230	mrem/pCi	0.342	M	3	D D	0.342	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-232	mrem/pCi	1.64	M	3	D	1.64	NR	NR	NR	NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.132	М	3	D	0.132	NR	NR	NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.123	M	3	D D	0.123	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236 U-238	mrem/pCi mrem/pCi	0.125 0.118	M	3	6	0.125 0.118	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Ingestion Dose Donversio		\$2.59.25 S	MATERIAL SE	5/5 (36)-)+O	365 P. C. 26	STANSAUSIA	28 Y Y 48 Y Y G	3473 S. C. C. C. C. C. C. C. C. C. C. C. C. C.	> 100 W.G.	British Mark	MARKET CONTRACTOR
Ac-227	mrem/pCi	0.0141	M	3	D	0.0141	NR	NR	NR	NR	FGR-11, RESRAD Library
Pa-231 Pb-210	mrem/pCi mrem/pCi	0.0106 0.00537	M	3	D	0.0106 0.00537	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00337	₩.	3	D	0.00132	NA	NR	NR	NA NA	FGR-11, RESPAD Library
Ra-228	mrem/pCi	0.00144	M	3	D	0.00144	NA	NR	NR	NR	FGR-11, RESRAD Library
Th-228	mrem/pCi	0.000396	М	3	D	0.000396	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-230 Th-232	mrem/pCi mrem/pCi	0.000548 0.00273	M	3	0	0.000548 0.00273	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
U-234	mrem/pCi	0.000283	M	3	Ď	0.000283	NR	NR	NR	NA	FGR-11, RESRAD Library
U-235	mrem/pCi	0.000266	М	3	D	0.000266	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236 U-238	mrem/pCi	0.000269	M M	3	D D	0.000269 0.000255	NR NR	NR	NR	NR	FGR-11, RESRAD Library
Plant Transfer Factors (pC	mrem/pCi			3	U	0.000255	NR	NR	_NR	NR	FGR-11, RESRAD Library
	1	19-3-3 ()			245 50		A A MANAGEMENT OF THE PARTY OF		74. 974 8000000	S 1740.0 30.174	Pathway suppressed for
Ac-227	,	0.0025	Р	11	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pa-231	_	0.01	Р	1	NA .	Not used	NR .	NR	NR	NR	Pathway suppressed for industrial worker scenario
1 4-231		0.01	<u> </u>		- ''	1401 0360	INT	- (46)		INIT	Pathway suppressed for
Pb-210		0.01	Ρ	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pa 226		0.04	Р] ,]	NIA	Notuced	NO	ND.	N.D.	NO	Pathway suppressed for
Ra-226	<u> </u>	0.04		. 1	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Ra-228		0.04	Р	1	NA	Not used	NR	NR_	NR	NR	industrial worker scenario
											Pathway suppressed for
Th-228	<u> </u>	0.001	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-230		0.001	P	1	NA I	Not used	NR	NR	NR	NR	industrial worker scenario
											Pathway suppressed for
Th-232	<u> </u>	0.001	Р	1	ŅA	Not used	NR	NR	NR	NR_	industrial worker scenario
U-234	.	0.0025	Р	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
0 204		0.0020				1101 0500	1,01				Pathway suppressed for
U-235		0.0025	Р	1	NA .	Not used	NR	NA	NR	NR	industrial worker scenario
11.226		0.0025	Р	1	NA	Not used	ND	NR	NO	NO	Pathway suppressed for
U-236	 	0.0025			NA NA	1401 0580	NR	INFI	NA	NR	industrial worker scenario Pathway suppressed for
U-238		0.0025	Р	11	NA	Not used	_NR	NR	NR	NR	industrial worker scenario
Meat Transfer Factor	467 S 11 C 6	all discussions			554 8 486854	X3: - X28-27.22	70000000		ikoniekovi.	0.000 (M.).	W. 1864 (1965) (1965) (1965)
Ac-227	(pCi/kg)/ (pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
NO 561	(pCi/kg)/	0.00002			11/4	1101 0300	110	140	140	IND	Pathway suppressed for
Pa-231	(pCi/d)	0.005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Dh 040	(pCi/kg)/	0.0000	Р			Na	7	NE T			Pathway suppressed for
Pb-210	(pCi/d)	0.0008_	۲ .	2	NA	Not used	NR	NR	NR]	NR	industrial worker scenario

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value or Distribution⁴	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Ra-226	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA NA	Not used	NR	NR	NR	NB	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/		P	2	NA NA						Pathway suppressed for industrial worker scenario
Th-228	(pCi/d) (pCi/kg)/	0.0001				Not used	NR	NR	NR	NR ·	Pathway suppressed for
Th-230	(pCi/d) (pCi/kg)/	0.0001	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-232	(pCi/d) (pCi/kg)/	0.0001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-234	(pCi/d) (pCi/kg)/	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-235	(pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
U-236	(pCi/d)	0.00034	Р	2	NA .	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-238	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Milk Transfer Factor	(pCi/L)/	455486545	200000			ABOVE (PERMIE		\$2000000000000000000000000000000000000	Mark 22		Pathway suppressed for
Ac-227	(pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NR	NA	industrial worker scenario Pathway suppressed for
Pa-231	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pb-210	(pCl/L)/ (pCl/d)	0.0003	Р	2	NA	Not used	NR	NR	· NR	NR	Pathway suppressed for industrial worker scenario
Ra-226	(pCi/L)/ (pCi/d)	0.001	Р	2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/L)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for lindustrial worker scenario
Th-228	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NA	NR	NA	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/	0.000005	P	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-230	(pCi/L)/										Pathway suppressed for
Th-232	(pCi/d) (pCi/L)/	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-234	(pCi/d) (pCi/L)/	0.0006	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-235	(pCi/d) (pCi/L)/	0.0006	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-236	(pCi/d) (pCi/L)/	0.0006	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-238	(pCi/d)	0.0006	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Bloaccumulation factor fo Ac-227	(pCi/kg)/ (pCi/L)	15	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/L)	300	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/L)	50	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/L)	50	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
_	(pCi/kg)/										Pathway suppressed for
Th-228	(pCi/kg)/	100	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for
Th-230	(pCi/L) (pCi/kg)/	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-232	(pCi/L) (pCi/kg)/	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-234	(pCi/L) (pCi/kg)/	10	ρ	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-235	(pCVL)	10	Р	2	NA	Not used	NR	NR	NR		industrial worker scenario Pathway suppressed for
U-236	(pCi/kg)/ (pCi/L)	10	Р	2	NA	Not used	NR	NR	NR		industrial worker scenario
U-238	(pCi/kg)/ (pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Bioaccumulation factor fo	r crustacea and (pCi/kg)/	mollusks 💸	1.52560	962.F15.		经收收的股份	48.534.545.745.7	#30FM(635)	#PLAGUAY		Pathway suppressed for
Ac-227	(pCi/L)	1000	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/L)	110	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/L)	100	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario

	 	 	r				Distribution	Distribution	Distribution	Distribution	
	ł	RESRAD	}	1		Value or	Parameter	Parameter	Parameter	Parameter	1
Parameter	Units	Default	Type1	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
	(pCi/kg)/										Pathway suppressed for
Ra-226	(pCi/L)	250	P	3	NA	Not used	NR	NA	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Ra-228	(pCi/L)	250	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/	i									Pathway suppressed for
Th-228	(pCi/L)	500	L P	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-230	(pCi/L)	500	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-232	(pCi/L)	500	P	3	NA	Not used	NR	NR	NR	NR_	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-234	(pCi/L)	60	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		1	1							Pathway suppressed for
U-235	(pCi/L)	60	Р	3	NA	Not used	NR_	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-236	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR_	NR_	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-238	(pCi/L)	60	Р	3	NA '	Not used	NR	NR	NR NR	NR	industrial worker scenario
Graphics Parameters	25.286.000 E.	26/24/2005	68 (C)		45570 59245		Access to	\$400 ACC		7132000	22.02.80
	{	ĺ	1	1							Value greater than default
Number of points		32	NA	NA	NA .	1024	NR	NR	NR	NR	provides more evaluation points
Spacing	 	Log	NA NA	NA NA	NA.	Log	NR	NR	NR	NR	RESRAD Default
Time Integration Paramete	era .	3.00 Dec	27722	2X2X27941	10.00 (27 VSM)\$425.	FE SERVE SE				\$1748 n.e.h.	
Maximum number of	1 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 -	3 Acres 6 44 36 11 1		The same of the same of		Charles Control Control			2.2000000	AND THE PROPERTY OF THE PARTY O	
points for dose	1 -	17	NA	NA	NA	17	NR	NR	NR	NR	RESRAD Default

'P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A, Table 2.1)

²1 = high priority, 2 = medium priority, 3 ≈ low priority (NUREG/CR-6697, Att. B, Table 4.2)

³D = deterministic, S = stochastic

⁴Distribution Statistical Parameters:

Lognormal-n: 1 = mean, 2 = standard deviation

Bounded lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit

Truncated lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower quantile, 4 = upper quantile

Bounded normal: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit

Beta: 1 = minimum, 2 = maximum, 3 = P-value, 4 = Q-value

Triangular: 1 = minimum, 2 = mode (most likely), 3 = maximum
Uniform: 1 = minimum, 2 = maximum
Continuous logarithmic: RESRAD default statistical parameters
Continuous linear: RESRAD default statistical parameters

NR = not required

Additional Sensitivity Analysis Data:

Sampling Technique = Latin Hypercube Random Seed = 1000

Number of observations = 300 Number of repetitions = 1

Grouping of Correlations = correlated or uncorrelated

Table C-2
Honeywell Metropolis Works
Pond C Dose Assessment
Industrial Worker Scenario
Source Configuration Summary

		5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
	Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
	Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area	CZ Area ⁽³⁾	Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m²)	(m ²)	(m)	(m)	(m)	(m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b – Ponds B, C, D, and E" provided in Appendix A

⁽²⁾ Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond

Table C-3
Honeywell Metropolis Works
Pond C Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

	Radionuclide Concentration (pCi/g)		
Radionuclide	Average Dry	Corrected for 5% Bulking Factor	Corrected for % Solids
Protactinium 231	0.26	0.24	0.13
Radium 226	0.59	0.56	0.31
Thorium 228	0.10	0.09	0.05
Thorium 230	3.00	2.85	1.56
Thorium 232	0.09	0.09	0.05
Uranium 234	263.85	250.66	136.83
Uranium 235	14.10	13.40	7.31
Uranium 236	6.31	5.99	3.27
Uranium 238	273.00	259.35	141.58

% Solids:

54.59%

Table C-4 Honeywell Metropolis Works Pond C Dose Assessment Industrial Worker Scenario Hydraulic Conductivity of Silty Clay

Pressure	Hydraulic Conductivity	Hydraulic Conductivity
(psf)	(cm/sec)	(m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table C-5
Honeywell Metropolis Works
Pond C Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

<u> </u>		Bulk	Average
		Density	Bulk Density
Pond	Sample ID	(g/ml)	(g/mi)
В	B-18 Lower	1.6	-
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В	-	-	1.575
С	C-2	1.6	-
С	C-5	1.7	-
С	C-19 Lower	1.6	-
С	C-19 Upper	1.5	-
С	-	•	1.6
D	D-8 Lower	1.5	-
D	D-8 Upper	1.6	-
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	-
D	D-17 Lower	1.5	
D	D-17 Upper	1.6	-
D	D-26 Lower	1.8	-
D ·	D-26 Upper	1.9	-
D	-	•	1.6
E	E-65 Lower	1.3	
E	E-65 Upper	1.5	-
E	E-80 Lower	1.5	-
E	E-80 Upper	1.5	-
E	E-97 Lower	1.2	-
E	E-97 Upper	1.1	-
E	E-103 Lower	1.7	-
E	E-103 Upper	1.7	-
E	<u>-</u>	-	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX D

Pond D Probabilistic Sensitivity Analysis Input Summary

Parameter Contaminated Zone Area of contaminated zone Thickness of contaminated zone	Units	Default	Type ¹				Parameter	Parameter	Parameter	Parameter	
Area of contaminated zone Thickness of	6.26-77-4077			Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
zone Thickness of		3.87528.3773		WARE!	XXXXXXXXXXX	[[200] (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2	COMPANY PRODUCTION	Takker Delta.		2008 Pale 20	
Thickness of											
Thickness of	m²	10000	Р	2	D	3,900	NR	NR	NR	NR	See Table D-2.
1											
Out in the second	m l	2	Р	2	D	1.959	NR	NR	NR	NR	See Table D-2.
1											Length of longest side of
Length parallel to the											contaminated zone. See Table D
1 • '	[400	Р		D	65	NR	NR	NR	NFi	2
aquifer flow	m	100		2	<u> </u>	05	INH	INF	INIT	INFI	C.
Basic Radiation Dose			_	_	_						Unrestricted release criteria in 10
	mrem/year	30	Р	3	D	25	NR	NR	NR	NR	CFR 20.1402
Time since placement	yr	0	Р	3	٥	0	NR	NR .	NR	NR	RESRAD default
Times for calculations	yr	1	Р	3	D	11	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	3	Р	3	D	3	NR	NR _	NR	NR	RESRAD default
Times for calculations	yr	10	Ρ	3	D	10	NR	NA	NR	NR	RESRAD default
Times for calculations	yr	30	Р	3	D	30	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	100	Ρ	3	D	100	NR	NR	NA	NR	RESRAD default
Times for calculations	yr	300	P	3	D	300	NR	NR	NR	NR	RESRAD default
Times for calculations	yr yr	1000	P	3	D D	1000	NR	NR	NR	NR	RESRAD default
Initial Principle Radionuclide C			Bune abov		8848 T T T T T T T T T T T T T T T T T T		300000 C 1976	2014-2017-98-510	75.3c.37(.1639855.7c)	377300000000	
Soil: Ac-227	pCi/g	0	Р	2	D	0	NR	NR	NR	NR	See Table D-3
		0	P	2	D	0.25	NR	NR	NR	NR	See Table D-3
Soil: Pa-231	pCi/g										
Soil: Pb-210	pCi/g	0	Р	2	D	0	NR	NR	NR	NR	See Table D-3
Soil: Ra-226	pCi/g	0	Р	2	D	0.46	NR	NR	NR	NR	See Table D-3
Soil: Ra-228	pCi/g	0	Р	2	D	0	NR	NR	NR	NR	See Table D-3
Soil: Th-228	ρCi/g	0	Р	2	D	0.28	NR	NR	NR	NR	See Table D-3
Soil: Th-230	pCi/g	0	Ρ	2	D	1.14	NR	NR	NR	NR	See Table D-3
Soil: Th-232	pCi/g	0	Р	2	D	0.07	NA	NR_	NR	NR	See Table D-3
Soil: U-234	pCi/g	0	Р	2	D	480.78	NR	NR	NR	NR	See Table D-3
Soil: U-235	pCi/g	0	Р	2	D	8.68	NR	NR	NR	NR	See Table D-3
Soil: U-236	pCi/g	0	Р	2	D	12.87	NR	NR	NR	NR	See Table D-3
Soil: U-238	pCi/g	0	Р	2	D	503.83	NR	NR	NR	NR	See Table D-3
30											Not used for calculation of
Groundwater: Ac-227	pCi/L	o	Р	3	NA	Not used	NR	NR	, NR	NR	distribution coefficients
Groundwater. Ac-227	POVE				190	1401 0300	1471	1471		1411	Not used for calculation of
Crownstant Bo 221	nC://	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Groundwater: Pa-231	pCi/L	<u> </u>	_ F		IVA	Not used	INIT	INIT	NO.	NH	
				_	· '						Not used for calculation of
Groundwater: Pb-210	pCi/L.	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
ł											Not used for calculation of
Groundwater: Ra-226	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Ra-228	pCi/L	0	Р	3	NA	Not used	NR	NR	NĤ	NR	distribution coefficients
											Not used for calculation of
Groundwater: Th-228	pCi/L	0	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Th-230	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Th-232	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Circultavater: 111 252	POLE										Not used for calculation of
Groundwater: U-234	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Globildwater. 0-234	PONE				-19/4	1401 0300		1411		1917	Not used for calculation of
0	. 0:0		_			Maka.ad	NO	ND	MO	NO	
Groundwater: U-235	pCi/L	0	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
!									_		Not used for calculation of
Groundwater: U-236	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: U-238	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Cover and Contaminated Zon	ne Hydrologic	al Data	5.888ad	学り 学生	10000000000000000000000000000000000000		用场的外域也	-0.80 (1.00°)	《李文章》	が変数となる。	才 \$45000 (100 g)\$600 (\$10 Q)
Cover depth	m	0	Р	2	_ D	2.76	NR	NR	NR	NR	See Table D-2
						Bounded	_				NUREG/CR-6697 Att. C, Table
Density of cover material	g/cm ³	1.5	P	1	s	Normal	1.696	0.1855	1.123	2.269	3.1-1, Silty Clay
											Uniform distribution derived from NUREG/CR-6697 Att.C, Section 3.8 for permanent pasture with maximum 5% slope. Design maximum
	m/yr	0.001	P.B	2	s	Uniform	0.00003	0.00018	-	-	slope is 4%
Cover erosion rate											
Cover erosion rate Density of contaminated	I										

	<u></u>					Value or	Distribution	Distribution	Distribution	Distribution	
Parameter	Units	RESRAD Default	Туре¹	Priority ²	Treatment ³	Distribution ⁴	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Basis
											Uniform distribution derived
											from NUREG/CR-6697 Att.C.
											Section 3.8 for permanent
Contaminated zone		·					[pasture with assumed 2%
erosion rate	m/yr	0.001	P,B	2	s	Uniform	0.00001	0.00006	_		slope after cover erosion.
Contaminated zone total						Bounded					NUREG/CR-6697 Att. C, Table
porosity	-	0.4	Ρ	2	S	Normal	0.41	0.09	0.1319	0.6881	3.2-1, Loamy Sand
Contaminated zone field capacity	_	0.2	Р	3	י ס	0.2	NR	NR	NR	NR	RESRAD default
сарасну		0.2		3_		<u> </u>	NO.	(4)1	1411	1417	Average Kh from dilatometer
											(DMT) pressure dissipation tests
							ł			l	performed on in-situ Pond E
Contaminated zone			_		_						sludge by In-Situ Testing LC,
hydraulic conductivity	m/yr	10	Р	2	<u>D</u>	1.6 Bounded	NR	NR	NR	NR	August 5-7, 2009
Contaminated zone b parameter	_	5.3	Р	2	s	lognormal-n	0.305	0.258	0.61	3.01	NUREG/CR-6697 Att. C, Table 3.5-1, Loamy Sand
parameter			<u> </u>		<u>~</u>	logitottiai ti	- 0.000	5.250	0.07	0.01	This parameter only used if
Humidity in air	g/m³	8	Ρ	3	NA	Not used	NR.	NR	NR	. NR	Tritium is present in soil
Evapotranspiration	<u> </u>										NUREG/CR-6697 Att. C, Section
coefficient	-	0.5	Р	2	S	Uniform	0.5	0.75		-	4.3
							[;	
											Average annual wind speed for Paducah, KY (NOAA),7.4 mph
Average annual wind											http://lwf.ncdc.noaa.gov/oa/clima
speed	m/s	2	Р	2	ם	3.3	NR .	NR	NR .	NR .	te/online/ccd/avgwind.html
											NUREG/CR-6697 Att. C, Table
Precipitation rate	m/yr	1	P	2	D	1.25	NR	NR	NR	NR_	4.1-1, Paducah, KY
				_		•					Not applicable for industrial
Irrigation rate	m/yr	0.2	В	_3	D	00	NR	NR	NR	NR	scenario
Irrigation mode	_	Overhead	В	3	ا م	Overhead	NR	NR	NR	NR	used in Illinois
mganor mode		0.00									NUREG/CR-6697 Att. C, Table
•											4.2-1 method. Assume c ₁ = 0.3,
Runoff coefficient	-	0.2	Р	2	D	0.4	NR	NR	NR	NR	$c_2 = 0.2$, and $c_3 = 0.1$
Watershed area for	,										Pond area watershed. See
nearby stream or pond	m ²	1.00E+06	Р	3	D	277817	NR	NR	NR	NR	Appendix A.
Accuracy for water soil computation		1.00E-03	NA	3	D	1.00E-03	NR	NR	NR	NR	RESRAD default
Saturated Zone Hydrologic	al Data	457474 30 kg kg	9.058AU.5	W600000		SI GRANNER GRA	######################################	3000 000000000000000000000000000000000	2.153.015S-		1231110 4314311
						Bounded					NUREG/CR-6697 Att. C, Table
Density of saturated zone	g/cm ³	1.5	Р	1	S	Normal	1.5105	0.159	1.019	2.002	3.1-1, Sand
Saturated zone total						Bounded		0.00	0.0440	0.0454	NUREG/CR-6697 Att. C, Table
porosity Saturated zone effective		0.4	Р	1	S	Normal Bounded	0.43	0.06	0.2446	0.6154	3.2-1, Sand NUREG/CR-6697 Att. C, Table
porosity		0.2	P	1	s	Normal	0.383	0.061	0.195	0.572	3.3-1, Sand
Saturated zone field											
capacity		0.2	Р	3	D	0.2	NR	NA	NR	NR	RESRAD default
Saturated zone hydraulic			_			n.:	442		4 000	4.0.0	NUREG/CR-6697 Att. C, Table
conductivity	m/yr	100	Р	1	S	Beta	110	5870	1.398	1.842	3.4-1, Sand
											Andrews Engr. Geologic Cross Section Sheet A-A' (El. 319.24 –
	l .						(' i			El. 298.54)/ 4320 ft. See
Saturated zone hydraulic		ł					l un i		NR		
Saturated zone hydraulic gradient	_	0.02	Р	2	lol	0.0048	NR	NR	IND I	NR	Appendix A.
Saturated zone hydraulic gradient Saturated zone soil-	-					Bounded					Appendix A. NUREG/CR-6697 Att. C, Table
gradient Saturated zone soil- specific b parameter		5.3	Р	2	s	Bounded lognormal-n	-0.0253	0.216	0.501	1.9	NUREG/CR-6697 Att. C, Table 3.5-1, Sand
gradient Saturated zone soil- specific b parameter	- - m/yr					Bounded				1.9	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default
gradient Saturated zone soil- specific b parameter Water table drop rate		5.3	Р	2	s	Bounded lognormal-n	-0.0253	0.216	0.501	1.9 NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth
gradient Saturated zone soil- specific b parameter Water table drop rate Well-pump intake depth	- m/yr	5.3 1.00E-03	Р	2	<i>9</i>	Bounded lognormal-n 1.00E-03	-0.0253 NR	0.216 NR	0.501 NR	1.9 NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth from HSA - depth to saturated
gradient Saturated zone soil- specific b parameter Water table drop rate Well-pump intake depth		5.3	P P	2	s	Bounded lognormal-n	-0.0253	0.216	0.501	1.9 NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth
gradient Saturated zone soil- specific b parameter Water table drop rate Well-pump intake depth	- m/yr	5.3 1.00E-03	P P	2	<i>9</i>	Bounded lognormal-n 1.00E-03	-0.0253 NR	0.216 NR	0.501 NR	1.9 NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth from HSA - depth to saturated
gradient Saturated zone soil- specific b parameter Water table drop rate	- m/yr	5.3 1.00E-03	P P	2	<i>9</i>	Bounded lognormal-n 1.00E-03	-0.0253 NR	0.216 NR	0.501 NR	1.9 NR NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth from HSA - depth to saturated zone. ND Model is used for larger contaminated areas (e.g. more
gradient Saturated zone soil- specific b parameter Water table drop rate Well-pump intake depth (below water table) Model: non-dispersion or	- m/yr	5.3 1.00E-03	P P	2 3	<i>S</i> D	Bounded lognormal-n 1.00E-03	-0.0253 NR NR	0.216 NR NR	0.501 NR NR	1.9 NR NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth from HSA - depth to saturated zone. ND Model is used for larger contaminated areas (e.g. more than 1,000 m²) per RESRAD
gradient Saturated zone soil- specific b parameter Water table drop rate Well-pump intake depth (below water table)	- m/yr	5.3 1.00E-03	P P	2	<i>9</i>	Bounded lognormal-n 1.00E-03	-0.0253 NR	0.216 NR	0.501 NR	1.9 NR NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth from HSA - depth to saturated zone. ND Model is used for larger contaminated areas (e.g. more than 1,000 m²) per RESRAD Users Manual Section E.3.1.
gradient Saturated zone soil- specific b parameter Water table drop rate Well-pump intake depth (below water table) Model: non-dispersion or	m/yr	5.3 1.00E-03	P P	2 3	<i>S</i> D	Bounded lognormal-n 1.00E-03	-0.0253 NR NR	0.216 NR NR	0.501 NR NR	1.9 NR NR	NUREG/CR-6697 Att. C, Table 3.5-1, Sand RESRAD default Honeywell Sanitary Well Depth from HSA - depth to saturated zone. ND Model is used for larger contaminated areas (e.g. more than 1,000 m²) per RESRAD

				_							
							Distribution	Distribution	Distribution	Distribution	
		RESRAD		. 2	3	Value or	Parameter	Parameter	Parameter	Parameter	Basis
Parameter	Units	Default	Type1	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis Andrews Engineering Project ID
											91-135 cross section Sheet
Number of unsaturated											Number A-A', January 2007.
zones	-	1	Р	3	D	5	NR	NR	NR	NR	See Appendix A.
· · · · · · · · · · · · · · · · · · ·											Andrews Engineering Project ID
Unsaturated zone 1											91-135 cross section Sheet
thickness (Clayey Silt/Silty							<u>.</u> '				Number A-A', January 2007.
Clay)	m	4	Р	1	D	6.86	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 1 soil	_,3	4.5	ا ہا			Bounded Normal	1.696	0.1855	1 100	2.269	NUREG/CR-6697 Att. C, Table
density Unsaturated zone 1 total	g/cm ³	1.5	Р	2	S	Bounded	1.090	0.1655	1.123	2.269	3.1-1, Silty Clay NUREG/CR-6697 Att. C. Table
porosity	_	0.4	Р	2	s	Normal	0.36	0.07	0.144	0.576	3.2-1, Silty Clay
Unsaturated zone 1		0.4	<u> </u>			Bounded	5.55				NUREG/CR-6697 Att. C, Table
effective porosity	-	0.2	P	2	s	Normal	0.289	0.0735	0.0623	0.517	3.3-1, Silty Clay
Unsaturated zone 1 field											
capacity	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 1											
hydraulic conductivity	m/yr	10	Р	2	D	126	NR	NA	NRNR	NR	See Table D-4
						Davisidad					NUREG/CR-6697 Att. C, Table
Unsaturated zone 1 soil-	_	5.3	P	2	s	Bounded lognormal-n	2.29	0.259	4.43	22	3.5-1, Silty Clay
specific b parameter		3.3				logiloimai-n	2.23	0.233	4.40		Andrews Engineering Project ID
Unsaturated zone 2											91-135 cross section Sheet
thickness (Sandy Silt/Silty			1]			1	Number A-A', January 2007.
Sand)	m	4	Р	1	D	1.71	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 2 soil						Bounded					NUREG/CR-6697 Att. C, Table
density	g/cm ³	1.5	Р	2	s	Normal	1.5635	0.2385	0.827	2.3	3.1-1, Loamy Sand
Unsaturated zone 2 total			P	2	s	Bounded	0.41	0.09	0.1319	0.6881	NUREG/CR-6697 Att. C, Table
porosity		0.4	<u> </u>		- 5	Normal Bounded	0.41	0.09	0.1319	0.0001	3.2-1, Loamy Sand NUREG/CR-6697 Att. C, Table
Unsaturated zone 2 effective porosity	_	0.2	Р	2	s	Normal	0.353	0.0913	0.0711	0.635	3.3-1, Loamy Sand
Unsaturated zone 2 field			<u> </u>		<u> </u>	TTOTT	0.555	0.0070	0.0711	0.000	Joseph County During
capacity	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 2											NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	Р	2	S	Beta	12.3	4230	0.7992	1.91	3.4-1, Loamy Sand
						5					AUDEO (CD CCCT AU C T-LI-
Unsaturated zone 2 soil-		5.3	P	2	s	Bounded	0.305	0.258	0.61	3.01	NUREG/CR-6697 Att. C, Table 3.5-1, Loamy Sand
specific b parameter	<u> </u>	5.3				lognormal-n	0.303	0.238	0.01	3.01	Andrews Engineering Project ID
]	ļ								91-135 cross section Sheet
Unsaturated zone 3)	ļ]				}			ļ	Number A-A', January 2007.
thickness (Sand)	m	4	Р	1	Ū	1.71	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 3 soil	,					Bounded					NUREG/CR-6697 Att. C, Table
density	g/cm ³	1.5	P	2	S	Normal	1.5105	0.159	1.019	2.002	3.1-1, Sand
Unsaturated zone 3 total		1 04	P			Bounded	0.43	0.06	0.2446	0.6154	NUREG/CR-6697 Att. C, Table 3.2-1. Sand
Unsaturated zone 3	<u> </u>	0.4	P	2	S	Normal Bounded	0.43	0.06	0.2446	0.6154	NUREG/CR-6697 Att. C, Table
effective porosity	_	0.2	P	2	s	Normal	0.383	0.061	0.195	0.572	3.3-1. Sand
Unsaturated zone 3 field			 						***		
capacity	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 3											NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	Р	2	S	Beta	110	5870	1.398	1.842	3.4-1, Sand
		1] .							ļ ·	NUIDEC/CD 6607 AH C Tobio
Unsaturated zone 3 soil-		٠,	P	,	c	Bounded lognormal-n	-0.0253	0.216	0.501	1 10	NUREG/CR-6697 Att. C, Table
specific b parameter		5.3	<u> </u>	2	S	lognomari	10.0233	0.216	0.501	1.9	Andrews Engineering Project ID
Unsaturated zone 4	1	l	1								91-135 cross section Sheet
thickness (Sandy Silt/Silty	ł	1									Number A-A', January 2007.
Sand)	m	4	Р	1	D	4	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 4 soil						Bounded					NUREG/CR-6697 Att. C, Table
density	g/cm ³	1.5	Р	2	S	Normal	1.5635	0.2385	0.827	2.3	3.1-1, Loamy Sand
Unsaturated zone 4 total	ľ	1	P	_		Bounded	ا بین ا	0.00	0.1010	0.6004	NUREG/CR-6697 Att. C, Table 3.2-1, Loamy Sand
porosity Unsaturated zone 4		0.4	 	2	S	Normal Bounded	0.41	0.09	0.1319	0.6881	NUREG/CR-6697 Att. C, Table
effective porosity		0.2	P	2	s	Normal	0.353	0.0913	0.0711	0.635	3.3-1, Loamy Sand
Unsaturated zone 4 field	 		 					3,33,3	9.9711		Joseph Carry
capacity		0.2	P	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 4	·	<u> </u>	,								NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	Р	2	S	Beta	12.3	4230	0.7992	1.91	3.4-1, Loamy Sand

							Distribution	Distribution	Distribution	Distribution	
		RESRAD				Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Unsaturated zone 4 soil-						Bounded					NUREG/CR-6697 Att. C, Table
specific b parameter	-	5.3	Р	2	S	lognormal-n	0.305	0.258	0.61	3.01	3.5-1, Loamy Sand
							1				Andrews Engineering Project ID 91-135 cross section Sheet
Unsaturated zone 5											Number A-A', January 2007.
thickness (Sand)	m	4	Р	1	D	1,14	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 5 soil density	g/cm ³	1.5	Р	2	s	Bounded Normal	1.5105	0.159	1.019	2.002	NUREG/CR-6697 Att. C, Table 3.1-1, Sand
Unsaturated zone 5 total						Bounded					NUREG/CR-6697 Att. C, Table
porosity		0.4	P	2	S	Normal	0.43	0.06	0.2446	0.6154	3.2-1, Sand
Unsaturated zone 5 effective porosity		0.2	Р	2	s	Bounded Normal	0.383	0.061	0.195	0.572	NUREG/CR-6697 Att. C, Table 3.3-1, Sand
Unsaturated zone 5 field											
capacity		0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default NUREG/CR-6697 Att. C, Table
Unsaturated zone 5 hydraulic conductivity	m/yr	10	Р	2	s	Beta	110	5870	1.398	1.842	3.4-1, Sand
7,5,44										·	
Unsaturated zone 5 soil-		5.3	P	2	s	Bounded lognormal-n	-0.0253	0.216	0.501	1.9	NUREG/CR-6697 Att. C, Table 3.5-1, Sand
specific b parameter Distribution Coefficients (co	ontaminated, u				50000000	lognomia-n	90.0233	0.210	0.301	1.3 3440 - 3.440	3.5-1, Salid
						Truncated					NUREG/CR-6697 Att. C, Section
Ac-227	cm ³ /g	20	Р	1	S	lognormal-n Truncated	6.72	3.22	0.001	0.999	3.9, Table 3.9-1 NUREG/CR-6697 Att. C, Section
Pa-231	cm ³ /g	50	Р	1	s	lognormal-n	5.94	3.22	0.001	0.999	3.9, Table 3.9-1
	3.					Truncated	7.70	0.70	0.004	0.000	NUREG/CR-6697 Att. C, Section
Pb-210	cm ³ /g	100	Р	11	S	lognormal-n Truncated	7.78	2.76	0.001	0.999	3.9, Table 3.9-1 NUREG/CR-6697 Att. C, Section
Ra-226	cm ³ /g	70	Р	1	S	lognormal-n	8.17	1.7	0.001	0.999	3.9, Table 3.9-1
2 000	3,	70	P			Truncated	0.47		0.004	0.000	NUREG/CR-6697 Att. C, Section
Ra-228	cm³/g	70	P-	1	S	lognormal-n Truncated	8.17	1.7	0.001	0.999	3.9, Table 3.9-1 NUREG/CR-6697 Att. C, Section
Th-228	cm³/g	60000	Р	1	S.	lognormal-n	8.68	3.62	0.001	0.999	3.9, Table 3.9-1
Th 220	cm³/g	60000	Р	1	s	Truncated	8.68	3.62	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
Th-230	cm /g	60000		 	3	lognormal-n Truncated	0.00	3.62	0.001	0.999	NUREG/CR-6697 Att. C. Section
Th-232	cm³/g	60000	Р	11	s	lognormal-n	8.68	3.62	0.001	0.999	3.9, Table 3.9-1
U-234	cm³/g	50	P	1	s	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
0-234	Citi /g					Truncated	7.04	0.10	0.001	0.555	NUREG/CR-6697 Att. C, Section
U-235	cm ³ /g	50	Р	11	S	lognormal-n	4.84	3.13	0.001	0.999	3.9, Table 3.9-1
U-236	cm³/g	50	Р	1	s	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
0.200				<u> </u>		Truncated					NUREG/CR-6697 Att. C, Section
U-238	cm³/g	50	P	1	S	lognormal-n	4.84	3.13	0.001	0.999	3.9, Table 3.9-1
Transport Factor Options	eta en Par		\$0005\#6		920 SAGE 11.				CON CYRY		
ł			1	}							RESRAD default, parameter is
											not used for calculation of distribution coefficients. Value of
	ĺ	•	i								0 not used for calculation of
Leach rate	1/yr	0	Р	3	D	0	NR	NR	NR	NR	distribution coefficients.
Salubility limit	mol/L	0	Р	3	D	2.94E-06	NR	NR	NR	NR	Value used for Uranium nuclides only
Soldblinty little	THOUL		<u> </u>	<u> </u>		2.542 00					RESRAD default, parameter not
Literatura (Control of Control of	0	V '41-		_	N. A	N1-	N/C	No	ND		used for calculation of
Use plant/soil ratio	Check box	Yes/No	NA COMMAN	3	NA	No	NR	NR	NR	NR	distribution coefficients.
Inhalation rate	m³/yr	8400	M, B	3	D	11400	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Mass loading for		0.0004				Continuous					NUREG/CR-6697 Att. C, Section
inhalation Exposure duration	g/m³ yr	0.0001 30	P, B	3	S D	linear 25	NA .	NR NR	NR NR	NR.	4.6 RESRAD Manual, Table 2.3
Indoor dust filtration factor											
(shielding factor,	}	0.	, ,	_		I to if a sum	0.15	0.05			NUREG/CR-6697 Att. C, Section
inhalation) Shielding factor, external	-	0.4	P, B	_2	s	Uniform Bounded	0.15	0.95		-	7.1 NUREG/CR-6697 Att. C, Section
gamma		0.7	Р	2	s	lognormal-n	-1.3	0.59	0.044	1	7.10
Indoor time fraction		0.5	В	3	D	0.17	NA	NR	NR	NR	RESRAD Manual, Table 2.3
Outdoor (on site) time fraction	_	0.25	В	3	D	0.06	NR	NR	NR	NR	RESRAD Manual, Table 2.3
	·		···-								

						Value or	Distribution	Distribution	Distribution	Distribution	
B	1.1-14-	RESRAD	T	Priority ²	Treatment ³	Distribution ⁴	Parameter 1	Parameter 2	Parameter	Parameter 4	Basia
Parameter Chang of the	Units	Default	Type'	Priority-	Treatment	Distribution			3	4	Basis Shape representative of pond
Shape of the contaminated zone	_	1	P	3	D	Non-circular	NFI	NR	NR	NR	(rectangular)
Ingestion, Dietary	A TALESTON	8782722	#400 B	880 Sec. 3	PATRICE SHOW	Marita Services	\$1600 PM	1905-2000 Pt.	NOTES CONTROL	500-6092-47	
Fruit, vegetable, and grain		200 000 000 000.	7. C. M. P. G. D. C. C.	24.55		3.615.31.4.35.43.5	131,511,511			3	Pathway suppressed for
consumption rate	kg/yr	160	м, в	2	NA .	Not used	NR	NR	NR	NR	industrial worker scenario
Leafy vegetable											Pathway suppressed for
consumption	kg/yr	14	M, B	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
				_							Pathway suppressed for
Milk consumption	. L/yr	92	M, B	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Meat and poultry		00		3	٠.,	Nat want	NR		ND	NO	Pathway suppressed for
consumption	kg/yr	63	M, B	3	NA NA	Not used	INH	NR	NR_	NR	industrial worker scenario Pathway suppressed for
Fish consumption rate	kg/yr	5.4	м.в	3	NA NA	Not used	NA	NR	NR	NR	industrial worker scenario
Other seafood		- U. T	111, 5	<u>*</u> _							Pathway suppressed for
consumption rate	kg/yr	0.9	м, в	3	NA NA	Not used	NR	NR	NA	NR	industrial worker scenario
	J - 3'										RESRAD Manual, Table 2.3
	!										based on EPA suggested value
Soil ingestion rate	g/yr	36.5	M, B	2	D	36.5	NR	NR	NR	NR	of 100 mg/day
	1										NUREG/CR-5512, V3
Drinking water intake	L/yr	510	M, B	2	D	478.5	NR	NR	NR	NR	Table 6.87
Contomination function of	ļ	}			j						RESRAD default, all drinking water assumed from
Contamination fraction of drinking water		1	B, P	3	NA NA	1	NA	NR	NR	NR	groundwater
Contamination fraction of	·	 '	5, -	-	NO.	· · · · · · · · · · · · · · · · · · ·	INFI	INFI	Nn	NI	Pathway suppressed for
household water	-	1	B, P	3	NA NA	Not used	NR	NR	NR	NA	industrial worker scenario
Contamination fraction of											Pathway suppressed for
livestock water	<u> </u>	1 1	B, P	3	NA.	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of									-		Pathway suppressed for
irrigation water		11	B, P	3	NA	Not used	NR	NR NR	NR	NR	industrial worker scenario
Contamination fraction of		l	۱								Pathway suppressed for
aquatic food		0.5	B, P	2	NA_	Not used	NA	NR NR	NR	NR	industrial worker scenario
Contamination fraction of plant food		-1	8. P	3	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of		 	5, 1	- 3	190	1401 4304	1411	INIT	NI	ND	Pathway suppressed for
meat		1 -1	B.P	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of					<u> </u>						Pathway suppressed for
milk	·	-1	B, P	3	NA	Not used	NR	NR	NR NR	NR	industrial worker scenario
Ingestion, Non-Dietary	SAME FROM	X.70.388	\$6.5%	DESCRIPTION OF THE PERSON OF T	254 254 255		经存款证据的	MANAGO OF	10 45 KA34 M	PATE CONTROL	
Livestock fodder intake				_	l						Pathway suppressed for
rate for meat	kg/d	68	M	3	NA NA	Not used	NR	NR	: NR		industrial worker scenario
Livestock fodder intake	kald	55	м	3	NA NA	Not used	NR	NR	NR		Pathway suppressed for
rate for milk Livestock water intake	kg/d	- 33	101		INA	1401 0560	NH	INT	INFL	INFL	industrial worker scenario Pathway suppressed for
rate for meat	l ∟⁄a	50	м	3	NA NA	Not used	NA	NR	NR	NR	industrial worker scenario
Livestock water intake		 	<u> </u>								Pathway suppressed for
rate for milk	L/d	160	М	3	NA.	Not used	NR	NR	NR	NR	industrial worker scenario
											Pathway suppressed for
Livestock soil intake	kg/d	0.5	M	3	NA NA	Not used	NR	NR NR	NR	NR	industrial worker scenario
Mass loading for foliar		l	_		}						Pathway suppressed for
deposition	g/m³	1.00E-04	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Depth of soil mixing layer	m	0.15	Р	2	s	Triangular	0	0.15	0.6		NUREG/CR-6697 Att. C, Section 3.12
Depth of Soil mixing layer	 '''	0.15		-		Inangulai		0.13	0.8		Pathway suppressed for
Depth of roots	m	0.9	P	1	NA NA	Not used	NR	NR	NR		industrial worker scenario
Bopin or roots			-	<u> </u>							RESRAD default, all drinking
Drinking water fraction											water assumed from
from groundwater	-	1	B, P	3	D	1	NR	NR	NR		groundwater
Household water fraction			ľ								
from groundwater		1	B, P	3	NA NA	Not used	NR	NR	NR		Parameter applies to Radon only.
Livestock water fraction						Net					Pathway suppressed for
from groundwater		1	B, P	3	NA NA	Not used	NR	NR NR	NR		industrial worker scenario
Irrigation fraction from		1	B, P	3	NA NA	Not used	NR	NB	ND		Pathway suppressed for industrial worker scenario
groundwater Wet weight crop yield for	+ <u>-</u> -	 	0, 5		IVA	1101 0360	INFL	NR	NR		Pathway suppressed for
non-leafy plants	kg/m²	0.7	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet weight crop yield for	1.3/111	† - 	· · · · ·				,,,,,		14(1		Pathway suppressed for
leafy plants	kg/m²	1.5	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet weight crop yield for			Γ								Pathway suppressed for
fodder	kg/m²	1.1	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario

	i		ł			11-1	Distribution	Distribution	Distribution	Distribution	!
		RESRAD				Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Туре	Priority ²	Treatment ³	Distribution ⁴	11	2	3	4	Basis
Growing season for non-			_	_ 1							Pathway suppressed for
leafy vegetables	yr	0.17	Р	3	NA NA	Not used	NR	NR_	NR	NR	industrial worker scenario
Growing season for leafy		0.05	P		NA	Mak consist	NR		NE		Pathway suppressed for
vegetables	yr	0.25		3	NA NA	Not used	NH	NR	NR	NR	industrial worker scenario
Growing season for fodder	,, _r	0.08	Р	3	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Translocation factor for	yr	0.08			NA	1401 useu	INIT	INFI	INFI	IVIT	Pathway suppressed for
non-leafy vegetables		0.1	Р	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Translocation factor for	<u> </u>		 			1101 0300	1414		1911	1411	Pathway suppressed for
leafy vegetables		1	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Translocation factor for			- ` -		146	1101 0000	1,1,1				Pathway suppressed for
fodder	ĺ . I	1	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Dry foliar interception											
fraction for non-leafy	i !		1 1					[Pathway suppressed for
vegetables	<u>.</u>	0.25	Р	3	NA	Not used	NR	NA	NR	NR	industrial worker scenario
Dry foliar interception											
fraction for leafy											Pathway suppressed for
vegetables		0.25	ρ	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Dry foliar interception											Pathway suppressed for
fraction for fodder		0.25	Р	3	NA	Not used	NR	NR NR	NR	NR	industrial worker scenario
Wet foliar interception											
fraction for non-leafy											Pathway suppressed for
vegetables		0.25	P	_3	NA	Not used	NR NR	NR	NR	NR	industrial worker scenario
Wet foliar interception											
fraction for leafy											Pathway suppressed for
vegetables		0.25	Р	2	NA	Not used	NA	NR	NA	NR	industrial worker scenario
Wet foliar interception			_								Pathway suppressed for
fraction for fodder		0.25	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Weathering removal					1						Pathway suppressed for
constant for vegetation	1/yr	20	Р	2	NA	Not used	NR	NR	NR	NR_	industrial worker scenario
Special Radionuclides (C-1	4)	"是沙尔尔克斯	OF FREE	1000 C	20 文章 20 元章 20	2 22 20		6452 Y \$65 (46)	\$428.WOO.A.	R. W. C. ASS. CO.	Applicable for C. 14 avecause
C-12 concentration in water	g/cm ³	2.00E-05	Р	з [NA NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
C-12 concentration in	g/ciii_	2.002.05			INA	Not used	INIT	INIT	NA	INH	Applicable for C-14 exposure
contaminated soil	g/g	3.00E-02	P	3	NA NA	Not used	NR	NR	NR	NR	only
Fraction of vegetation	-99	3.00L-02	- '			1400 0300	(411	7411	- 1913	MI	Applicable for C-14 exposure
carbon from soil	. :	2.00E-02	Р	3	NA NA	Not used	NA	NR	NR	NR	only
Fraction of vegetation		2.002	 - ` -					1,11			Applicable for C-14 exposure
carbon from air	. 1	0.98	Р	3	NA	Not used	NR	NR	NR	NR	only
Cti14 evasion layer											Applicable for C-14 exposure
thickness in soil	m	0.3	Р	2	NA	Not used	NFI	NR	NA	NA	only
C-14 evasion flux rate											Applicable for C-14 exposure
from soil	1/s	7.00E-07	P	3	NA	Not used	NR	NR	NR	NR	only
C-12 evasion flux rate											Applicable for C-14 exposure
from soil	1/s	1.00E-10	Р	3	NA	Not used	NR	NR	NR	NR	only
Fraction of grain in beef	!				I			l l			Applicable for C-14 exposure
cattle feed		0.8	В	3	NA NA	Not used	NR	NR	NR	NR	only
Fraction of grain in milk					j]	,		Applicable for C-14 exposure
cow feed	-	0.2	В	3	NA	Not used	NA	NR	NR	NR	only
Storage Times of Contamin	nated Foodstuf	IS CARROLL	gertian.	\$50 ,0 00	\$30 N. A. W.S.	(KES) XX (LEVA)		Proceeding.	38,37, 67,44,55 <u>.</u>		
Storage time for fruits,					- 1						
non-leafy vegetables, and		14	اما	_		Netugad	NO				Pathway suppressed for
grain	ď	14	В	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for leafy	d		В	3	NA	Not used	NB	NR J	NA	NA .	Pathway suppressed for industrial worker scenario
vegetables		·'			NA I	NOLUSEU	1414	IVA	INFI	INFI	Pathway suppressed for
Storage time for milk	d	1	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for think		·				1401 0360	(11)	- INFO	1417	NO.	Pathway suppressed for
Storage time for meat	d	20	в	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Grouge time for mout				Ť	- ``` -	1101 0000	-,,,,				Pathway suppressed for
Storage time for fish	d	7	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
											
Storage time for		İ						Į			Pathway suppressed for
crustacea and mollusks	ď	7	в	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for well											Pathway suppressed for
water	d	1	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for surface											Pathway suppressed for
water	d i	1	в	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for livestock											Pathway suppressed for
fodder	d	45	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Radon		学等教,证"人	Supering Sty.			ANZERSON	744	177 a 482 k 15		\$45567555	

Number Description Descr												
Parameter Para												
microses to building m 0.15 P 3 NA Not used NR NR NR NR NR NR Objected for Page exposure exposure movements of the property of		í l										
ounceation m 0.15 P 3 NA Not used NR NR NR NR NR NR Only with destroy purposes or present or presen		Units	Default	Type'	Priority ²	Treatment	Distribution*	1	2	3	4	
oundation — gin ² 2.4 P 3 NA Not used NR NR NR NR NR NR Only material processory of cover — 0.4 P 3 NA Not used NR NR NR NR NR NR NR NR NR NR NR NR NR	Thickness of building foundation	m	0.15	P	3	NA	Not used	NR	NR	NA	NR	1
Columbridge Cover Columbridge Cover Columbridge	Bulk density building	3	2.4		2	NIA	Netwood	NID	ND	ND	ND	Applicable for Radon exposure
P 3 NA Not used NR NR NR NR NR NR NR N	Total porosity of cover	g/m ⁻	2.4	-	-3-	NA .	Not used	INH	NH	INIT	INH	Applicable for Radon exposure
Description Description	material		0.4	Р	3	NA	Not used	NR	NR	NR	NR	only
	Total porosity of building foundation		0.1	Р	3	NA	Not used	NR	NR	NR	NR	1
	Volumetric water content										:	Applicable for Radon exposure
Machine offices 1,000 1,	of cover material		0.05	Р	3	NA	Not used	NR	NR	NFI	NR	1
building foundation - 0.03 P 3 NA Not used NR NR NR NR NR Applicable for Radon exposure now material m/s 3.00E-07 P 3 NA Not used NR NR NR NR NR Applicable for Radon exposure now material m/s 3.00E-07 P 3 NA Not used NR NR NR NR NR Applicable for Radon exposure now material m/s 3.00E-07 P 3 NA Not used NR NR NR NR NR Applicable for Radon exposure now material m/s 2.00E-06 P 3 NA Not used NR NR NR NR NR NR Applicable for Radon exposure now material not support	Volumetric water content	, ,										Applicable for Radon exposure
Reduce of the content of the conte	of building foundation		0.03	Р	3	NA	Not used	NR	NR NR	NR NR	NR	only
National Confession National Confession	Radon diffusion coefficient							!	'		'	Applicable for Radon exposure
Name	in cover material	m/s	2.00E-06	Ρ	3	NA NA	Not used	NR	NR	NR	NR	only
National Continuated cone soil action (incomplete in contaminated cone soil action ventical dimension in my series by the continuation of mixing in my series (incomplete in my series) National Market (incomplete in my series)	Radon diffusion coefficient	}										Applicable for Radon exposure
nicontaminated zone soil adon vertical dimension m 2 P 3 NA Not used NR NR NR NR NR NR NR NR NR NR NR NR NR	in foundation material	m/s	3.00E-07	Р	3	NA .	Not used	NR	NR	NR	NR	only
Name	Radon diffusion coefficient	1 1		1								Applicable for Radon exposure
Mindred Mind		m/s	2.00E-06	Р	3	NA NA	Not used	NR NR	NR	NR	NR NR	
	of mixing	m	2	Р_	3	NA	Not used	NR	NR	NR	NR	only
Building (room) height m 2.5 P 3 NA		1/hr	0.5	P. B	3	NA	Not used	NR	NR I	NR	NR	
Applicable for Radon exposure and core Description P. 3 NA Not used NR NR NR NR NR NR NR N		1	2.5		,	N/A	Net wood	ND	ND	ND	NO	Applicable for Radon exposure
Subding depth below	Building (room) neight Building interior area	 	2.5	F-	3	NA .	Not used	NH	NH	NH	NH_	Applicable for Radon exposure
	factor	<u> </u>	0	Р	3	NA NA	Not used	NR	NR	NR	NR	
Description Description	ground surface	m	-1	Р	3	NA	Not used	NR	NR	NR	NR	only
Single factor - external (pCV) Specific M 3 NA Not used NR NR NR NR NR RESRAD Default	Radon-222 emanation		0.25	Р	3	NΔ	Notused	NR	NR I	N₽	NR	L *:
Single Factors	Radon-220 emanation											Applicable for Radon exposure
Siope factor - external (risklyr) Nuclide Specific M 3 NA Not used NR NR NR NR RESRAD Default		-										
Siope factor - external (pCurgo Specific M 3 NA Not used NR NR NR NR NR RESRAD Default	HISK Conversion Factors		Control of No. 120.50	NA 4754647	40.1.11.32.035H	Separate (1988) 1881 (1988)	950 x 500 x 000 x 000 x 000 x	0.250	77293397 JANES 11.	2000 an 100 an 2000 an 1	\$\$\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
Siope factor - inhalation	Slope factor – external			М	3	. NA	Not used	NR	NR	NR	NR	RESRAD Default
Name	Slope factor – inhalation		l .		3	NA .	Not used	מוא	NR	NR	NR	RESRAD Default
Inhalation dose conversion factors:		risk/oCi i	specific	i M								
Ac-227 mrem/pC 6.7 M 3 D 6.7 NR NR NR NR FGR-11, RESRAD Library			Nuclide									
Pa-231	Slope factor – ingestion	risk/pCi	Nuclide specific	М		NA .	Not used	NR			NR	RESRAD Default
December December	Slope factor – ingestion Inhalation dose conversion	risk/pCi	Nuclide specific	М	3	NA	Not used	NR			NR	RESRAD Default
Ra-226 mrem/pCi 0.00858 M 3 D 0.00858 NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227	risk/pCi n factors	Nuclide specific 6.7	M M	3	NA D	Not used 6.7	NR NR	NR	NR	NR NR	RESRAD Default
The 228	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231	risk/pCi 1 factors mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28	M M M	3 3 3	NA D D	Not used 6.7 1.28	NR NR NR	NR NR	NR NR	NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-228	Slope factor – ingestion Inhalation dose conversior Ac-227 Pa-231 Pb-210	risk/pCi 1 lactors mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136	M M M	3 3 3	NA D D D	6.7 1.28 0.0136	NR NR NR NR	NR NR NR	NR NR NR	NR NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-230 mrem/pCi 0.326 M 3 D 0.326 NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversior Ac-227 Pa-231 Pb-210 Ra-226	risk/pCi 1 factors mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858	M M M M	3 3 3 3	NA D D D D	Not used 6.7 1.28 0.0136 0.00858	NR NR NR NR NR	NR NR NR NR	2R 2G 2G 2G 2G	NR NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-232 mrem/pCi 1.64 M 3 D 1.64 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228	risk/pCi nactors mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477	M M M M	3 3 3 3 3	NA D D D D	6.7 1.28 0.0136 0.00858 0.00477	NR NR NR NR NR NR	NR NR NR NR NR	24 24 24 24 24 24	NR NR NR NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
D-234 mrem/pCi 0.132 M 3 D 0.132 NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228	risk/pCi lactors mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342	M M M M M	3 3 3 3 3 3	NA D D D D	Not used 6.7 1.28 0.0136 0.00858 0.00477 0.342	NR NR NR NR NR NR NR NR NR	NR NR NR NR NR NR	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NR NR NR NR NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
J-235 mrem/pCi 0.123 M 3 D 0.123 NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-238	risk/pCi lactors mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326	M M M M M M	3 3 3 3 3 3	NA D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326	2E 2E 2E 2E 2E 2E 2E 2E 2E	NA NA NA NA NA NA NA	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NR NR NR NR NR NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
J-236 mrem/pCi 0.125 M 3 D 0.125 NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversior Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-230	risk/pCi n lactors mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64	M M M M M M M	3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64	25 25 25 25 25 25 25 25 25 25 25 25 25 2	NA NA NA NA NA NA NA NA	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NR NR NR NR NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
J-238 mrem/pCi 0.118 M 3 D 0.118 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-230 U-234	risk/pCi nations mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132	M M M M M M M	3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132	2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2	26 26 26 26 26 26 26 26 26 26 26 26 26 2	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Name	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-230 Th-232 U-234 U-235	risk/pCi 1 lactors/ mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123	M M M M M M M	3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00457 0.342 0.326 1.64 0.132 0.123	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NR NR NR NR NR NR NR NR NR NR NR NR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Ac-227 mrem/pCi 0.0141 M 3 D 0.0141 NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-230 Th-332 U-234 U-235 U-236	risk/pCi nlactors/ mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123	M M M M M M M M	3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	26 26 26 26 26 26 26 26 26 26 26 26 26 2	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Ac-227 mrem/pCi 0.0141 M 3 D 0.0141 NR NR NR NR FGR-11, RESRAD Library Pa-231 mrem/pCi 0.0106 M 3 D 0.0106 NR NR NR NR NR FGR-11, RESRAD Library Pa-231 mrem/pCi 0.00537 M 3 D 0.00537 NR NR NR NR NR FGR-11, RESRAD Library Pa-226 mrem/pCi 0.00132 M 3 D 0.00537 NR NR NR NR NR FGR-11, RESRAD Library Pa-228 mrem/pCi 0.00144 M 3 D 0.00132 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-228 mrem/pCi 0.000396 M 3 D 0.000396 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-230 mrem/pCi 0.000548 M 3 D 0.000396 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-232 mrem/pCi 0.000548 M 3 D 0.000548 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-232 mrem/pCi 0.000273 M 3 D 0.000273 NR NR NR NR NR FGR-11, RESRAD Library Ph-234 mrem/pCi 0.000283 M 3 D 0.000283 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-235 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-236 mrem/pCi 0.000269 M 3 D 0.000269 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-238 mrem/pCi 0.000255 M 3 D 0.000269 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-238 mrem/pCi 0.000255 M 3 D 0.000265 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR NR FGR-11, RESRAD Library Ph-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR NR NR FGR-11, RESRAD Library Ph-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR NR PGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversior Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-234 U-235 U-236 U-236	risk/pCi nlactors/ mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.326 1.64 0.132 0.123 0.125 0.118	M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	8.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118	2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	XR	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Pa-231 mrem/pCi 0.0106 M 3 D 0.0106 NR NR NR NR FGR-11, RESRAD Library Pb-210 mrem/pCi 0.00537 M 3 D 0.00537 NR NR NR NR NR FGR-11, RESRAD Library Pa-226 mrem/pCi 0.00132 M 3 D 0.00132 NR NR NR NR NR NR FGR-11, RESRAD Library Ra-228 mrem/pCi 0.00144 M 3 D 0.00144 NR NR NR NR NR NR NR FGR-11, RESRAD Library Rh-228 mrem/pCi 0.000396 M 3 D 0.000396 NR NR NR NR NR NR FGR-11, RESRAD Library Rh-230 mrem/pCi 0.000548 M 3 D 0.000548 NR NR NR NR NR FGR-11, RESRAD Library Rh-230 mrem/pCi 0.000273 M 3 D 0.000548 NR NR NR NR NR FGR-11, RESRAD Library Rh-232 mrem/pCi 0.00273 M 3 D 0.00273 NR NR NR NR NR FGR-11, RESRAD Library Rh-234 mrem/pCi 0.000283 M 3 D 0.000283 NR NR NR NR NR FGR-11, RESRAD Library Rh-235 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR NR FGR-11, RESRAD Library Rh-236 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR NR FGR-11, RESRAD Library Rh-238 mrem/pCi 0.000265 M 3 D 0.000269 NR NR NR NR NR FGR-11, RESRAD Library Rh-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR NR FGR-11, RESRAD Library Rh-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversior Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-234 U-235 U-236 U-236	risk/pCi nlactors/ mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 0.132 0.123 0.125 0.118	M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NA NA NA NA NA NA NA NA NA NA NA NA NA N	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NG	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Pb-210	Slope factor – ingestion Inhalation dose conversior Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-234 U-235 U-236 U-236	risk/pCi nlactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 0.132 0.123 0.125 0.118	M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NA NA NA NA NA NA NA NA NA NA NA NA NA N	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NG	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Ra-226	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-234 U-235 U-236 U-236 U-238 Ingestion Dose Donversion	risk/pCi 1 lactors/ mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.125 0.018	M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	0.0136 0.026 0.0326 0.0326 0.0326 1.64 0.132 0.123 0.125 0.118	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NA NA NA NA NA NA NA NA NA NA NA NA NA N	25	26 26 26 26 26 26 27 26 27 26 27 27 27 27 27 27 27 27 27 27 27 27 27	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Result	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-230 Th-232 U-234 U-235 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231	risk/pCi nlactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.118	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NA NA NA NA NA NA NA NA NA NA NA NA NA N	3.3.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5	2	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-228	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-330 Th-332 U-234 U-235 U-236 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210	risk/pCi ntactors: mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.118	2 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	NR NR NR NR NR NR NR NR NR NR NR NR NR N		26 26 26 26 26 26 26 26 26 27 26 27 26 27 27 27 27 27 27 27 27 27 27 27 27 27	RESRAD Default FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-230 mrem/pCi 0.000548 M 3 D 0.000548 NR NR NR NR NR FGR-11, RESRAD Library Th-232 mrem/pCi 0.00273 M 3 D 0.00273 NR NR NR NR NR FGR-11, RESRAD Library J-234 mrem/pCi 0.000283 M 3 D 0.000283 NR NR NR NR NR FGR-11, RESRAD Library J-235 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR NR FGR-11, RESRAD Library J-236 mrem/pCi 0.000269 M 3 D 0.000269 NR NR NR NR NR FGR-11, RESRAD Library J-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-230 Th-232 U-234 U-235 U-236 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226	risk/pCi nlactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	26 26 26 26 26 26 26 26 26 26 27 26 27 27 27 27 27 27 27 27 27 27 27 27 27	25 25 25 25 25 25 25 25 25 25 25 25 25 2	20 20 20 20 20 20 20 20 20 20 20 20 20 2	RESRAD Default FGR-11, RESRAD Library
Th-232 mrem/pCi 0.00273 M 3 D 0.00273 NR NR NR NR FGR-11, RESRAD Library J-234 mrem/pCi 0.000283 M 3 D 0.000283 NR NR NR NR NR FGR-11, RESRAD Library J-235 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR NR FGR-11, RESRAD Library J-236 mrem/pCi 0.000269 M 3 D 0.000269 NR NR NR NR NR FGR-11, RESRAD Library J-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-230 Th-232 U-234 U-235 U-236 U-238 U-238 U-238 U-238 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228	risk/pCi nlactors/ mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	0.0132 0.0141 0.0106 0.00537 0.0342 0.326 1.64 0.132 0.123 0.125 0.018	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	26 26 26 26 26 26 26 26 26 26 26 26 26 2	25		RESRAD Default FGR-11, RESRAD Library
Th-232 mrem/pCi 0.00273 M 3 D 0.00273 NR NR NR NR FGR-11, RESRAD Library J-234 mrem/pCi 0.000283 M 3 D 0.000283 NR NR NR NR NR FGR-11, RESRAD Library J-235 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR NR FGR-11, RESRAD Library J-236 mrem/pCi 0.000269 M 3 D 0.000269 NR NR NR NR NR FGR-11, RESRAD Library J-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-230 Th-232 U-234 U-235 U-236 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226	risk/pCi nlactors/ mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	0.0132 0.0141 0.0106 0.00537 0.0342 0.326 1.64 0.132 0.123 0.125 0.018	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	26 26 26 26 26 26 26 26 26 26 26 26 26 2	25		RESRAD Default FGR-11, RESRAD Library
J-234 mrem/pCi 0.000283 M 3 D 0.000283 NR NR NR NR FGR-11, RESRAD Library J-235 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR FGR-11, RESRAD Library J-236 mrem/pCi 0.000269 M 3 D 0.000269 NR NR NR NR FGR-11, RESRAD Library J-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-230 Th-232 U-235 U-236 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228	risk/pCi nlactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00132 0.00134	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	Not used 6.7 1.28 0.0136 0.0858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144 0.000396	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	NA NA NA NA NA NA NA NA NA NA NA NA NA N	22		RESRAD Default FGR-11, RESRAD Library
J-235 mrem/pCi 0.000266 M 3 D 0.000266 NR NR NR NR NR FGR-11, RESRAD Library J-236 mrem/pCi 0.000269 M 3 D 0.000269 NR NR NR NR FGR-11, RESRAD Library J-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-234 U-235 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-232	risk/pCi nlactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144 0.000396 0.000548	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144 0.000396		NA NA NA NA NA NA NA NA NA NA NA NA NA N	25 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2	RESRAD Default FGR-11, RESRAD Library
J-236 mrem/pCi 0.000269 M 3 D 0.000269 NR NR NR NR FGR-11, RESRAD Library J-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-234 U-235 U-236 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-232 Th-230 Th-230 Th-230	risk/pCi nlactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118 0.0164 0.00537 0.00132 0.00134 0.000396 0.000396 0.000548 0.00273	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D	0.0132 0.118 0.0136 0.00858 0.00477 0.342 0.326 0.123 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144 0.000396 0.000548 0.000273		26 25 25 25 25 25 25 25 25 25 25 25 25 25	25 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2	RESRAD Default FGR-11, RESRAD Library
D-238 mrem/pCi 0.000255 M 3 D 0.000255 NR NR NR NR NR FGR-11, RESRAD Library	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-232 U-234 U-235 U-236 U-238 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-228 Th-230 Th-230 Th-232 U-234	risk/pCi nlactors/ mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.123 0.124 0.0106 0.00537 0.00132 0.00144 0.000396 0.000548 0.00273 0.000283	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D	0.0141 0.0106 0.0037 0.0037 0.0037 0.0123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00132 0.00132	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	29 29 29 29 29 29 29 29 29 29 29 29 29 2	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2		RESRAD Default FGR-11, RESRAD Library
	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-228 Th-230 Th-232 U-234 U-235 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-232 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235	risk/pCi 1 lactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144 0.000396 0.000548 0.00273 0.000263	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	Not used 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.000548 0.00073 0.000283 0.000283		200	3	2	RESRAD Default FGR-11, RESRAD Library
	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-232 U-234 U-235 U-236 U-238 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-228 Th-228 Th-230 Th-230 Th-232 U-234	risk/pCi 1 lactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144 0.000396 0.000548 0.00273 0.000263	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	8.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.125 0.118 0.0166 0.00537 0.00132 0.00144 0.000396 0.000548 0.00273 0.00283 0.00266 0.000269		200	3	2	RESRAD Default FGR-11, RESRAD Library
	Slope factor – ingestion Inhalation dose conversion Ac-227 Pa-231 Pb-210 Ra-228 Th-230 Th-232 U-234 U-235 U-236 U-238 Ingestion Dose Donversion Ac-227 Pa-231 Pb-210 Ra-226 Ra-228 Th-230 Th-232 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235 U-234 U-235	risk/pCi nlactors mrem/pCi	Nuclide specific 6.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.123 0.125 0.118 0.0141 0.0106 0.00537 0.00132 0.00144 0.000396 0.000283 0.00273 0.000283 0.000286	M M M M M M M M M M M M M M M M M M M	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA D D D D D D D D D D D D D D D D D D D	8.7 1.28 0.0136 0.00858 0.00477 0.342 0.326 1.64 0.132 0.125 0.118 0.0166 0.00537 0.00132 0.00144 0.000396 0.000548 0.00273 0.00283 0.00266 0.000269		NA NA NA NA NA NA NA NA NA NA NA NA NA N		2	RESRAD Default FGR-11, RESRAD Library

			ı —				Distribution	Distribution	Distribution	Distribution	I
		RESRAD	Time!	Priority ²	Treatment ³	Value or Distribution ⁴	Parameter 1	Parameter	Parameter	Parameter	Domin
Parameter	Units	Default	Type'	Phonty	Treatment	Distribution	 	2	3	4	Basis Pathway suppressed for
Ac-227	:	0.0025	Р	_1	NA NA	Not used	NR	NR	NR	_NR	industrial worker scenario
Pa-231		0.01	P	1	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
21.040		0.04	Р			Netword		ND	ND	N.D.	Pathway suppressed for
Pb-210	· · ·	0.01	<u> </u>	1	NA NA	Not used	NR	NR	NR	NA NA	industrial worker scenario Pathway suppressed for
Ra-226		0.04	P	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-228	-	0.04	Р	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
7. 000		0.001	Р	1	NA NA	Netwood	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-228		0.001	 -	<u>'</u>	INA	Not used	ND -	INA	INIT	- JAIT	Pathway suppressed for
Th-230	<u> </u>	0.001	Р	11	NA	Not used	NR.	NR	NR	NR	industrial worker scenario
Th-232	- :	0.001	Р	1	NA	Not used	NR	NR	NR	NR.	Pathway suppressed for industrial worker scenario
11 224		0.0025	Р	1	NA	Not used	NR	NR	NA	NR	Pathway suppressed for
U-234		0.0025	 -		NA	Not used	INFL	INM	NH	NH.	industrial worker scenario Pathway suppressed for
U-235		0.0025	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
U-236		0.0025	Р	1	NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
11 000		0.0005	Р	1	NA	Not used	NR	NR	NR	МП	Pathway suppressed for
U-238 Meat Transfer Factor	- N:195 (AN)36	0.0025	- P	190246FIG	. INA 	Not used	INH	NH NH	ANGLESSES	NR	industrial worker scenario
A - 007	(pCi/kg)/ (pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NA	NR	Pathway suppressed for
Ac-227	(pCi/kg)/	0.00002	<u> </u>		NA .	Not used	INIT	INH	NH	NH	industrial worker scenario Pathway suppressed for
Pa-231	(pCi/d) (pCi/kg)/	0.005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pb-210	(pCi/d)	0.0008	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
Hd-220	(pCi/kg)/	0.001			110	1401 0360	INIT	INFI	IND	INFL .	Pathway suppressed for
Ra-228	(pCi/d) (pCi/kg)/	0.001	P	2	NA_	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-228	(pCi/d)	0.0001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Th-230	(pCi/kg)/ (pCi/d)	0.0001	Р	2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
111-230	(pCi/kg)/		l			1401 0300				INT	Pathway suppressed for
Th-232	(pCi/d) (pCi/kg)/	0.0001	Р	2	NA	Not used	NA	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-234	(pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NA	industrial worker scenario
U-235	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
0-203	(pCi/kg)/									1411	Pathway suppressed for
U-236	(pCi/d) (pCi/kg)/	0.00034	P	2	NA	Not used	NR	NR NR	NR	NR	industrial worker scenario Pathway suppressed for
U-238	(pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Milk Transfer Factor	(pCi/L)/	\$26.56 PM (5)	3/4/	3,1620-65	094,895,65	1960, W. 2227 W	XX X (545.5)	STANKER!		386 35 CA	Pathway suppressed for
Ac-227	(pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pa-231	(pCi/L)/ (pCi/d)	0.000005	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/		<u> </u>							1413	Pathway suppressed for
Pb-210	(pCi/d) (pCi/L)/	0.0003	Р	2	NA NA	Not used	NR	NR_	NR NR	NR	industrial worker scenario Pathway suppressed for
Ra-226	(pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NA	NR	industrial worker scenario
Ra-228	(pCi/L)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/										Pathway suppressed for
Th-228	(pCi/d) (pCi/L)/	0.000005	Р	2	NA NA	Not used	NR	NR	NR .	NR	industrial worker scenario Pathway suppressed for
Th-230	(pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Th-232	(pCi/L)/ (pCi/d)	0.000005	P	2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/										Pathway suppressed for
U-234	(pCi/d) (pCi/L)/	0.0006	Р	2	NA	Not used	NR	NR	NR		industrial worker scenario Pathway suppressed for
U-235	(pCi/d)	0.0006	Р	2	NA	Not used	NR	NR	NR		industrial worker scenario

							Distribution	Distribution	Distribution	District dis-	T
						Value or	Distribution	Distribution	Distribution	Distribution	
_		RESRAD	١_,	2	3	i	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
1	(pCi/L)/							l '			Pathway suppressed for
U-236	(pCi/d)	0.0006	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/L)/		_ :								Pathway suppressed for
U-238	(pCi/d)	0.0006	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Bioaccumulation factor for			S. S \$755		医性性性	BARRIET LAIN.	なる。		%04990 76	Figure 1	
	(pCi/kg)/		_								Pathway suppressed for
Ac-227	(pCi/L)	15	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		_	_							Pathway suppressed for
Pa-231	· (pCi/L)	10	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/			_							Pathway suppressed for
Pb-210	(pCi/L)	300	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		_								Pathway suppressed for
Ra-226	(pCi/L)	50	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
į	(pCi/kg)/							1			Pathway suppressed for
Ra-228	(pCi/L)	50	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-228	(pCi/L)	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/			i							Pathway suppressed for
Th-230	(pCi/L)	100	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-232	(pCi/L)	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/	1									Pathway suppressed for
U-234	(pCi/L)	10	Ρ	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-235	(pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-236	(pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/								-		Pathway suppressed for
U-238	(pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Bioaccumulation factor for	crustacea and	mollusks	(FAKAP)		SELECTION	(C. 1. Begggar, 6.5)	45423264C0				480386 (195.1980)
	(pCi/kg)/	T									Pathway suppressed for
Ac-227	(pCi/L)	1000	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/								-		Pathway suppressed for
Pa-231	(pCi/L)	110	P	3 .	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Pb-210	(pCi/L)	100	Р	3	NA	Not used	NR	NA	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Ra-226	(pCi/L)	250	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Ra-228	(pCi/L)	250	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-228	(pCi/L)	500	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-230	(pCi/L)	500	Ρ	3	NA	Not used	NR	NA	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-232	(pCi/L)	500	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-234	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-235	(pCi/L)	60	Р	3	NA	Not used	NA	NR	NR	NR	industrial worker scenario
	(pCi/kg)/							· · · · · · · · · · · · · · · · · · ·			Pathway suppressed for
U-236	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-238	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Graphics Parameters	337 077 37	33 9/807803411	29450	11. J. 18 J. No.	0-14 23 5 5	34.65 to 1805.00	I WAKETA È	324 A42,11	F. 46016451		XERSID AVAILABILIST SAN
1	l .	1	}	!			1				Value greater than default
Number of points	.	32	NA	NA	NA	1024	NR	NR	NR	NR	provides more evaluation points
Spacing		Log	NA	NA	NA	Log	NR	NR	NR	NR	RESRAD Default
Time Integration Paramete	rs - No.	(3) SALE (1942)	C1824940	2508527	per Ekrem	ESSAGES AT ACT IS	97, WF (4013) (1)	87,38,7882	DECIMAL SE	29888 KEK	215 0 , 1157 E 9795 S 702 F 7
Maximum number of	1			and the street of the street o							
points for dose	Ι.	17	NA	NA	NA	17	NR	· NR	NR	NR	RESRAD Default
Po 2026		L	,,			<u> </u>	1,411	. , 411		1911	1

Lognormal-n: 1 = mean, 2 = standard deviation

Bounded lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit
Truncated lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower quantile, 4 = upper quantile

P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A, Table 2.1)

²1 = high priority, 2 = medium priority, 3 = low priority (NUREG/CR-6697, Att. B, Table 4.2)

³D = deterministic, S = stochastic

⁴Distribution Statistical Parameters:

								Distribution	Distribution	Distribution	Distribution	
ĺ			RESRAD				Value or	Parameter	Parameter	Parameter	Parameter	
L	Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis

Bounded normal: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit
Beta: 1 = minimum, 2 = maximum, 3 = P-value, 4 = Q-value
Triangular: 1 = minimum, 2 = mode (most likely), 3 = maximum
Uniform: 1 = minimum, 2 = maximum
Continuous logarithmic: RESRAD default statistical parameters

Continuous linear: RESRAD default statistical parameters NR ≈ not required

Additional Sensitivity Analysis Data:

Sampling Technique = Latin Hypercube Random Seed = 1000
Number of observations = 300
Number of repetitions = 1
Grouping of Correlations = correlated or uncorrelated

Table D-2
Honeywell Metropolis Works
Pond D Dose Assessment
Industrial Worker Scenario
Source Configuration Summary

		5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
	Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
	Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area	CZ Area ⁽³⁾	Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m ²)	(m^2)	(m)	(m)	(m)	(m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b – Ponds B, C, D, and E" provided in Appendix A

⁽²⁾ Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond

Table D-3
Honeywell Metropolis Works
Pond D Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

	Radionu	uclide Concentration	n (pCi/g)
		Corrected for 5%	Corrected for
Radionuclide	Average Dry	Bulking Factor	% Solids
Protactinium 231	0.52	0.49	0.25
Radium 226	0.95	0.90	0.46
Thorium 228	0.58	0.55	0.28
Thorium 230	2.35	2.23	1.14
Thorium 232	0.15	0.14	0.07
Uranium 234	993.50	943.82	480.78
Uranium 235	17.94	17.04	8.68
Uranium 236	26.60	25.27	12.87
Uranium 238	1041.12	989.06	503.83

% Solids:

50.94%

Table D-4 Honeywell Metropolis Works Pond D Dose Assessment Industrial Worker Scenario Hydraulic Conductivity of Silty Clay

Pressure	Hydraulic Conductivity	Hydraulic Conductivity
(psf)	(cm/sec)	(m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table D-5
Honeywell Metropolis Works
Pond D Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Bulk Density	Average Bulk Density
Pond	Sample ID	(g/ml)	(g/ml)
В	B-18 Lower	1.6	
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В	-	-	1.575
С	C-2	1.6	-
С	C-5	1.7	-
С	C-19 Lower	1.6	-
С	C-19 Upper	1.5	•
С	-	_ -	1.6
D	D-8 Lower	1.5	-
D	D-8 Upper	1.6	-
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	-
D	D-17 Lower	1.5	-
D	D-17 Upper	1.6	•
D	D-26 Lower	1.8	
D	D-26 Upper	1.9	-
D	-	-	1.6
E	E-65 Lower	1.3	•
E	E-65 Upper	1.5	-
E	E-80 Lower	1.5	•
E	E-80 Upper	1.5	-
Ε	E-97 Lower	1.2	-
E	E-97 Upper	1.1	-
E	E-103 Lower	1.7	-
E	E-103 Upper	1.7	-
E	-	•	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX E

Pond E Probabilistic Sensitivity Analysis Input Summary

		Γ			ı		Distribution	Distribution	Distribution	Distribution	
1		RESRAD				Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Contaminated Zone	880448.078000	\$2000000000000000000000000000000000000	88.40 (0.00)	8.0800386	1012 K 1910 SEEF J.				100000000000000000000000000000000000000	\$40 (\$44) SE	
Area of contaminated											
zone	m²	10000	₽	2	D	12,000	NR	NR	NR	NR	See Table E-2.
Thickness of		_		_	_	1	l				0
contaminated zone	m	2	Р	2	D	3.453	NR	NR	NR	NR	See Table E-2.
Langth parallel to the		l		ľ	ł		1	i I			Length of longest side of contaminated zone. See Table E
Length parallel to the aquifer flow	m	100	Р	2	D	165	NR	NR	NR	NR	2.
Basic Radiation Dose		100			<u> </u>	100	1311	- (1)			Unrestricted release criteria in
Limit	mrem/year	30	P	3	D	25	NR	NR	NR	NR	10 CFR 20.1402
Time since placement	yr	0	Р	3	ō	0	NR	NR	NR	NA	RESRAD default
Times for calculations	yr	1	Р	3	D	1	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	3	Р	3	D	3	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	10	Р	3	D	10	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	30	Р	3	D	30	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	100	Р	3	D	100	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	300	P	3	D	300 1000	NR	NR	NA	NR	RESRAD default
Times for calculations	yr (a Camanana)	1000		3	D	1000	NR	NR	NR_	NR	HESHAD delault
Initial Principle Radionuclic	pCi/g	Ones O	P	2	D D	0	NR	NR	NR	NR	See Table E-3
Soil: Ac-227 Soil: Pa-231	pCi/g	0		2	D	0.07	NR NR	NR	NR	NR	See Table E-3
Soil: Pb-210	pCi/g	0	P	2	 5	0.07	NR	NR	NR	NR	See Table E-3
Soil: Ra-226	pCi/g	0	P	2	 5	0.34	NR.	NR	NR	NR	See Table E-3
Soil: Ra-228	pCi/g	ō	P	2	D	0	NR	NR	NR	NR	See Table E-3
Soil: Th-228	pCi/g	0	Р	2	D	0.03	NR	NR	NR	NR	See Table E-3
Soil: Th-230	pCi/g	0	Р	2	D	0.83	NR	NR	NR	NR	See Table E-3
Soil: Th-232	pCi/g	0	Р	2	D	0.03	NR	NR	NR	NR	See Table E-3
Soil: U-234	pCi/g	. 0	Р	2	D	118.57	NR	NR	NR	NR	See Table E-3
Soil: U-235	pCi/g	0	Р	2	D	5.11	NR	NR	NR	NR	See Table E-3
Soil: U-236	pCi/g	0	Р	2	D	2.91	NR	NR	NR	NR	See Table E-3
Soil: U-238	pCi∕g	0	P	2	D	122.69	NR	NR	NR	NR	See Table E-3
		_	l _								Not used for calculation of
Groundwater: Ac-227	pCi/L	0	P	3	NA NA	Not used	NR	NR	NR_	NR	distribution coefficients
	0.0			_ `	l						Not used for calculation of
Groundwater: Pa-231	pCi/L	0	P	3	NA NA	Not used	NR	NR	NA	NR	distribution coefficients
Crowndurator: Ph 310	pCi/L	0	Р	3	NA	Not used	NŘ	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater: Pb-210	PCVL	<u> </u>			INA	1401 USBU	INIT	IND	NIT	חאו	Not used for calculation of
Groundwater: Ra-226	pCi/L	0	Р	3	NA	Not used	NR	NR .	NR	NR	distribution coefficients
GIOGNANGIO I I G 220	PONE	<u>-</u>	<u> </u>	-	147.	1101 0000		1411			Not used for calculation of
Groundwater: Ra-228	pCi/L	l o	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
	F										Not used for calculation of
Groundwater: Th-228	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Th-230	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Th-232	pCi/L	0	, Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
			_ '								Not used for calculation of
Groundwater: U-234	pCi/L	0	P	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
0	-0:#	١ ,	P	١ ,	l	Natural		ND	ND	ND	Not used for calculation of
Groundwater: U-235	pCi/L	0	 -	3	NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-236	pCi/L	0	lρ	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
Groundwater. 0-236	POWE	- · ·			130	1401 0300	1464	NA	140	1973	Not used for calculation of
Groundwater: U-238	pCi/L	٥	lρ	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients
Cover and Contaminated		h		2500000000	100000000000000000000000000000000000000	100 0000		AND SERVE	SW MARKETON	FEDERAL STREET	GISTING TO COMMISSION OF THE C
Cover depth	m	0	Р	2	Ð	1.59	NR	NR	NR	NR	See Table E-2
						Bounded					NUREG/CR-6697 Att. C, Table
Density of cover material	g/cm ³	1.5	Р	1	s	Normal	1.696	0.1855	1.123	2.269	3.1-1, Silty Clay
Cover erosion rate	m/yr	0.001	P,B	2	S	Uniform	0.00003	0.00018			Uniform distribution derived from NUREG/CR-6697 Att.C, Section 3.8 for permanent pasture with maximum 5% slope. Design maximum slope is 4%
Density of contaminated											
zone	g/cm ³	1.5	Р	1	D	1.438	NR	NR	NR	NR	See Table E-5
											Uniform distribution derived from NUREG/CR-6697 Att.C.
Contaminated zone	mh:-	0.001	9.9	2	s	Uniform	0.00001	0.00006			Section 3.8 for permanent pasture with assumed 2%
erosion rate	m/yr	0.001	P,B	2		Ondom	0.00001	0.0000		-	slope after cover erosion.

		RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Contaminated zone total				,		Bounded		l			NUREG/CR-6697 Att. C, Table
porosity		0.4	Р	2	S	Normal	0.41	0.09	0.1319	0.6881	3.2-1, Loamy Sand
Contaminated zone field capacity	_	0.2	P	3	D	0.2	NR	NR	NR	NR	RESRAD default
,			· · · · · ·								Average Kh from dilatometer
											(DMT) pressure dissipation tests
Contaminated zone				i							performed on in-situ Pond E sludge by In-Situ Testing LC,
hydraulic conductivity	m/yr	10	Р	2	D	1.6	NR	NR	NR	NR	August 5-7, 2009
Contaminated zone b						Bounded					NUREG/CR-6697 Att. C, Table
parameter		5.3	Р	2	S	lognormal-n	0.305	0.258	0.61	3.01	3.5-1, Loamy Sand This parameter only used if
Humidity in air	g/m³	8	lρ	3	NA	Not used	NR	NR NR	NR	NR	Tritium is present in soil
Evapotranspiration											NUREG/CR-6697 Att. C,
coefficient		0.5	Р	2	s	Uniform	0.5	0.75	-	-	Section 4.3
			}								Average annual wind speed for
			1								Paducah, KY (NOAA),7.4 mph
Average annual wind											http://lwf.ncdc.noaa.gov/oa/clima
speed	m/s	2	P	2	D	3.3	NR	NR	NR	NR	te/online/ccd/avgwind.html NUREG/CR-6697 Att. C, Table
Precipitation rate	m/yr	1	P	2	D	1.25	NR	NR	NR	NR	4.1-1, Paducah, KY
											Not applicable for industrial
Irrigation rate	m/yr	0.2	В	3	D	0	NA	NR	NR	NR	scenario
Irrigation mode	_	Overhead	В	3	D	Overhead	NR	NR	NR NR	NR	RESRAD default. Method is used in Illinois
ingation mode		Overneau	-			Overnead	INA	I I	INFI	NO.	NUREG/CR-6697 Att. C, Table
1			}	i i				<u> </u>	,		4.2-1 method. Assume c ₁ = 0.3,
Runoff coefficient	<u> </u>	0.2	Р	2	D	0.4	NR	NR	NR	NR	$c_2 = 0.2$, and $c_3 = 0.1$
Watershed area for nearby stream or pond	m²	1.00E+06	P	3	D	277817	NR	NR	NR I	NŘ	Pond area watershed. See Appendix A.
Accuracy for water soil		1.002+00	<u> </u>	,		2,,,,,,	1311	NA.	(4)	1411	Appendix A.
computation		1.00E-03	NA	3	D	1.00E-03	NR	NR	NR	NR	RESRAD default
Saturated Zone Hydrologic	al Data		Part Control	600 (J. 20	War Arth	Bounded	9863 9767.2559.		S825/3430 9 63	200-200-00-00	NUREG/CR-6697 Att. C, Table
Density of saturated zone	g/cm ³	1.5	Р	1	s	Normal	1.5105	0.159	1.019	2.002	3.1-1, Sand
Saturated zone total						Bounded					NUREG/CR-6697 Att. C, Table
porosity		0.4	P	1	S	Normal	0.43	0.06	0.2446	0.6154	3.2-1, Sand
Saturated zone effective porosity		0.2	Р	1	s	Bounded Normal	0.383	0.061	0.195	0.572	NUREG/CR-6697 Att. C, Table 3.3-1, Sand
Saturated zone field		U.L	 -i			1,10111101	0.000		0.100	0.07.2	0.0 1, 00.10
capacity		0.2	P	3	D	0.2	NR	NA	NR	NR	RESRAD default
Saturated zone hydraulic conductivity	m/yr	100	Р	1	s	Beta	110	5870	1.398	1.842	NUREG/CR-6697 Att. C, Table 3.4-1, Sand
Conductivity	111/91	100	<u> </u>			Deta	- 110	3070	1.030	1.042	Andrews Engr. Geologic Cross
					·						Section Sheet A-A' (El. 319.24 -
Saturated zone hydraulic gradient		0.02	Р	2	D	0.0048	NR	NR	NR	NR	El. 298.54)/ 4320 ft. See Appendix A.
Saturated zone soil-	•	0.02	F	-		Bounded	1945	IVIT	NH	INIT	NUREG/CR-6697 Att. C. Table
specific b parameter	-	5.3	Р	2	S	lognormal-n	-0.0253	0.216	0.501	1.9	3.5-1, Sand
Water table drop rate	m/yr	1.00E-03	Р	3	D	1.00E-03	NR	NR	NR	NR	RESRAD default
Well-pump intake depth			ŀ								Honeywell Sanitary Well Depth from HSA - depth to saturated
(below water table)	m	10	Р	2	D	105	NR	NR -	NR	NR	zone.
			İ				;				ND Model is used for larger contaminated areas (e.g. more
Model: non-dispersion or			-	l '							than 1,000 m ²) per RESRAD
mass balance	-	ND	Р	3	D	ND	NR	NR	NR	NR	Users Manual Section E.3.1.
	3.		Ī	l .							This parameter is not used in the
Well pumping rate Unsaturated Zone Hydrolo	m ³ /yr	250	8, P	2	0	Not used	NR	NR	NA	NR	non-dispersion model
Unsaturated Zorie Hydrold	yıcaı Data 🛠	25,25,200,200,200,200,200	ARC (7365) "III	2005/08 37 ABC	paras et il per Al	marantini (j.C.E.	C. B. B. B. C. C. C. C. C. C. C. C. C. C. C. C. C.	S 22 28 28 462 5	gorastana 14	an egytti aggatetti.	Andrews Engineering Project ID
[91-135 cross section Sheet
Number of unsaturated				_	ایا	F	No.		No.	N/D	Number A-A', January 2007.
zones		11	Р	3	D	5	NR	NR	NR	NR	See Appendix A. Andrews Engineering Project ID
Unsaturated zone 1											91-135 cross section Sheet
thickness (Clayey Silt/Silty											Number A-A', January 2007.
Clay)	m	4	Р	1	D	6.86	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 1 soil density	g/cm ³	1.5	_P	2	s	Bounded Normal	1.696	0.1855	1.123	2.269	NUREG/CR-6697 Att. C, Table 3.1-1, Silty Clay
Unsaturated zone 1 total	9.3111					Bounded					NUREG/CR-6697 Att. C, Table
porosity	-	0.4	Р	2	S	Normal	0.36	0.07	0.144	0.576	3.2-1, Silty Clay

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value or Distribution ⁴	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Unsaturated zone 1	Office	Delault	1,950	Thonly	Heatinent	Bounded	 			7	NUREG/CR-6697 Att. C. Table
effective porosity	_	0.2	Р	2	s	Normal	0.289	0.0735	0.0623	0.517	3.3-1, Silty Clay
Unsaturated zone 1 field capacity Unsaturated zone 1	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
hydraulic conductivity	m/yr	10	P	2	D	126	NR	NR	NR	NR	See Table E-4
Unsaturated zone 1 soil- specific b parameter	-	5.3	Р	2	S	Bounded lognormal-n	2.29	0.259	4.43	22	NUREG/CR-6697 Att. C, Table 3.5-1, Silty Clay
Unsaturated zone 2 thickness (Sandy Silt/Silty Sand)	m	4	Р	1	D	1.71	NR	NR	NFI	NFR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 2 soil						Bounded					NUREG/CR-6697 Att. C, Table
density Unsaturated zone 2 total	g/cm ³	1.5	Р	2	S	Normal Bounded	1.5635	0.2385	0.827	2.3	3.1-1, Loamy Sand NUREG/CR-6697 Att. C, Table
porosity		0.4	Р	2	S	Normal	0.41	0.09	0.1319	0.6881	3.2-1, Loamy Sand NUREG/CR-6697 Att. C, Table
Unsaturated zone 2 effective porosity		0.2	Р	2	S	Bounded Normal	0.353	0.0913	0.0711	0.635	3.3-1, Loamy Sand
Unsaturated zone 2 field capacity	-	0.2	Р	3	D	0.2	NR	NŘ	NR	NR	RESRAD default
Unsaturated zone 2 hydraulic conductivity	m/yr	10	Р	2	s	Beta	12.3	4230	0.7992	1.91	NUREG/CR-6697 Att. C, Table 3.4-1, Loamy Sand
Unsaturated zone 2 soil-	_	5.3	Р	2	s	Bounded lognormal-n	0.305	0.258	0.61	3.01	NUREG/CR-6697 Att. C, Table 3.5-1, Loamy Sand
Unsaturated zone 3		3.0				logionnai ii	0.000	0.230		0.01	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
thickness (Sand)	m	4	Р	. 1	D	1.71	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 3 soil density	g/cm ³	1.5	P	2	s	Bounded Normal	1.5105	0.159	1.019	2.002	NUREG/CR-6697 Att. C, Table 3.1-1, Sand
Unsaturated zone 3 total porosity		0.4	Р	2	S	Bounded Normal	0.43	0.06	0.2446	0.6154	NUREG/CR-6697 Att. C, Table 3.2-1, Sand
Unsaturated zone 3 effective porosity	_	0.2	Р	2	s	Bounded Normal	0.383	0.061	0.195	0.572	NUREG/CR-6697 Att. C, Table 3.3-1, Sand
Unsaturated zone 3 field			P								
Capacity Unsaturated zone 3	-	0.2		3	D	0.2	NR	NR _	NR	NR	RESRAD default NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	_10	₽	2	S	Beta	110	5870	1.398	1.842	3.4-1, Sand
Unsaturated zone 3 soil- specific b parameter		5.3	Р	2	S	Bounded lognormal-n	-0.0253	0.216	0.501	1.9	NUREG/CR-6697 Att. C, Table 3.5-1, Sand
Unsaturated zone 4 thickness (Sandy Silt/Silty Sand)	m	4	Р	1	D	4	NR	NR	NR	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 4 soil density	g/cm ³	1.5	Р	2	S	Bounded Normal	1.5635	0.2385	0.827	2.3	NUREG/CR-6697 Att. C, Table 3.1-1, Loamy Sand
Unsaturated zone 4 total porosity	-	0.4	Р	2	s	Bounded Normal	0.41	0.09	0.1319	0.6881	NUREG/CR-6697 Att. C, Table 3.2-1, Loamy Sand
Unsaturated zone 4 effective porosity	_	0.2	P	2	S	Bounded Normal	0.353	0.0913	0.0711	0.635	NUREG/CR-6697 Att. C, Table 3.3-1, Loamy Sand
Unsaturated zone 4 field capacity		0.2	P	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 4 hydraulic conductivity	m/yr	10	P	2	s	Beta	12.3	4230	0.7992	1.91	NUREG/CR-6697 Att. C, Table 3.4-1, Loamy Sand
Unsaturated zone 4 soil-	11091	10	'		3	Bounded	12.0	4230	0.7332	1.51	NUREG/CR-6697 Att. C, Table
specific b parameter	-	5.3	Р	2	s	lognormal-n	0.305	0.258	0.61	3.01	3.5-1, Loamy Sand Andrews Engineering Project ID
Unsaturated zone 5 thickness (Sand)	m	4	₽	1	D	1.14	NR	NR	NR	NR	91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 5 soil density	g/cm³	1.5	Р	2	s	Bounded Normal	1.5105	0.159	1.019	2.002	NUREG/CR-6697 Att. C, Table 3.1-1, Sand
Unsaturated zone 5 total porosity	-	0.4	Р	2	s	Bounded Normal	0.43	0.06	0.2446	0.6154	NUREG/CR-6697 Att. C, Table 3.2-1, Sand
Unsaturated zone 5 effective porosity		0.2	P	2	s	Bounded Normal	0.383	0.061	0.195	0.572	NUREG/CR-6697 Att. C, Table 3.3-1, Sand
Unsaturated zone 5 field capacity		0.2	ρ	3		0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 5	m/···		P	2	s		110	5870	1.398		NUREG/CR-6697 Att. C, Table
hydraulic conductivity	m/yr	10	٢		5	Beta	110	20/0	1.396	1.842	3.4-1, Sand

r		Y	,	r	1		Distribution	Distribution	Distribution	Distribution	1
		RESRAD				Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Type1	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Unsaturated zone 5 soil-						Bounded]		NUREG/CR-6697 Att. C. Table
specific b parameter	-	5.3	Р	2	s	lognormal-n	-0.0253	0.216	0.501	1.9	3.5-1, Sand
Distribution Coefficients (c	ontaminated, u	insaturated, a	nd satura	ted zones		Truncated	t, 10 m/s				NUREG/CR-6697 Att. C.
Ac-227	cm³/g	20	Р	1	s	lognormal-n	6.72	3.22	0.001	0.999	Section 3.9, Table 3.9-1
D. 004	3,		Р			Truncated	5.04		0.004	0.000	NUREG/CR-6697 Att. C,
Pa-231	cm ³ /g	50		1	S	lognormal-n Truncated	5.94	3.22	0.001	0.999	Section 3.9, Table 3.9-1 NUREG/CR-6697 Att. C.
Pb-210	cm³/g	100	Ρ	1	s	lognormal-n	7.78	2.76	0.001	0.999	Section 3.9, Table 3.9-1
Ra-226	cm³/g	70	P	1 .	s	Truncated lognormal-n	8.17	1.7	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
114-220			<u> </u>	<u> </u>		Truncated	0.17	<u>'::</u>	0.001	0.555	NUREG/CR-6697 Att. C,
Ra-228	cm ³ /g	70	Р	1	S	lognormal-n Truncated	8.17	1.7	0.001	0.999	Section 3.9, Table 3.9-1 NUREG/CR-6697 Att. C.
Th-228	cm³/g	60000	Р	1	s	lognormal-n	8.68	3.62	0.001	0.999	Section 3.9, Table 3.9-1
	3.		_		_	Truncated					NUREG/CR-6697 Att. C,
Th-230	cm³/g	60000	Р	1	s	lognormal-n Truncated	8.68	3.62	0.001	0.999	Section 3.9, Table 3.9-1 NUREG/CR-6697 Att. C,
Th-232	cm³/g	60000	Р	1	s	lognormal-n	8.68	3.62	0.001	0.999	Section 3.9, Table 3.9-1
U-234	cm³/g	50	Р	1	s	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
0-234	CIII 7g	50		- '-	3	Truncated	4.04	3.13	0.001	0.999	NUREG/CR-6697 Att. C,
U-235	cm³/g	50	Р	1	S	lognormal-n	4.84	3.13	0.001	0.999	Section 3.9, Table 3.9-1
U-236	cm³/g	50	Р	1	s	Truncated lognormal-n	4.84	3.13	0.001	0.999	NUREG/CR-6697 Att. C, Section 3.9, Table 3.9-1
						Truncated		<u> </u>			NUREG/CR-6697 Att. C,
U-238 Transport Factor Options	cm ³ /g	50	P	1	S	lognormal-n	4.84	3.13	0.001	0.999	Section 3.9, Table 3.9-1
Transport Factor Options:	O STREET, BROCKERINGS	X1100 100 100 100 100 100 100 100 100 10	C-4:3:30AR	SECTION STATES	2C 3152 1, Nader 27, 374	**** * * * * * * * * * * * * * * * * *	3.23 (300%) (300%)	7-9-20-39-39-55-4	May 198 Converse	Marketing Continues	
Leach rate	1/yr	0	Р	3	D	0	NR	NR	NR	NR	RESRAD default, parameter is not used for calculation of distribution coefficients. Value of 0 not used for calculation of distribution coefficients.
Solubility limit	mol/L	0	Р	3	D	2.94E-06	NR	NR	NR	NR	Value used for Uranium nuclides only
Coldbinty in the	1,7042		 	<u> </u>				1371	, ,,,,		RESRAD default, parameter not
Use plant/soil ratio	Check box	Yes/No	NA NA	3	NA NA	No	NR	NR	NR	NR	used for calculation of distribution coefficients.
Occupancy	ATTO ASSESSED	679/34 3 941	CSCH 36	(Wardes	48636543c	200775753550	ROST/XXX	21222000	32742042	227 22 256 c	distribution coemiciants.
Inhalation rate	m³/yr	8400	м, в	3	D	11400	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Mass loading for inhalation	g/m³	0.0001	P, B	2	s	Continuous linear		_	_		NUREG/CR-6697 Att. C, Section 4.6
Exposure duration	yr	30	В	3	D	25	NR	NR	NR	NA	RESRAD Manual, Table 2.3
Indoor dust filtration factor (shielding factor, inhalation)		0.4	P, B	2	s	Uniform	0.15	0.95	-		NUREG/CR-6697 Att. C, Section 7.1
Shielding factor, external		2.7		_		Bounded	4.5	0.50			NUREG/CR-6697 Att. C,
gamma Indoor time fraction	-	0.7 0.5	P 8	3	S	lognormal-n 0.17	-1.3 NR	0.59 NR	0.044 NR	NR	Section 7.10 RESRAD Manual, Table 2.3
Outdoor (on site) time					_						
fraction Shape of the	-	0.25	8	3	D	0.06	NR	NR	NR	NR	RESRAD Manual, Table 2.3 Shape representative of pond
contaminated zone	-	1	Р	3	D	Non-circular	NR	NR	NR .	NR	(rectangular)
Ingestion, Dietary	MARKING IN	9-1450 <u>354</u> 956		\$78861R	->:-0 3 (8)	Procession of the Control of the Con	8000 EC 10.5)	PROCESS OF	Pathway suppressed for
Fruit, vegetable, and grain consumption rate	kg/yr	160	м, в	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Leafy vegetable											Pathway suppressed for
consumption	kg/yr	14	M, B	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Milk consumption	L/yr	92	M, B	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Meat and poultry	kehe	63	м, в	3	NA	Not used	· NR	NR	ND	NO	Pathway suppressed for
consumption	kg/yr	- 03	1971, D	-	INA.	1401 USBU	1417	INF	NR	NR	industrial worker scenario Pathway suppressed for
Fish consumption rate	kg/yr	5.4	M, B	3	NA	Not used	NR	NR	NR		industrial worker scenario
Other seafood consumption rate	kg/yr	0.9	М, В	3	NA NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario
Soil ingestion rate	g/yr	36.5	М, В	2	D	36.5	NR	NR	NR	NA	RESRAD Manual, Table 2.3 based on EPA suggested value of 100 mg/day
Drinking water intake	L/yr	510	М, В	2	D	478.5	NR	ND	ND		NUREG/CR-5512, V3
Drinking water intake	∟∪yr	310	I W, B			478.5	NH	NR	NR	NR	Table 6.87

						,	Distribution	Distribution	Distribution	Distribution	
		RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	1
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
			,,,,,,								RESRAD default, all drinking
Contamination fraction of			i								water assumed from
drinking water		1	B, P	3	NA	1	NR	NR	NR	NR	groundwater
Contamination fraction of household water		1	B, P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of	-	<u> </u>	B, P		INA	Not used	I IND	I NIS	NH	NH	Pathway suppressed for
livestock water	-	1	В,Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of											Pathway suppressed for
irrigation water	-	1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of						\$1-\$d					Pathway suppressed for
aquatic food Contamination fraction of		0.5	B, P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
plant food		-1	B.P.	3	NA	Not used	NR	NR .	NR	NR	industrial worker scenario
Contamination fraction of									7.11,1		Pathway suppressed for
meat	-	-1	В, Р	3	NA	Not used	NR	NA	NR	NR NR	industrial worker scenario
Contamination fraction of									-		Pathway suppressed for
milk	-	-1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ingestion, Non-Dietary//	(77) AB E (17) (8 A)	E049494.75	2000	1.67%(\$100g);	100000000000000000000000000000000000000	(AME CONTACT)	**************************************	86/02/02/161		\$5.5 Y/49.46694	Pathway suppressed for
rate for meat	kg/đ	68	М	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Livestock fodder intake											Pathway suppressed for
rate for milk	kg/d	_55	М	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Livestock water intake			1	_			!				Pathway suppressed for
rate for meat Livestock water intake	L/d	50	М	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
rate for milk	L/d	160	м	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Tato to than	<u> </u>				,		- '''-	1111	7311		Pathway suppressed for
Livestock soil intake	kg/d	0.5	М	3	NA	Not used	NR	NR	_NR	NR	industrial worker scenario
Mass loading for foliar											Pathway suppressed for
deposition	g/m³	1.00E-04	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario NUREG/CR-6697 Att. C.
Depth of soil mixing layer	m	0.15	_P	2	s	Triangular	0	0.15	0.6		Section 3.12
Deptit of son mixing layer	""	0.13	- -			mangulas		0.13	0.0		Pathway suppressed for
Depth of roots	m	0.9	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
											RESRAD default, all drinking
Drinking water fraction				_	_					_	water assumed from
from groundwater	-	1	B, P	3	D	1	NR	NA	NR	NR NR	groundwater
Household water fraction											Parameter applies to Radon
from groundwater		1	B, P	3	NA NA	Not used	NR	NR	NR	NR	only.
Livestock water fraction											Pathway suppressed for
from groundwater	-	1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Irrigation fraction from			B, P	3	A14	Maturad	\	ND.		ND	Pathway suppressed for
groundwater Wet weight crop yield for		1	6, P	3	NA	Not used	NR	NR	NR	NR NR	industrial worker scenario Pathway suppressed for
non-leafy plants	kg/m²	0.7	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet weight crop yield for											Pathway suppressed for
leafy plants	kg/m²	1.5	Р	3	NA	Not used	NR	NA	NA	NR	industrial worker scenario
Wet weight crop yield for	1.1.2					M-1 d					Pathway suppressed for
fodder Growing season for non-	kg/m²	1.1	_Р	3	NA NA	Not used	NR	NR	NR		industrial worker scenario Pathway suppressed for
leafy vegetables	yr	0.17	P	3	NA .	Not used	NR	NA	NR	NR	industrial worker scenario
Growing season for leafy	,		···						7411		Pathway suppressed for
vegetables	yr	0.25	Р	3	NA	Not used	NR	NR	NR	NA	industrial worker scenario
Growing season for											Pathway suppressed for
fodder Translagation factor for	yr	0.08	P	3	NA NA	Not used	NR	NR I	NR NR		industrial worker scenario
Translocation factor for non-leafy vegetables	_	0.1	P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Translocation factor for		5.1			,		.,,,		, ,		Pathway suppressed for
leafy vegetables	-	1	Р	3	NA	Not used	NR	NR	NR		industrial worker scenario
Translocation factor for											Pathway suppressed for
fodder	<u> </u>	1	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Dry foliar interception fraction for non-leafy				ļ	ļ			ļ	ļ		Pathway suppressed for
vegetables		0.25	Р	3	NA	Not used	NR	NR	NR		rathway suppressed for industrial worker scenario
Dry foliar interception		5.25				3004				1411	
fraction for leafy									ĺ		Pathway suppressed for
vegetables	-	0.25	Ρ	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Dry foliar interception									T		Pathway suppressed for
fraction for fodder	·	0.25	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet foliar interception fraction for non-leafy			}	- 1	1		1	ł	ł	l	Pathway suppressed for
vegetables		0.25	P	3	NA	Not used	NR	NR	NR		industrial worker scenario
	······		لسنا	<u> </u>				,			

<u> </u>											<u> </u>
		RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Distribution ⁴	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Basis
Wet foliar interception	Onns	Delault	туре	Filolity	пединени	Distribution	'				Dasis
fraction for leafy					ł						Pathway suppressed for
vegetables	-	0.25	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet foliar interception											Pathway suppressed for
fraction for fodder	-	0.25	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Weathering removal			_								Pathway suppressed for
constant for vegetation	1/yr	20	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Special Radionuclides (C-	14)	250000000000000000000000000000000000000			2000000000		12.00 PM	SOME MORRO	7 8055 K. Bod	30/5/3/03/5/03	A - I I - 6 - 0 44
C-12 concentration in water	g/cm ³	2.00E-05	P	3	NA	Not used	NA	NR	NR	NR	Applicable for C-14 exposure only
C-12 concentration in	g/cm	2.00E-03	_		, NA	1401 0560	INFI	(ND	IND	INIT	Applicable for C-14 exposure
contaminated soil	g/g	3.00E-02	Р	3	NA	Not used	NR	NR	NR	NR	only
Fraction of vegetation	99	0.002 02	Ť					1		<u></u>	Applicable for C-14 exposure
carbon from soil	-	2.00E-02	Р	3	NA NA	Not used	NA	NR	NR	NR	only
Fraction of vegetation										_	Applicable for C-14 exposure
carbon from air	-	0.98	Р	3	NA	Not used	NR	NR	NR .	NR	only
C⊡14 evasion layer											Applicable for C-14 exposure
thickness in soil	m	0.3	Р	2	NA	Not used	NR	NR	NR	NR	only
C-14 evasion flux rate			_ :								Applicable for C-14 exposure
from soil	1/s	7.00E-07	Р	3	NA	Not used	NR	NA	NR	NR	only
C-12 evasion flux rate	41-	4 005 40	Р			Netword	NO		NO.	ND	Applicable for C-14 exposure
from soil Fraction of grain in beef	1/s	1.00E-10	Р	3	NA .	Not used	NR	NR	NR	NR_	only Applicable for C-14 exposure
cattle feed	_	0.8	В	3	NA I	Not used	NR	NR	NR	NR	only
Fraction of grain in milk	-	0.8	-		IVA	1401 0360	INO	INE	ING	1913	Applicable for C-14 exposure
cow feed	_	0.2	В	3	NA	Not used	NR	NR	NR	NR	only
Storage Times of Contami	nated Foodstu		alitical seek	291218/63	34 4 3 3 1 2 3	F-0000-007-04/78/74	MINESON.	SCHOOL SECTION	CONTRACTOR OF	010000000000000000000000000000000000000	
Storage time for fruits,											
non-leafy vegetables, and											Pathway suppressed for
grain	d	14	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for leafy			_ :								Pathway suppressed for
vegetables	d	. 1	В	3	NA	Not used	NR	NR	NR	NR_	industrial worker scenario
0						Natural	ND				Pathway suppressed for
Storage time for milk	d	1	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for meat	d	20	В	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Storage time for meat	0	20			110	1401 0300	ING	INIT	Nn	INIT	Pathway suppressed for
Storage time for fish	d	7	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Otorago umo ror morr							7,11	7411	7411		
Storage time for											Pathway suppressed for
crustacea and mollusks	d	7	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for well											Pathway suppressed for
water	d	1	В	3	NA	Not used	NR	NR	NR	NR _	industrial worker scenario
Storage time for surface			_							_	Pathway suppressed for
water	d	1	В	3	NA NA	Not used	NR	NR	NR	NR_	industrial worker scenario
Storage time for livestock			_							ND	Pathway suppressed for
fodder	d	45	8	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Radon Thickness of building	800 MARY 200	880 800 X X X	997-X1-03:	\$454,323,054c		1943 10038884083688	9018289 92-5084	8.86/1/2004/075	**C***********************************	(19939X130)X14	Applicable for Radon exposure
foundation	m	0.15	Р	3	NA NA	Not used	NR	NR	NR	NR	only
Bulk density building	- '''	0.13	·		147	1101 0500	1471	1411	1411		Applicable for Radon exposure
foundation	g/m³	2.4	Р	3	NA	Not used	NR	NR	NR	NR	only
Total porosity of cover											Applicable for Radon exposure
material	-	0.4	Р	3	NA ,	Not used	NR	NA	NR	NR	only
Total porosity of building											Applicable for Radon exposure
foundation		0.1	Р	3	NA	Not used	NR	NR	NR	NR	only
Volumetric water content			_		ا						Applicable for Radon exposure
of cover material	-	0.05	Р	3	NA	Not used	NR	NR	NR	NR	only
Volumetric water content											Applicable for Redea assesses
of building foundation	_	0.03	Р	3	NA .	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon diffusion		0.00			110	110, 0300	1163	118	14(1	110	5.ny
coefficient in cover											Applicable for Radon exposure
material	m/s	2.00E-06	Р	3	NA	Not used	NR	NR	NR		only
Radon diffusion						- 7					
coefficient in foundation											Applicable for Radon exposure
material	m/s	3.00E-07	Р	3	NA	Not used	NR	NR	NR		only
Radon diffusion											
			1								Applicable for Radon exposure
coefficient in											
coefficient in contaminated zone soil	m/s	2.00E-06	Р	3	NA	Not used	NR	NR 1	NR		only
coefficient in contaminated zone soil Radon vertical dimension	"."										Applicable for Radon exposure
coefficient in contaminated zone soil Radon vertical dimension of mixing	m/s m	2.00E-06 2	P P	3	NA NA	Not used Not used	NR NR	NR NR	NR NR	NR	Applicable for Radon exposure only
coefficient in contaminated zone soil Radon vertical dimension	"."									NR	Applicable for Radon exposure

	1		I				Distribution	Distribution	Distribution	Distribution	
		RESRAD	١.	١,	١,	Value or	Parameter	Parameter	Parameter	Parameter	
Parameter	Units	Default	Туре	Priority ²	Treatment ³	Distribution ⁴	1	2	3	4	Basis
Building (room) baight	m	2.5	P	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Building (room) height Building interior area		2.5		-	NA.	1401 0560	Nn Nn	I IND	IND	i ivin	Applicable for Radon exposure
factor		0	Р	3	NA	Not used	NR	NR	NR	NR	only
Building depth below											Applicable for Radon exposure
ground surface	m	-1	Р	3	NA	Not used	NR	NR	NR	NR	only
Radon-222 emanation		0.05	P							١ ,,,	Applicable for Radon exposure
Radon-220 emanation	<u> </u>	0.25	P .	3	NA NA	Not used	NR NR	NR	NR	NR	Applicable for Radon exposure
coefficient		0.15	Р	3	NA NA	Not used	NR	NR	NR	NR	lonly
Risk Conversion Factors	200000000000000000000000000000000000000	# # - 15 E E	26327E	b26453225	600000000	\$201001.054X	are process of	Name of the Association of the A	27/23/29- 2 38	XXXXXXXX	
	(risk/yr)/	Nuclide									
Slope factor – external	(pCi/g)	specific	М	3	NA	Not used	NR	NR	NR	NR	RESRAD Default
01	### (F.C)	Nuclide	۱.,		N/A	Notuced		ND.	1	ND.	RESRAD Default
Slope factor - inhalation	risk/pCi	specific Nuclide	М	3	NA NA	Not used	NR	NR	NR	NR	HESHAD Delault
Slope factor - ingestion	risk/pCi	specific	Ιм	3	NA	Not used	NR	NR	NR	NR	RESRAD Default
Inhalation dose conversion			87252YC1	2462475748K	Mark Skirrly		CAT TO COME	0250 C.	C22-1170-00	30000XV0	22400
Ac-227	mrem/pCi	6.7	М	3	D	6.7	NR	NR	NR	NR	FGR-11, RESRAD Library
Pa-231	mrem/pCi	1.28	М	3	D	1.28	NR	NR	NR	NR	FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.0136	М	3	D	0.0136	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00858	М	3	D	0.00858	NR	NR	NR	NR NR	FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00477	M	3	ם	0.00477	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-228	mrem/pCi	0.342 0.326	M	3	D	0.342 0.326	NR NR	NR NR	NA NA	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-230 Th-232	mrem/pCi mrem/pCi	1.64	M	3	D D	1.64	NR NR	NR NR	NR	NR NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.132	M	3	<u> </u>	0.132	NR	NR	NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.123	M	3	D	0.123	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.125	М	3	D	0.125	NR	NR	NR	NR	FGR-11, RESRAD Library
U-238	mrem/pCi	0.118	М	3	D	0.118	NR	NR	NR	NR	FGR-11, RESRAD Library
Ingestion Dose Donversio	n Factors	96.00	1.380.7	20/40/55	(100 Mar. 1963)		V1031018201	047 3 10467	1201/4000		
Ac-227	mrem/pCi	0.0141	М	3	D	0.0141	NR	NR	NR	NR	FGR-11, RESRAD Library
Pa-231	mrem/pCi	0.0106	M	3	D	0.0106	NA	NR	NR	NR	FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.00537 0.00132	M	3	D D	0.00537 0.00132	NR NR	NR NR	NR NR	NA NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Ra-226 Ra-228	mrem/pCi mrem/pCi	0.00132	M	3	D D	0.00132	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-228	mrem/pCi	0.000396	M	3	D D	0.000396	NR NR	NR	NR	NR	FGR-11, RESRAD Library
Th-230	mrem/pCi	0.000548	M	3	- 5 -	0.000548	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-232	mrem/pCi	0.00273	М	3	D	0.00273	NR	NR	NA	NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.000283	М	3	D	0.000283	NR	NR	NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.000266	М	3	D	0.000266	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.000269	М	3	D	0.000269	NR	NR	NA	NR	FGR-11, RESRAD Library
U-238	mrem/pCi	0.000255	M	3	D	0.000255	NR	NR	NR	NR	FGR-11, RESRAD Library
Plant Transfer Factors (pC	ing plant (wet)	/[pCi/g soil (dr	/)#38.0342 1	\$440 0.00			A. S. C. S. 279)	2.30	7965.000.000		Pathway suppressed for
Ac-227		0.0025	l p	1	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
A0-227		0.0020			14/	1101 0000		··· /\.	- 1111		Pathway suppressed for
Pa-231	-	0.01	Р	1	NA	Not used	NA	NR	NR	NR	industrial worker scenario
											Pathway suppressed for
Pb-210		0.01	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
											Pathway suppressed for
Ra-226	 	0.04	P	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
 Ra-228	١.	0.04	P	1	NA	Not used	NR	NR I	NR	NR	Pathway suppressed for industrial worker scenario
na-220		0.04			AYI	NOLUSEG	INM	INT	INH		Pathway suppressed for
Th-228		0.001	Р	1	NΑ	Not used	NR	NR	NR		industrial worker scenario
			 							.411	Pathway suppressed for
Th-230	-	0.001	P	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	1	ľ	T								Pathway suppressed for
Th-232	·	0.001	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
											Pathway suppressed for
U-234	ļ — - —	0.0025	P	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
U-235		0.0025	P	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
0-233	 	0.0025	- 		144	1401.0360	1417	170	140	140	Pathway suppressed for
U-236		0.0025	P	1	NA .	Not used	NR .	NR	NR .	NR	industrial worker scenario
	 			<u> </u>							Pathway suppressed for
U-238		0.0025	Р	1	NA	Not used	NR	NA	NR	NR	industrial worker scenario
Meat Transfer Factor	\$1.28847CB		\$ Z. 60, 766	MANAGER A			6 20 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			WARTER	
	(pCi/kg)/										Pathway suppressed for
Ac-227	(pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		_								Pathway suppressed for
Pa-231	(pCi/d)	0.005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ph 210	(pCi/kg)/	0.0008	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/d)	0.0000			INA	1404 0280	1417	IALL	IND	INL	mudalital Worker Sceniano

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value or Distribution⁴	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Ra-226	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
Th-228	(pCi/d) (pCi/kg)/	0.0001	Р	2	NA NA	Not used	NR	NR	NR	NR _	industrial worker scenario Pathway suppressed for
Th-230	(pCi/d) (pCi/kg)/	0.0001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-232	(pCi/d)	0.0001	Р	2	NA NA	Not used	NR	NR	NR_	NR	industrial worker scenario
U-234	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-235	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-236	(pCi/kg)/ (pCi/d)	0.00034	Ρ	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-238	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Milk Transfer Factor			2783488	¥78948117	\$-0 X /\$3-10300	848447838464	12000	25/3/4/07	200000011-83	20/12/12/1980	
Ac-227	(pCi/L)/ (pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pa-231	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR .	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/L)/ (pCi/d)	0.0003	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/										Pathway suppressed for
Ra-226	(pCi/t)/	0.001	Р	2	NA NA	Not used	NR	NA	NR_	NR	industrial worker scenario Pathway suppressed for
Ra-228	(pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-228	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Th-230	(pCi/L)/ (pCi/d)	0.000005	Ρ	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-232	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-234	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-235	(pCi/L)/ (pCi/d)	0.0006	Р	.2	NA .	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/L)/										Pathway suppressed for
U-236	(pCi/d) (pCi/L)/	0.0006	Р	2	NA NA	Not used	NR NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-238 Bioaccumulation factor fo	(pCi/d)	0.0006	P	2	NA NA	Not used	NR	NR	NR	NA	industrial worker scenario
	(pCi/kg)/		1.0.00000000		<u> </u>						Pathway suppressed for
Ac-227	(pCi/L) (pCi/kg)/	15	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Pa-231	(pCi/L) (pCi/kg)/	10	Р	2	NA .	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Pb-210	(pCi/L)	300	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/L)	50	P	2	NA NA	Not used	NR	NR	NR_	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/L)	50	Ρ	2	NA NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Th-228	(pCi/kg)/ (pCi/L)	100	Э	2	NA	Not used	NR	NR	NA I	NR	Pathway suppressed for industrial worker scenario
Th-230	(pCi/kg)/ (pCi/L)	100	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-232	(pCi/kg)/ (pCi/L)	100	P	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/		Р	2		Not used	NR				Pathway suppressed for
U-234	(pCi/L) (pCi/kg)/	10			NA	Not used	NH	NA	NR		industrial worker scenario Pathway suppressed for
U-235	(pCi/L) (pCi/kg)/	10	Р	2	NA NA	Not used	NR	NR	NR		industrial worker scenario Pathway suppressed for
U-236	(pCi/L) (pCi/kg)/	10	P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
U-238	(pCi/L)	10	Р	2	NA	Not used	NR	NR	NR_	NR	Pathway suppressed for industrial worker scenario
Bloaccumulation factor fo	r crustacea and (pCi/kg)/	molluske (%)	931.14Q416		26500000	-00-79-9 7 0- 0 70		31605 EEC.	T.E. A. Y. S. (1994)	V443/28/27/2/	Pathway suppressed for
Ac-227	(pCi/L) (pCi/kg)/	1000	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Pa-231	(pCi/L)	110	Р	3	NA NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/L)	100	Р	3	NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario

		RESRAD				Value or	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type1	Priority ²	Treatment ³	Distribution ⁴	rarameter	2	3	4	Basis
Farameter	44	Delault	туре	Filonty	Healmein	DISTIDUTION			,	-	Pathway suppressed for
Ra-226	(pCi/kg)/ (pCi/L)	250	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
na-220	(pCi/kg)/	230			IVA	1401 0590	IND	INIT	INF		Pathway suppressed for
Ra-228		250	P	3	NA	Not used	NR	NR	NR NR	NR	industrial worker scenario
ma-220	(pCi/L)	250	<u> </u>	3	NA.	Not used	NH	NH	INFI		
T. 000	(pCi/kg)/	500	P			A1-4 4	l				Pathway suppressed for
Th-228	(pCi/L)	500	Р	3	NA	Not used	NR	NR	NR	NR _	industrial worker scenario
	(pCi/kg)/			_			l				Pathway suppressed for
Th-230	(pCi/L)	500	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		[Pathway suppressed for
Th-232	(pCi/L)	500	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/			1							Pathway suppressed for
U-234	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-235	(pCi/L)	60	₽	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-236	(pCi/L)	60	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-238	(pCi/L)	60	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Graphics Parameters	%201X-2-25	WALDER TO	eracer.	8928243E	25 78 628 x 20	CM 82 82 82 82 82 82 82 82 82 82 82 82 82	POR DESCRIPTION				
			-								
				1							Value greater than default
Number of points	·	32	NA	NA	NA	1024	NR	NR	NR	NR	provides more evaluation points
Spacing		Log	NA	NA	NA	Log	NA	NR	NR	NR	RESRAD Default
Time Integration Paramete	ers : Market State	MANUSTARY	<i>68.28.2</i> 8	20/20	20 408 0280405	ESPANA PROMININA	ASSETTED S	\$4.00 m	SE ANGGE	49.22.24	
Maximum number of											
points for dose		17	NA	NA	NA	17	NR	NR	NR	NR	RESRAD Default

P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A, Table 2.1)

Lognormal-n: 1 = mean, 2 = standard deviation
Bounded lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit

Truncated lognormal-n: 1 = mean, 2 = standard deviation, 3 = lower quantile, 4 = upper quantile

Bounded normal: 1 = mean, 2 = standard deviation, 3 = lower limit, 4 = upper limit

Beta: 1 = minimum, 2 = maximum, 3 = P-value, 4 = Q-value Triangular: 1 = minimum, 2 = mode (most likely), 3 = maximum

Uniform: 1 = minimum, 2 = maximum
Continuous logarithmic: RESRAD default statistical parameters
Continuous linear: RESRAD default statistical parameters

NR = not required

Additional Sensitivity Analysis Data:

Sampling Technique = Latin Hypercube

Random Seed = 1000

Number of observations = 300

Number of repetitions = 1

Grouping of Correlations = correlated or uncorrelated

²1 = high priority, 2 = medium priority, 3 = low priority (NUREG/CR-6697, Att. B, Table 4.2)

³D = deterministic, S = stochastic

⁴Distribution Statistical Parameters:

Table E-2 **Honeywell Metropolis Works** Pond E Dose Assessment Industrial Worker Scenario **Source Configuration Summary**

		5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
	Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
	Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area	CZ Area ⁽³⁾	Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m^2)	(m²)	(m)	(m)	(m)	(m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
Е	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b -Ponds B, C, D, and E" provided in Appendix A

(2) Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond

Table E-3
Honeywell Metropolis Works
Pond E Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

	Radionuclide Concentration (pCi/g)				
		Corrected for			
Radionuclide	Average Dry	Bulking Factor	% Solids		
Protactinium 231	0.15	0.14	0.07		
Radium 226	0.69	0.66	0.34		
Thorium 228	0.07	0.06	0.03		
Thorium 230	1.66	1.58	0.83		
Thorium 232	0.05	0.05	0.03		
Uranium 234	237.77	225.89	118.57		
Uranium 235	10.24	9.73	5.11		
Uranium 236	5.84	5.55	2.91		
Uranium 238	246.05	233.75	122.69		

% Solids:

52.49%

Table E-4 Honeywell Metropolis Works Pond E Dose Assessment Industrial Worker Scenario Hydraulic Conductivity of Silty Clay

Pressure	Hydraulic Conductivity	Hydraulic Conductivity
(psf)	(cm/sec)	(m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table E-5
Honeywell Metropolis Works
Pond E Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

		Bulk Density	Average Bulk Density
Pond	Sample ID	(g/ml)	(g/ml)
В	B-18 Lower	1.6	-
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В	-	•	1.575
С	C-2	1.6	-
С	C-5	1.7	-
С	C-19 Lower	1.6	-
С	C-19 Upper	1.5	•
С	-	<u>-</u>	1.6
D	D-8 Lower	1.5	
D	D-8 Upper	1.6	-
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	-
D	D-17 Lower	1.5	-
D	D-17 Upper	1.6	<u>-</u>
D	D-26 Lower	1.8	-
D	D-26 Upper	1.9	•
D		-	1.6
E	E-65 Lower	1.3	-
E	E-65 Upper	1.5	
E	E-80 Lower	1.5	_
E	E-80 Upper	1.5	
E	E-97 Lower	1.2	•
Ε	E-97 Upper	1.1	•
E	E-103 Lower	1.7	•
E	E-103 Upper	1.7	•
E	-	-	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX F

Pond B RESRAD Probabilistic Sensitivity Analysis Uncertainty Output

Table F-1 Honeywell Metropolis Works Pond B Dose Assessment Probabilistic Sensitivity Analysis Results

December of Duck - Wilde Verick!	Signiff	Coofficient	Cumulative Density Function	Deterministic
Description of Probabilistic Variable	Significance	Coefficient -0.9	Value 25%	Value
Density of cover material Cover erosion rate	1 26	0.1	25% 50%	1.571 1.05E-04
Contaminated zone erosion rate	85	0.04	50%	3.49E-05
Contaminated zone erosion rate Contaminated zone total porosity	66	0.04	50%	0.41
Contaminated Zone B parameter	106	-0.01	50%	1.35
Evapotranspiration coefficient	6	-0.18	50%	0.62
Density of saturated zone	75	-0.05	50%	1.510
Saturated zone total porosity	118	0.01	50%	0.43
Saturated zone effective porosity	5	-0.18	50%	0.38
Saturated zone hydraulic conductivity	50	-0.07	50%	2500.0
Saturated Zone B parameter	10	-0.15	50%	0.97
Density of Unsaturated Zone 1	8	-0.16	50%	1.69
Total Porosity of Unsaturated Zone 1	12	0.15	50%	0.36
Effective Porosity of Unsaturated Zone 1	20	-0.12	50%	0.28
Parameter of Unsaturated Zone 1	74	-0.05	50%	9.87
Density of Unsaturated Zone 2	123	0	50%	1.56
Total Porosity of Unsaturated Zone 2	27	0.1	50%	0.409
Effective Porosity of Unsaturated Zone 2	103	-0.02	50%	0.3
Hydraulic Conductivity of Unsaturated Zone 2	51	-0.07	50%	1024.7
Parameter of Unsaturated Zone 2	45	0.08	50%	1.3
Density of Unsaturated Zone 3	108	0.01	50%	1.51
Total Porosity of Unsaturated Zone 3	64	0.06	50%	0.43
Effective Porosity of Unsaturated Zone 3	114	-0.01	50%	0.38
Hydraulic Conductivity of Unsaturated Zone 3	44	-0.08	50%	2495.
Parameter of Unsaturated Zone 3	58	0.06	50%	0.9
Density of Unsaturated Zone 4	67	0.05	50%	1.56
Total Porosity of Unsaturated Zone 4	37	0.09	50%	0.38
Effective Porosity of Unsaturated Zone 4	14	-0.14	50%	0.31
Hydraulic Conductivity of Unsaturated Zone 4	91 94	-0.03 -0.02	50% 50%	1021. 1.3
Density of Unsaturated Zone 4 Density of Unsaturated Zone 5	49	0.02	50%	1.51
Total Porosity of Unsaturated Zone 5	49	0.07	50%	0.43
Effective Porosity of Unsaturated Zone 5	48	0.08	50%	0.43
Hydraulic Conductivity of Unsaturated Zone 5	89	-0.03	50%	2493.
Parameter of Unsaturated Zone 5	11	0.15	50%	0.9
Mass loading for inhalation	109	-0.01	50%	2.35E-0
Indoor dust filtration factor	53	0.07	50%	0.54
External gamma shielding factor	13	0.14	50%	0.26
Depth of soil mixing layer	78	0.04	50%	0.23
Kd of Ac-227 in Contaminated Zone	112	-0.01	50%	824.
Kd of Ac-227 in Unsaturated Zone 1	86	0.03	50%	818.
Kd of Ac-227 in Unsaturated Zone 2	56	-0.07	50%	828.
Kd of Ac-227 in Unsaturated Zone 3	25	-0.11	50%	825.
Kd of Ac-227 in Unsaturated Zone 4	40	-0.09	50%	809.
Kd of Ac-227 in Unsaturated Zone 5	21	-0.11	50%	814.
Kd of Ac-227 in Saturated Zone	24	-0.11	50%	810.
Kd of Pa-231 in Contaminated Zone	17	0.12	50%	374.
Kd of Pa-231 in Unsaturated Zone 1	92	-0.03	50%	370.
Kd of Pa-231 in Unsaturated Zone 2	34	-0.09	50%	375.
Kd of Pa-231 in Unsaturated Zone 3	35	0.09	50%	375.
Kd of Pa-231 in Unsaturated Zone 4	32	-0.1	50%	378.
Kd of Pa-231 in Unsaturated Zone 5	88	-0.03	50%	375.
Kd of Pa-231 in Saturated Zone Kd of Pb-210 in Contaminated Zone	93	-0.02 0.04	50% 50%	378. 2373.
Kd of Pb-210 in Contaminated Zone Kd of Pb-210 in Unsaturated Zone 1	80	0.04	50%	2373.
Kd of Pb-210 in Unsaturated Zone 1 Kd of Pb-210 in Unsaturated Zone 2	62	-0.06	50%	2361.
Kd of Pb-210 in Unsaturated Zone 2 Kd of Pb-210 in Unsaturated Zone 3	73	0.05	50%	2356.
Kd of Pb-210 in Unsaturated Zone 4	95	0.03	50%	2352.
Kd of Pb-210 in Unsaturated Zone 5	83	-0.04	50%	2379.
Kd of Pb-210 in Saturated Zone S	104	-0.04	50%	2360.
Kd of Ra-226 in Contaminated Zone	47	-0.02	50%	3501.
Kd of Ra-226 in Unsaturated Zone 1	87	-0.03	50%	3506.
Kd of Ra-226 in Unsaturated Zone 2	61	0.06	THE RESIDENCE OF THE PARTY OF T	3505.

Table F-1 Honeywell Metropolis Works Pond B Dose Assessment Probabilistic Sensitivity Analysis Results

			Cumulative Density Function	Deterministic
Description of Probabilistic Variable	Significance	Coefficient	Value	Value
Kd of Ra-226 in Unsaturated Zone 3	101	0.02	50%	3522.
Kd of Ra-226 in Unsaturated Zone 4	99	0.02	50%	3484.
(d of Ra-226 in Unsaturated Zone 5	68	0.05	50%	3495.
(d of Ra-226 in Saturated Zone	116	-0.01	50%	3529.
d of Ra-228 in Contaminated Zone	96	-0.02	50%	3489.
Kd of Ra-228 in Unsaturated Zone 1	110	0.01	50%	3507.
Kd of Ra-228 in Unsaturated Zone 2	54	0.07	50%	3521.
Kd of Ra-228 in Unsaturated Zone 3	63	0.06	50%	3513.
Kd of Ra-228 in Unsaturated Zone 4	23	-0.11	50%	3504.
Kd of Ra-228 in Unsaturated Zone 5	52	0.07	50%	3483.
(d of Ra-228 in Saturated Zone	18	0.12	50%	3521.
(d of Th-228 in Contaminated Zone	102	0.02	50%	5883.
(d of Th-228 in Unsaturated Zone 1	111	-0.01	50%	5736.
(d of Th-228 in Unsaturated Zone 2	71	-0.05	50%	5825.
(d of Th-228 in Unsaturated Zone 3	97	0.02	50%	5786.
Kd of Th-228 in Unsaturated Zone 4	30	-0.1	50%	5774.
(d of Th-228 in Unsaturated Zone 5	79	-0.04	50%	5784.
(d of Th-228 in Saturated Zone	122	0	50%	5828.
(d of Th-230 in Contaminated Zone	36	-0.09	50%	5770.
(d of Th-230 in Unsaturated Zone 1	33	0.09	50%	5842.
(d of Th-230 in Unsaturated Zone 2	72	-0.05	50%	5842.
(d of Th-230 in Unsaturated Zone 3	76	-0.04	50%	5882.
(d of Th-230 in Unsaturated Zone 4	29	0.1	50%	5778.
(d of Th-230 in Unsaturated Zone 5	41	-0.09	50%	5859.
(d of Th-230 in Saturated Zone	100	0.02	50%	5849.
(d of Th-232 in Contaminated Zone	3	0.21	50%	5770.
Kd of Th-232 in Unsaturated Zone 1	16	-0.13	50%	5808.
Kd of Th-232 in Unsaturated Zone 2	4	0.18	50%	5744.
Kd of Th-232 in Unsaturated Zone 3	31	-0.1	50%	5769.
Kd of Th-232 in Unsaturated Zone 4	117	-0.01	50%	5778.
Kd of Th-232 in Unsaturated Zone 5	43	-0.08	50%	5822.
Kd of Th-232 in Saturated Zone	107	0.01	50%	5864.
Kd of U-234 in Contaminated Zone	82	0.04	50%	123.
Kd of U-234 in Unsaturated Zone 1	22	0.11	50%	126.
Kd of U-234 in Unsaturated Zone 2	60	0.06	50%	124.
Kd of U-234 in Unsaturated Zone 3	55	-0.07	50%	124.
Kd of U-234 in Unsaturated Zone 4	59	-0.06	50%	124.
Kd of U-234 in Unsaturated Zone 5	119	-0.01	50%	125.
Kd of U-234 in Saturated Zone	28	-0.1	50%	126.
Kd of U-235 in Contaminated Zone	2	-0.5	25%	15.
Kd of U-235 in Unsaturated Zone 1	84	-0.04	50%	125.
Kd of U-235 in Unsaturated Zone 2	39	-0.09	50%	123.
Kd of U-235 in Unsaturated Zone 3	19	0.12	50%	125.
Kd of U-235 in Unsaturated Zone 4	70	0.05	50%	124.
Kd of U-235 in Unsaturated Zone 5	113	-0.01	50%	124.
Kd of U-235 in Saturated Zone	98	-0.02	50%	124.
Kd of U-236 in Contaminated Zone	46	-0.08	50%	123.
Kd of U-236 in Unsaturated Zone 1	57	0.06	50%	124.
Kd of U-236 in Unsaturated Zone 2	69	0.05	50%	123.
Kd of U-236 in Unsaturated Zone 3	121	0	50%	123.
Kd of U-236 in Unsaturated Zone 4	105	-0.01	50%	124.
Kd of U-236 in Unsaturated Zone 5	9	-0.16	50%	125.
Kd of U-236 in Saturated Zone	81	-0.04	50%	125.
Kd of U-238 in Contaminated Zone	38	-0.09	50%	124
Kd of U-238 in Unsaturated Zone 1	115	0.01	50%	123.
Kd of U-238 in Unsaturated Zone 2	90	0.03	50%	124.
Kd of U-238 in Unsaturated Zone 3	15	-0.13	50%	123.
Kd of U-238 in Unsaturated Zone 4	120 65	0.06	50% 50%	124. 126.
Kd of U-238 in Unsaturated Zone 5			E(10/	100

APPENDIX G

Pond C RESRAD Probabilistic Sensitivity Analysis Uncertainty Output

Table G-1 Honeywell Metropolis Works Pond C Dose Assessment Probabilistic Sensitivity Analysis Results

Description of Probabilistic Variable	Cignificana	Coefficient	Cumulative Density	Deterministic Value
Description of Probabilistic Variable	Significance	Coefficient -0.85	Function Value	
Density of cover material Cover erosion rate	3	0.28	25% 75%	1.571 1.42E-04
Contaminated zone erosion rate	72	0.04	50%	3.49E-05
Contaminated zone erosion rate Contaminated zone total porosity	114	-0.01	50%	3.49E-05 0.41
Contaminated Zone b parameter	58	-0.06	50%	1.35
Evapotranspiration coefficient	31	-0.1	50%	0.62
Density of saturated zone	54	-0.06	50%	1.510
Saturated zone total porosity	34	-0.09	50%	0.43
Saturated zone effective porosity	15	-0.13	50%	0.38
Saturated zone hydraulic conductivity	28	-0.11	50%	2500.0
Saturated Zone b parameter	45	-0.07	50%	0.97
Density of Unsaturated Zone 1	5	-0.2	50%	1.695
Total Porosity of Unsaturated Zone 1	4	0.2	50%	0.360
Effective Porosity of Unsaturated Zone 1	22	-0.12	50%	0.289
b Parameter of Unsaturated Zone 1	63	0.05	50%	9.870
Density of Unsaturated Zone 2	97	0.02	50%	1.563
Total Porosity of Unsaturated Zone 2	9	0.14	50%	0.409
Effective Porosity of Unsaturated Zone 2	46	0.07	50%	0.35
Hydraulic Conductivity of Unsaturated Zone 2	37	-0.08	50%	1024.76
b Parameter of Unsaturated Zone 2	110	-0.01	50%	1.35
Density of Unsaturated Zone 3	27	0.11	50%	1.510
Total Porosity of Unsaturated Zone 3	74	0.04	50%	0.430
Effective Porosity of Unsaturated Zone 3	106	-0.01	50%	0.383
Hydraulic Conductivity of Unsaturated Zone 3	6	-0.16	50%	2495.4
b Parameter of Unsaturated Zone 3	71	0.04	50%	0.97
Density of Unsaturated Zone 4	116	0 00	50%	1.562
Total Porosity of Unsaturated Zone 4	77	0.03 -0.14	50% 50%	0.389
Effective Porosity of Unsaturated Zone 4 Hydraulic Conductivity of Unsaturated Zone 4	10 82	0.03	50%	0.318 1021.1
b Parameter of Unsaturated Zone 4	99	0.03	50%	1.35
Density of Unsaturated Zone 5	121	0.01	50%	1.510
Total Porosity of Unsaturated Zone 5	84	0.03	50%	0.430
Effective Porosity of Unsaturated Zone 5	101	0.00	50%	0.383
Hydraulic Conductivity of Unsaturated Zone 5	91	-0.02	50%	2493.6
b Parameter of Unsaturated Zone 5	32	0.09	50%	0.97
Mass loading for inhalation	119	0	50%	2.35E-05
Indoor dust filtration factor	109	-0.01	50%	0.547
External gamma shielding factor	16	0.13	50%	0.269
Depth of soil mixing layer	55	-0.06	50%	0.231
Kd of Ac-227 in Contaminated Zone	68	0.04	50%	824.5
Kd of Ac-227 in Unsaturated Zone 1	111	-0.01	50%	818.4
Kd of Ac-227 in Unsaturated Zone 2	14	-0.13	50%	828.4
Kd of Ac-227 in Unsaturated Zone 3	56	-0.06	50%	825.1
Kd of Ac-227 in Unsaturated Zone 4	8	-0.15	50%	809.7
Kd of Ac-227 in Unsaturated Zone 5	13	-0.13	50%	814.7
Kd of Ac-227 in Saturated Zone	92	-0.02	50%	810.4
Kd of Pa-231 in Contaminated Zone	65	0.05	50%	374.3
Kd of Pa-231 in Unsaturated Zone 1	64	0.05		370.7
Kd of Pa-231 in Unsaturated Zone 2	61	-0.05	50%	375.1
Kd of Pa-231 in Unsaturated Zone 3	67	0.04	50%	375.3
Kd of Pa-231 in Unsaturated Zone 4	11	-0.14	50%	378.2
Kd of Pa-231 in Unsaturated Zone 5	42 30	-0.08	50%	375.6
Kd of Pa-231 in Saturated Zone Kd of Pb-210 in Contaminated Zone	66	0.1 0.04	50% 50%	378.4 2373.8
Kd of Pb-210 in Contaminated Zone Kd of Pb-210 in Unsaturated Zone 1	78	0.04	50%	23/3.8
Kd of Pb-210 in Unsaturated Zone 1 Kd of Pb-210 in Unsaturated Zone 2	69	-0.04	50%	2347.3
Kd of Pb-210 in Unsaturated Zone 2 Kd of Pb-210 in Unsaturated Zone 3	81	0.03	50%	2356.9
Kd of Pb-210 in Unsaturated Zone 3 Kd of Pb-210 in Unsaturated Zone 4	36	-0.08	50%	2350.8
Kd of Pb-210 in Unsaturated Zone 5	76	-0.04	50%	2379.9
Kd of Pb-210 in Saturated Zone	35	-0.09	50%	2360.3
Kd of Ra-226 in Contaminated Zone	123	0.00	50%	3501.2
Kd of Ra-226 in Unsaturated Zone 1	94	0.02	50%	3506.5
ING OF HA-220 III Offsaturated Zone 1				

Table G-1 Honeywell Metropolis Works Pond C Dose Assessment Probabilistic Sensitivity Analysis Results

<u> </u>	1			
			Cumulative Density	Deterministic
Description of Probabilistic Variable	Significance	Coefficient	Function Value	Value
Kd of Ra-226 in Unsaturated Zone 3	57	0.06	50%	3522.8
Kd of Ra-226 in Unsaturated Zone 4	38	-0.08	50%	3484.6
Kd of Ra-226 in Unsaturated Zone 5	117	0	50%	3495.8
Kd of Ra-226 in Saturated Zone	44	0.08	50%	3529.3
Kd of Ra-228 in Contaminated Zone	62	0.05	50%	3489.5
Kd of Ra-228 in Unsaturated Zone 1	96	0.02	50%	3507.0
Kd of Ra-228 in Unsaturated Zone 2	26	0.11	50%	3521.8
Kd of Ra-228 in Unsaturated Zone 3	87	0.02	50%	3513.0
Kd of Ra-228 in Unsaturated Zone 4	51	-0.07	50%	3504.5
Kd of Ra-228 in Unsaturated Zone 5	83	-0.03	50%	3483.8
Kd of Ra-228 in Saturated Zone	53	0.06	50%	3521.4
Kd of Th-228 in Contaminated Zone	100	0.01	50%	5883.2
Kd of Th-228 in Unsaturated Zone 1	108	0.01	50%	5736.1
Kd of Th-228 in Unsaturated Zone 2	103	-0.01	50%	5825.4
Kd of Th-228 in Unsaturated Zone 3	70	0.04	50%	5786.3
Kd of Th-228 in Unsaturated Zone 4	40	-0.08	50%	5774.7
Kd of Th-228 in Unsaturated Zone 5	89	-0.02	50%	5784.1
Kd of Th-228 in Saturated Zone	86	-0.03	50%	5828.0
Kd of Th-230 in Contaminated Zone	95	-0.02	50%	5770.7
Kd of Th-230 in Unsaturated Zone 1	90	-0.02	50%	5842.5
Kd of Th-230 in Unsaturated Zone 2	75	0.04	50%	5842.8
Kd of Th-230 in Unsaturated Zone 3	43	-0.08	50%	5882.2
Kd of Th-230 in Unsaturated Zone 4	41	0.08	50%	5778.8
Kd of Th-230 in Unsaturated Zone 5	79	0.03	50%	5859.6
Kd of Th-230 in Saturated Zone	39	0.08	50%	5849.2
Kd of Th-232 in Contaminated Zone	19	0.12	50%	5770.9
Kd of Th-232 in Unsaturated Zone 1	52	-0.07	50%	5808.9
Kd of Th-232 in Unsaturated Zone 2	29	0.1	50%	5744.2
Kd of Th-232 in Unsaturated Zone 3	115	-0.01	50%	5769.1
Kd of Th-232 in Unsaturated Zone 4	105	-0.01	50%	5778.8
Kd of Th-232 in Unsaturated Zone 5	23	-0.12	50%	5822.9
Kd of Th-232 in Saturated Zone	47	-0.07	50%	5864.1
Kd of U-234 in Contaminated Zone	85	-0.03	50%	123.5
Kd of U-234 in Unsaturated Zone 1	20	0.12	50%	126.1
Kd of U-234 in Unsaturated Zone 2	24	0.11	50%	124.2
Kd of U-234 in Unsaturated Zone 3	120	0	50%	124.2
Kd of U-234 in Unsaturated Zone 4	59	-0.06	50%	124.7
Kd of U-234 in Unsaturated Zone 5	25	-0.11	50%	125.7
Kd of U-234 in Saturated Zone	112	-0.01	50%	126.4
Kd of U-235 in Contaminated Zone	2	-0.6	50%	123.9
Kd of U-235 in Unsaturated Zone 1	93	0.02	50%	125.8
Kd of U-235 in Unsaturated Zone 2		0.02	50% 50%	123.3 125.9
Kd of U-235 in Unsaturated Zone 3	60 73	0.06 0.04	50%	125.9
Kd of U-235 in Unsaturated Zone 4	80	0.04		124.9
Kd of U-235 in Unsaturated Zone 5	98	0.03	50% 50%	124.7
Kd of U-235 in Saturated Zone	49	-0.02	50%	123.9
Kd of U-236 in Contaminated Zone	33			
Kd of U-236 in Unsaturated Zone 1		0.09		124.0
Kd of U-236 in Unsaturated Zone 2 Kd of U-236 in Unsaturated Zone 3	118 122	0		123.8 123.9
Kd of U-236 in Unsaturated Zone 3	50		50%	123.9
Kd of U-236 in Unsaturated Zone 5	7	-0.07	50%	125.9
	113		50%	125.9
Kd of U-236 in Saturated Zone Kd of U-238 in Contaminated Zone	113		50%	125.8
Kd of U-238 in Contaminated Zone Kd of U-238 in Unsaturated Zone 1	17	0.12		123.8
Kd of U-238 in Unsaturated Zone 1	107	0.12		124.5
	21	-0.12	50%	123.4
Kd of U-238 in Unsaturated Zone 3		0.01		123.4
Kd of U-238 in Unsaturated Zone 4 Kd of U-238 in Unsaturated Zone 5	102	0.01		124.0
Kd of U-238 in Saturated Zone	18	0.12	50%	124.3

APPENDIX H

Pond D RESRAD Probabilistic Sensitivity Analysis Uncertainty Output

Table H-1 Honeywell Metropolis Works Pond D Dose Assessment Probabilistic Sensitivity Analysis Results

Description of Probabilistic Variable	Significance	Coefficient	Cumulative Density Function Value	Deterministic Value
Density of cover material	Significance	-0.98	25%	1.571
Cover erosion rate	43		50%	1.05E-04
Contaminated zone erosion rate	71	-0.07	50%	3.49E-05
Contaminated zone total porosity	15	0.11	50%	0.41
Contaminated Zone B parameter	55	0.06	50%	1.35
Evapotranspiration coefficient	68	0.05	50%	0.62
Density of saturated zone	120	0	50%	1.510
Saturated zone total porosity	100	-0.01	50%	0.43
Saturated zone effective porosity	5	-0.16	50%	0.38
Saturated zone hydraulic conductivity	37	-0.08	50%	2500.0
Saturated Zone b parameter	74	-0.04	50%	0.97
Density of Unsaturated Zone 1	16	-0.11	50%	1.698
Total Porosity of Unsaturated Zone 1	58	0.05	50%	0.360
Effective Porosity of Unsaturated Zone 1	19	0.1	50%	0.289
b Parameter of Unsaturated Zone 1	24	-0.1	50%	9.870
Density of Unsaturated Zone 2	95	-0.02	50%	1.563
Total Porosity of Unsaturated Zone 2	47	-0.06	50%	0.409
Effective Porosity of Unsaturated Zone 2	108	0.01	50%	0.35
Hydraulic Conductivity of Unsaturated Zone 2	111	-0.01	50%	1024.76
b Parameter of Unsaturated Zone 2	44	-0.07	50%	1.35
Density of Unsaturated Zone 3	112	-0.01	50%	1.510
Total Porosity of Unsaturated Zone 3	121	0	50%	0.430
Effective Porosity of Unsaturated Zone 3	50	-0.06	50%	0.383
Hydraulic Conductivity of Unsaturated Zone 3	65	0.05	50%	2495.4
b Parameter of Unsaturated Zone 3	28	0.08	50%	0.97
Density of Unsaturated Zone 4	110	0.01	50%	1.562
Total Porosity of Unsaturated Zone 4	41	0.07	50%	0.389
Effective Porosity of Unsaturated Zone 4	114	0	50% 50%	0.318
Hydraulic Conductivity of Unsaturated Zone 4 b Parameter of Unsaturated Zone 4	21 105	-0.1 -0.01	50%	1021.1
Density of Unsaturated Zone 5	77	0.04	50%	1.35
Total Porosity of Unsaturated Zone 5	9	0.04	50%	0.430
Effective Porosity of Unsaturated Zone 5	4	0.14	50%	0.430
Hydraulic Conductivity of Unsaturated Zone 5	66	0.17	50%	2493.6
b Parameter of Unsaturated Zone 5	98	-0.01	50%	0.97
Mass loading for inhalation	75	0.04	50%	2.35E-05
Indoor dust filtration factor	25	-0.09	50%	0.547
External gamma shielding factor	2	0.45	75%	0.397
Depth of soil mixing layer	61	0.05	50%	0.231
Kd of Ac-227 in Contaminated Zone	83	-0.03	50%	824.5
Kd of Ac-227 in Unsaturated Zone 1	67	0.05	50%	818.4
Kd of Ac-227 in Unsaturated Zone 2	80	0.03	50%	828.4
Kd of Ac-227 in Unsaturated Zone 3	69	-0.05	50%	825.1
Kd of Ac-227 in Unsaturated Zone 4	116	0	50%	809.7
Kd of Ac-227 in Unsaturated Zone 5	76	0.04	50%	814.7
Kd of Ac-227 in Saturated Zone	102	0.01	50%	810.4
Kd of Pa-231 in Contaminated Zone	89	0.02	50%	374.3
Kd of Pa-231 in Unsaturated Zone 1	96			370.7
Kd of Pa-231 in Unsaturated Zone 2	99	0.01	50%	375.1
Kd of Pa-231 in Unsaturated Zone 3	86	0.03	50%	375.3
Kd of Pa-231 in Unsaturated Zone 4	84		50%	378.2
Kd of Pa-231 in Unsaturated Zone 5	35	0.08	50%	375.6
Kd of Pa-231 in Saturated Zone	62	-0.05	50%	378.4
Kd of Pb-210 in Contaminated Zone	8	-0.15	50%	2373.8
Kd of Pb-210 in Unsaturated Zone 1	122	0 00	50%	2347.3
Kd of Pb-210 in Unsaturated Zone 2	26	-0.09		2361.6
Kd of Pb-210 in Unsaturated Zone 3	33	-0.08	50%	2356.9
Kd of Pb-210 in Unsaturated Zone 4	56	THE RESERVE OF THE PARTY OF THE	50%	2352.1
Kd of Pb-210 in Unsaturated Zone 5	88	0.02	50%	2379.9
Kd of Pb-210 in Saturated Zone	12	-0.11	50% 50%	2360.3
Kd of Ra-226 in Contaminated Zone Kd of Ra-226 in Unsaturated Zone 1	18 97	0.11 -0.02		3501.2 3506.5
Kd of Ra-226 in Unsaturated Zone 1 Kd of Ra-226 in Unsaturated Zone 2	14		50%	3505.6
Nu oi na-220 iii olisalulaleu 2011e 2	14	0.11	50%	3,6006

Table H-1 Honeywell Metropolis Works Pond D Dose Assessment Probabilistic Sensitivity Analysis Results

			Cumulative Density	Deterministic
Description of Probabilistic Variable	Significance	Coefficient	Function Value	Value
Kd of Ra-226 in Unsaturated Zone 3	53	-0.06	50%	3522.8
Kd of Ra-226 in Unsaturated Zone 4	94	-0.02 -0.02	50% 50%	3484.6 3495.8
Kd of Ra-226 in Unsaturated Zone 5 Kd of Ra-226 in Saturated Zone	72	-0.02	50%	3529.3
Kd of Ra-228 in Contaminated Zone	73	-0.04	50%	3489.5
Kd of Ra-228 in Unsaturated Zone 1	115	0.04	50%	3507.0
Kd of Ra-228 in Unsaturated Zone 2	23	-0.1	50%	3521.8
Kd of Ra-228 in Unsaturated Zone 3	78	-0.03	50%	3513.0
Kd of Ra-228 in Unsaturated Zone 4	119	0	50%	3504.5
Kd of Ra-228 in Unsaturated Zone 5	11	0.13	50%	3483.8
Kd of Ra-228 in Saturated Zone	45	-0.07	50%	3521.4
Kd of Th-228 in Contaminated Zone	82	0.03	50%	5883.2
Kd of Th-228 in Unsaturated Zone 1	46	-0.06	50%	5736.1
Kd of Th-228 in Unsaturated Zone 2	79	-0.03	50%	5825.4
Kd of Th-228 in Unsaturated Zone 3	109	-0.01	50%	5786.3
Kd of Th-228 in Unsaturated Zone 4	91	-0.02	50%	5774.7
Kd of Th-228 in Unsaturated Zone 5	7	-0.16	50%	5784.1
Kd of Th-228 in Saturated Zone Kd of Th-230 in Contaminated Zone	107	-0.01 -0.01	50% 50%	5828.0 5770.7
Kd of Th-230 in Contaminated Zone 1	48	0.06	50%	5842.5
Kd of Th-230 in Unsaturated Zone 2	17	-0.11	50%	5842.8
Kd of Th-230 in Unsaturated Zone 3	87	-0.03	50%	5882.2
Kd of Th-230 in Unsaturated Zone 4	54	0.06	50%	5778.8
Kd of Th-230 in Unsaturated Zone 5	70	-0.04	50%	5859.6
Kd of Th-230 in Saturated Zone	52	-0.06	50%	5849.2
Kd of Th-232 in Contaminated Zone	32	0.08	50%	5770.9
Kd of Th-232 in Unsaturated Zone 1	117	0	50%	5808.9
Kd of Th-232 in Unsaturated Zone 2	113	0.01	50%	5744.2
Kd of Th-232 in Unsaturated Zone 3	90	-0.02	50%	5769.1
Kd of Th-232 in Unsaturated Zone 4	60	0.05	50%	5778.8
Kd of Th-232 in Unsaturated Zone 5	81	-0.03	50%	5822.9
Kd of Th-232 in Saturated Zone	30	0.08	50%	5864.1
Kd of U-234 in Contaminated Zone	29	-0.08	50%	123.5
Kd of U-234 in Unsaturated Zone 1	104	0.01	50%	126.1
Kd of U-234 in Unsaturated Zone 2	27	0.09	50%	124.2
Kd of U-234 in Unsaturated Zone 3	103	-0.01	50%	124.2
Kd of U-234 in Unsaturated Zone 4 Kd of U-234 in Unsaturated Zone 5	40 34	-0.07 -0.08	50% 50%	124.7 125.7
Kd of U-234 in Onsaturated Zone 5	31	0.08	50%	126.4
Kd of U-235 in Contaminated Zone	6	-0.16	50%	123.9
Kd of U-235 in Unsaturated Zone 1	85	-0.03	50%	125.8
Kd of U-235 in Unsaturated Zone 2	20	-0.1	50%	123.3
Kd of U-235 in Unsaturated Zone 3	123	0	50%	125.9
Kd of U-235 in Unsaturated Zone 4	106	0.01	50%	124.9
Kd of U-235 in Unsaturated Zone 5	36	0.08	50%	124.7
Kd of U-235 in Saturated Zone	92	-0.02	50%	124.4
Kd of U-236 in Contaminated Zone	3	-0.23	50%	123.9
Kd of U-236 in Unsaturated Zone 1	51	-0.06		124.0
Kd of U-236 in Unsaturated Zone 2	22	0.1	50%	123.8
Kd of U-236 in Unsaturated Zone 3	118	0	50%	123.9
Kd of U-236 in Unsaturated Zone 4	57	-0.05	50%	124.0
Kd of U-236 in Unsaturated Zone 5	63	0.05	50%	125.9
Kd of U-236 in Saturated Zone	64	-0.05	50% 50%	125.8
Kd of U-238 in Contaminated Zone Kd of U-238 in Unsaturated Zone 1	38 59	0.08 0.05	50% 50%	124.0 123.8
Kd of U-238 in Unsaturated Zone 1 Kd of U-238 in Unsaturated Zone 2	42	0.05	50%	124.5
Kd of U-238 in Unsaturated Zone 3	13	0.07	50%	123.4
ING OF 5-200 III OFFSELDIALED ZOTIE 5				
Kd of U-238 in Unsaturated Zone 4	101	-0.06	50% I	124 (1)
Kd of U-238 in Unsaturated Zone 4 Kd of U-238 in Unsaturated Zone 5	49 10	-0.06 0.13	50% 50%	124.0 126.2

APPENDIX I

Pond E RESRAD Probabilistic Sensitivity Analysis Uncertainty Output

Table I-1 Honeywell Metropolis Works Pond E Dose Assessment Probabilistic Sensitivity Analysis Results

Description of Probabilistic Variable	Significance	Coefficient	Cumulative Density Function Value	Deterministic Value
Density of cover material	1	-0.88	25%	1.571
Cover erosion rate	5	0.16	50%	1.05E-04
Contaminated zone erosion rate	122	0	50%	3.49E-05
Contaminated zone total porosity	82	0.03	50%	0.41
Contaminated Zone B parameter	61	-0.05	50%	1.35
Evapotranspiration coefficient	29	-0.11	50%	0.62
Density of saturated zone	102	-0.02	50%	1.510
Saturated zone total porosity	40	-0.08	50%	0.43
Saturated zone effective porosity	12	-0.14	50%	0.38
Saturated zone hydraulic conductivity	34	-0.1	50%	2500.0
Saturated Zone B parameter	15	-0.14	50%	0.97
Density of Unsaturated Zone 1	22 21	-0.12 0.13	50% 50%	1.695 0.360
Total Porosity of Unsaturated Zone 1	16	-0.13	50%	0.289
Effective Porosity of Unsaturated Zone 1	96	-0.13	50%	9.870
b Parameter of Unsaturated Zone 1				1.563
Density of Unsaturated Zone 2	103 24	0.02	50% 50%	0.409
Total Porosity of Unsaturated Zone 2 Effective Porosity of Unsaturated Zone 2	114	-0.01	50%	0.409
Hydraulic Conductivity of Unsaturated Zone 2	51	-0.07	50%	1024.76
b Parameter of Unsaturated Zone 2	121	-0.07	50%	1.35
Density of Unsaturated Zone 3	60	0.05	50%	1.510
Total Porosity of Unsaturated Zone 3	104	0.03	50%	0.430
Effective Porosity of Unsaturated Zone 3	120	0.02	50%	0.383
Hydraulic Conductivity of Unsaturated Zone 3	20	-0.13	50%	2495.4
b Parameter of Unsaturated Zone 3	80	0.03	50%	0.97
Density of Unsaturated Zone 4	110	0.03	50%	1.562
Total Porosity of Unsaturated Zone 4	32	0.01	50%	0.389
Effective Porosity of Unsaturated Zone 4	18	-0.13	50%	0.318
Hydraulic Conductivity of Unsaturated Zone 4	123	0.10	50%	1021.1
b Parameter of Unsaturated Zone 4	58	0.06	50%	1.35
Density of Unsaturated Zone 5	75	0.03	50%	1.510
Total Porosity of Unsaturated Zone 5	83	0.03	50%	0.430
Effective Porosity of Unsaturated Zone 5	63	0.05	50%	0.383
Hydraulic Conductivity of Unsaturated Zone 5	66	-0.04	50%	2493.6
b Parameter of Unsaturated Zone 5	27	0.12	50%	0.97
Mass loading for inhalation	109	0.01	50%	2.35E-05
Indoor dust filtration factor	39	0.08	50%	0.547
External gamma shielding factor	4	0.17	50%	0.269
Depth of soil mixing layer	92	-0.02	50%	0.231
Kd of Ac-227 in Contaminated Zone	89	0.03	50%	824.5
Kd of Ac-227 in Unsaturated Zone 1	91	0.02	50%	818.4
Kd of Ac-227 in Unsaturated Zone 2	25	-0.12	50%	828.4
Kd of Ac-227 in Unsaturated Zone 3	33	-0.1	50%	825.1
Kd of Ac-227 in Unsaturated Zone 4	31	-0.1	50%	809.7
Kd of Ac-227 in Unsaturated Zone 5	3	-0.18	50%	814.7
Kd of Ac-227 in Saturated Zone	55	-0.06	50%	810.4
Kd of Pa-231 in Contaminated Zone	28	0.11	50%	374.3
Kd of Pa-231 in Unsaturated Zone 1	117	0.01	50%	370.7
Kd of Pa-231 in Unsaturated Zone 2	59	-0.05	50%	375.1
Kd of Pa-231 in Unsaturated Zone 3	52	0.06	50%	375.3
Kd of Pa-231 in Unsaturated Zone 4	14	-0.14	50%	378.2
Kd of Pa-231 in Unsaturated Zone 5	85	0.03	50%	375.6
Kd of Pa-231 in Saturated Zone	73	0.04	50%	378.4
Kd of Pb-210 in Contaminated Zone	119	0	50%	2373.8
Kd of Pb-210 in Unsaturated Zone 1	49	0.07	50%	2347.3
Kd of Pb-210 in Unsaturated Zone 2	76	-0.03	50%	2361.6
Kd of Pb-210 in Unsaturated Zone 3	112	0.01	50%	2356.9
Kd of Pb-210 in Unsaturated Zone 4	100	-0.02	50%	2352.1
Kd of Pb-210 in Unsaturated Zone 5	47	-0.07	50%	2379.9
Kd of Pb-210 in Saturated Zone	68	-0.04	50%	2360.3
Kd of Ra-226 in Contaminated Zone	53	-0.06	50%	3501.2
Kd of Ra-226 in Unsaturated Zone 1	111	0.01	50%	3506.5
Kd of Ra-226 in Unsaturated Zone 2	44	0.07	50%	3505.6

Table I-1 Honeywell Metropolis Works Pond E Dose Assessment Probabilistic Sensitivity Analysis Results

Description of Probabilistic Variable	Significance	Coefficient	Cumulative Density Function Value	Deterministic Value
Kd of Ra-226 in Unsaturated Zone 3	79	-0.03	50%	3522.8
Kd of Ra-226 in Unsaturated Zone 4	67	-0.04	50%	3484.6
Kd of Ra-226 in Unsaturated Zone 5	54	0.06	50%	3495.8
Kd of Ra-226 in Saturated Zone	94	-0.02	50%	3529.3
Kd of Ra-228 in Contaminated Zone	69	0.04	50%	3489.5
Kd of Ra-228 in Unsaturated Zone 1	105	-0.02	50%	3507.0
Kd of Ra-228 in Unsaturated Zone 2	26	0.12	50%	3521.8
Kd of Ra-228 in Unsaturated Zone 3	106	0.02	50%	3513.0
Kd of Ra-228 in Unsaturated Zone 4	35	-0.09	50%	3504.5
Kd of Ra-228 in Unsaturated Zone 5	107	0.02	50%	3483.8
Kd of Ra-228 in Saturated Zone	17	0.13	50%	3521.4
Kd of Th-228 in Contaminated Zone	70	0.04	50%	5883.2
Kd of Th-228 in Unsaturated Zone 1	87	0.03	50%	5736.1
Kd of Th-228 in Unsaturated Zone 2	90	-0.03	50%	5825.4
Kd of Th-228 in Unsaturated Zone 3	88	0.03	50%	5786.3
Kd of Th-228 in Unsaturated Zone 4	50	-0.07	50%	5774.7
Kd of Th-228 in Unsaturated Zone 5	74	-0.03	50%	5784.1
Kd of Th-228 in Saturated Zone	116	-0.01	50%	5828.0
Kd of Th-230 in Contaminated Zone	42	-0.08	50%	5770.7
Kd of Th-230 in Unsaturated Zone 1	57	0.06	50%	5842.5
Kd of Th-230 in Unsaturated Zone 2	101	0.02	50%	5842.8
Kd of Th-230 in Unsaturated Zone 3	98	-0.02	50%	5882.2
Kd of Th-230 in Unsaturated Zone 4	36	0.09	50%	5778.8
Kd of Th-230 in Unsaturated Zone 5	118	0.01	50%	5859.6
Kd of Th-230 in Saturated Zone	48	0.07	50%	5849.2
Kd of Th-232 in Contaminated Zone	9	0.15	50%	5770.9
Kd of Th-232 in Unsaturated Zone 1	8	-0.15	50%	5808.9
Kd of Th-232 in Unsaturated Zone 2	11	0.15	50%	5744.2
Kd of Th-232 in Unsaturated Zone 3	41	-0.08	50%	5769.1
Kd of Th-232 in Unsaturated Zone 4	86	0.03	50%	5778.8
Kd of Th-232 in Unsaturated Zone 5	10	-0.15	50%	5822.9
Kd of Th-232 in Orisaturated Zone 5 Kd of Th-232 in Saturated Zone	99	-0.15	50%	5864.1
Kd of U-234 in Contaminated Zone	84	0.02	50%	123.5
Kd of U-234 in Contaminated Zone 1	43	0.08	50%	126.1
Kd of U-234 in Unsaturated Zone 2	13	0.08	50%	124.2
Kd of U-234 in Unsaturated Zone 3	72	-0.04		124.2
	46		50%	
Kd of U-234 in Unsaturated Zone 4		-0.07	50%	124.7
Kd of U-234 in Unsaturated Zone 5	95	-0.02	50%	125.7
Kd of U-234 in Saturated Zone	45	-0.07	50%	126.4
Kd of U-235 in Contaminated Zone	2	-0.58	25%	15.2
Kd of U-235 in Unsaturated Zone 1	93	-0.02	50%	125.8
Kd of U-235 in Unsaturated Zone 2	77	-0.03	50%	123.3
Kd of U-235 in Unsaturated Zone 3	30	0.11	50%	125.9
Kd of U-235 in Unsaturated Zone 4	97	0.02	50%	124.9
Kd of U-235 in Unsaturated Zone 5	56	0.06	50%	124.7
Kd of U-235 in Saturated Zone	108	0.02	50%	124.4
Kd of U-236 in Contaminated Zone	38	-0.08	50%	123.9
Kd of U-236 in Unsaturated Zone 1	65	0.05	50%	124.0
Kd of U-236 in Unsaturated Zone 2	64	0.05	50%	123.8
Kd of U-236 in Unsaturated Zone 3	115	0.01	50%	123.9
Kd of U-236 in Unsaturated Zone 4	78	-0.03	50%	124.0
Kd of U-236 in Unsaturated Zone 5	6	-0.16	50%	125.9
Kd of U-236 in Saturated Zone	71	-0.04	50%	125.8
Kd of U-238 in Contaminated Zone	23	-0.12	50%	124.0
Kd of U-238 in Unsaturated Zone 1	37	0.09	50%	123.8
Kd of U-238 in Unsaturated Zone 2	81	0.03	50%	124.5
Kd of U-238 in Unsaturated Zone 3	19	-0.13	50%	123.4
Kd of U-238 in Unsaturated Zone 4	113	-0.01	50%	124.0
Kd of U-238 in Unsaturated Zone 5	62	0.05	50%	126.2
Kd of U-238 in Saturated Zone	7	0.16	50%	124.3

APPENDIX J

Ponds B through E Probabilistic Sensitivity Analysis Results (On enclosed CD)

APPENDIX K

Pond B Deterministic Dose Assessment Input Summary

		r					Distribution	Distribution	Distribution	Distribution	T
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Parameter	Parameter 2	Parameter 3	Parameter	Basis
Contaminated Zone	230 3 2 2 3 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	SESSAUSE P	SS-600	Entire Section	Treatment	NASSAD, SON SOCI	202000000	1-4-55-50 pink	3554 2536	36x53335653	2000
Area of contaminated					-	4 000	MG	NA	NO	AUD	
Zone Thickness of	m²	10000	Р	2	D	4,000	NA		NR	NR.	See Table K-2.
contaminated zone	m	2	Р	2	D	2.608	NR	NR	NA	NR	See Table K-2. Length of longest side of
Length parallel to the				1							contaminated zone. See Table K
aquifer flow Basic Radiation Dose	m	100	Р	2	D	94	· NR	NR	NR	NR	2. Unrestricted release criteria in 10
Limit	mrem/year	30	Р	3	D	25	NR	NA	NR	NA	CFR 20.1402
Time since placement Times for calculations	yr	0 1	P	3	D	0	NR NR	NR NR	NR NR	NR NR	RESRAD default
Times for calculations	yr yr	3	P	3	6	3	NA NA	NR.	NR	NR	RESRAD default
Times for calculations	yr	10	Р	3	D	10	NA	NR	NR	NR	RESRAD default
Times for calculations Times for calculations	yr yr	100	P	3	D	100	NR NR	NR NR	NR NR	NR NR	RESRAD default
Times for calculations	yr	300	Р	3	В	300	NR	NA	NA	NR .	RESRAD default
Times for calculations Initial Principle Radionuclio	yr a Congactratic	1000	P	3	D	1000	NR Zeowania	NR	NR	NR	RESRAD default
Soil: Ac-227	pCi/g	0	P	2	D	0	NR	NR	NR	NR	See Table K-3
Soil: Pa-231	ρCi/g	0	Р	2	D	0.04	RA	NR	NR	NR	See Table K-3
Soil: Pb-210 Soil: Ra-226	ρCi/g pCi/g	0	P	2	D D	0.42	NA NA	NR NR	NR NR	NA NR	See Table K-3 See Table K-3
Soil: Pa-228	pCi/g	0	P	2	. D	0	NA	NR	NR	NR	See Table K-3
Soil: Th-228	pCVg	0	Р	2	D	0.08	NR NO	NR	NR	NR	See Table K-3
Soil: Th-230 Soil: Th-232	pCi/g ρCi/g	0	P	2	D	0.07	NR NR	NR NR	NR NR	NR NR	See Table K-3 See Table K-3
Soil: U-234	pC/g	0	P	2	D	69.50	NR	NR	NR	NR	See Table K-3
Soil: U-235	pCi/g	0	P	2	D	4.48	NR	NA	NA NA	NR	See Table K-3
Soil: U-236 Soil: U-238	pCi/g pCi/g	0	P	2	D	1.86 71.59	NA NA	NR NR	NA NA	NA NA	See Table K-3
											Not used for calculation of
Groundwater: Ac-227	рСИ.	0	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Pa-231	pCVL.	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Pb-210	рСИL	0	Р	3_	NA NA	Not used	NR	NR	NA	NA	distribution coefficients Not used for calculation of
Groundwater: Ra-226	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Ra-228	pCVL	0	Р	3	NA_	Not used	NR	NR	NR	NR NR	distribution coefficients Not used for calculation of
Groundwater: Th-228	pC/L	0	P	3	NA	Not used	NR_	NR	NR	NR .	distribution coefficients Not used for calculation of
Groundwater: Th-230	рСИ	0	Р	3	NA	Not used	NR	NR	NA	NR	distribution coefficients Not used for calculation of
Groundwater: Th-232	pCVL	0	Р	3	NA NA	Not used	NR_	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-234	pCVL	0	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-235	рСИL	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-236	рСИ	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-238	pCVL	0	Р	3	NA	Not used	NR	NR	NR NR	NR	distribution coefficients
Cover and Contaminated 2 Cover depth	Zane Hydrolog m	ical Data	P	2	D	1,74	NR	NR	NR	NA	See Table K-2
Density of cover material	g/cm³	1.5	P	1	s	1.571	NR	NR	NR	NA	25% cumulative density function value. See Appendix J
Bonsily of covor marchay	90	1.0	<u> </u>			1.011		7,00			50% cumulative density function
Cover erosion rate Density of contaminated	m/yr	0.001	P,B	2	, S	1.05E-04	NR	NR_	NR	NR	value. See Appendix J
zone	g/cm ³	1.5	Р	1	D	1.575	NR	NR	NR	NR	See Table K-5
Contaminated zone erosion rate	m/yr	0.001	P,B	2	S	3.49E-05	NR	NR	NA NA	NR	50% cumulative density function value. See Appendix J
Contaminated zone total porosity		0.4	Р	2	s	0.41	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Contaminated zone field		0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
capacity	 -	0.2				0.2	INF	INT	INF	INH	Average Kh from dilatometer
Contaminated zone hydraulic conductivity	m/yr	10	P	2	D	1.6	NR	NR	NR		(DMT) pressure dissipation tests performed on in-situ Pond E sludge by In-Situ Testing LC. August 5-7, 2009
Contaminated zone b		5.3	Р	2	s	1.35	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Humidity in air	g/m³	8	Р	3	NA .	Not used	NA	NA ,	NR	NA	This parameter only used if Tritium is present in soil
Evapotranspiration coefficient		0.5	P	2	s	0.62	NR	NR	NR		50% cumulative density function value. See Appendix J
Average annual wind											Average annual wind speed for Paducah, KY (NOAA),7.4 mph http://lwf.ncdc.noaa.gov/oa/clima
speed	m/s	2	Р	2	D	3.3	NR	NR NR	NR	NR	te/online/ccd/avgwind.html

							Distribution	Distribution	Distribution	Distribution	
Parameter	Units	RESRAD Default	Туре	Priority ²	Treatment ³	Value	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Basis
Precipitation rate	m/yr	11	Р	2	D	1.25	NR	NR	NR	NR	NUREG/CR-6697 Att. C, Table 4.1-1, Paducah, KY
Irrigation rate	m/yr	0.2	8	3	D	0	NA	NR	NR	NR	Not applicable for industrial scenario
Irrigation mode		Overhead	В	3	D	Overhead	NR	NR	NR_	NR	RESRAD default. Method is used in Illinois
											NUREG/CR-6697 Att. C, Table 4.2-1 method. Assume c ₁ = 0.3.
Runoff coefficient Watershed area for	-	0.2	Р	2	D	0.4	NR	NR	NR	NR	c ₂ = 0.2, and c ₃ = 0.1 Pond area watershed. See
nearby stream or pond Accuracy for water soil	m²	1.00E+06	P	3	D	277817	NR NR	NR	NR	NR	Appendix A.
computation Saturated Zone Hydrologic	a) Data	1.00E-03	NA *******	3	D	1.00E-03	NA V	NR	NA	RN	RESRAD default
										_	50% cumulative density function
Density of saturated zone	g/cm ³	1.5	Р	1	S	1.51	NR	NR	NA	NR	value. See Appendix J
Saturated zone total porosity	<u>-</u>	0.4	Р	1	S	0.43	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Saturated zone effective porosity		0.2	Р	,	s	0.38	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Saturated zone field capacity	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Saturated zone hydraulic											50% cumulative density function
conductivity	m/yr	100	_Р	_1_	s	2500.0	NR	NR	NR	NR	value. See Appendix J Andrews Engr. Geologic Cross
Saturated zone hydraulic		200	Р			0.0040	AUD.			ND	Section Sheet A-A' (El. 319.24 - El. 298.54)/ 4320 ft. See
gradient		0.02		2	D	0.0048	NR	NR	NR	NR	Appendix A.
Saturated zone soil- specific b parameter	-	5.3	Р	2	s	0.97	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Water table drop rate	m/yr	1.00E-03	Р	3	D	1.00E-03	NR	NR	NR_	NR	RESRAD default Honeywell Sanitary Well Depth
Well-pump intake depth (below water table)	TO.	10	_Ρ	2	0	105	NR	NR	NR	NR	from HSA - depth to saturated zone.
1											ND Model is used for larger
Model: non-dispersion or											contaminated areas (e.g. more than 1,000 m²) per RESRAD
mass balance		ND	P	3	D	ND	NR	NR	NR	NR	Users Manual Section E.3.1. This parameter is not used in the
Well pumping rate Unsaturated Zone Hydrolo	m³/yr gical Data	250	B, P	2	D a waxayayaya	Not used	NR	NA	NA	NR	non-dispersion model
											Andrews Engineering Project ID 91-135 cross section Sheet
Number of unsaturated zones		1	Р	3	D	5	NR	NR	NR	NR	Number A-A', January 2007. See Appendix A.
Unsaturated zone 1											Andrews Engineering Project ID 91-135 cross section Sheet
thickness (Clayey Silt/Silty Clay)	m	4	Р	1	D	6.86	NR	NR	NA	NR	Number A-A', January 2007. See Appendix A.
Clay) Unsaturated zone 1 soil										NR	See Appendix A. 50% cumulative density function
Clay) Unsaturated zone 1 soil density	m g/cm³	1.5	P	2	D S	1.695	NR NR	NR NR	NR NR	NR NA	See Appendix A. 50% cumulative density function value. See Appendix J
Clay) Unsaturated zone 1 soil										NR NA	See Appendix A. 50% cumulative density function
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 lotal porosity Unsaturated zone 1 lotal porosity		1.5	Р	2	s	1.695	NR	NR	NR	NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 total porosity Unsaturated zone 1 affective porosity Unsaturated zone 1 field capacity		0.4	P	2	S S	0.360	NR NR	NR NR	NR NR	NR NA NA	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 total porosity Unsaturated zone 1 effective porosity Unsaturated zone 1 field		0.4	P P	2 2	s s	0.360 0.289	NR NR NR	NR NR NR	NR NR NR	NA NA NA NA	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 total porosity Unsaturated zone 1 offective porosity Unsaturated zone 1 field capacity Unsaturated zone 1 hydraulic conductivity Unsaturated zone 1 soil-	g/cm³	0.4 0.2 0.2 10	P P P	2 2 3 2 2	S S D	1.695 0.360 0.289 0.2	NR NR NR NR	NR NR NR	NR NA NR	NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 lotal porosity Unsaturated zone 1 index porosity Unsaturated zone 1 field capacity Unsaturated zone 1 field capacity Unsaturated zone 1 hydraulic conductivity Unsaturated zone 1 soil-specific b parameter	g/cm³	0.4 0.2 0.2	P P P	2 2 3	S S S	0.360 0.289	NR NR NR NR	NR NR NR NR	NR NR NR	NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4 50% cumulative density function value. See Appendix J. Andrews Engineering Project ID
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 total porosity Unsaturated zone 1 offective porosity Unsaturated zone 1 field capacity Unsaturated zone 1 hydraulic conductivity Unsaturated zone 1 soil-	g/cm³	0.4 0.2 0.2 10	P P P	2 2 3 2 2	S S D	1.695 0.360 0.289 0.2	NR NR NR NR	NR NR NR NR	NR NR NR	NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESHAD default. See Table K-4. 50% cumulative density function value. See Appendix J.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 lotal porosity Unsaturated zone 1 lotal porosity Unsaturated zone 1 effective porosity Unsaturated zone 1 field capacity Unsaturated zone 1 soil-specific b parameter Unsaturated zone 2 soil Unsaturated zone 2 soil Unsaturated zone 2 soil	g/cm³	1.5 0.4 0.2 0.2 10 5.3	P P P	2 2 3 2 2 1	S S D D	1.695 0.360 0.289 0.2 126 9.87	NR NR NR NR NR NR	NR NR NR NR NR NR	NR NR NR NR NR	NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4 50% cumulative density function value. See Appendix J. Andrews Engineering Project ID 91-135 cross section Sheet Number A-A, January 2007. See Appendix A.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 lotal porosity Unsaturated zone 1 lotal porosity Unsaturated zone 1 field capacity Unsaturated zone 1 hydraulic conductivity Unsaturated zone 1 soil-specific b parameter Unsaturated zone 1 soil-specific b parameter Unsaturated zone 2 soil density Unsaturated zone 2 soil density	g/cm³	1.5 0.4 0.2 0.2 10	P P P	2 2 3 2 2	S S D D	1.695 0.360 0.289 0.2 126 9.87	25 25 25 25 25 25 25 25 25 25 25 25 25 2	NR NR NR NR NR	NA NA NA NA NA NA	NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4. 50% cumulative density function value. See Appendix J. Andrews Engineering Project ID. 91-135 cross section Sheet Number A-X, January 2007. See Appendix A. 50% cumulative density function value. See Appendix A.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 lotal porosity Unsaturated zone 1 lotal porosity Unsaturated zone 1 effective porosity Unsaturated zone 1 field capacity Unsaturated zone 1 soil-specific b parameter Unsaturated zone 2 soil Unsaturated zone 2 soil Unsaturated zone 2 soil	g/cm³	1.5 0.4 0.2 0.2 10 5.3	P P P	2 2 3 2 2 1	S S D D	1.695 0.360 0.289 0.2 126 9.87	NR NR NR NR NR NR	NR NR NR NR NR NR	NR NR NR NR NR	NR NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4 50% cumulative density function value. See Appendix J. Andrews Engineering Project ID 91-135 cross section Sheet Number A-A, January 2007. See Appendix A.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 lotal porosity Unsaturated zone 1 lotal porosity Unsaturated zone 1 effective porosity Unsaturated zone 1 field capacity Unsaturated zone 1 hydraulic conductivity Unsaturated zone 1 soil-specific b parameter Unsaturated zone 2 soil density Sand) Unsaturated zone 2 soil density Unsaturated zone 2 soil density Unsaturated zone 2 lotal porosity Unsaturated zone 2 lotal porosity Unsaturated zone 2 effective porosity	g/cm³	1.5 0.4 0.2 0.2 10 5.3	P P P	2 2 3 2 2 1	S S D D S S	1.695 0.360 0.289 0.2 126 9.87	NR NR NR NR NR NR NR	NR NR NR NR NR NR	NR NR NR NR NR NR	NR NR NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4 50% cumulative density function value. See Appendix J. Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 total porosity Unsaturated zone 1 effective porosity Unsaturated zone 1 field capacity Unsaturated zone 1 hydraulic conductivity Unsaturated zone 1 soil-specific b parameter Unsaturated zone 2 thickness (Sandy Sit/Sitly Sand) Unsaturated zone 2 zoil density Unsaturated zone 2 soil density Unsaturated zone 2 total porosity Unsaturated zone 2 total porosity Unsaturated zone 2 total porosity Unsaturated zone 2	g/cm³	1.5 0.4 0.2 0.2 10 5.3 4 1.5	P P P P	2 2 3 2 2 1 2 2 2 2	S S S D D S S S S S	1.695 0.360 0.289 0.2 126 9.87 1.71 1.563 0.409	NR NR NR NR NR NR NR NR	NR NR NR NR NR NR NR	NR NR NR NR NR NR NR	NR NR NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4 50% cumulative density function value. See Appendix J. Andrews Engineering Project ID 91-135 cross section Sheet Number A-A, January 2007. See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J.
Clay) Unsaturated zone 1 soil density Unsaturated zone 1 lotal porosity Unsaturated zone 1 lotal porosity Unsaturated zone 1 field capacity Unsaturated zone 1 soil-specific b parameter Unsaturated zone 1 soil-specific b parameter Unsaturated zone 2 soil density Unsaturated zone 2 soil density Unsaturated zone 2 soil density Unsaturated zone 2 lotal porosity Unsaturated zone 2 lotal porosity Unsaturated zone 2 effective porosity Unsaturated zone 2 effective porosity Unsaturated zone 2 lield	g/cm³	1.5 0.4 0.2 0.2 10 5.3 4 1.5	P P P P P	2 2 3 2 2 1 1 2 2 2 2	S	1.695 0.360 0.289 0.2 126 9.87 1.71 1.563 0.409	NR NR NR NR NR NR NR NR NR	NR NR NR NR NR NR NR NR	NR NR NR NR NR NR	NR NR NR NR NR NR NR NR	See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. RESRAD default See Table K-4 50% cumulative density function value. See Appendix J. Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J. 50% cumulative density function value. See Appendix J.

Parameter	Units	RESRAD Default	Туре¹	Priority ²	Treatment ³	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Unsaturated zone 3 thickness (Sand)	m	4	P	1	D	1.71	NA	NR	NR	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 3 soil density	g/cm³	1.5	Р	2	s	1.510	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 total porosity		0.4	Р	2	s	0.43	NA	NR	NR.	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 effective porosity		0.2	Р	2	s	0.383	NR	_NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 field capacity	<u>.</u>	0.2	Р	3	D	0.2	NR	NA	NR	NA	RESRAD default
Unsaturated zone 3 hydraulic conductivity	m/yr	10	Р	2	s	2495.4	NR_	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 soil- specific b parameter		5.3	Р	2	s	0.97	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Unsaturated zone 4 thickness (Sandy Silt/Silty Sand)	m	44	Р	1	D	4	NR	NR	NR	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 4 soil density	g/cm³	1.5	Р	2	S	1.562	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 total porosity		0.4	Р	2	S	0.389	NA	NR_	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 effective porosity Unsaturated zone 4 field		0.2	Р	2	S	0.318	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
capacity	-	0.2	Р	3	D	0.2	NA	NR	NR	NR	RESRAD default
Unsaturated zone 4 hydraulic conductivity	m/yr	10	Р	2	s	1021.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 soil- specific b parameter	<u>.</u>	5.3	Р	2	s	1.35	NR	NR	NA	NA	50% cumulative density function value. See Appendix J Andrews Engineering Project IO
Unsaturated zone 5 thickness (Sand)	m	. 4	Р	11	D	1.14	NR	NR	NA	NA	91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 5 soil density	g/cm³	1.5	Р	2	s	1.510	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 total porosity		0.4	P	2	s	0.43	NR	NR	NR NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 effective porosity Unsaturated zone 5 field		0.2	Р	2	s	0.383	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
capacity	<u> </u>	0.2	Р	3	D	0.2	NR	NR	NR	NA	RESRAD default
Unsaturated zone 5 hydraulic conductivity	m/yr	10	P	2	s	2493.6	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Unsaturated zone 5 soil- specific b parameter Distribution Coefficients (co	ontaminated, u	5.3 nsaturated, an	p d saturati	2 od zones)	S_	0.97	NA	NR	NR	NA ****	50% cumulative density function value. See Appendix J
Ac-227 (CZ)	cm³/g	20	P	1	s	824.5	NA .	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ1)	cm³/g	20	۵	1	s	818.4	NR	NR	NA	NR .	50% cumulative density function value. See Appendix J
Ac-227 (UZ2)	cm³/g	20	P	1	s	828.4	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Ac-227 (UZ3)	cm³/g	20	P	_ !	s	825.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ4)	cm³/g	20	Р	. 1	s	809.7	NA	NR	NR NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ5)	cm³/g	20	Р	1	s	814.7	NR	NA	NR		50% cumulative density function value. See Appendix J
Ac-227 (SZ)	cm³/g	20	Р	_1_	s	810.4	NR	NR	NR NR		50% cumulative density function value. See Appendix J
Pa-231 (CZ)	cm³/g	50	Р	_ 1	s	374.3	NR	NR	NR		50% cumulative density function value. See Appendix J
Pa-231 (UZ1)	cm³/g	50	Р	1	s	370.7	NR	NR	_ NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Pa-231 (UZ2)	cm³/g	50	Р	1	s	375.1	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ3)	cm³/g	50	Р	1	s	375.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ4)	cm³/g	50	ρ	1	s	378.2	NR	NA	NR	_NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ5)	cm³/g	50	Р	1	s	375.6	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (SZ)	cm³/g	50	Р	1	s	378.4	NR	NA	NR	NA NA	50% cumulative density function value. See Appendix J
Pb-210 (CZ)	cm³/g	100	Р	1	s	2373.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ1)	cm³/g	100	Р	1	s	2347.3	NR	NR	NR	NR_	50% cumulative density function value. See Appendix J
Pb-210 (UZ2)	cm³/g	100	Р	_1_	S	2361.6	ŊR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ3)	cm³/g	100	P_	1	_s	2356.9	NR	NR	NR		50% cumulative density function value. See Appendix J
Pb-210 (UZ4)	cm³/g	100	Р	1	_s	2352.1	NR	NR	NA	NA	50% cumulative density function value. See Appendix J
Pb-210 (UZ5)	cm³/g	100	Р	1	s	2379.9	NR	NR	NR_		50% cumulative density function value. See Appendix J
Pb-210 (SZ)	cm³/g	100	Р	. ,	s	2360.3	NR	NR	NR	NR NR	50% cumulative density function value. See Appendix J
Ra-226 (CZ)	cm³/g	70	P	.1	s	3501.2	NR	NR	NR	NR NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ1)	cm³/g	70	Р	_1_	s	3506.5	NR	NR	NR		50% cumulative density function value. See Appendix J
Ra-226 (UZ2)	cm³/g	70	Р_	1_	S	3505.6	NR NR	NR	NR_		50% cumulative density function value. See Appendix J
Ra-226 (UZ3)	cm³/g	70	Р		s	3522.8	NA NA	NA	NR		50% cumulative density function value. See Appendix J
Ra-226 (UZ4)	cm³/g	70	Р_		s	3484.6	_NR	NR	NR		50% cumulative density function value. See Appendix J
Ra-226 (UZ5)	cm³/g	70	Р	11	s	3495.8	NR	NR	NR		50% cumulative density function value. See Appendix J
Ra-226 (SZ)	cm³/g	70	Р	1	s	3529.3	NR	NR	NR		50% cumulative density function value. See Appendix J
Ra-228 (CZ)	cm³/g	70	P	_1_	s	3489.5	NR NR	NR	NA.		50% cumulative density function value. See Appendix J
Ra-228 (UZ1)	cm³/g	_70	Р	1	s	3507.0	NR	NR	NR		50% cumulative density function value, See Appendix J
Ra-228 (UZ2)	cm³/g	70	Р		s	3521.8	NR	NR	NR		50% cumulative density function value. See Appendix J
Ra-228 (UZ3)	cm³/g	70	Р		s	3513.0	NR	NR PA	NR	NR	50% cumulative density function value. See Appendix J
Ra-228 (UZ4)	cm³/g	70	Р	1	s	3504.5	NR	NR	NR		50% cumulative density function value, See Appendix J
Ra-228 (UZ5)	cm³/g	70	Р	1	s	3483.8	NR	NR	NR		50% cumulative density function value. See Appendix J
Ra-228 (SZ)	cm³/g	70	Р	1	s	3521.4	NA	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (CZ)	cm³/g	60000	Р	1	s	5883.2	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (UZ1)	cm³/g	60000	Р	,	s	5736.1	NR	NR NR	NR		50% cumulative density function value. See Appendix J
Th-228 (UZ2)	cm³/g	60000	Р	1	s	5825.4	NR NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (UZ3)	_cm³/g	60000	Р	1	s	5786.3	NR	NR	NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Туре¹	Priority ²	Treatment ³	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Th-228 (UZ4)	cm³/g	60000	Р	1	s	5774.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-228 (UZ5)	cm³/g	60000	Р	1	s	5784.1	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-228 (SZ)	cm³/g	60000	Р	1	S	5828.0	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (CZ)	cm³/g	60000	Р	1	s	5770.7	NR	NA	NR	NA	50% cumulative density function value. See Appendix J
Th-230 (UZ1)	cm³/g	60000	Р	. 1	s	5842.5	NR	NR	RN	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ2)	cm³/g	60000	Р	1	S	5842.8	NR	NA	NR	NR _	50% cumulative density function value. See Appendix J
Th-230 (UZ3)	cm³/g	60000	Р	11	s	5882.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ4)	cm³/g	60000	Р	1	s	5778.8	NR	NR	NR	_NR	50% cumulative density function value. See Appendix J
Th-230 (UZ5)	cm³/g	60000	ρ	1	s	5859.6	NR	NA	NA	NR.	50% cumulative density function value. See Appendix J
Th-230 (SZ)	cm³/g	60000	Р	1	s	5849.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (CZ)	cm³/g	60000	Р	1	s	5770.9	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ1)	cm³/g	60000	Р	1	S_	5808.9	NR	NR	NR	NR _	50% cumulative density function value. See Appendix J
Th-232 (UZ2)	cm³/g	60000	Ρ	1	s	5744.2	NR	NR	NR	NA .	50% cumulative density function value. See Appendix J
Th-232 (UZ3)	cm³/g	60000	Р	1	s	5769.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ4)	cm³/g	60000	Р	1	s	5778.8	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Th-232 (UZ5)	cm³/g	60000	Р	1	S	5822.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (SZ)	cm³/g	60000	Р	1	s	5864.1	NR	NA_	NA	NA .	50% cumulative density function value. See Appendix J
U-234 (CZ)	cm³/g	50	Р	1	NA	123.5	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
U-234 (UZ1)	cm³/g	50	Р	1	NA NA	126.1	NR	NR_	NR	NR	50% cumulative density function value. See Appendix J
U-234 (UZ2)	cm³/g	50	Р	. 1	NA .	124.2	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
U-234 (UZ3)	cm³/g	50	Р_	1	NA NA	124.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-234 (UZ4)	cm³/g	50	Р	_1_	NA NA	124.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-234 (UZ5)	cm³/g	50	Р	1	NA	125.7	NR	NR	NR		50% cumulative density function value. See Appendix J
U-234 (SZ)	cm³/g	50	Р	1	NA NA	126.4	NR	NA	NA	NA	50% cumulative density function value. See Appendix J
U-235 (CZ)	cm³/g	50	Р	_1	NA	15.2	NR	NR	NR	NR_	25% cumulative density function value. See Appendix J
U-235 (UZ1)	cm³/g	50	Р	1	NA NA	125.8	NR	NR	NR		50% cumulative density function value. See Appendix J
U-235 (UZ2)	cm³/g	50	Р	1	NA.	123.3	NR	ŊŖ_	NB		50% cumulative density function value. See Appendix J
U-235 (UZ3)	cm³/g	50	Р	1	NA	125.9	NR	NR	NR		50% cumulative density function value. See Appendix J
U-235 (UZ4)	cm³/g	50	Р	_ 1	NA	124.9	NA	NR_	NR		50% cumulative density function value. See Appendix J
U-235 (UZ5)	cm³/g	50	Р	_11	NA	124.7	NR	NR	NR		50% cumulative density function value. See Appendix J

[RESRAD	[Γ		Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Value	1	2	3	4	Basis
U-235 (SZ)	cm³/g	50	Р	1	NA	124.4	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
U-236 (CZ)	cm³/g	50	Р	1	NA	123.9	NR_	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ1)	cm³/g	50	Р	1	NA.	124.0	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ2)	cm³/g	50	Р	1	NA_	123.8	NR	NR	NA	RN	50% cumulative density function value. See Appendix J
U-236 (UZ3)	cm³/g	50	Р	1	NA	123.9	NR -	NA	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ4)	cm³/g	50	P	_ 1	NA .	124.0	NR	NA NA	NR NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ5)	cm³/g	50	Р	1	NA	125.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (SZ)	_cm³/g	50	Р	1	NA_	125.8	NR	NR_	NA	NA	50% cumulative density function value. See Appendix J
U-238 (CZ)	cm³/g	50	Р	1	NA	124.0	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ1)	cm³/g	50	Р	11	NA.	123.8	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ2)	cm³/g	50	Р	11	NA_	124.5	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ3)	cm³/g	50	Р	1	NA.	123.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ4)	cm³/g	50	Р	1	NA NA	124.0	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
U-238 (UZ5)	_cm³/g	50	Р	1	NA.	126.2	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
U-238 (SZ) Transport Factor Options	cm³/g	50	P	1	NA_	124.3	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Transport According to											RESRAD default, parameter is not used for calculation of distribution coefficients. Value of 0 not used for calculation of
Leach rate	1/yr	0	P	3	D	0	NR	NR	NR	NR	distribution coefficients. Value used for Uranium nuclides
Solubility limit	mol/L	0	Р	3	D	2.94E-06	NR	NR	NR	NR	only RESRAD default, parameter not used for calculation of
Use plant/soil ratio	Check box	Yes/No	NA	3 (* > 2.5	NA Administration	No No	NR 6.23466556	NR WWW.	NR Section (Section)	NR On the second	distribution coefficients.
Inhalation rate	m³/yr	8400	M, B	3	D	11400	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Mass loading for inhalation Exposure duration	g/m³ yr	0.0001 30	P, B	23	S D	2.35E-05 25	NR NR	NR NR	NR NR	NR NR	50% cumulative density function value. See Appendix J RESRAD Manual, Table 2.3
Indoor dust filtration factor (shielding factor, inhalation)		0.4	P. B	2	S	0.547	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Shielding factor, external gamma		0.7	Р	2	<u>s</u>	0.269424	NR_	NR	NR	NR	50% cumulative density function value. See Appendix J
Indoor time fraction Outdoor (on site) time		0.5	В	3	D	0.17	NA	NR	NR		RESRAD Manual, Table 2.3
fraction Shape of the		0.25	В	3	D	0.06	NR	NR	NR	NR	RESRAD Manual, Table 2.3 Shape representative of pond
contaminated zone		1	Р	3	D	Non-circular	NR	NR	NR	NR Passacare areas	(rectangular)
Ingestion, Dietary Fruit, vegetable, and grain consumption rate	kg/yr	160	M, B	2	NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Leafy vegetable consumption	kg/yr	14	м, в	3	NA	Not used	NA	NR	NA	NR_	Pathway suppressed for industrial worker scenario
Milk consumption	L/yr	92	м, в	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Meat and poultry consumption	kg/yr	63	M, B	3	NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario
Fish consumption rate	kg/yr	5,4	м. в	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Other seafood consumption rate	kg/yr	0.9	м, в	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario RESRAD Manual, Table 2.3
Soil ingestion rate	g/yr_	36.5	М, В	2	D	36.5	NR	NR	NR		based on EPA suggested value of 100 mg/day NUREG/CR-5512, V3
						_					NILIDEC/CD Ecto Va

		RESRAD					Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter Contamination fraction of	Units	Default	Туре	Priority ²	Treatment ³	Value	1	2	3	4	Basis
drinking water Contamination fraction of		1	B, P	3	NA	1	NR	NR	NR	NA	RESRAD Default Pathway suppressed for
household water	-	1	B, P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of livestock water		1	В, Р	3	NA	Not used	NR	NA	NR	NA	Pathway suppressed for industrial worker scenario
Contamination fraction of					Ì						Pathway suppressed for
irrigation water Contamination fraction of	•	11	B, P	3	NA NA	Not used	NR	NR _	NR	NR	industrial worker scenario Pathway suppressed for
aquatic food	-	0.5	B, P	2	NA	Not used	NR	NR	NA	NR	industrial worker scenario
Contamination fraction of plant food		-1	В, Р	3	NA.	Not used	NR	NR	NR	NR NR	Pathway suppressed for industrial worker scenario
Contamination fraction of	· ·										Pathway suppressed for
meat Contamination fraction of	-	-1	B, P	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
milk		-1	B, P	3	NA	Not used	NR	NR	NR	NA	industrial worker scenario
Ingestion; Non-Dietary	9 000 000000000000000000000000000000000	#WINDS	8-4-5-49	900 mark	20,662,036,05	60-0173 (28 06) 81	Reservatives.	\$6386666446	Market Comment	SHEEL STANK	Pathway suppressed for
rate for meat Livestock fodder intake	kg/d	68	М	3	NA	Not used	NR	NR	NA NA	NR	industrial worker scenario Pathway suppressed for
rate for milk Livestock water intake	kg/d	55	М	3	NA .	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
rate for meat	L/d	50	М	3	NA	Not used	NR _	NR	NR	NR	industrial worker scenario
Livestock water intake rate for milk	L/d	160	М	3	NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
Livestock soil intake	kg/d	0.5	м	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Mass loading for foliar						Nataad		ND			Pathway suppressed for
deposition	g/m³	1.00E-04	Р	3	NA NA	Not used	NR	NA	NR .	NR	industrial worker scenario
Depth of soil mixing layer	m	0.15	Р	2	s	0.231	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Depth of roots	m	0.9	Р	1	NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
		0.5	<u> </u>			1101000					RESRAD default, all drinking
Drinking water fraction from groundwater	-	1	B, P	3	D	1	NR	NA	NR	NR	water assumed from groundwater
Household water fraction											Parameter applies to Radon
from groundwater	-	1	B, P	3	NA.	Not used	NR	NR _	NR	NR	only.
Livestock water fraction from groundwater		1	В, Р	3	NA	Not used	NR	-NR	NR	NR	Pathway suppressed for industrial worker scenario
Irrigation fraction from groundwater		1	8, P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Wet weight crop yield for									<u> </u>		Pathway suppressed for
non-leafy plants Wet weight crop yield for	kg/m²	0.7	Ρ	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
leafy plants	kg/m²	1.5	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet weight crop yield for fodder	kg/m²	1.1	₽	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Growing season for non- leafy vegetables	\ar	0.17	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Growing season for leafy	yr								i		Pathway suppressed for
vegetables Growing season for	yr	0.25	Р	3	NA NA	Not used	NR	NA .	NA .	NA NA	industrial worker scenario Pathway suppressed for
fodder	yr	0.08	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Translocation factor for non-leafy vegetables	-	0.1	Р	3	NA	Not used	NR	NA	NR NR	NR	Pathway suppressed for industrial worker scenario
Translocation factor for leafy vegetables		1	P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Translocation factor for											Pathway suppressed for
Dry foliar interception	•	1	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
fraction for non-leafy						Nine nort	NO.				Pathway suppressed for
vegetables Dry foliar interception		0.25	Р	3	NA	Not used	NR	NA	NR	NR	industrial worker scenario
fraction for leafy		0.25	 _P	3	NA.	Not used	NR	NR	NR NR	NR	Pathway suppressed for industrial worker scenario
Dry foliar interception	<u> </u>										Pathway suppressed for
fraction for fodder Wet foliar interception		0.25	P	3	NA_	Not used	NR	NR	NR	NR	industrial worker scenario
fraction for non-leafy											Pathway suppressed for
vegetables Wet foliar interception	•	0.25	Р	3	NA.	Not used	NR	NA	NR	NR	industrial worker scenario
fraction for leafy	}		_			N-1-1-	N.D				Pathway suppressed for
vegetables Wet foliar interception	-	0.25	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
fraction for fodder Weathering removal	<u> </u>	0.25	Р	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
constant for vegetation	1/yr	20	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Special Radionuclides (C- C-12 concentration in	14) % & % & . [Burney State State .	80.1974/F	35.3835 A	Constant.	STEEL FROM !	\$-500×163	266010112802 <u>x</u>	3088340006	85.84.0.44.00	Applicable for C-14 exposure
water	g/cm ³	2.00E-05	Р	3	NA	Not used	NR	NR	NR	NR	only
C-12 concentration in contaminated soil	g/g	3.00E-02	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
Fraction of vegetation carbon from soil		2.00E-02	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
Fraction of vegetation carbon from air			Р	3	NA	Not used	NR	NA	NR	NR	Applicable for C-14 exposure only
Ci:14 evasion layer		0.98									Applicable for C-14 exposure
thickness in soil	m	0.3	P	2	NA .	Not used	NR	NA	NR	NR	only

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		RESRAD	Timel	Priority ²	T	Malua	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	Posis
Parameter C-14 evasion flux rate	Units	Default	Type	Priority	Treatment ³	Value	 '	22	3	4	Basis Applicable for C-14 exposure
from soil C-12 evasion flux rate	1/8	7.00E-07	Р	3	NA NA	Not used	NR	NR	NA	NR	only Applicable for C-14 exposure
from soil	1/5	1.00E-10	Р	3	l NA	Not used	NR	NR	NR	NA	only
Fraction of grain in beef cattle feed		0.8	В	3	NA	Not used	NR	NA	NR	NR	Applicable for C-14 exposure
Fraction of grain in milk						1101 0300					Applicable for C-14 exposure
Storage Times of Contain	instad Ecodetii	0.2	B Seferation	3	NA MANAGEMENT	Not used	NR	NR NR	NR Section 1990	NR XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	only
Storage time for fruits,	nated rootstu	118 34,745,27,0795.	2/03.00	- m.as.e s.	2388475 00 year 527	200 J. 18 18 18 18 18 18 18 18 18 18 18 18 18	- 35 C TO 12 A .	NAME OF SERVICES AND SERVICES.	1-17-201 • 37-47 (C	39 300 300 129 22	4.11.00.1 (asset of the security of the society with the
non-leafy vegetables, and grain	d	14	В	3	NA NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
Storage time for leafy											Pathway suppressed for
vegetables	d	11	8	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Storage time for milk	d	11	В	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for meat	a	20	В	3	NA .	Not used	NR .	NR.	NR	NR	Pathway suppressed for industrial worker scenario
											Pathway suppressed for
Storage time for fish	d	7	В	3	NA_	Not used	NR	NR_	NR	NR	industrial worker scenario
Storage time for	. '	_		_ '							Pathway suppressed for
Crustacea and mollusks Storage time for well	<u>d</u>	7	В	3	NA_	Not used	NR	NR	NR	NR	Industrial worker scenario Pathway suppressed for
water	d	11	В	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for surface water	d	1	В	3	NA.	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Storage time for livestock			_			Not used					Pathway suppressed for
fodder Radon	d Say Carrie	45	B	3	NA	THOU USED	NR	NR Middle Section	NR SZSZZZSZ	NR	industrial worker scenario
Thickness of building foundation		0.15	ρ	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Bulk density building	m	0.15								1	Applicable for Radon exposure
foundation Total porosity of cover	g/m³	2.4	P	_3	NA NA	Not used	NR	NR	NA	NR	only Applicable for Radon exposure
material		0.4	Ρ	3	NA	Not used	NR	NR	NR	NR	only
Total porosity of building foundation		0.1	P	3	NA.	Not used	NA	NA	NR	NR	Applicable for Radon exposure only
						1101 0000					
Volumetric water content of cover material		0.05	P	3	NA	Not used	NR	. NA	NR	NR	Applicable for Radon exposure only
		0.00	_								
Volumetric water content of building foundation	i	0.03	Р	3	NA	Not used	NA	NR	NR	NR	Applicable for Radon exposure
Radon diffusion											
coefficient in cover material	m/s	2.00E-06	Р	3	NA	Not used	NR	NA	NR	NR.	Applicable for Radon exposure only
Radon diffusion											Applicable for Radon exposure
coefficient in foundation material	m/s	3.00E-07	P	3	NA	Not used	NR	NR	NA	NR	only
Radon diffusion coefficient in											Applicable for Radon exposure
contaminated zone soil	m/s	2.00E-06	Р	3	NA	Not used	NR	NR	NR	NR	only
Radon vertical dimension of mixing	m	2	P	3	NA.	Not used	NR	NA	NR	NR	Applicable for Radon exposure
Average building air											Applicable for Radon exposure
exchange rate	1/hr	0.5	Р, В	3	NA NA	Not used	NR	NR _	NR	NA	only Applicable for Radon exposure
Building (room) height	m	2.5	Р	3	NA NA	Not used	NR	NR	NR	NR	only
Building interior area	i .	0	Р	3	NA	Not used	NR	NA	NR	NA.	Applicable for Radon exposure
Building depth below			Р	,			NR				Applicable for Radon exposure
ground surface Radon-222 emanation	m_	-1	-	3	NA	Not used	NH	NR	NR	NR	only Applicable for Radon exposure
coefficient	· · ·	0.25	Р	3	NA NA	Not used	NR	NA	NR		only Applicable for Radon exposure
Radon-220 emanation coefficient	Ì	0.15	Р	3	NA	Not used	NR	NR	NR	NR	only
Risk Conversion Factors	(risk/yr)/	Nuclide	\$30.\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\$280-1325.	3880X0880	siggraff felyligist.	60000000000000000000000000000000000000	(5,56,50)(g)	\$4000000107	BACTERA.	
Slope factor - external	(pCi/g)	specific	М	3	NA	Not used	NR	NR	NA	NR	RESRAD Default
Slope factor - inhalation	risk/pCl	Nuclide specific	М	3	NA	Not used	NR	NB	NA	NR	RESRAD Default
		Nuclide		_							
Slope factor – ingestion Inhalation dose conversion	risk/pCi	specific	M ZDOP N	3 (8/4.45/3)	NA .	Not used	NR	NR Merconstant	NA	NR Tables	RESRAD Default
Ac-227	mrem/pCi	6.7	М	3	D .	6.7	NA	NA	NR	RN	FGR-11, RESRAD Library
Pa-231 Pb-210	mrem/pCi mrem/pCi	1.28 0.0136	M	3	٥٥	1.28 0.0136	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00858	M	3	D	0.00858	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-228 Th-228	mrem/pCi mrem/pCi	0.00477 0.342	M	3	D 0	0.00477	NR NR	NR NR	NR NR		FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-230	mrem/pCi	0.326	М	3	Ď	0.326	NR	NA	NR	NR	FGR-11, RESRAD Library
Th-232 U-234	mrem/pCi mrem/pCi	1.64 0.132	M	3	D	1.64 0.132	NR NR	NR NR	NR NR		FGR-11, RESRAD Library FGR-11, RESRAD Library
U-235	mrem/pCi	0.123	М	3	D	0.123	NR	NR	NA	NR	FGR-11, RESRAD Library
U-236 U-238	mrem/pCi mrem/pCi	0.125 0.118	M	3	D D	0.125 0.118	NA NA	NR NA	NA NA		FGR-11, RESRAD Library
Ingestion Dose Donversion	n Factors	January Street	180000	W. 1. 1980 200	King Park	Principle Complete Committee	B wat Kill	248878 - HOSSE		16854 698 A	Warker and the same of the sam
Ac-227 Pa-231	mrem/pCi mrem/pCi	0.0141	M	3	0	0.0141	NA NR	NA NA	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.00537	М	3_	à	0.00537	NR	NR	NR	NA	FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00132	М	3	D	0.00132	NR	NR	NR	NA	FGR-11, RESRAD Library

		RESRAD					Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Value	1	2	3	4	Basis
Ra-228	mrem/pCi	0.00144	- M	3	D	0.00144 0.000396	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-228 Th-230	mrem/pCi mrem/pCl	0.000396	M	3	Б	0.000548	NR	NR	NR NR		FGR-11, RESRAD Library
Th-232	mrem/pCi	0.00273	M	3	Ď	0.00273	NR	NR	NR	NR	FGR-11, RESRAD Library
U-234 U-235	mrem/pCi mrem/pCi	0.000283	M	3	D D	0.000283	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.000269	M	3	D D	0.000269	NA	NA	NA NA	NR	FGR-11, RESRAD Library
U-238	mrem/pCi	0.000255	М	3	D	0.000255	NR	NA	NR	NR	FGR-11, RESRAD Library
Plant Transfer Factors [pC	Vg plant (wet))	[pCl/g soil (dry	112000	\$454.5% A.	3.72344A.	2500 DAR 70 10	565500000000000000000000000000000000000	2078/08509	POST 25/8 (\$12.20)	Carlotte spirit	Pathway suppressed for
Ac-227	-	0.0025	Р	1	NA	Not used	NR	NR	NR	NA	industrial worker scenario
Pa-231		0.01	Р	1	NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
Pb-210		0.01	Р	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-226		0.04	Р	11	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228		0.04	Р	1	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-228		0.001	Р	1	NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
Th-230	<u> </u>	0.001	Р	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-232		0.001	P	11	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-234		0.0025	Р	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-235		0.0025	P	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-236		0.0025	Р	1	NA NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
U-238		0.0025	Р	. 1	NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
Meat Transfer Factor	2283324315984		\$65,327	CACCE	MEN.CSESSON.	370%。27年夏6365%。	1986/283/861	STATE OF THE	\$200-020098	(20) 新加州(1)。	487 <i>62</i> 6-38-38-6709210-66
Ac-227	(pCi/kg)/ (pCi/d)	0.00002	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/d)	0.005	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/d)	0.0008	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/d)	0.001	Ρ	2	NA .	Not used	. NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-228	(pCi/kg)/ (pCi/d)	0.0001	Р	2	NA	Not used	NR_	NR	NR	NA	Pathway suppressed for industrial worker scenario
Th-230	(pCVkg)/ (pCVd)	0.0001	Р	2	NA .	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario Pathway suppressed for
Th-232	(pCi/kg)/ (pCi/d) (pCi/kg)/	0.0001	Р	2	NA NA	Not used	NR	NA	NR	NR	industrial worker scenario Pathway suppressed for
U-234	(pCVkg)/ (pCVkg)/	0.00034	P	2	NA	Not used	NA	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-235	(pCVkg)/	0.00034	Р	2	NA	Not used	NR _	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-236	(pCVkg)/	0.00034	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-238 Milk Transfer Factor	(pCVd)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
MIK Transfer Paciol	(pCVL)/	90080 151 278A 191	H SKIPKI D	13,000,000,000	CX_11181582	p 342 4.70 5744 5.	27: 1 29 - 380 - 18	18.000 W/V X 17.77	Catalog at a trade in Alberta	2007-40000-000-0	Pathway suppressed for
Ac-227	(pCVd)	0.00002	Р	2	NA	Not used	NR	NR	NR	NA	industrial worker scenario
Pa-231	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NA	NA	NR	Pathway suppressed for industrial worker scenario
1 4-201	(pCVL)/	0.00000			- 141.						Pathway suppressed for
Pb-210	(pCi/d)	0.0003	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-226	(pCi/L)/ (pCi/d)	0.001	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCVL)/										Pathway suppressed for
Ra-228	(pCVL)/	0.001	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-228	(pCVd)	0.000005	P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Th-230	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-232	(pCVL)/ (pCVd)	0.000005	Р	2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-234	(pCVL)/ (pCVd)	0.0006	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-235	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA	Not used	NR_	NR	NR		Pathway suppressed for industrial worker scenario
U-236	(pCVL)/ (pCVd)	0.0006	P	2	NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario
U-238	(pCVL)/ (pCVd)	0.0006	Р	2	NA	Not used	NR	NR	NR .		Pathway suppressed for industrial worker scenario
Bioaccumulation factor fo	r.fish kwas sis addi	128-120959:00	048.1	W 1000	Hospiners, Ag	BY THE MAKES TO	8852780.00%	GAZKETEK:	19.27.27.2	5 3A 12382NAT	
Ac-227	(pCi/kg)/ (pCi/L)	15	Р	2	NA NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/L)	10	Р	2	NA NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario
Pb-210	(pCVkg)/ (pCVL)	300	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pa-226	(pCVkg)/ (pCVL)	50	P	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
- 14 ZZV	(bost)				, ,,,,,		· '*''		1911		

			Τ .				Distribution	Distribution	Distribution	Distribution	
	1	RESRAD	l .	ŀ		ļ	Parameter	Parameter	Parameter		İ
Down mater	Units	Default		Priority ²	Treatment ³		Parameter			Parameter	
Parameter	(pCi/kg)/	Delaun	Type	Priority	meatment	Value		2	3	4	Basis
0- 000			1 _	١ .	١	l		l			Pathway suppressed for
Pa-228	(pCVL)	50	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/					l					Pathway suppressed for
Th-228	(pCVL)	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
L	(pCVkg)/	1			1 .						Pathway suppressed for
Th-230	(pCVL)	100	P	2	NA.	Not used	NA	NR	NR	NR	industrial worker scenario
	(pCVkg)/	J	j	ļ]	T	j	,]]	Pathway suppressed for
Th-232	(pCi/L)	100	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/	l									Pathway suppressed for
U-234	(pCVL)	10	P	2	NA.	Not used	NR	NR	NR	NA NA	industrial worker scenario
	(pCi/kg)/		T"								Pathway suppressed for
U-235	(pCi/L)	10	P	2	NA NA	Not used	NR NR	NR	NR	l nr	industrial worker scenario
	(pCi/kg)/		-								Pathway suppressed for
U-236	(pCi/L)	10	P	2	NA.	Not used	NR NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/		1								Pathway suppressed for
U-238	(pCi/L)	10	P	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Bioaccumulation factor fo		molluska	MARGI	NYKAMATA	Section Control	130 PROGRESSOR	2017-145-186-188	SPHULLIAN.	: 2000 939 30 of	2006/2006	Total Control of Storing No.
	(pCi/kg)/	1		10 701.11	W W	* 000 - 0.000 00 00 00 00 00 00 00 00 00 00 00	7 1 1 1 1 1 1 1	1537 1757 5 4 4 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4	1, 100 State William	V. 10 20 20 20 20 20 20 20 20 20 20 20 20 20	Pathway suppressed for
Ac-227	(pCVL)	1000	P	3	NA	Not used	Í NR	NR	l NR	NR	industrial worker scenario
	(pCVkg)/					1101 0300	1111	- 1111	, NA	140	Pathway suppressed for
Pa-231	(pCi/L)	110	P	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
1 4 251	(pCi/kg)/		- '			1401 0360	INIT	NA.	IND	NH	Pathway suppressed for
Pb-210	(pCVL)	100	P	3	NA	Not used	NR	NR	NR		
15-210	(pCVkg)/	100		3	140	Not useu	INT.	IND	INFI	NR	industrial worker scenario
Ra-226	(pCVkg)/	250	P	3	NA .	Not used	NR .	NR	NR NR		Pathway suppressed for
114-220	(pCVkg)/	250			NA.	Not usea	INH	NH	NH	NR	industrial worker scenario
Ra-228	(pCVL)	250	Р	3	NA	*****					Pathway suppressed for
na-226	(pCi/kg)/	250	P	3	NA_	Not used	NR	NR	NR		industrial worker scenario
Th-228	(pCVkg)/	500	Р								Pathway suppressed for
111-220		300		3	NA NA	Not used	NR	NR	NR		industrial worker scenario
Th-230	(pCi/kg)/		_								Pathway suppressed for
1 N-23U	(pCi/L)	500	P	3	NA NA	Not used	NR	NR	NR		industrial worker scenario
	(pCVkg)/	l									Pathway suppressed for
Th-232	(pCi/L)	500	Р	3	NA	Not used	NR	NR	NR		industrial worker scenario
	(pCi/kg)/		[[Pathway suppressed for
U-234	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
L	(pCvkg)/		1								Pathway suppressed for
U-235	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCi/kg)/										Pathway suppressed for
U-236	(pCi/L)	60	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
	(pCl/kg)/										Pathway suppressed for
U-238	(pCi/L)	60	Р	3	_NA	Not used	NR	NR	NR	NR	industrial worker scenario
Graphics Parameters	620000000000000000000000000000000000000	SHEASTERN THE R	30000	17.00 Bel 1	GOODSEN	\$3000000000000000000000000000000000000	\$\$245.P\$246.T\$1.T	1.184.3404.381.1	CONTRACTOR ST	ioling we	CARPONE SECURITION OF THE SECURITION OF
	1	Į.			,		l i				Value greater than default
Number of points	I	32	NA	NA	NA	1024	NR	NR	NR		provides more evaluation points
Spacing	1	Log	NA	NA	NA	Log	NR	NR	NR		RESRAD Default
Time Integration Paramet	ers Non-call	\$00.000 (Files Co.	%C 1004.:	Balgrain)	11 14 14 16 16 16 16 16 16 16 16 16 16 16 16 16	835/-WAL/-327 (BSZ)	38 38 WXE	7778660 (Oas#6		\$250 BRIDGE	A 2027 CARL DOCUMENTS
Maximum number of	T										
points for dose		17	NA	NA	NA	17	NR	NR	NR	NA	RESRAD Default

Notes:

1P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A. Table 2.1)

21 = high priority, 2 = medium priority, 3 = low priority (NUREG/CR-6697, Att. B. Table 4.2)

3D = deterministic, S = stochastic

Table K-2 **Honeywell Metropolis Works** Pond B Dose Assessment Industrial Worker Scenario **Source Configuration Summary**

		5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
1	Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
	Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area	CZ Area ⁽³⁾	Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m ²)	(m ²)	(m)	(m)	(m)	(m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b -Ponds B, C, D, and E" provided in Appendix A

⁽²⁾ Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume
(3) CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond

Table K-3
Honeywell Metropolis Works
Pond B Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

	Radionu	clide Concentratio	n (pCi/g)
Radionuclide	Average Dry	Corrected for 5% Bulking Factor	Corrected for % Solids
Protactinium 231	0.08	0.07	0.04
Radium 226	0.77	0.73	0.42
Thorium 228	0.15	0.15	0.08
Thorium 230	4.23	4.02	2.30
Thorium 232	0.13	0.12	0.07
Uranium 234	127.98	121.58	69.50
Uranium 235	8.24	7.83	4.48
Uranium 236	3.43	3.25	1.86
Uranium 238	131.84	125.25	71.59

Pond Solids: 57.16%

Table K-4 Honeywell Metropolis Works Pond B Dose Assessment Industrial Worker Scenario Hydraulic Conductivity of Silty Clay

Pressure	Hydraulic Conductivity	Hydraulic Conductivity
(psf)	(cm/sec)	(m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table K-5
Honeywell Metropolis Works
Pond B Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

<u> </u>		Bulk	Average
		Density	Bulk Density
Pond	Sample ID	(g/ml)	(g/ml)
В	B-18 Lower	1.6	-
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В	-	•	1.575
C	C-2	1.6	·
С	C-5	1.7	-
С	C-19 Lower	1.6	-
C	C-19 Upper	1.5	-
С	-	•	1.6
D	D-8 Lower	1.5	-
D	D-8 Upper	1.6	-
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	<u>-</u>
D	D-17 Lower	1.5	-
D	D-17 Upper	1.6	<u>-</u>
D	D-26 Lower	1.8	-
D	D-26 Upper	1.9	-
D	-		1.6
E	E-65 Lower	1.3	-
E	E-65 Upper	1.5	-
E	E-80 Lower	1.5_	-
E	E-80 Upper	1.5	•
E	E-97 Lower	1.2	•
E	E-97 Upper	1.1	-
E	E-103 Lower	1.7_	•
E	E-103 Upper	1.7	
E	-	-	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX L

Pond C Deterministic Dose Assessment Input Summary

,		J	·	, <u> </u>			Distribution	Distribution	Distribution	Distribution	,
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment	Value	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Basis
Contaminated Zone		> OF ALL	ह कुरका व	3	Mar. 15 10. :	\$4.153.42.25	dSymptop's	ಕಾರಣಿ ಬಿನ್	11895 Fr. P.	naraki saji s	2.1.2.3 %
Area of contaminated zone	m²	10000	Р	2	D	4,000	NR	NA	NR	NR	See Table L-2.
Thickness of contaminated zone	_m	2	Р	2	D	2.724	NR	NR	NR	NR	See Table L-2.
Length parallel to the aquifer flow	m	100	P	2	٥	94	NR	NR	NR	NR	Length of longest side of contaminated zone. See Table L-
Basic Radiation Dose											Unrestricted release criteria in 10
Limit Time since placement	mrem/year yr	30	P	3	0	25 0	NR NR	NR NR	NR NR	NR NR	CFR 20.1402 IRESRAD default
Times for calculations	уī	1	P	3	0	1	NR	NA	NA	NR	RESRAD default
Times for calculations Times for calculations	yr yr	10	P	3	D D	10	NR NR	NR NR	NR NR	NR NR	RESRAD default
Times for calculations	yr	30	Р	3	D	30	NR	NR	NR	NR	RESRAD default
Times for calculations Times for calculations	yr yr	100 300	P	3	0	300	NR NR	NR NR	NA NA	NR NR	RESRAD default
Times for calculations	yr	1000	Р	3	0	1000	NR	NR	NR	NA	RESRAD default
Initial Principle Radionuclic Soil: Ac-227	pCi/g	ons see See 1957.	\$5.13405 P	1,590.47 to	gian geografia. D	0	NA NA	NR	NA	NR	See Table L-3
Soil: Pa-231	ρCVg	0	P	2	Б	0.31	NR	NA	NP	NA	See Table L-3
Soil: Pb-210 Soil: Ra-226	pCVg pCVg	0	P	2	0	0.05	NR NR	NR NR	NA NA	NR NR	See Table L-3 See Table L-3
Soil: Ra-228	pC√g	0	P	2	b	0	NR	NR	NR	NR	See Table L-3
Soil: Th-228 Soil: Th-230	pCi/g pCi/g	0 0	P	2	0	1.56 0.05	NR NR	NA NA	NR NR	NR NR	See Table L-3 See Table L-3
Soil: Th-232	pCVg	0	P	2	٥	136.83	NR	NR	NR	NR	See Table L-3
Soil: U-234 Soil: U-235	pCVg pCVg	0	P	2	5	7.31 3.27	NR NR	NR NR	NR NR	NR RA	See Table L-3 See Table L-3
Soil: U-236	pCi/g	0	Þ	2	٥	141.58	NR	NR	NR	NR	See Table L-3
Soil: U-238	pCi/g	0	P	2	٥	0.00	NA	NR	NA	NR	See Table L-3 Not used for calculation of
Groundwater: Ac-227	pCi/L	0	Р	3	NA.	Not used	NR	NR	NR	NA	distribution coefficients
Groundwater: Pa-231	pCi/L	0	Р	3	NA	Not used	NA	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater: Pb-210	рСVL	0	Р	3	NA.	Not used	NR	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater: Ra-226	pCi/L	_ 0	P_	3	NA	Not used	NR	NR	NA	NR.	Not used for calculation of distribution coefficients
Groundwater: Ra-228	pCVL	0	Р	3	NA	Not used	NR	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater: Th-228	pCi/L	0	Р	3	NA	Not used	NFI	NR	NA	NR	Not used for calculation of distribution coefficients
Groundwater: Th-230	pCVL	0	Р	3	NA	Not used	NR	NR	NA	NR	Not used for calculation of distribution coefficients
Groundwater: Th-232	pCi/L	0	Р	3	NA .	Not used	NR	NR	NR	NA	Not used for calculation of distribution coefficients
Groundwater: U-234	рСи	0	Р	3	NA	Not used	NR	NA	NA.	NR	Not used for calculation of distribution coefficients
Groundwater: U-235	рСИ.	0	P	3	NA	Not used	NR	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater: U-236	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater: U-238	pCVL_	0	Р	3	NA	Not used	NR	NH	NR NR	NR	Not used for calculation of distribution coefficients
Cover and Contaminated : Cover depth	Zone Hydrolog m	ical Data⊚⊸″. 0	P	2	D	1.51	NR	NR	NR	NR	See Table L-2
Density of cover material	g/cm³	1.5	Р	1	0	1.571	NR	NA	NA	NR	25% cumulative density function value. See Appendix J
Cover erosion rate	m/yr	0.001	P.B	2	D	1.42E-04	NR	NR	NR	NR	75% cumulative density function value. See Appendix J
Density of contaminated zone	g/cm³	1.5	Р	1	٥	1.6	NR	NA	_ PM	NR	See Table L-5
Contaminated zone erosion rate	m/yr	0.001	P.B	2	D	3.49E-05	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Contaminated zone total porosity		0.4	P P	2	D	0.41	NR	NR.	NR	NR	50% cumulative density function value. See Appendix J
Contaminated zone field capacity		0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Contaminated zone hydraulic conductivity	m/yr	10	Р	2	D	1.6	NR	NR	NA		Average Kh from dilatometer (DMT) pressure dissipation tests performed on in-situ Pond E sludge by In-Situ Testing LC. August 5-7, 2009
Contaminated zone b		5.3	Р	2	D	1.35	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
											This parameter only used if
Humidity in air Evapotranspiration coefficient	g/m³	0.5	P	2	NA D	Not used 0.62	NR NR	NR NR	NR NR	NR NR	Tritium is present in soil 50% cumulative density function value. See Appendix J
Average annual wind speed	m/s	2	Р	\$	D	3.3	NR	NR	NR	NR	Average annual wind speed for Paducah, KY (NOAA),7.4 mph http://iwl.ncdc.noaa.gov/oa/clima te/online/cod/avgwind.html NUREG/CR-6697 Att. C, Table
Precipitation rate	m/yr		Р	5	D	1.25	NR	NR	NA_		4.1-1, Paducah, KY

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
											Not applicable for industrial
Irrigation rate	m/yr	0.2	В	3_	D	0	NR.	NR	NR	NR	scenario RESRAD default. Method is
Irrigation mode	-	Overhead	В	_3	<u>D</u>	Overhead	NR	NR	NR	NR	used in Illinois NUREG/CR-6697 Att. C. Table
Runoff coefficient	-	0.2	Р	2	D	0.4	NA	NR	NR	NR	4.2-1 method. Assume $c_1 = 0.3$, $c_2 = 0.2$, and $c_3 = 0.1$
Watershed area for nearby stream or pond	m²	1.00E+06	Р	3	D	2.78E+05	NA .	NR	NR	NR	Pond area watershed. See Appendix A.
Accuracy for water soil computation		1.00E-03	NA	3	D	1.00E-03	NR	NR	NR	NR	RESRAD default
Saturated Zone Hydrologic	al Deta‰ 🦮	paper of the Joseph	(19) resp. £	Exp#95.99	KRAPAGO.	349000000000000000000000000000000000000	25"587860.	BOOK DALL	45862EEE	(%)%\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	2.201456.3N.3C.3T.770.7 F.NC.16
Density of saturated zone	g/cm³	1.5	Р	1	D	1.51	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Saturated zone total porosity		0.4	Р	1	D	0.43	NR	NA	NA NA	NR	50% cumulative density function value. See Appendix J
Saturated zone effective porosity		0.2	Р	. 1	D	0.38	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Saturated zone field capacity		0.2	Ρ	3	D	0.2	NR	NR	NR	NR	RESRAD default
Saturated zone hydraulic conductivity	m/yr	100	Р	1	D	2500.0	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Saturated zone hydraulic gradient		0.02	Р	2	D	0.0048	NR	NR	NR	NR	Andrews Engr. Geologic Cross Section Sheet A-A' (El. 319.24 – El. 298.54)/ 4320 ft. See Appendix A.
Saturated zone soil- specific b parameter	-	5.3	Р	2	D	0.97	NR	NA	NA	NR	50% cumulative density function value. See Appendix J
Water table drop rate	m/yr	1.00E-03	Р	3	D	1.00E-03	NR	NR	NA	NR	RESRAD default Honeywell Sanitary Well Depth
Well-pump intake depth (below water table)	m	10	Р	2	D	105	NR	NR	NR	NR NR	from HSA - depth to saturated zone.
Model: non-dispersion or mass balance		ΝĎ	P	3	D -	ND	NR	NR	NA	NA	ND Model is used for larger contaminated areas (e.g. more than 1,000 m²) per RESRAD Users Manual Section E.3.1.
	3,										This parameter is not used in the
Well pumping rate Unsaturated Zone Hydroto	m³/yr gical Data ∷	250	B, P Pose M€	2 £ZYJÁW	D D	Not used	NR A	NR	NA R	NR	non-dispersion model
Number of unsaturated zones		1	P	3	D	5	NB	RA	NR	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A. Andrews Engineering Project ID
Unsaturated zone 1 thickness (Clayey Silt/Silty Clay)	E	4	Р	1	D	6.86	NR	NR .	NR	NR	91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 1 soil density	g/cm³	1.5	Ρ	2	D	1.695	NA	NA	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 1 total porosity		0.4	P	2	D	0.360	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 1 effective porosity Unsaturated zone 1 field		0.2	ρ	2	D	0.289	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
capacity		0.2	Ρ	3	D	0.2	NA	NR	NR	NR	RESRAD default
Unsaturated zone 1 hydraulic conductivity	m/yr	10	Р	- 2	Ð	126	NR	NR	NR	NR	See Table L-4
Unsaturated zone 1 soil- specific b parameter		5.3	Р	2	D	9.87	NR	NR	NR	NR	50% cumulative density function value. See Appendix J Andrews Engineering Project ID
Unsaturated zone 2 thickness (Sandy Silt/Silty Sand)	m	4	Р	1	D	1,71	NR	NR	NR		91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 2 soil density	g/cm³	1.5	Ρ	2	D	1.563	NR	NR NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 2 total porosity		0.4	Р	2	D	0.409	NR	NR	NR	· NR	50% cumulative density function value. See Appendix J
Unsaturated zone 2 effective porosity Unsaturated zone 2 field	-	0.2	Р	2	D	0.35	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
capacity		0.2	P	3_	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 2 hydraulic conductivity	m/yr	10	Р	2	D	1024.76	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 2 soil-	.	5.3	Р	2	D	1.35	NR	NA	NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Parameter Unsaturated zone 3	Units	Derault	уре	rionly.	reament	value			3	4	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007.
thickness (Sand)	. m	4	Р	1	D	1.71	NR	NR	NR	NR	See Appendix A.
Unsaturated zone 3 soil density	g/cm³	1.5	P	2	D	1.510	NR	NR_	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 total porosity		0.4	Р	2	D	0.43	NR	NR	NЯ	NR NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 effective porosity		0.2	P	2	D	0.383	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 field capacity		0.2	ρ	3	D	0.2	NŖ	NR	NR	NR	RESRAD default
Unsaturated zone 3 hydraulic conductivity	m/yr_	10	ρ	2	D	2495.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 soil- specific b parameter		5.3	Р	2	D	0.97	NR .	NR	NR	NA	50% cumulative density function value. See Appendix J
Unsaturated zone 4 thickness (Sandy SilvSilty Sand)	m	4	Р	1	D	4	NR	NR	NR _	ŅŔ	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 4 soil density	g/cm³	1.5	Р	2	D	1.562	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 total porosity		0.4	Р	2	D	0.389	NR	NA	NR	NR_	50% curnulative density function value. See Appendix J
Unsaturated zone 4 effective porosity		0.2	Р	2	D	0.318	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 field capacity		0.2	Р	3	D	0.2	NR	NA	NR	NR	RESRAD default
Unsaturated zone 4 hydraulic conductivity	m/yr	10	Р	2	D	1021.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 soil- specific b parameter	<u> </u>	5.3	Р	2_	D	1.35	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 thickness (Sand)	m	4	Р	1	D	1.14	NA	NR_	NR		Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007, See Appendix A.
Unsaturated zone 5 soil density	g/cm ¹	1,5	Р	2	D	1.510	NA	NA	NA .	NA	50% cumulative density function value. See Appendix J
Unsaturated zone 5 total porosity	<u> </u>	0.4	P	2	0	0.43	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 effective porosity Unsaturated zone 5 field		0.2	Р	2	D	0.383	NR	NR.	NR	NR _	50% cumulative density function value. See Appendix J
capacity	<u> </u>	0.2	Ρ	3	D	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone 5 hydraulic conductivity	m/yr	10	Р	2	D	2493.6	NR	NA NA	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 soil- specific b parameter Distribution Coefficients (co		5.3	P	2	D	0.97	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Distribution Cognicients (co	onammated, u	nsaturated, an	o saturati	a zones)	Section Section 1	\$1259 (* 877)	(80 YeAse) - 150e)	O(1000000000000000000000000000000000000	257 1257 551	15-1-20-20-K-1-1-1	50% cumulative density function
Ac-227 (CZ)	cm³/g	50	Р	1	s	824.5	NR	NR	NA	NFI	value. See Appendix J
Ac-227 (UZ1)	cm³/g	20	Р	1	\$	818.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ2)	cm³/g	20	Ρ.	1	s	828.4	NR	NR_	NR		50% cumulative density function value. See Appendix J
Ac-227 (UZ3)	cm³/g	20	Ρ		s	825.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ4)	cm³/g	20	Р	11	s	809.7	NR	NR	NR		50% cumulative density function value. See Appendix J
Ac-227 (UZ5)	cm³/g	20	Р	1	s	814.7	NR	NR	NR		50% cumulative density function value. See Appendix J
Ac-227 (SZ)	cm³/g	20	Р		s	810.4	NR	NA NA	NR		50% cumulative density function value. See Appendix J
Pa-231 (CZ)	cm³/g	50	Р	1	s	374.3	NA	NR	NA	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ1)	cm³/g	_50	Р	_1	s	370.7	NR	NR	NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Туре¹	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Pa-231 (UZ2)	cm³/g	50	Р	1_	S	375.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ3)	cm³/g	50	Р	1	s	375.3	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ4)	cm ³ /g	50	Р	1	s	378.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ5)	cm³/g	50	P	1	s	375.6	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (SZ)	cm³/g	50	Р	1	S	378.4	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (CZ)	cm³/g	100	Р	1	s	2373.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ1)	cm³/g	100	Р	1	s	2347.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ2)	cm³/g	100	Р	11	s	2361.6	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ3)	cm³/g	100	P_	1	s	2356.9	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ4)	cm³/g	100	Р	1	s	2352.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ5)	cm³/g	100	Р	1	s	2379.9	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (SZ)	cm³/g	100	Р	1	s	2360.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-226 (CZ)	cm³/g	70	Р	1	s_	3501.2	NR	NR	_NR	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ1)	cm³/g	. 70	Р	1	s	3506.5	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ2)	cm³/g	70	Р	1	s	3505.6	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ3)	cm³/g	70	Ρ	1	s	3522.8	NR	NR	NR	<u>NR</u>	50% cumulative density function value. See Appendix J
Ra-226 (UZ4)	cm³/g	70	Р	1	s	3484.6	NA	NR	NR NR	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ5)	cm³/g	70	P	1	<u>s</u>	3495.8	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Ra-226 (SZ)	cm³/g	70	Р	1	s	3529.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-228 (CZ)	cm³/g	70	Р	1	s	3489.5	NR	NA	NR_	NR	50% cumulative density function value. See Appendix J
Ra-228 (UZ1)	cm³/g	70	Р	1	s	3507.0	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Ra-228 (UZ2)	cm³/g	70	Р	_1_	s	3521.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-228 (UZ3)	cm³/g	70	P_	1_	s	3513.0	NR	NR	NR NR		50% cumulative density function value. See Appendix J
Ra-228 (UZ4)	cm³/g	70	Р	1	<u>s</u>	3504.5	NR	NR	NR		50% cumulative density function value. See Appendix J
Ra-228 (UZ5)	cm³/g	70	Р	_1_	s	3483.8	NA	NR	NR		50% cumulative density function value. See Appendix J
Ra-228 (\$Z)	cm³/g	70	Р	_1	s	3521.4	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (CZ)	cm³/g	60000	Р		s	5883.2	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (UZ1)	cm³/g	60000	P		S	5736.1	NR	NR	NR.	NR	50% cumulative density function value. See Appendix J
Th-228 (UZ2)	cm³/g	60000	Р	1	s	5825.4	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (UZ3)	cm³/g	60000	Р	1	s	5786.3	NR	NR	NA		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Туре'	Priority ²	Treatment	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Th-228 (UZ4)	cm³/g	60000	Р	1	s	5774.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-228 (UZ5)	cm³/g	60000	Р	1	s	5784.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-228 (SZ)	cm³/g	60000	Р	1	S	5828.0	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Th-230 (CZ)	cm³/g	60000	Р	1	s	5770.7	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ1)	cm³/g	60000	Р	11	S	5842.5	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ2)	cm³/g	60000	Р	1	s	5842.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ3)_	cm³/g	60000	P	1	s	5882.2	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ4)	cm³/g	60000	Р	1	s	5778.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ5)	cm³/g	60000	Р	1	S	5859.6	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (SZ)	cm³/g	60000	P	1	s	5849.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (CZ)	cm³/g	60000	ρ	,	s	5770.9	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ1)	cm³/g	60000	ρ	1	s	5808.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ2)	cm³/g	60000	Р	11	s	5744.2	NR	NA	NA	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ3)	cm³/g	60000	P	1	s	5769.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ4)	cm³/g	60000	Р	1	s	5778.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ5)	cm³/g	60000	Р	_11	s	5822.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (SZ)	cm³/g	60000	Р	1	s	5864.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-234 (CZ)	cm³/g	50	P	1	NA	123.5	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
U-234 (UZ1)	cm³/g	50_	Р	1	NA NA	126.1	NR .	NB	NR	NR	50% cumulative density function value. See Appendix J
U-234 (UZ2)	cm³/g	50	P	_1	NA NA	124.2	NR	_NR	NR	NR	50% cumulative density function value. See Appendix J
U-234 (UZ3)	cm³/g	50	Р	1	NA	124.2	NR	NR	NR_		50% cumulative density function value. See Appendix J
U-234 (UZ4)	cm³/g	50	_Р	1	NA NA	124.7	NR	NR	NR		50% cumulative density function value. See Appendix J
U-234 (UZ5)	cm³/g	50	Р	1	NA	125.7	NR	NR	NR		50% cumulative density function value. See Appendix J
U-234 (SZ)	cm ¹ /g	50_	P		NA NA	126.4	NR	NR	NR		50% cumulative density function value. See Appendix J
U-235 (CZ)	cm³/g	50	Р	1	NA NA	123.9	NA	NA	NR		50% cumulative density function value. See Appendix J
U-235 (UZ1)	cm³/g	50	Р	_1	NA	125.8	NR	NR	NR		50% cumulative density function value. See Appendix J
U-235 (UZ2)	cm³/g	50	Р	1	NA NA	123.3	NR	NR	NR		50% cumulative density function value. See Appendix J
U-235 (UZ3)	cm³/g	50	Р	1	NA.	125.9	NR	NR	NR		50% cumulative density function value. See Appendix J
U-235 (UZ4)	cm³/g	50	_Р	1	NA	124.9	NR	NR	NR		50% cumulative density function value. See Appendix J
U-235 (U Z 5)	cm³/g	50	P	_1	NA	124.7	NR	NR	NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Туре'	Priority ²	Treatment ³	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
U-235 (SZ)	cm³/g	50	Р	1	NA NA	124.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (CZ)	cm³/g	50	Р	1	NA .	123.9	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
U-236 (UZ1)	cm³/g	50	Р	1	NA NA	124.0	NR	NR	NR_	NR	50% cumulative density function value. See Appendix J
U-236 (UZ2)	cm³/g	50	Р	1	NA.	123.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ3)	cm³/g	50	Р	1	NA	123.9	NR	NR	NR NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ4)	cm³/g	50	Р	1	NA NA	124.0	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ5)	cm³/g	50	Р	1	NA NA	125.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (SZ)	cm³/g	50	Р	1	NA NA	125.8	NP:	NR	NA	NR	50% cumulative density function value. See Appendix J
U-238 (CZ)	cm³/g	50	Р	11	NA.	124.0	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ1)	cm³/g	50	Р	. 1_	NA.	123.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ2)	cm³/g	50	Р	1	NA.	124.5	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
U-238 (UZ3)	cm³/g	50	Р	11	NA	123.4	NR	NA	NA	NR	50% cumulative density function value. See Appendix J
U-238 (UZ4)	cm³/g	50_	Р	1	_NA	124.0	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ5)	cm³/g	50	Р	11	NA	126.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (SZ)	cm³/g	50	P	1	NA.	124.3	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
		_			_	_					RESRAD default, parameter is not used for calculation of distribution coefficients. Value o 0 not used for calculation of
Leach rate	1/yr	0	Р	3	D	0	NA	NR	NR		distribution coefficients. Value used for Uranium nuclides
Solubility limit Use plant/soil ratio	mol/L Check box	0 Yes/No	P NA	3	D. NA	2.94E-06 No	NR NR	NR NR	NR NR		only RESRAD default, parameter not used for calculation of . distribution coefficients.
Occupancy		をおけるがと	$x_1, \infty_{\mathcal{I}} \geq$	洲公司。	10.42807	11 28 28 29 5 4 16	1911 II SEC.	Lotse Wester	జిఖాకా 17% రేస్	2003 January 1988	(1)。1988年(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
Inhalation rate	m³/yr	8400	M, B	3	D	11400	NR	NR	NA	NR	RESRAD Manual, Table 2.3
Mass loading for inhalation Exposure duration	g/m³ yr	0.0001 30	P, B	2	D D	2.35E-05 25	NR NR	NR NR	NR NR	NR	50% cumulative density function value. See Appendix J RESRAD Manual, Table 2.3
Indoor dust filtration factor (shielding factor, inhalation)	-	0.4	P.B	5	D	0.547	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Shielding factor, external gamma Indoor time fraction	· · ·	0.7	P	2	D	0.269 0.17	NR NR	NR NR	NR NR	NR	50% cumulative density function value. See Appendix J RESRAD Manual, Table 2.3
Outdoor (on site) time											
fraction Shape of the		0.25	В	3	D	0.06	NR	NR	NR NR		RESRAD Manual, Table 2.3 Shape representative of pond
contaminated zone Ingestion, Dietary	- 04.582.632	1	P 4 \$gers	3 @579613	D """	Non-circular	NR	NA NO SOURCE	NR	NR	(rectangular)
Fruit, vegetable, and grain consumption rate	kg/yr	160	M, B	2	NA _	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
Leafy vegetable consumption	kg/yr	14	M, B	3	NA	Not used	NR	NA	NR		Pathway suppressed for industrial worker scenario
Milk consumption	L∕yr	92	M, B	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Meat and poultry consumption	kg/yr	63	М, В	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Fish consumption rate	kg/yr	5.4	M, B	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Other seafood consumption rate	kg/yr	0.9	M, B	3	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario RESRAD Manual, Table 2.3
Soil ingestion rate	g/yr	36.5	M, B	2	D	36.5	NR	NA	NR	NA	based on EPA suggested value of 100 mg/day
Drinking water intake	L∕yr	510	M, B	2	D	478.5	NR	NR.	NR		NUREG/CR-5512, V3 Table 6.87

<u></u>			,				Distribution	Distribution	Distribution	Distribution	
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Parameter	Parameter 2	Parameter 3	Parameter 4	Basis
Contamination fraction of drinking water		1	В, Р	3	NA.	1	NA	NR	NR	NR	RESRAD Default
Contamination fraction of											Pathway suppressed for
household water Contamination fraction of	<u> </u>	1	B, P	3	NA .	Not used	NR	NA	NR	NR	industrial worker scenario Pathway suppressed for
livestock water Contamination fraction of	· · ·	11	В, Р	3	NA	Not used	NA NA	NR	NR	NR	industrial worker scenario Pathway suppressed for
irrigation water		1	В, Р	3_	NA	Not used	NA	NR	NR	NR	industrial worker scenario
Contamination fraction of aquatic food		0.5	В, Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of											Pathway suppressed for
plant food Contamination fraction of		-1	B. P	3	NA	Not used	NR _	NR	NR	NR	industrial worker scenario Pathway suppressed for
meat		-1	В. Р	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Contamination fraction of milk		-1	В, Р	3	NA	Not used	NR	NR	NA	NR	industrial worker scenario
Ingestion, Non-Dietary	American X.	Astronomics and an artist of the second	-35 P. R.S.	e de la compa	4000 HART	1407-1981-285-099	Control Species	\$256,870,000,00	125 A 44 A 45 CH	THE PERSON	Pathway suppressed for
rate for meat	kg/d	68	М	3	NA .	Not used	NR	NR	NR	NA	industrial worker scenario
Livestock fodder intake rate for milk	kg/di	55	м	3	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Livestock water intake											Pathway suppressed for
rate for meat Livestock water intake	L/d	50	М_	3	NA NA	Not used	NR	NA .	NR	NA	industrial worker scenario Pathway suppressed for
rate for milk	L/d	160	М	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Livestock soil intake	kg/d	0.5	М	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Mass loading for foliar deposition	g/m ³	1.00E-04	Р	3	NA	Not used	NR	NA	NR	NA	Pathway suppressed for industrial worker scenario
	-		_								
Depth of soil mixing layer	m	0,15	Р	2	_ ם _ ַ	0.231	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Depth of roots	m	0.9	Р	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
		9.5	<u> </u>	<u> </u>	, <u>, , , , , , , , , , , , , , , , , , </u>	1101 0300			190		RESRAD default, all drinking
Drinking water fraction from groundwater		,	B, P	3	ן ס	1	NR	NR	NR NR	NR	water assumed from groundwater
Household water fraction from groundwater		,	В.Р	3	NA.	Not used	NA	NR .	NA	NA	Parameter applies to Radon lonly.
Livestock water fraction from groundwater		1	B, P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Irrigation fraction from		 									Pathway suppressed for
groundwater Wet weight crop yield for		1	B, P	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
non-leafy plants	kg/m²	0.7	ρ	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Wet weight crop yield for leafy plants	kg/m²	1.5	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Wet weight crop yield for fodder	kg/m²	1.1	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Growing season for non-	, Kym _										Pathway suppressed for
Growing season for leafy	yr	0.17	Р	3	NA_	Not used	NR_	NR	NR	NR	industrial worker scenario Pathway suppressed for
vegetables	yr	0.25	Р	3	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Growing season for fodder	yr	0.08	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Translocation factor for non-leafy vegetables		0.1	P	3	NA	Not used	NA	NR	NA	NR	Pathway suppressed for industrial worker scenario
Translocation factor for											Pathway suppressed for
leafy vegetables Translocation factor for		1	Р	3	NA NA	Not used	_NR	NR	NA	NR	industrial worker scenario Pathway suppressed for
fodder Dry foliar interception	<u> </u>	1	Р	3	NA	Not used	NR	NR	NR	NA	industrial worker scenario
fraction for non-leafy		_	_								Pathway suppressed for
vegetables Dry foliar interception	<u> </u>	0.25	Р	3	NA	Not used	NA	NR	NR	NR	industrial worker scenario
fraction for leafy	ŀ	0.05	P	3		M -1ad	NR	NR	NR	NR	Pathway suppressed for
vegetables Dry foliar interception	<u> </u>	0.25		3-	NA NA	Not used	NH .	NH.	NH	NH	industrial worker scenario Pathway suppressed for
fraction for fodder Wet foliar interception	<u> </u>	0.25	Р	3	NA .	Not used	NR	NR	NA	NR	industrial worker scenario
fraction for non-leafy	(Í									Pathway suppressed for
vegetables Wet foliar interception	 	0.25	ρ	3	NA .	Not used	NR	NR	NR	NR	industrial worker scenario
fraction for leafy			_		ا ,,, ا				N		Pathway suppressed for
vegetables Wet foliar interception		0.25	P	2	NA .	Not used	NR	NA	NR	NR	industrial worker scenario Pathway suppressed for
fraction for fodder Weathering removal		0.25	Р	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
constant for vegetation	1/yr	20	ρ	2	NA	Not used	NR	NA	NA	NR	industrial worker scenario
Special Radionuclides (C- C-12 concentration in	14 <u>}েল স্কৃত্</u>	t leggitti jan	3.44520	Chargos I.m.	#7.7.29%\$CX5	\$\$\$\$\$\$\$\$\$\$	10.29062.49	\$1587548V	edit dage to	· 14年7月日本第一	Applicable for C-14 exposure
water	g/cm ³	2.00E-05	Р	3	NA NA	Not used	NR	NR	NA	NR	only
C-12 concentration in contaminated soil	9/9	3.00E-02	Р	3	NA	Not used	NA	NR	NA	NR	Applicable for C-14 exposure only
Fraction of vegetation			Р								Applicable for C-14 exposure
carbon from soil Fraction of vegetation	 	2.00E-02		3	NA NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure
carbon from air Ci 14 evasion layer	<u> </u>	0.98	Р	3	NA	Not used	NR.	NR	NR	NR	only Applicable for C-14 exposure
thickness in soil	m	0.3	Р	2	NA .	Not used	NR	NR	NR	NR	only
C-14 evasion flux rate from soil	1/s	7.00E-07	Р	3	NA.	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
1				ئــــــــــــــــــــــــــــــــــــــ							لــــــــــــــــــــــــــــــــــــــ

Parameter	Units	RESRAD Default	Туре¹	Priority ²	Treatment ³	Valu e	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
C-12 evasion flux rate											Applicable for C-14 exposure
Fraction of grain in beef	1/\$	1.00E-10	Р	3	NA NA	Not used	NR	NR	NA	NR	Applicable for C-14 exposure
cattle feed	<u> </u>	0.8	В	3	NA	Not used	NR	NR	NR	NR	only
Fraction of grain in milk cow feed		0.2	В	3	NA NA	Not used	NR	NR	NA	NR	Applicable for C-14 exposure only
Storage Times of Contam	nated Foodstu	ffs:XSGC	14.Q" (\$\chi_1	1,352.73 ₁₀	REPORT OF THE	2012/03/46/46/57	586500525	Berthir and	S.W. Y. West	1888. Specie 5	CONTRACTOR CHILDREN CON
Storage time for fruits, non-leafy vegetables, and			ļ	l	İ			i			Pathway suppressed for
grain Storage time for leafy	<u>d</u>	14	В	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
vegetables	d	1	В	3	NA.	Not used	NR	NR	NA	NR	industrial worker scenario
Storage time for milk	d	1	В	3	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Siolage lime for think											Pathway suppressed for
Storage time for meat	<u>d</u>	20	В	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Storage time for fish	d	7	В	3	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Storage time for	[[[[[1	[Pathway suppressed for
crustacea and mollusks	d	7	8	3	NA	Not used	NR	NR	NR .	NR	industrial worker scenario
Storage time for well water	[d	1 1	В	_ 3	NA_	Not used	_NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Storage time for surface water	d	,	В	3	NA	Not used	NR	NR	NA	NR.	Pathway suppressed for industrial worker scenario
Storage time for livestock											Pathway suppressed for
fodder Radon	d Variation XXX	45	B	3	NA ECTAMBANGO	Not used	NR (************************************	NR Schoolsting	NR 2×2000	NA MA	industrial worker scenario
Thickness of building											Applicable for Radon exposure only
foundation Bulk density building		0.15	P	3	NA NA	Not used	NR NR	NR_	NR NR	NR	Applicable for Radon exposure
foundation Total perosity of cover	g/m³	2.4	P	3	NA NA	Not used	NR_	NR	NR	NR	only Applicable for Radon exposure
material	-	0.4	Р	3	NA	Not used	NR	NR	NR	NR	only
Total porosity of building foundation	Ţ <u> </u>	0.1	P	3	NA.	Not used	NR	NR	NR	NR	Applicable for fladon exposure lonly
						10.000				1	
Volumetric water content of cover material		0.05	P	3	NA NA	Not used	NR	NA	NA NA	NR	Applicable for Radon exposure only
Volumetric water content of building foundation		0.03	P	3	NA	Not used	NR	NA	NR	NA	Applicable for Radon exposure only
Radon diffusion coefficient in cover											Applicable for Radon exposure
material	m/s	2.00E-06	Р	3	NA	Not used	NR.	NR	NR NR	NR	only
Radon diffusion coefficient in foundation	1				1		1				Applicable for Radon exposure
material	m/s	3.00E-07	Р	3	NA NA	Not used	NR	NA	NR	NR	only
Radon diffusion coefficient in	•			1					ļ		Applicable for Radon exposure
contaminated zone soil	m/s	2.00E-06	Р	3	NA	Not used	NR _	NA NA	NR NR	NR	only
Radon vertical dimension of mixing	m	2	Р	3	NA	Not used	NR	NR	NR_	NR	Applicable for Radon exposure only
Average building air exchange rate	1/hr	0.5	Р. В	3	NA NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure
	· · · · · · · · · · · · · · · · · · ·										Applicable for Radon exposure
Building (room) height Building interior area	_ m	2.5	Р		NA NA	Not used	NA	NA	NA	NR	only Applicable for Radon exposure
factor Building depth below	<u> </u>	0	P	3	NA NA	Not used	NR	NR	NR	NR	only Applicable for Radon exposure
ground surface	m	1	Р	3	NA	Not used	NA NA	NR	NR	NA	only
Radon-222 emanation coefficient	ļ .	0.25	P	3	NA NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon-220 emanation			Р	3	NA			NA	ND		Applicable for Radon exposure
Risk Conversion Factors:	954L5098	0.15	4894	5.14 24 ye	NA System of the control of the cont	Not used	NR Section 1	18.25 Persons	NR	NR NR	only
Slope factor ~ external	(risk/yr)/ (pCl/g)	Nuclide specific	м	3	NA.	Not used	NR	NR	NR	NR	RESRAD Default
		Nuclide			i						
Slope factor - inhalation	risk/pCi	specific Nuclide	M	3	NA NA	Not used	NR	NA	NR	NR	RESRAD Default
Slope factor – ingestion	risk/pCi	specific	М	3	NA	Not used	NR SACONOMIC	NR	NR	NR	RESRAD Default
Inhalation dose conversion Ac-227	mrem/pCi	6.7	M	3	24-3/3 ≠ √ D	6.7	NR NR	NA NA	NA	NA	FGR-11, RESRAD Library
Pa-231	mrem/pCi	1.28	М	3	Ď	1.28	NR	NR	NR	NR	FGR-11, RESRAD Library
Pb-210 Ra-226	mrem/pCi mrem/pCi	0.0136	M	3	D D	0.0136 0.00858	NR NA	NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00477	М	3	D	0.00477	NA	PA	NA	NA	FGR-11, RESHAD Library
Th-228 Th-230	mrem/pCi mrem/pCi	0.342	M	3	D	0.342	NR NR	NR NR	NA NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-232	mrem/pCi	1.64	М	3	D	1.64	NR	NR	NR	NR	FGR-11, RESRAD Library
U-234 U-235	mrem/pCi mrem/pCi	0.132	M	3	D	0.132 0.123	NR NR	NR NR	NR NR	NR NA	FGR-11, RESRAD Library FGR-11, RESRAD Library
U-236	mrem/pCi	0.125	М	3	D	0.125	NR	NR	NR	NA	FGR-11, RESRAD Library
U-238 Ingestion Dose Donversion	mrem/pCi	0.118	M	3 	V. 22.22.22.	0.118 *\.*.\\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.	NA Section 1	NA	NA « ABY B.V.	NR	FGR-11, RESRAD Library
Ac-227	mrem/pCi	0.0141	М	3	D	0.0141	NA NB	NA NB	NR NB	NR NO	FGR-11, RESRAD Library FGR-11, RESRAD Library
Pa-231 Pb-210	mrem/pCi mrem/pCi	0.0106	M	3	D	0.0106 0.00537	NR NR	NA NA	NA NA	NA NA	FGR-11, RESRAD Library
Ra-226 Ra-228	mrem/pCi	0.00132 0.00144	M	3	D	0.00132	NR NR	NA NB	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
Th-228	mrem/pCi mrem/pCi	0.000396	М	3	D	0.000396	NR	Я	NR	NR	FGR-11, RESHAD Library
Th-230	mrem/pCi	0.000548	М	3	D	0.000548	NR	NR	NR	NR	FGR-11, RESRAD Library

	,	,				γ	Distribution	Distribution	Distribution	Distribution	
		RESRAD	T 1	Priority ²	Treatment	Malua.	Parameter	Parameter	Parameter	Parameter	Danie.
Parameter Th-232	Units mrem/pCi	Default 0.00273	Type ¹	9 Priority	Treatment	Value 0.00273	NR NR	NB S	NA NA	NR NR	Basis FGR-11, RESRAD Library
U-234	mrem/pCi	0.000283	М	3	Ъ	0.000283	NR	NA	NR	NA	FGR-11, RESRAD Library
U-235	mrem/pCi	0.000266	M	3		0.000266	NA NR	NR NR	NR NR	NR NR	FGR-11, RESHAD Library
U-236 U-238	mrem/pCi mrem/pCi	0.000269	M	3	6	0.000269	NR	NA	NR NR	NA NA	FGR-11, RESRAD Library
Plant Transfer Factors [p0		/[pCi/g soil (dry) \$45 _{.50}	经特殊的	海然では	Yar (Swifter edi sh i)	30000 74K+48	nest@herrette	24(4) (1) (b)	STATE OF THE PARTY.	SIGNERAL PARK SANDERS STORES
Ac-227		0.0025	P	1	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
			_								Pathway suppressed for
Pa-231	 	0.01	Р	1	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Pb-210	١.	0.01	Р	1	NA	Not used	NR	NR	NA	NR	industrial worker scenario
D- 000		0.04	Р	,	NA .	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-226	 - ` -	0.04			110	140t used	INIS	INIT	NIT	INIT	Pathway suppressed for
Ra-228		0.04	Р	1	NA NA	Not used	NA	NA	NR.	NR	industrial worker scenario
Th-228	1.	0.001	Р	1	NA.	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
		1	Р				AUD.	115	ND		Pathway suppressed for
Th-230	 	0.001	P	1	NA.	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Th-232	<u> </u>	0.001	P	1	NA	Not used	NR .	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-234	·	0.0025	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario
U-235		0.0025	Р	1	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	 	1									Pathway suppressed for
U-236	 	0.0025	Р	1	NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-238	<u> </u>	0.0025	Ρ	1	NA	Not used	NR	NA	NA	NR.	industrial worker scenario
Meat Transfer Factor	57.897	9213 4 to 364	:353Y/64	20000		\$25.4500 PG#	2000/00/2005	W.S.D.004, 1,	アングルがよって	35000000000000000000000000000000000000	Parties of the parties of the property.
Ac-227	(pCi/kg)/ (pCi/d)	0.00002	P	2	NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/	2 205	Р	,		Newsend	110	NO	ND	ND	Pathway suppressed for
Pa-231	(pCi/d) (pCi/kg)/	0.005	 -	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
Pb-210	(pCVd)	0.0008	Р	2	NA	Not used	NR	NFI	NR	NR	industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA	Not used	NA .	NR	NP.	NA	Pathway suppressed for industrial worker scenario
	(pCi/kg)/		P			No.			4.5		Pathway suppressed for
Ra-228	(pCi/d) (pCi/kg)/	0.001	۲	2	NA	Not used	NR	NA	NR	NR	industrial worker scenario Pathway suppressed for
Th-228	(pCVd)	0.0001	P	2	NA.	Not used	NR	NR NR	NR	NR	industrial worker scenario
Th-230	(pCi/kg)/ (pCi/d)	0.0001	Р	2	NA.	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCvkg)/		Р			None					Pathway suppressed for industrial worker scenario
Th-232	(pCi/d) (pCi/kg)/	0.0001	F -	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for
U-234	(pCVd) (pCVkg)/	0.00034	Р	5	NA	Not used	NR	NR	NR	NA	industrial worker scenario Pathway suppressed for
U-235	(pCVd)	0.00034	P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
U-236	(pCi/kg)/ (pCi/d)	0.00034	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
0-200	(pCi/kg)/										Pathway suppressed for
U-238	(pCVd)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Milk Transfer Factor	(pCVL)/	2007 ANNE SE S S 22	96-9387	SEC SHAPE OF	\$1.5 Apr. 7 2000	That employees in the	eristen stangen	magnetic and a second	133131 317728	(C. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Pathway suppressed for
Ac-227	(pCVd)	0.00002	Р	2	NA_	Not used	NR	NR	NA	NFI	industrial worker scenario Pathway suppressed for
Pa-231	(pCi/L)/ (pCi/d)	0.000005	P	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
T1. 0.0	(pCVL)/	0.0000	Р	2	NA	Not used	NR	32	NR	- 10	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/d) (pCi/L)/	0.0003	F-		NA.	NOT USED	NH_	INH	NH.	NR NR	Pathway suppressed for
Ra-226	(pCVd)	0.001	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario
Ra-228	(pCVL)/ (pCVd)	0.001	P	2	NA	Not used	NR .	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCVL)/										Pathway suppressed for
Th-228	(pCi/L)/	0.000005	P	2	NA NA	Not used	NR	NR	NR	NA	industrial worker scenario Pathway suppressed for
Th-230	(pCVd)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
Th-232	(pCVL)/ (pCVd)	0.000005	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCVL)/										Pathway suppressed for
U-234	(pCVd) (pCVL)/	0.0006	Р	2	NA NA	Not used	NR	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-235	(pCVd)	0.0006	Р.	2	NA	Not used	NA	NR	NR	NR	industrial worker scenario Pathway suppressed for
U-236	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA	Not used	NR	NA .	NR	NR	industrial worker scenario
U-238	(pCi/L)/	0.0006	Р	2	NA	Not used	NR	NR	NR	NA	Pathway suppressed for industrial worker scenario
Bioaccumulation factor fo	(pCVd)	0.0006	# <u></u>	72,300	96.78.025%.	Not used	MH Mg(L), YU	NH SRecord	NH WWW.co.c.	NH GCH UPST	D. Jakoba Barana Barana
	(pCi/kg)/		_		N/A	Notreed	ND	NS	ND		Pathway suppressed for
Ac-227	(pCi/L) (pCi/kg)/	15	Р	2	NA NA	Not used	NR	NA	NR		industrial worker scenario Pathway suppressed for
Pa-231	(pCVL)	10	Р	_2	NA_	Not used	NR	NR	NR	NA	industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/L)	300	Р	2	NA	Not used	NR	NR	NR		Pathway suppressed for industrial worker scenario
	(pCi/kg)/	1									Pathway suppressed for
Ra-226	(pCVL) (pCVkg)/	50	P	2	NA	Not used	NΑ	NR	NR NR	NR	industrial worker scenario Pathway suppressed for
Ra-228	(pCVL)	50	P.	2	NA	Not used	NR	NR	NR	NA	industrial worker scenario
Th-228	(pCVkg)/ (pCVL)	100	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
117220	T /hcari	100			130		1411			OB	

Units (pCvkg)/ (pCvL) (pCvkg)/	RESRAD Default	Type ¹				Distribution	Distribution	Distribution	Distribution	
(pCi/kg)/ (pCi/L)	Default	Type ¹				Parameter	Parameter	Parameter	Parameter	i
(pCi/kg)/ (pCi/L)			Priority ²	Treatment ³	Value	1	2	3	4	Basis
(pCi/L)			1.1.01.19	Hodanient	74100	<u> </u>		_ -		Pathway suppressed for
	100	P '	2	NA	Not used	NR	NR .	NR		industrial worker scenario
	700	<u> </u>	<u> </u>	-7.57	1101000	1177				Pathway suppressed for
(pCVL)	100	Р	2	NA	Not used	NR	NR	NR		industrial worker scenario
(pCyka)/		<u> </u>			710.000			2,7,7		Pathway suppressed for
(pCVL)	10	Р	2	NA	Not used	NR	NR	NR	NR	industrial worker scenario
										Pathway suppressed for
(pCVL)	10	P	2	NA	Not used	NR .	NR .	NR	NR	industrial worker scenario
(pCVkg)/										Pathway suppressed for
(pCi/L)	10	Р	2	NA	Not used	NR	NA	NR	NR	industrial worker scenario
(pCi/kg)/										Pathway suppressed for
(pCVL)	10	Р	2	NA	Not used	NR	NA	NR	NR .	industrial worker scenario
	mollusks	1227,240.	ASSES	300 6140 550	(1865.65) 836 等起[2]	er, word pass	W-500 1994 1.	social sections	DESERTION OF CHARGE	RECOMMENDING PROPERTY OF
(pCl/kg)/										Pathway suppressed for
(pCVL)	1000	P	3	NA.	Not used	NR	NR	NR	NR	industrial worker scenario
(pCVkg)/										Pathway suppressed for
(pCVL)	110	Р	3	NA	Not used	NA NA	NR_	NR		industrial worker scenario
(pCVkg)/										Pathway suppressed for
	100	Р	3	NA	Not used	NR	NA_	NR		industrial worker scenario
(pCi/kg)/										Pathway suppressed for
(pCi/L)	250	Р	3	NA	Not used	NR	NR	NR		industrial worker scenario
										Pathway suppressed for
	250	Р	3	NA	Not used	NA	NR	NR		industrial worker scenario
										Pathway suppressed for
	500	Р	3	NA	Not used	NA	NR	NR NR		industrial worker scenario
										Pathway suppressed for
	500	Р	3	NA	Not used	NR	NA	NR		industrial worker scenario
			_			Ì				Pathway suppressed for
	500	Р	3	NA NA	Not used	NR.	NR	NR		industrial worker scenario
		_	_ [Pathway suppressed for
	60	Р	3	NA NA	Not used	NR	NR	NR		industrial worker scenario
										Pathway suppressed for
	60	Р	3	NA _	Not used	NR	NH_	NR		industrial worker scenario
										Pathway suppressed for
	60	<u> </u>	3	NA NA	Not used	NH	NH	_NH		industrial worker scenario
		ایا	. '							Pathway suppressed for industrial worker scenario
Charles Charles	11/07/8/8/2007 PAR	C00000 10 1	1681 G 85.	A 1 (1 (1 (1 (1 (1 (1 (1 (1 (1	**************************************	\$300 10 03 60 60 60 60	i Status Petroparious	190 (250-0-120) (1788)	1957/002 D00000,7549	KNO proklementenia Januaria
										Value greater than default
	32	NA	NA	NA	1024	ND	ND	l NB I		provides more evaluation points
 										RESRAD Default
*** XXX.2 480.9797										TO THE CONTROL OF THE
HB 9 C C C C C C C C C C C C C C C C C C	N. dwile 35 Millerette.	5- 4-55 to 124	pec/s265, 97	Hand of Chicagon	STREET, STREET	1,1,155,500 Markey	Sept 5 10 (1) 10 1	Committee and the specific	1 Met abit N. 150	processors for the warpings of the process of the
	17	NA.	NA I	NΔ	17	NA I	NR I	NB	NB.	RESRAD Default
	(ECV/G)/(ECV/G	(pCVkg)/ (pCVk) 10 (pCikg)/ (pCVL) 10 (pCikg)/ (pCVL) 10 (pCikg)/ (pCVL) 1000 (pCikg)/ (pCVL) 1000 (pCikg)/ (pCVL) 110 (pCikg)/ (pCVL) 1000 (pCikg)/ (pCVL) 250 (pCikg)/ (pCVL) 250 (pCikg)/ (pCVL) 500 (pCikg)/ (pCVL) 500 (pCikg)/ (pCVL) 500 (pCikg)/ (pCVL) 500 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60 (pCikg)/ (pCVL) 60	(pC/kg)/ (pC/k) 10 P P (pC/kg)/ (pC/k) 10 P P (pC/kg)/ (pC/k) 10 P P (pC/kg)/ (pC/k) 100 P P (pC/kg)/ (pC/k) 1100 P P (pC/kg)/ (pC/k) 1100 P P (pC/kg)/ (pC/k) 1100 P P (pC/kg)/ (pC/k) 1500 P P (pC/kg)/ (pC/k) 250 P P (pC/kg)/ (pC/k) 500 P P (pC/kg)/ (pC/k) 500 P P (pC/kg)/ (pC/k) 500 P P (pC/kg)/ (pC/k) 500 P P (pC/kg)/ (pC/k) 500 P P (pC/kg)/ (pC/k) 500 P P (pC/kg)/ (pC/k) 500 P P (pC/kg)/ (pC/k) 60 P P (pC/kg)/ (pC/k) 60 P P (pC/kg)/ (pC/k) 60 P P (pC/kg)/ (pC/k) 60 P P (pC/kg)/ (pC/k) 60 P P (pC/kg)/ (pC/k) 60 P P (pC/kg)/ (pC/k) 60 P P (pC/kg)/ (pC/k) 60 P P P (pC/kg)/ (pC/k) 60 P P P (pC/kg)/ (pC/k) 60 P P P (pC/kg)/ (pC/k) 60 P P P P (pC/kg)/ (pC/k) 60 P P P P (pC/kg)/ (pC/k) 60 P P P P (pC/kg)/ (pC/k) 60 P P P P P (pC/kg)/ (pC/k) 60 P P P P P (pC/kg)/ (pC/k) 60 P P P P P P (pC/kg)/ (pC/k) 60 P P P P P P P P P P P P P P P P P P	(pCVkg)/ (pCVL) 10 P 2 (pCVkg)/ (pCVL) 10 P 2 (pCVkg)/ (pCVL) 10 P 2 (pCVkg)/ (pCVL) 10 P 3 (pCVkg)/ (pCVL) 110 P 3 (pCVkg)/ (pCVL) 110 P 3 (pCVkg)/ (pCVL) 110 P 3 (pCVkg)/ (pCVL) 100 P 3 (pCVkg)/ (pCVL) 250 P 3 (pCVkg)/ (pCVL) 250 P 3 (pCVkg)/ (pCVL) 500 P 3 (pCVkg)/ (pCVL) 500 P 3 (pCVkg)/ (pCVL) 500 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3 (pCVkg)/ (pCVL) 60 P 3	(pCi/kg)/	(pC/kg)/ ((pC/kg)/ ((pC/kg)/ (pC/k)	(pC/kg)/ (pC/k)	(pC/kg)/ (pC/k)

Notes:

| P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A, Table 2.1)

| T = high priority, 2 = medium priority, 3 = low priority (NUREG/CR-6697, Att. B, Table 4.2)

| D = deterministic. S = stochastic

Table L-2
Honeywell Metropolis Works
Pond C Dose Assessment
Industrial Worker Scenario
Source Configuration Summary

		5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
1	Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
	Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area		Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m ²)	(m²)	(m)	(m)	(m)	(m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b – Ponds B, C, D, and E" provided in Appendix A

⁽²⁾ Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond

Table L-3
Honeywell Metropolis Works
Pond C Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

		Corrected for	
j	<u> </u>	5% Bulking	Corrected for
Radionuclide	Average Dry	Factor	% Solids
Protactinium 231	0.26	0.24	0.13
Radium 226	0.59	0.56	0.31
Thorium 228	0.10	0.09	0.05
Thorium 230	3.00	2.85	1.56
Thorium 232	0.09	0.09	0.05
Uranium 234	263.85	250.66	136.83
Uranium 235	14.10	13.40	7.31
Uranium 236	6.31	5.99	3.27
Uranium 238	273.00	259.35	141.58

% Solids:

54.59%

Pond Solids: 57.16%

Table L-4
Honeywell Metropolis Works
Pond C Dose Assessment
Industrial Worker Scenario
Hydraulic Conductivity of Silty Clay

Pressure (psf)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
,	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table L-5
Honeywell Metropolis Works
Pond C Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

		Bulk	Average
		Density	Bulk Density
Pond	Sample ID	(g/ml)	(g/ml)
В	B-18 Lower	1.6	-
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В		-	1.575
С	C-2	1.6	-
C	C-5	1.7	-
С	C-19 Lower	1.6	-
C	C-19 Upper	1.5	<u>-</u>
C		•	1.6
D	D-8 Lower	1.5	-
D	D-8 Upper	1.6	-
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	-
D	D-17 Lower	1.5	-
D	D-17 Upper	1.6	-
D	D-26 Lower	1.8	-
D	D-26 Upper	1.9	-
D	-	•	1.6
E	E-65 Lower	1.3	·-
E	E-65 Upper	1.5	-
E	E-80 Lower	1.5	-
E	E-80 Upper	1.5	-
E	E-97 Lower	1.2	_
E	E-97 Upper	1.1	-
E	E-103 Lower	1.7	-
E	E-103 Upper	1.7	-
E	-	•	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX M

Pond D Deterministic Dose Assessment Input Summary

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Contaminated Zone	\$250 END'S.	2849300AU	MANNA.	401/28/3	SCHOOLS AND A	REAL PROPERTY.	BANGRAGE	STREET OF	73-83 NA (8-57)	H-1000000000000000000000000000000000000	100000000000000000000000000000000000000
Area of contaminated zone	m²	10000	Р	2	D	3,900	NR	NR	NR	NR	See Table M-2.
Thickness of contaminated zone	m	2	Р	2	D	1.959	NR	NR	NR	NR	See Table M-2.
Length parallel to the											Length of longest side of contaminated zone. See Table M-
aquifer flow Basic Radiation Dose	m	100	Р	2	D	65	NR	NR	NR	NR	Unrestricted release criteria in 10
Limit Time since placement	mrem/year	30 0	P	3	D D	25 0	NR NR	NA NA	NR NR	NR NR	CFR 20.1402 RESRAD default
Times for calculations	yr yr	1	 	3	D		NR	NR.	NR	NR	RESRAD default
Times for calculations	yr	3	P	3	5	3	NR	NR	NR	NA	RESRAD default
Times for calculations	yr	10	P	3	0	10	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	30	P	3	Ď	30	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	100	Р	3	D	100	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	300	P	3	D	300	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	1000	Р	3	D	1000	NR	NR	NR	NR	RESRAD default
Initial Principle Radionuclio		ne in the same	899747.31	Algebra 1999	844 TO 12 8X	FREEWAY.	-RELEVANCES FOR		JUNEAU CO	400000000000	
Soil: Ac-227	pCi/g	0	Р	2	D	0	NR	NR	NR	NR	See Table M-3
Soil: Pa-231	pCi/g	0	Р	2	D	0.25	NA	NR	NR	NR	See Table M-3
Soil: Pb-210	pCi/g	0	Р	2	D	0	NR	NR	NR	NR	See Table M-3
Soil: Ra-226	pCi/g	0	Ρ	2	D	0.46	NR	NR	NR	NR	See Table M-3
Soil: Fla-228	pCi/g	0	P	2	D	0	NR	NR	NR_	NR	See Table M-3
Soil: Th-228	pCi/g	0	Р	2	D	0.28	NR	NR	NR	NR	See Table M-3
Soil: Th-230	pCi/g	0	Р	2	D	1.14	NR	NR	NR	NA	See Table M-3
Soil: Th-232	pCi/g	0	Р	2	D	0.07	NR	NR	NR	NA	See Table M-3
Soil: U-234	pCi/g	0	P	2	D	480.78 8.68	NR NR	NR NR	NA NA	NA NA	See Table M-3
Soil: U-235 Soil: U-236	pCi/g pCi/g	0	P	2	D 0	12.87	NR	NR	NA	NR	See Table M-3 See Table M-3
Soil: U-238	pCi/g	0	P	2	D	503.83	NR	NR	NA NA	NR	See Table M-3
Groundwater: Ac-227	pCi/L	0	P	3	NA NA	Not used	NR	NR	NA NA	NR NR	Not used for calculation of distribution coefficients
Groundwater: Pa-231	pCi/L	. 0	Р	3	NA NA	Not used	NA	NR	NA	NR	Not used for calculation of
											distribution coefficients Not used for calculation of
Groundwater: Pb-210	pCi/L	0	Р	3	NA .	Not used	NA	NR	NR	NR .	distribution coefficients Not used for calculation of
Groundwater: Ra-226	pCi/L	0	Р	3	NA NA	Not used	NA	NA	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Ra-228	pCi/L	0	Р	3	NA NA	Not used	NR	NA	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Th-228	ρCi/L	0	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Th-230	ρCi/L	0	P	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Th-232	pCi/L	0	Р	3	NA NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-234	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-235	pCi/L	0	Р	3	NA .	Not used	NR	NR	NR	NR	distribution coefficients Not used for calculation of
Groundwater: U-236	pCi/L	0	Ρ	3	NA _	Not used	NR	NR	NR		distribution coefficients Not used for calculation of
Groundwater: U-238 Cover and Contaminated Z	pCi/L	0	P	3	NA NA	Not used	NR	NA	NR		distribution coefficients
Cover depth	m m	0	P	2	D	2.76	NR	NA	NR		See Table M-2
Cover depair						2.70					25% cumulative density function
Density of cover material	g/cm ³	1.5	Р	1	D	1.571	NR_	NR	NR	NA	value. See Appendix J 50% cumulative density function
Cover erosion rate Density of contaminated	m/yr	0.001	P,B	2	D	1.05E-04	NR	NR	NR		value. See Appendix J
zone Contaminated zone	g/cm ³	1.5	Р	1	D	1.6	NA	NR	NR		See Table M-5 50% cumulative density function
erosion rate	m/yr	0.001	P.8	2	D	3.49E-05	NA	NR	RN	NR	value. See Appendix J
Contaminated zone total porosity		0.4	Ρ	2	D	0.41	NR	NR	NR		50% cumulative density function value. See Appendix J
Contaminated zone field capacity	-	0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
Contaminated zone	m/yr	10	Р	2	D	1.6	NR .	NR	NA		Average Kh from dilatometer (DMT) pressure dissipation tests performed on in-situ Pond E sludge by In-Situ Testing LC, August 5-7, 2009
Contaminated zone b	,1	5.3	Р	2	0	1.35	NR	NR	NR		50% cumulative density function
									_		value. See Appendix J This parameter only used if
Humidity in air	g/m ³	8	P	3	NA	Not used	NR	NR	NR	NR	Tritium is present in soil

Proving across wind speed of my 2		,			,		ı	I no series as	T 5: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1:	Ta	Laura	T
Page Page									Parameter	Parameter		
self-deemi		Units	Default	Type¹	Priority ²	Treatment ³	Value	1	2	3	4	
Per age arrows word speed for we goed of my 2 P 2 D 3.3 NR NR NR NR NR NR NR NR NR NR NR NR NR	Evapotranspiration coefficient	l <u>.</u>	0.5	Р	2	ا ا	0.62	NR	NR	NR	NR	
wronge servall wind professor and professor												
verage entral wind gelead of mits 2		}]	1]	ļ			ļ			
Telephatron rate	Average annual wind		İ									http://lwf.ncdc.noaa.gov/oa/climat
recipitation rate myk 1 P 2 D 125 MR NR NR NR NR A 1-1, Packagus KY registion rate myk 2 B 3 D 0 NR NR NR NR NR registion rate myk 0.2 B 3 D 0 NR NR NR NR NR registion rate myk 0.2 B 3 D 0 NR NR NR NR NR registion rate myk 0.2 B 3 D 0 NR NR NR NR NR NR registion rate myk 0.2 P 2 D 0.4 NR NR NR NR NR NR registion rate myk 0.2 P 2 D 0.4 NR NR NR NR NR NR NR registion rate myk 0.0 NR NR NR NR NR NR NR N	speed	m/s	2	Р	2	D	3.3	NR	NR	NR NR	NR	e/online/ccd/avgwind.html
rigation ratio myle 0.2 B 3 D 0 NR NR NR NR NR NR NR NR NR NR NR NR NR	Precipitation rate	m/vr	,	P	2	В	1.25	NR NR	NR NR	NR	NR	
Part Part								<u> </u>				Not applicable for industrial
registion mode - Overhead - Overh	Irrigation rate	m/yr	0.2	В	3	D		NR	NA	NR	NR	
Internal Coolinewrit - 0.2 P 2 D 0.4 NR NR NR NR NR NR NR N	Irrigation mode	-	Overhead	В	3	D	Overhead	NR	NA	NA	NR	
Name												
Valenthrough y televan or point of 100E-06 P 3 D 2.78E-09 NR NR NR NR NR NR RAGE end was waterabled. See a course for water soil course for twister so	Busett enetticient		٠,	ا	ا ا	_				NO		
actively terms or ported m² 1.00E-0.6 P 3 D 2.78E-0.9 NR NR NR NR Appendix A. Construction of Country of Coun			0.2				0.4	NA.	INIT	NIT .	INA	
March Marc	nearby stream or pond	m²	1.00E+06	ρ_	3	D	2.78E+05	NR	NR	NR	NR	
### Annual set of the process of the		_	1.00F-03	NA.	3	n :	1.005-03	ND	NR	NB	NB	RESBAD default
Part Part		al Data										TOTAL GENERAL
Solution Solution						_						
		g/cm ²	1.5			- د	1.51	NH	NH	NH	NH	
Crossly Cros	porosity	<u> </u>	0.4	Р	1	D	0.43	NR	NR _	NR	NR	
atturated zone field agency - 0.2 P 3 D 0.2 NR NR NR NR NR NR RESRAD default Solic cumulative density function model field agency - 0.2 P 3 D 0.2 NR NR NR NR NR NR NR NR NR NR NR NR NR			0.2			_	0.29	ND	ND	ND	NO	
	Saturated zone field		0.2	<u> </u>		U .	0.38	INT	INIT	IVIT	NM	value. See Appendix J
Onductivity	capacity		0.2	Р	3	D	0.2	NR	NR	NR	NR	
Andrew Eng. Geologic Cross Section Sheet Ak (E. 319.24 – E. 286.54) 4320 ft. See Appendix A. Andrew Eng. Geologic Cross Section Sheet Ak (E. 319.24 – E. 286.54) 4320 ft. See Appendix A. See See Appendix A. See See Appendix A. See See Appendix A. See See See See See See See See See Se		m/ur	100	P	,	n	2500.0	NE	NA	NA	NB	
Section Sheef A.P. (E. 319.24 -	Condoctivity	111771	100		<u></u>		2300.0	,				
Page Page			ľ								l	Section Sheet A-A' (El. 319.24 -
Solution Solution			0.02	Р	2	ח	0.0048	NR	NR	NR	NR	
Valer table drop rate	Saturated zone soil-											
Honoywell Santary Well Depth	specific b parameter	-										
Vell-pump intake depth	vvater lable drop rate	in/yr	1.00=-03	<u> </u>			1.00E-03	NH	INH	NH	NH	
No Model is used for larger contaminated areas (e.g. more than 1,000 m²) por RESRAD	Well-pump intake depth			_		_						from HSA - depth to saturated
Contaminated areas (e.g. more han 1,000 m²) per 1	(below water table)	m	10	Р	2	D	105	NR .	NH	NH	NR	zone.
International Content Inte												ND Model is used for larger
No	•		•									contaminated areas (e.g. more
Vell pumping rate		_	ND	P	3	n	ND	NP	NR	NR		
Insaturated Zone Hydrological Data	mass calance		1,10				NO		1411		.,,,	
Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.	Well pumping rate											
1	Unsaturated Zone Hydroid	JICEI DATE	51,58(223,3,5),59,89,2	*0.00X(2.3)	AMONTH AND	395 00 + 5580000 C		D##*****X	SHEET CARREST	7-0200000	######################################	
ones - 1 P 3 D 5 NR NR NR NR NR Appendix A. Andrews Engineering Project ID 91-135 cross section Sheet Number A-A. January 2007. See Appendix A. Andrews Engineering Project ID 91-135 cross section Sheet Number A-A. January 2007. See Appendix A. Solve Cumulative density function value. See Appendix A. The staturated zone 1 total crossity - 0.4 P 2 D 0.360 NR NR NR NR NR NR NR NR NR NR NR NR NR			-									
Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See NR NR NR NR NR NR NR NR Appendix A. Nanuary 2007. See NR NR NR NR NR NR Appendix A. Nanuary 2007. See NR NR NR NR NR NR NR NR NR Appendix A. NR NR NR NR NR NR NR NR NR NR NR NR NR	Number of unsaturated				ا ا	_		NID.	NO	ND		
Insaturated zone 1	zones	-	<u> </u>	-		<u> </u>		140	NIT	NIN	NA.	
Description Description	Unsaturated zone 1											91-135 cross section Sheet
Insaturated zone			4		١, ١	n	6.06	ND	ND	NID	ND	
Insaturated zone 1 total Consist	Unsaturated zone 1 soil						0.00	, MO	IVI	INT.	NR	
Design	density	g/cm ³	1.5	Ρ	2	D	1.695	NR	NR	NR	NR	value. See Appendix J
Insaturated zone 1			0.4	Р	2	D	0.360	NR	NR	NA	NA	50% cumulative density function value. See Appendix J
Insaturated zone 1 field apacity	Unsaturated zone 1											
Apacity -	effective porosity		0.2	Р	2	D	0.289	NR	NR	NR	NR	value. See Appendix J
Insaturated zone 1	capacity		0.2	Р	3	D	. 0.2	NR	NR	NR	NR	RESRAD default
Insaturated zone 1 soil- pecific b parameter - 5.3 P 2 D 9.87 NR NR NR NR NR NR NR NR NR NR NR NR NR	Unsaturated zone 1											
Decific b parameter -	hydraulic conductivity	m/yr	10	Р	2	D	126	NR	NR	NA	NR NR	See Table M-4
Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Search Sitt/Sitty Search Search Sitt/Sity Search Search Sitt/Sity Search S	Unsaturated zone 1 soil-										1	50% cumulative density function
Insaturated zone 2	specific b parameter	-	5.3	Р	2	D	9.87	NR	NR	NR	NR	value. See Appendix J
Number A-A', January 2007. See Jandy Number A-A', January 2007. See Jandy Number A-A', January 2007. See Jandy Number A-A', January 2007. See Appendix A.	I Insaturated zono 2											Andrews Engineering Project ID
Sand m 4 P 1 D 1.71 NR NR NR NR Appendix A	thickness (Sandy Silt/Silty											
ensity	Sand)	m	4	Р	1	D	1.71	NR	NR	NR	NR	Appendix A.
Insaturated zone 2 total 50% cumulative density function		g/cm ³	15	Р		ר ו	1.563	NR	NR	NR		
	Unsaturated zone 2 total	9011					,,,,,,,					
	porosity	<u> </u>	0.4	Р	2	D	0.409	NR	NR	NA		

			r				Distribution	Distribution	Disasib, siss	Diatribution	T
_		RESRAD	_ ,				Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter Unsaturated zone 2	Units	Default	Туре¹	Priority ²	Treatment ³	Value	1 1	2	3	4	Basis 50% cumulative density function
effective porosity	•	0.2	Р	2	D	0.35	NR	NA	NR	NR	value. See Appendix J
Unsaturated zone 2 field capacity		0.2	Р	3	D	0.2	NR	NR	NR .	NR	RESRAD default
Unsaturated zone 2 hydraulic conductivity	m/yr	10	Р	2	D	1024.76	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 2 soil- specific b parameter		5.3	Р	2	D	1.35	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 thickness (Sand)	m	4	Р	1	D	1.71	NR	NA	NR	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 3 soil density	g/cm³	1.5	Р	2	D	1.510	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 total porosity	-	0.4	Р	2	D	0.43	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 effective porosity		0.2	Р	2	D	0.383	NA	NA	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 field capacity		0.2	Р	3	D	0.2	NR	NR	NFI	NR	RESRAD default
Unsaturated zone 3 hydraulic conductivity	m/yr	10	Р	2	D	2495.4	RN	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3 soil- specific b parameter		5.3	Р	2	D	0.97	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 thickness (Sandy Silt/Silty	_		Р		D		NR	NA	NFI	NR	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See
Sand) Unsaturated zone 4 soil	m 3	4	Р	1		4					Appendix A. 50% cumulative density function
Unsaturated zone 4 total porosity	g/cm ³	1.5 0.4	P	2	D D	0.389	NR NR	NR NR	NR NR	NR NR	value. See Appendix J 50% cumulative density function value. See Appendix J
Unsaturated zone 4 effective porosity		0.2	Р	2	D	0.318	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 field capacity		0.2	P	3	D	0.2	NA NA	NR	NR	NR	RESRAD default
Unsaturated zone 4 hydraulic conductivity	m/yr	10	P	2	0	1021.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 4 soil- specific b parameter	_	5.3	Р	2	D	1.35	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 thickness (Sand)	m	4	Р	1	D	1.14	NR	NR	NR	N A	Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
Unsaturated zone 5 soil density	g/cm ³	1.5	Р	2	D .	1.510	NFI	NR	NA	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 total	grom	0.4	P	2	D	0.43	NR	NR	NR	NR	50% cumulative density function
Unsaturated zone 5			Р								value. See Appendix J 50% cumulative density function
Unsaturated zone 5 field		0.2	P	2	D	0.383	NR NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 5		10	P	3	D D	0.2 2493.6	NR NR	NRNR	NR NR	NR NR	RESRAD default 50% cumulative density function
hydraulic conductivity Unsaturated zone 5 soil-	m/yr	10			1						value. See Appendix J 50% cumulative density function
specific b parameter Distribution Coefficients (co	ontaminated, u	5.3 nsaturated, and	P d saturate	2 d zones)	D	0.97	NA 24	NA V	NR	NR	value. See Appendix J
Ac-227 (CZ)	cm³/g	20	Р	1	s	824.5	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ1)	cm³/g	20	Р	1	S	818.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ2)	cm³/g	20	P	1	s	828.4	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Ac-227 (UZ3)	cm³/g	20	P	1	s	825.1	NR	NR_	NŘ	NA	50% cumulative density function value. See Appendix J
Ac-227 (UZ4)	cm³/g	20	Р	1	S	809.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (UZ5)	cm³/g	20	Ρ	1	s	814.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ac-227 (SZ)	cm³/g	20	Р	1	s	810.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (CZ)	cm³/g	50	Р	1	s	374.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ1)	cm³/g	50	Р	1	s	370.7	NR	NR	NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Pa-231 (UZ2)	cm³/g	50	Р	1	s	375.1	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ3)	cm³/g	50	P	1	s	375. 3	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ4)	cm³/g	50	Р	1	s	378.2	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ5)	cm³/g	50	Р	1	s	375.6	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (SZ)	cm³/g	50	Р	1	s	378.4	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (CZ)	cm³/g	100	Р	1	s	2373.8	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ1)	cm³/g	100	Р	1	S	2347.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ2)	cm³/g	100	Ρ	1	s	2361.6	NR	NR	NA	NA	50% cumulative density function value. See Appendix J
Pb-210 (UZ3)	cm³/g	100	Р	1	s	2356.9	NA	NA	NA	NA	50% cumulative density function value. See Appendix J
Pb-210 (UZ4)	cm³/g	100	Р	. 1	s	2352.1	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ5)	cm³/g	100	Р	1	s	2379.9	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Pb-210 (SZ)	cm³/g	100	Р	1	s	2360.3	NR.	NĤ	NR	NR	50% cumulative density function value. See Appendix J
Fia-226 (CZ)	cm³/g	70	Р	1	s	3501.2	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ1)	cm³/g	70	Р	1	S	3506.5	NR	NA	NA	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ2)	cm³/g	70	Р	1	s	3505.6	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ3)	cm³/g	70	Р	1	s	3522.8	NE	NA	NA	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ4)	cm³/g	70	Р	1	s	3484.6	NA	NA	NA	NR	50% cumulative density function value. See Appendix J
Ra-226 (UZ5)	cm³/g	70	Р	1	s	3495.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Fia-226 (SZ)	cm³/g	70	Р	1	s	3529.3	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Ra-228 (CZ)	cm³/g	70	Р	1	S	3489.5	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-228 (UZ1)	cm³/g	70	Р	1	s	3507.0	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-228 (UZ2)	cm³/g	70	Р	1	s	3521.8	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Ra-228 (UZ3)	cm³/g	70	Р	1	s	3513.0	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Ra-228 (UZ4)	cm³/g	70	Р	1	s	3504.5	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-228 (UZ5)	cm³/g	70	Р	1	s	3483.8	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Ra-228 (SZ)	cm³/g	70	Р	1	s	3521.4	NR	NR	NA NA	NR	50% cumulative density function value. See Appendix J
Th-228 (CZ)	cm³/g	60000	Р	1	s	5883.2	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Th-228 (UZ1)	cm³/g	60000	Р	1	s	5736.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-228 (UZ2)	cm³/g	60000	Р	1	s	5825.4	NR	NĤ	NR	NR	50% cumulative density function value. See Appendix J
Th-228 (UZ3)	cm³/g	60000	Р	1	s	5786.3	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (UZ4)	cm³/g	60000	Р	1	s	5774.7	NR	NR	NR	1	50% cumulative density function value. See Appendix J
Th-228 (UZ5)	cm³/g	60000	P	1	s	5784.1	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (SZ)	cm³/g	60000	Р	1	s	5828.0	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-230 (CZ)	cm³/g	60000	P	1	s	5770.7	NR	NR	NR NR		50% cumulative density function value. See Appendix J
Th-230 (UZ1)	cm³/g	60000	P	,	s	5842.5	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-230 (UZ2)	cm³/g	60000	P	1	s	5842.8	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-230 (UZ3)	cm³/g	60000	ρ	1	s	5882.2	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-230 (UZ4)	cm ³ /g	60000	Р	1	s	5778.8	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-230 (UZ5)	cm ³ /g	60000	P	1	s	5859.6	NA NA	NR	NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Type'	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Th-230 (SZ)	cm³/g	60000	Р	1	s	5849.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
			P	1	S		NA	NR	N8	NA	50% cumulative density function value. See Appendix J
Th-232 (CZ)	cm ³ /g	60000	P			5770.9	NR	NR	NR NR		50% cumulative density function
Th-232 (UZ1)	cm³/g	60000		1	S	5808.9				NR	value. See Appendix J 50% cumulative density function
Th-232 (UZ2)	cm³/g	60000	P	1 .	S	5744.2	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Th-232 (UZ3)	cm³/g	60000	_ P	1	S	5769.1	NR	NR	NA	NR NR	value. See Appendix J 50% cumulative density function
Th-232 (UZ4)	cm³/g	60000	Р	1	S	5778.8	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Th-232 (UZ5)	cm³/g	60000	Р	. 1	S	5822.9	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Th-232 (SZ)	cm³/g	60000	_ Р	1	s	5864.1	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-234 (CZ)	cm³/g	50	P	1	NA	123.5	NR	NR	NR	NR NR	value. See Appendix J 50% cumulative density function
U-234 (UZ1)	cm³/g	50	- Ρ	1	NA	126.1	NR	NR	NR	NR NR	value. See Appendix J 50% cumulative density function
U-234 (UZ2)	cm ³ /g	50	Р	1	NA	124.2	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-234 (UZ3)	cm³/g	50	P	1	NA .	124.2	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-234 (UZ4)	cm³/g	50	Ρ	1	NA.	124.7	NR	NR	NR	NR NR	value. See Appendix J 50% cumulative density function
U-234 (UZ5)	cm³/g	50	Р	1	NA	125.7	NR	NR	NR	NR_	value. See Appendix J
U-234 (\$Z)	cm³/g	50	P	1	NA	126.4	NR	NR	NR	NA .	50% cumulative density function value. See Appendix J
U-235 (CZ)	cm³/g	50	Р	1	NA	123.9	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
U-235 (UZ1)	cm³/g	50	Р	1	NA NA	125.8	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
U-235 (UZ2)	cm³/g	50	Р	1	NA .	123.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-235 (UZ3)	cm³/g	50	Р	1	NA	125.9	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
U-235 (UZ4)	cm³/g	50	Р	1	NA	124.9	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
U-235 (UZ5)	cm³/g	50	Р	1	NA	124.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-235 (SZ)	cm³/g	50	Р	1	NA	124.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (CZ)	cm³/g	50	Р	1	NA	123.9	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
U-236 (UZ1)	cm³/g	50	Р	1	NA	124.0	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ2)	cm³/g	50	Р	1	NA	123.8	NA	NA	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ3)	cm³/g	50	Р	1	NA NA	123.9	NA NA	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ4)	cm³/g	50	Р	1	NA.	124.0	NA	NR	NR	NA NA	50% cumulative density function value. See Appendix J
	cm ³ /g	50	P	1	NA NA	125.9	NR.	NR	NR	NR	50% cumulative density function
U-236 (UZ5)	cm ³ /g		Р	1	,	125.9	NR	NR	NR		value. See Appendix J 50% cumulative density function
U-236 (SZ)		50			NA					NR NR	value. See Appendix J 50% cumulative density function
U-238 (CZ)	cm ³ /g	50	P	1	NA	124.0	NR	NA	NA	NR	value. See Appendix J 50% cumulative density function
U-238 (UZ1)	cm³/g	50	Р	1	NA .	123.8	NR	NA	NA	NR	value. See Appendix J 50% cumulative density function
U-238 (UZ2)	cm³/g	50	P	1	NA NA	124.5	NR	NA	NR	NR	value. See Appendix J 50% cumulative density function
U-238 (UZ3)	cm ³ /g	50	Р	1	NA	123.4	NFI	NA	NR		value. See Appendix J 50% cumulative density function
U-238 (UZ4)	cm ³ /g	50	Р.		NA_	124.0	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-238 (UZ5)	cm ³ /g	50	Р	1	NA	126.2	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-238 (SZ) Transport Factor Options	cm³/g	50	P	1 (%) 3 5 5 5	NA NA	124.3	NR	NR	NA	NR	value. See Appendix J
Leach rate	1/yr	0	P	3	D	0	NR	NR N	NR		RESRAD default, parameter is not used for calculation of distribution coefficients. Value of 0 not used for calculation of distribution coefficients.

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Parameter	Units	RESRAD Default	Type¹	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
											Value used for Uranium nuclides
Solubility limit	mol/L	0	Р_	3	D	2.94E-06	NR	NR	NR	NA	RESRAD default, parameter not used for calculation of distribution
Use plant/soil ratio	Check box	Yes/No	NA	3	NA	No	NR	NR	NR	NR	coefficients.
Occupancy	-34	0.400	7,3000	30000000	D	11400	NR	NR	NA	NA	RESRAD Manual, Table 2.3
Inhalation rate Mass loading for	m³/yr	8400	М, В	3		11400	INIT	NIT.	NIT	NA.	50% cumulative density function
inhalation	g/m³	0.0001	P,B	2	D	2.35E-05	NR	NR	NR	NR	value. See Appendix J
Exposure duration	yr	30	В	3	D	25	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Indoor dust filtration factor (shielding factor, inhalation)		0.4	P. B	2	D	0.547	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Shielding factor, external gamma	_	0.7	 _P	2	D	0.397	NR	NR	NR	NR	75% cumulative density function value. See Appendix J
Indoor time fraction		0.5	В	3	0	0.17	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Outdoor (on site) time		0.05			D	0.06	NR	NR	NR	NR	DECRAD Manual Table 0.2
fraction Shape of the		0.25	В	3	U	0.06	NH	NH	Nn	NH	RESRAD Manual, Table 2.3 Shape representative of pond
contaminated zone	-	11	P	3	D	Non-circular	NR	NR	NR	NR	(rectangular)
Ingestion, Dietary		megastatis.	24400 N	98241912 1470	800000000000000000000000000000000000000	(1815) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816) (1816)	\$1,67,000.00 17.00	SEN STALL SHEET		Maria Comme	Pathway suppressed for industrial
Fruit, vegetable, and grain consumption rate	kg/yr	160	м, в	_2	NA	Not used	NR	NR	NR	NR	worker scenario
Leafy vegetable consumption	kg/yr	14	м, в	3	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Milk consumption	∟∕yr	92	м, в	2	NA.	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Meat and poultry consumption	kg/yr	63	м, в	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Fish consumption rate	kg/yr	5.4	м, в	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Other seafood consumption rate	kg/yr	0.9	м, в	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
		36.5	м, в	2	D	36.5	NR	NR	NR	NR	RESRAD Manual, Table 2.3 based on EPA suggested value of 100 mg/day
Soil ingestion rate	g/yr	510	M, B	2	D	478.5	NA NA	NA	NR NR	NR	NUREG/CR-5512, V3 Table 6.87
Drinking water intake Contamination fraction of	L∕yr	· · · · · · · · · · · · · · · · · · ·				1		NA.	NA NA		
drinking water Contamination fraction of	-	1	В, Р	_3	NA 		NA			NA	RESRAD Default Pathway suppressed for industrial
household water Contamination fraction of		1	В, Р	3	NA	Not used	NR	NR	NA	NA	worker scenario Pathway suppressed for industrial
livestock water Contamination fraction of	<u> </u>	1	B, P	3	NA NA	Not used	NR	NR	NA	NR	worker scenario Pathway suppressed for industrial
irrigation water Contamination fraction of	-	1	В, Р	3	NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
aquatic food	-	0.5	B, P	2	NA	Not used	NA	NR	NR	NA	worker scenario
Contamination fraction of plant food		-1	B, P	3	NA_	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of meat		-1	В, Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of milk		-1	B, P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ingestion, Non-Dietary	2888819 (1975)4	\$4508Q8G8G	1000	Transfer	327 640 0266	S-720 y - 520 y	555-1513/15 9 43	SSETTEDAME.			Pathway suppressed for industrial
rate for meat	kg/d	68	м	3	NA	Not used	NR	NA	NR	NR	worker scenario
Livestock fodder intake rate for milk	kg/d	55	м	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Livestock water intake rate for meat	L/d	50	м	3	NA	Not used	NR	NR	NA		Pathway suppressed for industrial worker scenario
Livestock water intake rate for milk	L/d _	160	М	3	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Livestock soil intake	kg/d	0.5	м	3	NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
Mass loading for foliar deposition	g/m³	1.00E-04	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Depth of soil mixing layer	m m	0.15	Р	2	D	0.231	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Depth of roots	m	0.9	Р	1	NA NA	Not used	NR	NR I	NR	NR	Pathway suppressed for industrial worker scenario
				- - -							RESRAD default, all drinking
Drinking water fraction from groundwater		1	B, P	3	D	1	NR	NR	NR	NR	water assumed from groundwater
Household water fraction	1					41					D
from groundwater Livestock water fraction		1	В, Р	3	NA	Not used	NA	NR	NR NR	NR	Parameter applies to Radon only. Pathway suppressed for industrial
from groundwater		11	8, P	3	NA	Not used	NR	NR	NR NR	NR	worker scenario

			ī		1		Distribution	Distribution	Distribution	Distribution	
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Basis
Irrigation fraction from	Units	Delauit	туре	FIIOTHY	Heatment	value	<u>'</u>		- 3	-	Pathway suppressed for industrial
groundwater		1	B, P	3	NA	Not used	NR	NR	NR	NR	worker scenario
Wet weight crop yield for non-leafy plants	kg/m²	0.7	Р	2	NA NA	Not used	NR NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Wet weight crop yield for			_								Pathway suppressed for industrial
leafy plants Wet weight crop yield for	kg/m²	.1.5	Р	3	NA NA	Not used	NR	NR	NR NR	NR	worker scenario Pathway suppressed for industrial
fodder	kg/m²	1.1	ρ	3	NA	Not used	NR	NR	NR	NR	worker scenario
Growing season for non- leaty vegetables	yr	0.17	Р	3	NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Growing season for leafy vegetables	yr	0.25	Р	3	NA.	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Growing season for			_						i		Pathway suppressed for industrial
Transjocation factor for	yr	0.08	P	3	NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
non-leafy vegetables		0.1	Р	3	NA	Not used	NR	NR	NR	NR	worker scenario
Translocation factor for leafy vegetables		1	P	3	NA NA	Not used	NA	NA	NR	NR	Pathway suppressed for industrial worker scenario
Translocation factor for											Pathway suppressed for industrial
fodder Dry foliar interception		1	Р	. 3	NA NA	Not used	NR	NR	NR	NR NR	worker scenario
fraction for non-leafy							<u>'</u>				Pathway suppressed for industrial
vegetables		0.25	Р.	3	NA	Not used	NR	NR	NR	NR	worker scenario
Dry foliar interception fraction for leafy											Pathway suppressed for Industrial
vegetables		0.25	P	3	NA	Not used	NR	NR	NA	NA .	worker scenario
Dry foliar interception fraction for fodder	-	0.25	P	3	NA	Not used	NA	NR	NR	NA	Pathway suppressed for industrial worker scenario
Wet foliar interception											
fraction for non-leafy vegetables		0.25	Р	3	NA .	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Wet foliar interception											
traction for leafy vegetables		0.25	P	2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Wet foliar interception											Pathway suppressed for industrial
fraction for fodder Weathering removal	•	0.25	P .	3	NA	Not used	NR	NR	NR	NR NR	worker scenario Pathway suppressed for industrial
constant for vegetation	4 6	مم ا	P	۱ ۾	N/A	N-44			l		
	1/yr	20		2	NA	Not used	NR	NR	NR	NR	worker scenario
Special Radionuclides (C-		20 36.3655 33	\$2500	2 350040	IVA NOSAS SESSE	Not used	NR	NR Swall	NH >>	NH *** Yess	worker scenario
Special Radionuclides (C- C-12 concentration in water											
Special Fladionuctides (C-12 concentration in water C-12 concentration in	g/cm ³	2.00E-05	\$000000	THE COMME	NA NA	Not used	NR	NA	NR	NR	Applicable for C-14 exposure only
Special Radionuclides (C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation	9/g	2.00E-05 3.00E-02	P P	3	NA NA	Not used Not used	NR NR	NR NR	NR NR	NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionuclides (C- C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil	g/cm ³	2.00E-05	P	3	NA NA	Not used	NR	NA	NR	NR	Applicable for C-14 exposure only
Special Fladionuclides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air	9/g	2.00E-05 3.00E-02	P P	3	NA NA	Not used Not used	NR NR	NR NR	NR NR	NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C::14 evasion layer	g/cm³ g/g -	2.00E-05 3.00E-02 2.00E-02 0.98	P P	3 3	NA NA NA	Not used Not used Not used Not used	NR NR NR	NR NR NR	NR NR NR NR	NR NR NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Factionuclides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C: 14 evasion layer thickness in soil C-14 evasion flux rate	g/cm ³ g/g m	2.00E-05 3.00E-02 2.00E-02 0.98 0.3	P P P	3 3 3 3	NA NA NA NA	Not used Not used Not used Not used Not used Not used	NR NR NR NR	NR NR NR NR	NR NR NR NR NR	NR NR NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Factionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C::14 evasion layer thickness in soil C-14 evasion flux rate from soil	g/cm³ g/g -	2.00E-05 3.00E-02 2.00E-02 0.98	P P P	3 3 3	NA NA NA	Not used Not used Not used Not used	NR NR NR	NR NR NR	NR NR NR NR	NR NR NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionuclides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C-114 evasion layer thickness in soil C-12 evasion flux rate from soil C-12 evasion flux rate from soil	g/cm ³ g/g	2.00E-05 3.00E-02 2.00E-02 0.98 0.3	P P P	3 3 3 3	NA NA NA NA	Not used Not used Not used Not used Not used Not used	NR NR NR NR	NR NR NR NR	NR NR NR NR NR	NR NR NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C: 114 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef	g/cm³ g/cm³ g/g n 1/s	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10	P P P P	3 3 3 2 3 3 3	NA NA NA NA NA NA NA NA	Not used Not used Not used Not used Not used Not used Not used Not used	NE NE NE NE NE NE NE NE NE NE NE NE NE N	NR NR NR NR NR NR NR NR	NR NR NR NR NR NR NR	NR NR NR NR NR NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C-114 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk	g/cm³ g/cm³ g/g m 1/s	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8	P P P P B	3 3 3 2 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA	Not used Not used Not used Not used Not used Not used Not used Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NR NR NR NR NR NR NR NR NR	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NR NR NR NR NR NR NR NR NR NR NR NR NR N	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Redionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C::14 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in beef cattle feed Fraction of grain in milk cow feed	g/cm³ g/cm³ g/g	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8	P P P P B B	3 3 3 3 2 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NE NE NE NE NE NE NE NE NE NE NE NE NE N	NE NE NE NE NE NE NE NE NE NE NE NE NE N	2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionuclides (C-C-12 concentration in water C-12 concentration in contaminated solid Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C-114 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin Storage Times of Contamin	g/cm³ g/cm³ g/g	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8	P P P P B	3 3 3 2 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA	Not used Not used Not used Not used Not used Not used Not used Not used Not used	NE NE NE NE NE NE NE NE NE NE NE NE NE N	NR NR NR NR NR NR NR NR NR	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NR NR NR NR NR NR NR NR NR NR NR NR NR N	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C::14 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamit Storage Times of Contamit Storage Times of Contamit Storage time for fruits, non-leafy vegetables, and	g/cm³ g/cm³ g/g - m 1/s 1/s - nated Foodstuff	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2	P P P P P P P P P P P P P P P P P P P	3 3 3 3 2 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NA NA NA NA NA NA NA NA NA NA NA NA NA N	28 28 28 28 28 28 28 28 28 28 28 28 28 2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionuclides (C-C-12 concentration in water C-12 concentration in contaminated solid Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C-114 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain Storage time for leafy	g/cm³ g/g g/g m 1/s 1/s c nated Foodstuf	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8	P P P P B B B	3 3 3 3 2 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NE NE NE NE NE NE NE NE NE NE NE NE NE N	NE NE NE NE NE NE NE NE NE NE NE NE NE N	2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Redionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C:14 evasion layer thickness in soil C-14 evasion flux rate from soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain	g/cm³ g/cm³ g/g - m 1/s 1/s - nated Foodstuff	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2	P P P P P P P P P P P P P P P P P P P	3 3 3 3 2 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NA NA NA NA NA NA NA NA NA NA NA NA NA N	28 28 28 28 28 28 28 28 28 28 28 28 28 2	NR NR NR NR NR NR NR NR NR NR NR NR NR N	Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-14 exposure only Applicable for C-15 exposure only Applicable for C-16 exposure only Applicable for C-17 exposure only Applicable for C-18 exposure only Applicable for C-19 exposure only
Special Radionuclides (C-C-12 concentration in water C-12 concentration in contaminated solid Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C-114 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain Storage time for leafy	g/cm³ g/g g/g m 1/s 1/s c nated Foodstuf	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2	P P P P B B B	3 3 3 3 2 3 3 3	NA NA NA NA NA NA NA NA NA NA NA	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NA NA NA NA NA NA NA NA NA NA NA NA NA N	NR NR NR NR NR	NR NR NR NR NR NR NR NR NR NR NR NR	Applicable for C-14 exposure only Applicable for C-14 exposure only
Special Radionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from sir C::14 evasion layer thickness in soil C-12 evasion flux rate from soil G-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contami Storage time for fruits, non-leafy vegetables, and grain Storage time for leafy vegetables Storage time for leafy vegetables	g/cm³ g/cm³ g/g - m 1/s 1/s - nated Foodstuff d d	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2	P P P P B B B B B B B B B	3 3 3 3 2 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NE NE NE NE NE NE NE NE NE NE NE NE NE N		2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2	2	Applicable for C-14 exposure only Applic
Special Fladionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C-114 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle fleed Fraction of grain in beef cattle fleed Fraction of grain in milk cow fleed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain Storage time for leafy vegetables Storage time for milk Storage time for milk	g/cm³ g/cm³ g/g	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2 14 1 1 20	P P P P B B B B B	3 3 3 3 3 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NR NR NR NR	2	Applicable for C-14 exposure only Applic
Special Radionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from sir C::14 evasion layer thickness in soil C-12 evasion flux rate from soil G-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contami Storage time for fruits, non-leafy vegetables, and grain Storage time for leafy vegetables Storage time for leafy vegetables	g/cm³ g/cm³ g/g - m 1/s 1/s - nated Foodstuff d d	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2	P P P P B B B B B B B B B	3 3 3 3 2 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NE NE NE NE NE NE NE NE NE NE NE NE NE N		2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2	2	Applicable for C-14 exposure only Applic
Special Fladionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C-114 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle fleed Fraction of grain in beef cattle fleed Fraction of grain in milk cow fleed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain Storage time for leafy vegetables Storage time for milk Storage time for milk	g/cm³ g/cm³ g/g	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2 14 1 1 20 7	P P P P B B B B B B B B B	3 3 3 3 3 3 3 3 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NA NA NA NA NA NA NA NA NA NA NA NA NA N	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Applicable for C-14 exposure only Applic
Special Radionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from sir C::14 evasion layer thickness in soil C-12 evasion flux rate from soil G-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contaminational flux rate from soil Storage time for fruits, non-leafy vegetables, and grain Storage time for leafy vegetables from formal from formal form	g/cm³ g/cm³ g/g	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2 14 1 1 20	P P P P B B B B B	3 3 3 3 3 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NA NA NA NA NA NA NA NA NA NA NA NA NA N	NR NR NR NR NR NR NR NR NR NR NR NR NR N	2	Applicable for C-14 exposure only Applicable for C-15 exposure only Applicable for C-16 exposure only Applic
Special Redionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from sir C: 14 evasion layer thickness in soil C-12 evasion flux rate from sir C: 12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain Storage time for milk Storage time for meat Storage time for meat Storage time for meat Storage time for meat Storage time for meat Storage time for rustacea and mollusks Storage time for crustacea and mollusks Storage time for crustacea and mollusks Storage time for crustacea	g/cm³ g/cm³ g/g	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2 14 1 1 20 7	P P P P B B B B B B B B B	3 3 3 3 3 3 3 3 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NE NE NE NE NE NE NE NE NE NE NE NE NE N	NR NR NR NR NR NR NR NR NR NR NR NR NR N	NR NR NR NR NR NR NR NR NR NR NR NR NR N	Applicable for C-14 exposure only Applic
Special Factionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C1:14 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain Storage time for meat Storage time for meat Storage time for meat Storage time for fruits Storage time for meat Storage time for soil Storage time for meat Storage time for crustacea and moliusks Storage time for well water Storage time for surface	g/cm³ g/cm³ g/g - m 1/s 1/s c hated Foodstuff d d d d d	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2 14 1 1 20 7	P P P P B B B B B B B B B B B B B B B B	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used			2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2	28 28 28 28 28 28 28 28 28 28 28 28 28 2	Applicable for C-14 exposure only Applicable for C-15 exposure only Applicable for C-16 exposure only Applic
Special Redionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from sir C::14 evasion layer thickness in soil C-12 evasion flux rate from soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage times of Contamis Storage time for fruits, non-leafy vegetables, and grain Storage time for milk Storage time for meat Storage time for meat Storage time for crustacea and mollusks Storage time for crustacea and mollusks Storage time for well water Storage time for well water Storage time for surface water	g/cm³ g/cm³ g/g - m 1/s 1/s - valed Foodstuff d d d d	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2 (5)	P P P P P B B B B B B B B B B B B B B B	3 3 3 3 3 3 3 3 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used		NE NE NE NE NE NE NE NE NE NE NE NE NE N			Applicable for C-14 exposure only Applic
Special Factionucides (C-C-12 concentration in water C-12 concentration in contaminated soil Fraction of vegetation carbon from soil Fraction of vegetation carbon from air C1:14 evasion layer thickness in soil C-12 evasion flux rate from soil Fraction of grain in beef cattle feed Fraction of grain in milk cow feed Storage Times of Contamin Storage time for fruits, non-leafy vegetables, and grain Storage time for meat Storage time for meat Storage time for meat Storage time for fruits Storage time for meat Storage time for soil Storage time for meat Storage time for crustacea and moliusks Storage time for well water Storage time for surface	g/cm³ g/cm³ g/g - m 1/s 1/s c hated Foodstuff d d d d d	2.00E-05 3.00E-02 2.00E-02 0.98 0.3 7.00E-07 1.00E-10 0.8 0.2 14 1 1 20 7	P P P P B B B B B B B B B B B B B B B B	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	NA NA NA NA NA NA NA NA NA NA NA NA NA N	Not used Not used			2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2		Applicable for C-14 exposure only Applicable for C-15 exposure only Applicable for C-16 exposure only Applic

							Distribution	Distribution	Distribution	Distribution	<u> </u>
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Basis
Thickness of building foundation	m	0.15	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Bulk density building foundation	g/m³	2.4	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure
Total porosity of cover material		0.4	P	3	NA.	Not used	NR	NA	NR	NR	Applicable for Radon exposure
Total porosity of building			Р				NR				Applicable for Radon exposure
foundation	-	0.1	-	3	NA	Not used	INIT	NR	NR	NR	only
Volumetric water content of cover material		0.05	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Volumetric water content of building foundation		0.03	P	3	NA NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon diffusion coefficient in cover material	m/s	2.00E-06	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon diffusion coefficient in foundation material	m/s	3.00E-07	P	3	NA .	Not used	NR	NR	NR	NA	Applicable for Radon exposure only
Radon diffusion coefficient											Applicable for Radon exposure
in contaminated zone soil Radon vertical dimension	m/s	2.00E-06	Р	3	NA	Not used	NR	NR	NA	NR	only Applicable for Radon exposure
of mixing	m	2	Р	3	NA	Not used	NR	NR	NR	NR	only Applicable for Radon exposure
Average building air exchange rate	1/hr	0.5	P, B	3	NA	Not used	NR NR	NR	NR	NR	only
Building (room) height	m	2.5	Р	3	NA.	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Building interior area factor		00	Р	3	NA_	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Building depth below ground surface	m	-1	Р	3_	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon-222 emanation coefficient		0.25	Р	3	NA	Not used	NR	NR	NA	NR	Applicable for Radon exposure only
Radon-220 emanation coefficient		0.15	P	3_	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Risk Conversion Factors	(risk/yr)/	Nuclide	25.000		\$13\$\$4\$\$b#*		3 - XXXX			90/3/2011/10	
Slope factor – external	(pCi/g)	specific Nuclide	М	3	NA	Not used	NA	NA	NR	NFI .	RESRAD Default
Slope factor – inhafation	risk/pCi	specific Nuclide	М	3	NA	Not used	NR	NR	NR	NFI	RESRAD Default
Slope factor – ingestion Inhalation dose conversion	risk/pCi factors	specific	M	3_	NA Mariana	Not used	NA ***	NR	NA	NR	RESRAD Default
Ac-227	mrem/pCi	6.7	M	3	٥	6.7	NR	NR	NR	NA	FGR-11, RESRAD Library
Pa-231	mrem/pCi	1.28	M	3	D	1.28	NR	NR	NR	NR	FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.0136	M	3	0	0.0136	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00858	М	3	D	0.00858	NA	NA	NA		FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00477	M	3	D	0.00477	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-228	mrem/pCi	0.342	M	3	D	0.342	NR	NR	NR	RA	FGR-11, RESRAD Library
Th-230	mrem/pCi	0.326	М	3	D	0.326	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-232	mrem/pCi	1.64	M	3	D	1.64	NR	NR	NR	NR NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.132	М	3	D	0.132	NR	NFI	NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.123	М	3	D	0.123	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.125	M	3	D	0.125	NR	NR	NR	NA	FGR-11, RESRAD Library
U-238	mrem/pCi	0.118	М	3	D	0.118	NA	NR	NR	NR	FGR-11, RESRAD Library
Ingestion Dose Donversion		2014400	994 P.Y.	\$34X.25	Sales Charles	Marie Sanger W. Co.	\$50 magagaga	\$68.03.13.47.40	ENTERNATION	(4X %)	
Ac-227	mrem/pCi	0.0141	М	3	D	0.0141	NR	NA	NR	NR	FGR-11, RESRAD Library
Pa-231	mrem/pCi	0.0106	M	3	D	0.0106	NR_	NR	NR	NR	FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.00537	М	3	D	0.00537	NA	NR NR	NR	NR NR	FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00132	М	3	D	0.00132	NR	NR	NR		FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00144	M	3	D	0.00144	NR	NFI .	NR		FGR-11, RESRAD Library
Th-228	mrem/pCi	0.000396	М	3	D	0.000396	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-230	mrem/pCi	0.000548	M	3	D	0.000548	NR	NR	NR		FGR-11, RESRAD Library
Th-232	mrem/pCi	0.00273	М	3	D	0.00273	NR	NR	NA	NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.000283	M	3	D	0.000283	NR	NA	NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.000266	М	3	D	0.000266	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.000269	М	3	D	0.000269	NR	NR	NR		FGR-11, RESRAD Library
U-238	mrem/pCi	0.000255	M	3	D	0.000255	NR	NR	NR		FGR-11, RESRAD Library
Plant Transfer Factors [pC	/g plant (wet))/	pCi/g soit (dry)] 🚁 🗀	\$\$\$\sigma_\circ\circ\circ\circ\circ\circ\circ\cir	2004425,563	76789 98 541.4	\$250 79580 K		\$\$ 450 pt (1986)	States (1995)	
Ac-227	<u>.</u>	0.0025	ρ	1	NA_	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario Pathway suppressed for industrial
Pa-231		0.01	Р	_1	NA	Not used	NR_	NR	NR	NR	worker scenario Pathway suppressed for industrial
Pb-210	-	0.01	Р	1	NA	Not used	NR	NA	RN.	NR	worker scenario Pathway suppressed for industrial
Ra-226		0.04	Ρ_	11	NA	Not used	NR	NR	NR		worker scenario

	,								r · · · · · ·	г	
		RESRAD					Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Value	1	2	3	4	Basis Pathway suppressed for industrial
Ra-228	<u>-</u>	0.04	Р	1	NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
Th-228	<u> </u>	0.001	Р	1	NA NA	Not used	NR	NR	NR	NR	worker scenario
Th-230	<u> </u>	0.001	Р	1	NA	Not used	NR	NR	_NR	NR	Pathway suppressed for industrial worker scenario
Th-232		0.001	Р	1	NA.	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
U-234		0.0025	Р	1	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-235		0.0025	Р	1	NA NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
	<u> </u>	0.0025	P	,	NA NA	Not used	NR.	NR	NR.	NR	Pathway suppressed for industrial
U-236	 -										worker scenario Pathway suppressed for industrial
U-238 Meat Transfer Factor		0.0025	P	1 382943	NA	Not used	NR	NR	NR	NR NR	worker scenario
Ac-227	(pCi/kg)/ (pCi/d)	0.00002	Р	2	NA	Not used	NR	NA	, NR	NR	Pathway suppressed for industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/d)	0.005	P	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/d)	0.0008	Р	2	NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/ (pCi/d)	0.001	Р	2	NA.	Not used	NR.	NA NA	NR NR	NA	Pathway suppressed for industrial worker scenario
Ra-226	(pCi/kg)/		<u> </u>								Pathway suppressed for industrial
Ra-228	(pCi/d) (pCi/kg)/	0.001	Р	22	NA_	Not used	NR	NR	NFI	NR	worker scenario Pathway suppressed for industrial
Th-228	(pCi/d) (pCi/kg)/	0.0001	P	2	NA	Not used	NR	NR	NA	NR	worker scenario Pathway suppressed for industrial
Th-230	(pCi/kg)/	0.0001	Р .	2	NA	Not used	NR	NR	NB	NR_	worker scenario Pathway suppressed for industrial
Th-232	(pCi/d) (pCi/kg)/	0.0001	P	2	NA	Not used	NR	NB NB	NR NR	NR	worker scenario Pathway suppressed for industrial
U-234	(pCi/d) (pCi/kg)/	0.00034	Р	2	NA	Not used	NR _	NR	NR	NR	worker scenario Pathway suppressed for industrial
U-235	(pCi/d)	0.00034	Р	2	NA	Not used	NR	NR.	NR	NR	worker scenario
U-236	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA NA	Not used	NR_	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-238	(pCi/kg)/ (pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Milk Transfer Factor	(pCi/L)/	ator sough said	S945412	369/03/60			MY (XassiX) (25.25.33.25.33	35 T \$ 6 T \$ 6 T	Pathway suppressed for industrial
Ac-227	(pCi/d) (pCi/L)/	0.00002	P	2	NA.	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
Pa-231	(pCi/d) (pCi/L)/	0.000005	Р	2	NA	Not used	NR	NR	NA	NR	worker scenario
Pb-210	(pCi/d)	0.0003	Р	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-226	(pCl/L)/ (pCi/d)	0.001	Р	_2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/L)/ (pCi/d)	0.001	Р	2	NA	Not used	NR	NFI	NA	NR	Pathway suppressed for industrial worker scenario
Th-228	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	_ NR	NA	Pathway suppressed for industrial worker scenario
Th-230	(pCi/L)/ (pCi/d)	0.000005	Р	2	NΑ	Not used	NFI	NR	NR	NFI	Pathway suppressed for industrial worker scenario
Th-232	(pCi/L)/ (pCi/d)	0.000005	Р	2	NA	Not used	NR	NA	NA	NR	Pathway suppressed for industrial worker scenario
U-234	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA	Not used	NA	NR	NR		Pathway suppressed for industrial worker scenario
	(pCi/L)/		Р								Pathway suppressed for industrial
U-235	(pCi/d) (pCi/L)/	0.0006		2	NA	Not used	NR	NA	NR	NR	worker scenario Pathway suppressed for industrial
U-236	(pCi/d) (pCi/L)/	0.0006	Р	2	NA	Not used	NR_	NR	NA	NR	worker scenario Pathway suppressed for industrial
U-238 Bloaccumulation factor for	(pCi/d)	0.0006	P Section	2	NA_	Not used	NR	NR Addition	NR	NR	worker scenario
Ac-227	(pCi/kg)/ (pCi/L)	15	ρ	2	NA	Not used	NR	PIN	NR	NA	Pathway suppressed for industrial worker scenario
	(pCi/kg)/		P	2			NR	NR			Pathway suppressed for industrial
Pa-231	(pCi/kg)/	10			NA NA	Not used			NA NB		worker scenario Pathway suppressed for industrial
Pb-210	(pCi/L) (pCi/kg)/	300	Р	2	NA .	Not used	NR	NR	NR		worker scenario Pathway suppressed for industrial
Ra-226	(pCi/L) (pCi/kg)/	50	P	2	NA NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
Ra-228	(pCi/L) (pCi/kg)/	50	Р	2	NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
Th-228	(pCVL)	100	Р	2	NA NA	Not used	NR	NR_	NR NR	NR	worker scenario

Parameter	Units	RESRAD Default	Type¹	Priority ²	Treatment ³	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Th-230	(pCi/kg)/ (pCi/L)	100	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-232	(pCi/kg)/ (pCi/L)	100	P	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-234	(pCi/kg)/ (pCi/L)	10	Р	2_	NA .	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
U-235	(pCi/kg)/ (pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-236	(pCi/kg)/ (pCi/L)	10	Р	2	NA .	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-238	(pCi/kg)/ (pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Bloaccumulation factor to		moliuska	688	XXXX200		2817.30 821 °	17 4 M 18 19 19 19	percentage and a	Comment of the Control	F43000000000000000000000000000000000000	86 20 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0
Ac-227	(pCi/kg)/ (pCi/L)	1000	Р	3	NĄ	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/L)	110	P.	_3	NA	Not used	NR	NR	NR	NFI	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/L)	_100	Р	3	NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/L)	250	Р	_3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/L)	250	Р	3	NA	Not used	NR	NR	<u>N</u> A	NR	Pathway suppressed for industrial worker scenario
Th-228	(pCi/kg)/ (pCi/L)	500	Р	3	NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
Th-230	(pCi/kg)/ (pCi/L)	500	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-232	(pCi/kg)/ (pCi/L)	500	Р	3	NA	Not used	NA	NR	NR	NA	Pathway suppressed for industrial worker scenario
U-234	(pCi/kg)/ (pCi/L)	_60	P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario Pathway suppressed for industrial
U-2 35	(pCi/kg)/ (pCi/L) (pCi/kg)/	60	P	3	NA	Not used	NR	_NR	NR	NR	worker scenario Pathway suppressed for industrial
U-236	(pCi/kg)/ (pCi/kg)/	60	Р	_3	NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
U-238	(pCi/L)	60	P	3	NA	Not used	NR	NR_	NR	NA	worker scenario
Graphics Parameters	**************************************			138883333	(en:55/86531	REPORT AND THE PROPERTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE P	Jane 11 1000 1000 1000 1		2 612 7-40 Y 3026 18 1	pro pro transporter de de de la constanta de l	Value greater than default
Number of points	1 .	32	NA NA	NA I	NA .	1024	NR	NR	NR	NR	provides more evaluation points
Spacing	 	Log	NA -	NA NA	NA NA	Log	NR	NR	NR	NR	RESRAD Default
Time Integration Paramet	ers	Confession Sc	200000	k xilanbidate	10000000000000000000000000000000000000	100000000000000000000000000000000000000	44.866.20	150 Ball (140)	and selections	*::00000000000000000000000000000000000	8. 0 5. 0 80. 0 70 8 80. 0 80. T.
Maximum number of	T		1					[
points for dose] -	17	NA	NA	NA .	17	NA NA	NR .	NR	NA	RESRAD Default

¹P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A, Table 2.1)

²1 = high priority, 2 = medium priority, 3 = low priority (NUREG/CR-6697, Att. B, Table 4.2)

³D = deterministic, S = stochastic

Table M-2
Honeywell Metropolis Works
Pond D Dose Assessment
Industrial Worker Scenario
Source Configuration Summary

		5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
	Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
	Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area	CZ Area ⁽³⁾	Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m²)	(m ²)	(m)	(m)	(m)	(m)
В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b – Ponds B, C, D, and E" provided in Appendix A

⁽²⁾ Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond

Table M-3
Honeywell Metropolis Works
Pond D Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

	Radion	uclide Concentration	ı (pCi/g)
		Corrected for 5%	Corrected for %
Radionuclide	Average Dry	Bulking Factor	Solids
Protactinium 231	0.52	0.49	0.25
Radium 226	0.95	0.90	0.46
Thorium 228	0.58	0.55	0.28
Thorium 230	2.35	2.23	1.14
Thorium 232	0.15	0.14	0.07
Uranium 234	993.50	943.82	480.78
Uranium 235	17.94	17.04	8.68
Uranium 236	26.60	25.27	12.87
Uranium 238	1041.12	989.06	503.83

% Solids:

50.94%

Table M-4 Honeywell Metropolis Works Pond D Dose Assessment Industrial Worker Scenario Hydraulic Conductivity of Silty Clay

Pressure (psf)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table M-5
Honeywell Metropolis Works
Pond D Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

			Average
		Bulk Density	Bulk Density
Pond	Sample ID	(g/ml)	(g/ml)
В	B-18 Lower	1.6	-
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В	-	-	1.575
С	C-2	1.6	-
C	C-5	1.7	-
C	C-19 Lower	1.6	-
C	C-19 Upper	1.5	-
C	-	•	1.6
D	D-8 Lower	1.5	-
D	D-8 Upper	1.6	_
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	-
D	D-17 Lower	1.5	-
D	D-17 Upper	1.6	
D	D-26 Lower	1.8	
D	D-26 Upper	1.9	•
D	-	-	1.6
E E	E-65 Lower	1.3	•
E	E-65 Upper	1.5	-
E	E-80 Lower	1.5	-
E	E-80 Upper	1.5	-
E E	E-97 Lower	1.2	-
	E-97 Upper	1.1	-
E E	E-103 Lower	1.7	-
E	E-103 Upper	1.7	•
ш	-	-	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX N

Pond E Deterministic Dose Assessment Input Summary

							Olatela de la	Distrib. No.	Cintally dian	Distribution	
		RESRAD					Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Value	1	2	3	4	Basis
Contaminated Zone			1.00g N	1852/305		\$45700 J. Yest.	ja engligasi	HREARCH CO.	American i	80 Ser 5 200 F	
Area of contaminated	2		_						_	_	
zone	m²	10000	Р	2	D	12,000	NR	NR	NR	NR	See Table N-2.
Thickness of contaminated zone	· m	2	Р	2	D	3.453	NR	NR.	NR	NR	See Table N-2.
CONTAININATED ZONE	:	<u>_</u>	 			0.400	141	1111	1411		Length of longest side of
Length parallel to the											contaminated zone. See Table N-
aquifer flow	m	100	Р	2	D	165	NR	NR	NA	NR	2.
Basic Radiation Dose			_	_	_ '						Unrestricted release criteria in 10
Limit Time since placement	mrem/year	30 0	P	3	D D	25 0	NR NR	NR NR	NR NR	NR NR	CFR 20.1402 RESRAD default
Time since placement Times for calculations	yr yr	1	P	3	D	1	NR NR	NR NR	NR NR	NR NR	RESRAD default
Times for calculations	yr	3	P	3	D	3	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	10	Р	3	D	10	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	30	Р	3	D	30	NR	NR	NR	NR	RESRAD default
Times for calculations	yr	100	Р	3	O	100	NA	NR	NR	NR	RESRAD default
Times for calculations	yr	300	P	3	D	300	NR	NR	NR	NR	RESRAD default
Times for calculations Initial Principle Radionuclic	yr to Congnitati	1000	P	3	D	1000	NA	NR	NR	NR	RESRAD default
Soil: Ac-227	pCi/g	0	P	2	D	0	NR	NR	NR	NR	See Table N-3
Soil: A6-227	ρCi/g	Ö	P	2	D	0.07	NR	NR	NR	NR	See Table N-3
Soil: Pb-210	pCi/g	0	Р	2	D	0	NR	NR	NR	NR	See Table N-3
Soil: Ra-226	pCi/g	0	Р	2	D	0.34	NR	NR	NR	NA	See Table N-3
Soil: Ra-228	pCi/g	0	Р	2	D	0	NR	NR	NR	NA	See Table N-3
Soil: Th-228	pCi/g	0	P	2	D	0.03	NR	NR	NR	NR	See Table N-3
Soil: Th-230 Soil: Th-232	pCi/g pCi/g	0	P	2	D D	0.83	NR NR	NR NR	NR NR	NR NR	See Table N-3 See Table N-3
Soil: U-234	pCi/g	0	P	2	D	118.57	NR NR	NR.	NR NR	NR	See Table N-3
Soil: U-235	pCi/g	ŏ	P	2	D	5.11	NR	NR.	NR	NR	See Table N-3
Soil: U-236	pCi/g	0	Р	2	D	2.91	NR	NR	NR	NR	See Table N-3
Soil: U-238	pCi/g	0	Р	2	D	122.69	NA	NR	NR	NR	See Table N-3
l		_	_	_				1			Not used for calculation of
Groundwater: Ac-227	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Groundwater: Pa-231	pCi/L	0	.Р	.3	NA	Not used	NR	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater. 1 a-201	POIL	<u>-</u>				1400 0300	(41)	1911	1411	UNIT	Not used for calculation of
Groundwater: Pb-210	pCi/L	0	Р	3	NA ·	Not used	NR	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Ra-226	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
C	pCi/L	o	Р	ا ا	A1 A	Natural	NO		No	ND	Not used for calculation of
Groundwater: Ra-228	pCVL	<u>'</u>	<u> </u>	3	NA	Not used	NR.	NA	NR	NR	distribution coefficients Not used for calculation of
Groundwater: Th-228	pCi/L	0	P	3	NA	Not used	NA	NA	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: Th-230	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
			_								Not used for calculation of
Groundwater: Th-232	pCi/L	0	Р	3	NA_	Not used	NR	NR	NR	NR	distribution coefficients
Groundwater: U-234	pCi/L	٥	Р	3	NA	Not used	NR	NR	NR	NR	Not used for calculation of distribution coefficients
Groundwater. 0-234	port	-			IVA	Not used	INFI	INITS	INU	NIT	Not used for calculation of
Groundwater: U-235	pCi/L	0	Р	3	NA	Not used	NA	NR	NR	NR	distribution coefficients
											Not used for calculation of
Groundwater: U-236	pCi/L	0	Р	3	NA	Not used	NR	NR .	NR	NR	distribution coefficients
	0.4										Not used for calculation of
Groundwater: U-238 Cover and Contaminated 2	pCi/L	0	Р	3	NA	Not used	NR	NR	NR	NR	distribution coefficients
Cover depth	m	0	P	2	D	1.594	NR	NR	NR	NR	See Table N-2
		Ť	<u> </u>				. , 11	. 4/1	7 11 1		25% cumulative density function
Density of cover material	g/cm ³	1.5	Р	1	s	1.571	NR	NR	NR	NR	value. See Appendix J
											50% cumulative density function
Cover erosion rate	m/yr	0.001	P,B	2	s	1.05E-04	NR	NR	NR	NR	value. See Appendix J
Density of contaminated	_/3	١.,	ا ہا	,	_	1 4075					Can Table N. S
zone Contaminated zone	g/cm ³	1.5	Р	1	D	1.4375	NR	NR	NR	NR	See Table N-5 50% cumulative density function
erosion rate	m/yr	0.001	Р,В	2	s	3.49E-05	NR	NR :	NR	NR	value. See Appendix J
Contaminated zone total	,,,,	5.551	· · · ·			5. ISE 95	7 71 1	1411	,,(1	1 41 1	50% cumulative density function
porosity		0.4	Р	2	s	0.41	NR	NR	NR	NR	value. See Appendix J
Contaminated zone field											
capacity		0.2	Р	3	D	0.2	NR	NR	NR	NR	RESRAD default
		ł	l								Average Kh from dilatometer
1								1			(DMT) pressure dissipation tests
Contaminated zone											performed on in-situ Pond E
Contaminated zone hydraulic conductivity	m/yr	10 .	Р	2	D	1.6	NR	NR	. NR	NR	
	m/yr	10 . 5.3	P	2	D S	1.6	NR NR	NR NR	NR NR		performed on in-situ Pond E studge by In-Situ Testing LC,

							I 5: . :: . :		5		,
i		RESRAD	ì				Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Туре'	Priority ²	Treatment ³	Value	1	2	3	4	Basis
			77.							<u> </u>	This parameter only used if
Humidity in air	g/m³	8	Р	3	NA	Not used	NR	NR	NR	NR	Tritium is present in soil
Evapotranspiration											50% cumulative density function
coefficient	· · · · · ·	0.5	Р	2	S	0.62	NR	NR	NR	NR	value. See Appendix J
											Average annual wind speed for Paducah, KY (NOAA),7.4 mph
Average annual wind		,	,	ļ .						ļ	http://lwf.ncdc.noaa.gov/oa/climat
speed	m/s	2	Р	2	D	3.3	NR	NA	NR	NR	e/online/ccd/avgwind.html
Precipitation rate	m/yr	1	P	2	D	1.25	NR	NR	NR	NR	NUREG/CR-6697 Att. C, Table 4.1-1, Paducah, KY
Irrigation rate	m/yr	0.2	В	3	D	0	NR	NR	NR	NR	Not applicable for industrial scenario
Irrigation mode	-	Overhead	В	3	D	Overhead	NR	NR	NA	NR	RESRAD default. Method is used in Illinois
Runoff coefficient	_	0.2	Р	2	D	0.4	NR	NR	NA NA	NR	NUREG/CR-6697 Att. C, Table 4.2-1 method. Assume $c_1 = 0.3$, $c_2 = 0.2$, and $c_3 = 0.1$
Watershed area for										(**)	Pond area watershed. See
nearby stream or pond	m ²	1.00E+06	Р	3	D	2.78E+05	NR	NR NR	NR	NR	Appendix A.
Accuracy for water soil											
computation Saturated Zone Hydrologic	al Data	1.00E-03	NA	3	D	1.00E-03	NR	NR	NR	NR NR	RESRAD default
Saturated 2016 i lydiologic	an Date.	SECTION STORY CONTRACTOR SECTION		837 LEUWE TO	CONTRACTOR OF STREET	CO VEGLANSIVES TO PART 2.1.	17.00 de 200 4.00 de 200 40 per e	110 4 8 70 YEAR OLD IN	Aller Break Laberty	1 CHARLES NO. 15	50% cumulative density function
Density of saturated zone	g/cm ³	1.5	Р	1	s	1.51	NR	NR	NR	NR	value. See Appendix J
Saturated zone total porosity		0.4	P	1	s	0.43	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Saturated zone effective		<u> </u>				9.10		- · · · · · · · · · · · · · · · · · · ·			50% cumulative density function
porosity		0.2	Р	1	s	0.38	NR	NR	NR NR	NR	value. See Appendix J
Saturated zone field capacity		0.2	Р	3	D	0.2	NR.	NR -	· NA	NR	RESRAD default
Saturated zone hydraulic		- U.L	<u> </u>	Ů		0.2		- 101		101	50% cumulative density function
conductivity	m/yr	100	Ρ	1	S	2500.0	NR	NR	NR	NR	value. See Appendix J
<u> </u>											Andrews Engr. Geologic Cross
Saturated zone hydraulic						,					Section Sheet A-A' (El. 319.24 – El. 298.54)/ 4320 ft. See
gradient	-	0.02	Р	2	D	0.0048	NR	NR	NA	NR	Appendix A.
Saturated zone soil-											50% cumulative density function
specific b parameter Water table drop rate	m/yr	5.3 1.00E-03	P	3	S D	0.97 1.00E-03	NR NR	NR NR	NR NR	NR NR	value. See Appendix J RESRAD default
Trater table drop late	110)1	1.002.00				1.002-05	- '''	1911	1913	1913	Honeywell Sanitary Well Depth
Well-pump intake depth							_				from HSA - depth to saturated
(below water table)	m	10	Р	2	D	105	NA	NR	NR	NR	zone.
											ND Model is used for larger contaminated areas (e.g. more
Model: non-dispersion or											than 1,000 m²) per RESRAD
mass balance		ND	Ρ	3	D	ND	NR	NR	NR	NR	Users Manual Section E.3.1.
Well pumping rate	m³/yr	250	В, Р	2	D	Not used	NR_	NR	NR_	NR	This parameter is not used in the non-dispersion model
Unsaturated Zone Hydroic	gicai Data	W41216/92807 P47642	28/29/2013		\$\$ 65 A A A A A A A A A A A A A A A A A A		14719/WASS-91	PERKET IN	44.180-96.9E.51.0	300.000	Andrews Engineering Project ID
Number of unsaturated zones	_	1	Р	3	D	5	NR	NA .	N#3	NA .	91-135 cross section Sheet Number A-A', January 2007. See Appendix A.
											Andrews Engineering Project ID
Unsaturated zone 1 thickness (Clayey											91-135 cross section Sheet Number A-A', January 2007. See
Silt/Silty Clay)	m	4	Р	1	D	6.86	NR	NR	NR		Appendix A.
Unsaturated zone 1 soil	-1- 3			_		4.005	No	No.			50% cumulative density function
density Unsaturated zone 1 total	g/cm ³	1.5	Р	2	s	1.695	NR	NR	NR		value. See Appendix J 50% cumulative density function
porosity	-	0.4	Р	2	s	0.360	NR	NA	NR	NR	value. See Appendix J
Unsaturated zone 1											50% cumulative density function
effective porosity	· · ·	0.2	Р	2	S	0.289	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 1 field capacity		0.2	Р	3	D	0.2	NR	NA	NR	NR	RESRAD default
Unsaturated zone 1											
hydraulic conductivity	m/yr	10	Р	2	D	126	NR	NR	NR_	NR	See Table N-4
Unsaturated zone 1 soil- specific b parameter	<u>.</u>	5.3	Р	2	s	9.87	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 2 thickness (Sandy Silt/Silty Sand)	E	4	Р	1	D	1.71	NR	NR	яи		Andrews Engineering Project ID 91-135 cross section Sheet Number A-A', January 2007. See Appendix A
Jailu)						1.71	IAU	INA	INT	ind	Appendix A.

Γ	<u> </u>	Τ					Distribution	Distribution	Distribution	Distribution	I
Barameter	Linite	RESRAD	Tuno!	Oriority ²	Transmant ³	Volue	Parameter 1	Parameter	Parameter	Parameter	Rasin
Parameter Unsaturated zone 2 soil	Units	Default	Type'	Priority ²	Treatment ³	Value		2	3	4	Basis 50% cumulative density function
density	g/cm ³	1.5	Р	2	s	1.563	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 2 total			_	_							50% cumulative density function
porosity Unsaturated zone 2		0.4	Р	2	S	0.409	NA	NR	NR	NA	value. See Appendix J 50% cumulative density function
effective porosity	-	0.2	Р	2	s	0.35	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 2 field				_							
Capacity Unsaturated zone 2	 	0.2	P	3	D	0.2	NR	NR	NR	NR	RESRAD default 50% cumulative density function
hydraulic conductivity	m/yr	10	Р	2	s	1024.76	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 2 soil- specific b parameter		5.3	P	2	s	1.35	NA	NR	NR	NA	50% cumulative density function value. See Appendix J
								<u> </u>			Andrews Engineering Project ID
		ľ	i				!	ì			91-135 cross section Sheet
Unsaturated zone 3 thickness (Sand)	m	4	Р	1	D	1.71	NR	NR	NR	NR	Number A-A', January 2007. See Appendix A.
Unsaturated zone 3 soil											50% cumulative density function
density	g/cm ³	1.5	Р	2	S	1.510	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 3 total porosity		0.4	Р	2	s	0.43	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 3											50% cumulative density function
effective porosity Unsaturated zone 3 field	<u> </u>	0.2	Р	2	S	0.383	NR	NR	NR	NR	value. See Appendix J
capacity		0.2	Р	3	D	0.2	NR	NA	NR	NR	RESRAD default
Unsaturated zone 3			_								50% cumulative density function
hydraulic conductivity	m/yr	10	Р	2	s	2495.4	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 3 soil-											50% cumulative density function
specific b parameter	· ·	5.3	Р	2	S	0.97	NR	NR_	NR	NR	value. See Appendix J
Unsaturated zone 4								i '			Andrews Engineering Project ID 91-135 cross section Sheet
thickness (Sandy Silt/Silty											Number A-A', January 2007. See
Sand) Unsaturated zone 4 soil	m	4	Р	1	D	4	NR	NR	NR	NR	Appendix A. 50% cumulative density function
density	g/cm ³	1.5	Р	2	s	1.562	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 4 total											50% cumulative density function
porosity Unsaturated zone 4		0.4	Р	2	S_	_0.389	NR .	NR	NR	NR	value. See Appendix J 50% cumulative density function
effective porosity		0.2	Р	2	s	0.318	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 4 field capacity		0.2	Р	3	D	0.2	NR	NR	NA	NR	RESRAD default
Unsaturated zone 4	 -	0.2	<u> </u>	-		0.2	- 100	INIT	INIT	NO.	50% cumulative density function
hydraulic conductivity	m/yr	10	Р	2	s	1021.1	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 4 soil-]	ļ	j				ļ				50% cumulative density function
specific b parameter		5.3	Р	2	S	1.35	NR	NR	NR	NR	value. See Appendix J
										-	Andrews Engineering Project ID 91-135 cross section Sheet
Unsaturated zone 5	1		i i					 			Number A-A', January 2007. See
thickness (Sand)	m	4	Р	1	D	1.14	NR	NA	NR	NR	Appendix A.
Unsaturated zone 5 soil density	g/cm ³	1.5	Р	2	s	1.510	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
Unsaturated zone 5 total	•										50% cumulative density function
porosity Unsaturated zone 5	· · · · ·	0.4	Р	2	S	0.43	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
effective porosity	.	0.2	Р	2	s	0.383	NR	NR	NA	NR	value. See Appendix J
Unsaturated zone 5 field											
Capacity Unsaturated zone 5	· ·	0.2	Р	3	D	0.2	NB	NR _	NR.	NR	RESRAD default 50% cumulative density function
hydraulic conductivity	m/yr_	10	Р	2	s	2493.6	NR	NR	NR	NR	value. See Appendix J
Unsaturated zone 5 soil- specific b parameter		5.3	Р	2	s	0.97	NA.	NR	NR	NR	50% cumulative density function value, See Appendix J
Distribution Coefficients (c	ontaminated, (nd satura			Constant Constant	ROSNW ₂ i	THE SERVE	\$4.748200P	STEPPERSON	90000000000000000000000000000000000000
Ac-227 (CZ)	cm³/g	20	Р	1	s	824.5	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
1AC-227 (OZ)	CIII 7g	20	- ' - 			624.5	, NA	1313	. INFI	INIT	50% cumulative density function
Ac-227 (UZ1)	cm ³ /g	20	Р	11	<u>s</u>	818.4	NR	NR	NR	NR	value. See Appendix J
Ac-227 (UZ2)	cm ³ /g	20	Р	1	s	828.4	NA	NR	NR	NA	50% cumulative density function value. See Appendix J
										_	50% cumulative density function
Ac-227 (UZ3)	cm³/g	20	Р	1	S	825.1	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Ac-227 (UZ4)	cm³/g	20	Р	1	s_	809.7	NR	NR	NR	NR	value. See Appendix J
											50% cumulative density function
Ac-227 (UZ5)	cm³/g	20	Р		<u>s</u>	814.7	NR	NR	NR	NR	value. See Appendix J

Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
							-				50% cumulative density function
Ac-227 (SZ)	cm ³ /g	20	Р	1-	S	810.4	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Pa-231 (CZ)	cm ³ /g	50	Р	1	s	374.3	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Pa-231 (UZ1)	cm³/g	50	Р	1_1_	s	370.7	NR	NR	NR	NA	value. See Appendix J
Pa-231 (∪Z2)	cm³/g	50	Р	1	s	375.1	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ3)	cm ³ /g	50	P	,	s	375.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ4)	cm³/g	50	Р	1	s	378.2	NR	NA	NR	NR	50% cumulative density function value. See Appendix J
Pa-231 (UZ5)	cm³/g	50	Р	1	s	375.6	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
											50% cumulative density function
Pa-231 (SZ)	cm³/g	50	Р	1	S	378.4	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Pb-210 (CZ)	cm³/g	100	Р	1	s	2373.8	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Pb-210 (UZ1)	cm³/g	100	Р	1	s	2347.3	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Pb-210 (UZ2)	cm³/g	100	Р	1	s	2361.6	NR	NR	NR	NR	value. See Appendix J
Pb-210 (UZ3)	cm ³ /g	100	Р	1	s	2356.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (UZ4)	cm³/g	100_	Р	1	s	2352.1	NR	NR	NR	NA	50% cumulative density function value. See Appendix J
Pb-210 (UZ5)	cm³/g	100	Р	1	s	2379.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Pb-210 (SZ)	cm³/g	100	Р	1	s	2360.3	NA	NR	NR .	NR	50% cumulative density function value. See Appendix J
											50% cumulative density function
Ra-226 (CZ)	cm³/g	70	Р	1	S	3501.2	NR	NA	NR	NR	value. See Appendix J 50% cumulative density function
Ra-226 (UZ1)	cm³/g	70	Р	_1	S	3506.5	NA	NR	NR	NA	value. See Appendix J 50% cumulative density function
Ra-226 (UZ2)	cm ³ /g	70	Р	_11	s	3505.6	NR	NA	NR	NR	value. See Appendix J 50% cumulative density function
Ra-226 (UZ3)	cm³/g	70	Р	1	s	3522.8	NA	NR	NR	NR	value. See Appendix J
Ra-226 (UZ4)	cm³/g	70	Р	1	s	3484.6	NR	NR	NA NA	NR	50% cumulative density function value. See Appendix J
Ha-226 (UZ5)	cm³/g	70	ρ	_1	_ s	3495.8	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-226 (SZ)	cm³/g	70	D.	1	s	3529.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Ra-228 (CZ)	cm³/g	70	Р	1	s	3489.5	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
	cm³/g	70	P	1	s			NR			50% cumulative density function
Ra-228 (UZ1)						3507.0	NR		NR NR		value. See Appendix J 50% cumulative density function
Ra-228 (UZ2)	cm³/g	70	Ρ	1	S	3521.8	NR	NR	NR		value. See Appendix J 50% cumulative density function
Ra-228 (UZ3)	cm ³ /g	70	Р		s	3513.0	NA	NR	NR NR		value. See Appendix J 50% cumulative density function
Ra-228 (UZ4)	cm³/g	70	ρ	_1_	s	3504.5	NR .	NR	NR	NR	value. See Appendix J 50% cumulative density function
Ra-228 (UZ5)	cm³/g	70	Р	_1_	s	3483.8	NR	NR	NR	NR	value. See Appendix J
Ra-228 (SZ)	cm³/g	70	P	1	s	3521.4	NR	NR	NR		50% cumulative density function value. See Appendix J
Th-228 (CZ)	cm³/g	60000	Р	1	s	5883.2	NR	NA	NFI		50% cumulative density function value. See Appendix J
Th-228 (UZ1)	cm³/g	60000	Р	1	s	5736.1	N R	NR	NR		50% cumulative density function value. See Appendix J
			Р								50% cumulative density function
Th-228 (UZ2)	cm³/g	60000		1	S	5825.4	NR	NA	NR		value. See Appendix J 50% cumulative density function
Th-228 (UZ3)	cm ³ /g	60000	Р	1	s	5786.3	NR	NR	NR		value. See Appendix J 50% cumulative density function
Th-228 (UZ4)	cm³/g	60000	P	1	s	5774.7	NR	NR	NR		value. See Appendix J 50% cumulative density function
Th-228 (UZ5)	cm³/g	60000	P	1	s	5784.1	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Th-228 (SZ)	cm³/g	60000	Р	1	s	5828.0	NR	NR	NR	NR	value. See Appendix J
Th-230 (CZ)	cm³/g	60000	Р	1	s	5770.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-230 (UZ1)	cm³/g	60000	P	1	_ s _	5842.5	NR	NA	NR		50% cumulative density function value. See Appendix J

Parameter	Units	RESRAD Default	Type'	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
											50% cumulative density function
Th-230 (UZ2)	cm ³ /g	60000	Р	1	S	5842.8	NR	NR	NR	NA	value. See Appendix J 50% cumulative density function
Th-230 (UZ3)	cm ³ /g	60000	P	1	S	5882.2	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
Th-230 (UZ4)	cm³/g	60000	Р	1	S	5778.8	NR	NR	NR	NA NA	value. See Appendix J 50% cumulative density function
Th-230 (UZ5)	cm³/g	60000	Р	1	s	5859.6	NR	NA	NR	NR	value. See Appendix J 50% cumulative density function
Th-230 (SZ)	cm³/g	60000	Р	1	s	5849.2	NR	NR	NR	NR	value. See Appendix J
Th-232 (CZ)	cm ³ /g	60000	Р	1	S	5770.9	NR	NR	NR	NR	value. See Appendix J
Th-232 (UZ1)	cm³/g	60000	Р	11	s	5808.9	NA	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ2)	cm³/g	60000	Р	1	S	5744.2	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ3)	cm³/g	60000	Р	1	s	5769.1	NR	NR	NR	NR_	50% cumulative density function value. See Appendix J
Th-232 (UZ4)	cm ³ /g	60000	Р	1	s	5778.8	NR	NR.	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (UZ5)	cm³/g	60000	Р	1	s	5822.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Th-232 (SZ)	cm³/g	60000	Р	1	s	5864.1	NR	NA	NA	NA	50% cumulative density function value, See Appendix J
U-234 (CZ)	cm³/g	50	Р	. 1	NA NA	123.5	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
	cm ³ /g		P	1			NR NR		NR		50% cumulative density function
U-234 (UZ1)		50			NA	126.1		NR		NR	value. See Appendix J 50% cumulative density function
U-234 (UZ2)	cm³/g	50	Р	1	NA NA	124.2	NR	NR	NR	NR NR	value. See Appendix J 50% cumulative density function
U-234 (UZ3)	cm ³ /g	50	Ρ	1	NA NA	124.2	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-234 (UZ4)	cm ³ /g	50	Р	11	NA NA	124.7	NR NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-234 (UZ5)	cm ³ /g	50	Р	1	NA.	125.7	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-234 (SZ)	cm ³ /g	50	Р	1	NA NA	126.4	NR	NA	NR	NR	value. See Appendix J 25% cumulative density function
U-235 (CZ)	cm³/g	50	Р	1	NA NA	15.2	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-235 (UZ1)	cm³/g	50	Р	1	NA NA	125.8	NR	NR	NR	NR	value. See Appendix J
U-235 (UZ2)	cm³/g	50	Р	11	NA _	123.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-235 (UZ3)	cm ³ /g	50	Р	1	NA	125.9	NR	NR	NA	NR	50% cumulative density function value. See Appendix J
U-235 (UZ4)	cm³/g	50	Р	1	NA	124.9	NR	NR	NA	NPI_	50% cumulative density function value. See Appendix J
U-235 (UZ5)	cm³/g	50	Р	1	NA	124.7	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-235 (SZ)	cm³/g	50	Р	1	NA	124.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (CZ)	cm³/g	50	Р	1	NA	123.9	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-236 (UZ1)	cm³/g	50	Р	1	NA NA	124.0	NA	NA	NA	NA	50% cumulative density function value. See Appendix J
U-236 (UZ2)	cm³/g	50	P	1	NA NA	123.8	NR	NR NR	NR	NR	50% cumulative density function value. See Appendix J
											50% cumulative density function
U-236 (UZ3)	cm ³ /g	50	Р	1	NA .	123.9	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-236 (UZ4)	cm³/g	50	Р	11	NA_	124.0	_ NR	NR	NR	NR_	value. See Appendix J 50% cumulative density function
U-236 (UZ5)	cm³/g	50	Р	1	NA NA	125.9	NR	NB	NR	NR	value. See Appendix J 50% cumulative density function
U-236 (SZ)	cm³/g	50	Р	1	NA .	125.8	NR	NA	NR	NFI	value. See Appendix J 50% cumulative density function
U-238 (CZ)	cm³/g	50	Р	1	NA NA	124.0	NR	NR	NR	NR	value. See Appendix J 50% cumulative density function
U-238 (UZ1)	cm³/g	50	Р	1	NA	123.8	NR	NR	NR	NR	value. See Appendix J
U-238 (UZ2)	cm³/g	50	Р	1	NA	124.5	NFI	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ3)	cm³/g	50	Р		NA	123.4	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
U-238 (UZ4)	cm³/g	50	Р	1	NA	124.0	NR	NR	NR	NR	50% cumulative density function value. See Appendix J

							Distribution	Distribution	Distribution	Distribution	·
Parameter	Linite	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Parameter	Parameter 2	Parameter 3	Parameter 4	Basis
Parameter	Units	Detault	туре	Phonty	Treatment	value	<u> </u>				50% cumulative density function
U-238 (UZ5)	cm ³ /g	50	Р	1	NA NA	126.2	NR	NR	NR	NR	value. See Appendix J
U-238 (SZ)	cm ³ /g	50	Р	1	NA	124.3	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Transport Factor Options	\$140 大型 1418 1514	7817783°5730	24(A)\$25°	3566FR(1)+		があっては他である		增加增多的	SE FRANKS SE	SUBIXES A.	VINE AND AND POST SERVICES
											RESRAD default, parameter is not used for calculation of distribution coefficients. Value of 0 not used for calculation of
Leach rate	1/yr	0	Р	3	0	0	NR	NR .	NR	NR	distribution coefficients. Value used for Uranium nuclides
Solubility limit	mol/L	0	Р	3	D	2.94E-06	NR	NR	NR	NR	anly
Use plant/soil ratio	Check box	Yes/No	NA	3	NA	No	NR	NR	NR	NR	RESRAD default, parameter not used for calculation of distribution coefficients.
Occupancy Inhalation rate	m³/yr	8400	M, B	3	B D	11400	NR	NR	NR	NR	RESRAD Manual, Table 2.3
Mass loading for		0400	,V,, D			11400					50% cumulative density function
inhalation	g/m³	0.0001.	P, B	2	S	2.35E-05	NR	NR	NR	NR	value. See Appendix J
Exposure duration Indoor dust filtration	yr	30	В	3	D	25	NR	NR	NR	NR	RESRAD Manual, Table 2.3
factor (shielding factor, inhalation)		0.4	P, B	2	S	0.547	NR ·	NR	NR	NP:	50% cumulative density function value. See Appendix J
Shielding factor, external gamma		0.7	P	2	s	0.269424	NR	NR	NR	NR	50% cumulative density function value. See Appendix J
Indoor time fraction		0.5	В	3	D	0.17	NR	NR	NA	NR	RESRAD Manual, Table 2.3
Outdoor (on site) time fraction		0.25	В	3	D	0.06	NR	NR	NP.	NR	RESRAD Manual, Table 2.3
Shape of the contaminated zone		1	Р	3	D	Non-circular	NR	NR	NR	NR	Shape representative of pond (rectangular)
Ingestion, Dietary	1807 (CUSAVI)	1777.42 3 1779.	MARKAR	MACHENS.	60 7 (37402)		40787427497,	x 34528	2000年11月20日	CHECKEN W	10-11-10-10-10-10-10-10-10-10-10-10-10-1
Fruit, vegetable, and grain consumption rate	kg/yr	160	М, В	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Leafy vegetable consumption	kg/yr	14	М, В	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Milk consumption	_∟/yr	92	м, в	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Meat and poultry consumption	kg/yr	63	м, в	3	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Fish consumption rate	kg/yr	5.4	М, В	3	NA NA	Not used	NR	NR	NA	NR	Pathway suppressed for industrial worker scenario
Other seafood consumption rate	kg/yr	0.9	м, в	3	NA	Not used	NR	NR	NFI	NR.	Pathway suppressed for industrial worker scenario
Soil ingestion rate	g/yr	36.5	М, В	2	D	36.5	NR	NR	NR	NR	RESRAD Manual, Table 2.3 based on EPA suggested value of 100 mg/day
Son ingestion rate	<u> </u>	30.3	IVI, D	-		30.0	NI	14(1		1915	NUREG/CR-5512, V3
Drinking water intake Contamination fraction of	L/yr	510	M, B	2	D	478.5	NR	NR	NR	NA	Table 6.87
drinking water	-	1	В, Р	3	NA	1	NR	NR	NR	NR	RESRAD Default
Contamination fraction of household water	-	1	В, Р	3	NA	Not used	NR	NR	NR	_NR	Pathway suppressed for industrial worker scenario
Contamination fraction of livestock water		1	В, Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of irrigation water		1	В, Р	3	NA	Not used	NR	NR	NP	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of aquatic food		0.5	В, Р	2	NA	Not used	NA	NR	NR		Pathway suppressed for industrial worker scenario
Contamination fraction of plant food		-1	8, P	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Contamination fraction of											Pathway suppressed for industrial
meat Contamination fraction of		-1	В, Р	3	NA	Not used	NR NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
milk Ingestion, Non-Dietary	eranga. Kangara	-1 09/49/4555 901	B, P	3	NA	Not used	NR	NR	NR	NR	worker scenario
Livestock fodder intake	S. 1256 A. H. 1944 . 7 A.	PG9 1537 PhotoNy 781 o	1.018211.2.444.	H428/988	man 2	100 P. HELL THE 1880 SEC. V.	72 36 (Mark 129 7 Ac.)	9000m (2) (C) [10] [890	80 E 20 C 10 (1 485 1 160	07 4 Sept. 3, 27 C	Pathway suppressed for industrial
rate for meat Livestock fodder intake	kg/d	68	М	3	NA	Not used	NR	NR	NA	NR	worker scenario Pathway suppressed for industrial
rate for milk	kg/d	55	M	3	NA	Not used	NR	NA	NR	NA	worker scenario Pathway suppressed for industrial
Livestock water intake rate for meat	L/d	50	м	3	NA	Not used	NR	NR	NR	NR	worker scenario
Livestock water intake rate for milk	L/d	160	М	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Livestock soil intake	kg/d	0.5	м	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Mass loading for foliar deposition	g/m³	1.00E-04	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario

							Diotribution	Distribution	Distribution	Distribution	
Parameter	Units	RESRAD Default	Type ¹	Priority ²	Treatment ³	Value	Distribution Parameter	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
											50% cumulative density function
Depth of soil mixing layer	<u>m</u>	0.15	Р	2	S	0.231	NFI	NR .	NR	NR	value. See Appendix J Pathway suppressed for industrial
Depth of roots	m	0.9	Р	1	NA .	Not used	NA	NA	NR	NR	worker scenario
Drinking water fraction from groundwater	-	1	B, P	3	D	1	NR	NR	NR	NR	RESRAD default, all drinking water assumed from groundwater
Household water fraction from groundwater	_	1	8, P	3	NA :	Not used	NR	NR	NR	NR	Parameter applies to Radon only.
Livestock water fraction from groundwater		1	В. Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Irrigation fraction from											Pathway suppressed for industrial
groundwater Wet weight crop yield for	<u>-</u>	1	В, Р	3	NA .	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industria
non-leafy plants Wet weight crop yield for	kg/m²	0.7	Р	5	NA	Not used	NA	NR NR	NR	NR	worker scenario Pathway suppressed for industrial
leafy plants Wet weight crop yield for	kg/m²	1.5	Р	3	NA NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
fodder	kg/m²	1.1	Р	3	NA	Not used	NR	NR	NR	NR	worker scenario
Growing season for non- leafy vegetables	yr	0.17	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Growing season for leafy vegetables	yr	0.25	Р	3	NA	Not used	NA	NR	NR	NA	Pathway suppressed for industrial worker scenario
Growing season for fodder	yr	0.08	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Translocation factor for		0.1	Р	3	NA NA		NR	NR		NR	Pathway suppressed for industrial
non-leafy vegetables Translocation factor for						Not used			NR		worker scenario Pathway suppressed for industrial
leafy vegetables Translocation factor for	<u> </u>	1	P	3	NA NA	Not used	NR	NR	NR NR	NR	worker scenario Pathway suppressed for industrial
fodder Dry foliar interception		1	Р	3	NA .	Not used	NR	NR	NR	NR	worker scenario
fraction for non-leafy vegetables	<u> </u>	0.25	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Dry foliar interception fraction for leafy	ļ										Pathway suppressed for industrial
vegetables Dry foliar interception	-	0.25	P	3	NA NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
fraction for fodder Wet foliar interception	· <u>-</u>	0.25	Р	3	NA	Not used	NR	NR	NR	NR	worker scenario
fraction for non-leafy vegetables	-	0.25	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Wet foliar interception fraction for leafy vegetables	-	0.25	P	2	NA NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
Wet foliar interception fraction for fodder		0.25	ρ	3	NA I	Not used	NR	NR	NŘ	NR	Pathway suppressed for industrial worker scenario
Weathering removal											Pathway suppressed for industrial
constant for vegetation Special Radionuclides (C:	1/yr 1 4)	20	P AGAMA	2	NA NA	Not used	NR	NR Alekaw	NR NR	NR	worker scenario
C-12 concentration in water	g/cm³	2.00E-05	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
C-12 concentration in contaminated soil	g/g	3.00E-02	p	3	NA	Not used	NR	NA	NR	NR	Applicable for C-14 exposure only
Fraction of vegetation	<u> </u>	2.00E-02	ρ	3	NA	Not used	NR	NR	NR	NR	
carbon from soil Fraction of vegetation											Applicable for C-14 exposure only
carbon from air Ci 114 evasion layer		0.98	Р	3	NA NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
thickness in soil C-14 evasion flux rate	m	0.3	Р	_2	NA	Not used	NR	NR NR	NR	NR	Applicable for C-14 exposure only
from soil C-12 evasion flux rate	<u>1/s</u>	7.00E-07	Р	3	NA NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
from soil Fraction of grain in beef	1/s	1.00E-10	Þ	3	NA NA	Not used	NA	<u>NR</u>	NR	NR	Applicable for C-14 exposure only
cattle feed		0.8	В	_ 3	NA	Not used	NR	NR	NR	NR	Applicable for C-14 exposure only
Fraction of grain in milk cow feed	-	0.2	В	3	NA	Not used	NR	NR	NR		Applicable for C-14 exposure only
Storage Times of Contami Storage time for fruits.	nated Foodstu	ffs Sharifers &		aslett.	aryjenyn		850 838 4 6.		PURADYETS	\$20 <u>% %</u> \$2.30.88	**************************************
non-leafy vegetables, and grain	d	14	В	3	NA_	Not used	NR	NR	NA		Pathway suppressed for industrial worker scenario
Storage time for leafy vegetables	d	1	8	3	NA	Not used	NR	NFI	NR		Pathway suppressed for industrial worker scenario
Storage time for milk	ď	1	В	3	NA.	Not used	NR	_NR_	NR	NR	Pathway suppressed for industrial worker scenario

Parameter	Units	RESRAD Default	Type'	Priority ²	Treatment ³	Value	Distribution Parameter 1	Distribution Parameter 2	Distribution Parameter 3	Distribution Parameter 4	Basis
Storage time for meat	d	20	В	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Storage time for fish	d	7	В	3	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Storage time for	<u>_</u>	· · · ·				Not dodd	,,,,,				Pathway suppressed for industrial
crustacea and mollusks Storage time for well	d	7	8	3	NA NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
water Storage time for surface	d	1	В	3	NA.	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
water Storage time for livestock	d	1	В	3	NA NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
fodder Radon	d	45	В	3	NA NA	Not used	NR	NR	NR	NR	worker scenario
Thickness of building foundation	m	0.15	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Bulk density building foundation	g/m³	2.4	P	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Total porosity of cover material		0.4	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Total porosity of building foundation		0.1	Ρ	3_	NA	Not used	NR	NA	NR	NR	Applicable for Radon exposure only
Volumetric water content of cover material	_	0.05	Р	3	NA .	Not used	NA	NR	NB	NR	Applicable for Radon exposure only
Volumetric water content of building foundation		0.03	Р	3	NA	Not used	NR	NR	NR NR	NR	Applicable for Radon exposure only
Radon diffusion coefficient in cover material	m/s	2.00E-06	Р	3	NA NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon diffusion coefficient in foundation material	m/s	3.00E-07	Р	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon diffusion coefficient in		2.00E-06	P	3	NA NA		NR	NR	NR	NR	Applicable for Radon exposure only
contaminated zone soil Radon vertical dimension of mixing	m/s m	2.002-06	P	3	NA NA	Not used	NR	NR	NR	NR NR	Applicable for Radon exposure only
Average building air exchange rate	1/hr	0.5	Р, В	3	NA NA	Not used	NR	NR NR	NR	NR	Applicable for Radon exposure only
Building (room) height	m	2.5	Р	3	NA NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Building interior area factor		0	Р	3	NA.	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Building depth below ground surface	m	-1	Р	3	NA.	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon-222 emanation coefficient		0.25	P	3	NA	Not used	NR	NR	NR	NR	Applicable for Radon exposure only
Radon-220 emanation coefficient		0.15	Р	3	NA	Not used	NA	NR	NR	NR	Applicable for Radon exposure only
Risk Conversion Factors	\$50 with G	6377 ASSES	56002-7.	3F33\$45.5	366800		DE LIGITARY	ë€it reev	(2450) V	2445-AL2	
Slope factor – external	(risk/yr)/ (pCi/g)	Nuclide specific	м	3	NA	Not used	NR	NFI	NA	NA	RESRAD Default
Slope factor - inhalation	risk/pCi	Nuclide specific Nuclide	М	3	NA	Not used	NA	NR	NR	NR	RESRAD Default
Slope factor - ingestion	risk/pCi	specific	М	3	NA NA	Not used	NR	NR	NR	NR	RESRAD Default
Ac-227	mrem/pCi	6.7	M	3	D	6.7	NR	NR	NR	NR	FGR-11, RESRAD Library
Pa-231	mrem/pCi	1.28	M	3	D	1.28	NR	NR	NR	NR NR	FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.0136	М	3	D	0.0136	NA	NR	NR	NR	FGR-11, RESRAD Library
Ra-226	mrem/pCl	0.00858	M	3	D	0.00858	NR	NR	NR	NA	FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00477	М	3	D	0.00477	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-228	mrem/pCi	0.342	M	3	Ω	0.342	NR	NR	NR NR	NR	FGR-11, RESRAD Library
Th-230	mrem/pCi	0.326	М	3	D	0.326	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-232	mrem/pCl	1.64	M	3	ام	1.64	NR	NR	NR	NR	FGR-11, RESRAD Library
U-234	mrem/pCi	0.132	M	3	0	0.132	NR	NR	NR NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.123	M	3	0	0.123	NR NR	NR NB	NR NB	NR NR	FGR-11, RESRAD Library
U-236 U-238	mrem/pCi mrem/pCi	0.125 0.118	M	3	0	0.125 0.118	NR NR	NR NR	NR NR		FGR-11, RESRAD Library FGR-11, RESRAD Library
Ingestion Dose Donversion		0.118	NA San San	3 చియ్చి}	<u>ں</u>	0.118 	NH	NH MXXVXX	NH	NH	FGH-11, HESHAD Library
Ac-227	mrem/pCl	0.0141	M	3	D	0.0141	NR	NR	NR	NR	FGR-11, RESRAD Library
Pa-231	mrem/pCi	0.0106	M	3	D	0.0106	NR	NR	NR NR	NR	FGR-11, RESRAD Library
Pb-210	mrem/pCi	0.00537	M	3	<u>a</u>	0.00537	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-226	mrem/pCi	0.00132	M	3	0	0.00132	NR	NR	NR	NR	FGR-11, RESRAD Library
Ra-228	mrem/pCi	0.00144	M	3	ā	0.00144	NA	NR	NR		FGR-11, RESRAD Library
				لــــــــــــــــــــــــــــــــــــــ		0.00,					

		T		Γ		Γ	Distribution	Distribution	Distribution	Distribution	r
		RESRAD			} ,		Parameter	Parameter	Parameter	Parameter	_
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Value	1	2	3	4	Basis
Th-228	mrem/pCi	0.000396	M	3	D	0.000396	NR	NR	NR	NR	FGR-11, RESRAD Library
Th-230 Th-232	mrem/pCi mrem/pCi	0.000548	M	3	D D	0.000548	NR NR	NR NR	NR NR	NR NR	FGR-11, RESRAD Library FGR-11, RESRAD Library
U-234	mrem/pCi	0.00273	M	3	6	0.000283	NR	NR	NR NR	NR	FGR-11, RESRAD Library
U-235	mrem/pCi	0.000266	M	3	- 5 -	0.000266	NR	NR	NR	NR	FGR-11, RESRAD Library
U-236	mrem/pCi	0.000269	М	3	D	0.000269	NR	NR	NA	NR	FGR-11, RESRAD Library
U-238	mrem/pCi	0.000255	М	3	D	0.000255	NR	NR	NR	NR	FGR-11, RESRAD Library
Plant Transfer Factors [pCi/g plant (wet)	V[pCVg soil (dr	y)]	4.3% A.C.		2015年2016年2	MANAGET ST	Contract of Sec.	MARCHANIA CONTRACTOR	PROPERTY.	Character Contract House
											Pathway suppressed for industrial
Ac-227		0.0025	P	1	NA NA	Not used	NR	NR NR	NR	NR_	worker scenario
Pa-231		0.01	l _P	1	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
14201	 -	0.01		 	11/	1101 0300		 	 		Pathway suppressed for industrial
Pb-210	_	0.01	P	1	NA NA	Not used	NR	NR	NR	NR	worker scenario
	 				 						Pathway suppressed for industrial
Ra-226		0.04	Р	11	NA .	Not used	NR	NR	NR	NR	worker scenario
	j	1		1]				J	J	Pathway suppressed for industrial
Ra-228		0.04	Р	1	NA	Not used	NR	NR	NR	NR	worker scenario
Th-228	1	0.001	P	,	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
111-228	 -	0.001			INA	Not used	- NO	IND	ING	INF	Pathway suppressed for industrial
Th-230	1 .	0.001	l p	1	NA NA	Not used	NR	NR	NR	NR	worker scenario
		9,55		· · · · · ·		1101 4000					Pathway suppressed for industrial
Th-232		0.001	P	. 1	NA.	Not used	NR	NR	NR	NR.	worker scenario
								i			Pathway suppressed for industrial
U-234		0.0025	Р	1	NA	Not used	NR	NR	NR	NR	worker scenario
	İ		i _		i				1	·	Pathway suppressed for industrial
U-235		0.0025	Р	1	NA NA	Not used	NR	NR	NR	NR	worker scenario
U-236	1.	0.0025	P	1	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
0-230		0.0023	 	 	17/2	Not used				- '''' -	Pathway suppressed for industrial
U-238	1 .	0.0025	P	1	NA NA	Not used	NR	NR ·	NR	NR	worker scenario
Meat Transfer Factor	e wasanaa		14999	W.34./*	在本次列数第 76	\$5500 BELLES	WASHINGTON	YERKOKUMA	STATE OF THE STATE	SCP TAKES	845-25008-5000 - 64469
	(pCi/kg)/	I									Pathway suppressed for industrial
Ac-227	(pCi/d)	0.00002	Р	2	NA NA	Not used	NR	NR	NR	NR	worker scenario
D- 004	(pCl/kg)/	2 005	P							}	Pathway suppressed for industrial
Pa-231	(pCi/d)	0.005	<u> </u>	2	NA NA	Not used	NR	NR	NR	NR	worker scenario
Pb-210	(pCi/kg)/ (pCi/d)	0.0008	P	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
1 5-210	(pCl/kg)/	0.0000	⊢∸		18/2	1101 0300		1413	- 1,11,	- : \	Pathway suppressed for industrial
Ra-226	(pCi/d)	0.001	Р	2	NA NA	Not used	NR	NR .	NR .	NR	worker scenario
	(pCi/kg)/										Pathway suppressed for industrial
Ra-228	(pCi/d)	0.001	Р	2	NA	Not used	NR	NR	NR	NA	worker scenario
	(pCi/kg)/		1 _							_	Pathway suppressed for industrial
Th-228	(pCi/d)	0.0001	Р	2	NA NA	Not used	NR	NA	NR	NR	worker scenario
Th-230	(pCi/kg)/ (pCi/d)	0.0001	Р	2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
111-230	(pCi/kg)/	0.0001	 		ING	NOT USED	INFI	INIT	IND	ING	Pathway suppressed for industrial
Th-232	(pCi/d)	0.0001	Р	2	NA	Not used	NR	NR	NR	NR	worker scenario
	(pCi/kg)/										Pathway suppressed for industrial
U-234	(pCl/d)	0.00034	Р	2	NA	Not used	NR	_ NR	NR	NR	worker scenario
	(pCi/kg)/		-								Pathway suppressed for industrial
U-235	(pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	worker scenario
	(pCi/kg)/	0.00004	P	١ ,					NO		Pathway suppressed for industrial
U-236	(pCi/d) (pCi/kg)/	0.00034	F P	2	NA NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
U-238	(pCi/d)	0.00034	Р	2	NA	Not used	NR	NR	NR	NR	worker scenario
Milk Transfer Factor		V5,747,555.55	6348CA			587/245 P5296					WORKER SCHIRING
	(pCi/L)/					7,7					Pathway suppressed for industrial
Ac-227	(pCi/d)	0.00002	P	2	NA	Not used	NR	NR	NR	NR	worker scenario
	(pCi/L)/										Pathway suppressed for industrial
Pa-231	(pCi/d)	0.000005	Р	2	NA .	Not used	NR	NR	NR	NR	worker scenario
	(pCi/L)/		_	_						_	Pathway suppressed for industrial
Pb-210	(pCi/d)	0.0003	Р	2	NA_	Not used	NR	NR	NR	NR	worker scenario
D- 226	(pCi/L)/	0.001	P	2	NA	Naturand	NO	ND	ND	MD	Pathway suppressed for industrial
Ra-226	(pCi/d) (pCi/L)/	0.001	 		IVA	Not used	NR	NR	NR	NA	worker scenario Pathway suppressed for industrial
Ra-228	(pCi/d)	0.001	Р	2	NA NA	Not used	NR	NR	NR	NR	worker scenario
	(pCi/L)/	T			<u> </u>						Pathway suppressed for industrial
Th-228	(pCi/d)	0.000005	Р	2	NA	Not used_	NR	NR	NR	NA	worker scenario
	(pCi/L)/										Pathway suppressed for industrial
Th-230	(pCi/d)	0.000005	Р	2	NA_	Not used	NFI	NR	NR		worker scenario
	(pCi/L)/										Pathway suppressed for industrial
Th-232	(pCi/d)	0.000005	Р	2	NA	Not used	NR	NR	NR		worker scenario
	(pCi/L)/	0,000	P	ا ہا		Afat years		110			Pathway suppressed for industrial
U-234	(pCi/d)	0.0006	L	2	NA	Not used	NA	<u>N</u> A	NA I	NR NR	worker scenario

					·	г—	Distribution	I Distribution	Distribution	L Distribution	т
		RESRAD		,]	Distribution Parameter	Distribution Parameter	Distribution Parameter	Distribution Parameter	
Parameter	Units	Default	Type ¹	Priority ²	Treatment ³	Valu e	1	2	3	4	Basis
U-235	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA.	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-236	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA	Not used	NA	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-238	(pCi/L)/ (pCi/d)	0.0006	Р	2	NA NA	Not used	NR	NR	NR	NB	Pathway suppressed for industrial worker scenario
Bioaccumulation factor to		(1.70), (Part)	2055	Swiffice	SWS MACH	SACONE US	GURBLE	39 S. 18 14 1		Musical Sci	
Ac-227	(pCi/kg)/ (pCi/L)	15	Р	2_	NA _	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pa-231	(pCi/kg)/ (pCi/L)	10	Р	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Pb-210	(pCi/kg)/ (pCi/L)	300	Р	2	NA.	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/L)	50	P	2	NA.	Not used	NR	NA	NB	NR	Pathway suppressed for industrial worker scenario
11d 220	(pCi/kg)/					1101 0000	·	 	 		Pathway suppressed for industrial
Ra-228	(pCVL)	50	Р	2	NA NA	Not used	NR	NR	NR	NA	worker scenario
Th-228	(pCi/kg)/ (pCi/L)	100	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-230	(pCi/kg)/ (pCi/L)	100	P	2_	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-232	(pCi/kg)/ (pCi/L)	100	P	2	NA	Not used	NA	NR	NR.	NR	Pathway suppressed for industrial worker scenario
U-234	(pCi/kg)/ (pCi/L)	10	Р	2	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-235	(pCi/kg)/ (pCi/L)	10	Р	2	NA.	Not used	NB	NR	NB	NR	Pathway suppressed for industrial worker scenario
U-236	(pCi/kg)/ (pCi/L)	10	Р	2	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/	10	p	2	NA NA		NR				Pathway suppressed for industrial
U-238 Bloaccumulation factor for	(pCVL)		F (20), 2 G		NA	Not used	NH	NR NR	NR	NR	worker scenario
	(pCi/kg)/	Ī									Pathway suppressed for industrial
Ac-227	(pCi/L) (pCi/kg)/	1000	Р	3	NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
Pa-231	(pCi/L)	110	Р	3	NA NA	Not used	NR	NR	NR	NR	worker scenario
Pb-210	(pCi/kg)/ (pCi/L)	100	Р	3	NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Ra-226	(pCi/kg)/ (pCi/L)	250	Р	3	NA_	Not used	NA	NR	NA	NA	Pathway suppressed for industrial worker scenario
Ra-228	(pCi/kg)/ (pCi/L)	250	Р	3	NA NA	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
Th-228	(pCi/kg)/ (pCi/L)	500	Р	3	NA.	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
	(pCi/kg)/										Pathway suppressed for industrial
Th-230	(pCi/kg)/	500	Р	3	NA	Not used	NR	NR	NR	NR	worker scenario Pathway suppressed for industrial
Th-232	(pCi/L) (pCi/kg)/	500	Р	3	NA_	Not used	NR	NR	NFI	NR	worker scenario Pathway suppressed for industrial
U-234	(pCi/L)	60	Р	3	NA_	Not used	NR	NR	NR	NR	worker scenario
U-235	(pCi/kg)/ (pCi/L)	60	Р	3	NA_	Not used	ŅR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-236	(pCi/kg)/ (pCi/L)	60	Р	3	NA_	Not used	NR	NR	NR	NR	Pathway suppressed for industrial worker scenario
U-238	(pCi/kg)/ (pCi/L)	60	Р	3	NA	Not used	NR	NA	NR	NR	Pathway suppressed for industrial worker scenario
Graphics Parameters	1,000,00	d. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	1009/4	F37831.7	- 0.634.	, 10. 0360	30 NAC	FWE 5/88770	2010	NA NA	- Carrena
											Moles are shown to default
Number of points	<u>_</u> .	32	NA	NA	NA.	1024	NR	NR	NR	NR	Value greater than default provides more evaluation points
Spacing	-	Log	NA	NA	NA	Log	NR	NR	NR	NR	RESRAD Default
Time Integration Paramet	ers ·	Part Sympa	3-4-403	SPA min	12			**************************************			
Maximum number of											
points for dose		17	NA	NA	NA	17	NA	NR	NR	NA	RESRAD Default

Notes:

¹P = physical, B = behavioral, M = metabolic, when more than one type is listed the first is primary and the next is secondary (NUREG/CR-6697, Att. A, Table 2.1)

²1 = high priority, 2 = medium priority, 3 = low priority (NUREG/CR-6697, Att. B, Table 4.2)

³D = deterministic, S = stochastic

Table N-2
Honeywell Metropolis Works
Pond E Dose Assessment
Industrial Worker Scenario
Source Configuration Summary

			5% Sludge	Stabilized	Sludge	Sludge		Sludge	Sludge		Average
Ì		Sludge	Bulking	Sludge	Surface	Surface	Estimated	Surface	Surface	CZ	Cover
ļ		Volume ⁽¹⁾	Volume ⁽¹⁾	Volume ⁽²⁾	Area ⁽¹⁾	Area	CZ Area ⁽³⁾	Length ⁽⁴⁾	Width ⁽⁴⁾	Thickness ⁽⁵⁾	Thickness ⁽¹⁾
	Pond	(ft ³)	(ft ³)	(ft ³)	(ft ²)	(m ²)	(m ²)	(m)	(m)	(m)	(m)
	В	351,729	17,586	369,315	43,169	4,011	4,000	94	43	2.608	1.74
	С	368,064	18,403	386,467	43,244	4,017	4,000	94	43	2.724	1.51
	D	256,986	12,849	269,835	41,980	3,900	3,900	65	60	1.959	2.76
	E	1,404,459	70,223	1,474,682	130,156	12,092	12,000	165	74	3.453	1.59

Notes:

⁽¹⁾ Andrews Engineering Calculation "Calculation of Average Cover Soil Thickness over Sludge, Closure Option 2b – Ponds B, C, D, and E" provided in Appendix A

⁽²⁾ Stabilized Sludge Volume = Sludge Volume + 5% Sludge Bulking Volume

⁽³⁾ CZ Area was estimated by rounding the Sludge Surface Area.

⁽⁴⁾ Approximate sludge surface dimensions estimated with reference to sludge surface areas and the pond

Table N-3
Honeywell Metropolis Works
Pond E Dose Assessment
Industrial Worker Scenario
Radionuclide Concentrations

	Radionuclide Concentration (pCi/g)				
		Corrected for			
	<u> </u>	5% Bulking	Corrected for		
Radionuclide	Average Dry	Factor	% Solids		
Protactinium 231	0.15	0.14	0.07		
Radium 226	0.69	0.66	0.34		
Thorium 228	0.07	0.06	0.03		
Thorium 230	1.66	1.58	0.83		
Thorium 232	0.05	0.05	0.03		
Uranium 234	237.77	225.89	118.57		
Uranium 235	10.24	9.73	5.11		
Uranium 236	5.84	5.55	2.91		
Uranium 238	246.05	233.75	122.69		

% Solids:

52.49%

Table N-4
Honeywell Metropolis Works
Pond E Dose Assessment
Industrial Worker Scenario
Hydraulic Conductivity of Silty Clay

Pressure	Hydraulic Conductivity	Hydraulic Conductivity
(psf)	(cm/sec)	(m/yr)
1040	4.00E-04	126
1930	1.90E-04	60
2385	1.80E-04	57
	2.57E-04	81

Reference: Geotechnics Laboratory report "Hydraulic Conductivity

of a Large Block Sample", June 17, 2010

Large Block Sample collected 8 to 10 ft below ground which

is in Clayey Silt/Silty Clay Zone

Table N-5
Honeywell Metropolis Works
Pond E Dose Assessment
Industrial Worker Scenario
Contaminated Zone Bulk Density

			Average
	1	Bulk Density	Bulk Density
Pond	Sample ID	(g/ml)	(g/ml)
В	B-18 Lower	1.6	-
В	B-18 Upper	1.7	-
В	B-19 Upper	1.4	-
В	B-26 Lower	1.6	-
В	· ·	-	1.575
С	C-2	1.6	-
С	C-5	1.7	-
С	C-19 Lower	1.6	•
С	C-19 Upper	1.5	•
С	-	-	1.6
D	D-8 Lower	1.5	-
D	D-8 Upper	1.6	•
D	D-10 Lower	1.4	-
D	D-10 Upper	1.5	-
D	D-17 Lower	1.5	-
D	D-17 Upper	1.6	-
D	D-26 Lower	1.8	-
D	D-26 Upper	1.9	-
D		-	1.6
E	E-65 Lower	1.3	-
E	E-65 Upper	1.5	-
E	E-80 Lower	1.5	-
E	E-80 Upper	1.5	-
E	E-97 Lower	1.2	-
E	E-97 Upper	1.1	-
E	E-103 Lower	1.7	-
E	E-103 Upper	1.7	-
E	-	-	1.4375

Reference: Andrews Engineering "Calcium Fluoride Sludge Pond Sampling Report"

APPENDIX O

Pond B Deterministic Dose Assessment Report

RESRAD, Version 6.5 Th Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

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Contaminated Zone and Total Dose Summary	14
Total Dose Components	
Time = 0.000E+00	15
Time = 1.000E+00	16
Time = 3.000E+00	17
Time = 1.000E+01	18
Time = 3.000E+01	19
Time = 1.000E+02	20
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RESRAD, Version 6.5 The Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Dose Conversion Factor (and Related) Parameter Summary Dose Library: FGR 12 & FGR 11

Menu Parameter A-1 DCF's for external ground radiation, (mrem/yr)/(pCi/g) A-1 Ac-227 (Source: FGR 12) A-1 Ac-228 (Source: FGR 12) A-1 At-218 (Source: FGR 12) A-1 Bi-210 (Source: FGR 12) A-1 Bi-211 (Source: FGR 12) A-1 Bi-212 (Source: FGR 12)	5.978E+00 5.847E-03	4.951E-04	Name
A-1 Ac-227 (Source: FGR 12) A-1 Ac-228 (Source: FGR 12) A-1 At-218 (Source: FGR 12) A-1 Bi-210 (Source: FGR 12) A-1 Bi-211 (Source: FGR 12)	5.978E+00 5.847E-03	5.978E+00	DCEL(1)
A-1 Ac-227 (Source: FGR 12) A-1 Ac-228 (Source: FGR 12) A-1 At-218 (Source: FGR 12) A-1 Bi-210 (Source: FGR 12) A-1 Bi-211 (Source: FGR 12)	5.978E+00 5.847E-03	5.978E+00	i i ncel (1)
A-1 Ac-228 (Source: FGR 12) A-1 At-218 (Source: FGR 12) A-1 Bi-210 (Source: FGR 12) A-1 Bi-211 (Source: FGR 12)	5.978E+00 5.847E-03	5.978E+00	
A-1 At-218 (Source: FGR 12) A-1 Bi-210 (Source: FGR 12) A-1 Bi-211 (Source: FGR 12)	5.847E-03		•
A-1 Bi-210 (Source: FGR 12) A-1 Bi-211 (Source: FGR 12)		J.84/E-U3	•
A-1 Bi-211 (Source: FGR 12)	1 3.606E-03 i	3.606E-03	
	2.559E-01		
	1.171E+00		•
A-1 Bi-214 (Source: FGR 12)		9.808E+00	•
A-1 Fr-223 (Source: FGR 12)		1.980E-01	
A-1 Pa-231 (Source: FGR 12)	1.906E-01		•
A-1 Pa-234 (Source: FGR 12)	1.155E+01		
A-1 Pa-234m (Source: FGR 12)	8.967E-02		
A-1 Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(12)
A-1 Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1 (13)
A-1 Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(14)
A-1 Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(15)
A-1 Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(16)
A-1 Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(17)
A-1 Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1 Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(19)
A-1 Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1 (20)
A-1 Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(21)
A-1 Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(22)
A-1 Ra-223 (Source: FGR 12)	6.034E-01	6.034E-01	DCF1(23)
A-1 Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(24)
A-1 Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(25)
A-1 Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(26)
A-1 Rn-219 (Source: FGR 12)	3.083E-01	3.083E-01	DCF1(27)
A-1 Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(28)
A-1 Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(29)
A-1 Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1(30)
A-1 Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(31)
A-1 Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(32)
A-1 Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1(33)
A-1 Th-232 (Source: FGR 12)		5.212E-04	
A-1 Th-234 (Source: FGR 12)	2.410E-02	2,410E-02	DCF1(35)
A-1 T1-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1 (36)
A-1 T1-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(37)
A-1 T1-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(38)
A-1 U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(39)
A-1 U-235 (Source: FGR 12)	7.211E-01	7,211E-01	DCF1(40)
A-1 U-236 (Source: FGR 12)		2.148E-04	
A-1 U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1 (42)
B-1 Dose conversion factors for inhalation, mrem/pCi:		 	
B-1 Ac-227+D	6.724E+00	6.700E+00	DCF2 (1)
B-1 Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1 Pb-210+D	2.320E-02	1.360E-02	DCF2(3)
B-1 Ra-226+D	8.594E-03	8.580E-03	DCF2 (4)
B-1 Ra-228+D	5.078E-03	4.770E-03	DCF2(5)

RESRAD, Version 6.5 T4 Limit = 180 days 09/29/2010 13:04 Page 3

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued) $\mbox{Dose Library: FGR 12 6 FGR 11}$

	1	Current	Base	Parameter
Menu	Parameter	Value#	Case*	Name
			·	·
B-1	Th+228+D	3.454E-01	3.420E-01	DCF2(6)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(7)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(8)
B-1	U-234	1.320E-01	1.320E-01	DCF2(9)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 (10)
B-1	U-236	1.250E-01	1.250E-01	DCF2 (11)
B-1	U-238	1.180E-01	•	
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(13)
	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D		1.410E-02	
	Pa-231		1.060E-02	
		7.276E-03		
		1.321E-03		•
		1.442E-03 8.086E-04		
		5.480E-04		
		2.730E-03		
		2.830E-04		
		2.673E-04		
		2.690E-04		
	<u>'</u>	2.550E-04		
	U-238+D		2.550E-04	
		,		
D-34	Food transfer factors:	i		İ
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500€-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		8.000E-04	
	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34	•	İ		
	Ra-226+D , plant/soil concentration ratio, dimensionless		4.000E-02	
		1.000E-03		
	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34			4 0000 00	. DME (F 1)
		4.000E~02		
		1.000E-03		
	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	1.000E-03	1.0008-03	RTF(5,3)
D-34		1.000E-03	1 000=03	פיים (ל 1)
			1.000E-03	
	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-04	
D-34 D-34		J.000E-00	J.000E-00	0,3/
J 34	!	ı		

RESRAD, Version 6.5 T4 Limit = 180 days 09/29/2010 13:04 Page 4

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued) · Dose Library: FGR 12 & FGR 11

			Current	Base	Parameter
Menu	 	Parameter	Value#	Case*	Name
D-34	rh-230	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-230	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34 D-34	Th-230	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
	Th-232	, plant/soil concentration ratio, dimensionless	1.000E-03	1 1.000E-03	RTF(8,1)
	Th-232	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		1.000E-04	
	Th-232	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	!	
D-34			I	I	
D-34	U-234	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-234	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-234	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E~04	6.000E-04	RTF(9,3)
D-34	ŀ		l	l	
D-34	U-235+D	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-235+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-235+D	, $milk/livestock-intake ratio$, $(pCi/L)/(pCi/d)$	6.000E-04	6.000E-04	RTF(10,3)
D-34			1	l	İ
D-34	U-236	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-236	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-236	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34	'		l	l	
D-34	U-238	, plant/soil concentration ratio, dimensionless		2.500E-03	•
	U-238	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.400E-04	
	U-238	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34					
	U-238+D	, plant/soil concentration ratio, dimensionless	•	2.500E-03	
	U-238+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	,	3.400E-04	
D-34	U-238+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04 	6.000E-04 	RTF(13,3)
D-5	Bioaccumu	lation factors, fresh water, L/kg:			
D~5	Ac-227+D	, fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D	, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC (1,2)
D-5			1	l [
D-5	Pa-231	, fish	1.000E+01	1.000E+01	BIOFAC (2,1)
D-5	Pa-231	, crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5					
D-5	Pb-210+D	, fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5			l	1	
D-5	Ra-226+D	, fish		5.000E+01	
D-5	Ra-226+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5					
D-5	Ra-228+D			5.000E+01	
	Ra-228+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5					
	Th-228+D				BIOFAC(6,1)
	Th-228+D	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5	l mu 222	Si.h	1 000m:00	1.000=:00	Promise a se
	Th-230				BIOFAC(7,1)
D-5	Th-230	, crustacea and mollusks	3.000 6 +02	5.000E+02	BIOFAC(7,2)
D-5	l			l	

RESRAD, Version 6.5 The Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

	I		Current	Base	Parameter
Menu	1	Parameter	Value#	Case*	Name
D-5	Th-232	, fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-232	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5	1			i	l
D-5	U-234	, fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-234	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (9,2)
D-5	1		l	1	1
D-5	U-235+D	, fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-235+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
D-5			l	!	ŀ
D-5	U-236	, fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-236	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5	1		ł	f	1
D-5	U-238	, fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-238	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5			ţ.	ŀ	
D-5	U-238+D	, fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-238+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report. *Base Case means Default.Lib w/o Associate Nuclide contributions.

RESRAD, Version 6.5 Th Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

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Site-Specific Parameter Summary

1		User	1	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	•
			· 	 	·
R011	Area of contaminated zone (m**2)	4.000E+03	1.000E+04		AREA
R011	Thickness of contaminated zone (m)	2.608E+00	2.000E+00		THICKO
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00		SUBMFRACT
R011	Length parallel to aquifer flow (m)	9.400E+01	1.000E+02		LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01		BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00		TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00		T(2)
R011	Times for calculations (yr)	3.000E+00	3.000€+00		T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01		T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01		т(5)
R011 J	Times for calculations (yr)	1.000E+02	1.000E+02		T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02		T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03		T(8)
R011	Times for calculations (yr)	not used	0.000E+00		Т(9)
R011	Times for calculations (yr)	not used	0.000E+00		T(10)
1		1	(1
R012	Initial principal radionuclide (pCi/g): Pa-231	4.000E-02	0.000E+00		\$1(2)
R012	Initial principal radionuclide (pCi/g): Ra-226	4.200E-01	0.000E+00		S1(4)
R012	Initial principal radionuclide (pCi/g): Th-228	8.000E-02	0.000E+00		S1(6)
R012	Initial principal radionuclide (pCi/g): Th-230	2.300E+00	0.000E+00		S1(7)
R012	Initial principal radionuclide (pCi/g): Th-232	7.000E-02	0.000E+00		S1(8)
R012	Initial principal radionuclide (pCi/g): U-234	6.950E+01	0.000E+00		S1(9)
R012	Initial principal radionuclide (pCi/g): U-235	4.480E+00	0.000E+00		S1(10)
R012	Initial principal radionuclide (pCi/g): U-236	1.860E+00	0.000E+00		S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	7.159E+01	0.000E+00		S1(12)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00		W1(2)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00		W1(4)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00		W1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00		W1(7)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00		W1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		W1(9)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		W1(10)
R012	Concentration in groundwater (pCi/L): U-236	not used	0.000E+00		W1(11)
R012 J	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		W1(12)
J					
R013	Cover depth (m)	1.740E+00			COVER0
R013	-	1.571E+00	1.500E+00		DENSCV
R013		1.050E-04	1.000E-03		ACA
R013	Density of contaminated zone (g/cm**3)	•	1.500E+00		DENSCZ
R013		•	1.000€-03		vcz
R013	Contaminated zone total porosity	4.100E-01	4.000E-01		TPCZ
		2.000E-01			FCCZ
		1.600E+00			HCCZ
		1.350E+00			BCZ
R013		3.300E+00	·		WIND
		not used			HUMID
	Evapotranspiration coefficient		5.000E-01		EVAPTR
		1.250E+00	•		PRECIP
	-	0.000E+00	·		RI
R013	Irrigation mode	overhead	overhead		IDITCH

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RESRAD, Version 6.5 The Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

		User		Used by RESRAD	Parameter			
Menu	Parameter	Input	Default	(If different from user input)	Name			
R013	Runoff coefficient	4.000E-01	2.000E-01		RUNOFF			
R013	Watershed area for nearby stream or pond (m**2)	2.778E+05	1.000E+06		WAREA			
R013		1.000E-03			l EPS			
		,]	 	, - I			
R014	Density of saturated zone (g/cm**3)	saturated zone (g/cm**3) 1.510E+00 1.500E+00		DENSAQ				
R014	Saturated cone total porosity	4.300E-01	4.000E-01		TPSZ			
R014	Saturated zone effective porosity	3.800E-01	2.000E-01		EPSZ			
R014	Saturated zone field capacity	2.000E-01	2.000E-01		FCSZ			
R014	Saturated zone hydraulic conductivity (m/yr)	2.500E+03	1.000E+02		HCSZ			
R014	Saturated zone hydraulic gradient	4.800E-03	2.000E-02	HGWT				
R014	Saturated zone b parameter	9.700E-01	5.300E+00		BSZ			
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03		VWT			
R014	Well pump intake depth (m below water table)	1.050E+02	1.000E+01		DWIBWT			
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND		MODEL			
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	•	טw			
		i i	1		I			
R015	Number of unsaturated zone strata	5	1		, NS			
		' 6.860E+00	•		H(1)			
		1.695E+00			DENSUZ(1)			
		3.600E-01	'		TPUZ(1)			
	·	2.890E-01			EPUZ(1)			
		1 2.000E-01			FCUZ(1)			
	• -	9.870E+00	'		BUZ(1)			
R015	•	1.262E+02			HCUZ(1)			
		1			1			
R015	Unsat. zone 2, thickness (m)	1.710E+00	0.000E+00		H(2)			
	Unsat. zone 2, soil density (g/cm**3)		1.500E+00		DENSUZ(2)			
	Unsat. zone 2, total porosity	4.090E-01			TPUZ(2)			
	Unsat. zone 2, effective porosity	3.500E-01			EPUZ(2)			
	Unsat. zone 2, field capacity	:	2.000E-01		FCUZ (2)			
	•	1.350E+00	•		BUZ(2)			
		1.025E+03			HCUZ (2)			
		1						
R015	Unsat. zone 3, thickness (m)	1.710E+00	0.000E+00 l		H(3)			
	•	1.510E+00			DENSUZ(3)			
	•	4.300E-01			TPUZ (3)			
	•	3.830E-01		· ·	EPUZ (3)			
	·	2.000E-01			FCUZ (3)			
	•	9.700E-01			BUZ (3)			
		2.495E+03			HCUZ (3)			
15			1					
R015	Unsat. zone 4, thickness (m)	4.000E+00	0.000E+00		H(4)			
		1.562E+00	,		DENSUZ(4)			
	•	3.890E-01		•	TPUZ (4)			
	•	3.180E-01		· ·	EPUZ (4)			
		2.000E-01						
	•	2.000E-01 1.350E+00	,		FCUZ (4)			
	•		•	'	BUZ (4)			
KUIS	Unsat. zone 4, hydraulic conductivity (m/yr)	1.021E+03	1.000E+01		HCUZ (4)			

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

			1		
!		User	<u> </u>	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
R015	Unsat. zone 5, thickness (m)	1.140E+00	0.000E+00		Н(5)
R015	Unsat. zone 5, soil density (g/cm**3)	1.510E+00	1.500E+00		DENSUZ(5)
R015	Unsat. zone 5, total porosity	4.300E-01	4.000E-01		TPU2 (5)
R015	Unsat. zone 5, effective porosity	3.830E-01	2.000E-01		EPUZ(5)
R015	Unsat. zone 5, field capacity	2.000E-01	2.000E-01		FCUZ(5)
R015	Unsat. zone 5, soil-specific b parameter	9.700E-01	5.300E+00		BUZ (5)
R015	Unsat. zone 5, hydraulic conductivity (m/yr)	2.494E+03	1.000E+01		HCUZ(5)
ĺ		Ì	· 	I	i I
R016	Distribution coefficients for Pa-231			l	†
R016	Contaminated zone (cm**3/g)	3.743E+02	5.000E+01		DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	3.707E+02	5.000E+01	1	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	3.751E+02	5.000E+01	1	DCNUCU(2,2)
R016	Unsaturated zone 3 (cm**3/g)	3.753E+02	5.000E+01		DCNUCU(2,3)
R016	Unsaturated zone 4 (cm**3/g)	3.782E+02	5.000E+01	ļ	DCNUCU(2,4)
R016	Unsaturated zone 5 (cm**3/g)	3.756E+02	5.000E+01		DCNUCU(2,5)
R016	Saturated zone (cm**3/g)	3.784E+02	5.000E+01	1	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.853E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
I		[1	Į.	
R016	Distribution coefficients for Ra-226	l :	1	l	
R016	Contaminated zone (cm**3/g)	3.501E+03	7.000E+01		DCNUCC (4)
R016	Unsaturated zone 1 (cm**3/g)	3.507E+03	7.000€+01		DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	3.506E+03	7.000E+01		DCNUCU(4,2)
R016	Unsaturated zone 3 (cm**3/g)	3.523E+03	7.000E+01		DCNUCU(4,3)
R016	. Unsaturated zone 4 (cm**3/g)	3.485E+03	7.000E+01	- 	DCNUCU(4,4)
R016	Unsaturated zone 5 (cm**3/g)	3.496E+03	7.000E+01	'	DCNUCU(4,5)
R016	Saturated zone (cm**3/g)	3.529E+03	7.000E+01		DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.982E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
				·	
R016					
R016	·		6.000E+04		DCNUCC(6)
R016	-	5.736E+03			DCNUCU(6,1)
R016	- -	5.825E+03			DCNUCU(6,2)
R016	· · · · · · · · · · · · · · · · · · ·	5.786E+03			DCNUCU(6,3)
R016			6.000E+04		DCNUCU(6,4)
R016 R016	•	5.784E+03	6.000E+04 6.000E+04		DCNUCU(6,5) DCNUCS(6)
R016			0.000E+04		, ,
R016		0.000E+00 0.000E+00			ALEACH(6)
KUI6 I	Solubility constant	0.000£+00	0.000E+00	not used	SOLUBK(6)
R016 I	Distribution coefficients for Th-230	ı 			
R016		 5.771E+03	6.000E+04		DCNUCC(7)
R016		5.843E+03		· · · · · · · · · · · · · · · · · · ·	DCNUCU(7,1)
R016		5.843E+03 5.843E+03		'	DCNUCU (7,2)
R016		5.882E+03		'	DCNUCU (7, 3)
R016		5.002E+03 5.779E+03			DCNUCU (7,4)
R016		5.860E+03			DCNUCU (7,5)
R016		5.849E+03		· · · · · · · · · · · · · · · · · · ·	DCNUCS(7)
R016		0.000E+00			ALEACH(7)
R016			0.000E+00		SOLUBK(7)
	·		'	·	

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

		User	1	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
R016	Distribution coefficients for Th-232		1	 	
R016	Contaminated zone (cm**3/g)	5.771E+03	6.000E+04		DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.809E+03	6.000E+04		DCNUCU(8,1)
R016	Unsaturated zone 2 (cm**3/g)	5.744E+03	6.000E+04		DCNUCU(8,2)
R016	Unsaturated zone 3 (cm**3/g)	5.769E+03	6.000E+04		DCNUCU(8,3)
R016	Unsaturated zone 4 (cm**3/g)	5.779E+03	6.000E+04		DCNUCU(8,4)
R016	Unsaturated zone 5 (cm**3/g)	5.823E+03	6.000E+04		DCNUCU(8,5)
R016	Saturated zone (cm**3/g)	5.864E+03	6.000E+04		DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.202E-05	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for U-234	 	! 	1 	[[
R016	Contaminated zone (cm**3/g)	1.235E+02	5.000E+01	1	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.261E+02	5.000E+01		DCNUCU(9,1)
R016	Unsaturated zone 2 (cm**3/g)	1.242E+02	5.000E+01	I	DCNUCU(9,2)
R016	Unsaturated zone 3 (cm**3/g)	1.242E+02	5.000E+01		DCNUCU(9,3)
R016	Unsaturated zone 4 (cm**3/g)	1.247E+02	5.000E+01		DCNUCU(9,4)
R016	Unsaturated zone 5 (cm**3/g)	1.257E+02	5.000E+01		DCNUCU(9,5)
R016	Saturated zone (cm**3/g)	1.264E+02	5.000E+01	1	DCNUCS (9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.609E-04	ALEACH(9)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd =-1.762E-01 not used	SOLUBK(9)
R016	Distribution coefficients for U-235	ŀ	! 	! 	!
R016	Contaminated zone (cm**3/g)	1.520E+01	5.000E+01		DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	1.258E+02	5.000E+01	l	DCNUCU(10,1)
R016	Unsaturated zone 2 (cm**3/g)	1.233E+02	5.000E+01		DCNUCU(10,2)
R016	Unsaturated zone 3 (cm**3/g)	1.259E+02	5.000E+01	l	DCNUCU(10,3)
R016	Unsaturated zone 4 (cm**3/g)	1.249E+02	5.000E+01	ļ	DCNUCU(10,4)
R016	Unsaturated zone 5 (cm**3/g)	1.247E+02	5.000E+01		DCNUCU(10,5)
R016	Saturated zone (cm**3/g)	1,244E+02	5.000E+01		DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.508E-03	ALEACH(10)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd = 2.808E+00 not used	SOLUBK(10)
R016	Distribution coefficients for U-236	! !) 	! 	
R016	Contaminated zone (cm**3/g)	1.239E+02	5.000E+01		DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	1.240E+02	5.000E+01		DCNUCU(11,1)
R016	Unsaturated zone 2 (cm**3/g)	1.238E+02	5.000E+01		DCNUCU(11,2)
R016	Unsaturated zone 3 (cm**3/g)	1.239E+02	5.000E+01		DCNUCU(11,3)
R016	Unsaturated zone 4 (cm**3/g)	1.240E+02	5.000E+01		DCNUCU(11,4)
R016	Unsaturated zone 5 (cm**3/g)	1.259E+02	5.000E+01		DCNUCU(11,5)
R016	Saturated cone (cm**3/g)	1.258E+02	5.000E+01		DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.591E-04	ALEACH(11)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd =-1.509E-01 not used	SOLUBK(11)

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File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

	1	User		Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
5016		 	 		
R016 R016	•	1 1 2405.02	 	2 0417.00	l names de
R016	Contaminated zone (cm**3/g)		5.000E+01	<u>'</u>	DCNUCC(12)
R016		•	5.000E+01		DCNUCU(12,1)
R016	·		5.000E+01	'	DCNUCU(12,2)
R016	, , , , , , , , , , , , , , , , , , ,	:	5.000E+01	,	DCNUCU(12,3)
R016	· •	1.240E+02		•	DCNUCU(12,4)
R016	· · · · · · · · · · · · · · · · · · ·	1.262E+02		•	DCNUCU(12,5)
R016		•	5.000E+01	'	DCNUCS(12)
		•	0.000E+00	'	ALEACH(12)
R016	Solubility constant	1 2.940E-06	0.000E+00	Sol. Kd = 3.041E+02 used	SOLUBK(12)
R016		1			1
R016		1 0 0455 00			
R016	Contaminated zone (cm**3/g)	:	2.000E+01	•	DCNUCC(1)
R016		•	2.000E+01	•	DCNUCU(1,1)
			2.000E+01		DCNUCU(1,2)
R016			2.000E+01		DCNUCU(1,3)
R016	,	1	2.000E+01		DCNUCU(1,4)
R016	Unsaturated zone 5 (cm**3/g)	8.147E+02			DCNUCU(1,5)
R016	Saturated zone (cm**3/g)		2.000E+01		DCNUCS(1)
R016	·-		0.000E+00		ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016		1 1	Į.		
R016		1 2 2745.02			
R016	Contaminated zone (cm**3/g)		1.000E+02		DCNUCC(3)
R016			1.000E+02		DCNUCU(3,1)
R016			1.000E+02		DCNUCU(3,2)
R016			1.000E+02		DCNUCU(3,3)
R016	· · · · · · · · · · · · · · · · · · ·	2.352E+03	,		DCNUCU(3,4)
R016	· · · · · · · · · · · · · · · · · · ·	2.380E+03	,		DCNUCU(3,5)
R016		2.360E+03	,		DCNUCS(3)
R016	· • ·		0.000E+00	2.923E-05	ALEACH(3)
1010	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-228	· .	1		<u> </u>
R016	<u> </u>	, 3.490E+03	7.000E+01		DCNUCC(5)
R016	•	3.507E+03	•		DCNUCU(5,1)
R016	Unsaturated zone 2 (cm**3/g)	3.522E+03			DCNUCU (5,2)
R016			7.000E+01		DCNUCU(5,3)
R016	Unsaturated zone 4 (cm**3/g)		7.000E+01	~~~	DCNUCU(5,4)
R016	Unsaturated zone 5 (cm**3/g)	:	7.000E+01		DCNUCU(5,5)
R016	Saturated zone (cm**3/g)		7.000E+01		DCNUCS (5)
R016	Leach rate (/yr)	0.000E+00	•	1.988E-05	ALEACH(5)
R016	Solubility constant		0.000E+00	·	SOLUBK(5)
i	·		1		
R017	Inhalation rate (m**3/yr)	1.140E+04	8.400E+03		INHALR
	Mass loading for inhalation (g/m**3)		1.000E-04		MLINH
	Exposure duration		3.000E+01		ED
	Shielding factor, inhalation		4.000E-01		SHF3
R017	Shielding factor, external gamma		7.000E-01		SHF1
	Fraction of time spent indoors		5.000E-01		FIND
		. '	,	'	

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Parameter Engul	1		User	I	Used by RESRAD	Parameter
Sape factor (Lag. external gemma 1.0000-00 1.0000-00 -1 shows non-circular AREA. FS	Menu	Parameter		Default	·	Name
	R017	Fraction of time spent outdoors (on site)	6.000E-02	2.500E-01		FOTD
	R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
BOIT Outer annular radius (m), cing 2: 8.838Fe0 0.078Fe10 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 3: 1.325Fe10 0.0000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 5: 1.208Fe10 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 5: 1.208Fe10 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 5: 1.208Fe10 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 8: 3.039Fe10 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 8: 3.538Fe10 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 9: 3.938Fe10 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 10: 4.417Ev01 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 11: 4.388Fe10 0.000Fe00 RAD_SHAPE(3) ROIT Outer annular radius (m), cing 12: 5.300Fe10 0.000Fe00 RAD_SHAPE(3) ROIT	R017		İ			I
RAD_SHAPE(1)	R017	Outer annular radius (m), ring 1:	4.417E+00	5.000E+01		RAD_SHAPE(1)
RAD_SHAPE(4) RAD_SHAPE(4) RAD_SHAPE(4) RAD_SHAPE(4) RAD_SHAPE(4) RAD_SHAPE(5	R017	Outer annular radius (m), ring 2:	8.833E+00	7.071E+01	l	RAD_SHAPE(2)
RAD_SHAPE(S) RAD_	R017	Outer annular radius (m), ring 3:	1.325E+01	0.000E+00	1	RAD_SHAPE(3)
RAD_SHAPE(6) RAD_SHAPE(6) RAD_SHAPE(6) RAD_SHAPE(6) RAD_SHAPE(6) RAD_SHAPE(7	R017	Outer annular radius (m), ring 4:	1.767E+01	0.000E+00	l	RAD_SHAPE(4)
RAD_SHAPE(7)	R017	Outer annular radius (m), ring 5:	2.208E+01	0.000E+00		RAD_SHAPE(5)
RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(8) RAD_SHAPE(10) RAD_SHAPE(10) RAD_SHAPE(10) RAD_SHAPE(11) RAD_SHAPE(12) RA	R017	Outer annular radius (m), ring 6:	2.650E+01	0.000E+00		RAD_SHAPE(6)
RAD_SHAPE(9) RAD_SHAPE(9) RAD_SHAPE(9) RAD_SHAPE(9) RAD_SHAPE(9) RAD_SHAPE(10) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(11) RAD_SHAPE(12) RAD_SHAPE	R017	Outer annular radius (m), ring 7:	3.092E+01	0.000E+00		RAD_SHAPE(7)
### RAIS Outer annular radius (m), ring 10;	R017	Outer annular radius (m), ring 8:	3.533E+01	0.000E+00		RAD_SHAPE(8)
RO17 Outer annular radius (m), ring 11:	R017	Outer annular radius (m), ring 9:	3.975E+01	0.000E+00		RAD_SHAPE(9)
RAD_SHAPE(12) RAD_SHAPE(12	R017	Outer annular radius (m), ring 10:	4.417E+01	0.000E+00		RAD_SHAPE(10)
R017 Fractions of annular areas within AREA:	R017	Outer annular radius (m), ring 11:	4.858E+01	0.000E+00		RAD_SHAPE(11)
R017 Ring 1 1.000E+00 1.000E+00 FRACA (1) R017 Ring 2 1.000E+00 2.73ZE-01 FRACA (2) FRACA (2) R017 Ring 2 1.000E+00 2.73ZE-01 FRACA (2) FRACA (3) R017 Ring 4 1.000E+00 0.000E+00 FRACA (4) R017 Ring 5 9.800E-01 0.000E+00 FRACA (4) R017 Ring 5 9.800E-01 0.000E+00 FRACA (5) R017 Ring 7 5.400E-01 0.000E+00 FRACA (7) R017 Ring 7 5.400E-01 0.000E+00 FRACA (7) R017 Ring 9 3.900E-01 0.000E+00 FRACA (8) R017 Ring 9 3.900E-01 0.000E+00 FRACA (8) R017 Ring 10 3.400E-01 0.000E+00 FRACA (9) R017 Ring 10 3.400E-01 0.000E+00 FRACA (10) R017 Ring 11 2.700E-01 0.000E+00 FRACA (10) R017 Ring 12 4.600E-02 0.000E+00 FRACA (12) FRACA (12) R018 Futts, vegetables and grain consumption (kg/yr) not used 1.600E+02 DIET (3) R018 Futts, vegetable consumption (kg/yr) not used 1.600E+02 DIET (3) R018 Futts, vegetable consumption (kg/yr) not used 5.400E+01 DIET (3) R018 Fish consumption (kg/yr) not used 6.300E+01 DIET (6) R018 Fish consumption (kg/yr) not used 5.400E+01 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) R018 Soil ingestion tate (g/yr) R018 Soil inges	R017	Outer annular radius (m), ring 12:	5.300E+01	0.000E+00		RAD SHAPE(12)
R017 Ring 1	ĺ		1		1	l
R017	R017	Fractions of annular areas within AREA:	ſ	1	1	1
R017	R017	Ring 1	1.000E+00	1.000E+00		FRACA (1)
R017 Ring 4	R017	Ring 2	1.000E+00	2.732E-01		FRACA (2)
R017 Ring S	R017	Ring 3	1.000E+00	0.000E+00		FRACA (3)
R017 Ring 6	R017	Ring 4	1.000E+00	0.000E+00		FRACA (4)
R017 Ring 7	R017	Ring 5	9.800E-01	0.000E+00		FRACA (5)
R017	R017	Ring 6	6.900E-01	0.000E+00		FRACA (6)
R017 Ring 9 3.900E-01 0.000E+00 FRACA (9) R017 Ring 10 3.400E-01 0.000E+00 FRACA (10) R107 Ring 11 2.700E-01 0.000E+00 FRACA (11) R017 Ring 12 4.600E-02 0.000E+00 FRACA (12) R018 Fruits, vegetables and grain consumption (kg/yr) not used 1.600E+02 DIET (1) R018 Leafy vegetable consumption (kg/yr) not used 1.400E+01 DIET (2) R018 Maik consumption (L/yr) not used 9.200E+01 DIET (3) R018 Meat and poultry consumption (kg/yr) not used 5.400E+01 DIET (4) R018 Fish consumption (kg/yr) not used 5.400E+00 DIET (5) R018 Other seafcod consumption (kg/yr) not used 5.400E+00 DIET (6) R018 Soil ingestion tate (g/yr) 3.650E+01 3.650E+01 SOIL R018 Drinking water intake (L/yr) 3.650E+01 3.650E+01 DWI R018 Contamination fraction of drinking water 1.000E+00 1.000E+00 FDW R018 Contamination fraction of household water not used 1.000E+00 FIRW R018 Contamination fraction of irrigation water not used 1.000E+00 FIRW R018 Contamination fraction of aquatic food not used 1.000E+00 FIRW R018 Contamination fraction of plant food not used 1.000E+00 FIRW R018 Contamination fraction of plant food not used 1.000E+00 FRACA (12) FRACA (1	R017	Ring 7	5.400E-01	0.000E+00		FRACA (7)
R017 Ring 10	R017	Ring 8	4.400E-01	0.000E+00		FRACA(8)
R017 Ring 11	R017	Ring 9	3.900E-01	0.000E+00		FRACA (9)
R017 Ring 12	R017	Ring 10	3.400E-01	0.000E+00		FRACA(10)
R018 Fruits, vegetables and grain consumption (kg/yr) not used 1.600E+02 DIET(1)	R017	Ring 11	2.700E-01	0.000E+00		FRACA(11)
R018 Leafy vegetable consumption (kg/yr)	R017	Ring 12	4.600E-02	0.000E+00	l	FRACA(12)
R018 Leafy vegetable consumption (kg/yr)	1		!			
R018 Milk consumption (L/yr)	R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02		DIET(1)
R018 Meat and poultry consumption (kg/yr) not used 6.300E+01 DIET(4) R018 Fish consumption (kg/yr) not used 5.400E+00 DIET(5) R018 Other seafood consumption (kg/yr) not used 9.000E-01 DIET(6) R018 Soil ingestion rate (g/yr) 3.650E+01 3.650E+01 SOIL R018 Drinking water intake (L/yr) 4.785E+02 5.100E+02 DWI R018 Contamination fraction of drinking water 1.000E+00 1.000E+00 FDW R018 Contamination fraction of household water not used 1.000E+00 FHW R018 Contamination fraction of livestock water not used 1.000E+00 FIRW R018 Contamination fraction of aquatic food not used 1.000E+00 FR9 R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of meat not used -1 FMEAT R019 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LF15 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LF16	R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01		DIET(2)
R018 Fish consumption (kg/yr) not used 5.400E+00 DIET(5) R018 Other seafood consumption (kg/yr) not used 9.000E-01 DIET(6) R018 Soil ingestion rate (g/yr) 3.650E+01 3.650E+01 SOIL R018 Drinking water intake (L/yr) 4.785E+02 5.100E+02 DWI R018 Contamination fraction of drinking water 1.000E+00 1.000E+00 FDW R018 Contamination fraction of household water not used 1.000E+00 FLW R018 Contamination fraction of livestock water not used 1.000E+00 FLW R018 Contamination fraction of irrigation water not used 1.000E+00 FR9 R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of plant food not used -1 FMEAT R018 Contamination fraction of meat not used -1 FMEAT R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LF15 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LF16	R018	Milk consumption (L/yr)	not used	9.200E+01		DIET(3)
R018 Other seafood consumption (kg/yr) not used 9.000E-01 DIET(6) R018 Soil ingestion rate (g/yr) 3.650E+01 3.650E+01 SOIL R018 Drinking water intake (L/yr) 4.785E+02 5.100E+02 DWI R018 Contamination fraction of drinking water 1.000E+00 1.000E+00 FDW R018 Contamination fraction of household water not used 1.000E+00 FHW R018 Contamination fraction of livestock water not used 1.000E+00 FIRW R018 Contamination fraction of irrigation water not used 1.000E+00 FIRW R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of plant food not used -1 FMEAT R018 Contamination fraction of meat not used -1 FMEAT R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LFI5 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01		DIET(4)
R018 Soil ingestion rate (g/yr) 3.650E+01 3.650E+01 SOIL R018 Drinking water intake (L/yr) 4.785E+02 5.100E+02 DWI R018 Contamination fraction of drinking water 1.000E+00 1.000E+00 FDW R018 Contamination fraction of household water not used 1.000E+00 FHHW R018 Contamination fraction of livestock water not used 1.000E+00 FIRW R018 Contamination fraction of aquatic food not used 5.000E+01 FR9 R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R019 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LFI5 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Fish consumption (kg/yr)	not used	5.400E+00		DIET(5)
R018 Drinking water intake (L/yr) 4.785E+02 5.100E+02 DWI R018 Contamination fraction of drinking water 1.000E+00 1.000E+00 FDW R018 Contamination fraction of household water not used 1.000E+00 FHHW R018 Contamination fraction of livestock water not used 1.000E+00 FLW R018 Contamination fraction of irrigation water not used 1.000E+00 FRW R018 Contamination fraction of aquatic food not used 5.000E+01 FRP R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R019 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 5.500E+01 LFI5 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Other seafood consumption (kg/yr)	not used	9.000E-01		DIET(6)
R018 Contamination fraction of drinking water 1.000E+00 1.000E+00 FDW R018 Contamination fraction of household water not used 1.000E+00 FHHW R018 Contamination fraction of livestock water not used 1.000E+00 FLW R018 Contamination fraction of irrigation water not used 1.000E+00 FRW R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R018 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 5.500E+01 LFI5 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01		SOIL
R018 Contamination fraction of household water not used 1.000E+00 FHHW R018 Contamination fraction of livestock water not used 1.000E+00 FLW R018 Contamination fraction of irrigation water not used 1.000E+00 FIRW R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R018 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LF15 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LF16	R018	Drinking water intake (L/yr)	4.785€+02	5.100E+02		DWI
R018 Contamination fraction of livestock water not used 1.000E+00 FLW R018 Contamination fraction of irrigation water not used 1.000E+00 FIRW R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R018 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LF15 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LF16	R018	Contamination fraction of drinking water	1.000E+00	1.000E+00		FDW
R018 Contamination fraction of irrigation water not used 1.000E+00 FIRW R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R019 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LF15 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LF16	R018	Contamination fraction of household water	not used	1.000E+00		FHHW
R018 Contamination fraction of aquatic food not used 5.000E-01 FR9 R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R018 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LFIS R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFIG	R018	Contamination fraction of livestock water	not used	1.000E+00		FLW
R018 Contamination fraction of plant food not used -1 FPLANT R018 Contamination fraction of meat not used -1 FMEAT R018 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LFI5 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Contamination fraction of irrigation water	not used	1.000E+00		FIRW
R018 Contamination fraction of meat not used -1	R018	Contamination fraction of aquatic food	not used	5.000E-01		FR9
R018 Contamination fraction of milk not used -1 FMILK R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LFI5 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Contamination fraction of plant food	not used	-1		FPLANT
R019 Livestock fodder intake for meat (kg/day) not used 6.800E+01 LFI5 R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Contamination fraction of meat	not used	-1		FMEAT
R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	R018	Contamination fraction of milk	not used	-1	-	FMILK
R019 Livestock fodder intake for milk (kg/day) not used 5.500E+01 LFI6	I		1 1	I		
	R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01		LFI5
R019 Livestock water intake for meat (L/day) not used 5.000E+01 LWI5	R019)	Livestock fodder intake for milk (kg/day)	not used	5.500E+01		LFI6
	R019	Livestock water intake for meat (L/day)	not used	5.000E+01		LWI5

RESRAD, Version 6.5 Th Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

		User	I	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
			 	 	
R019	Livestock water intake for milk (L/day)	not used	1.600E+02		LW16
R019	Livestock soil intake (kg/day)	not used	5.000E-01	'	LSI
R019	•	not used	1.000E-04		MLFD
R019	Depth of soil mixing layer (m)	2.310E-01	1.500E-01		DM
R019		not used	9.000E-01		DROOT
R019	•	1.000E+00	1.000E+00		FGWDW
R019	Household water fraction from ground water	not used	1.000E+00		FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	,	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00		FGWIR
		1	1		ĺ
R19B		not used	7.000E-01		YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	•	YV(2)
R19B		not used	1.100E+00	•	YV (3)
R19B		not used	1.700E-01		TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	'	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02		TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01		TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00		TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00		TIV(3)
R198	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01		RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01		RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01		RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01		RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01		WLAM
		1			l
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05		C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02		C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02		CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01		CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	•	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07		EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10		REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01		AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01		AVFG5
		[
STOR	-	•			
STOR		1.400E+01			STOR_T(1)
STOR		1.000E+00	'		STOR_T(2)
STOR	Milk		1.000E+00		STOR_T(3)
STOR			2.000E+01		STOR_T(4)
STOR			7.000E+00		STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00		STOR_T(6)
STOR		1.000E+00			STOR_T(7)
STOR		1.000E+00			STOR_T(B)
STOR	Livestock fodder	4.500E+01	4.500E+01		STOR_T(9)
1		!		ł	
R021		not used	1.500E-01		FLOORI
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	1	DENSFL

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Site-Specific Parameter Summary (continued)

1		User	1	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		+	 	 	
R021	Total porosity of the cover material	not used	4.000E-01	l	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	l	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	1	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02		PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):	1	1	1	
R021	in cover material	not used	2.000E-06	i	DIFCV
R021	in foundation material	not used	3.000E-07		DIFFL
R021	in contaminated zone soil	not used	2.000E-06		DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00		HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01		REXG
R021	Height of the building (room) (m)	not used	2.500E+00		HRM
R021	Building interior area factor	not used	0.000E+00		FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00		DMFL,
R021	Emanating power of Rn-222 gas	not used	2.500E-01		EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01		EMANA (2)
1		1	1	I	
TITL	Number of graphical time points	1024		·	NPTS
TITL	Maximum number of integration points for dose] 17	J		LYMAX
TITL	Maximum number of integration points for risk	1			KYMAX
1				l	

Summary of Pathway Selections

Pathway	User Selection
1 external gamma	active
2 inhalation (w/o radon)	active
3 plant ingestion	suppressed
4 meat ingestion	suppressed
5 milk ingestion	suppressed
6 aquatic foods	suppressed
7 drinking water	active
8 soil ingestion	active
9 radon	suppressed
Find peak pathway doses	suppressed

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Contamin	ated Zone	Dimensions	Initial Soil Co	ncentrations, pCi/g
Area:	4000.00	square meters	Pa-231	4.000E-02
Thickness:	2.61	meters	Ra-226	4.200E-01
Cover Depth:	1.74	meters	Th-228	8.000E-02
			Th-230	2.300E+00
			Th-232	7.000E-02
			U-234	6.950E+01
			U-235	4.480E+00
			U-236	1.860E+00
			11-239	7 1596+01

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03 TDOSE(t): 2.287E-09 1.817E-09 1.408E-09 1.674E-09 2.391E-09 2.731E-09 3.658E-09 9.925E-09 M(t): 9.149E-11 7.268E-11 5.633E-11 6.697E-11 9.565E-11 1.092E-10 1.463E-10 3.970E-10

 $\label{eq:maximum TDOSE(t): 9.925E-09 mrem/yr at t = 1.000E+03 years} \label{eq:maximum TDOSE(t): 9.925E-09 mrem/yr at t = 1.000E+03 years}$

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 0.000E+00 \ years$

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
							
Pa-231	9.451E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	4.965E-10 0.2171	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	1.759E-09 0.7689	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	5.892E-13 0.0003	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	1.219E-11 0.0053	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	5.342E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	1.326E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	4.125E-21 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	1.920E-11 0.0084	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
-							
Total	2.287E-09 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

	Water		Water Fish		h	Radon		Plant		Meat		Milk		All Pathways*	
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.451E-17	0.0000	
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.965E-10	0.2171	
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.759E-09	0.7689	
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.892E-13	0.0003	
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.219E-11	0.0053	
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.342E-17	0.0000	
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.326E-17	0.0000	
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.125E-21	0.0000	
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.920E-11	0.0084	
						-							_		
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.287E-09	1.0000	

 $[\]ensuremath{^{+}} \text{Sum}$ of all water independent and dependent pathways.

Summary : MTW Pond B Industrial Worker - Deterministic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t \ = 1.000E+00 \ years$

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	2.550E-16 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	4.969E-10 0.2735	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	1.225E-09 0.6744	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	1.769E-12 0.0010	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	7.378E-11 0.0406	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	3.742E-16 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	1.365E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	5.514E-20 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	1.922E-11 0.0106	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	1.817E-09 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Radio	Wate	er	Fish	h	Rado	on	Plan	nt	Meat	=	Mill	k .	All Path	ways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.550E-16	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.969E-10	0.2735
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.225E-09	0.6744
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.769E-12	0.0010
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.378E-11	0.0406
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.742E-16	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.365E-17	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.514E-20	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.922E-11	0.0106
<u></u>												MA:		
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.817E-09	1.0000

^{*}Sum of all water independent and dependent pathways.

RESRAD, Version 6.5

Th Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio~	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio- Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	5.624E-16 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	4.977E-10 0.3535	0.000E+00 0.0000	0.000£+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	5.949E-10 0.4225	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	4.136E-12 0.0029	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	2.921E-10 0.2075	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	1.981E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	1.553E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	5.175E-19 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	1.927E-11 0.0137	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	1.408E-09 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t \ = \ 3.000E+00 \ years$

Radio-	Wate	er	Fis	h	Rado	on	Plan	nt	Mean	:	Mill	•	All Pati	hways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.624E-16	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00.	0.0000	0.000E+00	Ó.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.977E-10	0.3535
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.949E-10	0.4225
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.136E-12	0.0029
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.921E-10	0.2075
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.981E-15	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.553E-17	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.175E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.927E-11	0.0137
-	A		-											
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-09	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio- Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	1.510E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	5.005E-10 0.2989	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	4.744E-11 0.0283	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	1.249E-11 0.0075	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	1.094E-09 0.6537	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	1.784E-14 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	3.257E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	7.120E-18 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	1.944E-11 0.0116	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	1.674E-09 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Radio-	Wate	er	Fis	h	Rado	on	Pla	nt	Mea	t	Mil	k	All Path	hways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.510E-15	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.005E-10	0.2989
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.744E-11	0.0283
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.249E-11	0.0075
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-09	0.6537
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.784E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.257E-17	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.120E-18	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.944E-11	0.0116
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.674E-09	1.0000

 $^{{}^{\}star}\text{Sum}$ of all water independent and dependent pathways.

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio- Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	3.381E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	5.084E-10 0.2126	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	3.451E-14 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	3.703E-11 0.0155	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	1.826E-09 0.7635	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	1.531E-13 0.0001	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	1.479E-16 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	4.887E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	1.993E-11 0.0083	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	2.391E-09 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Radio-	Wat	er	Fis	h	Rade	on	Pla	nt	Mea	t	Mill	k	All Pat	hways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract,	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.381E-15	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.084E-10	0.2126
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.451E-14	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.703E-11	0.0155
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.826E-09	0.7635
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.531E-13	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.479E-16	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.887E-17	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.993E-11	0.0083
												<u> </u>		
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.391E-09	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 1.000E+02 \ years$

Water Independent Pathways (Inhalation excludes radon)

	Groui	nd	Inhala	tion	Rado	on	Pla	nt	Meat		Mil)	<	Soil	1
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	5.754E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	5.371E-10	0.1967	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.586E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.309E-10	0.0479	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.039E-09	0.7468	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.769E-12	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	8.564E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	2.333E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.175E-11	0.0080	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-										-				-
Total	2.731E-09	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 1.000E+02 \ years$

Radio-	Wate	er	Fis	h	Rad	on	Pla	nt	Mea	t	Mill	ς.	All Pati	hways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa~231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	.0.0000	0.000E+00	0.0000	5.754E-15	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.371E-10	0.1967
Th~228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.586E-25	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-10	0.0479
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.039E-09	0.7468
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.769E-12	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.564E-16	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.333E-16	0.0000
U-538	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.175E-11	0.0080
-													4000	
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.731E-09	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	i	Inhala	tion	Rade	on	Plan	nt	Mean	:	Mill	ς.	Soi	l
Radio~ Nuclide	mrem/yr f	ract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	7.917E-15 0	0.000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	6.282E-10 0	.1717	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00 0	0.000	0.000E+00	0.0000	0.000E+00	0.0000	0,000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	4.782E-10 0	.1307	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.505E-09 0	0.6847	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.892E-11 0	0.0052	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.984E-15 0	0.000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	8.790E-16 0	0.000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.793E-11 0	0.0076	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
										-				
Total	3.658E-09 1	.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

	Wate	er	Fisl	n	Rado	on	Plan	nt	Mea	ŧ	Mill	t	All Path	nways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.917E-15	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.282E-10	0.1717
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.782E-10	0.1307
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.505E-09	0.6847
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.892E-11	0.0052
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.984E-15	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.790E-16	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.793E-11	0.0076
										-				
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.658E-09	1.0000

 $^{{}^\}star \text{Sum of all water independent and dependent pathways.}$

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-		-	-				
Nuclide	mrem/yr fract	. mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	2.090E-14 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	1.088E-09 0.109	6 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	0.000E+00 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	3.230E-09 0.325	4 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	5.146E-09 0.518	5 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	3.938E-10 0.039	7 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	1.134E-14 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	5.154E-15 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	6.734E-11 0.006	8 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	9.925E-09 1.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

	Wate	er	Fis	h	Rado	on	Plan	nt	Mea	t	Mill	.	All Path	nways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.090E-14	0.0000
Ra-226	0.000E+00		0.000E+00		0.000E+00		0.000E+00		0.000E+00		0.000E+00		1.088E-09	
Th-228 Th-230	0.000E+00		0.000E+00 0.000E+00		0.000E+00 0.000E+00		0.000E+00 0.000E+00		0.000E+00 0.000E+00		0.000E+00 0.000E+00		0.000E+00 3.230E-09	
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00		0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00		5.146E-09	0.5185
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00		0.000E+00		0.000E+00		3.938E-10	0.0397
0-235	0.000E+00		0.000E+00		0.000E+00		0.000E+00		0.000E+00		0.000E+00		1.134E-14	
U-236 U-238	0.000E+00	*	0.000E+00 0.000E+00		0.000E+00 0.000E+00		0.000E+00 0.000E+00		0.000E+00 0.000E+00		0.000E+00		5.154E-15 6.734E-11	
														-
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.925E-09	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Dose/Source Ratios Summed Over All Pathways Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Thread	DSR(j,t) At Time in Years (mrem/yr)/(pCi/	z)	
(i)	(j)	Fraction	0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02		+03
Pa-231	Pa-231	1.000E+00	3.178E-16 3.183E-16 3.194E-16 3.232E-16 3.345E-16 3.769E-16	5.303E-16 1.752E	-15
Pa-231	Ac-227+D	1.000E+00	2.045E-15 6.057E-15 1.374E-14 3.742E-14 8.419E-14 1.435E-13	1.974E-13 5.208E	-13
Pa-231	∑DSR(j)		2.363E-15 6.375E-15 1.406E-14 3.774E-14 8.453E-14 1.438E-13	1.979E-13 5.225E	-13
Ra-226+D	Ra-226+D	1.000E+00	1.182E-09 1.183E-09 1.185E-09 1.192E-09 1.210E-09 1.279E-09	1.496E-09 2.590E	-09
Ra-226+D	Pb-210+D	1.000E+00	1.633E-18 4.838E-18 1.098E-17 2.992E-17 6.742E-17 1.138E-16	1.466E-16 3.020E	-16
Ra-226+D	∑DSR(j)		1.182E-09 1.183E-09 1.185E-09 1.192E-09 1.210E-09 1.279E-09	1.496E-09 2.590E	-09
Th-228+D	Th-228+D	1.000E+00	2.198E-08 1.532E-08 7.436E-09 5.930E-10 4.314E-13 4.482E-24	0.000E+00 0.000E	+00
Th-230	Th-230	1.000E+00	5.972E-27 6.994E-27 7.037E-27 7.189E-27 7.644E-27 9.472E-27	1.748E-26 1.492E	-25
Th-230	Ra-226+D	1.000E+00	2.562E-13 7.692E-13 1.798E-12 5.433E-12 1.610E-11 5.690E-11	2.079E-10 1.404E	-09
Th-230	Pb-210+D	1.000E+00	2.365E-22 1.643E-21 8.533E-21 7.186E-20 5.163E-19 3.649E-18	1.806E-17 1.573E	-16
Th-230	∑DSR(j)		2.562E-13 7.692E-13 1.798E-12 5.433E-12 1.610E-11 5.690E-11	2.079E-10 1.404E	-09
Th-232	Th-232	1.000E+00	9.123E-30 9.154E-30 9.217E-30 9.441E-30 1.011E-29 1.284E-29	2.545E-29 2.786E	-28
Th-232	Ra-228+D	1.000E+00	1.673E-12 1.332E-11 2.785E-11 5.869E-11 8.188E-11 9.238E-11	1.212E-10 3.133E	-10
Th-232	Th-228+D	1.000E+00	1.695E-10 1.041E-09 4.145E-09 1.557E-08 2.600E-08 2.904E-08	3.566E-08 7.320E	-08
Th-232	∑DSR(j)		1.742E-10 1.054E-09 4.173E-09 1.563E-08 2.608E-08 2.913E-08	3.578E-08 7.352E	-08
U-234	U-234	1.000E+00	2.863E-28 2.871E-28 2.886E-28 2.940E-28 3.099E-28 3.727E-28	6.315E-28 3.998E	-27
U-234	Th-230	1.000E+00	3.139E-32 9.441E-32 2.215E-31 6.776E-31 2.081E-30 8.340E-30	4.363E-29 1.037E	-27
U-234	Ra-226+D	1.000E+00	7.686E-19 5.385E-18 2.851E-17 2.566E-16 2.203E-15 2.546E-14	2.722E-13 5.666E	-12
U-234	Pb-210+D	1.000E+00	5.330E-28 7.950E-27 9.161E-26 2.325E-24 5.059E-23 1.309E-21	2.146E-20 6.16BE	-19
U-234	∑DSR(j)		7.686E-19 5.385E-18 2.851E-17 2.566E-16 2.203E-15 2.546E-14	2.722E-13 5.666E	-12
U-235+D	U-235+D	1.000E+00	2.943E-18 2.936E-18 2.923E-18 2.878E-18 2.752E-18 2.354E-18	1.507E-18 3.160E	-19
U-235+D	Pa-231	1.000E+00	3.358E-21 1.007E-20 2.348E-20 7.021E-20 2.023E-19 6.507E-19	1.892E-18 8.500E-	-18
U-235+D	Ac-227+D	1.000E+00	1.445E-20 1.002E-19 5.190E-19 4.322E-18 3.005E-17 1.882E-16	6.626E-16 2.522E-	-15
U-235+D	∑DSR(j)		2.961E-18 3.047E-18 3.466E-18 7.270E-18 3.301E-17 1.912E-16	6.660E-16 2.530E	-15
			•		
U-236	U-236	1.000E+00	1.208E-29 4.219E-29 4.242E-29 4.324E-29 4.564E-29 5.516E-29	9.479E-29 6.305E-	-28
U-236	Th-232	1.000E+00	2.251E-40 6.773E-40 1.590E-39 4.876E-39 1.508E-38 6.195E-38	3.478E-37 1.059E-	-35
U-236	Ra-228+D	1.000E+00	7.761E-23 5.259E-22 2.587E-21 1.830E-20 9.227E-20 4.097E-19	1.614E-18 1.184E-	-17
U-236	Th-228+D	1.000E+00	2.140E-21 2.912E-20 2.757E-19 3.810E-18 2.618E-17 1.250E-16	4.709E-16 2.759E-	-15
U-236	∑DSR(j)		2.218E-21 2.965E-20 2.782E-19 3.828E-18 2.627E-17 1.254E-16	4.726E-16 2.771E	-15
U-238	U-238	5.400E-05	0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00	0.000E+00 0.000E	+00
U-238+D	U-238+D	9.999E-01	2.681E-13 2.685E-13 2.692E-13 2.715E-13 2.784E-13 3.038E-13	3.900E-13 9.351E-	-13
U-238+D	U-234	9.999E-01	.061E-34 1.221E-33 2.865E-33 8.766E-33 2.693E-32 1.080E-31	5.660E-31 1.348E-	-29
U-238+D	Th-230	9.999E-01	2.967E-38 2.082E-37 1.107E-36 1.009E-35 9.005E-35 1.190E-33	1.869E-32 1.494E-	-30
U-238+D	Ra-226+D	9.999E~01	6.448E-25 8.178E-24 9.558E-23 2.551E-21 6.356E-20 2.425E-18	7.795E-17 5.503E-	-15
U-238+D	Pb-210+D	9.999E~01	3.026E-34 9.338E-33 2.331E-31 1.762E-29 1.142E-27 1.045E-25	5.617E-24 5.805E-	-22
U-238+D	∑D\$R(j)		2.681E-13 2.685E-13 2.692E-13 2.715E-13 2.784E-13 3.038E-13	3.901E-13 9.406E-	-13

The DSR includes contributions from associated (half-life \le 180 days) daughters.

RESRAD, Version 6.5

Th Limit = 180 days

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Summary : MTW Pond B Industrial Worker - Deterministic Run

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Single Radionuclide Soil Guidelines G(i,t) in pCi/g Basic Radiation Dose Limit = 2.500E+01 mrem/yr

						Ci		
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05
U-236	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07
U-235	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06
U-234	*6,247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05
Th-230	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	1.780E+10
Th-228	l.137E+09	1.632E+09	3.362E+09	4.216E+10	5.795E+13	*8.195E+14	*8.195E+14	*8.195E+14
Ra-226	2.115E+10	2.113E+10	2.110E+10	2.098E+10	2.065E+10	1.955E+10	1.671E+10	9.653E+09
Pa-231	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	44.723E+10	*4.723E+10	*4.723E+10	*4.723E+10
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Nuclide								

^{*}At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g) and Single Radionuclide Soil Guidelines G(i,t) in pCi/g at tmin = time of minimum single radionuclide soil guideline and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	<pre>Initial (pCi/g)</pre>	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pa-231	4.000E-02	1.000E+03	5.225E-13	*4.723E+10	5.225E-13	*4.723E+10
Ra-226	4.200E-01	1.000E+03	2.590E-09	9.653E+09	2.590E-09	9.653E+09
Th-228	B.000E-02	0.000E+00	2.198E-08	1.137E+09	0.000E+00	*8.195E+14
Th-230	2.300E+00	1.000E+03	1.404E-09	1.780E+10	1.404E-09	1.780E+10
Th-232	7.000E-02	1.000E+03	7.352E-08	*1.097E+05	7.352E-08	*1.097E+05
U-234	6.950E+01	1.000E+03	5.666E-12	*6.247E+09	5.666E-12	+6.247E+09
U-235	4.480E+00	1.000E+03	2.530E-15	*2.161E+06	2.530E-15	*2.161E+06
U-236	1.860E+00	1.000E+03	2.7718-15	*6.468E+07	2.771E-15	*6.468E+07
U-238	7.159E+01	1.000E+03	9.406E-13	*3.361E+05	9.406E-13	*3.361E+05

^{*}At specific activity limit

Summary : MTW Pond B Industrial Worker - Deterministic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_B_IW-DET.RAD

Individual Nuclide Dose Summed Over All Pathways Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)					DOSE(j,t)	mrem/vr			
(j)	(i)	1111 (1)	t =	0 0005+00	1 BOOE+00	3 0006+00		-	1 0005+02	3.000E+02	1 000£+03
						3.0002700				7.0008.02	
Pa-231	Pa-231	1.000E+00		1.271E-17	1.273E-17	1.278E-17	1.293E-17	1.338E-17	1.508E-17	2.121E-17	7.007E-17
Pa-231	U-235	1.000E+00		1.504E-20	4.511E-20	1.052E~19	3.146E-19	9.062E-19	2.915E-18	8.478E-18	3.808E-17
Pa-231	∑DOSE(j)		1.273E-17	1.278E-17	1.288E-17	1.324E-17	1.428E-17	1.799E-17	2.969E-17	1.082E-16
			•								
Ac-227	Pa-231	1.000E+00		8.180E-17	2.423E-16	5.497E-16	1.497E-15	3.368E-15	5.739E-15	7.896E-15	2.083E-14
Ac-227	U-235	1.000E+00		6.472E-20	4.490E-19	2.325E-18	1.936E-17	1.346E-16	8.430E-16	2.968E-15	1.130E-14
Ac-227	∑DOSE(j)		8.186E-17	2.427E-16	5.520E-16	1.516E-15	3.502E-15	6.582E-15	1.086E-14	3.213E-14
Ra-226	Ra-226	1.000E+00		4.965E-10	4.969E-10	4.977E-10	5.005E-10	5.084E-10	5.371E-10	6.282E-10	1.088E-09
Ra-226	Th-230	1.000E+00		5.892E-13	1.769E-12	4.136E-12	1.249E-11	3.703E-11	1.309E-10	4.782E-10	3.230E-09
Ra-226	U-234	1.000E+00		5.342E-17	3.742E-16	1.981E-15	1.784E-14	1.531E-13	1.769E-12	1.892E-11	3.938E-10
Ra-226	U-238	9.999E-01		3.900E-23	5.855E-22	6.842E-21	1.826E-19	4.550E-18	1.736E-16	5.580E-15	3.939E-13
Ra-226	∑DOSE(j)		4.971E-10	4.987E-10	5.019E-10	5.130E-10	5.456E-10	6.697E-10	1.125E-09	4.711E-09
Pb-210	Ra-226	1.000E+00		6.859E-19	2.032E-18	4.611E-18	1.257E-17	2.831E-17	4.781E-17	6.159E-17	1.269E-16
Pb-210	Th-230	1.000E+00		5.439E-22	3.778E-21	1.963E-20	1.653E-19	1.187E-18	8.392E-18	4.154E-17	3.617E-16
Pb-210	U-234	1.000E+00		3.704E-26	5.526E-25	6.367E-24	1.616E-22	3.516E-21	9.094E-20	1.491E-18	4.287E-17
Pb-210	U-238	9.999E-01		0.000E+00	0.000E+00	0.000E+00	1.261E-27	8.175E-26	7.479E-24	4.021E-22	4.155E-20
Pb-210	∑DOSE(j)		6.864E-19	2.036E-18	4.631E-18	1.273E-17	2.951E-17	5.629E-17	1.046E-16	5.315E-16
Th-228	Th-228	1.000E+00		1.759E-09	1.225E-09	5.949E-10	4.744E-11	3.451E-14	3.586E-25	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00		1.186E-11	7.285E-11	2.902E-10	1.090E-09	1.820E-09	2.033E-09	2.496E-09	5.124E-09
Th-228	U-236	1.000E+00		3.980E-21	5.416E-20	5.127E-19	7.086E-18	4.870E-17	2.326E-16	8.760E-16	5.132E-15
Th-228	∑DOSE(j)		1.770E-09	1.298E-09	8.851E-10	1.138E-09	1.820E-09	2.033E-09	2.496E-09	5.124E-09
Th-230		1.000E+00		1.604E-26	1.609E-26	1.618E-26	1.654E-26	1.758E-26	2.179E-26	4.020E-26	3.433E-25
Th-230	U-234	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.447E-28	5.796E-28	3.032E-27	7.209E-26
Th-230	U-238	9.999E-01		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.069E-28
Th-230	∑DOSE(j)		1.604E-26	1.609E-26	1.618E-26	1.654E-26	1.772E-26	2.236E-26	4.324E-26	4.155E-25
Th-232		1.000E+00								1.781E-30	
Th-232	U-236	1.000E+00								0.000E+00	
Th-232	∑DOSE(j)		6.386E-31	6.408E-31	6.452E-31	6.608E-31	7.076E-31	8.989E-31	1.781E-30	1.950E-29
		1.000E+00								8.483E-12	
	U-236	1.000E+00								3.003E-18	
Ra-228	∑DOSE(j)		3.271E-13	9.324E-13	1.949E-12	4.108E-12	5.731E-12	6.466E-12	8.483E-12	2.193E-11
	224	1 0005.00		1 0000 00	1 0055 05		2 2425 26	0 1548 05	2 500= 25	. 2000 26	0 3300 00
U-234	U-234	1.000E+00								4.389E-26	
U-234	U-238	9.999E-01								0.000E+00	
U-234	∑DOSE(j)		1.9908-26	1.995€-26	2.006E-26	2.043E-26	2.154E-26	2.59UE-26	4.389E-26	2.788E-25
11 225	U-235	1.000E+00		1 210E 17	1 2150 12	1 3105 17	1 2005-17	1 2225-17	1 0550-17	6.750E-18	1 4165 10
U-235	0-235	1.0006.400		1.3186-17	1.3156-17	1.3106-17	1.2896-17	1.2336-17	1.0556-17	6.750E-18	1.416E-18
0.226		1 0000.00		7 0275 20	7 0405 20	7 0015 20	0.0435.30	0 4005-30	1 0265 20	1 7638-20	1 1720 27
U-236	U-236	1.000E+00		7.02/E-29	7.048E-29	1.8916-29	6.U42E-29	0.4096-29	1.020E-28	1.763E-28	1.1/3E-2/
U-238	U-238	5.400E-05		0.000#+00	0.000F+00	0 0005+00	0.0005+00	0.000#+00	0.000#+00	0.000E+00	0 000=+00
U-238	U-238	9.999E-01								2.792E-11	
U-238	∑DOSE(j									2.792E-11 2.792E-11	
3 230	20002()					2.7276 11	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			2,,,,,,,	5.054E II

Summary : MTW Pond B Industrial Worker - Deterministic Run

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Individual Nuclide Soil Concentration Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	t=	0.000E+00	1.000E+00	3.000E+00	S(j,t), 1.000E+01		1.000E+02	3.000E+02	1.000E+03
Pa-231	Pa-231	1.000E+00		4.000E-02	3.999E-02	3.998E-02	3.992E-02	3.975E-02	3.918E-02	3.760E-02	3.254E-02
Pa-231	U-235	1.000E+00		0.000E+00	9.457E-05	2.824E-04	9.259E-04	2.651E-03	7.546E-03	1.501E-02	1.768E-02
Pa-231	ΣS(j):			4.000E-02	4.009E-02	4.026E-02	4.084E-02	4.240E-02	4.673E-02	5.261E-02	5.022E-02
Ac-227	Pa-231	1.000E+00		0.000E+00	1.253E-03	3.642E-03	1.089E-02	2.449E-02	3.768E-02	3.774E-02	3.266E-02
Ac-227	U-235	1.000E+00		0.000E+00	1.491E-06	1.309E-05	1.339E-04	9.617E-04	5.506E-03	1.417E-02	1.771E-02
Ac-227	Σs(j):			0.000E+00	1.255E-03	3.655E-03	1.102E-02	2.546E-02	4.319E-02	5.191E-02	5.038E-02
	-										
Ra-226	Ra-226	1.000E+00		4.200E-01	4.198E-01	4.194E-01	4.181E-01	4.143E-01	4.014E-01	3.666E-01	2.670E-01
Ra-226	Th-230	1.000E+00		0.000E+00	9.962E-04	2.987E-03	9.940E-03	2.968E-02	9.731E-02	2.786E-01	7.923E-01
Ra-226	U-234	1.000E+00		0.000E+00	1.355E-07	1.218E-06	1.350E-05	1.207E-04	1.309E-03	1.100E-02	9.656E-02
Ra-226	U-238	9.999E-01		0.000E+00	1.319E-13	3.558E-12	1.315E-10	3.528E-09	1.278E-07	3.240E-06	9.655E-05
Ra-226	∑S(j):			4.200E-01	4.208E-01	4.224E-01	4.281E-01	4.441E-01	5.000E-01	6.562E-01	1.156E+00
Pb-210	Ra-226	1.000E+00		0.000E+00	1.285E-02	3.737E-02	1.119E-01	2.526E-01	3.880E-01	3.717E-01	2.707E-01
Pb-210	Th-230	1.000E+00		0.000E+00	1.532E-05	1.351E-04	1.397E-03	1.040E-02	6.768E-02	2.502E-01	7.714E-01
Pb-210	U-234	1.000E+00		0.000E+00	1.393E-09	3.701E-08	1.298E-06	3.024E-05	7.294E-04	8.966E-03	9.138E-02
Pb-210	U-238	9.999E-01		0.000E+00	1.018E-15	8.144E-14	9.619E-12	6.911E-10	5.966E-08	2.413E-06	8.853E-05
Pb-210	∑S(j):			0.000E+00	1.287E-02	3.750E-02	1.133E-01	2.630E-01	4.564E-01	6.308E-01	1.134E+00
Th-228	Th-228	1.000E+00		8.000E-02	5.568E-02	2.698E-02	2.136E-03	1.522E-06	1.470E-17	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00		0.000E+00	1.305E-03	8.702E-03	3.950E-02	6.715E-02	6.991E-02	6.974E-02	6.916E-02
Th-228	U-236	1.000E+00		0.000E+00	5.932E-13	1.279E-11	2.411E-10	1.758E-09	7.954E-09	2.443E-08	6.924E-08
Th-228	∑S(j):			8.000E-02	5.699E-02	3.568E-02	4.164E-02	6.715E-02	6.991E-02	6.974E-02	6.916E-02
Th-230	Th-230	1.000E+00		2.300E+00	2.300E+00	2.300E+00	2.300E+00	2.299E+00	2.295E+00	2.286E+00	2.252E+00
Th-230	U-234	1.000E+00		0.000E+00	6.254E-04	1.875E-03	6.238E-03	1.861E-02	6.077E-02	1.721E-01	4.728E-01
Th-230	U-238	9.999E-01		0.000E+00	9.132E-10	8.214E-09	9.110E-08	8.154E-07	8.891E-06	7.583E-05	7.010E-04
Th-230	∑S(j):			2.300E+00	2.301E+00	2.302E+00	2.306E+00	2.317E+00	2.356E+00	2.458E+00	2.726E+00
•											
Th-232	Th-232	1.000E+00		7.000E-02	7.000E-02	7.000E-02	6.999E-02	6.997E-02	6.992E-02	6.975E-02	6.916E-02
Th-232	U-236	1.000E+00		0.000E+00	9.174E-11	2.750E-10	9.150E-10	2.729E-09	8.919E-09	2.530E-08	6.983E-08
Th-232	∑S(j):			7.000E-02	7.000E-02	7.000E-02	6.999E-02	6.997E-02	6.992E-02	6.975E-02	6.916E-02
Ra-228	Th-232	1.000E+00		0.000E+00	7.949E-03	2.124E-02	4.902E-02	6.809E-02	6.991E-02	6.974E-02	6.916E-02
Ra-228	U-236	1.000E+00		0.000E+00	5.314E-12	4.426E-11	3.836E-10	1.998E-09	8.195E-09	2.465E-08	6.939E-08
Ra-228	∑s(j):			0.000E+00	7.949E-03	2.124E-02	4.902E-02	6.809E-02	6.991E-02	6.974E-02	6.916E-02
U-234	U-234	1.000E+00		6.950E+01	6.946E+01	6.938E+01	6.911E+01	6.833E+01	6.569E+01	5.869E+01	3.955E+01
U-234	U-238	9.999E-01						6.016E-03			
U-234	∑s(j):			6.950E+01	6.946E+01	6.938E+01	6.911E+01	6.834E+01	6.571E+01	5.874E+01	3.969E+01
U-235	U-235	1.000E+00		4.480E+00	4.460E+00	4.420E+00	4.283E+00	3.913E+00	2.854E+00	1.159E+00	4.939E-02
U-236	U-236	1.000E+00		1.860E+00	1.859E+00	1.857E+00	1.850E+00	1.829E+00	1.759E+00	1.573E+00	1.063E+00
U-238	U-238	5.400E-05		3.866E-03							
U-238	U-238	9.999E-01		7.159E+01							
U-238	∑S(j):			7.159E+01	7.157E+01	7.154E+01	7.143E+01	7.110E+01	6.998E+01	6.686E+01	5.700E+01

 $\ensuremath{\mathsf{THF}}(i)$ is the thread fraction of the parent nuclide.

APPENDIX P

Pond C Deterministic Dose Assessment Report

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

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Time = 0.000E+00	15
Time = 1.000E+00	16
Time = 3.000E+00	17
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Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

Dose Conversion Factor (and Related) Parameter Summary $\mbox{Dose Library: FGR 12 \& FGR 11}$

		Current	Base	Parameter
Menu	Parameter	Value#	Case*	Name
		l	 	
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)		l	l
A-1	Ac~227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1(1)
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(2)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(3)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(4)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1(5)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(6)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(7)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1(8)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1(9)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1 (10)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(11)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(12)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1(13)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(14)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(15)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(16)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(17)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(19)
A-1	Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1(20)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(21)
A-1	Po-218 (Source: FGR 12)		5.642E-05	
A-1	Ra-223 (Source: FGR 12)		6.034E-01	
A-1	Ra-224 (Source: FGR 12)	5.119E~02	5.119E-02	DCF1(24)
A-1	Ra-226 (Source: FGR 12)		3.176E-02	
A-1	·		0.000E+00	
A-1	Rn-219 (Source: FGR 12)		3.083E-01	
A-1	Rn-220 (Source: FGR 12)		2.298E-03	
A-1	Rn-222 (Source: FGR 12)		2.354E-03	
	Th-227 (Source: FGR 12)		5.212E-01	
A-1	Th-228 (Source: FGR 12)		7.940E-03	
			1.209E-03	
	Th-231 (Source: FGR 12)		3.643E-02	
	•		5.212E-04	
			2.410E-02	
	T1-207 (Source: FGR 12)		1.980E-02	
			2.298E+01	
	T1-210 (Source: no data)		-2.000E+00	
	U-234 (Source: FGR 12)		4.017E-04	
	U-235 (Source: FGR 12)		7.211E-01	
A-1	U-236 (Source: FGR 12)		2,148E-04	
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1 (42)
_		!	 	
	Dose conversion factors for inhalation, mrem/pCi:	1		
			6.700E+00	
			1.280E+00	
			1.360E-02	
B-1	•		8.580E-03	
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(5)

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

	1	Current	Base	Parameter
Menu	Parameter	Value#	Case*	Name
		 	 	
B-1	Th-228+D	3.454E-01		:
B-1	Th-230	•	3.260E-01	•
		1.640E+00	•	•
B-1	U-234	1.320E-01		-
B-1	U-235+D		1.230E-01	
	,	1.250E-01		
B-1	•	1.180E-01		
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(13)
			1	1
D-1	Dose conversion factors for ingestion, mrem/pCi:	1 1 4905 02	1 1 1105 00	[ncm2/ 1)
D-1	Ac-227+D	1.480E-02		•
	•	1.060E-02	•	•
D-1	•	7.276E-03		
	'	1.321E-03		
	•	1.442E-03	•	•
	•	8.086E-04		
D-1		5.480E-04		
	•	2.730E-03		:
		2.830E-04		
		2.673E-04		•
	,	2.690E-04	•	
	•	2.550E-04		
D-1	U-238+D	2.68/E-04	2.550E-04	1 DCF3 (13)
D=34	 Food transfer factors:	 	l , I	f 1
	'	2.500E-03	1 2.500E-03	RTF(1,1)
	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		2.000E-05	:
	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		2.000E-05	
D-34		1	2.0002 00 	l
	•	1.000E-02	1.000E-02	RTF(2,1)
	•	5.000E-03	•	
	Pa~231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-06	
D-34		1	}	1
	•	1.000E-02	1.000E-02	RTF(3,1)
	Pb~210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		8.000E-04	
	•	3.000E-04		
D-34		1	1	1
	•	4.000E-02	4.000E-02	RTF(4,1)
	•	1.000E-03		
	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)		1.000E-03	
D-34		1		l
	•	4.000E-02	4.000E-02	RTF(5,1)
		1.000E-03		
	•	1.000E-03		
		1 2,0000 03	1.0000-03	3,37
D-34		 1.000E-03	: 1 000=-03	RTF(6,1)
		1.000E-03		
		1.000E-04 5.000E-06		
		5.000E-00	3.000L-00	1 (0,5)
D-34	I	'	,	

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

	ı		Current	Base	Parameter
Menu	1	Parameter	Value#	Case*	Name
	 		J	ļ	
D-34	Th-230	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	, RTF(7,1)
D-34	Th-230	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th~230	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34			l	I	1
D-34	Th~232	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th~232	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th~232	, $milk/livestock-intake ratio$, $(pCi/L)/(pCi/d)$	5.000E-06	5.000E-06	RTF(8,3)
D-34	l		l	l	1
D-34	U-234	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-234	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-234	, milk/livestock-intake ratio, $(pCi/L)/(pCi/d)$	6.000E-04	6.000E-04	RTF(9,3)
D-34	1		!	1	I
D-34	U-235+D	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
	U-235+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	•	3.400E-04	
	U-235+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34					
	U-236	, plant/soil concentration ratio, dimensionless		2.500E-03	
	U-236	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	•	3.400E-04	
	U-236	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34	<u>'</u>			1 2 500= 03	
	U-238	•	2.500E-03	•	
	U-238	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.400E-04	
D-34	U-238	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	0.000E-04 	6.000E-04	KIE (12, 3)
	 U-238+D	, plant/soil concentration ratio, dimensionless	· 2 500E-03	 2.500E-03	! ድጥም <i>!</i> 13 11
	U-238+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.400E-04	
	U-238+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)		6.000E-04	
		, made, 121000000 200000 20000, (pol/ 2// (pol/ 4/	0.077 		
D-5	Bioaccumu	lation factors, fresh water, L/kg:	i I	, 	,
D-5	Ac-227+D	, fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D	, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5			1		1
D-5	Pa-231	, fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231	, crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5			1		
D-5	Pb-210+D	, fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5	1				
D-5	Ra-226+D	, fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5	'			1	
D-5	Ra-228+D				BIOFAC(5,1)
	Ra-228+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5					
	Th-228+D				BIOFAC(6,1)
D-5	Th-228+D	, crustacea and mollusks			BIOFAC(6,2)
D-5					
	Th-230				BIOFAC(7,1)
D-5	Th-230				BIOFAC(7,2)
D-5			. 1	l	

RESRAD, Version 6.5 The Limit = 180 days

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Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

Menu	 	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Th-232	, fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-232	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5	1		1		
D-5	U-234	, fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-234	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)
D-5	1		l	l	1
D-5	U-235+D	, fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-235+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
D-5	1		I		
D-5	U-236	, fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-236	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC (11,2)
D-5			(1
D-5	U-238	, fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-238	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5	1		i i		1
D-5	U-238+D	, fish			BIOFAC(13,1)
D-5	U-238+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

^{*}Base Case means Default.Lib w/o Associate Nuclide contributions.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

Site-Specific Parameter Summary

		User		Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		 	ļ	 	
R011	Area of contaminated zone (m**2)	4.000E+03	1.000E+04		AREA
R011	Thickness of contaminated zone (m)	2.724E+00	2.000E+00	l	THICKO
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00		SUBMFRACT
R011	Length parallel to aquifer flow (m)	9.400E+01	1.000E+02		LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01		BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00		TI I
R011	Times for calculations (yr)	1.000E+00	1.000E+00		T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	l	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01		T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01		T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	l	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02		T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	l	T(8)
R011	Times for calculations (yr)	not used	0.000E+00		T (9)
R011	Times for calculations (yr)	not used	0.000E+00		T(10)
		1]	1	ĺ
R012	Initial principal radionuclide (pCi/g): Pa-231	1.300E-01	0.000E+00		S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-226	3.100E-01	0.000E+00		S1(4)
R012	Initial principal radionuclide (pCi/g): Th-228	5.000E-02	0.000E+00		S1(6)
R012	Initial principal radionuclide (pCi/g): Th-230	1.560E+00	0.000E+00		\$1(7)
R012	Initial principal radionuclide (pCi/g): Th-232	5.000E-02	0.000E+00		\$1(8)
R012	Initial principal radionuclide (pCi/g): U-234	1.368E+02	0.000E+00	i	S1(9)
R012	Initial principal radionuclide (pCi/g): U-235	7.310E+00	0.000E+00		S1(10)
R012	Initial principal radionuclide (pCi/g): U-236	3.270E+00	0.000E+00		S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	1.416E+02	0.000E+00		S1(12)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00		W1 (2)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00		W1 (4)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00		W1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00		W1(7)
R012		not used	0.000E+00		W1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		W1 (9)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		W1 (10)
R012	Concentration in groundwater (pCi/L): U-236	not used	0.000E+00		W1(11)
R012		not used	0.000E+00		W1(12)
					1
R013	Cover depth (m)	1.510E+00	0.000E+00	***	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00		DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03		l vcv
R013		1.600E+00	1.500E+00		DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03		vcz
		4.000E-01	4.000E-01		TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01		FCCZ
	Contaminated zone hydraulic conductivity (m/yr)				HCCZ
R013		5.300E+00			BCZ
R013	•	3.300E+00		'	MIND
R013		not used			HUMID
	•	5.000E-01			EVAPTR
		1.250E+00	-		PRECIP
	•	0.000E+00			RI
	•	overhead			IDITCH
	-				

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

		User	I	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		ļ	· 	<u> </u>	<u> </u>
R013	Runoff coefficient	4.000E-01	2.000E-01		RUNOFF
R013	Watershed area for nearby stream or pond (m**2)		1.000E+06		WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03		EPS
İ		l .	1	t	l
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00		DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01		TPSZ
R014	Saturated zone effective porosity	1 2.000E-01	2.000E-01	J	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01		FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02		HCSZ
R014	Saturated zone hydraulic gradient	4.800E-03	2.000E-02		HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00		BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	l	VWT
R014	Well pump intake depth (m below water table)	1.050E+02	1.000E+01		DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	-	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02		UW
1		1		1	1
R015	Number of unsaturated zone strata	5	1		NS NS
R015	Unsat. zone 1, thickness (m)	6.860E+00	4.000E+00	-	H(1)
R015	Unsat, zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ (1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01		TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01		EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01		FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00		BUZ (1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.262E+02	1.000E+01		HCUZ(1)
		i		l	l
R015	Unsat. zone 2, thickness (m)	1.710E+00	0.000E+00		H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01		TPUZ(2)
R015	Unsat. zone 2, effective porosity	2.000E-01	2.000E-01		EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01		FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	5.300E+00	5.300E+00		BUZ(2)
R015	Unsat, zone 2, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		HCU2 (2)
1		[•		1
R015	Unsat, zone 3, thickness (m)	1.710E+00	0.000E+00		H(3)
R015	Unsat. zone 3, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ (3)
R015	Unsat. zone 3, total porosity	4.000E-01	4.000E-01		TPUZ(3)
R015	Unsat. zone 3, effective porosity	2.000E-01	2.000E-01		EPUZ(3)
R015	Unsat. zone 3, field capacity	2.000E-01	2.000E-01		FCUZ(3)
R015	Unsat. zone 3, soil-specific b parameter	5.300E+00	5.300E+00		BUZ (3)
R015	Unsat. zone 3, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	_ 	HCUZ(3)
		J !	J	l I	
R015	Unsat. zone 4, thickness (m)	4.000E+00	0.000E+00		H (4)
R015	Unsat. zone 4, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ (4)
R015	Unsat. zone 4, total porosity	4.000E~01	4.000E-01		TPUZ (4)
R015	Unsat. zone 4, effective porosity	2.000E-01	2.000E-01		EPUZ (4)
R015	Unsat. zone 4, field capacity	2.000E-01	2.000E-01		FCUZ (4)
R015	Unsat. zone 4, soil~specific b parameter	5.300E+00	5.300E+00		BUZ (4)
R015	Unsat. zone 4, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		HCUZ (4)

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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1		User	1	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		1		 	
R015	Unsat. zone 5, thickness (m)	1.140E+00	0.000E+00		H(5)
R015	Unsat. zone 5, soil density (g/cm**3)		1.500E+00		DENSUZ (5)
R015	Unsat. zone 5, total porosity	4.000E~01	4.000E-01		TPUZ(5)
R015	Unsat. zone 5, effective porosity	2.000E~01	2.000E-01	l ,	EPUZ(5)
R015	Unsat. zone 5, field capacity	2.000E-01	2.000E-01		FCU2 (5)
R015	Unsat. zone 5, soil-specific b parameter	5.300E+00	5.300E+00		BUZ (5)
R015	Unsat. zone 5, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		HCUZ(5)
		1	}	l	
R016	Distribution coefficients for Pa-231	1		l	
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS (2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.713E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
f		1	i I		
R016	Distribution coefficients for Ra-226	1		l	l
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		DCNUCC (4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(4,2)
R016	Unsaturated zone 3 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(4,3)
R016	Unsaturated zone 4 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(4,4)
R016	Unsaturated zone 5 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(4,5)
R016	Saturated zone (cm**3/g)	7.00DE+01	7.000E+01		DCNUCS (4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.225E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
!		1			
R016	Distribution coefficients for Th-228	1			
R016	Contaminated zone (cm**3/g)	•	6.000E+04		DCNUCC (6)
R016			6.000E+04		DCNUCU(6,1)
R016	•		6.000E+04		DCNUCU(6,2)
R016	•		6.000E+04		DCNUCU(6,3)
R016	-	•	6.000E+04		DCNUCU(6,4)
R016	•		6.000E+04		DCNUCU (6,5)
R016	-		6.000E+04		DCNUCS (6)
R016			0.000£+00 (1.434E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
	[ļ		
R016	Distribution coefficients for Th-230]	, , , , , , , , , , , , ,		
R016	-		6.000E+04	-~-	DCNUCC (7)
R016		6.000E+04			DCNUCU(7,1)
R016	· · · · · · · · · · · · · · · · · · ·	•	6.000E+04		DCNUCU (7,2)
R016			6.000E+04		DCNUCU (7,3)
R016		•	6.000E+04 J	•	DCNUCU (7,4)
R016	·		6.000E+04		DCNUCU(7,5)
R016	-		6.000E+04		DCNUCS (7)
R016			0.000E+00	1.434E-06	ALEACH (7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (7)

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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ı		User		Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
				 	
R016	Distribution coefficients for Th-232	!		l	1
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,2)
R016	Unsaturated zone 3 (cm**3/g)	1 6.000E+04 6.000E+04 ~		DCNUCU(8,3)	
R016	Unsaturated zone 4 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,4)
R016	Unsaturated zone 5 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,5)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04		DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.434E-06	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
I				l	1
R016	Distribution coefficients for U-234		1	1	1
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.713E-03	ALEACH(9)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd =-1.929E-01 not used	SOLUBK(9)
ļ				}	l
R016	Distribution coefficients for U-235			1	1
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS (10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.713E-03	ALEACH(10)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. $Kd = 4.670E+00$ not used	SOTOBK (10)
		1 !	1	1	l .
R016	Distribution coefficients for U-236	i 1			l
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.713E-03	ALEACH(11)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd =-1.519E-01 not used	SOLUBK(11)

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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		User	ı	Used by RESRAD	Parameter
Monu	Parameter		 Default	(If different from user input)	
Menu	Parameter	Input	Detaurt	t transfer trois user imputy	Name
R016	Distribution coefficients for U-238		1	l	I
R016	Contaminated zone (cm**3/g)	, 5.000E+01	5.000E+01	6.017E+02	DCNUCC(12)
R016		•	5.000E+01	6.017E+02	DCNUCU(12,1)
R016			5.000E+01	6.017E+02	DCNUCU(12,2)
R016			5.000E+01		DCNUCU(12,3)
R016		5.000E+01		6.017E+02	DCNUCU(12,4)
R016		•	5.000E+01	<u>'</u>	DCNUCU(12,5)
R016			5.000E+01	•	DCNUCS (12)
R016			0.000E+00	1.430E~04	ALEACH(12)
R016	Solubility constant	•	0.000E+00	Sol. Kd = 6.017E+02 used	SOLUBK(12)
		1	1	[, !
R016	Distribution coefficients for daughter Ac-227	i	· }	J	}
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1 2.000E+01	2.000E+01		DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	2.000E+01	2.000E+01	1	DCNUCU(1,2)
R016	Unsaturated zone 3 (cm**3/g)	2.000E+01	2.000E+01		DCNUCU(1,3)
R016	Unsaturated zone 4 (cm**3/g)	2.000E+01	2.000E+01		DCNUCU(1,4)
R016	Unsaturated zone 5 (cm**3/g)	2.000E+01	2.000E+01		DCNUCU(1,5)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	1	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.254E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
1		[[1
R016	Distribution coefficients for daughter Pb-210	1	ļ	l	l
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	l	DCNUCC (3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02		DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02		DCNUCU(3,2)
R016	Unsaturated zone 3 (cm**3/g)	1.000E+02	1.000E+02		DCNUCU(3,3)
R016	Unsaturated zone 4 (cm**3/g)	1.000E+02	1.000E+02	·	DCNUCU(3,4)
R016	Unsaturated zone 5 (cm**3/g)	1.000E+02	1.000E+02		DCNUCU(3,5)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02		DCNUCS (3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.585E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
		1		1	 -
R016	•	1			
R016	-	7.000E+01			DCNUCC(5)
R016		7.000E+01		•	DCNUCU(5,1)
R016	·	7.000E+01			DCNUCU(5,2)
R016		7.000E+01			DCNUCU(5,3)
R016	· · · · · · · · · · · · · · · · · · ·	7.000E+01			DCNUCU (5,4)
R016		7.000E+01			DCNUCU(5,5)
R016		7.000E+01			DCNUCS (5)
R016			0.000E+00	1.225E-03	ALEACH (5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
ו דותם	 Inhalation rate (m.*3/yr)		8.400E+03		INHALR
	•				MLINH
	•	1.000E-04 2.500E+01			ED
	•	2.500E+01 4.000E-01			SHF3
		4.000E-01 7.000E-01			SHF1
		7.000E-01 1.700E-01		'	FIND
KOT /	Fraction of time spent indoors	1 1.7005-01	J.000E-01	-	TIMD

RESRAD, Version 6.5 The Limit = 180 days

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1		User	1	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		·		 	
R017	Fraction of time spent outdoors (on site)	6.000E-02	2.500E-01		FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):	1	1	1	1
R017	Outer annular radius (m), ring 1:	4.417E+00	5.000E+01		RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	8.833E+00	7.071E+01	ļ	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.325E+01	0.000E+00	l	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	1.767E+01	0.000E+00		RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.208E+01	0.000E+00	l	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	2.650E+01	0.000E+00	ļ	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.092E+01	0.000E+00		RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	3.533E+01	0.000E+00	l	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	3.975E+01	0.000E+00		RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	4.417E+01	0.000E+00	·	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	4.858E+01	0.000E+00		RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	5.300E+01	0.000E+00		RAD_SHAPE(12)
l		1	l	[1
R017	Fractions of annular areas within AREA:	1	ŀ	l	
R017	Ring 1	1.000E+00	1.000E+00		FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01		FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00		FRACA (3)
R017	Ring 4	1.000E+00	0.000E+00		FRACA(4)
R017	Ring 5	9.800E-01	0.000E+00		FRACA (5)
R017	Ring 6	6.900E-01	0.000E+00		FRACA (6)
R017	Ring 7 ·	5.400E-01	0.000E+00		FRACA (7)
R017	Ring 8	4.400E-01	0.000E+00		FRACA(8)
R017	Ring 9	3.900E-01	0.000E+00		FRACA (9)
R017	Ring 10	3.400E-01	0.000E+00		FRACA(10)
R017	Ring 11	2.700E-01	0.000E+00		FRACA(11)
R017	Ring 12	4.600E-02	0.000E+00		FRACA (12)
1		1	l	<u> </u>	
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02		DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01		DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01		DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01		DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00		DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01		DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01		SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	f t	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00		FDW
R018	Contamination fraction of household water	not used	1.000E+00	 	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00		FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00		FIRW
R018	Contamination fraction of aquatic food	not used			FR9
R018	Contamination fraction of plant food	not used	-1	l	FPLANT
R018	Contamination fraction of meat	not used	-1	l i	FMEAT
R018	Contamination fraction of milk	not used	-1		FMILK
1		1		l i	
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	l	LFI5
	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	1 i	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01		LWI5

RESRAD, Version 6.5 T% Limit = 180 days

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Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Menu Parameter Input Default (If different from user input) Name R019 Livestock water intake for milk (L/day) not used 1.600E+02 LW16 R019 Livestock soil intake (kg/day) not used 5.000E-01 LSI R019 Mass loading for foliar deposition (g/m**3) not used 1.000E-04 MLFD R019 Depth of soil mixing layer (m) 1.500E-01 1.500E-01 DM R019 Depth of roots (m) not used 9.000E-01 DROOT R019 Drinking water fraction from ground water 1.000E+00 1.000E+00 FGWDW R019 Household water fraction from ground water not used 1.000E+00 FGWLW R019 Irrigation fraction from ground water not used 1.000E+00 FGWLW R019 Wet weight crop yield for Non-Leafy (kg/m**2) not used 7.000E-01 YV(1)
R019 Livestock soil intake (kg/day) not used 5.000E-01 LSI R019 Mass loading for foliar deposition (g/m**3) not used 1.000E-04 MLFD R019 Depth of soil mixing layer (m) 1.500E-01 1.500E-01 DM R019 Depth of roots (m) not used 9.000E-01 DROOT R019 Drinking water fraction from ground water 1.000E+00 1.000E+00 FGWDW R019 Household water fraction from ground water not used 1.000E+00 FGWHH R019 Livestock water fraction from ground water not used 1.000E+00 FGWLW R019 Irrigation fraction from ground water not used 1.000E+00 FGWRW R019 Wet weight crop yield for Non-Leafy (kg/m**2) not used 7.000E-01 YV(1)
R019 Livestock soil intake (kg/day) not used 5.000E-01 LSI R019 Mass loading for foliar deposition (g/m**3) not used 1.000E-04 MLFD R019 Depth of soil mixing layer (m) 1.500E-01 1.500E-01 DM R019 Depth of roots (m) not used 9.000E-01 DROOT R019 Drinking water fraction from ground water 1.000E+00 1.000E+00 FGWDW R019 Household water fraction from ground water not used 1.000E+00 FGWHH R019 Livestock water fraction from ground water not used 1.000E+00 FGWLW R019 Irrigation fraction from ground water not used 1.000E+00 FGWRW R019 Wet weight crop yield for Non-Leafy (kg/m**2) not used 7.000E-01 YV(1)
R019 Mass loading for foliar deposition (g/m**3) not used 1.000E-04 MLFD R019 Depth of soil mixing layer (m) 1.500E-01 1.500E-01 DM R019 Depth of roots (m) not used 9.000E-01 DROOT R019 Drinking water fraction from ground water 1.000E+00 1.000E+00 FGWDW R019 Household water fraction from ground water not used 1.000E+00 FGWHH R019 Livestock water fraction from ground water not used 1.000E+00 FGWLW R019 Irrigation fraction from ground water not used 1.000E+00 FGWIR R019 Wet weight crop yield for Non-Leafy (kg/m**2) not used 7.000E-01 YV(1)
R019 Depth of soil mixing layer (m) 1.500E-01 1.500E-01 DM
R019 Depth of roots (m)
R019 Drinking water fraction from ground water 1.000E+00 1.000E+00 FGWDW R019 Household water fraction from ground water not used 1.000E+00 FGWLW R019 Livestock water fraction from ground water not used 1.000E+00 FGWLW R019 Trigation fraction from ground water not used 1.000E+00 FGWLR R19B Wet weight crop yield for Non-Leafy (kg/m**2) not used 7.000E-01 YV(1)
R019 Household water fraction from ground water not used 1.000E+00 FGWHH
R019 Livestock water fraction from ground water not used 1.000E+00 FGWLW R019 Irrigation fraction from ground water not used 1.000E+00 FGWLR R19B Wet weight crop yield for Non-Leafy (kg/m**2) not used 7.000E-01 YV(1)
R019 Irrigation fraction from ground water
The transfer of the state of th
R19B Wet weight crop yield for Leafy (kg/m**2) not used 1.500E+00 YV(2)
R19B Wet weight crop yield for Fodder (kg/m**2) not used 1.100E+00 YV(3)
R19B Growing Season for Non-Leafy (years) not used 1.700E-01 TE(1)
R19B Growing Season for Leafy (years) not used 2.500E-01 TE(2)
R19B Growing Season for Fodder (years) not used 8.000E-02 ~ TE(3)
R19B Translocation Factor for Non-Leafy not used 1.000E-01 TIV(1)
R19B Translocation Factor for Leafy not used 1.000E+00 TIV(2)
R19B Translocation Factor for Fodder not used 1.000E+00 TIV(3)
R19B Dry Foliar Interception Fraction for Non-Leafy not used 2.500E-01 RDRY(1)
R19B Dry Foliar Interception Fraction for Leafy not used 2.500E-01 RDRY(2)
R19B Dry Foliar Interception Fraction for Fodder not used 2.500E-01 RDRY(3)
R19B Wet Foliar Interception Fraction for Non-Leafy not used 2.500E-01 RWET(1)
R19B Wet Foliar Interception Fraction for Leafy not used 2.500E-01 RWET(2)
R19B Wet Foliar Interception Fraction for Fodder not used 2.500E-01 RWET(3)
R19B Weathering Removal Constant for Vegetation not used 2.000E+01 WLAM
C14 C-12 concentration in water (g/cm**3) not used 2.000E-05 C12WTR
C14 C-12 concentration in contaminated soil (g/g) not used 3.000E-02 C12C2
C14 Fraction of vegetation carbon from soil not used 2.000E-02 CSOIL
C14 Fraction of vegetation carbon from air not used 9.800E-01 CAIR
C14 C-14 evasion layer thickness in soil (m) not used 3.000E-01 DMC
C14 C-14 evasion flux rate from soil (1/sec) not used 7.000E-07 EVSN
C14 C-12 evasion flux rate from soil (1/sec) not used 1.000E-10 REVSN
C14 Fraction of grain in beef cattle feed not used 8.000E-01 AVFG4
Cl4 Fraction of grain in milk cow feed not used 2.000E-01 AVFG5
STOR Storage times of contaminated foodstuffs (days):
STOR Fruits, non-leafy vegetables, and grain 1.400E+01 1.400E+01 STOR_T(1)
STOR Leafy vegetables 1.000E+00 1.000E+00 STOR_T(2)
STOR Milk 1.000E+00 1.000E+00 STOR_T(3)
STOR Meat and poultry 2.000E+01 STOR_T(4)
STOR Fish 7.000E+00 7.000E+00 STOR_T(5)
STOR Crustacea and mollusks 7.000E+00 7.000E+00 STOR_T(6)
STOR Well water 1.000E+00 1.000E+00 STOR_T(7)
STOR Surface water 1.000E+00 1.000E+00 STOR_T(8)
STOR Livestock fodder 4.500E+01 4.500E+01 STOR_T(9)
R021 Thickness of building foundation (m) not used 1.500E-01 FLOOR1
R021 Bulk density of building foundation (g/cm**3) not used 2.400E+00 DENSFL

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Site-Specific Parameter Summary (continued)

Name TPCV TPFL PH2OCV
TPFL
TPFL
phaoch
FHZQCV
PH2OFL
DIFCV
DIFFL
DIFCZ
HMIX
REXG
HRM
FAI
DMFL
EMANA (1)
EMANA (2)
NPTS
LYMAX
KYMAX

Summary of Pathway Selections

Pathway	User Selection	
1 external gamma	active	
2 inhalation (w/o radon)	active	
3 plant ingestion	suppressed	
4 meat ingestion	suppressed	
5 milk ingestion	suppressed	
6 aquatic foods	suppressed	
7 drinking water	active	
8 soil ingestion	active	
9 radon	suppressed	
Find peak pathway doses	active	

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

Contamir	Contaminated Zone Dimensions		Initial Soil Cor	ncentrations, pCi/g
Area:	4000.00	square meters	Pa-231	1.300E-01
Thickness:	2.72	meters	Ra-226	3.100E-01
Cover Depth:	1.51	meters	Th-228	5.000E-02
			Th-230	1.560E+00
			Th-232	5.000E-02
			U-234	1.368E+02
			U-235	7.310E+00
			U-236	3.270E+00

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

U-238 1.416E+02

4...

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03

TDOSE(t): 6.133E-08 5.246E-08 4.563E-08 5.727E-08 9.074E-08 1.942E-07 1.689E-06 5.798E-03

M(t): 2.453E-09 2.099E-09 1.825E-09 2.291E-09 3.629E-09 7.770E-09 6.754E-08 2.319E-04

Maximum TDOSE(t): 5.798E-0.3 mrem/yr at t = 1.000E+0.3 years

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

	Grou	nd	Inhala	tion	Rad	on	Pla	nt	Mea	t	Mil	¢ .	Soi	1
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	5.812E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	2.093E-08	0.3413	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.578E-08	0.5834	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.286E-11	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.958E-10	0.0048	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	6.022E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.369E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	2.495E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.300E-09	0.0701	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-		-												
Total	6.133E-08	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	5.812E-14 0.0000
Ra-226	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.093E-08 0.3413
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	3.578E-08 0.5834
Th-230	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.286E-11 0.0004
Th-232	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000£+00 0.0000	0.000E+00 0.0000	2.958E-10 0.0048
U-234	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	6.022E-15 0.0000
U-235	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.369E-14 0.0000
U-236	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.495E-19 0.0000
U-238	0.000E+00 0.0000	0.000E+00 0,0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.300E-09 0.0701
Total	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	6.133E-08 1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	1.418E-13 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	2.113E-08 0.4028	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	2.514E-08 0.4792	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	6.923E-11 0.0013	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	1.765E-09 0.0336	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	4.252E-14 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	2,426E-14 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	3.272E-18 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	4.357E-09 0.0831	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
=							
Total	5.246E-08 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 1.000E+00 \ years$

Radio-	Wate	er	Fish	Fish Radon		on	Plai	nt	Mea	Meat Milk		All Pati	All Pathways*	
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.418E-13	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.113E-08	0.4028
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.514E-08	0.4792
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.923E-11	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.765E-09	0.0336
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000£+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.252E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.426E-14	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.272E-18	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.357E-09	0.0831
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.246E-08	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhala	tion	Rade	on	Plan	nt	Meat	:	Mil)	k	Soil	l
Radio-													
Nuclide	mrem/yr fra	ct. mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	3.072E-13 0.0	000-3000.0000	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	2.154E-08 0.4	721 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.241E-08 0.2	720 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.649E-10 0.0	036 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	7.032E-09 0.1	541 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.292E-13 0.0	000 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.574E-14 0.0	000 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	3.077E-17 0.0	000 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.475E-09 0.0	981 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
					-								
Total	4.563E-08 1.0	000 0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	3.072E-13 0.0000
Ra-226	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.154E-08 0.4721
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.241E-08 0.2720
Th-230	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.649E-10 0.0036
Th-232	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	7.032E-09 0.1541
U-234	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.292E-13 0.0000
U-235	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.574E-14 0.0000
U-236	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	3.077E-17 0.0000
U-238	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.475E-09 0.0981
							- A-1
Total	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.563E-08 1.0000

 $[\]ensuremath{^{+}} \text{Sum}$ of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	8.676E-13 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	2.304E-08 0.4022	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	1.050E-09 0.0183	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	5.320E-10 0.0093	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	2.774E-08 0.4843	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	2.200E-12 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000£+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	3.447E-14 0.0000	0.000£+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	4.439E-16 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000£+00 0.0000
U-238	4.912E-09 0.0858	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	5.727E~08 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

	Wate	er	Fish	n	Rado	on	Plan	nt	Meat	=	Mil)		All Path	ways*
Radio-						<u>-</u>								
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.676E-13	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E-08	0.4022
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.050E-09	0.0183
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.320E-10	0.0093
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.774E-08	0.4843
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.200E-12	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.447E-14	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.439E-16	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.912E-09	0.0858
 .														
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.727E-08	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio- Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	2.377E-12 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	2.791E-08 0.3076	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	9.040E-13 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	1.903E-09 0.0210	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	5.449E-08 0.6005	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	2.271E-11 0.0003	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	9.276E-14 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	3.553E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	6.409E-09 0.0706	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	9.074E-08 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 3.000E+01 \ years$

	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
Radio- Nuclide	mrem/yr fract	. mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	0.000E+00 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.377E-12 0.0000
Ra-226	0.000E+00 0.000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.791E-08 0.3076
Th-228	0.000E+00 0.000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	9.040E-13 0.0000
Th-230	0.000E+00 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.903E-09 0.0210
Th-232	0.000E+00 0.000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	5.449E-08 0.6005
U-234	0.000E+00 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.271E-11 0.0003
U-235	0.000E+00 0.000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	9.276E-14 0.0000
U-236	0.000E+00 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	3.553E-15 0.0000
U-238	0.000E+00 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	6.409E-09 0.0706
							
Total	0.000E+00 0.000	0 0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	9.074E-08 1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

	Grou	nd	Inhala	tion	Rade	on	Plan	nt	Mea	:	Mill	¢	Soil	l
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	8.685E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	5.462E-08	0.2812	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.694E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.302E-08	0.0670	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.098E-07	0.5654	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	5.012E-10	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	9.327E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	2.940E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.626E-08	0.0837	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
				-						3				
Total	1.942E-07	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 1.000E+02 \ years$

	Wat	er	Fisl	h	Radi	on	Pla	nt	Mea	t	Mill	.	All Pati	nways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.685E-12	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.462E-08	0.2812
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.694E-23	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.302E-08	0.0670
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.098E-07	0.5654
0-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.012E-10	0.0026
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.327E-13	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.940E-14	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.626E-08	0.0837
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.942E-07	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 3.000E+02 \ years$

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa~231	1.189E-10 0.0001	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000£+00 0.0000	0.000£+00 0.0000
Ra~226	3.720E-07 0.2203	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	3.154E-07 0.1868	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	7.339E-07 0.4346	0.000E+00 0.0000	0.000E+00 0.0000	0.000.0 00+3000.0	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	3.415E-08 0.0202	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	4.562E-11 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	5.406E-13 0.0000	0.000E+00 0.0000	0.000£+00 0.0000	0.000£+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	2.331E-07 0.1380	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	1.689E-06 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.0000000000000000000000000000000000000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

	Wate	r	Fish	n	Rado	on	Plan	nt	Meat	t	Mill	c	All Path	ways*
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	.mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.189E-10	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.720E-07	0.2203
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.154E-07	0.1868
Th-232	0.0002+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.339E-07	0.4346
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.415E-08	0.0202
U-235	0.000E+00	0.0000	.0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.562E-11	0.0000
U~236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.406E-13	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.331E-07	0.1380
														
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.689E-06	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

Total Dose Contributions TOOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

	Groun	nd	Inhala	tion	Rado	nc	Plai	nt	Mea	t	Mill	•	Soil	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	1.507E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	3.092E-04	0.0533	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.718E-03	0.2963	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	6.339E-04	0.1093	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	4.920E-04	0.0849	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	5.934E-06	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	9.789E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.637E-03	0.4548	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-		-												
Total	5.798E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

	Wate	er	Fish	h	Rado	on	Plan	nt	Meat	=	Mill	ĸ	All Path	ways*
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
														
Pa-231	1.505E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.658E-06	0.0003
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.092E-04	0.0533
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.718E-03	0.2963
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.339E-04	0.1093
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.920E-04	0.0849
U-235	9.083E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.025E-06	0.0010
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.789E-10	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.637E-03	0.4548
-														
Total	2.413E-07	0.0000	0.000E+00	0.0000	0.000£+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.798E-03	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Dose/Source Ratios Summed Over All Pathways Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Thread	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g)	
(i)	(j)	Fraction	0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.00	00E+03
D- 221	Pa-231	1.000E+00	1.242E-13 1.262E-13 1.302E-13 1.453E-13 1.988E-13 5.951E-13 1.365E-11 7.90	025 07
Pa-231			3.228E-13 9.648E-13 2.233E-12 6.529E-12 1.809E-11 6.621E-11 9.013E-10 1.19	
Pa-231	Ac-227+D	1.000E+00		
Pa-231	∑DSR(j)		4.470E-13 1.091E-12 2.363E-12 6.674E-12 1.829E-11 6.681E-11 9.149E-10 1.27	/3&-US
Ra-226+D	Ra-226+D	1.000E+00	6.752E-08 6.817E-08 6.949E-08 7.432E-08 9.003E-08 1.762E-07 1.200E-06 9.97	73E-04
Ra-226+D	Pb-210+D	1.000E+00	1.895E-16 5.669E-16 1.315E-15 3.870E-15 1.086E-14 3.940E-14 4.502E-13 5.96	60E-09
Ra-226+D	∑DSR(j)		6.752E-08 6.817E-08 6.949E-08 7.432E-08 9.003E-08 1.762E-07 1.200E-06 9.97	/3E-04
Th-228+D	Th-228+D	1.000E+00	7.155E-07 5.028E-07 2.483E-07 2.100E-08 1.808E-11 3.388E-22 0.000E+00 0.00)0E+00
Th-230	Th-230	1.000E+00	7.632E-23 7.849E-23 8.302E-23 1.010E-22 1.770E-22 1.260E-21 3.434E-19 1.14	18E-10
Th-230	Ra-226+D	1.000E+00	1.466E-11 4.438E-11 1.057E-10 3.410E-10 1.220E-09 8.343E-09 2.022E-07 1.10)1E-03
Th-230	Pb-210+D	1.000E+00	2.747E-20 1.927E-19 1.023E-18 9.329E-18 8.416E-17 1.323E-15 6.583E-14 6.16	51E-09
Th-230	∑DSR(j)		1.466E-11 4.438E-11 1.057E-10 3.410E-10 1.220E-09 8.343E-09 2.022E-07 1.10)1E-03
Th-232	Th-232	1.000E+00	2.675E-25 2.760E-25 2.937E-25 3.654E-25 6.820E-25 6.057E-24 3.106E-21 9.47	/7E-12
Th-232	Ra-228+D	1.000E+00	3.892E-10 1.120E-09 2.390E-09 5.426E-09 9.413E-09 2.306E-08 2.781E-07 1.69	33E-03
Th-232	Th-228+D	1.000E+00	5.528E-09 3.418E-08 1.383E-07 5.494E-07 1.080E-06 2.174E-06 1.440E-05 1.09	98E-02
Th-232	∑DSR(j)		5.917E-09 3.530E-08 1.406E-07 5.548E-07 1.090E-06 2.197E-06 1.468E-05 1.26	38E-02
U-234	U-234	1.000E+00	4.350E-24 4.471E-24 4.723E-24 5.721E-24 9.892E-24 6.727E-23 1.608E-20 3.39	98E-12
U-234	Th-230	1.000E+00	3.449E-28 1.060E-27 2.609E-27 9.465E-27 4.736E-26 1.048E-24 7.269E-22 4.96	51E-13
U-234	Ra-226+D	1.000E+00	4.401E-17 3.107E-16 1.675E-15 1.608E-14 1.660E-13 3.663E-12 2.496E-10 3.59	6E-06
U-234	Pb-210+D	1.000E+00	6.195E-26 9.331E-25 1.099E-23 3.015E-22 8.214E-21 4.676E-19 7.422E-17 1.97	/0E-11
U-234	ΣDSR(j)		4.401E-17 3.107E-16 1.675E-15 1.608E-14 1.660E-13 3.663E-12 2.496E-10 3.59	96E-06
U-235+D	U-235+D	1.000E+00	3.237E-15 3.299E-15 3.427E-15 3.914E-15 5.721E-15 2.161E-14 9.636E-13 5.70)5E-07
U-235+D	Pa-231	1.000E+00	1.318E-18 4.008E-18 9.646E-18 3.229E-17 1.283E-16 1.267E-15 8.709E-14 1.69	91E-08
U-235+D	Ac-227+D	1.000E+00	2.286E-18 1.602E-17 8.493E-17 7.694E-16 6.840E-15 1.047E-13 5.191E-12 2.36	8E-07
U-235+D	∑DSR(j)		3.240E-15 3.319E-15 3.521E-15 4.715E-15 1.269E-14 1.276E-13 6.241E-12 8.24	2E-07
U-236	U-236	1.000E+00	7.713E-25 7.932E-25 8.389E-25 1.020E-24 1.786E-24 1.267E-23 3.417E-21 1.10	115-12
U-236	Th-232	1.000E+00	6.629E-36 2.043E-35 5.061E-35 1.877E-34 1.000E-33 2.759E-32 3.599E-29 2.23	
U-236	Ra-228+D	1.000E+00	6.469E-21 4.422E-20 2.220E-19 1.687E-18 1.048E-17 9.707E-17 3.154E-15 3.98	
U-236	Th-228+D	1.000E+00	6.982E-20 9.563E-19 9.189E-18 1.341E-16 1.076E-15 8.895E-15 1.622E-13 2.58	
U-236	∑DSR(j)	1.0005.00	7.629E-20 1.001E-18 9.411E-18 1.357E-16 1.087E-15 8.992E-15 1.653E-13 2.99	
0-230	ZD3K())		7.0256-20 1.0016 10 9.4116-16 1.5576 10 1.0076 15 0.5526 15 1.0556-15 2,55	45-10
U-238	U-238	5.400E-05	0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 5.045E-44 1.83	3E-24
U-238+D	U-238+D	9.999E-01	3.037E-11 3.078E-11 3.161E-11 3.469E-11 4.526E-11 1.149E-10 1.646E-09 1.86	2E-05
U-238+D	U-234	9.999E-01	6.198E-30 1.906E-29 4.702E-29 1.717E-28 8.762E-28 2.076E-26 1.751E-23 2.34	2E-14
U-238+D	Th-230	9.999E-01	3.267E-34 2.341E-33 1.305E-32 1.414E-31 2.063E-30 1.528E-28 3.314E-25 8.51	6E-16
U-238+D	Ra-226+D	9.999E-01	3.121E-23 4.723E-22 5.621E-21 1.602E-19 4.821E-18 3.565E-16 7.621E-14 4.26	9E-09
U-238+D	Pb-210+D	9.999E-01	3.519E-32 1.097E-30 2.797E-29 2.289E-27 1.865E-25 3.805E-23 2.062E-20 2.25	4E-14
U-238+D	∑DSR(j)		3.037E-11 3.078E-11 3.161E-11 3.469E-11 4.526E-11 1.149E-10 1.646E-09 1.86	3E-05

The DSR includes contributions from associated (half-life \leq 180 days) daughters.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Single Radionuclide Soil Guidelines G(i,t) in pCi/g Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide								
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	2.732E+10	1.961E+06
Ra-226	3.703E+08	3.667E+08	3.598E+08	3.364E+08	2.777E+08	1.419E+08	2.083E+07	2.507E+04
Th-228	3.494E+07	4.972E+07	1.007E+08	1.191E+09	1.383E+12	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	2.996E+09	1.237E+08	2.270E+04
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	1.972E+03
U-234	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	6.953E+06
U-235	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06
U-236	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6,468E+07	*6.468E+07	*6.468E+07	*6.468E+07
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05

^{*}At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g) and Single Radionuclide Soil Guidelines G(i,t) in pCi/g at tmin = time of minimum single radionuclide soil guideline and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pa-231	1.300E-01	1.000E+03	1.275E-05	1.961E+06	1.275E-05	1.961E+06
Ra-226	3.100E-01	1.000E+03	9.973E-04	2.507E+04	9.973E-04	2.507E+04
Th-228	5.000E-02	0.000E+00	7.155E-07	3.494E+07	0.000E+00	*8.195E+14
Th-230	1.560E+00	1.000E+03	1.101E-03	2.270E+04	1.101E-03	2.270E+04
Th-232	5.000E-02	1.000E+03	1.268E-02	1.972E+03	1.268E-02	1.972E+03
U-234	1.368E+02	1.000E+03	3.596E-06	6.953E+06	3.596E-06	6.953E+06
U-235	7.310E+00	1.000E+03	8.242E-07	*2.161E+06	8.242E-07	*2.161E+06
U-236	3.270E+00	1.000E+03	2.994E-10	*6.468E+07	2.994E-10	*6.468E+07
U-238	1.416E+02	1.000E+03	1.863E-05	*3.361E+05	1.863E-05	*3.361E+05

^{*}At specific activity limit

Summary : MTW Pond C Industrial Worker - Probabilistic Run

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Individual Nuclide Dose Summed Over All Pathways Parent Nuclide and Branch Fraction Indicated

Marcal Endon	Davant	PUE					DOSE (+ 1	mram/ur			
Nuclide (j)	(i)	THF(i)	+-	0.000£+00	1 0005+00	3 000E+00	DOSE(j,t) 1.000E+01		1 0005+02	3 0005+02	1 0006+03
	(1)		L-	0.0002.00	1.0002.00		1.0001.01	3.0002.01			
Pa-231	Pa-231	1.000E+00		1.615E-14	1.640E-14	1.693E-14	1.889E-14	2.584E-14	7.736E-14	1.775E-12	1.027E-07
Pa-231	U-235	1.000E+00		9.632E-18	2.930E-17	7.051E-17	2.360E-16	9.379E-16	9.260E-15	6.366E-13	1.236E-07
Pa-231	∑DOSE(j)			1.616E-14	1.643E-14	1.700E-14	1.912E-14	2.678E-14	8.662E-14	2.412E-12	2.263E-07
Ac-227	Pa-231	1.000E+00		4.197E-14	1.254E-13	2.903E-13	8.488E-13	2.351E-12	8.608E-12	1.172E-10	1.555E-06
Ac-227	U-235	1.000E+00		1.671E-17	1.171E-16	6.208E-16	5.625E-15	5.000E-14	7.655E-13	3.794E-11	1.731E-06
Ac-227	∑DOSE(j)			4.198E-14	1.255E-13	2.909E-13	8.544E-13	2.401E-12	9.373E-12	1.551E-10	3.286E-06
Ra-226	Ra-226	1.000E+00					2.304E-08				
Ra-226	Th-230	1.000E+00		2.286E-11	6.923E-11	1.649E-10	5.320E-10	1.903E-09	1.302E-08	3.154E-07	1.718E-03
Ra-226	U-234	1.000E+00		6.022E-15	4.252E-14	2.292E-13	2.200E-12	2.271E-11	5.012E-10	3.415E-08	4.920E-04
Ra-226	U-238	9.999E-01		4.419E-21	6.687E-20	7.958E-19	2.268E-17	6.826E-16	5.048E-14	1.079E-11	6.044E-07
Ra-226	∑DOSE(j			2.095E-08	2.120E-08	2.171E-08	2.357E-08	2.984E-08	6.814E-08	7.215E-07	2.520E-03
Pb-210	Ra-226	1.000E+00		5.875E-17	1.757E-16	4.076E-16	1.200E~15	3.367E-15	1.221E-14	1.396E-13	1.848E-09
Pb-210	Th-230	1.000E+00		4.286E-20	3.006E-19	1.597E-18	1.455E-17	1.313E-16	2.065E-15	1.027E-13	9.612E-09
Pb-210	U-234	1.000E+00		8.477E-24	1.277E-22	1.503E-21	4.126E-20	1.124E-18	6.399E-17	1.016E-14	2.695E-09
Pb-210	U-238	9.999E-01		0.000E+00	1.553E-28	3.960E-27	3.241E-25	2.640E-23	5.386E-21	2.919E-18	3.192E-12
Pb-210	∑DOSE(j	ı		5.879E-17	1.760E-16	4.092E-16	1.214E-15	3.499E-15	1.434E-14	2.524E-13	1.416E-08
Th-228		1.000E+00					1.050E-09				
Th-228	Th-232	1.000E+00		2.764E-10	1.709E-09	6.913E-09	2.747E-08	5.402E-08	1.087E-07	7.200E-07	5.492E-04
Th-228	U-236	1.000E+00					4.384E-16				
Th-228	∑DOSE(j	l		3.605E-08	2.685E-08	1.933E-08	2.852E-08	5.402E-08	1.087E-07	7.200E-07	5.492E-04
Th-230		1.000E+00					1.576E-22				
Th-230		1.000E+00					1.295E-24				
Th-230		9.999E-01					0.000E+00				
Tn-230	∑DOSE(j)			1.1916-22	1.2266-22	1.2996-22	1.589E-22	2.0205-22	2.1096-21	0.3338-19	2.4/IE-10
Th=232	Th=232	1.000E+00		1 338F-26	1 380F-26	1 469F-26	1.827E-26	3 410E-26	3.029E-25	1 553E-22	4 739E-13
Th-232		1.000E+00					0.000E+00				
	ΣDOSE (j)						1.827E-26				
1.1. 232	200011()			113330 23	1,0000 10	21,000					
Ra-228	Th-232	1.000E+00		1.946E-11	5.599E-11	1.195E-10	2.713E-10	4.706E-10	1.153E-09	1.390E-08	8.464E-05
Ra-228	U-236	1.000E+00		2.115E-20	1.446E-19	7.258E-19	5.517E-18	3.427E-17	3.174E-16	1.032E-14	1.303E-10
Ra-228	∑DOSE(j	l		1.946E-11	5.599E-11	1.195E-10	2.713E-10	4.706E-10	1.153E-09	1.390E-08	8.464E-05
U-234	U-234	1.000E+00		5.953E-22	6.118E-22	6.462E-22	7.828E-22	1.354E-21	9.204E-21	2.201E-18	4.650E-10
U-234	U-238	9.999E-01		8.774E-28	2.699E-27	6.657E-27	2.431E-26	1.241E-25	2.940E-24	2.480E-21	3.316E-12
U-234	∑DOSE (j	ı		5.953E-22	6.118E-22	6.462E-22	7.828E-22	1.354E-21	9.207E-21	2.203E-18	4.683E-10
U-235	U-235	1.000E+00		2.366E-14	2.411E-14	2.505E-14	2.861E-14	4.182E-14	1.580E-13	7.044E-12	4.171E-06
U-236	U-236	1.000E+00		2.522E-24	2.594E-24	2.743E-24	3.337E-24	5.840E-24	4.142E-23	1.117E-20	3.600E-12
										0 000= 0:	0.505- ::
	U-238	5.400E-05					0.000E+00				
U-238	U-238	9.999E-01					4.912E-09				
U-238	ΣDOSE (j			4.300E-09	4.35/E-09	4.4/DE-09	4.912E-09	0.4096-09	1.0205-08	2.331E-U/	2.03/6-03

THF(i) is the thread fraction of the parent nuclide.

Summary : MTW Pond C Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_C_IW-PROB.RAD

Individual Nuclide Soil Concentration Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)				S(j,t),	pCi/g			
(j)	(i)		t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pa-231	1.000E+00	1.300E-01	1.298E-01	1.293E-01	1.278E-01	1.234E-01	1.093E-01	7.727E-02	2.295E-02
Pa-231	U-235	1.000E+00	0.000E+00	1.544E-04	4.616E-04	1.520E-03	4.406E-03	1.302E-02	2.767E-02	2.759E-02
Pa-231	∑S(j):		1.300E-01	1.299E-01	1.298E-01	1.293E-01	1.278E-01	1.223E-01	1.049E-01	5.054E-02
Ac-227	Pa-231	1.000E+00	0.000E+00	4.061E-03	1.174E-02	3.442E-02	7.356E-02	9.802E-02	7.160E-02	2.127E-02
Ac-227	U-235	1.000E+00	0.000E+00	2.430E-06	2.130E-05	2.165E-04	1.535€-03	8.663E-03	2.314E-02	2.482E-02
Ac-227	∑S(j):		0.000E+00	4.064E-03	1.176E-02	3.464E-02	7.509E-02	1.067E-01	9.474E-02	4.608E-02
Ra-226	Ra-226	1.000E+00	3.100E-01	3.095E-01	3.085E-01	3.049E-01	2.950E-01	2.626E-01	1.885E-01	5.904E-02
Ra-226	Th-230	1.000E+00	0.000E+00	6.753E-04	2.022E-03	6.702E-03	1.978E-02	6.224E-02	1.595E-01	3.277E-01
Ra-226	U-234	1.000E+00	0.000E+00	2.665E-07	2.393E-06	2.638E-05	2.321E-04	2.385E-03	1.724E-02	9.382E-02
Ra-226	U-238	9.999E-01	0.000E+00	2.606E-13	7.025E-12	2.586E-10	6.860E-09	2.390E-07	5.438E-06	1.152E-04
Ra-226	∑S(j):		3.100E-01	3.102E-01	3.105E-01	3.116E-01	3.150E-01	3.273E-01	3.652E-01	4.807E-01
Pb-210	Ra-226	1.000E+00	0.000E+00	9.476E-03	2.750E-02	8.177E-02	1.807E-01	2.565E-01	1.934E-01	6.059E-02
	Th-230	1.000E+00			9.143E-05					
Pb-210		1.000E+00			7.270E-08					
Pb-210		9.999E-01			1.608E-13					
Pb-210	∑S(j):		0.000E+00	9.486E-03	2.759E-02	8.271E-02	1.877E-01	3.009E-01	3.495E-01	4.638E-01
Th-228	Th-228	1.000E+00	5.000E-02	3.480E-02	1.686E-02	1.335E-03	9.515E-07	9.198E-18	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	9.318E-04	6.208E-03	2.810E-02	4.756E-02	4.949E-02	4.948E-02	4.943E-02
Th-228	U-236	1.000E+00	0.000E+00	1.042E-12	2.244E-11	4.211E-10	3.032E-09	1.318E-08	3.639E-08	7.602E-08
Th-228	∑S(j):		5.000E-02	3.573E-02	2.307E-02	2.944E-02	4.757E-02	4.949E-02	4.948E-02	4.943E-02
Th-230	Th-230	1.000E+00	1.560E+00	1.560E+00	1.560E+00	1.560E+00	1.560E+00	1.558E+00	1.555E+00	1.544E+00
Th-230	U-234	1.000E+00	0.000E+00	1.231E-03	3.686E-03	1.221E-02	3.601E-02	1.131E-01	2.883E-01	5.849E-01
Th-230	U-238	9.999E-01	0.000E+00	1.805E-09	1.623E-08	1.795E-07	1.596E-06	1.699E-05	1.358E-04	1.038E-03
Th-230	∑S(j):		1.560E+00	1.561E+00	1.564E+00	1.572E+00	1.596E+00	1.672E+00	1.844E+00	2.130E+00
Th-232	Th-232	1.000E+00	5.000E-02	5.000E-02	5.000E-02	5.000E-02	5.000E-02	4.999E-02	4.998E-02	4.993E-02
Th-232	U-236	1.000E+00	0.000E+00	1.612E-10	4.827E-10	1.599E-09	4.717E-09	1.483E-08	3.783E-08	7.712E-08
Th-232	∑S(j):		5.000E-02	5.000E-02	5.000E-02	5.000E-02	5.000E-02	4.999E-02	4.998E-02	4.993E-02
Ra-228	Th~232	1,000E+00	0,000E+00	5.675E-03	1.515E-02	3.485E-02	4.821E-02	4.949E-02	4.948E-02	4.943E-02
Ra-228	U-236	1.000E+00	0.000E+00	9.335E-12	7.762E-11	6.694E-10	3.441E-09	1.356E-08	3.666E-08	7.610E-08
Ra-228	∑S(j):		0.000E+00	5.675E-03	1.515E-02	3.485E-02	4.821E-02	4.949E-02	4.948E-02	4.943E-02
U-234	U-234	1.000E+00	1.368E+02	1.366E+02	1.361E+02	1.345E+02	1.300E+02	1.153E+02	8.177E+01	2.460E+01
U-234	U-238	9.999E-01	0.000E+00	4.010E-04	1.201E-03	3.976E-03	1.171E-02	3.661E-02	9.195E-02	1.753E-01
U-234	∑S(j):		1.368E+02	1.366E+02	1.361E+02	1.345E+02	1.300E+02	1.153E+02	8.187E+01	2.478E+01
U-235	U-235	1.000E+00	7.310E+00	7.297E+00	7.273E+00	7.186E+00	6.944E+00	6.159E+00	4.372E+00	1.318E+00
U-236	U-236	1.000E+00	3.270E+00	3.264E+00	3.253E+00	3.214E+00	3.106E+00	2.755E+00	1.956E+00	5.896E-01
U-238	U-238	5.400E-05	7.645E-03	7.644E-03	7.642E-03	7.634E-03	7.613E-03	7.537E-03	7,324E-03	6.627E-03
U-238	U-238	9.999E-01	1.416E+02	1.416E+02	1.415E+02	1.414E+02	1.410E+02	1.396E+02	1.356E+02	1.227E+02
U-238	ΣS(j):		1.416E+02	1.416E+02	1.415E+02	1.414E+02	1.410E+02	1.396E+02	1.356E+02	1.227E+02

 $\ensuremath{\text{THF}}(i)$ is the thread fraction of the parent nuclide.

APPENDIX Q

Pond D Deterministic Dose Assessment Report

RESRAD, Version 6.5

T% Limit = 180 days

09/29/2010 09:46 Page

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

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Time = 0.000E+00	15
Time = 1.000E+00	16
Time = 3.000E+00	17
Time = 1.000E+01	18
Time = 3.000E+01	19
Time = 1.000E+02	20
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Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

Dose Conversion Factor (and Related) Parameter Summary Dose Library: FGR 12 & FGR 11

		Current	Base	Parameter
Menu	Parameter	Value#	Case*	Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			<u> </u>
A-1	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1(1)
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(2)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(3)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(4)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1(5)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(6)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(7)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1(8)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1(9)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(10)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(11)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(12)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1(13)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(14)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(15)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(16)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(17)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1 (19)
A-1	Po-215 (Source: FGR 12)	1.016E-03		
	Po-216 (Source: FGR 12)	1.042E-04		•
	Po-218 (Source: FGR 12)	5.642E-05		•
	Ra-223 (Source: FGR 12)	6.034E-01		•
	Ra-224 (Source: FGR 12)	5.119E-02		
	Ra-226 (Source: FGR 12)	3.176E-02	•	
	Ra-228 (Source: FGR 12)	0.000E+00		
	Rn-219 (Source: FGR 12)	3.083E-01		
	Rn-220 (Source: FGR 12)	2.298E-03		
	Rn-222 (Source: FGR 12) Th-227 (Source: FGR 12)	2.354E-03		
		S.212E-01		
	Th-228 (Source: FGR 12) Th-230 (Source: FGR 12)	7.940E-03 1.209E-03		
	Th-231 (Source: FGR 12)	3.643E-02		
	Th-232 (Source: FGR 12)	5.212E-04		
	Th-234 (Source: FGR 12)	2.410E-02		
	T1-207 (Source: FGR 12)	1.980E-02	-	
	T1-208 (Source: FGR 12)	2.298E+01	•	
	T1-210 (Source: no data)	0.000E+00		
	U-234 (Source: FGR 12)	4.017E-04		
	U-235 (Source: FGR 12)	7.211E-01		
	U-236 (Source: FGR 12)	2.148E-04		
	U-238 (Source: FGR 12)	1.031E-04		
+		1		
B-1	Dose conversion factors for inhalation, mrem/pCi:	1	,	
	Ac-227+D	6.724E+00		
		1.280E+00		
		2.320E-02		
		8.594E-03		
		5.078E-03		
		•		

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

	1	Current	Base	Parameter
Menu	Parameter	Value#	Case*	Name
		 	 	
		3.454E-01		
	•	3.260E-01	•	•
		1.640E+00		
		1.320E-01		
	•	1.230E-01		
		1.250E-01		
	•	1.180E-01	•	•
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(13)
D 1		 	 	
D-1 D-1	Dose conversion factors for ingestion, mrem/pCi:	1 490E-02	1.410E-02	I DCF3(1)
	Ac-227+D		1.410E-02	
	Pa-231	7.276E-03		
	•	1.3216-03		
	•	1.442E-03		
	'	8.086E-04		
	'	5.480E-04		
		2.730E-03		
	•	2.830E-04	•	•
	•	2.673E-04		•
	•	2.690E-04		
	•	2.550E-04	•	
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(13)
			l	
D-34	Food transfer factors:	1	l	
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34		l	ļ	
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34			l i	
D-34	•	1.000E-02		•
	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		8.000E-04	
	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34	•			
	•	4.000E-02		
		1.000E-03		
	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34	•			
		4.000E-02		
		1.000E-03		
		1.000E-03	1.000E-03	RTF(5,3)
D-34		 1 000=-02	 1 000= 02	 pmg/
	•	1.000E-03		
		1.000E-04		
		5.000E-06	3.0000-00	KIE (0,3)
D-34	1		•	

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

	ı		Current	Base	Parameter
Menu	! 	Parameter	Value#	Case*	Name
	, 		, 	·	
D-34	Th-230	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-230	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-230	, $milk/livestock-intake ratio$, $(pCi/L)/(pCi/d)$	5.000E-06	5.000E-06	RTF(7,3)
D-34	l		1	l	l
D-34	Th-232	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-232	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-232	, $milk/livestock-intake ratio$, $(pCi/L)/(pCi/d)$	5.000E-06	5.000E-06	RTF(8,3)
D-34)		I	l	!
D-34	U-234	, plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-234	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	•	3.400E-04	
D-34	U-234	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-34					
	U-235+D		•	2.500E-03	
	U-235+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	•	3.400E-04	
	U-235+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				l	
	U-236	, plant/soil concentration ratio, dimensionless		2.500E-03	
	U-236	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	•	3.400E-04	•
	U-236	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1 6.0006-04	6.000E-04	KIF(11,3)
D-34	U-238	, plant/soil concentration ratio, dimensionless	 2 5005-03	 2.500E-03	 prr/ 12 11
	U-238	, beef/livestock-intake ratio, (pCi/kq)/(pCi/d)	•	3.400E-04	
	U-238	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)		6.000E-04	
D-34		, milky lives cook include lactor (polyb) (polyb)	1	I	1
	U-238+D	, plant/soil concentration ratio, dimensionless	l 2.500E-03	2.500E-03	RTF(13.1)
	U-238+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	•	3.400E-04	
	U-238+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)		6.000E-04	
	I				
D-5	Bioaccumu	lation factors, fresh water, L/kg:	l	l	l
D-5	Ac-227+D	, fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D	, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5			l	l	1
D-5	Pa-231	, fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231	, crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5)		l		l
D-5	Pb-210+D	, fish	•	3.000E+02	•
D-5	Pb-210+D	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5					
	Ra-226+D	, fish		5.000E+01	
D-5	Ra-226+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5					l oronia, E iv
	Ra-228+D			•	BIOFAC(5,1)
	Ka-228+D	, crustacea and mollusks	2.5006+02	2.500E+02	BIOFAC(5,2)
D-5	l mh_oogin	fich	 1 0006±03	 	BIOGRACI 6 1)
	Th-228+D		•	1.000E+02 5.000E+02	BIOFAC(6,1) BIOFAC(6,2)
D-5 D-5	11172207D	, clustacea and mollusks	J.0006+02 	3.000E+02	
	Th-230	, fish	 1.000E+02		BIOFAC(7,1)
	Th-230		•	5.000E+02	
D-5	1 111 230	, gradeada and moreona	3.0002.02		
- •	'		•		

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Dose Conversion Factor (and Related) Parameter Summary (continued) $\mbox{Dose Library: FGR 12 \& FGR 11}$

1		Current	Base	Parameter
Menu	Parameter	Value#	Case*	Name
D-5 Th-	-232 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5 Th-	-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5		Ì		
D-5 U-2	234 , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5 U-2	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)
D-5		1	l	l
D-5 U-2	235+D , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5 U-2	235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
D-5		1	1	†
D-5 U-2	236 , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5 U-2	crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5		1	l	l
D-5 U-2	238 , fish	1.000E+01	1.000E+01	BIOFAC (12,1)
D-5 U-2	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5		1	l	1
D-5 U-2	238+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5 U-3	238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

[#]For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

^{*}Base Case means Default.Lib w/o Associate Nuclide contributions.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Site-Specific Parameter Summary

1	· !	User	ı	Used by RESRAD	L Banamatan
Manu I	Denomation	:	l 0-5		Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
R011	Area of contaminated zone (m**2)	3.900E+03	1.000E+04	1	AREA
	Thickness of contaminated zone (m)	1.959E+00		•	THICKO
	Fraction of contamination that is submerged		0.000E+00	•	SUBMFRACT
	Length parallel to aquifer flow (m)	•	1.000E+02	•	LCZPAQ
	Basic radiation dose limit (mrem/yr)		3.000E+01	•	BRDL
	Time since placement of material (yr)	:		:	
	Times for calculations (yr)	•	0.000E+00 1.000E+00	•	TI
	Times for calculations (yr)	•	•	'	T(2)
	· · · · · · · · · · · · · · · · · · ·		3.000E+00	•	T(3)
	Times for calculations (yr)	1.000E+01		<u>'</u>	T(4)
	Times for calculations (yr)	•	3.000E+01	•	T (5)
		1.000E+02		'	T (6)
	Times for calculations (yr)		3.000E+02	·	T (7)
	Times for calculations (yr)	_	1.000E+03	'	T(8)
	Times for calculations (yr)	not used	0.000E+00	<u>'</u>	T(9)
R011	Times for calculations (yr)	not used	0.000E+00		T(10)
!		!			
	Initial principal radionuclide (pCi/g): Pa-231	2.500E-01	0.000E+00		S1(2)
	Initial principal radionuclide (pCi/g): Ra-226	4.600E-01	0.000E+00		S1(4)
	Initial principal radionuclide (pCi/g): Th-228	2.800E-01	0.000E+00		S1(6)
R012	Initial principal radionuclide (pCi/g): Th-230	1.140E+00	0.000E+00		S1(7)
R012	Initial principal radionuclide (pCi/g): Th-232	7.000E-02	0.000E+00	-	S1(8)
R012	Initial principal radionuclide (pCi/g): U-234	4.808E+02	0.000E+00		S1(9)
R012	Initial principal radionuclide (pCi/g): U-235	8.680E+00	0.000E+00		S1(10)
R012	Initial principal radionuclide (pCi/g): U-236	1.287E+01	0.000E+00		S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	5.038E+02	0.000E+00		51 (12)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00		W1 (2)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00		W1 (4)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00		W1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00		W1 (7)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00		W1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00		W1 (9)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		W1(10)
R012	Concentration in groundwater (pCi/L): U-236	not used	0.000E+00		W1(11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00		W1(12)
ı]			
R013	Cover depth (m)	2.760E+00	0.000E+00		COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00		DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03		vcv
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00		DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03		VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	<u>-i-</u>	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01		FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)		1.000E+01		HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00		BCZ
R013	Average annual wind speed (m/sec)	3.300E+00	2.000E+00		WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00		HUMID
R013	Evapotranspiration coefficient		5.000E-01		EVAPTR
	Precipitation (m/yr)	1.250E+00	•	i	PRECIP
	Irrigation (m/yr)	0.000E+00	2.000E-01		RÍ
		overhead			IDITCH
,		•	•	'	

RESRAD, Version 6.5 The Limit = 180 days

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Summary : MTW Pond D Industrial Worker - Probabilistic Run

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1		User	i .	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		 		 	
R013	Runoff coefficient	4.000E-01	2.000E-01		RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.778E+05	1.000E+06	·	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03		EPS
]		l	ĺ
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00		DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01		TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	l	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01		FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02		HCSZ
R014	Saturated zone hydraulic gradient	4.800E-03	2.000E-02		HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00		BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03		VWT
R014	Well pump intake depth (m below water table)	1.050E+02	1.000E+01		DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	DИD		MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02		WU WU
		F	1	1	1
R015	Number of unsaturated zone strata	5	1		NS NS
R015	Unsat. zone 1, thickness (m)	6.860E+00	4.000E+00		H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ(1)
R015		4.000E-01	•	·	TPUZ(1)
R015	• •	2.000E-01		·	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01		FCUZ(1)
R015		5.300E+00			BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.262E+02	1.000E+01		HCUZ(1)
		1	1		1
R015	Unsat. zone 2, thickness (m)	1.710E+00	0.000E+00		H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ (2)
R015	Unsat. zone 2, total porosity	4.000E-01	•	·	TPUZ(2)
R015	Unsat. zone 2, effective porosity	-	2.000E-01		EPUZ(2)
R015	•	2.000E-01	-		FCUZ(2)
R015	• • • • • • • • • • • • • • • • • • • •	5.300E+00	•	•	BUZ (2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		HCUZ(2)
	1	I	l		
R015	Unsat. zone 3, thickness (m)	1.710E+00	•		Н(3)
R015	Unsat. zone 3, soil density (g/cm**3)	•	1.500E+00	•	DENSUZ(3)
R015	Unsat. zone 3, total porosity	•	4.000E-01		TPUZ(3)
R015	Unsat. zone 3, effective porosity	2.000E-01			EPUZ(3)
R015	Unsat. zone 3, field capacity	•	2.000E-01		FCUZ(3)
R015	Unsat. zone 3, soil-specific b parameter	•	5.300E+00	•	BUZ(3)
R015	Unsat. zone 3, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		HCUZ(3)
		1			
		4.000E+00		•	H(4)
R015	Unsat. zone 4, soil density (g/cm**3)		1.500E+00	'	DENSUZ (4)
	Unsat. zone 4, total porosity	•	4.000E-01	•	TPUZ(4)
		2.000E-01	•	·	EPUZ(4)
		10-3000.S			FCUZ(4)
	Unsat. zone 4, soil-specific b parameter	•	5.300E+00		BUZ (4)
R015	Unsat. zone 4, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		HCUZ(4)

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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		User	ı	Used by RESRAD	Parameter
Menu l	Parameter	Input	 Default	(If different from user input)	Name
Menu	Farameter	I Input	L	t	I wame
R015	Unsat. zone 5, thickness (m)	1.140E+00	0.000E+00		 H(5)
R015	Unsat. zone 5, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ(5)
R015	Unsat. zone 5, total porosity	4.000E-01	4.000E-01		TPUZ (5)
R015	Unsat. zone 5, effective porosity	2.000E-01	2.000E-01		EPUZ(5)
R015	Unsat. zone 5, field capacity	2.000E-01	2.000E-01		FCUZ (5)
R015	Unsat. zone 5, soil-specific b parameter	5.300E+00	5.300E+00	l	BUZ (5)
R015	Unsat. zone 5, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	l	HCUZ (5)
- 1		1	İ	1	1
R016	Distribution coefficients for Pa-231	1	1	1	l
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS (2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.382E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
ļ		1		<u> </u>	<u> </u>
R016		1			
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	·	DCNUCC (4)
R016			7.000E+01	<u>.</u>	DCNUCU(4,1)
R016		7.000E+01		•	DCNUCU (4,2)
R016	·		7.000E+01	<u>'</u>	DCNUCU (4, 3)
R016	-	•	7.000E+01 7.000E+01	· ·	DCNUCU (4,4) DCNUCU (4,5)
R016 R016	·		7.000E+01	•	DCNUCS(4,3)
R016	-		0.000E+01	•	ALEACH(4)
R016	Solubility constant	•	0.000E+00		SOLUBK(4)
		1	1		1
R016	Distribution coefficients for Th-228	i			· I
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(6,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(6,2)
R016	Unsaturated zone 3 (cm**3/g)	6.000E+04	6.000E+04	l :	DCNUCU(6,3)
R016	Unsaturated zone 4 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(6,4)
R016	Unsaturated zone 5 (cm**3/g)	6.000E+04	6.000E+04	 	DCNUCU(6,5)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	l	DCNUCS (6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.994E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (6)
ı		1		l i	
R016	Distribution coefficients for Th-230	1		l i	
R016		•	6.000E+04		DCNUCC (7)
R016			6.000E+04	•	DCNUCU(7,1)
R016			6.000E+04		DCNUCU(7,2)
R016		•	6.000E+04	·	DCNUCU (7,3)
R016		•	6.000E+04	'	DCNUCU (7,4)
R016	Unsaturated zone 5 (cm**3/g)	•	6.000E+04		DCNUCU(7,5)
R016		6.000E+04			DCNUCS (7)
R016		•	0.0005+00	1.994E-06	ALEACH (7)
R016	Solubility constant	[U.000E+00	0.000E+00	not used	SOLUBK(7)

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R016 Unsaturated zone 2 (cm**3/g)			User		Used by RESRAD	Parameter
R016 Contaminated zone (cm**3/q)	Menu	Parameter	Input	Default	(If different from user input)	Name
R016 Contaminated zone (cm**3/q)					<u> </u>	
R016 Unsaturated zone 1 (cm**3/g)	R016	Distribution coefficients for Th-232				
R016 Unsaturated zone 2 (cm**3/g)	R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		DCNUCC (8)
R016 Unsaturated zone 3 (cm**3/g)	R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,1)
R016 Unsaturated zone 4 (cm**3/g)	R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,2)
R016 Unsaturated zone (cm**3/q)	R016	Unsaturated zone 3 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,3)
R016 Saturated zone (cm**3/g)	R016	Unsaturated zone 4 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,4)
R016 Leach rate (/yr)	R016	Unsaturated zone 5 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,5)
R016 Solubility constant	R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04		DCNUCS (8)
R016 Distribution coefficients for U-234	R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.994E-06	ALEACH(8)
R016 Contaminated zone (cm**3/q) 5.000E+01 5.000E+01 DCNUCC(9)	R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016 Contaminated zone (cm**3/q) 5.000E+01 5.000E+01 DCNUCC(9)	1	ĺ			ĺ	1
R016 Unsaturated zone 1 (cm**3/g)	R016	Distribution coefficients for U-234			l	1
R016 Unsaturated zone 2 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,2) R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,3) R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,4) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,5) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(9) R016 Distribution coefficients for U-235	R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC (9)
R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,3) R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,4) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,5) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(9) R016 Distribution coefficients for U-235	R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,1)
R016 Unsaturated zone 4 (cm**3/q) 5.000E+01 5.000E+01 DCNUCU(9, 4) R016 Unsaturated zone 5 (cm**3/q) 5.000E+01 5.000E+01 DCNUCU(9, 5) R016 Saturated zone (cm**3/q) 5.000E+01 5.000E+01 DCNUCU(9, 5) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(9) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd =-1.129E-01 not used SOLUBK(9) R016 Distribution coefficients for U-235	R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,2)
R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(9,5) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(9) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd =-1.129E-01 not used SOLUBK(9) R016 Distribution coefficients for U-235	R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,3)
R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCS(9) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(9) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd =-1.129E-01 not used SOLUBK(9) R016 Distribution coefficients for U-235	R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,4)
R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(9) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd =-1.129E-01 not used SOLUBK(9) R016 Distribution coefficients for U-235	R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,5)
R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd *-1.129E-01 not used SOLUBK(9) R016 Distribution coefficients for U-235	R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS (9)
R016 Distribution coefficients for U-235	R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.382E-03	ALEACH(9)
R016 Contaminated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCC(10) R016 Unsaturated zone 1 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,1) R016 Unsaturated zone 2 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,2) R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,3) R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Leach rate (/yr) 0.000E+01 5.000E+01 DCNUCU(10,5) R016 Solubility constant 2.940E-06 0.000E+00 2.382E-03 ALEACH(10) R016 Distribution coefficients for U-236	R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd =-1.129E-01 not used	SOLUBK(9)
R016 Contaminated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCC(10) R016 Unsaturated zone 1 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,1) R016 Unsaturated zone 2 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,2) R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,3) R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Leach rate (/yr) 0.000E+01 5.000E+01 DCNUCU(10,5) R016 Solubility constant 2.940E-06 0.000E+00 2.382E-03 ALEACH(10) R016 Distribution coefficients for U-236					1	l
R016 Unsaturated zone 1 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,1) R016 Unsaturated zone 2 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,2) R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,3) R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(10) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10) R016 Distribution coefficients for U-236	R016	Distribution coefficients for U-235	1	I	1	
R016 Unsaturated zone 2 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,2) R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,3) R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(10) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10) R016 Distribution coefficients for U-236	R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	l	DCNUCC(10)
R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,3) R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCS(10) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(10) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10) R016 Distribution coefficients for U-236	R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,1)
R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,4) R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCS(10) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(10) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10) R016 Distribution coefficients for U-236	R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,2)
R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(10,5) R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCS(10) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(10) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10) R016 Distribution coefficients for U-236	R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,3)
R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCS(10) R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(10) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10) R016 Distribution coefficients for U-236	R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,4)
R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(10) R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10) R016 Distribution coefficients for U-236	R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,5)
R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 5.588E+00 not used SOLUBK(10)	R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS (10)
R016 Distribution coefficients for U-236	R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.382E-03	ALEACH(10)
	R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd = $5.588E+00$ not used	SOLUBK(10)
	1	·		1	†	1
	R016	Distribution coefficients for U-236			l	
R016 Contaminated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCC(11)	R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC(11)
R016 Unsaturated zone 1 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(11,1)	R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,1)
R016 Unsaturated zone 2 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(11,2)	R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,2)
R016 Unsaturated zone 3 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(11,3)	R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01	(DCNUCU(11,3)
R016 Unsaturated zone 4 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(11,4)	R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(11,4)
R016 Unsaturated zone 5 (cm**3/g) 5.000E+01 5.000E+01 DCNUCU(11,5)	R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01	[DCNUCU(11,5)
R016 Saturated zone (cm**3/g) 5.000E+01 5.000E+01 DCNUCS(11)	R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS(11)
R016 Leach rate (/yr) 0.000E+00 0.000E+00 2.382E-03 ALEACH(11)	R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.382E-03	ALEACH(11)
R016 Solubility constant 2.940E-06 0.000E+00 Sol. Kd = 6.202E-02 not used SOLUBK(11)	R016	Solubility constant	2.940E-06	0.0008+00	Sol. Kd = 6.202E-02 not used	SOLUBK(11)

RESRAD, Version 6.5

The Limit = 180 days

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Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

•				I was a but propage	1
	D b	User	 	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
R016	Distribution coefficients for U-238	1		I	
R016		5.000E+01	5.000E+01	2.142E+03	DCNUCC(12)
R016	• • • • • • • • • • • • • • • • • • • •		5.000E+01		DCNUCU(12,1)
R016	<u>-</u>		5.000E+01	<u>'</u>	DCNUCU (12, 2)
R016	·		5.000E+01		DCNUCU(12,3)
R016			5.000E+01	· ·	DCNUCU (12,4)
R016		•	5.000E+01		DCNUCU (12,5)
R016	_	•	5.000E+01	•	DCNUCS(12)
R016	•		0.000E+00		ALEACH(12)
R016	_		0.000E+00		SOLUBK(12)
*****		1	1	1	1
R016	Distribution coefficients for daughter Ac-227	1	, 	, 	, !
R016	-	2.000E+01	2.000E+01		DCNUCC(1)
R016		•	2.000E+01		DCNUCU(1,1)
R016	•		2.000E+01	, 	DCNUCU(1,2)
R016	· · · · · · · · · · · · · · · · · · ·		2.000E+01		DCNUCU(1,3)
R016		•	2.000E+01	, I	DCNUCU(1,4)
R016		·	2.000E+01	•	DCNUCU(1,5)
R016		•	2.000E+01	•	DCNUCS(1)
R016		•	0.000E+00	5.916E-03	ALEACH(1)
R016	Solubility constant	•	0.000E+00	not used	SOLUBK(1)
		1		1	1
R016	Distribution coefficients for daughter Pb-210	i		1	!
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02		DCNUCC (3)
R016		1 1.000E+02	1.000E+02		DCNUCU(3,1)
R016			1.000E+02	· ·	DCNUCU (3,2)
R016	-		1.000E+02		DCNUCU(3,3)
R016			1.000E+02		DCNUCU(3,4)
R016	<u>-</u>		1.000E+02	,	DCNUCU(3,5)
R016	<u>-</u>		1.000E+02	,	DCNUCS(3)
R016			0.000E+00	1.194E-03	ALEACH(3)
R016	Solubility constant	•	0.000E+00	not used	SOLUBK(3)
		i		I	,
R016	Distribution coefficients for daughter Ra-228	1			
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		DCNUCC (5)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,2)
R016	Unsaturated zone 3 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,3)
R016	Unsaturated zone 4 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,4)
R016	Unsaturated zone 5 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,5)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01		DCNUCS (5)
R016		0.000E+00			ALEACH(5)
R016		0.000E+00		'	SOLUBK(5)
		1	i	i	
R017	Inhalation rate (m**3/yr)	1.140E+04	8.400E+03		INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04		MLINH
R017	Exposure duration	2.500E+01	3.000E+01		ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01		SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01		SHF1
R017	Fraction of time spent indoors	1.700E-01	5.000E-01		FIND

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

		User	I	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
			 	· 	
R017	Fraction of time spent outdoors (on site)	6.000E-02	2.500E-01		FOTD .
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):	1	l	1	I
R017	Outer annular radius (m), ring 1:	3.917E+00	5.000E+01		RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	7.833E+00	7.071E+01		RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.175E+01	0.000E+00		RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	1.567E+01	0.000E+00		RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	1.958E+01	0.000E+00		RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	2.350E+01	0.000E+00		RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	2.742E+01	0.000E+00		RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	3.133E+01	0.000E+00		RAD SHAPE(8)
R017	_	3.525E+01	0.000E+00		RAD SHAPE(9)
R017		•	0.000E+00	•	RAD_SHAPE(10)
R017	-		0.000E+00	· ·	RAD_SHAPE(11)
R017	-	4.700E+01	•	· ·	RAD_SHAPE(12)
1.02	Satel dimaral radias (m), rang rat	1	l	' 	t
R017	Fractions of annular areas within AREA:	1	I	' I	; }
R017		1.000E+00	1 1.000E+00	' 	FRACA(1)
R017	-	1.000E+00	•		FRACA(2)
R017	-	1.000E+00	•	•	FRACA(3)
R017	· · · · · · · · · · · · · · · · · · ·	9.800E-01			FRACA(4)
R017	· · · · · · · · · · · · · · · · · · ·	1.000E+00			FRACA (5)
R017	· · · · · · · · · · · · · · · · · · ·	9.700E-01	•	·	FRACA(6)
R017	·	1.000E+00		·	FRACA (7)
	-	9.500E-01	•		FRACA(8)
R017		6.300E-01	•	'	FRACA(9)
R017 R017	·	2.900E-01	•		FRACA(10)
	•	1.200E-01		<u>'</u>	FRACA(11)
R017	-	1.100E-02		· :	FRACA(11)
R017	Ring 12	1.100E-02	1	1	FRACA(12)
DA19	Fruits, vegetables and grain consumption (kg/yr)	l not used	1 1.600E+02	! !	DIET(1)
R018		not used	1.400E+01		DIET(2)
R018	Leafy vegetable consumption (kg/yr)			• •	
R018	Milk consumption (L/yr)	not used	9.200E+01	•	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01		DIET(4)
R018		not used	5.400E+00	•	DIET(5)
R018		not used	9.000E-01		DIET(6)
R018	· -	3.650E+01			SOIL
R018	Drinking water intake (L/yr)	4.785E+02	•		DWI
R018		1.000E+00			FDW
R018		•	1.000E+00	•	FHHW :
	•		1.000E+00	•	FLW
		not used			FIRW
	Contamination fraction of aquatic food		5.000E-01		FR9
R018	Contamination fraction of plant food		-1		FPLANT
R018	Contamination fraction of meat	not used	-1		FMEAT
R018	Contamination fraction of milk	not used	-1		FMILK
		I		l	
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	i	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01		LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01		LWI5

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

1		User	1	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
			·	<u> </u>	ļ
R019	Livestock water intake for milk (L/day)	not used	1.600E+02		LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01		LSI
R019	Mass loading for foliar deposition $(g/m^{**}3)$	not used	1.000E-04		MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	l	DM
R019	Depth of roots (m)	not used	9.000E-01	l	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	1	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	1	FCWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	l	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00		FGWIR
	!			l ·	l
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01		YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	1	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	1	YV (3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01		TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01		TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	1	TE (3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01		TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00		TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	l	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	1	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		RDRY(2)
R198	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		RDRY (3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01		RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01		RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	·	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01		WLAM
İ		1	1	1	l
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05		C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02		C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02		CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	- 	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01		DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07		EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10		REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01		AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01		AVFG5
1		ł	i 1	l	l
STOR	Storage times of contaminated foodstuffs (days):	İ	l i		1
STOR	Fruits, non-leafy vegetables, and grain		1.400E+01		STOR_T(1)
STOR	Leafy vegetables		1.000E+00		STOR_T(2)
STOR	•	•	1.000E+00		STOR_T(3)
STOR			2.000E+01		STOR_T(4)
STOR	•		7.000E+00		STOR_T(5)
STOR		7.000E+00	'		STOR_T(6)
STOR		1.000E+00			STOR_T(7)
STOR	•	1.000E+00			STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01		STOR_T(9)
	l		 -		
R021	•		1.500E-01		FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00		DENSFL

RESRAD, Version 6.5

The Limit = 180 days

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Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	 Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Total porosity of the cover material	not used	4.000E-01		TPCV
R021	Total porosity of the building foundation	not used	1.000E-01		TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02		PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02		PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):	1	1	1	l
R021	in cover material	not used	2.000E-06		DIFCV
R021	in foundation material	not used	3.000E-07		DIFFL
R021	in Contaminated zone soil	not used	2.000E-06		DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00		HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01		REXG
R021	Height of the building (room) (m)	not used	2.500E+00	1	HRM
R021	Building interior area factor	not used	0.000E+00		FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	·	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01		EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01		EMANA (2)
ı			1	I	l
TITL	Number of graphical time points	1024		l	NPTS
TITL	Maximum number of integration points for dose	17		1	LYMAX
TITL	Maximum number of integration points for risk	1		1	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 external gamma	active
2 inhalation (w/o radon)	active
3 plant ingestion	suppressed
4 meat ingestion	suppressed
5 milk ingestion	suppressed
6 aquatic foods	suppressed
7 drinking water	active
8 soil ingestion	active
9 radon	suppressed
Find peak pathway doses	active
·	t .

RESRAD, Version 6.5 The Limit = 180 days

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Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

Contaminated Zone Dimensions

Initial Soil Concentrations, pCi/g

Area:	3900.00 square meters	Pa-231	2.500E-01	
Thickness:	1.96 meters	Ra-226	4.600E-01	
Cover Depth:	2.76 meters	Th-228	2.800E-01	
		Th-230	1.140E+00	
		Th-232	7.000E-02	
		U-234	4.808E+02	
		U-235	8.680E+00	
		U-236	1.287E+01	
		U-238	5.038E+02	

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Total Mixture Sum $M(t) \Rightarrow$ Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03 TDOSE(t): 1.512E-12 1.086E-12 6.123E-13 3.557E-13 5.924E-13 1.194E-12 8.096E-12 4.577E-07

M(t): 6.047E-14 4.342E-14 2.449E-14 1.423E-14 2.370E-14 4.776E-14 3.239E-13 1.831E-08

Maximum TDOSE(t): 4.577E-07 mrem/yr at t = 1.000E+03 years

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 0.000E+00 \ years$

Water Independent Pathways (Inhalation excludes radon)

	Groun	nd	Inhala	tion	Rado	on	Plan	nt	Mea	t	Mil)	κ .	Soil	L
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
														
Pa-231	1.172E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	2.425E-14	0.0160	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0,0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.484E-12	0.9815	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0,0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.305E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0,0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.870E-15	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0,0000	0.000E+00	0.0000
U-234	1.652E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	4.520E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	6.667E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.000E-16	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
	-													
Total	1.512E-12	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
Radio-							
Nuclide	mrem/yr frac	. mrem/yr fract.	mrem/yr .fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
							
Pa-231	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.172E-21 0.0000
Ra-226	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.425E-14 0.0160
Th-228	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.484E-12 0.9815
Th-230	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.305E-17 0.0000
Th-232	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.870E-15 0.0019
U-234	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.652E-20 0.0000
U-235	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.520E-25 0.0000
U-236	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	6.667E-24 0.0000
U-238	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	8.000E-16 0.0005
Total	0.000E+00 0.00	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.512E-12 1.0000

^{*}Sum of all water independent and dependent pathways.

RESRAD, Version 6.5 Th Limit = 180 days

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Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio- Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	3.476E-21 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.0006+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	2.448E-14 0.0225	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	1.043E-12 0.9603	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	3.950E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	1.773E-14 0.0163	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	1.166E-19 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	2.176E-24 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	9.120E-23 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	8.108E-16 0.0007	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	1.086E-12 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	3.476E-21 0.0000
Ra-226	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.448E-14 0.0225
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.043E-12 0.9603
Th-230	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	3.950E-17 0.0000
Th-232	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.773E-14 0.0163
U-234	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.166E-19 0.0000
U-235	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.176E-24 0.0000
U-236	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	9.120E-23 0.0000
U-238	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	8.108E-16 0.0007
					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Market recommendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of the commendation of t	
Total	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.086E-12 1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

### Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	8.010E-21 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	2.493E-14 0.0407	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0,000E+00 0.0000
Th-228	5.148E-13 0.8407	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	9.404E-17 0.0002	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	7.166E-14 0.1170	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	6.282E-19 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	1.077E-23 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	8.754E-22 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	8.327E-16 0.0014	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
	<del></del>						
Total	6.123E-13 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

# Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

	Water	Water		Fish		on	Pla	nt	Mea	:	Mil	k	All Pati	nways*
Radio- Nuclide	mrem/yr fra	act.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.010E-21	0.0000
Ra-226	0.000E+00 0.0	0000	0.000£+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.493E-14	0.0407
Th-228	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.148E-13	0.8407
Th-230	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.404E-17	0.0002
Th-232	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.166E-14	0.1170
U-234	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.282E-19	0.0000
U-235	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	.0.000	1.077E-23	0.0000
U-236	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.754E-22	0.0000
U-238	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.327E-16	0.0014
Total	0.000E+00 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.123E-13	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

### Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio- Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	2.320E-20 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	2.657E-14 0.0747	0.0000000000000000000000000000000000000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	4.354E-14 0.1224	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	3.029E-16 0.0009	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	2.844E-13 0.7995	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	6.015E-18 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	9.531E-23 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	1.274E-20 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	9.141E-16 0.0026	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
MARK							
Total	3.557E-13 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

	Water		Fish		Rade	on	Pla	nt	Mea	t.	Mill	k	All Pat	hways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.320E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.657E-14	0.0747
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.354E-14	0.1224
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.029E-16	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.844E-13	0.7995
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.015E-18	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.531E-23	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.274E-20	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.141E-16	0.0026
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.557E-13	1.0000

^{.*}Sum of all water independent and dependent pathways.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 3.000E+01 \ years$ 

### Water Independent Pathways (Inhalation excludes radon)

	Groui	nd	Inhala	tion	Radi	on	Pla	nt	Mea	t	Mill	k	Soil	l
Radio-						<del></del>		<del></del> .						
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	6.274E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	3.188E-14	0.0538	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.749E-17	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.079E-15	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.582E-13	0.9422	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	6.162E-17	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	8.275E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	1.015E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.193E-15	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
						· · · · ·							<del></del>	
Total	5.924E-13	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

	Wate	er	Fish	h	Rado	on	Plan	nt	Mea	E	Mill	k	All Path	hways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.274E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.188E-14	0.0538
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.749E-17	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.079E-15	0.0018
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.582E-13	0.9422
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.162E-17	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.275E+22	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.193E-15	0.0020
					<del></del>	-								
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.924E-13	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 1.000E+02 \ years$ 

#### Water Independent Pathways (Inhalation excludes radon)

	Groun	nd	Inhala	tion	Rado	on	Plan	nt	Mea	:	Mill	¢	Soi	l
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	2.140E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	6.034E-14	0.0505	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	7.022E-28	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	7.258E-15	0.0061	0.000E+00	0.0000	*0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.122E-12	0.9397	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.325E-15	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.183E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	8.203E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.034E-15	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
								-				-	***************************************	
Total	1.194E-12	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

	Wate	Water		Fish		on	Plan	nt	Mea	:	Míl)	•	All Path	ways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.140E-19	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.034E-14	0.0505
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.022E-28	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.258E-15	0.0061
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.122E-12	0.9397
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.325E-15	0.0011
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.183E-20	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.203E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.034E-15	0.0025
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.194E-12	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 3.000E+02 \ years$ 

#### Water Independent Pathways (Inhalation excludes radon)

	Ground	Ground Inhalation		Plant	Meat	Milk	Soil	
Radio-								
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	
	<del></del>							
Pa-231	2.434E-18 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
Ra-226	3.734E-13 0.0461	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
Th-230	1.686E-13 0.0208	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
Th-232	7.427E-12 0.9173	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
U-234	8.403E-14 0.0104	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0,0000	
U-235	4.882E-19 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
U-236	1.409E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
U-238	4.371E-14 0.0054	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
Total	8.096E-12 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	

### Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

	Water	Water Fish		Plant	Meat	Milk	All Pathways*	
Radio-					<del></del>			
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	
Pa-231	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.434E-18 0.0000	
Ra-226	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	3.734E-13 0.0461	
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	
Th-230	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.686E-13 0.0208	
Th-232	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	7.427E-12 0.9173	
U-234	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	8.403E-14 0.0104	
U-235	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.882E-19 0.0000	
U-236	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000£+00 0.0000	1.409E-17 0.0000	
U-238	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.371E-14 0.0054	
***************************************								
Total	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	8.096E-12 1.0000	

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 1.000E+03 \ years$ 

#### Water Independent Pathways (Inhalation excludes radon)

	Ground Inhalation		Rado	Radon Plant		Meat		Milk		Soil				
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	1.113E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	2.201E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.213E-10	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.554E-09	0.0121	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	9.786E-10	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	8.044E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	1.916E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	5.042E-10	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
														-
Total	8.078E-09	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

	Water Fi		Fish Radon		on	Plant		Meat		Milk		All Pathways*		
Radio-			-											
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	3.274E-07	0.7154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.274E-07	0.7154
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.201E-10	0.0005
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.213E-10	0.0018
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.554E-09	0.0121
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.786E-10	0.0021
U-235	1.222E-07	0.2670	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.222E-07	0.2670
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.916E-14	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.042E-10	0.0011
					-									
Total	4.497E-07	0.9824	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.577E-07	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

# Dose/Source Ratios Summed Over All Pathways Parent and Progeny Principal Radionuclide Contributions Indicated

				•						
Parent	Product	Thread		DSR	(j,t) At T	ime in Yea	rs (mrem	/yr)/(pCi/	g)	
(i)	(j)	Fraction	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pa-231	1.000E+00	4.448E-23	4.515E-23	4.653E-23	5.168E-23	6.975E-23	1 . 993E-22	4.000E-21	1.449E-16
Pa-231	Ac-227+D	1.000E+00			3.200E-20					
Pa-231	ΣDSR(j)	1.0002.00			3.204E-20					
Fa-231	YD2K(1)		4.0075-21	1,3505-20	3.204E-20	3.278E-20	2.3035-13	0.3025-19	5.757E-10	1.3105-00
Ra-226+D	Ra-226+D	1.000E+00	5.273E-14	5.321E-14	5.419E-14	5.776E-14	6.931E-14	1.312E-13	8.117E-13	4.784E-10
Ra-226+D	Pb-210+D	1.000E+00	8.854E-24	2.648E-23	6.135E-23	1.800E-22	5.007E-22	1.756E-21	1.791E-20	5.103E-17
Ra-226+D	∑DSR(j)		5.273E-14	5.321E-14	5.419E-14	5.776E-14	6.931E-14	1.312E-13	8.117E-13	4.784E-10
Th-228+D	Th-228+D	1.000E+00	5.299E-12	3.723E-12	1.838E-12	1.555E-13	1.339E-16	2.508E-27	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	4.520E-38	4.649E-38	4.917E-38	5.983E-38	1.048E-37	7.463E-37	2.034E-34	6.798E-26
Th-230	Ra-226+D	1.000E+00	1.145E-17	3.465E+17	8.249E-17	2.657E-16	9.461E-16	6.367E-15	1.479E-13	7.204E-10
Th-230	Pb-210+D	1.000E+00	1.284E-27	9.002E-27	4.778E-26	4.347E-25	3.898E-24	6.009E-23	2.808E-21	7.109E-17
Th-230	∑DSR(j)		1.145E-17	3.465E-17	8.249E-17	2.657E-16	9.461E-16	6.367E-15	1.479E-13	7.204E-10
Th-232	Th-232	1.000E+00	3.088E-42	3.187E-42	3.393E-42	4.221E-42	7.877E-42	6.994E-41	3.586E-38	1.094E-28
Th-232	Ra-228+D	1.000E+00	6.783E-17	1.951E-16	4.163E+16	9.439E-16	1.635E-15	4.004E-15	4.827E-14	2.937E-10
Th-232	Th-228+D	1.000E+00	4.093E-14	2.530E-13	1.023E-12	4.061E-12	7.972E-12	1.603E-11	1.060E-10	7.905E-08
Th-232	∑DSR(j)		4.100E-14	2.532E-13	1.024E-12	4.062E-12	7.974E-12	1.603E-11	1.061E-10	7.934E-08
U-234	U-234	1.000E+00	6.933E-40	7.121E-40	7.511E-40	9.056E-40	1.545E-39	1.003E-38	2.097E-36	2.774E-28
U-234	Th-230	1.000E+00			1.544E-42					
U-234	Ra-226+D	1.000E+00			1.307E-21					
U-234	Pb-210+D	1.000E+00			5.127E-31					
U-234	ΣDSR(j)	110001			1.307E-21					
0 23.	250.(())		31.13.12.23	2,	1100/0 21	1,2313 20	1,0000 17	2.,,555 10	11,100 10	2.0332 12
U-235+D	U-235+D	1.000E+00	1.873E-26	1.908E-26	1.979E-26	2.250E-26	3.245E-26	1.170E-25	4.563E-24	1.690E-18
U-235+D	Pa-231	1.000E+00	4.717E-28	1.434E-27	3.447E-27	1.148E-26	4.503E-26	4.242E-25	2.551E-23	3.101E-18
U-235+D	Ac-227+D	1.000E+00	3.287E-26	2.302E-25	1.218E-24	1.095E-23	9.525E-23	1.363E-21	5.622E-20	1.408E-08
U-235+D	∑DSR(j)		5.208E-26	2.507E-25	1.241E-24	1.098E-23	9.533E-23	1.363E-21	5.625E-20	1.408E-08
U-236	U-236	1.000E+00	5.806E-41	5.967E-41	6.302E-41	7.630E-41	1.318E-40	8.919E-40	2.104E~37	4.245E=29
U-236	Th-232	1.000E+00			0.000E+00					
U-236	Ra-228+D	1.000E+00			3.863E-26					
U-236	Th-228+D	1.000E+00			6.798E-23					
U-236	ΣDSR(j)	1.0002.00			6.802E-23					
0 230	Z03K()/		3.1012 23	7.0005 24	0.0026 25	7.0376 22	7.0702 21	0.3736 20	1.0752 10	1.40% 13
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238+D	U-238+D	9.999E-01	1.588E-18	1.609E-18	1.653E-18	1.814E-18	2.368E-18	6.021E-18	8.670E-17	9.980E-13
U-238+D	U-234	9.999E-01	0.000E+00	2.803E-45	8.408E-45	2.803E-44	1.387E-43	3.219E-42	2.587E-39	3.133E-30
U-238+D	Th-230	9.999E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E-45	8.968E-44	1.864E-40	4.441E-31
U-238+D	Ra-226+D	9.999E-01	2.437E-29	3.688E-28	4.386E-27	1.248E-25	3.736E-24	2.713E-22	5.526E-20	2.686E-15
U-238+D	Pb-210+D	9.999E-01	1.644E-39	5.123E-38	1.306E-36	1.066E-34	8.633E-33	1.724E-30	8.727E-28	2.506E-22
U-238+D	∑DSR(j)		1.588E-18	1.609E-18	1.653E-18	1.814E-18	2.368E-18	6.022E-18	8.676E-17	1.001E-12
						<del></del>				

The DSR includes contributions from associated (half-life  $\leq$  180 days) daughters.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

# Single Radionuclide Soil Guidelines G(i,t) in pCi/g Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide								
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
		<del></del>	<del></del>					
Pa-231	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	1.909E+07
Ra-226	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11	5.225E+10
Th-228	4.718E+12	6.714E+12	1.360E+13	1.608E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05
U-234	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09
U-235	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06
U-236	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05

^{*}At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g) and Single Radionuclide Soil Guidelines G(i,t) in pCi/g at tmin = time of minimum single radionuclide soil guideline and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pa-231	2.500E-01	1.000E+03	1.310E-06	1.909E+07	1.310E-06	1.909E+07
Ra-226	4.600E-01	1.000E+03	4.784E-10	5.225E+10	4.784E-10	5.225E+10
Th-228	2.800E-01	0.000E+00	5.299E-12	4.718E+12	0.000E+00	*8.195E+14
Th-230	1.140E+00	1.000E+03	7.204E-10	*2.018E+10	7.204E-10	*2.018E+10
Th-232	7.000E-02	1.000E+03	7.934E-08	*1.097E+05	7.934E-08	*1.097E+05
U-234	4.808E+02	1.000E+03	2.035E-12	*6.247E+09	2.035E-12	*6.247E+09
U-235	8.680E+00	1.000E+03	1.408E-08	*2.161E+06	1.408E-08	*2.161E+06
U-236	1.287E+01	1.000E+03	1.489E-15	*6.468E+07	1.489E-15	*6.468E+07
U-238	5.038E+02	1.000E+03	1.001E-12	*3.361E+05	1.001E-12	*3.361E+05

^{*}At specific activity limit

Summary : MTW Pond D Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\MTW\MTW_POND_D_IW-PROB.RAD

# Individual Nuclide Dose Summed Over All Pathways Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)					DOSE(j,t)	, mrem/yr			
(j)	(i)		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pa-231	1.000E+00		1.112E-23	1.129E-23	1.163E-23	1.292E-23	1.744E-23	4.982E-23	1.000E-21	3.623E-17
Pa-231	U-235	1.000E+00		4.095E-27	1.245E-26	2.992E-26	9.967E-26	3.909E-25	3.682E-24	2.215E-22	2.691E-17
Pa-231	∑DOSE(j)			1.112E-23	1.130E-23	1.166E-23	1.302E-23	1.783E-23	5.350E-23	1.221E-21	6.315E-17
Ac-227	Pa-231	1.000E+00		1.161E-21	3.465E-21	7.999E-21	2.318E-20	6.272E-20	2.140E-19	2.433E-18	3.274E-07
Ac-227	U-235	1.000E+00		2.853E-25	1.998E-24	1.057E-23	9.501E-23	8.268E-22	1.183E-20	4.880E-19	1.222E-07
Ac-227	∑DOSE(j)			1.161E-21	3.467E-21	8.009E-21	2.328E-20	6.355E-20	2.258E-19	2.921E-18	4.497E-07
Ra-226	Ra-226	1.000E+00		2.425E-14	2.448E-14	2.493E-14	2.657E-14	3.188E-14	6.034E-14	3.734E-13	2.201E-10
Ra-226	Th-230	1.000E+00		1.305E-17	3.950E-17	9.404E-17	3.029E-16	1.079E-15	7.258E-15	1.686E-13	8.213E-10
Ra-226	U-234	1.000E+00		1.652E-20	1.166E-19	6.282E-19	6.015E-18	6.162E-17	1.325E-15	8.403E-14	9.786E-10
Ra-226	U-238	9.999E-01		1.228E-26	1.858E-25	2.210E-24	6.288E-23	1.882E-21	1.367E-19	2.784E-17	1.353E-12
Ra-226	∑DOSE(j)			2.427E-14	2.452E-14	2.502E-14	2.688E-14	3.302E-14	6.892E-14	6.260E-13	2.021E-09
Pb-210	Ra-226	1.000E+00		4.073E-24	1.218E-23	2.822E-23	8.281E-23	2.303E-22	8.078E-22	8.237E-21	2.347E-17
Pb-210	Th-230	1.000E+00		1.463E-27	1.026E-26	5.447E-26	4.955E-25	4.444E-24	6.850E-23	3.201E-21	8.105E-17
Pb-210	U-234	1.000E+00		0.000E+00	0.000E+00	0.000E+00	6.747E-27	1.823E-25	1.009E-23	1.463E-21	9.495E-17
Pb-210	U-238	9.999E-01		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.688E-28	4.397E-25	1.263E-19
Pb-210	∑DOSE(j)			4.074E-24	1.219E-23	2.828E-23	8.331E-23	2.350E-22	8.863E-22	1.290E-20	1.996E-16
Th-228	Th-228	1.000E+00		1.484E-12	1.043E-12	5.148E-13	4.354E-14	3.749E-17	7.022E-28	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00		2.865E-15	1.771E-14	7.163E-14	2.843E~13	5.581E-13	1.122E-12	7.423E-12	5.533E-09
Th-228	U-236	1.000E+00		6.653E-24	9.110E-23	8.749E-22	1.273E-20	1.015E-19	8.201E-19	1.409E-17	1.909E-14
Th-228	∑DOSE(j)			1.487E-12	1.060E-12	5.864E-13	3.278E-13	5.581E-13	1.122E-12	7.423E-12	5.533E-09
Th-230	Th-230	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.749E-26
Th-230	U-234	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.124E-25
Th-230	U-238	9.999E-01		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	∑DOSE(j)			0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.899E-25
Th-232	Th-232	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.657E~30
		1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	ΣDOSE(j)			0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.657E-30
Ra-228	Th-232	1.000E+00		4.748E-18	1.366E-17	2.914E-17	6.607E-17	1.144E-16	2.803E-16	3.379E-15	2.056E-11
Ra-228	U-236	1.000E+00		1.451E-26	9.913E-26	4.972E-25	3.770E-24	2.325E-23	2.105E-22	6.454E-21	7.097E-17
Ra-228	∑DOSE(j)			4.748E-18	1.366E-17	2.914E-17	6.607E-17	1.144E-16	2.803E-16	3.379E-15	2.056E-11
U-234	U-234	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.334E-25
U-234	U-238	9.999E-01		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.579E-27
U-234	∑DOSE(j)			0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.350E-25
U-235	U-235	1.000E+00		1.626E-25	1.656E-25	1.718E-25	1.953E-25	2.817E-25	1.015E-24	3.960E-23	1.467E-17
U-236	U-236	1.000E+00		0,000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.464E-28
U-238	U-238	5.400E-05		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	9.999E-01		8.000E-16	8.108E-16	8.327E-16	9.141E-16	1.193E-15	3.034E-15	4.368E-14	5.028E-10
U-238	∑DOSE(j)			8.000E-16	8.108E-16	8.327E-16	9.141E-16	1.193E-15	3.034E-15	4.368E-14	5.028E-10

 $\mathtt{THF}\left(i\right)$  is the thread fraction of the parent nuclide.

Summary : MTW Pond D Industrial Worker - Probabilistic Run

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# Individual Nuclide Soil Concentration Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent	THF(i)					S(j,t),	pCi/g			
(j)	(i)		t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pa-231	1.000E+00		2.500E-01	2.494E-01	2.482E-01	2.441E-01	2.326E-01	1.966E-01	1.216E-01	2.261E-02
Pa-231	U-235	1.000E+00		0.000E+00	1.832E-04	5.470E-04	1.793E-03	5.128E-03	1.446E-02	2.688E-02	1.678E-02
Pa-231	∑S(j):			2.500E-01	2.496E-01	2.488E-01	2.459E-01	2.377E-01	2.111E-01	1.484E-01	3.939E-02
Ac-227	Pa-231	1.000E+00		0.000E+00	7.801E-03	2.249E-02	6.545E-02	1.369E-01	1.719E-01	1.095E-01	2.036E-02
Ac-227	U-235	1.000E+00		0.000E+00	2.882E-06	2.522E-05	2.546E-04	1.771E-03	9.443E-03	2.192E-02	1.468E-02
Ac-227	∑S(j):			0.000E+00	7.804E-03	2.252E-02	6.570E-02	1.387E-01	1.813E-01	1.314E-01	3.504E-02
Ra-226	Ra-226	1.000E+00		4.600E-01	4.590E-01	4.571E-01	4.503E-01	4.314E-01	3.715E-01	2.423E-01	5.429E-02
Ra-226	Th-230	1.000E+00		0.000E+00	4.933E-04	1.477E-03	4.886E-03	1.435E-02	4.444E-02	1.092E-01	2.024E-01
Ra-226	U-234	1.000E+00		0.000E+00	9.361E-07	8.399E-06	9.234E-05	8.064E-04	8.072E-03	5.433E-02	2.411E-01
Ra-226		9.999E-01						2.422E-08			
Ra-226	∑S(j):			4.600E-01	4.595E-01	4.585E-01	4.553E-01	4.466E-01	4.240E-01	4.058E-01	4.980E-01
Pb-210	Ra-226	1.000E+00						2.648E-01			
	Th-230	1.000E+00						5.012E-03			
Pb-210		1.000E+00						2.020E-04			
Pb-210		9.999E-01						4.736E-09			
Pb-210	∑S(j):			0.000E+00	1.406E-02	4.082E-02	1.215E-01	2.700E-01	3.995E-01	3.909E-01	4.755E-01
Th-228	Th-228	1.000E+00		2.800E-01	1.949E-01	9.443E-02	7.475E-03	5.328E-06	5.151E-17	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00		0.000E+00	1.304E-03	8.688E-03	3.928E-02	6.636E-02	6.901E-02	6.898E-02	6.889E-02
Th-228	U-236	1.000E+00		0.000E+00	4.101E-12	8.825E-11	1.652E-09	1.181E-08	5.019E-08	1.307E-07	2.376E-07
Th-228	∑S(j):			2.800E-01	1.962E-01	1.031E-01	4.676E-02	6.637E-02	6.901E-02	6.898E-02	6.889E-02
Th-230	Th-230	1.000E+00		1.140E+00	1.140E+00	1.140E+00	1.140E+00	1.140E+00	1.139E+00	1.136E+00	1.128E+00
Th-230	U-234	1.000E+00		0.000E+00	4.323E-03	1.294E-02	4.277E-02	1.253E-01	3.848E-01	9.257E-01	1.635E+00
Th-230	U-238	9.999E-01		0.000E+00	6.423E-09	5.772E-08	6.376E-07	5.646E-06	5.933E-05	4.589E-04	3.253E-03
Th-230	∑S(j):			1.140E+00	1.144E+00	1.153E+00	1.183E+00	1.265E+00	1.524E+00	2.062E+00	2.766E+00
Th-232	Th-232	1.000E+00		7.000E-02	7.000E-02	7.000E-02	7.000E-02	7.000E-02	6.999E-02	6.996E-02	6.986E-02
Th-232	U-236	1.000E+00		0.000E+00	6.342E-10	1.898E-09	6.274E-09	1.838E-08	5.649E-08	1.361E-07	2.416E-07
'Fh-232	∑S(j):			7.000E-02	7.000E-02	7.000E-02	7.000E-02	7.000E-02	6.999E-02	6.996E-02	6.986E-02
Ra-228	Th-232	1.000E+00		0.000E+00	7.943E-03	2.119E-02	4.870E-02	6.726E-02	6.901E-02	6.898E-02	6.889E-02
Ra-228	U-236	1.000E+00		0.000E+00	3.673E-11	3.052E-10	2.625E-09	1.340E-08	5.159E-08	1.316E-07	2.378E-07
Ra-228	∑S(j):			0.000E+00	7.943E-03	2.119E-02	4.870E-02	6.726E-02	6.901E-02	6.898E-02	6.889E-02
U-234	U-234	1.000E+00						4.476E+02			
U-234	U-238	9.999E-01		0.000E+00	1.427E-03	4.269E-03	1.411E-02	4.132E-02	1.267E-01	3.032E-01	5.234E-01
U-234	∑S(j):			4.808E+02	4.796E+02	4.774E+02	4.695E+02	4.476E+02	3.789E+02	2.354E+02	4.480E+01
U-235	U-235	1.000E+00		8.680E+00	8.659E+00	8.618E+00	8.476E+00	8.081E+00	6.840E+00	4.248E+00	8.017E-01
U-236	U-236	1.000E+00		1.287E+01	1.284E+01	1.278E+01	1.257E+01	1.198E+01	1.014E+01	6.298E+00	1.189E+00
U-238	U-238	5.400E-05		2.721E-02	2.721E-02	2.720E-02	2.719E-02	2.716E-02	2.706E-02	2.675E-02	2.573E-02
U-238	U-238	9.999E-01		5.038E+02	5.038E+02	5.037E+02	5.035E+02	5.030E+02	5.010E+02	4.954E+02	4.764E+02
U-238	∑S(j):			5.038E+02	5.038E+02	5.037E+02	5.035E+02	5.030E+02	5.010E+02	4.955E+02	4.765E+02

THF(i) is the thread fraction of the parent nuclide.

### APPENDIX R

**Pond E Deterministic Dose Assessment Report** 

RESRAD, Version 6.5 The Limit = 180 days

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Summary : MTW Pond E Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\MTW\MTW_POND_E_IW-PROB.RAD

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Time = 0.000E+00	15
Time = 1.000E+00	16
Time = 3.000E+00	17
Time = 1.000E+01	18
Time = 3.000E+01	19
Time = 1.000E+02	20
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Summary : MTW Pond E Industrial Worker - Probabilistic Run

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# Dose Conversion Factor (and Related) Parameter Summary Dose Library: FGR 12 & FGR 11

		l Curvant	Base	Parameter
		Current		:
Menu	Parameter	Value# 	Case*	Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)	1	 	1
	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1( 1)
	Ac-228 (Source: FGR 12)		5.978E+00	:
		•	5.847E-03	
	Bi-210 (Source: FGR 12)	•	3.606E-03	:
	Bi-211 (Source: FGR 12)		2.559E-01	:
	•	'	1.171E+00	
		'	9.808E+00	
	Fr-223 (Source: FGR 12)		1.980E-01	
	·		1.906E-01	
		•	1.155E+01	
	Pa-234m (Source: FGR 12)	•	8.967E-02	
			2.447E-03	
	Pb-211 (Source: FGR 12)	•	3.064E-01	-
	Pb-212 (Source: FGR 12)		7.043E-01	
	•		1.341E+00	
	•	•	5.231E-05	
	Po-211 (Source: FGR 12)		4.764E-02	
		•	0.000E+00	
	,		5.138E-04	
	Po-215 (Source: FGR 12)	•	1.016E-03	:
	•		1.042E-04	
			5.642E-05	
	Ra-223 (Source: FGR 12)		6.034E-01	
		'	5.119E-02	
A-1	Ra-226 (Source: FGR 12)		3.176E-02	
	Ra-228 (Source: FGR 12)	•	0.000E+00	
	•	3.083E-01	3.083E-01	DCF1( 27)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1( 28)
	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1( 29)
A-1	Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1( 30)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1( 31)
		1.209E-03	1.209E-03	DCF1( 32)
A-1	Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1( 33)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1( 34)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1( 35)
A-1	T1-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1( 36)
A-1	T1-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1( 37)
A-1	T1-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1( 38)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1( 39)
A-1	U-235 (Source: FGR 12)	7.211E-01	7.211E-01	DCF1 ( 40)
A-1	U-236 (Source: FGR 12)	2.148E-04	2.148E-04	DCF1 ( 41)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1( 42)
	l	l	1	
B-1	Dose conversion factors for inhalation, mrem/pCi:	l		
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2( 1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2( 2)
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2( 3)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2( 4)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2( 5)

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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# Dose Conversion Factor (and Related) Parameter Summary (continued) $\qquad \qquad \text{Dose Library: FGR 12 \& FGR 11}$

		Current	Base	Parameter
Menu	Parameter	Value#	Case*	Name L
B-1	Th-228+D	3.454E-01	3.420E-01	   DCF2( 6)
B-1	'Th-230	3.260E-01	3.260E-01	DCF2( 7)
B-1	Th-232	1.640E+00	1.640E+00	DCF2( 8)
B-1	U-234	1.320E-01	1.320E-01	DCF2( 9)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2( 10)
B-1	U-236	1.250E-01	1.250E-01	DCF2( 11)
B-1	U-238	1.180E-01	1.180E-01	DCF2( 12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2( 13)
		<u> </u>		
	Dose conversion factors for ingestion, mrem/pCi:	   1 490E-03	   1 410E-02	l nestr ii
	Ac-227+D	1.060E-02	1.410E-02	
	Pa-231			
	Pb-210+D	•	5.370E-03	•
D-1	Ra-226+D	1.321E-03		•
	•	1.442E-03		
		8.086E-04		
	•	5.480E-04		
	•	2.730E-03		
	•	2.830E-04		•
	•	2.673E-04		
	U-236   U-238	2.690E-04 2.550E-04		•
		'	2.550E-04	
D-1	U-238+D	2.00/E-04 	2.3305-04	DCF3( 13)
D-34	   Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF( 1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF( 1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF( 1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF( 2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF( 2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF( 2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF( 3,1)
D-34	Pb-210+B , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF( 3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF( 3,3)
D-34	l			1
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF( 4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF( 4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF( 4,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF( 5,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF( 5,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF( 5,3)
D-34			i	
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF( 6,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF( 6,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF( 6,3)
D-34	l		- 1	

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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# Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

Menu	 	Parameter	Current   Value#	Base Case*	Parameter Name
Herra	! 	(0)	<del>                                     </del>	<del> </del>	<del> </del>
D-34	Th-230	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF( 7,1)
D-34	Th-230	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF( 7,2)
D-34	Th-230	, milk/livestock-intake ratio, $(pCi/L)/(pCi/d)$	5.000E-06	5.000E-06	RTF( 7,3)
D-34	1		1	1	l
D-34	Th-232	, plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF( 8,1)
D-34	Th-232	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF( 8,2)
D-34	Th-232	<pre>, milk/livestock-intake ratio, (pCi/L)/(pCi/d)</pre>	5.000E-06	5.000E-06	RTF( 8,3)
D-34	1		†	I	l
D-34	U-234	, plant/soil concentration ratio, dimensionless	•	2.500E-03	•
D-34	U-234	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	•	3.400E-04	•
D-34	U-234	<pre>, milk/livestock-intake ratio, (pCi/L)/(pCi/d)</pre>	6.000E-04	6.000E-04	RTF( 9,3)
D-34	l		!	!	
D-34	U-235+D	•	•	2.500E-03	
	U-235+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.400E-04	:
D-34	U-235+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF( 10,3)
D-34				!	l
	U-236			2.500E-03	
	U-236	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.400E-04	
	U-236	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF( 11,3)
D-34			 		 
	บ-238		•	2.500E-03	
	U-238			3.400E-04	
	U-238	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1 6.0006-04	6.000E-04	KIF ( 12,3)
D-34	!   U−238+D	, plant/soil concentration ratio, dimensionless	3 = 0.0 = 0.3	   2.500E-03	ן בינו אים אים ! '' מיים ו
		-	-	3.400E-04	
	U-238+D U-238+D	<pre>, beef/livestock-intake ratio, (pCi/kg)/(pCi/d) , milk/livestock-intake ratio, (pCi/L)/(pCi/d)</pre>	:	6.000E-04	
D-34	0-2307 <i>B</i> 	, milk/livestock-incake latto, (pol/b)/ (pol/k)	0.0000 04	1	KII ( 15,5)
D-5	   Bioaccumu	lation factors, fresh water, L/kg:			
D-5	Ac-227+D	, fish	1.500E+01	1.500E+01	BIOFAC( 1,1)
D-5	Ac-227+D	, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC( 1,2)
D-5	l		l	l	1
D-5	Pa-231	, fish	1.000E+01	1.000E+01	BIOFAC( 2,1)
D-5	Pa-231	, crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC( 2,2)
D-5			1	1	
D-5	Pb-210+D	, fish	3.000E+02	3.000E+02	BIOFAC( 3,1)
D-5	Pb-210+D	, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC( 3,2)
D-5			l	l	
D-5	Ra-226+D	, fish	5.000E+01	5.000E+01	BIOFAC( 4,1)
D-5	Ra~226+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC( 4,2)
D-5			1	1	
D-5	Ra-228+D	, fish	5.000E+01	5.000E+01	BIOFAC( 5,1)
D-5	Ra-228+D	, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC( 5,2)
D-5			l	<b>l</b>	
	Th-228+D			1.000E+02	
	Th-228+D	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC( 6,2)
D-5			<u> </u>		
	Th-230			'	BIOFAC( 7,1)
	Th-230				BIOFAC( 7,2)
D-5	l		l	<b>l</b> 1	

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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# Dose Conversion Factor (and Related) Parameter Summary (continued) Dose Library: FGR 12 & FGR 11

1			Current	Base	Parameter
Menu		Parameter	Value#	Case*	Name
D-5	Th-232	, fish	1.000E+02	1.000E+02	BIOFAC( 8,1)
D-5	Th-232	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC( 8,2)
D-5			l	ŀ	l
D-5	U-234	, fish	1.000E+01	1.000E+01	BIOFAC( 9,1)
D-5	U-234	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 9,2)
D-5			1	1	l
D-5	U-235+D	, fish	1.000E+01	1.000E+01	BIOFAC( 10,1)
D-5	U-235+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 10,2)
D-5			1	1	1
D-5	U-236	, fish	1.000E+01	1.000E+01	BIOFAC( 11,1)
D-5	U-236	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 11,2)
D-5		•	l	1	
D-5	U-238	, fish	1.000E+01	1.000E+01	BIOFAC( 12,1)
D-5	U-238	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 12,2)
D-5		•	l	I	
D-5	U-238+D	, fish	1.000E+01	1.000E+01	BIOFAC( 13,1)
D-5	U-238+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 13,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

^{*}Base Case means Default.Lib w/o Associate Nuclide contributions.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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#### Site-Specific Parameter Summary

		User	l	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
					<del> </del>
R011		1.200E+04		•	AREA
R011	Thickness of contaminated zone (m)	3.453E+00	2.000E+00		THICK0
R011	· · · · · · · · · · · · · · · · · · ·	0.000E+00			SUBMFRACT
R011	Length parallel to aquifer flow (m)	:	1.000E+02		LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01		BRDL
R011	Time since placement of material (yr)	•	0.000E+00	•	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00		T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00		T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01		T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01		T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	1	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02		T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	·	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	l	T( 9)
R011	Times for calculations (yr)	not used	0.000E+00		T(10)
		l			l
R012	Initial principal radionuclide (pCi/g): Pa-231	7.000E-02	0.000E+00		S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-226	3.400E-01	0.000E+00		S1(4)
R012	Initial principal radionuclide (pCi/g): Th-228	3.000E-02	0.000E+00		S1(6)
R012	Initial principal radionuclide (pCi/g): Th-230	8.300E-01	0.000E+00		S1(7)
R012	Initial principal radionuclide (pCi/g): Th-232	3.000E-02	0.000E+00		S1(8)
R012	Initial principal radionuclide (pCi/g): U-234	1.186E+02	0.000E+00		S1(9)
R012	Initial principal radionuclide (pCi/g): U-235	5.110E+00	0.000E+00		S1(10)
R012	Initial principal radionuclide (pCi/g): U-236	2.910E+00	0.000E+00		S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	1.227E+02	0.000E+00		S1(12)
	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00		W1 ( 2)
R012		not used	0.000E+00		W1 ( 4)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00		W1(6)
R012	<u> </u>	not used	0.000E+00		W1 ( 7)
R012		not used	0.000E+00		W1(8)
R012	· · · · · · · · · · · · · · · · · · ·	not used	0.000E+00	•	W1( 9)
	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00		W1 (10)
R012		not used	0.000E+00		W1 (11)
R012		not used	0.000E+00		W1(12)
	,, , ,,,	, I		, 	, . , I
R013	Cover depth (m)	1.590E+00	0.000E+00	l	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	' 	DENSCV
		1.000E-03	1.000E-03		l vcv
R013	•	•	1.500E+00		DENSCZ
R013		1.000E-03		, ,	l vcz
	Contaminated zone total porosity	4.000E-01			TPCZ
			2.000E-01		FCCZ
	Contaminated zone field capacity   Contaminated zone hydraulic conductivity (m/yr)	1.600E+00			HCCZ
	•	5.300E+00		1 <b>1</b>	BCZ
	•	3.300E+00			WIND
	•	not used		,	HUMID
		not used   5.000E-01		•	EVAPTR
		1.250E+00		•	PRECIP
	•	0.000E+00		•	RI
		overhead		•	
KULJ	Irrigation mode	Oversead	Overnead		IDITCH

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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		User	I	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		· 	<del> </del>	· 	· 
R013	Runoff coefficient	4.000E-01	2.000E-01	:	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.778E+05	1.000E+06	l	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03		EPS
		I	1	!	1
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	1	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01		TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01		EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	l	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	l	HCSZ
R014	Saturated zone hydraulic gradient	4.800E-03	2.000E-02	l	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	l	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03		VWT
R014	Well pump intake depth (m below water table)	1.050E+02	1.000E+01		DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND		MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02		UW
!		1		Į.	l
R015	Number of unsaturated zone strata	5	1		NS
R015	Unsat. zone 1, thickness (m)	6.860E+00	4.000E+00		Н(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ(1)
R015		4.000E-01			TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01		EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01		FCUZ(1)
R015		5.300E+00	•		BUZ (1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.262E+02	1.000E+01		HCUZ(1)
(		. 1			1
	•	1.710E+00		•	H(2)
		1.500E+00			DENSUZ(2)
		4.000E-01		•	TPUZ(2)
	· · · · · · · · · · · · · · · · · · ·	2.000E-01			EPUZ(2)
	·	2.000E-01			FCUZ(2)
	•	5.300E+00			BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01		HCUZ(2)
		1 . 2.2- 22 .			1
		1.710E+00			H(3)
		1.500E+00			DENSUZ (3)
	·	4.000E-01			TPUZ (3)
		2.000E-01			EPUZ(3)
		2.000E-01			FCUZ(3)
		5.300E+00     1.000E+01		'	BUZ (3)
KOTO	Unsat. zone 3, hydraulic conductivity (m/yr)	1 1.000E+01	1.0006+01		HCUZ(3)
ם חוב ו	Unest zone A thickness (m)	   4.000E+00	0 000E±00		l u (A)
		4.500E+00     1.500E+00		'	H(4)
		1.300E+00     4.000E-01		·	DENSUZ(4) TPUZ(4)
	• •	4.000E-01     2.000E-01		,	EPUZ (4)
		2.000E-01     2.000E-01		'	FCUZ (4)
		2.000E-01     5.300E+00			BUZ (4)
		1.000E+00		'	HCUZ (4)
KOTO	ondat. Zone 4, nyurauric conductivity (M/yr)	1 1.0000-01	1.0006.01		11002 (4)

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		User	1	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
	1,1 11,000	<u> </u>		L	<u> </u>
R015	Unsat. zone 5, thickness (m)	1.140E+00	0.000E+00		, ] H(5)
R015	Unsat. zone 5, soil density (g/cm**3)	1.500E+00	1.500E+00		DENSUZ (5)
R015	Unsat. zone 5, total porosity	4.000E-01	4.000E-01		TPUZ (5)
R015	Unsat. zone 5, effective porosity	2.000E-01	2.000E-01		EPUZ(5)
R015	Unsat. zone 5, field capacity	2.000E-01	2.000E-01		FCUZ (5)
R015	Unsat. zone 5, soil-specific b parameter	5.300E+00	5.300E+00		BUZ (5)
R015	Unsat. zone 5, hydraulic conductivity (m/yr)	J 1.000E+01	1.000E+01	J	HCUZ (5)
1		I		I	1
R016	Distribution coefficients for Pa-231	1		l	1
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	l <del></del>	DCNUCC ( 2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01	<del></del>	DCNUCU(2,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(2,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCS ( 2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.373E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 2)
		J .		l	1
R016	Distribution coefficients for Ra-226	<b>I</b>			
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		DCNUCC ( 4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU( 4,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(4,2)
R016	Unsaturated zone 3 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(4,3)
R016	Unsaturated zone 4 (cm**3/g)	J 7.000E+01	7.000E+01		DCNUCU( 4,4)
R016	Unsaturated zone 5 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU( 4,5)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01		DCNUCS ( 4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.818E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 4)
İ		I	l l		
R016	Distribution coefficients for Th-228	l i	l		
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04		DCNUCC ( 6)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU( 6,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(6,2)
R016	Unsaturated zone 3 (cm**3/g)	6.000E+04			DCNUCU(6,3)
R016		6.000E+04	6.000E+04		DCNUCU(6,4)
R016	-	'	6.000E+04 )		DCNUCU( 6,5)
R016	•		6.000E+04		DCNUCS ( 6)
R016			0.000E+00	1.149E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 6)
	i				
R016		1		į	
R016	-	6.000E+04			DCNUCC(7)
R016		6.000E+04	,		DCNUCU(7,1)
R016		6.000E+04	•		DCNUCU (7,2)
R016	-	6.000E+04	,	<del>-</del>	DCNUCU(7,3)
R016		,	6.000E+04		DCNUCU (7,4)
R016			6.000E+04		DCNUCU (7,5)
R016			6.000E+04		DCNUCS ( 7)
R016			0.000E+00	1.149E-06	ALEACH(7)
R016	Solubility constant	0.000E+00	U.UUUE+0U	not used	SOLUBK (7)

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		User		Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		· 	-	<del>-</del>	<del></del>
R016	Distribution coefficients for Th-232	l .	1	l	l
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	l	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	l	DCNUCU(8,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,2)
R016	Unsaturated zone 3 (cm**3/g) .	6.000E+04	6.000E+04	1	DCNUCU(8,3)
R016	Unsaturated zone 4 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,4)
R016	Unsaturated zone 5 (cm**3/g)	6.000E+04	6.000E+04		DCNUCU(8,5)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	<del> </del>	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.149E-06	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 8)
١		ł		l	1
R016	Distribution coefficients for U-234	1		1	l
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		DCNUCC ( 9)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU( 9,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU( 9,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,3)
R016	Unsaturated zone 4 (cm**3/g)		5.000E+01		DCNUCU(9,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(9,5)
R016	Saturated zone (cm**3/g)		5.000E+01		DCNUCS ( 9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.373E-03	ALEACH(9)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd $=-2.007E-01$ not used	SOLUBK( 9)
I		1		l	
R016	Distribution coefficients for U-235	1	-		
R016	Contaminated zone (cm**3/g)	•	5.000E+01		DCNUCC (10)
R016	Unsaturated zone 1 (cm**3/g)	•	5.000E+01		DCNUCU(10,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01		DCNUCU(10,2)
R016	Unsaturated zone 3 (cm**3/g)	•	5.000E+01		DCNUCU(10,3)
R016	Unsaturated zone 4 (cm**3/g)	•	5.000E+01		DCNUCU(10,4)
R016		5.000E+01		<del></del>	DCNUCU(10,5)
R016		5.000E+01			DCNUCS (10)
R016		0.000E+00		1.373E-03	ALEACH(10)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd = 3.194E+00 not used	SOLUBK (10)
		!	l l		
R016		[	1		
R016		5.000E+01		<del></del>	DCNUCC(11)
R016		5.000E+01			DCNUCU(11,1)
R016		5.000E+01			DCNUCU(11, 2)
R016	Unsaturated zone 3 (cm**3/g)		5.000E+01		DCNUCU(11,3)
R016	Unsaturated zone 4 (cm**3/g)		5.000E+01		DCNUCU(11,4)
R016	-	5.000E+01			DCNUCU(11,5)
R016	· · · · · · · · · · · · · · · · · · ·	5.000E+01	•		DCNUCS (11)
R016	•	0.000E+00	•	1.373E-03	ALEACH(11)
R016	Solubility constant	2.940E-06	U.000E+00	Sol. Kd =-1.634E-01 not used	SOLUBK (11)

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1		User		Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
				<b>-</b>	· 
R016	Distribution coefficients for U-238			İ	I
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	5.213E+02	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	5.213E+02	DCNUCU(12,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+01	5.000E+01	5.213E+02	DCNUCU(12,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+01	5.000E+01	5.213E+02	DCNUCU(12,3)
R016	Unsaturated zone 4 (cm**3/g)	5.000E+01	5.000E+01	5.213E+02	DCNUCU(12,4)
R016	Unsaturated zone 5 (cm**3/g)	5.000E+01	5.000E+01	5.213E+02	DCNUCU(12,5)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	5.213E+02	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.322E-04	ALEACH(12)
R016	Solubility constant	2.940E-06	0.000E+00	Sol. Kd = $5.213E+02$ used	SOLUBK(12)
		1		1	i
R016	Distribution coefficients for daughter Ac-227	1		1	I
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01		DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01		DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	2.000E+01	2.000E+01		DCNUCU(1,2)
R016	Unsaturated zone 3 (cm**3/g)	2.000E+01	2.000E+01		DCNUCU(1,3)
R016	Unsaturated zone 4 (cm**3/g)	2,000E+01	2.000E+01		DCNUCU(1,4)
R016	Unsaturated zone 5 (cm**3/g)	2.000E+01	2.000E+01	l	DCNUCU(1,5)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	l	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.409E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 1)
1		1		l	1
R016	Distribution coefficients for daughter Pb-210	1		İ	1
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	l	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	l	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02		DCNUCU(3,2)
R016	Unsaturated zone 3 (cm**3/g)	1.000E+02	1.000E+02		DCNUCU(3,3)
R016	Unsaturated zone 4 (cm**3/g)	1.000E+02	1.000E+02	l	DCNUCU(3,4)
R016	Unsaturated zone 5 (cm**3/g)	1.000E+02	1.000E+02	l	DCNUCU(3,5)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	l	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.880E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 3)
		1		1	1
R016	Distribution coefficients for daughter Ra-228	1			<b>†</b>
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01		DCNUCC (5)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	l	DCNUCU(5,2)
R016-	Unsaturated zone 3 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,3)
R016	Unsaturated zone 4 (cm**3/g)	7.000E+01	7.000E+01	<del></del>	DCNUCU(5,4)
R016	Unsaturated zone 5 (cm**3/g)	7.000E+01	7.000E+01		DCNUCU(5,5)
R016		7.000E+01		•	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.818E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 5)
ļ		1 1		l	1
	Inhalation rate (m**3/yr)	1.140E+04			INHALR
	-	1.000E-04		,	MLINH
	Exposure duration	2.500E+01		•	ED
	Shielding factor, inhalation		4.000E-01		SHF3
	Shielding factor, external gamma	-	7.000E-01		SHF1
R017	Fraction of time spent indoors	1.700E-01	5.000E-01		FIND

RESRAD, Version 6.5

The Limit = 180 days

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Summary : MTW Pond E Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\MTW\MTW_POND_E_IW-PROB.RAD

		User	l	Used by RESRAD	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		· ·	, 		·
R017	Fraction of time spent outdoors (on site)	6.000E-02	2.500E-01		FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):	i		1	
R017	Outer annular radius (m), ring 1:	7.667E+00	5.000E+01		RAD_SHAPE( 1)
R017	Outer annular radius (m), ring 2:	1.533E+01	7.071E+01		RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	2.300E+01	0.000E+00	1	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	3.067E+01	0.000E+00	1	RAD SHAPE (4)
R017	Outer annular radius (m), ring 5:	3.833E+01	0.000E+00		RAD SHAPE (5)
R017	Outer annular radius (m), ring 6:	4.600E+01	0.000E+00		RAD SHAPE( 6)
R017	Outer annular radius (m), ring 7:	5.367E+01	0.000E+00		RAD SHAPE( 7)
R017	Outer annular radius (m), ring 8:	6.133E+01	0.000E+00		RAD SHAPE ( 8)
R017	Outer annular radius (m), ring 9:	6.900E+01	0.000E+00		RAD SHAPE ( 9)
R017	Outer annular radius (m), ring 10:	7.667E+01	0.000E+00		RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	8.433E+01	0.000E+00		RAD SHAPE(11)
R017	Outer annular radius (m), ring 12:	9.200E+01			RAD SHAPE(12)
ï	, , , , , , , ,	I			
R017	Fractions of annular areas within AREA:	I			
R017	Ring 1	1.000E+00	1.000E+00		FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01		FRACA (2)
R017	Ring 3	1.000E+00			FRACA (3)
R017	Ring 4	9.800E-01	0.000E+00		FRACA (4)
R017		9.800E-01			FRACA (5)
R017		6.800E-01			FRACA ( 6)
R017	Ring 7	5.300E-01			FRACA (7)
R017		4.400E-01			FRACA (8)
R017		3.900E-01		<del></del>	FRACA ( 9)
R017	Ring 10	3.300E-01			FRACA(10)
R017	Ring 11	•	0.000E+00		FRACA(11)
R017	Ring 12	5.700E-02			FRACA(12)
ĺ	•	i			
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02		DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01		DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	, <del></del>	DIET(3)
R018		:	6.300E+01		DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00		DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01		DIET(6)
R018	Soil ingestion rate (g/yr)		3.650E+01	·	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02		DWI
R018	Contamination fraction of drinking water	1.000E+00	. 1.000E+00		FDW
R018	Contamination fraction of household water	not used	1.000E+00		FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00		FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00		FIRW
		not used			FR9
			-1		FPLANT
R018	•		-1		FMEAT
	Contamination fraction of milk		-1		FMILK
i			i	,	
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	1	LF15
		not used	5.500E+01		LFI6
R019		not used	5.000E+01	!	LW15
'	• • • •		•	'	-

Summary : MTW Pond E Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\MTW\MTW_POND_E_IW-PROB.RAD

Name	1		User	ı	Used by RESRAD	Parameter
	Menu l	Parameter		Default	· ·	:
Livestock and intoke (My/day)			· ·		· · · · · · · · · · · · · · · · · · ·	<del> </del>
R199   Mass loading for foliar deposition (g/m**3)   not used   1.008-01     DR   R19   Depth of soil mixing layer (m)   1.508-01   1.508-01     DR   DR   DR   DR   DR   DR   D	R019	Livestock water intake for milk (L/day)	not used	1.600E+02		LWI6
Bogth of soil mixing layer (n)	R019	Livestock soil intake (kg/day)	not used	5.000E-01		LSI
R019   Depth of roots   m	R019	Mass loading for foliar deposition $(g/m^{**}3)$	not used	1.000E-04	1	MLFD
R013   Drinking water fraction from ground water   1.000E+00   1.000E+00     PCMRM   R013   Nousehold water fraction from ground water   not used   1.000E+00     PCMRM   R013   Livestock water fraction from ground water   not used   1.000E+00     PCMRM   R015   Crrigation fraction from ground water   not used   1.000E+00     PCMRM   R015   Crrigation fraction from ground water   not used   1.000E+00     PCMRM   R015   Crrigation fraction from ground water   not used   1.000E+00     PCMRM   R015   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016   R016	R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01		DM
ROUSE   Livestock water fraction from ground water	R019	Depth of roots (m)	not used	9.000E-01		DROOT
R019   Livestock water fraction from ground water	R019	Drinking water fraction from ground water	1.000E+00	1.000E+00		FGWDW
Roll	R019	Household water fraction from ground water	not used	1.000E+00		FGWHH
### R198   Wet weight crop yield for Non-Leafy (kg/m**2)   not used   7.0000-01     YV(1)   ### R198   Wet weight crop yield for Leafy (kg/m**2)   not used   1.1000-00     YV(2)   ### R198   Wet weight crop yield for Fodder (kg/m**2)   not used   1.1000-00     YV(3)   ### R198   Growing Season for Non-Leafy (years)   not used   1.1000-01     TE(1)   ### R198   Crowing Season for Leafy (years)   not used   2.5000-01     TE(3)   ### R198   Crowing Season for Fodder (years)   not used   3.0000-02     TE(3)   ### R198   Translocation Factor for Non-Leafy   not used   1.0000-00     TIV(1)   ### R198   Translocation Factor for Fodder   not used   1.0000-00     TIV(2)   ### R198   Translocation Factor for Fodder   not used   1.0000-00     R0RY(1)   ### R198   Dry Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Dry Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01     R0RY(1)   ### R199   Wet Foliar Interception Fraction for Non-Leafy   not used   2.5000-01	R019	Livestock water fraction from ground water	not used	1.000E+00	<del></del>	FGWLW
R198   Wet weight crop yield for Loafy	R019	Irrigation fraction from ground water	not used	1.000E+00		FGWIR
R198   Wet weight crop yield for Loafy	1		1	l	1	1
R198   Wet weight crop yield for Fodder (kg/m**2)   not used   1.100E+00     TE(1)   R198   Growing Season for Non-Leafy (years)   not used   2.500E+01     TE(2)   R198   Growing Season for Leafy (years)   not used   2.500E+01     TE(2)   R198   Growing Season for Fodder (years)   not used   8.000E+02     TE(3)   R198   Translocation Factor for Non-Leafy   not used   1.000E+00     TIV(1)   R198   Translocation Factor for Leafy   not used   1.000E+00     TIV(2)   R198   Translocation Factor for Fodder   not used   1.000E+00     TIV(2)   R198   Translocation Factor for Fodder   not used   2.500E+01     R0RY(1)   R198   Dry Foliar Interception Fraction for Non-Leafy   not used   2.500E+01     R0RY(1)   R198   Dry Foliar Interception Fraction for Leafy   not used   2.500E+01     R0RY(1)   R198   Dry Foliar Interception Fraction for Leafy   not used   2.500E+01     R0RY(1)   R198   Wet Foliar Interception Fraction for Leafy   not used   2.500E+01     R0RY(1)   R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.500E+01     R0RY(1)   R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.500E+01     R0RY(1)   R198   Wet Foliar Interception Fraction for Leafy   not used   2.500E+01     R0REY(1)   R198   Wet Foliar Interception Fraction for Leafy   not used   2.500E+01     R0REY(1)   R198   Wet Foliar Interception Fraction for Todder   not used   2.500E+01     R0REY(1)   R198   Wet Foliar Interception Fraction for Todder   not used   2.500E+01     R0REY(1)   R198   Wet Foliar Interception Fraction for Todder   not used   2.500E+01     R0REY(1)   R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.500E+01     R0REY(1)   R198   Wet Foliar Interception Fraction for Non-Leafy   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198	R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	l	YV (1)
R198   Growing Season for Non-Leafy (years)   not used   1.700E-01     TE(1)   R198   Growing Season for Leafy (years)   not used   3.000E-02     TE(3)   R198   Growing Season for Fodder   years)   not used   1.000E-01     TE(3)   R198   Translocation Factor for Non-Leafy   not used   1.000E-01     TIV(1)   R198   Translocation Factor for Non-Leafy   not used   1.000E-00     TIV(2)   R198   Translocation Factor for Fodder   not used   1.000E-00     TIV(3)   R198   Translocation Factor for Fodder   not used   1.000E-00     TIV(3)   R198   Dry Foliar Interception Fraction for Non-Leafy   not used   2.500E-01     RDRY(1)   R198   Dry Foliar Interception Fraction for Non-Leafy   not used   2.500E-01     RDRY(1)   R198   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R196   R	R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	<del></del>	YV (2)
R198   Growing Season for Leafy (years)   not used   2.500E-01       TE(2)	R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00		YV (3)
R198   Translocation Factor for Non-Leafy   not used   8.000E-02     TE(3)   R198   Translocation Factor for Non-Leafy   not used   1.000E-01     TIV(1)   R198   Translocation Factor for Leafy   not used   1.000E-00     TIV(2)   R198   Translocation Factor for Leafy   not used   1.000E-00     TIV(3)   R198   Translocation Factor for Faction for Non-Leafy   not used   2.500E-01     R0RY(1)   R198   Dry Foliar Interception Fraction for Non-Leafy   not used   2.500E-01     R0RY(2)   R198   Dry Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(2)   R198   Dry Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Weathering Removal Constant for Vegetation   not used   2.000E-01     R0RY(3)   R198   Weathering Removal Constant for Vegetation   not used   2.000E-01     R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198	R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01		TE(1)
### Right   Translocation Factor for Non-Leafy   not used   1.000E-00     TIV(1)   #### Right   Translocation Factor for Leafy   not used   1.000E-00     TIV(2)   ##### Right   Translocation Factor for Fodder   not used   1.000E-00     TIV(3)   ####################################	R19B	Growing Season for Leafy (years)	not used	2.500E-01		TE (2)
R198   Translocation Factor for Leafy	R19B	Growing Season for Fodder (years)	not used	8.000E-02		TE(3)
### R198   Translocation Factor for Fodder   not used   1.000E+00	R19B	Translocation Factor for Non-Leafy	not used	1.000E-01		TIV(1)
R198   Dry Foliar Interception Fraction for Non-Leafy   not used   2.500E-01     R0RY(1)   R198   Dry Foliar Interception Fraction for Leafy   not used   2.500E-01     R0RY(2)   R198   Dry Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Dry Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(3)   R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.500E-01     R0RY(3)   R198   Wet Foliar Interception Fraction for Leafy   not used   2.500E-01     R0RY(1)   R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     R0RY(1)   R198   Weathering Removal Constant for Vegetation   not used   2.000E-01     R0RY(3)   R198   Weathering Removal Constant for Vegetation   not used   2.000E-05     C120T   C14   C-12 concentration in water (g/cm**3)   not used   2.000E-05     C120T   C14   Fraction of vegetation carbon from soil   not used   2.000E-05     C30IL   C14   Fraction of vegetation carbon from air   not used   2.000E-02     C30IL   C14   Fraction of vegetation carbon from air   not used   2.000E-01     DMC   C14   C-14 evasion flux rate from soil (1/sec)   not used   7.000E-01     DMC   C14   C-12 evasion flux rate from soil (1/sec)   not used   7.000E-01     REVSN   C14   Fraction of grain in beef cattle feed   not used   8.000E-01     AVFG5   AVFG5   C14   Fraction of grain in milk cow feed   not used   2.000E-01     AVFG5   STOR   Fults, non-leafy vegetables, and grain   1.400E+01   1.400E+01     STOR_T(1)   STOR_T(2)   STOR   Fults, non-leafy vegetables, and grain   1.400E+01   1.400E+01     STOR_T(3)   STOR_T(4)   STOR_T(4)   STOR_T(5)   STOR_T(6)   STOR_T(6)   STOR_T(6)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   STOR_T(7)   S	R19B	Translocation Factor for Leafy	not used	1.000E+00		TIV(2)
### Page   Dry Foliar Interception Fraction for Leafy   not used   2.500E-01	R19B	Translocation Factor for Fodder	not used	1.000E+00		TIV(3)
R198   Dry Foliar Interception Fraction for Podder   not used   2.500E-01     RRDY(3)       R198   Wet Foliar Interception Fraction for Non-Leafy   not used   2.500E-01     RWET(1)       R198   Wet Foliar Interception Fraction for Leafy   not used   2.500E-01     RWET(3)       R198   Wet Foliar Interception Fraction for Leafy   not used   2.500E-01     RWET(3)       R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     RWET(3)       R198   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     RWET(3)       R198   Wet Foliar Interception Fraction for Fodder   not used   2.000E-01     RWET(3)       R198   Wet Foliar Interception Fraction for Fodder   not used   2.000E-02     RWET(3)       R198   Wet Foliar Interception Fraction for Fodder   not used   2.000E-02     RWET(3)       R198   Wet Foliar Interception Fraction for Fodder   not used   2.000E-02     CI20TR       R198   Wet Foliar Interception Fraction for Fodder   not used   3.000E-02     CI20TR       R198   Wet Foliar Interception Fraction for Fodder   not used   3.000E-02     CI20TR       R198   Wet Foliar Interception Fraction for Fodder   not used   3.000E-02     CI20TR       R198   Wet Foliar Interception Fraction for Fodder   not used   3.000E-01     CI20TR       R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198   R198	R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01		RDRY(1)
RMET (1)	R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01		RDRY(2)
R19B   Wet Foliar Interception Fraction for Leafy   not used   2.500E-01     RWET(2)       R19B   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01     RWET(3)       R19B   Weathering Removal Constant for Vegetation   not used   2.500E-01     WLAM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                -	R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01		RDRY(3)
RISB   Wet Foliar Interception Fraction for Fodder   not used   2.500E-01	R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	l	RWET(1)
R19B   Weathering Removal Constant for Vegetation   not used   2.000E+01	R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01		RWET(2)
	R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01		RWET(3)
C14   C-12 concentration in contaminated soil (g/g)   not used   3.000E-02     C12CZ   C14   Fraction of vegetation carbon from soil   not used   2.000E-02     CSOIL   C14   Fraction of vegetation carbon from air   not used   9.800E-01     CAIR   C14   C-14 evasion layer thickness in soil (m)   not used   3.000E-01     DMC   C14   C-14 evasion flux rate from soil (l/sec)   not used   7.000E-07     EVSN   C14   C-12 evasion flux rate from soil (l/sec)   not used   1.000E-10     REVSN   C14   Fraction of grain in beef cattle feed   not used   8.000E-01     AVFG4   C14   Fraction of grain in milk cow feed   not used   2.000E-01     AVFG5    STOR   Storage times of contaminated foodstuffs (days):                 STOR   Fruits, non-leafy vegetables, and grain   1.400E+01   1.400E+01     STOR_T(1)   STOR   Leafy vegetables   1.000E+00   1.000E+00     STOR_T(2)   STOR   Milk   1.000E+00   1.000E+00     STOR_T(3)   STOR   Meat and poultry   2.000E+01   2.000E+01     STOR_T(4)   STOR   Fish   7.000E+00   7.000E+00     STOR_T(5)   STOR   Crustacea and mollusks   7.000E+00   7.000E+00     STOR_T(6)   STOR   Surface water   1.000E+00   1.000E+00     STOR_T(7)   STOR   Surface water   1.000E+00   1.000E+00     STOR_T(7)   STOR   Livestock fodder   4.500E+01   4.500E+01     STOR_T(9)	R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01		WLAM
C14   C-12 concentration in contaminated soil (g/g)   not used   3.000E-02     C12CZ   C14   Fraction of vegetation carbon from soil   not used   2.000E-02     CSOIL   C14   Fraction of vegetation carbon from air   not used   9.800E-01     CAIR   C14   C-14 evasion layer thickness in soil (m)   not used   3.000E-01     DMC   C14   C-14 evasion flux rate from soil (l/sec)   not used   7.000E-07     EVSN   C14   C-12 evasion flux rate from soil (l/sec)   not used   1.000E-10     REVSN   C14   Fraction of grain in beef cattle feed   not used   8.000E-01     AVFG4   C14   Fraction of grain in milk cow feed   not used   2.000E-01     AVFG5    STOR   Storage times of contaminated foodstuffs (days):                 STOR   Fruits, non-leafy vegetables, and grain   1.400E+01   1.400E+01     STOR_T(1)   STOR   Leafy vegetables   1.000E+00   1.000E+00     STOR_T(2)   STOR   Milk   1.000E+00   1.000E+00     STOR_T(3)   STOR   Meat and poultry   2.000E+01   2.000E+01     STOR_T(4)   STOR   Fish   7.000E+00   7.000E+00     STOR_T(5)   STOR   Crustacea and mollusks   7.000E+00   7.000E+00     STOR_T(6)   STOR   Surface water   1.000E+00   1.000E+00     STOR_T(7)   STOR   Surface water   1.000E+00   1.000E+00     STOR_T(7)   STOR   Livestock fodder   4.500E+01   4.500E+01     STOR_T(9)	ı		1	<b>i</b> i	1	l
C14   Fraction of vegetation carbon from soil   not used   2.000E-02     CAIR   C14   Fraction of vegetation carbon from air   not used   9.800E-01     CAIR   C14   C-14 evasion layer thickness in soil (m)   not used   3.000E-01     DMC   C14   C-14 evasion flux rate from soil (1/sec)   not used   7.000E-07     EVSN   C14   C-12 evasion flux rate from soil (1/sec)   not used   1.000E-10     REVSN   C14   Fraction of grain in beef cattle feed   not used   8.000E-01     AVFG4   C14   Fraction of grain in milk cow feed   not used   2.000E-01     AVFG5    STOR   Storage times of contaminated foodstuffs (days):           STOR   Fruits, non-leafy vegetables, and grain   1.400E+01   1.400E+01     STOR_T(1)   STOR   Leafy vegetables   1.000E+00   1.000E+00     STOR_T(2)   STOR   Milk   1.000E+00   1.000E+00     STOR_T(3)   STOR   Meat and poultry   2.000E+01   2.000E+01     STOR_T(3)   STOR   Crustacea and mollusks   7.000E+00   7.000E+00     STOR_T(5)   STOR   Well water   1.000E+00   1.000E+00     STOR_T(6)   STOR   Surface water   1.000E+00   1.000E+00     STOR_T(7)   STOR   Surface water   1.000E+00   1.000E+00     STOR_T(8)   STOR   Livestock fodder   4.500E+01   4.500E+01     STOR_T(9)   STOR   Livestock fodder   4.500E+01   4.500E+01     STOR_T(9)	C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	l <del></del>	C12WTR
C14   Fraction of vegetation carbon from air   not used   9.800E-01     CATR  C14   C-14 evasion layer thickness in soil (m)   not used   3.000E-01     DMC  C14   C-14 evasion flux rate from soil (1/sec)   not used   7.000E-07     EVSN  C14   C-12 evasion flux rate from soil (1/sec)   not used   1.000E-10     REVSN  C14   Fraction of grain in beef cattle feed   not used   8.000E-01     AVFG4  C14   Fraction of grain in milk cow feed   not used   2.000E-01     AVFG5  STOR   Storage times of contaminated foodstuffs (days):	C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	l	C12CZ
C14   C-14 evasion layer thickness in soil (m)	C14	Fraction of vegetation carbon from soil	not used	2.000E-02		CSOIL
C14   C-14 evasion flux rate from soil (1/sec)   not used   7.000E-07     EVSN  C14   C-12 evasion flux rate from soil (1/sec)   not used   1.000E-10     REVSN  C14   Fraction of grain in beef cattle feed   not used   8.000E-01     AVFG4  C14   Fraction of grain in milk cow feed   not used   2.000E-01     AVFG5  STOR   Storage times of contaminated foodstuffs (days):	C14	Fraction of vegetation carbon from air	not used	9.800E-01		CAIR
C14   C-12 evasion flux rate from soil (1/sec)   not used   1.000E-10     REVSN  C14   Fraction of grain in beef cattle feed   not used   8.000E-01     AVFG4  C14   Fraction of grain in milk cow feed   not used   2.000E-01     AVFG5  STOR   Storage times of contaminated foodstuffs (days):	C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01		DMC
C14   Fraction of grain in beef cattle feed	C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07		EVSN
	C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10		REVSN
STOR   Storage times of contaminated foodstuffs (days):	C14	Fraction of grain in beef cattle feed	not used	8.000E-01		AVFG4
STOR   Fruits, non-leafy vegetables, and grain           1.400E+01   1.400E+01              STOR_T(1)           STOR   Leafy vegetables           1.000E+00   1.000E+00              STOR_T(2)           STOR   Milk           1.000E+00   1.000E+00              STOR_T(3)           STOR   Meat and poultry           2.000E+01   2.000E+01              STOR_T(4)           STOR   Fish           7.000E+00   7.000E+00              STOR_T(5)           STOR   Crustacea and mollusks           7.000E+00   7.000E+00              STOR_T(6)           STOR   Well water           1.000E+00   1.000E+00              STOR_T(7)           STOR   Surface water           1.000E+00   1.000E+00              STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01              STOR_T(9)           R021   Thickness of building foundation (m)           not used   1.500E-01              FLOOR1	C14	Fraction of grain in milk cow feed	not used	2.000E-01		AVFG5
STOR   Fruits, non-leafy vegetables, and grain           1.400E+01   1.400E+01              STOR_T(1)           STOR   Leafy vegetables           1.000E+00   1.000E+00              STOR_T(2)           STOR   Milk           1.000E+00   1.000E+00              STOR_T(3)           STOR   Meat and poultry           2.000E+01   2.000E+01              STOR_T(4)           STOR   Fish           7.000E+00   7.000E+00              STOR_T(5)           STOR   Crustacea and mollusks           7.000E+00   7.000E+00              STOR_T(6)           STOR   Well water           1.000E+00   1.000E+00              STOR_T(7)           STOR   Surface water           1.000E+00   1.000E+00              STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01              STOR_T(9)           R021   Thickness of building foundation (m)           not used   1.500E-01              FLOOR1	ı		1		l	l
STOR   Leafy vegetables         1.000E+00   1.000E+00            STOR_T(2)           STOR   Milk         1.000E+00   1.000E+00            STOR_T(3)           STOR   Meat and poultry         2.000E+01   2.000E+01            STOR_T(4)           STOR   Fish         7.000E+00   7.000E+00            STOR_T(5)           STOR   Crustacea and mollusks         7.000E+00   7.000E+00            STOR_T(6)           STOR   Well water         1.000E+00   1.000E+00            STOR_T(7)           STOR   Surface water         1.000E+00   1.000E+00            STOR_T(8)           STOR   Livestock fodder         4.500E+01   4.500E+01            STOR_T(9)           R021   Thickness of building foundation (m)         not used   1.500E-01            FLOOR1	STOR	Storage times of contaminated foodstuffs (days):	1	1	l	l
STOR   Milk           1.000E+00   1.000E+00     STOR_T(3)           STOR   Meat and poultry           2.000E+01   2.000E+01     STOR_T(4)           STOR   Fish           7.000E+00   7.000E+00     STOR_T(5)           STOR   Crustacea and mollusks           7.000E+00   7.000E+00     STOR_T(6)           STOR   Well water           1.000E+00   1.000E+00     STOR_T(7)           STOR   Surface water           1.000E+00   1.000E+00     STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01     STOR_T(9)           R021   Thickness of building foundation (m)           not used   1.500E-01     FLOOR1	STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01		STOR_T(1)
STOR   Meat and poultry           2.000E+01   2.000E+01             STOR_T(4)           STOR   Fish           7.000E+00   7.000E+00             STOR_T(5)           STOR   Crustacea and mollusks           7.000E+00   7.000E+00             STOR_T(6)           STOR   Well water           1.000E+00   1.000E+00               STOR_T(7)           STOR   Surface water           1.000E+00   1.000E+00               STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01               STOR_T(9)           R021   Thickness of building foundation (m)           not used   1.500E-01               FLOOR1	STOR	Leafy vegetables	1.000E+00	1.000E+00		STOR_T(2)
STOR   Fish           7.000E+00   7.000E+00     STOR_T(5)           STOR   Crustacea and mollusks           7.000E+00   7.000E+00     STOR_T(6)           STOR   Well water           1.000E+00   1.000E+00     STOR_T(7)           STOR   Surface water           1.000E+00   1.000E+00     STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01     STOR_T(9)	STOR	Milk	1.000E+00	1.000E+00		STOR_T(3)
STOR   Crustacea and mollusks           7.000E+00   7.000E+00     STOR_T(6)           STOR   Well water           1.000E+00   1.000E+00     STOR_T(7)           STOR   Surface water           1.000E+00   1.000E+00     STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01     STOR_T(9)	STOR	Meat and poultry	2.000E+01	2.000E+01		STOR_T(4)
STOR   Well water           1.000E+00   1.000E+00     STOR_T(7)           STOR   Surface water           1.000E+00   1.000E+00     STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01     STOR_T(9)	STOR	Fish	7.000E+00	7.000E+00		STOR_T(5)
STOR   Surface water           1.000E+00   1.000E+00     STOR_T(8)           STOR   Livestock fodder           4.500E+01   4.500E+01     STOR_T(9)	STOR	Crustacea and mollusks	7.000E+00	7.000E+00		STOR_T(6)
STOR   Livestock fodder           4.500E+01   4.500E+01     STOR_T(9)	STOR	Well water	1.000E+00	1.000E+00		STOR_T(7)
R021   Thickness of building foundation (m)   not used   1.500E-01     FLOOR1	STOR	Surface water	1.000E+00	1.000E+00		STOR_T(8)
	STOR	Livestock fodder	4.500E+01	4.500E+01		STOR_T(9)
	1		1			1
R021   Bulk density of building foundation (g/cm**3)   not used   2.400E+00     DENSFL	R021	Thickness of building foundation (m)	not used	1.500E-01		FLOOR1
	R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00		DENSFL

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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### Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter   Name
R021	Total porosity of the cover material	not used	4.000E-01		TPCV
R021	Total porosity of the building foundation	not used	1.000E-01		TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02		PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02		PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):		l .	l	l
R021	in cover material	not used	2.000E-06		DIFCV
R021	in foundation material	not used	3.000E-07		DIFFL
R021	in contaminated zone soil	not used	2.000E-06		DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00		XIMH
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	1	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	1	HRM
R021	Building interior area factor .	not used	0.000E+00	l	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	1	DMFL
R021	Emanating power of Rn+222 gas	not used	2.500E-01	l	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	1	EMANA (2)
i		1	1	1	l
TITL	Number of graphical time points	1024		1	NPTS
TITL	Maximum number of integration points for dose	17		l	LYMAX
TITL	Maximum number of integration points for risk	1			KYMAX

#### Summary of Pathway Selections

Pathway	User Selection
1 external gamma	active
2 inhalation (w/o radon)	active
3 plant ingestion	suppressed
4 meat ingestion	suppressed
5 milk ingestion	suppressed
6 aquatic foods	suppressed
7 drinking water	active
8 soil ingestion	active
9 radon	suppressed
Find peak pathway doses	active

RESRAD, Version 6.5

The Limit = 180 days

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Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Contaminated Zone Dimensions

Initial Soil Concentrations, pCi/g

Area:	12000.00 square meters	Pa-231	7.000E-02
Thickness:	3.45 meters	Ra-226	3.400E-01
Cover Depth:	1.59 meters	Th-228	3.000E-02
		Th-230	8.300E-01
		Th-232	3.000E-02
		U-234	1.186E+02
		U-235	5.110E+00
		U-236	2.910E+00
		U-238	1.227E+02

#### Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03 TDOSE(t): 2.077E-08 1.830E-08 1.644E-08 1.997E-08 3.020E-08 6.373E-08 5.371E-07 1.746E-03

M(t): 8.308E-10 7.322E-10 6.577E-10 7.987E-10 1.208E-09 2.549E-09 2.148E-08 6.983E-05

Maximum TDOSE(t): 1.746E-03 mrem/yr at t = 1.000E+03 years

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

#### Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	9.234E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	9.334E-09 0.4494	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	1.008E-08 0.4852	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	4.946E-12 0.0002	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	8.217E-11 0.0040	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	2.122E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	3.163E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	1.023E-19 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	1.271E-09 0.0612	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	2.077E-08 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Radio-	Water		Fish		Rado	Radon		Plant		t	Mill	k	All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0,000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.234E-15	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.334E-09	0.4494
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.008E-08	0.4852
Th-230	0,000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.946E-12	0.0002
Th-232	0,000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.217E-11	0.0040
U-234	0,000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.122E-15	0.0000
U-235	0,000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-15	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.271E-09	0.0612
														-
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.077E-08	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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#### Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

#### Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalat	ion	Rado	חס	Pla	nt	Meat	t	Mill	k	Soi	1
Radio-														
Nuclide	mrem/yr fra	act.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
					<del></del>				<del></del>					
Pa-231	2.334E-14 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	9.427E-09 0.5	5150	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	7.081E-09 0.	3868	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.498E-11 0.6	8000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.938E-10 0.0	0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.498E-14 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.250E-15 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	1.354E-18 0.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.288E-09 0.0	0704	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.830E-08 1.0	0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

#### Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

	Water		Water Fish		Rade	on	Plan	nt	Mea	3	Mil)	•	All Pathways*	
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.0008+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.334E-14	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.427E-09	0.5150
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.081E-09	0.3868
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-11	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.938E-10	0.0270
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.250E-15	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-18	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-09	0.0704
**************************************										<del></del>			*****	
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-08	1.0000

 $^{{}^{\}star}\mathrm{Sum}$  of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

#### Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-							
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
	<del></del>						<del></del>
Pa-231	5.126E-14 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	9.614E-09 0.5847	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	3,496E-09 0.2126	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	3.568E-11 0.0022	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	1.974E-09 0.1201	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000£+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	8.080E-14 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	3.495E-15 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	1.280E-17 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	1.323E-09 0.0805	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	1.644E-08 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Radio-	Wat	er	Fis	h	Rado	on	Pla	nt	Mea	t	Mil	c	All Pati	nways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.126E-14	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.614E-09	0.5847
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.496E-09	0.2126
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.568E-11	0.0022
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.974E-09	0.1201
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.080E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.495E-15	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.280E-17	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.323E-09	0.0805
			MTM 17 18		=	WILL A. 1/7. 11.								ang disc
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0,0000	0.000E+00	0.0000	1.644E-08	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

#### Water Independent Pathways (Inhalation excludes radon)

	Grou	nd	Inhala	tion	Rado	on	Plan	nt	Mea		Mil	(	Soil	ı
Radio-			<del></del>				· · · · · · · · · · · · · · · · · · ·							
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	1.463E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.030E-08	0.5158	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.957E-10	0.0148	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.152E-10	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	7.804E-09	0.3908	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	7.768E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	5.109E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	1.853E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.452E-09	0.0727	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.997E-08	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t \ = 1.000E+01 \ years$ 

Radio- —	Wate	er	Fisl	า	Rado	on	Plan	nt	Mea	t	Mill	k	All Path	nways*
Radio-							-							
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
													<del></del>	
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.463E-13	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-08	0.5158
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.957E-10	0.0148
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.152E-10	0.0058
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.804E-09	0.3908
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.768E-13	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.109E-15	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.0008+00	0.0000	1.853E-16	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.452E-09	0.0727
												***************************************		
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.997E-08	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t = 3.000E+01 \ years$ 

#### Water Independent Pathways (Inhalation excludes radon)

	Groun	nd	Inhala	tion	Rado	on	Plan	nt	Mea	t	Mill	•	Soil	1
Radio-						<del></del>						<del></del>		
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
													<del></del>	<del></del>
Pa-231	4.060E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.254E-08	0.4152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.546E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	4.132E-10	0.0137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.535E-08	0.5081	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	8.050E-12	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.689E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	1.489E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.895E-09	0.0627	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
		=				-								
Total	3.020E-08	1,0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

	Water	Fi	sh	Rado	n	Plan	nt	Mean	=	Mill	c .	All Path	ways*
Radio-													
Nuclide	mrem/yr fra	ct. mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
						***************************************		<del></del>					
Pa-231	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.060E-13	0.0000
Ra-226	0.000E+00 0.0	0+3000.0 000	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.254E-08	0.4152
Th-228	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.546E-13	0.0000
Th-230	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.132E-10	0.0137
Th-232	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.535E-08	0.5081
U-234	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.050E-12	0.0003
U-235	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.689E-14	0.0000
U-236	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.489E-15	0.0000
U-238	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.895E-09	0.0627
Total	0.000E+00 0.0	000 0.000E+0	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.020E-08	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

#### Water Independent Pathways (Inhalation excludes radon)

	Grou	nd	Inhala	tion	Rado	n	Plan	nt	Mea	t	Mil	k .	Soi	1
Radio-		<del></del>												
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
									<del></del>				<del></del>	
Pa-231	1.527E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	2.496E-08	0.3916	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	4.771E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.849E-09	0.0447	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.093E-08	0.4853	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.800E-10	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.979E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	1.246E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.812E-09	0.0755	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.373E-08	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Radio-	Wate	er	Fisl	n	Rade	on	Pla	nt	Meat	<u>:</u>	Mil	k	All Path	ways*
Radio- Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.527E-12	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.496E-08	0.3916
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.771E-24	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.849E-09	0.0447
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.093E-08	0.4853
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.800E-10	0.0028
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.979E-13	0.0000
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.246E-14	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.812E-09	0.0755
								and the same of the same						
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.373E-08	1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t \ = \ 3.000E+02 \ years$ 

#### Water Independent Pathways (Inhalation excludes radon)

	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
Radio-						<del></del>	<del></del>
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	2,221E-11 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Ra-226	1.784E-07 0.3323	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	7.056E-08 0.1314	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000		0.000E+00 0.0000	0.000E+00 0.0000
Th-232	2.062E-07 0.3840	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-234	1.273E-08 0.0237	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-235	1.038E-11 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-236	2.358E-13 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
U-238	6.905E-08 0.1286	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
	***************************************						
Total	5.371E-07 1.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
Radio-	_				<del></del> .		
Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.221E-11 0.0000
Ra-226	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.784E-07 0.3323
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	7.056E-08 0.1314
Th-232	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.062E-07 0.3840
U-234	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.273E-08 0.0237
U-235	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.038E-11 0.0000
U-236	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.358E-13 0.0000
U-238	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	6.905E-08 0.1286
Total	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	5.371E-07 1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

#### Water Independent Pathways (Inhalation excludes radon)

	Grou	nd	Inhala	tion	Rade	on	Plan	nt	Mea	t.	Mill	k	Soil	ı
Radio-														<del></del>
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
									<del></del>					
Pa-231	3.249E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.753E-04	0.1004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	4.062E-04	0.2327	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.729E-04	0.0991	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.044E-04	0.1171	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.275E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-236	4.485E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	7.851E-04	0.4497	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
								-						
Total	1.746E-03	0.9999	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

# Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p) $As \ mrem/yr \ and \ Fraction \ of \ Total \ Dose \ At \ t \ = 1.000E+03 \ years$

	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
Radio- Nuclide	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Pa-231	9.597E-08 0.0001	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.209E-07 0.0002
Ra-226	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.753E-04 0.1004
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-230	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.062E-04 0.2327
Th-232	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.729E-04 0.0991
U-234	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	2.044E-04 0.1171
U-235	7.514E-08 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.350E+06 0.0008
U-236	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	4.485E-10 0.0000
U-238	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	7.851E-04 0.4497
Total	1.711E-07 0.0001	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	1.746E-03 1.0000

^{*}Sum of all water independent and dependent pathways.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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# Dose/Source Ratios Summed Over All Pathways Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Thread		DSR	(j,t) At T	ime in Yea	rs (mrem	/yr)/(pCi/	g)	
(i)	(j)	Fraction	0.000E+00				3.000E+01		-	1.000E+03
Pa-231	Pa-231	1.000E+00	3.089E-14	3.138E-14	3.240E-14	3.625E-14	4.992E-14	1.531E-13	3.760E-12	2.761E-07
Pa-231	Ac-227+D	1.000E+00	1.010E-13	3.021E-13	6.999E-13	2.054E-12	5.750E-12	2.166E-11	3.135E-10	5.736E-06
Pa-231	∑DSR(j)		1.319E-13	3.335E-13	7.324E-13	2.091E-12	5.800E-12	2.181E-11	3.173E-10	6.012E-06
Ra-226+D	Ra-226+D		2.745E-08							
Ra-226+D	Pb-210+D	1.000E+00								
Ra-226+D	∑DSR(j)		2.745E-08	2.773E-08	2.828E-08	3.029E-08	3.688E-08	7.341E-08	5.249E-07	5.157E-04
Th-228+D	Th-228+D	1.000E+00	3.359E-07	2.360E-07	1.165E-07	9.85/E-09	8.488E-12	1.5906-22	0.000E+00	0.000E+00
Th-230	Th-230	1 000F+00	8.092E-24	8 322E-24	8 803E-24	1.071E=23	1.877E-23	1.336E-22	3 642E-20	1.218E-11
Th-230	Ra-226+D	1.000E+00	5.959E-12							
Th-230	Pb-210+D	1.000E+00	9.316E-21							
Th-230	ΣDSR(j)	1.0002.00					4.979E-10			
111-230	ZD3K(J)		3.9395-12	1,0036-11	4,2336-11	1.3002-10	4.7/76 10	3.4336-07	0.3012-00	4.0345-04
Th-232	Th-232	1,000E+00	2.205E-26	2.274E-26	2.421E-26	3.012E-26	5.621E-26	4.992E-25	2.560E-22	7.813E-13
Th-232	Ra-228+D	1.000E+00	1.438E-10							
Th-232	Th-228+D	1.000E+00	2.595E-09							
Th-232	ΣDSR(j)						5.115E-07			
	2,501.()/				******		*******			
U-234	U-234	1.000E+00	4.242E-25	4.361E-25	4.610E-25	5.597E-25	9.745E-25	6.786E-24	1.737E-21	4.657E-13
U-234	Th-230	1.000E+00	3.658E-29	1.124E-28	2.769E-28	1.005E-27	5.047E-27	1.129E-25	8.081E-23	5.981E-14
U-234	Ra-226+D	1.000E+00	1.789E-17	1.264E-16	6.815E-16	6.551E-15	6.789E-14	1.518E-12	1.073E-10	1.724E-06
U-234	Pb-210+D	1.000E+00	2.101E-26	3.165E-25	3.727E-24	1.024E-22	2.800E-21	1.614E-19	2.638E-17	5.661E-12
U-234	∑DSR(j)		1.789E-17	1.264E-16	6.815E-16	6.551E-15	6.789E-14	1.518E-12	1.073E-10	1.724E-06
		•								
U-235+D	U-235+D	1.000E+00	6.180E-16	6.301E-16	6.549E-16	7.498E-16	1.104E-15	4.269E-15	2.038E-13	1.530E-07
U-235+D	Pa-231	1.000E+00	3.276E-19	9.969E-19	2.401E-18	8.054E-18	3.223E-17	3.258E-16	2.398E-14	5.907E-09
U-235+D	Ac-227+D	1.000E+00	7.153E-19	5.015E-18	2.661E-17	2.419E-16	2.170E-15	3.413E-14	1.803E-12	1.053E-07
U-235+D	∑DSR(j)		6.191E-16	6.361E-16	6.839E-16	9.997E-16	3.305E-15	3.873E-14	2.031E-12	2.643E-07
U-236	U-236	1.000E+00	7.168E-26	7.374E-26	7.804E-26	9.516E-26	1.677E-25	1.218E-24	3.517E-22	1.438E-13
U-236	Th-232	1.000E+00					8.284E-35			
U-236	Ra-228+D	1.000E+00	2.390E-21	1.634E-20	8.203E-20	6.244E-19	3.892E-18	3.648E-17	1.222E-15	1.676E-11
U-236	Th-228+D	1.000E+00	3.278E-20	4.491E-19	4.316E-18	6.304E-17	5.078E-16	4.246E-15	7.981E-14	1.372E-10
U-236	∑DSR(j)		3.517E-20	4.654E-19	4.398E-18	6.366E-17	5.117E-16	4.283E-15	8.103E-14	1.541E-10
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.064E-26
U-238+D	U-238+D	9.999E-01	1.036E-11	1 0500-11	1 0705-11	1 1845-11	1 5/155-11	3 0225-11	5 6295-10	6 3075-06
U-238+D	U-234	9.999E-01					8.588E-29			
U-238+D	U-234 Th-230	9.999E-01	3.465E-35							
U-238+D	rn-230 Ra-226+D	9.999E-01 9.999E-01	1.269E-23							
U-238+D	Pb-210+D	9.999E-01	1.193E-32							
U-238+D	ΣDSR(j)	J. 2335-01					1.545E-11			
U Z J O T D	703K(])			**************************************	1.0.00-11			J. J. Z. E 11	2.0200-10	J. J. J. J. E - U O

The DSR includes contributions from associated (half-life  $\le$  180 days) daughters.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\MTW\MTW_POND_E_IW-PROB.RAD

# Single Radionuclide Soil Guidelines G(i,t) in pCi/g Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide								
(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
	<del></del>	<del></del>					-	
Pa-231	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	4.158E+06
Ra-226	9.106E+08	9.017E+08	8.841E+08	8.253E+08	6.779E+08	3.406E+08	4.763E+07	4.848E+04
Th-228	7.442E+07	1.059E+08	2.145E+08	2.536E+09	2.945E+12	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	7.283E+09	2.941E+08	5.108E+04
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	4.337E+03
U-234	*6.247E+09	*6,247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	1.450E+07
U-235	*2.161E+06	*2,161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06
U-236	*6.468E+07	*6,468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07	*6.468E+07
U-238	*3.361E+05	*3,361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05

^{*}At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g) and Single Radionuclide Soil Guidelines G(i,t) in pCi/g at tmin = time of minimum single radionuclide soil guideline and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)
(i)	(pCi/g)	(years)		(pCi/g)		(pCi/g)
Pa-231	7.000E-02	1.000E+03	6.012E-06	4.158E+06	6.012E-06	4.158E+06
Ra-226	3.400E-01	1.000E+03	5.157E-04	4.848E+04	5.157E-04	4.848E+04
Th-228	3.000E-02	0.000E+00	3.359E-07	7.442E+07	0.000E+00	*8.195E+14
Th-230	8.300E-01	1.000E+03	4.894E-04	5.108E+04	4.894E-04	5.108E+04
Th-232	3.000E-02	1.000E+03	5.764E-03	4.337E+03	5.764E-03	4.337E+03
U-234	1.186E+02	1.000E+03	1.724E-06	1.450E+07	· 1.724E-06	1.450E+07
U-235	5.110E+00	1.000E+03	2.643E-07	*2.161E+06	2.643E-07	*2.161E+06
U-236	2.910E+00	1.000E+03	1.541E-10	*6.468E+07	1.541E-10	*6.468E+07
U-238	1.227E+02	1.000E+03	6.399E-06	*3.361E+05	6.399E-06	*3.361E+05

^{*}At specific activity limit

Summary : MTW Pond E Industrial Worker - Probabilistic Run

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\MTW\MTW_POND_E_IW-PROB.RAD

# Individual Nuclide Dose Summed Over All Pathways Parent Nuclide and Branch Fraction Indicated

									,			
N	luclide		THF(i)					DOSE(j,t)			2 0005.00	
	(j)	(i)		t=	0.000E+00	1.000E+00	3.0006+00	1.000E+01	3.0006+01	1.000E+02	3.000E+02	1.000E+03
-	221	Da - 221	1.000E+00		2 1625 15	2.197E-15	2 2605-15	2 5 2 7 5 - 1 5	2 4055-15	1 0715-14	2 6325-13	1 0335-00
	2a-231		1.000E+00									
						5.094E-18 2.202E-15						
	Pa-231	∑DOSE(j	J		2,1646-15	2.2026-15	2,2016-13	2.3/86-13	3.0396-13	1.2306-14	3.03/2-13	4.9316-00
ž	Ac-227	Pa-231	1.000E+00		7 072E-15	2.115E-14	4 900E-14	1 438E-13	4 025E-13	1 516E-12	2.195E-11	4 015E-07
	Ac-227		1.000E+00			2.563E-17						
		ΣDOSE(j)				2.117E-14						
,	C ZZ	20002()	,		7.0102 23	2,11,0 14	1.5155 1.	111300 17	111305 13	110704 12		3.037.20
F	Ra-226	Ra-226	1.000E+00		9.334E-09	9.427E-09	9.614E-09	1.030E-08	1.254E-08	2.496E-08	1.784E-07	1.753E-04
P	Ra-226	Th-230	1.000E+00		4.946E-12	1.498E-11	3.568E-11	1.152E-10	4.132E-10	2.849E-09	7.056E-08	4.062E-04
F	Ra-226	U-234	1.000E+00		2.122E-15	1.498E-14	8.080E-14	7.768E-13	8.050E-12	1.800E-10	1.273E-08	2.044E-04
F	Ra-226	U-238	9.999E-01		1.557E-21	2.357E-20	2.805E-19	8.004E-18	2.416E-16	1.805E-14	3.967E-12	2.413E-07
F	Ra-226	ΣDOSE (j)	)		9.339E-09	9.442E-09	9.650E-09	1.042E-08	1.296E-08	2.799E-08	2.617E-07	7.862E-04
E	Pb-210	Ra-226	1.000E+00		2.185E-17	6.538E-17	1.517E-16	4.470E-16	1.260E-15	4.639E-15	5.521E-14	6.262E-10
E	2b-210	Th-230	1.000E+00		7.733E-21	5.425E-20	2.882E-19	2.629E-18	2.378E-17	3.768E-16	1.903E-14	1.366E-09
E	2b-210	U-234	1.000E+00		2.491E-24	3.752E-23	4.420E-22	1.215E-20	3.320E-19	1.913E-17	3.128E-15	6.712E-10
F	Pb-210	U-238	9.999E-01		0.000E+00	0.000E+00	1.164E-27	9.538E-26	7.790E-24	1.605E-21	8.879E-19	7.646E-13
E	Pb-210	∑DOSE(j	)		2.186E-17	6.543E-17	1.520E-16	4.497E-16	1.284E-15	5.035E-15	7.737E-14	2.664E-09
1	rh-228	Th-228	1.000E+00		1.008E-08	7.081E-09	3.496E-09	2.957E-10	2.546E-13	4.771E-24	0.000E+00	0.000E+00
1	rh-228	Th-232	1.000E+00		7.785E-11	4.814E-10	1.948E-09	7.743E-09	1.524E-08	3.067E-08	2.031E-07	1.541E-04
7	rh-228	U-236	1.000E+00		9.539E-20	1.307E-18	1.256E-17	1.834E-16	1.478E-15	1.236E-14	2.322E-13	3.993E-10
7	rh-228	∑pose(j	)		1.016E-08	7.562E-09	5.444E-09	8.039E-09	1.524E-08	3.067E-08	2.031E-07	1.541E-04
7	rh-230	Th-230	1.000E+00		6.717E-24	6.908E-24	7.306E-24	8.891E-24	1.558E-23	1.109E-22	3.023E-20	1.011E-11
	rh-230		1.000E+00			1.333E-26						
	rh-230		9.999E-01			0.000E+00						
7	rh-230	ΣDOSE ( )	)		6.721E-24	6.921E-24	7.339E-24	9.010E-24	1.618E-23	1.243E-22	3.981E-20	1.721E-11
		m: 222			6 61 45 00		7 0635 30	0 0000 00	1 6067 27	1 4005 06	7 6700 04	2 2445 14
			1.000E+00			6.823E-28						
	rh-232		1.000E+00			0.000E+00 6.823E-28						
,	rh-232	∑DOSE(j	J		0.0146-20	0.023E-28	7.2036-20	9.0336-26	1.0000-27	1.4905-20	7.0736-24	2.3446-14
F	Ra=228	Th-232	1.000E+00		4.313E-12	1.241E-11	2.649E-11	6.019E-11	1.045E-10	2.561E-10	3.088E-09	1.880E-05
	Ra-228		1.000E+00			4.754E-20						
		ΣDOSE (j				1.241E-11						
•	220	25002()	,		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			***************************************				
Ţ	J-234	U-234	1.000E+00		5.030E-23	5.171E-23	5.466E-23	6.636E-23	1.155E-22	8.046E-22	2.059E-19	5.522E-11
Ţ	J-234	U-238	9.999E-01		0.000E+00	2.281E-28	5.628E-28	2.058E-27	1.054E-26	2.527E-25	2.201E-22	3.217E-13
ι	J-234	∑DOSE(j	)		5.030E-23	5.171E-23	5.466E-23	6.637E-23	1.156E-22	8.049E-22	2.061E-19	5.554E-11
ţ	J-235	U-235	1.000E+00		3.158E-15	3.220E-15	3.347E-15	3.831E-15	5.639E-15	2.182E-14	1.041E-12	7.821E-07
ι	J <b>-</b> 236	U-236	1.000E+00		2.086E-25	2.146E-25	2.271E-25	2.769E-25	4.880E-25	3.544E-24	1.023E-21	4.185E-13
ţ	J-238	U-238	5.400E-05			0.000E+00						
ţ	J-238	U-238	9.999E-01			1.288E-09						
į	J-238	∑DOSE(j	)		1.271E-09	1.288E-09	1.323E-09	1.452E-09	1.895E-09	4.812E-09	6.905E-08	7.848E-04
-					-							

 $\ensuremath{\mathsf{THF}}(i)$  is the thread fraction of the parent nuclide.

Summary : MTW Pond E Industrial Worker - Probabilistic Run

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# Individual Nuclide Soil Concentration Parent Nuclide and Branch Fraction Indicated

Nuclide	Parent (i)	THF(i)	t=	0.000E+00	1.000E+00	3.000E+00	S(j,t), 1.000E+01		1.000E+02	3.000E+02	1.000E+03
Da = 231	Dn = 231	1.000E+00		7 0005-02	6 9905-02	6 9715-02	6 0035-02	6.713E-02	6 0895-02	4 6085-02	1 7375-02
Pa-231		1.000E+00						3.112E-03			
Pa-231		1.0002.00						7.024E-02			
Ac-227	Pa-231	1.000E+00		0.000E+00	2.188E-03	6.331E-03	1.864E-02	4.027E-02	5.533E-02	4.333E-02	1.633E-02
Ac-227	U-235	1.000E+00		0.000E+00	1.699E-06	1.492E-05	1.521E-04	1.088E-03	6.326E-03	1.815E-02	2.474E-02
Ac-227	∑S(j):			0.000E+00	2.190E-03	6.346E-03	1.880E-02	4.136E-02	6.165E-02	6.149E-02	4.107E-02
Ra-226	Ra-226	1.000E+00		3.400E-01	3.395E-01	3.386E-01	3.352E-01	3.259E-01	2.951E-01	2.224E-01	8.259E-02
Ra-226	Th-230	1.000E+00		0.000E+00	3.593E-04	1.076E-03	3.570E-03	1.056E-02	3.351E-02	8.775E-02	1.912E-01
Ra-226	U-234	1.000E+00		0.000E+00	2.310E-07	2.075E-06	2.291E-05	2.023E-04	2.107E-03	1.580E-02	9.615E-02
Ra-226	U-238	9.999E-01		0.000E+00	2.259E-13	6.090E-12	2.244E-10	5.971E-09	2.102E-07	4.918E-06	1.134E-04
Ra-226	∑S(j):			3.400E-01	3.399E-01	3.396E-01	3.388E-01	3.366E-01	3.308E-01	3.260E-01	3.700€-01
Pb-210	Ra-226	1.000E+00						1.995E-01			
	Th-230	1.000E+00						3.693E-03			
Pb-210		1.000E+00						5.067E-05			
Pb-210		9.999E-01						1.168E-09			
Pb-210	ΣS(j):			0.000E+00	1.040E-02	3.022E-02	9.037E-02	2.032E-01	3.121E-01	3.188E-01	3.595E-01
Th-228	Th-228	1.000E+00		3.000E-02	2.088E-02	1.012E-02	8.009E-04	5.709E-07	5.519E-18	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00		0.000E+00	5.591E-04	3.726E-03	1.688E-02	2.859E-02	2.975E-02	2.975E-02	2.972E-02
Th-228	U-236	1.000E+00		0.000E+00	9.277E-13	1.998E-11	3.754E-10	2.712E-09	1.192E-08	3.396E-08	7.699E-08
Th-228	Σs(j):			3.000E-02	2.144E-02	1.384E-02	1.768E-02	2.859E-02	2.975E-02	2.975E-02	2.972E-02
Th-230	Th-230	1.000E+00		8.300E-01	8.300E-01	8.300E-01	8.299E-01	8.297E-01	8.292E-01	8.275E-01	8.216E-01
Th-230	U-234	1.000E+00		0.000E+00	1.067E-03	3.195E-03	1.060E-02	3.136E-02	9.967E-02	2.619E-01	5.763E-01
Th-230	U-238	9.999E-01	•	0.000E+00	1.565E-09	1.407E-08	1.558E-07	1.388E-06	1.489E-05	1.216E-04	9.870E-04
Th-230	∑S(j):			8.300E-01	8.311E-01	8.332E-01	8.405E-01	8.611E-01	9.288E-01	1.090E+00	1.399E+00
Th-232	Th-232	1.000E+00		3.000E-02	3.000E-02	3.000E-02	3.000E-02	3.000E-02	3.000E-02	2.999E-02	2.997E-02
Th-232	U-236	1.000E+00		0.000E+00	1.435E-10	4.298E-10	1.426E-09	4.219E-09	1.341E-08	3.530E-08	7.802E-08
Th-232	∑S(j):			3.000E-02	3.000E-02	3.000E-02	3.000E-02	3.000E-02	3.000E-02	2.999E-02	2.997E-02
Ra-228	Th-232	1.000E+00		0.000E+00	3.405E-03	9.091E+03	2.093E-02	2.898E-02	2.975E-02	2.975E-02	2.972E-02
Ra-228	U-236	1.000E+00		0.000E+00	8.309E-12	6.912E-11	5.969E-10	3.079E-09	1.227E-08	3.423E-08	7.709E-08
Ra-228	∑s(j):			0.000E+00	3.405E-03	9.091E-03	2.093E-02	2.898E-02	2.975E-02	2.975E-02	2.972E-02
U-234	U-234	1.000E+00		1.186E+02	1.184E+02	1.181E+02	1.170E+02	1.138E+02	1.033E+02	7.848E+01	2.996E+01
U-234	U-238	9.999E-01		0.000E+00	3.475E-04	1.041E-03	3.452E-03	1.020E-02	3.228E-02	8.370E-02	1.744E-01
U-234	Σs(j):			1.186E+02	1.184E+02	1.181E+02	1.170E+02	1.138E+02	1.034E+02	7.856E+01	3.013E+01
U-235	U-235	1.000E+00		5.110E+00	5.103E+00	5.089E+00	5.040E+00	4.904E+00	4.455E+00	3.385E+00	1.295E+00
U-236	U-236	1.000E+00		2.910E+00	2.906E+00	2.898E+00	2.870E+00	2.793E+00	2.537E+00	1.928E+00	7.374E-01
U-238	U-238	5.400E-05		6.625E-03	6.624E-03	6.623E-03	6.617E-03	6.599E-03	6.538E-03	6.368E-03	5.805E-03
U-238	U-238	9.999E-01		1.227E+02	1.227E+02	1.226E+02	1.225E+02	1.222E+02	1.211E+02	1.179E+02	1.075E+02
U-238	∑S(j):			1.227E+02	1.227E+02	1.226E+02	1.225E+02	1.222E+02	1.211E+02	1.179E+02	1.075E+02

THF(i) is the thread fraction of the parent nuclide.

### **APPENDIX S**

Alternate Assessment Reports (e.g., Resident Farmer, no cover) (On enclosed CD)

### APPENDIX T

Pond Characterization Report (Andrews Engineering, Inc.)

Honeywell International Inc., Metropolis Works Massac County, Illinois

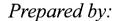
Pond Characterization
Report

November 2010

Honeywell

Prepared for:

Honeywell International Inc. 2768 North US 45 Road Metropolis, IL 62960





ANDREWS ENGINEERING, INC.

3300 Ginger Creek Drive Springfield, Illinois 62711

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## **FIGURES**

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## **EXHIBITS**

EXHIBIT 1	Photographs
EXHIBIT 2	Laboratory Analytical Reports
EXHIBIT 3	U.S. EPA April 23, 1993 Memorandum
EXHIBIT 4	Grain Size Distribution Curves
EXHIBIT 5	Scout Statistical Output

### LIST OF ACRONYMS

**ASTM** American Society for Testing and Materials

Calcium Fluoride CaF₂ Confidence Interval CI

U.S. Department of Transportation DOT **EPF Environmental Protection Facility** 

**FML** Flexible Membrane Liner **HASP** Health and Safety Plan

Methods for Chemical Analysis of Water and Wastes **MCAWW** 

MTW Honeywell International Inc. Metropolis Works National Pollutant Discharge Elimination System **NPDES OSHA** Occupational Safety & Health Administration

PPE Personal Protective Equipment

Resource Conservation and Recovery Act **RCRA TCLP** Toxicity Characteristic Leaching Procedure

TOC **Total Organic Carbon** 

U.S. EPA U.S. Environmental Protection Agency

### **EXECUTIVE SUMMARY**

Sampling of the calcium fluoride (CaF₂) ponds at Honeywell International Inc.'s Metropolis Works (MTW) was performed from March through July 2009. The goal of the sampling was to obtain characterization information of the CaF₂ material for the following parameters:

- Uranium
- Uranium Daughter Product Isotopes
- RCRA Toxicity Characteristic Leaching Procedure (TCLP) metals
- Presence of Free Liquids
- pH
- Total Organic Carbon
- Bulk Density
- Cation Exchange Capacity
- Chloride and Sulfide
- Grain Size Distribution

Prior to sampling, the ponds were divided into a total of 213 grids. Figures B-1 through E-1 show the locations of the grids. Composite CaF₂ samples were obtained from the grids and analyzed for total uranium and results reported on an as-is basis. None of the samples contained free water as determined by the paint filter liquids test. At random grid locations, samples were analyzed for additional parameters, listed previously. In addition to the grid samples, pondwide physically composited samples were obtained from B, C, D, and E Ponds.

Two sample types, composite and discrete, were collected from each core. Composite samples are physical composites of the core as retrieved. In these instances, compositing was done after the removal (without replacement) of the discrete samples. Discrete samples are grab samples selected based on their position in the sampler or a particular color (tan, yellow, white, etc.). The discrete samples were a much smaller weighted fraction of the composite.

The sampling results were statistically evaluated to determine if the CaF₂ material is characteristically hazardous in accordance with 35 Illinois Administrative Code (III. Adm. Code) 721, Subpart C. Sampling indicates none of the CaF₂ material is characteristically hazardous.

### 1. INTRODUCTION

### 1.1 Purpose and Objectives

The purpose of the CaF₂ pond sampling is to gather information necessary to characterize the CaF₂ material and best represent the concentration of the previously listed constituents in each pond.

### 1.2 Pond Background Overview

MTW's B, C, D, and E Ponds were constructed between 1974 and 1979 and are regulated under its RCRA Part B Permit (Permit No. B-65R and subsequent modifications). The approximate dimensions of each pond are shown below.

1

Pond ID	Length (feet)	Width (feet)	Depth (feet)	
B Pond	306	147	14.25 – 16.5	
C Pond	306	147	14.25 – 16.5	
D Pond	220	205	14.25 – 16.5	
E Pond	539	242	14.25 – 16.5	

Based upon a more specific CAD modeling survey, the precise volume of CaF₂ material in the ponds is shown below, corrected for actual pond geometry.

Pond ID	Volume (cubic feet)
B Pond	356,125
C Pond	365,732
D Pond	240,533
E Pond	1,404,863

Material is no longer discharged to B, C, and E Ponds. Water from MTW's EPF is discharged to D Pond for final clarification prior to discharge at MTW's NPDES permitted Outfall 002.

### 2. FIELD INVESTIGATION PROGRAM

As discussed previously, the goal of the sampling is to characterize the CaF₂ material in the MTW ponds for a number of parameters. Procedures for sample locations, sample collection, analytical parameters, worker safety, and sample shipment are discussed in this section.

### 2.1 Sample Locations

Prior to sampling, the ponds were divided into the following grids:

B and C Ponds

36 Grid Locations

Approximate Grid Dimensions:

34' x 36'9"

D Pond

36 Grid Locations

Approximate Grid Dimensions:

34'2" x 36'8"

E Pond

105 Grid Locations

Approximate Grid Dimensions:

35'11" x 34'7"

The grid locations are shown in Figures B-1 through E-1. Each grid location is referred by its pond designation (B through E) followed by its numeric designation (ranging from 1 to 105). Thus, the sample located at the southeast corner of C Pond is referred to as C-33; the sample located at the northwest corner of D Pond is referred to as D-6.

Samples were collected from the approximate center of the grids, unless the presence of equipment prohibited movement in the center of a grid.

### 2.2 Sample Collection Procedures

The following procedures were followed to obtain samples of the CaF₂ material:

- 1. The grid centers were marked on the pond's perimeter fenceline using surveying ribbon tape.
- 2. Prior to entering the ponds, samplers were tied off with a harness. The harness was secured to a Bobcat®-mounted winch in the slack position. A minimum of two members of the sampling team remained at the pond shoreline on an emergency, as-needed basis.
- 3. Two 14-foot, flat-bottomed jon boats were braced together to provide a stable platform from which to perform sampling. One boat was used to perform the material borings, and the other boat was used to record notes and obtain samples. The boat used to obtain borings had a hole cut in the bottom, in which a 2-foot high standpipe was placed to perform the borings.
- 4. At a minimum, samplers transported the following items onto the ponds in the boats:
  - Sampling jars
  - Small, temporary cooler
  - Small diameter material sampling device and disposable liners
  - Field book for recording notes
  - Latex sampling gloves
  - Two-way radios
  - Five-gallon buckets
  - Digital camera
  - Hand tools
  - Cookie sheets
  - Garbage bags
- 5. Using the fenceline ribbon tape as a guide, a Bobcat®-mounted winch pulled the flat-bottomed boats across the ponds. A winch line was attached to the boats at the front and back; however, pulling only occurred from the front unless absolutely necessary. Samplers located in the boats used two-way radios to inform the winch operators that the boats were in the appropriate location for sampling.
- 6. When the boats had reached their intended position, samplers hand augured into the CaF₂ material and obtained samples using the following procedure:
  - a. A 2½-inch diameter valved sampler was utilized. When the sampler is pushed downward, the valve opens allowing material to enter the sampler. When the sampler is pulled upward, the valve closes to maximize the amount of material recovered.

- b. Prior to beginning at each grid location, a clean, 3-foot plastic liner was inserted into the sampler. To maximize the amount of material recovered, a soil core catcher was fitted on the end of the liner. The same liner and core catcher was used throughout the borehole at each grid location.
- c. With the material sampler's t-handle attached, the sampler was slowly advanced into the CaF₂ material. Extensions to the material sampler were attached as necessary.
- d. After advancing the sampler into the material approximately three feet, the sampler was slowly withdrawn. The sampler was withdrawn as close to vertical as possible.
- e. The liner was removed from the sampler. A cookie sheet was covered with a clean, plastic garbage bag. The CaF₂ material was removed from the liner by gravity and placed on the lined cookie sheet. Each cookie sheet accommodated material from one sample liner (i.e., three feet). Depending upon the boring location, between one and five sample liner volumes were obtained. After the material had been placed upon the lined cookie sheet, the grid identification, and depth intervals were written on the garbage bag.
- f. Notes regarding the approximate amount recovered, appearance and visual consistency of the CaF₂ material were recorded in field books. Photographs of the material were taken to document the appearance of the material. Select photographs are contained in Exhibit 1.
- g. Using a putty knife, the CaF₂ material in each cookie sheet was mixed until the material had an approximately visually consistent color. On a new, lined cookie sheet, two to three putty knife scoops of material from each individual sheet was placed. The material in the new cookie sheet was mixed until the material had an approximately visually consistent color. Sample jars were filled from the CaF₂ material on the new cookie sheet.
- h. A portion of the composited material was placed into a pond-specific five-gallon bucket.
- 7. Grid locations marked with "●" on Figures B-1 through E-1.
  - a. Where the depth of the boring allowed, a composite sample was collected from the upper and lower halves of the CaF₂ material (i.e., two samples in each boring location). In some locations near the pond shoreline, only one composite sample was obtained. The CaF₂ material was composited using the procedures described in Step 6.
  - b. At a minimum, the composite samples were analyzed for the parameters listed below.

Parameter	Method
Total Uranium	EPA SW-846, Method 6010C (ICP)
U-234, U-235, U-238	Alpha Spectroscopy (A-01-R)
Th-232, Th230-Pa231, Th232, Th- 234, Pa-234m, Ra-226, Pb-212, Pb-214, Bi-214	Gamma Spectroscopy (Ga-01-R)
RCRA TCLP Metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag)	EPA SW-846, Method 1311/6010C
Paint Filter Test	EPA SW-846, Method 9095B
Moisture Content	ASTM D2216

Some of the composite samples were also analyzed for the parameters listed below. The composite samples analyzed for these additional parameters were spaced throughout the ponds to provide an overall characterization.

Parameter	Method		
Grain Size Distribution	ASTM D422		
Bulk Density	ASTM D-5057-90		
Cation Exchange Capacity	EPA SW-846, Method 9081		
Chloride	MCAWW, Method 300.0A		
Sulfide	MCAWW, Method 376.1		
Total Organic Carbon	EPA SW-846, Method 9060		

### 8. All other grid locations.

- a. A composite sample was collected from the entire length of the boring. The CaF₂ material was composited using the procedures described in Step 6.
- b. Discrete samples were obtained from locations where the appearance of the CaF₂ material had a significantly different color. A maximum of three samples were obtained from each of these grid locations (i.e., typically either one discrete and one composite sample or one discrete and two composite samples [(upper and lower]). The discrete samples were selected prior to homogenization for separate evaluation. These discrete samples occupied 2 ounces of the 317-ounce sampling core (0.63 percent).
- c. Samples from these grid locations were analyzed for the following parameters:

Parameter	Method
Total Uranium	EPA SW-846, Method 6010C (ICP)
Moisture Content	ASTM D2216

- 9. Samples were placed into laboratory-supplied wide-mouth amber glass sample jars.
- 10. After samples from a grid location had been obtained, the used sampling devices (i.e., liners, gloves, etc.) were placed in a garbage bag. At the end of each day, the garbage bags were placed in 55-gallon drums located within a rubber containment dike. MTW arranged for proper disposal of the used sampling devices. Excess CaF2 material was returned to the pond.
- 11. When shipping samples to the laboratory, the procedures listed in Section 2.5 were followed.

### **Analytical Parameters**

A minimum of one composite uranium sample was obtained from each grid location, except D-6 and D-33. At D-6 and D-33, after three attempts, no CaF₂ material was recovered in the borings (i.e., the borings were not completed), and no sample was obtained.

In addition to the composite uranium samples, discrete uranium samples were obtained if visually distinct (i.e., different colored) layers were observed in the material.

At locations marked with a dot, samples were also collected for:

- RCRA TCLP metals (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver)
- Uranium Daughter Product Isotopes
- Chloride and Sulfide
- Cation Exchange Capacity
- Grain Size Distribution
- Paint Filter Test

### 2.4 Worker Safety

All sampling personnel were OSHA 40-hour HAZWOPER trained in accordance with 29 CFR 1920. In addition, all sampling personnel received MTW's site-specific general and radiation safety training.

Prior to initiating sampling, a project HASP was developed in accordance with 29 CFR 1910.120. Among other things, the HASP included:

6

- An identification of potential hazards
- Provisions for minimizing potential hazards
- Worker protection and personal protective equipment
- Communication

- Emergency contacts
- Monitoring
- Daily safety meetings

Prior to sampling, Mr. Joe Johnson, MTW's Safety Supervisor, reviewed the HASP and discussed potential hazards associated with the sampling and CaF₂ material.

### 2.4.1 Personal Protective Equipment

In accordance with 29 CFR 1910.120, each offshore member of the sampling team was equipped with the following modified Level D PPE:

- Hard hat with face shield
- Long-sleeve shirt
- Tyvek suit
- Life jackets (D Pond)
- Safety harness
- Steel-toed boots with boot covers
- Gloves

### 2.5 Sample Packaging and Shipment

Samples were collected in laboratory-supplied wide-mouth amber glass sample jars. Sample jars were either packed on ice or stored in MTW's laboratory refrigerator prior to shipment to the laboratory.

Sample packaging procedures were:

- 1. Samples jars were labeled with laboratory supplied labels.
- 2. In addition to the laboratory supplied labels, all sample jars were labeled as "RADIOACTIVE MATERIAL SAMPLE."
- 3. Sample jars were securely closed and electrical tape was wrapped around the jar lid.
- 4. Sample jars were packaged in bubble wrap.
- 5. Sample jars were packaged in DOT-approved containers for shipment to the analytical laboratory.
  - a. A styrofoam cooler was utilized to hold the sample jars and ice. The coolers were sealed with tape and shrink wrap. A member of MTW's Health Physics group scanned the outside of the coolers prior to shipment, then they were placed inside DOT-approved containers for shipment.
  - b. Layers of absorbent, which consisted of absorbent mats, were placed at the bottom of the DOT-approved containers.
  - c. Shock absorbent packaging material (e.g., bubble wrap or packaging peanuts) was placed around the bottom, sides and top of the styrofoam cooler.

- d. Layers of absorbent were placed at the top of the DOT-approved container.
- e. Above the absorbent referenced in Item d., additional bubble wrap was placed.
- f. Above the bubble wrap, an 8.5"x11" label reading "RADIOACTIVE MATERIAL SAMPLE" was placed.
- g. The DOT-approved container was securely closed with packaging tape and shrink wrap.
- h. The outside of the DOT-approved container (on one side) was labeled with:
  - i. Orientation arrows (i.e., up arrows)
  - ii. A label reading "FRAGILE—HANDLE WITH CARE" (this label was placed on two sides of the container, with labels on opposite sides of the container)
  - iii. A label with Honeywell's address and the laboratory address
  - iv. A UN label with a UN number of 2910
  - v. In the event multiple containers were shipped at a time, each container was numbered and showed the total number of containers in the shipment (e.g., 1 of 3, 2 of 3, 3 of 3)
  - i. A laboratory chain of custody accompanied all sample shipments.
  - j. Prior to leaving MTW, the DOT containers were scanned by MTW's Health Physics department
  - k. Samples were transported to the laboratory using MTW's courier service.

### 3. DISCUSSION OF RESULTS

A summary of the analytical results is contained in the Tables section of this report. Laboratory analytical reports and completed Chain-of-Custody forms are contained in Exhibit 2.

The remainder of this section discusses analytical results for the various parameters that were analyzed.

### 3.1 Total Uranium

A total of 283 samples were analyzed for total uranium. These samples consisted of:

- 244 grid composite samples
- 35 discrete samples of material of different color
- 4 pondwide composite samples (i.e., pondwide composite samples from B, C, D, and E Ponds)

Tables B-1 through E-1 summarize the results of the composite and discrete samples. Tables B-2 through E-2 summarize the results of the pondwide composite samples. These can be found in the Tables section of this report.

### 3.2 Uranium Daughter Products Isotopes

A summary of uranium daughter product isotopes is contained in Tables B-3 through E-3.

### 3.3 RCRA TCLP Metals

A total of 74 samples were analyzed for RCRA TCLP metals. The number of samples per pond is:

- B Pond 11 samples
- C Pond 16 samples
- D Pond 14 samples
- E Pond 33 samples

None of the 74 samples contained concentrations of RCRA TCLP metals greater than the TCLP limits listed in 35 III. Adm. Code 721.124. Tables B-4 through E-4 summarize the RCRA TCLP metal analytical results.

With the exceptions noted in Section 4.2, in accordance with SW-846, Chapter 9, the TCLP metal results were statistically evaluated to determine the 80-percent upper confidence interval (CI) (two-tailed test). Statistical methods are discussed in Section 5. The 80-percent upper CI (two-tailed test) for arsenic, barium, and chromium is shown below.

Pond (sample size)	Arsenic (mg/l) (distribution)	Barium (mg/l) (distribution)	Chromium (mg/l) (distribution)	
B Pond	0.058	0.103	0.022	
(11)	(log-normal)	(normal)	(normal)	
C Pond	0.019	0.057	0.0170	
(16)	(not discernable)	(normal)	(normal)	
D Pond	0.089	0.073	0.154	
(14)	(normal)	(normal)	(not discernable)	
E Pond	0.021	0.059	0.0166	
(33)	(normal)	(normal)	(not discernable)	

The data were tested for goodness of fit with various distributions (gamma, log-normal, and normal) and were, for the most part, normally distributed. In cases where the normal distribution did not apply, the 80-percent upper confidence limit of other distributions was sufficiently far below the TCLP threshold, that further data transformations could not result in the 80-percent upper confidence limit exceeding the TCLP regulatory limit. Since the 80-percent upper CI (two-tailed test) for all RCRA TCLP metals is less than the TCLP limit contained in 35 III. Adm. Code 721.124, the CaF₂ material is not hazardous for any RCRA metals.

### 3.4 Paint Filter Test

A total of 75 samples were tested by the Paint Filter test. None of the samples contained free liquids as tested by the Paint Filter test. A summary of the test results is contained in Tables B-5 through E-5.

### 3.5 pH

A total of 77 samples were tested for pH. A summary of the results is presented in Tables B-5 through E-5.

Sample pH ranged from 10.6 to 12.8 standard units. In accordance with 35 III. Adm. Code 721.122, the hazardous waste characteristic of corrosivity applies to aqueous and liquid wastes. There is no regulatory definition of "aqueous." In an April 23, 1993, memorandum, U.S. EPA indicated "...any waste for which this method is applicable must contain at least 20% free water by volume." A copy of the memorandum is contained in Exhibit 3. As discussed in Section 3.4, all of the samples passed the Paint Filter test (i.e., contained no free liquids). As none of the samples contained free liquids, the CaF₂ material contains less than 20 percent free water by volume. Thus, the CaF₂ material does not carry the characteristic of corrosivity.

### 3.6 Total Organic Carbon

A total of 24 samples were tested for TOC. Tables B-6 through E-6 summarize the results. The TOC content ranged from 0.77 to 11 g/kg (as-is basis).

### 3.7 Bulk Density

A total of 24 samples were tested for bulk density. Tables B-7 through E-7 summarize the results. The bulk density of the CaF₂ material ranged from 1.1 to 1.9 g/ml (as-is basis).

### 3.8 Cation Exchange Capacity

A total of 24 samples were tested for cation exchange capacity. Tables B-8 through E-8 summarize the results. The cation exchange capacity ranged from 1.9 to 24.8 meq/100g (as-is basis).

### 3.9 Chloride and Sulfide

A total of 26 samples were tested for chloride and sulfide. Tables B-9 through E-9 summarize the results. The total chloride concentration ranged from 3.6 to 36 mg/kg (as-is basis). The total sulfide concentration ranged from <10 to 140 mg/kg (as-is basis).

### 3.10 Grain Size Distribution

A total of 24 samples were tested for grain size distribution. Grain size distribution curves are provided in Exhibit 4. The testing indicated the material particle size ranged from medium sand to clay. The majority of the material particle size is silty with some samples having a particle size of silty clay.

### 4. STATISTICAL PROCEDURES

### 4.1 Total Uranium

Prior to sampling, the ponds were divided into a total of 213 grids. Composite CaF₂ samples were obtained from the grids and analyzed for total uranium. At random grid locations samples were analyzed for additional parameters, listed previously. In addition to the grid samples, pondwide physically composited samples were obtained from B, C, D, and E Ponds as were

pondwide weighted composite samples. A statistical data reduction was performed on the total uranium concentrations on an as-is basis. The procedures are described below.

### 4.2 Total Uranium Statistical Procedures

A total of 283 samples were analyzed for total uranium. These samples consisted of:

- 244 grid composite samples
- 35 discrete samples of material of different color
- 4 pondwide composite samples (i.e., pondwide composite samples from B, C, D, and E Ponds)

Tables B-1 through E-1 summarize the results of the composite and discrete samples. Tables B-2 through E-2 summarize the results of the pond-wide composite samples. These can be found in the Tables section of this report.

The final results are presented below and were derived as explained in Sections 4.2.1 - 4.2.3.

Table 4.2-1. Uranium Results Ponds B - E

		Pond E	Pond D	Pond C	Pond B
(Ln(x _i ))	Mean Uranium (mg/kg) (as-is basis)	203	203 245		240
9	N (all data)	105	34	36	26
Individual Samples	Distribution	Ln Normal	Ln Normal	Ln Normal	Ln Normal
	95% Upper Confidence Limit Uranium (mg/kg) (one-tailed test) (as-is basis)	223	347	365	320
	Result	95% UCL < 500 mg/kg	95% UCL < 500 mg/kg	95% UCL < 500 mg/kg	95% UCL < 500 mg/kg

A total of three approaches were used/considered in the data reduction process resulting in the results in Table 4.2-1.

- 4.2.1. Weighted combinations to result in one concentration per core sample
- 4.2.2. Removal of data associated with severe defects in quality control samples as reported by the laboratory
- 4.2.3. Data transformations to normalize the data

Table 4.2-2 summarizes the data reduction process. Each of these three approaches will be described in Sections 4.2.1 – 4.2.3 below.

Table 4.2-2. Results of Data Reduction Process

Pond	Original Number of Samples	Number of Samples Weighted to Result in One Concentration per Core Sample (Section 4.2.1)	Number of Samples Associated with Severe Defects in Quality Control (MS/MSD) (Section 4.2.2)	Remaining Observations
В	46	10	10	26
С	45	9	0	36
D	54	20	0	34
E	134	29	0	105
Total	279 (244 grid composite; 35 discrete samples)	68	10	201

^{**} Lab batch ID 9082046 and associated data removed (Pond B). MSD and MS amounts were less than 4 times the sample concentration so MS and MSD could be evaluated as to their impact on data. MS and MSD recovery was 406 and 0.87 percent, respectively and were determined to introduce unacceptable and indeterminate bias to the uranium results.

### 4.2.1 Weighted Combinations to Result in One Concentration Per Core Sample

Two sample types from each core were considered: composite and discrete. Composite samples were physical composites of the core as retrieved. In these instances, compositing was done after the removal (without replacement) of the discrete samples. Discrete samples are grab samples selected based on their position in the sampler or a particular color (tan, yellow, white, etc.). The discrete samples were a much smaller weighted fraction of the composite and were weighted as follows. The weighting was done by considering the overall volume recovered from a boring (317 ounces). Of this volume, 2 ounces was the volume of a discrete sample. Therefore, if a discrete and a continuous sample arose from the same location the concentration of the location was computed by weighting as follows: [0.9937*composite concentration + 0.0063*discrete concentration]. The 0.0063 value is 2/317 = 0.0063. In other cases, the sampler was sectioned into an upper and a lower portion of equal volumes. In these cases the concentration of the location was computed by assigning equal weights to the upper and lower halves of the sampler: 0.50*[concentration of upper half] + 0.50*[concentration of lower half]. The variations in sampling and associated calculations are summarized below and in Table 4.2-3.

- (a) Samples in which there are upper and lower halves: These samples are designated as "lower" and "upper" and  $x_i$  for the sample was computed be equal weighting:  $0.5(x_{lower}) + 0.5(x_{upper})$ .
- (b) Samples in which there were discrete and composite samples from the same boring: These samples were volume weighted as indicated above and x_i computed as follows: 0.0063(x_{discrete}) + 0.9937(x_{composite})
- (c) Samples in which there were discrete samples as well as upper and lower halves from the same boring:

These samples were weighted and  $x_i$  was computed as follows:  $0.0063(x_{discrete}) + 0.4969(x_{upper}) + 0.4969(x_{lower})$ .

Table 4.2-3. Summary of the Samples Combined to Represent One Result per Core Sample

Pond Original Number of Samples		Number of Composite and Discrete Samples Mathematically Combined
В	46	10
С	45	9
D	54	20
E	134	29
Total	279 (244 grid composite; 35 discrete samples)	68

This process of weighting is consistent with SW-846 Chapter 9 (September 1986) and prevents undue weighting to any one core sample or set of core samples.

## 4.2.2 Removal of Data Associated with Severe Defects in Quality Control Samples as Reported by the Laboratory

TestAmerica performed matrix spike (MS) and matrix spike duplicate (MSD) analysis on various uranium samples at a rate of approximately one of each per batch. Each uranium batch consisted of approximately 10 total uranium samples (but in no event exceeded 20 samples). A total of 34 MS and MSD samples were analyzed, corresponding to the 34 batches of total uranium samples. Tables B-10 through E-10 summarize the laboratory MS and MSD recoveries.

In the MS and MSD samples where the sample concentration exceeded four times the spike amount, neither the MS nor the MSD percentage recovery results from that laboratory batch were considered for review. This is generally referred to as "the 4x rule." As a result of this review, the MS and MSD results (not the uranium results) for these laboratory batches were removed from statistical evaluation of the MS and MSD recoveries. However, as noted above, the uranium results from samples associated these MS and MSDs were valid and retained for calculations of the mean and standard deviations of the uranium concentrations.

In addition, the percent recoveries for the MS and MSD for samples (B Pond) B-21 LIQ, B-20 U, and B-18 U were reported as 0.87 and 406 percent. The amount of these spikes was less than 4x the sample concentration so the MS and MSD recovery information from these QC samples was usable. Unfortunately, the MS recovery was 406 percent and the MSD recovery was 0.87 percent. Not only was the recovery of both QC spikes unacceptable, but the difference in the MS and MSD recovery was too wide to be acceptable and outside of laboratory control limits. Due to their extreme difference from the ideal percent recovery of 70 to 130 percent, and the RPD of 20 percent between the MS and MSD, all of the uranium results from discrete and composite samples in this laboratory batch (9082046) were removed from statistical evaluation in accordance with professional judgment (MARSSIM Section 9.3.2.1; Appendix N [Tables N1 and N3]). In any event, these results would receive a "J" or estimated flag according to US EPA National Functional Guidelines for Inorganic Data Review. In some cases, estimated results can be considered as usable, but in this case were judged to be sufficiently defective to impart significant bias to these statistical evaluations.

#### 4.2.3 Data transformations to normalize the data

U.S. EPA through SW-846 and its statistical software package Scout (Version 1.0, 2008) requires data normalization and testing of data distributions. Data transformations include log transforms as one of the more preferred. Transformation of the data is always preferred when considering parametric/non-parametric statistics. A log transformation using parametric alternatives is preferred to the use of non-parametric alternatives to compute the appropriate statistics. This method of data transformation is also discussed in EPA publication SW-846.

### 4.3 RCRA TCLP Metals

The RCRA TCLP metal results were statistically evaluated to determine if the CaF₂ material in any of the Ponds is characteristically hazardous. The statistical evaluation was performed in accordance with procedures identified in EPA SW-846, Chapter 9. Statistical tests were performed using U.S. EPA's Scout 2008 Version 1.00.01 software (Scout). Scout may be downloaded at: <a href="http://www.epa.gov/esd/databases/scout/abstract.htm">http://www.epa.gov/esd/databases/scout/abstract.htm</a>. With the exceptions noted below, the TCLP metal results were statistically evaluated to determine the 80-percent upper CI using a two-tailed test. This is equivalent to a 90-percent upper confidence interval using a one- tailed test (SW-846, Chapter 9).

A statistical evaluation was not performed for the RCRA metals cadmium, lead, mercury, selenium, and silver. A statistical evaluation was not performed on these metals because the vast majority of analytical results were non-detects. Where results were reported, the results were estimated results, below the laboratory's reporting limit. The table below lists the number of reported, estimated results for cadmium, lead, selenium, and silver, and the laboratory's reporting limit.

TCLP Parameter	Number of Reported, Estimated Results	Laboratory TCLP Reporting Limit (mg/l)	
Cadmium	10	0.01	
Lead	4	0.04	
Selenium	1	0.03	
Silver	1	0.02	

Mercury had two results (both 0.0014 mg/l) reported at above the laboratory's reporting limit (0.001 mg/l). As only two of the 74 analytical results for mercury were reported above the laboratory's reporting limit, and were much less than the RCRA TCLP limit of 0.2 mg/l, a statistical evaluation was not performed for mercury.

The 80-percent upper CI (two-tailed test) along with the normalizing distribution for arsenic, barium, and chromium is the following table.

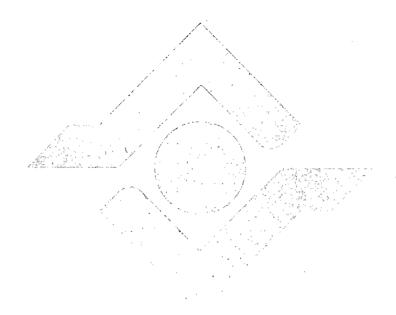
Pond	Arsenic (mg/l)	Barium (mg/l)	Chromium (mg/l)
(sample size)	(distribution)	(distribution)	(distribution)
B Pond	0.058	0.103	0.022
(11)	(log-normal)	(normal)	(normal)
C Pond	0.019	0.057	0.0170
(16)	(not discernable)	(normal)	(normal)
D Pond 0.089 (14) (normal)		0.073 (normal)	0.154 (not discernable)
E Pond	0.021	0.059	0.0166
(33)	(normal)	(normal)	(not discernable)

The data were tested for goodness of fit with various distributions (gamma, log-normal and normal) and were, for the most part, normally distributed. In cases where the normal distribution did not apply, the 80-percent upper confidence limit of other distributions evaluated by U.S. EPA sponsored ProUCL Version 4.0 was sufficiently far below the TCLP threshold that further data transformations could not result in the 80-percent upper confidence limit exceeding the TCLP regulatory limit. Since the 80-percent upper CI (two-tailed test) for all RCRA TCLP metals is less than the TCLP limit contained in 35 III. Adm. Code 721.124, the CaF₂ material is not hazardous for any RCRA metals. Exhibit 5 contains output from Scout.

### 5. CONCLUSIONS

Sampling of MTW's CaF₂ ponds was completed to obtain characterization information of the CaF₂ material.

The sampling of the CaF₂ material indicates the material is not a characteristically hazardous waste in accordance with 35 III. Adm. Code 721, Subpart C.





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Table B-1
B Pond - Total Uranium Analytical Summary - All Samples

Sort ID	Sample ID	Individual Samples, U mg/kg (X _i )	Sample Weights (A _i )	Core Weighted Averages, U mg/kg (X _I A _I )	Core Weighted Averages, U mg/kg (X _i A _i ) Samples Meeting Quality Control Criteria	Ln(A _i X _i ) All Samples	Ln(A _i X _i ) Samples Meeting Quality Control Criteria
B-01	B-1	238	1	238	238	5.472271	5.472271
B-02	B-2	240	1	240	240	5.480639	5,480639
B-03	B-3	323	1	323	323	5.777652	5.777652
B-04	B-4	214	1	214	214	5.365976	5.365976
B-05	B-5 Lower B-5 Upper	321 340	0.5 0.5	331	331	5.800607	5.800607
B-06	B-6	206	1	206	206	5.327876	5.327876
B-07	B-7	289	1	289	289	5.666427	5.666427
B-08	B-8	1,950	1 .	1950	1950	7.575585	7.575585
B-09	B-9	308	1	308	308	5.730100	5.730100
B-10	B-10 Lower B-10 Upper	297 195	0.5 0.5	246	246	5.505332	5.505332
B-11	B-11	66.6	1	66.6	66.6	4.198705	4.198705
B-12	B-12	336	1	336	336	5.817111	5.817111
B-13	B-13 B-13 LIQ	105 455	0.994 0.006	108	108	4.673763	4.673763
B-14	B-14	183	1	183	183	5.209486	5.209486
B-15	B-15	177	1	177	177	5.176150	5.176150
B-16	B-16	514	1	514	514	6.242223	6.242223
B-17	B-17	1,640	1	1640	1640	7.402452	7.402452
B-18	B-18 Lower B-18 Upper	7545, 229 - 134	0.497 0.497	Wester		51(85725	
	B-18U	378	#\$\$0000B##				
B-19	B-19 Lower B-19 Upper	213 × 65 2086 × 65	1215 U 500 VA	EADDE (C		68,939	
B-20	B-20 B-20U	702		złożatika 🖖		68W447	
B-21 -	B-21 B-21 LIQ	213	0.9945	ificeau.		Z177(Q3Q3k)	
B-22	B-21 EIQ	F. W. Al (6)	Secretary and Administration of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the	((6)		arrana (ikhizinin	
B-23	B-23	2217.6.3		22/19/00/20		5 (5) (5) (5)	
B-24	B-24	0.90.00 33.26.40				8 9 7 9 5 8 0 5 1 S 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	
B-25	B-25	244616247,85		99.2080162 <b>6</b> 88688		<b>35</b> 08759675	
		STATE OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY		STATE OF THE PARTY OF THE PARTY OF THE PARTY.		THE PROPERTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF TH	
B-26	B-26 Lower B-26 Upper	81.80°		68/3		COLDINAL CONTROL	

Table B-1
B Pond - Total Uranium Analytical Summary - All Samples

Sort ID	Sample ID	Individual Samples, U mg/kg (X _i )	Sample Weights (A _i )	Core Weighted Averages, U mg/kg (X _i A _i )	Core Weighted Averages, U mg/kg (X _i A _i ) Samples Meeting Quality Control Criteria	Ln(A _i X _i ) All Samples	Ln(A _i X _i ) Samples Meeting Quality Control Criteria
B-28	B-28	258	1	258	258	5.552960	5.552960
B-29	B-29	196	1	196	196	5.278115	5.278115
B-30	B-30 Lower B-30 Upper	98.8 298	0.5 0.5	198	198	5.290285	5.290285
B-31	B-31	224	1	224	224	5.411646	5.411646
B-32	B-32	304	1	304	304	5.717028	5.717028
B-33	B-33	37.7	1	37.7	37.7	3.629660	3.629660
B-34	B-34	40.2	1	40.2	40.2	3.693867	3.693867
B-35	B-35	331	1	331	331	5.802118	5.802118
B-36	B-36	296	. 1	296	296	5.690359	5.690359
	Average					5.380752	5.480323
	95% UCL (1-tail)					5.5911	5.75698
i	Average (transformed from						
	Ln)					217	240
	95% UCL (1-tail) (transformed from Ln)					268	320

Cells with light gray background represent discrete subsamples that were analyzed separately because they differed in color or other characteristic from the surrounding core material. The results from these subsamples were weighted by their mass and included as a part of a weighted average for the core as a whole, as shown in columns 5 and 6 (Core Weighted Averages).

Cells with darker gray background (B-18 through B-27) represent samples that were unusable because the asociated matrix spike data did not meet quality control criteria.

B-13 example: (0.994*105)+(0.006*455) = 108 mg/kg U (as-is)

Table C-1
C Pond - Total Uranium Analytical Summary - All Samples

Sort ID	Sample ID	Individual Samples, U mg/kg (X _i )	Sample Weights (A _i )	Core Weighted Averages, U mg/kg (X _i A _i )	Ln(A _i X _i )	
C-01	C-1	159	1	159	5.068904	
C-02	C-2	320	1	320	5.768321	
C-03	C-3	361	1	361	5.888878	
C-04	C-4	606	1	606	6.40688	
C-05	C-5	303	1	303	5.713733	
<del></del>	C-6 (COMPOSITE)	193	0.988			
C-06	C-6 U 12.00'-12.50'	1.370	0.006	206	5.327216	
	C-6 U 2.00'-2.50'	1,160	0.006			
C-07	C-7	1,770	1	1770	7.478735	
C-08	C-8	309	1	309	5.73334	
C-09	C-9	145	1	145	4.976734	
	C-10 Lower	2,000	0.5	140	7.07070	
C-10	C-10 Upper	103	0.5	1052	6.957973	
C 11	<del></del>			104	5 214026	
C-11 C-12	C-11 C-12	184 111	1 1	184 111	5.214936 4.70953	
<del>- :-</del>	C-12 C-13	133	1	133	4.70953	
C-13 C-14	C-13 C-14	116	1	116	4.75359	
C-14 C-15						
C-15 C-16	C-15	170 151	1	170	5.135798	
	C-16			151	5.01728	
C-17	C-17	284 124	1 1	284	5.648974	
C-18	C-18		· · · · · · · · · · · · · · · · · · ·	124	4.820282	
C-19	C-19 Lower	218	0.5	181	5.198497	
	C-19 Upper	144	0.5			
C-20	C-20	138	1	138	4.927254	
C-21	C-21	4,630	0.994	4647	8.444076	
	C-21U	7,540	0.006			
C-22	C-22	1,850	1	1850	7.52294	
C-23	C-23	213	1	213	5.361292	
C-24	C-24	117	1	117	4.762174	
C-25	C-25	355	1	355	5.87211	
	C-26 Lower	579	0.497			
C-26	C-26 Upper	418 0.497		505	6.22406	
	C-26U	1,540	0.006			
C-27	C-27	216	1	216	5.37527	
C-28	C-28	137	1	137	4.91998	
C-29	C-29	236	1	236	5.463832	
	C-30 Lower	412	0.497			
C-30	C-30 Upper	476	0.497	492	6.198064	
	C-30U	8,410	0.006			
C-31	C-31	298	1	298	5.697093	
C-32	C-32	158	1	158	5.062595	
C-33	C-33	286	1	286	5.655992	
C-34	C-34	555	1	555	6.318968	
C-35	C-35	293	1	293	5.680173	
C-36	C-36	259	1	259	5.556828	
	Average				5.659796	
	95% UCL (1-tail)	<i>\////////////////////////////////////</i>			5.8999	
	Average	<i>\\\\\\\\</i>			1	
	(transformed from	<i>\\\\\\\\</i>			1	
	Ln)	<i>\////////////////////////////////////</i>			287	
	95% UCL (1-tail)				<del></del>	
	(transformed from	<i>\\\\\\\\</i>			1	

analyzed separately because they differed in color or other characteristic from the surrounding core material. The results from these subsamples were weighted by their mass and included as a part of a weighted average for the core as a whole, as shown in columns 5 and 6 (Core Weighted Averages).

C-06 example: (0.988*193)+(0.006*1370)*(0.006*1160) = 206 mg/kg U (as-is)

Table D-1
D Pond - Total Uranium Analytical Summary - All Samples

Sort ID	Sample ID	(X _i )		Core Weighted Averages, U mg/kg (X _I A _I )	Ln(A _i X _i )	
D-01	D-1	113	1	113	4.727388	
D-02	D-2	103	1	103	4.634729	
D-03	D-3	170	1	170	5.135798	
D-04	D-4	105	1	105	4.65396	
D-05	D-5	297	1	297	5.693732	
5 07	D-7	129	0.994	420	4.00040	
D-07	D-7 Yellow	614	0.006	132	4.88212	
	D-8	558	0.006			
D-08	D-8 Lower	907	0.497	546	6.30184	
Ī	D-8 Upper	184	0.497			
D-09	. D-9	1,210	1 .	1210	7.098376	
	D-10	447	0.006			
D-10	D-10 Lower	756	0.497	686	6.530236	
	D-10 Upper	618	0.497			
	D-11	658	0.006			
D-11	D-11 Lower	1,180	0.497	801	6.686031	
	D-11 Upper	424	0.497			
D-12	D-12	83.2	1	83.2	4.421247	
D-13	D-13	101	1	101	4.615121	
D-14	D-14	389	0.994	400	E 002470	
ט-14	D-14 U @ 6.0'	2,270	0.006	400	5.992179	
D-15	D-15	901	0.994	900	6.802153	
נים	D-15 U	698	0.006	300	0.002153	
D-16	D-16	941	0.994	941	6.846624	
D-10	D-16 U @ 5.75'	891	0.006	341	0.040024	
	D-17	437	0.006			
D-17	D-17 Lower	1,280	0.497	809	6.695497	
	D-17 Upper	342	0.497			
D-18	D-18	72.8	1	72.8	4.287716	
	D-19	82	0.006			
D-19	D-19 Lower	70.2	0.497	70.5	4.255886	
	D-19 Upper	70.7	0.497			
D-20	D-20	286	1	286	5.655992	
D-21	D-21	401	1	401	5.993961	
D-22	D-22	2,990	1	2990	8.003029	
D-23	D-23	852	1	852	6.747587	
D-24	D-24	59.2	1	59.2	4.080922	
D-25	D-25	68.5	1	68.5	4.226834	

Table D-1
D Pond - Total Uranium Analytical Summary - All Samples

Sort ID	Sample ID	Individual Samples, U mg/kg .(X _I )	Sample Weights (A _I )	Core Weighted Averages, U mg/kg (X _i A _i )	Ln(A _i X _i )	
	D-26	258	0.006			
D 00	D-26 Lower	2,150	0.494	2240	7 70070	
D-26	D-26 Upper	2,320	0.494	2210	7.70079	
	D-26 U @ 8.50'	60.7	0.006			
D-27	D-27	326	1	326	5.786897	
D 20	D-28	307	0.994	240	E 7274E2	
D-28	D-28 U @ 7.00'	837	0.006	310	5.737153	
	D-29	530	0.006			
D-29	D-29 Lower	628	0.497	383	5.94904	
	D-29 Upper	137	0.497			
D-30	D-30	62.2	1	62.2	4.130355	
D-31	D-31	76.3	1	76.3	4.334673	
D-32	D-32	37.9	1_	37.9	3.634951	
D-34	D-34	103	1	103	4.634729	
D-35	D-35	684	11	684	6.527958	
D-36	D-36	39.3	11	39.3	3.671225	
	Average				5.50226	
	95% UCL (1-tail)				5.84935	
	Average					
	(transformed from				1	
	Ln)				245	
	95% UCL (1-tail)					
	(transformed from				1	
	Ln)	<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>			347	

Cells with light gray background represent discrete subsamples that were analyzed separately because they differed in color or other characteristic from the surrounding core material. The results from these subsamples were weighted by their mass and included as a part of a weighted average for the core as a whole, as shown in columns 5 and 6 (Core Weighted Averages).

D-08 example: (0.006*558)+(0.497*907)+(0.497*184) = 546 mgkg U (as-is)

Table E-1
E-Pond - Total Uranium Analytical Summary - All Samples

Sort ID	mg/kg (X ₁ )		Sample Weights (A _i )	Core Weighted Averages, U mg/kg (X,A _i )	Ln(A _i X _i )
E-001	E-1	449	1 1	449	6.107023
E-002	E-2	335	1	335	5.814131
E-003	E-3	301	1	301	5.707110
E-004	E-4	125	1	125	4.828314
E-005	E-5	207	1	207	5.332719
E-006	E-6	161	1	161	5.081404
E-007	E-7	139	1	139	4.934474
E-008	E-8	236	1	236	5.463832
E-009	E-9	235	1	235	5.459586
E-010	E-10 Lower E-10 U	215 2,120	0.497 0.006	210	5.344876
	E-10 Upper	181	0.497		
E-011	E-11	320	1	320	5.768321
E-012	E-12 Lower E-12 Upper	312 383	0.5	348	5.850765
E-013	E-13	147	11	147	4.990433
E-014	E-14	141	1	141	4.948760
E-015	E-15	260	1 1	260	5.560682
E-016	E-16 Lower E-16 Upper	188 317	0.5 0.5	253	5.531411
E-017	E-17	288	1	288	5.662960
E-018	E-18	445	11	445	6.098074
E-019	E-19	314	1	314	5.749393
E-020	E-20	926 254	1 1	926 254	6.830874
E-021 E-022	E-21 E-22	415	+ + +	415	5.537334 6.028279
E-023	E-23 Lower E-23 Upper	439 197	0.5	318	5.762051
E-024	E-24	238	1	238	5,472271
E-025	E-25	106	1 1	106	4.663439
E-026	E-26	- 531	1	531	6.274762
E-027	E-27 Lower E-27 Upper	676 39.4	0.5 0.5	358	5.879695
E-028	E-28	199	1	199	5.293305
E-029	E-29	429	1	429	6.061457
E-030	E-30	235	11	235	5.459586
E-031	E-31	206	1	206	5.327876
E-032	E-32	197	1	197	5.283204
E-033	E-33	989	1 1	989	6.896694
E-034	E-34	344 66	1 1	344	5.840642
E-035 E-036	E-35 E-36	201	1	66 201	4.189655 5.303305
		201	. 1	. 401	
E-U3/	E-37	486	1	486	6.186209
E-037 E-038	E-38 Lower	302	0.5	486 218	6.186209 <b>5.384495</b>
E-038	E-38 Lower E-38 Upper	302 134	0.5 0.5	218	5.384495
E-038	E-38 Lower	302	0.5		<b>5.384495</b> 5.308268
E-038	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower	302 134 202 474 455	0.5 0.5 1 1 0.5	<b>218</b> 202	5.384495
E-038 E-039 E-040 E-041	E-38 Lower E-38 Upper E-39 E-40	302 134 202 474	0.5 0.5 1 1 0.5 0.5	218 202 474 446	5.384495 5.308268 6.161207 6.100319
E-038 E-039 E-040	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper	302 134 202 474 455 437	0.5 0.5 1 1 0.5	218 202 474	5.384495 5.308268 6.161207
E-038 E-039 E-040 E-041 E-042	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-42 E-43 E-44 Lower	302 134 202 474 455 437 148	0.5 0.5 1 1 0.5 0.5 1 1 1 0.5	218 202 474 446 148	5.384495 5.308268 6.161207 6.100319 4.997212
E-038 E-039 E-040 E-041 E-042 E-043 E-044	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-42 E-43 E-44 Lower E-44 Upper	302 134 202 474 455 437 148 239 309 158	0.5 0.5 1 1 0.5 0.5 1 1 1 0.5 0.5	218 202 474 446 148 239 234	5.384495 5.308268 6.161207 6.100319 4.997212 5.476464 5.453182
E-038 E-039 E-040 E-041 E-042 E-043 E-044 E-045	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-42 E-43 E-44 Lower E-44 Upper	302 134 202 474 455 437 148 239 309	0.5 0.5 1 1 0.5 0.5 1 1 0.5 0.5	218 202 474 446 148 239 234 580	5.384495 5.308268 6.161207 6.100319 4.997212 5.476464 5.453182 6.363028
E-038 E-039 E-040 E-041 E-042 E-043 E-044	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-42 E-43 E-44 Lower E-44 Upper	302 134 202 474 455 437 148 239 309 158 580	0.5 0.5 1 1 0.5 0.5 1 1 1 0.5 0.5	218 202 474 446 148 239 234	5.384495 5.308268 6.161207 6.100319 4.997212 5.476464 5.453182
E-038 E-039 E-040 E-041 E-042 E-043 E-044 E-045 E-046	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-42 E-43 E-44 Lower E-44 Upper E-45 E-46	302 134 202 474 455 437 148 239 309 158 580	0.5 0.5 1 1 0.5 0.5 1 1 0.5 0.5 1 1	218 202 474 446 148 239 234 580 195	5.384495 5.308268 6.161207 6.100319 4.997212 5.476464 5.453182 6.363028 5.273000
E-038 E-039 E-040 E-041 E-042 E-043 E-044 E-045 E-046 E-047	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-42 E-43 E-44 Lower E-44 Upper E-45 E-46 E-47	302 134 202 474 455 437 148 239 309 158 580 195 275	0.5 0.5 1 1 0.5 0.5 1 1 0.5 0.5 1 1 1	218 202 474 446 148 239 234 580 195 275	5.384495 5.308268 6.161207 6.100319 4.997212 5.476464 5.453182 6.363028 5.273000 5.616771
E-038 E-039 E-040 E-041 E-042 E-043 E-044 E-045 E-046 E-047 E-048 E-049 E-050	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-43 E-44 Lower E-44 Upper E-45 E-46 E-47 E-48 E-49 E-50	302 134 202 474 455 437 148 239 309 158 580 195 275 126 218	0.5 0.5 1 1 0.5 0.5 1 1 0.5 0.5 1 1 1 1 1 1 1	218 202 474 446 148 239 234 580 195 275 126 218 247	5.384495 5.308268 6.161207 6.100319 4.997212 5.476464 5.453182 6.363028 5.273000 5.616771 4.836282 5.384495 5.509388
E-038 E-039 E-040 E-041 E-042 E-043 E-044 E-045 E-046 E-047 E-048 E-049	E-38 Lower E-38 Upper E-39 E-40 E-41 Lower E-41 Upper E-42 E-43 E-44 Lower E-44 Upper E-45 E-46 E-47 E-48 E-49	302 134 202 474 455 437 148 239 309 158 580 195 275 126 218	0.5 0.5 1 1 0.5 0.5 1 1 0.5 0.5 1 1 1 1 1 1	218 202 474 446 148 239 234 580 195 275 126 218	5.384495 5.308268 6.161207 6.100319 4.997212 5.476464 5.453182 6.363028 5.273000 5.616771 4.836282 5.384495

Table E-1
E-Pond - Total Uranium Analytical Summary - All Samples

Sort ID	D Sample ID Sampl mg/kg		Sample Weights (A _i )	Core Weighted Averages, U mg/kg (X _i A _i )	Ln(A _i X _i )
E-054	E-54	125	1	125	4.828314
E-055	E-55	184	1	184	5.214936
E-056	E-56	120	1	120	4.787492
E-057	E-57	693	1	693	6.541030
E-058	E-58	122	1	122	4.804021
E-059	E-59	297	1	297	5.693732
E-060	E-60	410	1	410	6.016157
E-061	E-61	137	1	137	4.919981
E-062	E-62	261	1	261	5.564520
E-063	E-63	142	1	142	4.955827
E-064	E-64	111	1	111	4.709530
E-065	E-65 Lower	397 121	0.5	259	5.556828
E-066	E-65 Upper E-66	331	1 1	331	5.802118
	E-67 Lower	1,280	0.5		
E-067	E-67 Upper	98.4	0.5	689	6.535532
E-068	E-68	98	1	98	4.584967
E-069	E-69	672	1	672	6.510258
E-070	E-70	121	1 .	121	4.795791
E-071	E-71	99.1	1	99.1	4.596129
E-072	E-72	262	1	262	5.568345
E-073	E-73	118	1	118	4.770685
E-074	E-74 Lower E-74 Upper	188 83.9	0.5 0.5	136	4.912287
E-075	E-75	166	1	166	5.111988
E-076	E-76	97.1	1	97.1	4.575741
E-077	E-77	167	1	167	5.117994
E-078	E-78	93.8	1	93.8	4.541165
E-079	E-79 Lower E-79 Upper	193 75	0.5 0.5	134	4.897840
E-080	E-80 Lower E-80 Upper	245 122	0.5 0.5	184	5.212215
E-081	E-81 E-81 U	162 718	0.994 0.006	165	5.107980
E-082	E-82	155	1	155	5.043425
E-083	E-83	119	1	119	4.779123
E-084	E-84	83.9	1	83.9	4.429626
E-085	E-85	83.2	1	83.2	4.421247
E-086	E-86	190	1	190	5.247024
E-087	E-87	224	1	224	5.411646
E-088	E-88 E-88 U	185 470	0.994	187	5.229557
	E-89	146	0.006	<del>   </del>	
E-089	E-89 U1	71:2	· · · · · · · · · · · · · · · · · · ·	146	4.984560
003	E-89 U2	244	0.006	{ ' [→] '	7.507500
	E-90	122	0.994	<del> </del>	
E-090	E-90 U	120		122	4.803923
E-091	E-91	80.9	1	80.9	4.393214
E-092	E-92	147	1	147	4.990433
E-093	E-93 E-93 Grey	271 97.1	0.994 0.006	270	5.598261
E-094	E-94 E-94 Tan	152 97.1	0.994 0.006	152	5.021711
E-095	E-95 E-95 U	223 744	0.994 0.006	226	5.421092
E-096	E-96 E-96 Tan E-96 White	202 103 108	0.988 0.006 0.006	201	5.302519
E-097	E-97 Lower E-97 U	216 110	0.497 0.006	149	5.003376

Table E-1
E-Pond - Total Uranium Analytical Summary - All Samples

Sort ID	Sample ID	Individual Samples, U mg/kg (X _i )	Sample Weights (A _i )	Core Weighted Averages, U mg/kg (X _i A _i )	Ln(A _i X _i )
E-098	E-98	65.1	1	65.1	4.175925
E-099	E-99	103	1	103	4.634729
E-100	E-100	156	1	156	5.049856
E-101	E-101	155	1	155	5.043425
E-102	E-102	159	1	159	5.068904
	E-103	136	0.006		
E-103	E103 Lower	145	0.497	109	4.687812
	E-103 Upper	71.9	0.497		
E-104	E-104	107	1	107	4.672829
E-105	E-105	89.7	1	89.7	4.496471
	Average				5.313797
	95% UCL (1- tail) Average				5.40652
	(transformed from Ln)				203
	95% UCL (1- tail)				
	(transformed from Ln)				223_

Cells with light gray background represent discrete subsamples that were analyzed separately because they differed in color or other characteristic from the surrounding core material. The results from these subsamples were weighted by their mass and included as a part of a weighted average for the core as a whole, as shown in columns 5 and 6 (Core Weighted Averages).

E-10 example: (0.497*215)+(0.006*2120)+(0.497*181) = 210 mg/kg U (as-is)

# Table B-2 B Pond - Pond Wide Composite Total Uranium Analytical Summary

Sample ID	Parameter	Units	Result
B-Pond Comp	Uranium	mg/kg	249

# Table C-2 C Pond - Pond Wide Composite Total Uranium Analytical Summary

Sample ID	Parameter	Units	Result
C-Pond Comp	Uranium	mg/kg	352

# Table D-2 D Pond - Pond Wide Composite Total Uranium Analytical Summary

Sample ID	Parameter	Units	Result
D-Pond Comp	Uranium	mg/kg	574

# Table E-2 E-Pond - Pond Wide Composite Total Uranium Analytical Summary

Sample ID	Parameter	Units	Result
E-Pond Comp	Uranium	mg/kg	168



## Table B-3 B Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	B-2	B-5 Lower	B-5 Upper	B-10 Lower	B-10 Upper	B-18 Lower	B-18 Upper
Bismuth 214	pCi/q	0.29	1.37	0.749286	1.36	0.89	0.69	0.76	0.75	0.6	1.37
Bismuth 214 (counting error)	pCi/g	0.2	0.48	0.291429	0.48	0.3	0.29	0.29	0.28	0.31	0.41
Lead 212	pCi/a	-0.1	0.5	0.143571	0.5	< 0.26	0.33	< 0.09	< 0.06	< 0.03	0.38
Lead 212 (counting error)	pCi/a	0.15	4.8	0.610714	0.23	< 0.22	0.2	< 0.16	< 0.15	< 0.18	0.22
Lead 214	pCi/q	0.33	1.68	0.900714	1.36	1.14	0.65	0.72	1.28	0.67	1.68
Lead 214 (counting error)	pCi/g	0.18	0.37	0.259286	0.31	0.33	0.2	0.27	0.37	0.24	0.35
Potassium 40	pCi/g	2.5	10.1	5.95		4.6				6.7	
Potassium 40 (counting error)	pCi/g	1.4	2.7	1.933333		1.7				2	
Protactinium 231	pCi/g	-0.8	1.1	-0.05714	< -0.8	< 0	< 1.1	< 0.02	< -0.02	< -0.4	< -0.6
Protactinium 231 (counting error)	pCi/g	1.5	2.7	2.121429	< 2.7	< 2.4	< 1.5	< 2.1	< 2.3	< 2.6	< 2.7
Protactinium 234M	pCi/g	61	329	160.9286	186	200	159	153	191	170	329
Protactinium 234M (counting error)	pCi/g	20	43	29.07143	33	30	28	30	32	29	43
Radium (226)	pCi/g	0.29	1.37	0.749286	1.36	J 0.89	J 0.69	J 0.76	J 0.75	J 0.6	1.37
Radium (226) (counting error)	pCi/g	0.2	0.48	0.291429	0.48	J 0.3	J 0.29_	J 0.29	J 0.28	J 0.31	0.41
Thorium 228	pCi/g	0.0003	0.53	0.146736	J 0.53	< 0.17	< 0.16	< 0.034	J 0.19	< 0.08	< 0.15
Thorium 228 (counting error)	pCi/g	0.051	0.25	0.133714	J 0.25	< 0.15	< 0.15	< 0.095	J 0.14	< 0.12	< 0.15
Thorium 230	pCi/g	1,11	9	3.932857	8.4	9	7.1	2.64	3.56	J 1.6	4.34
Thorium 230 (counting error)	pCi/g	0.35	1.2	0.675714	1.1	1.2	1	0.56	0.66	J 0.41	0.75
Thorium 232	pCi/g	-0.1	0.28	0.131429	< 0.28	< 0.2	< 0.23	< 0.04	< 0.12	< 0.17	< 0.22
Thorium 232 (counting error)	pCi/g	0.26	0.5	0.320714		< 0.26	< 0.28	< 0.3	< 0.35	< 0.32	< 0.3
Thorium 234	pCi/g	60.3	287	142.0071	171	204	156	122	180	146_	287
Thorium 234 (counting error)	pCi/g	5.6	25	13.02143	16	18	14	12	16	14	25
Uranium 234	pCi/g	41.8	248	114.0643	154	174	130	88	142	120	248
Uranium 234 (counting error)	pCi/g	4	22	12.45	18	19	16	11	17	11	22
Uranium 235	pCi/g	3.43	14.4	7.310714	9.4	10.2	7.77	6.8	9.1	7.5	14.4
Uranium 235 (counting error)	pCi/g	0.71	1.6	1.060714	1.4	1.2	0.99	1.1	1.1	1.2	1.6
Uranium 235/236	pCi/g	2.25	11.7	6.654286	J 11.2	J 11.5	J 10.3	J 7.1	J 9.5	5.8	11.7
Uranium 235/236 (counting error)	pCi/g	0.55	3.8	2.157857		J 3.8	J 3.7	J 2.9	J 3.4	1.1	2.1
Uranium 238	pCi/g	41.1	257	119.1214	170	176	135	86	148	122	257
Uranium 238 (counting error)	pCi/g	4	23	12.81429	19	20	16	11	17	11	23

#### Notes:

B = Estimated result. Result is less than RL.

## Table B-3 B Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	B-19 Lower	B-19 Upper	B-26 Lower	B-26 Upper	B-30 Lower	B-30 Upper	B-35
Bismuth 214	pCi/g	0.29	1.37	0.749286	0.75	0.77	0.51	0.39	0.5	0.86	< 0.29
Bismuth 214 (counting error)	pCi/g	0.2	0.48	0.291429	0.31	0.3	0.23	0.2	0.23	0.22	< 0.23
Lead 212	pCi/g	-0.1	0.5	0.143571	< -0.04	< 0.18	< 0.04	< -0.02	< -0.1	< 0.18	< 0.12
Lead 212 (counting error)	pCi/g	0.15	4.8	0.610714	< 1.5	< 0.16	< 0.17	< 0.21	< 4.8	< 0.19	< 0.16
Lead 214	pCi/g	0.33	1.68	0.900714	0.68	0.89	0.65	0.68	0.33	0.96	0.92
Lead 214 (counting error)	pCi/g	0.18	0.37	0.259286	0.19	0.23	0.27	0.18	0.2	0.22	0.27
Potassium 40	pCi/g	2.5	10.1	5.95	10.1		9.2	2.5		2.6	
Potassium 40 (counting error)	pCi/g	1.4	2.7	1.933333	2.3		2.7	1.5		1.4	
Protactinium 231	pCi/g	-0.8	1.1	-0.05714	< 0	< -0.4	< 0.9	< 0.7	< 0	< -0.5	< -0.8
Protactinium 231 (counting error)	pCi/g	1.5	2,7	2.121429	< 1.8	< 2.4	< 1.6	< 1.5	< 2.1	< 1.8	< 2.2
Protactinium 234M	pCi/g	61	329	160.9286	143	143	142	61	76	143	157
Protactinium 234M (counting error)	pCi/g	20	43	29.07143	26	30	_ 30	20	22	24	30
Radium (226)	pCi/g	0.29	1.37	0.749286	J 0.75	J 0.77	J 0.51	J 0.39	J 0.5	J 0.86	< 0.29
Radium (226) (counting error)	pCi/g	0.2	0.48	0.291429	J 0.31	J 0.3	J 0.23	J 0.2	J 0.23	J 0.22	< 0.23
Thorium 228	pCi/g	0.0003	0.53	0.146736	< 0.015	J 0.2	< 0.11	< 0.015	< 0.08	J 0.32	< 0.0003
Thorium 228 (counting error)	pCi/g	0.051	0.25	0.133714	< 0.089	J 0.16	< 0.14	< 0.051	< 0.11	J 0.2	< 0.067
Thorium 230	pCi/g	1.11	9	3.932857	J 1.53	2.76	J 1.91	J 1.11	2.1	5.84	3.17
Thorium 230 (counting error)	pCi/g	0.35	1.2	0.675714	J 0.41	0.57	J 0.47	J 0.35	0.46	0.93	0.59
Thorium 232	pCi/g	-0.1	0.28	0.131429	< 0.15	< -0.1	< 0.15	< 0	< 0.04	< 0.22	< 0.12
Thorium 232 (counting error)	pCi/g	0.26	0.5	0.320714	< 0.27	< 0.5	< 0.38	< 0.27	< 0.37	< 0.28	< 0.29
Thorium 234	pCi/g	60.3	287	142.0071	115	129	111	60.3	67.8	105	134
Thorium 234 (counting error)	pCi/g	5.6	25	13.02143	9.7	13	11	6.8	5.6	8.2	13
Uranium 234	pCi/g	41.8	248	114.0643	89.4	105	66	41.8	71.6	69.1	98
Uranium 234 (counting error)	pCi/g	4	22	12.45	8.2	9.6	6,1	4	8.8	9.6	14
Uranium 235	pCi/g	3.43	14.4	7.310714	6.19	5.3	4.96	3.43	4.16	6.04	7.1
Uranium 235 (counting error)	pCi/g	0.71	1.6	1.060714	0.95	1.1	0.97	0.73	0.71	0.8	1
Uranium 235/236	pCi/g	2.25	11.7	6.654286	4.6	4.5	3.41	2.25	J 3	J 3.6	J 4.7
Uranium 235/236 (counting error)	pCi/g	0.55	3.8	2.157857	0.9	0.94	0.72	0.55	J 1.5	J 2	J 2.8
Uranium 238	pCi/g	41.1	257	119.1214	89	112	68.5	41.1	78.2	69.9	115
Uranium 238 (counting error)	pCi/g	4	23	12.81429	8.1	10	6.3	4	9.4	9.6	15

#### Notes:

B = Estimated result. Result is less than RL.

J ≈ Method blank contamination. The associated method blank contains the target analyte

### Table C-3 C Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	C-2	C-5	C-9	C-10 Lower	C-10 Upper	C-17	C-19 Lower	C-19 Upper
Bismuth 214	pCi/g	0.25	1.25	0.605625	0.56	1.25	0.52	0.77	0.69	0.82	< 0.25	< 0.3
Bismuth 214 (counting error)	pCi/g	0.19	0.38	0.280625	0.24	0.38	0.28	0.31	0.25	0.34	< 0.21	< 0.23
Lead 212	pCi/g	-0.29	0.17	0.039938	< 0.09	< 0.06	< 0.01	< 0.12	< 0.17	< 0.13	< -0.03	< 0.03
Lead 212 (counting error)	pCi/g	0.11	0.71	0.225625	< 0.17	< 0.2	< 0.14	< 0.17	< 0.14	< 0.19	< 0.19	< 0.15
Lead 214	pCi/g	0.36	1,16	0.6525	0.6	1.05	0.73	0.66	0.62	1.16	0.46	0.72
Lead 214 (counting error)	pCi/g	0.14	0.35	0.2625	0.22	0.35	0.23	0.24	0.25	0.32	0.2	0.35
Potassium 40	pCi/g	3.1	9	4.9		3.1	5.3	7.5	3.3	3.3		5.3
Potassium 40 (counting error)	pCi/g	1.2	2.1	1.56		1.3	1.5	2.1	1.5	1.6		1.9
Protactinium 231	pCi/g	-2	1.6	0.25875	< 1.6	< 0.6	< -0.2	< 1.4	< 0.3	< 0.1	< 0.7	< 1.4
Protactinium 231 (counting error)	pCi/g	1.5	4.1	2.30625	< 1.8	< 2.4	< 2	< 2.1	< 2.5	< 2.6	< 1.8	< 2.4
Protactinium 234	pCi/g	1.89	1.89	1.89								
Protactinium 234 (counting error)	pCi/g	0.56	0.56	0.56							1.	
Protactinium 234M	pCi/g	131	812	305.0625	208	320	159	252	225	299	131	224
Protactinium 234M (counting error)	pCi/g	25	69	38.375	35	39	25	38	33	42	25	33
Radium (226)	pCi/g	0.25	1.25	0.605625	J 0.56	1.25	J 0.52	J 0.77	J 0.69	J 0.82	< 0.25	< 0.3
Radium (226) (counting error)	pCi/g	0.19	0.38	0.280625	J 0.24	0.38	J 0.28	J 0.31	J 0.25	J 0.34	< 0.21	< 0.23
Thallium 208	pCi/g	0.19	0.19	0.19		0.19						
Thallium 208 (counting error)	pCi/g	0.12	0.12	0.12	·	0.12						
Thorium 228	pCi/g	0.008	0.24	0.104938	< 0.08	< 0.14	< 0.096	J 0.24	< 0.11	J 0.107	J 0.122	< 0.008
Thorium 228 (counting error)	pCi/g	0.046	0.16	0.089438	< 0.13	< 0.13	< 0.08	J 0.16	< 0.11	J 0.079	J 0.081	< 0.046
Thorium 230	pCi/g	1.6	6.42	3.043125	5.03	4.03	1.68	6.42	2.23	1.9	4.91	1.83
Thorium 230 (counting error)	pCi/g	0.3	0.93	0.4925	0.84	0.69	0.32	0.93	0.5	0.33	0.65	0.34
Thorium 232	pCi/g	0.008	0.18	0.083563	< 0.01	< 0.16	< 0.043	< 0.18	< 0.1	< 0.036	J 0.096	< 0.025
Thorium 232 (counting error)	pCi/g	0.034	0.31	0.122	< 0.31	< 0.31	< 0.054	< 0.28	< 0.29	< 0.045	J 0.072	< 0.044
Thorium 234	pCi/g	101	671	254.5625	167	312	138	207	212	285	101	170
Thorium 234 (counting error)	pCi/g	7.9	53	20.60625	15	26	13	17	18	24	7.9	14
Uranium 234	pCi/g	113	726	264.5625	150	256	118	164	159	237	181	117
Uranium 234 (counting error)	pCi/g	12	77	29.3125	18	31	12	25	21	24	19	12
Uranium 235	pCi/g	5.9	35.4	13.81625	8.6	15.7	7.7	11.4	10.3	14.1	5.9	9.1
Uranium 235 (counting error)	pCi/g	0.81	3	1.4825	1.3	1.8	1.2	1.4	1.2	1.5	0.81	1.2
Uranium 235/236	pCi/g	4.9	33.5	12.4875	J 5.4	J 11.2	J 5.2	J 11.6	J 4.9	J 11.7	J 9	J 6.8
Uranium 235/236 (counting error)	pCi/g	1.8	10	4.7375	J 2.9	J 5.4	J 1.8	J 6.3	J 3.3	J 3.6	J 2.9	J 2.1
Uranium 238	pCi/g	120	745	272.125	165	259	128	166	145	253	170	125
Uranium 238 (counting error)	pCi/g	13	78	30.0625	20	32	13	25	19	26	18	13

#### Notes:

B = Estimated result. Result is less than RL.

### Table C-3 C Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	C-21	C-24	C-26 Lower	C-26 Upper	C-30 Lower	C-30 Upper	C-34	C-35
Bismuth 214	pCi/g	0.25	1.25	0.605625	< 0.41	< 0.28	1.06	< 0.47	0.64	0.46	0.77	0.44
Bismuth 214 (counting error)	pCi/g	0.19	0.38	0.280625	< 0.3	< 0.24	0.32	< 0.32	0.28	0.19	0.31	0.29
Lead 212	pCi/g	-0.29	0.17	0.039938	< -0.29	< 0.16	< 0.08	< -0.15	< 0.08	< 0.09	< 0.09	< -0.001
Lead 212 (counting error)	pCi/g	0.11	0.71	0.225625	< 0.61	< 0.16	< 0.18	< 0.71	< 0.13	< 0.11	< 0.21	< 0.15
Lead 214	pCi/g	0.36	1.16	0.6525	0.65	0.63	0.84	0.46	0.44	0.46	0.6	0.36
Lead 214 (counting error)	pCi/g	0.14	0.35	0.2625	0.31	0.3	0.31	0.32	0.2	0.14	0.25	0.21
Potassium 40	pCi/g	3.1	9	4.9			9		4.3	4.6	3.3	
Potassium 40 (counting error)	pCi/g	1.2	2.1	1.56		I	2		1.2	1.2	1.3	
Protactinium 231	pCi/g	-2	1.6	0.25875	< -2	< 0.4	< -0.7	< 0.1	< -0.7	< 0.3	< 0.04	< 0.8
Protactinium 231 (counting error)	pCi/g	1.5	4.1	2.30625	< 4.1	< 1.9	< 2.3	< 2.7	< 1.8	< 1.5	< 2.7	< 2.3
Protactinium 234	pCi/g	1.89	1.89	1.89							1.89	
Protactinium 234 (counting error)	pCi/g	0.56	0.56	0.56							0.56	
Protactinium 234M	pCi/g	131	812	305.0625	748	150	206	399	276	195	812	277
Protactinium 234M (counting error)	pCi/g	25	69	38.375	69	30	33	55	30	26	68	33
Radium (226)	pCi/g	0.25	1.25	0.605625	< 0.41	< 0.28	1.06	< 0.47	J 0.64	J 0.46	J 0.77	J 0.44
Radium (226) (counting error)	pCi/g	0.19	0.38	0.280625	< 0.3	< 0.24	0.32	< 0.32	J 0.28	J 0.19	J 0.31	J 0.29
Thallium 208	pCi/g	0.19	0.19	0.19								
Thallium 208 (counting error)	pCi/g	0.12	0.12	0.12	_						ĺ	
Thorium 228	pCi/g	0.008	0.24	0.104938	J 0.108	J 0.095	J 0.129	< 0.093	J 0.084	< 0.061	< 0.096	J 0.11
Thorium 228 (counting error)	pCi/g	0.046	0.16	0.089438	J 0.081	J 0.077	J 0.084	< 0.078	J 0.068	< 0.064	< 0.082	J 0.081
Thorium 230	pCi/g	1.6	6.42	3.043125	2.09	3.04	3.3	1.6	2.62	2.9	2.75	2.36
Thorium 230 (counting error)	pCi/g	0.3	0.93	0.4925	0.36	0.46	0.48	0.3	0.4	0.45	0.44	0.39
Thorium 232	pCi/g	0.008	0.18	0.083563	J 0.114	J 0.13	J 0.054	< 0.008	< 0.052	J 0.125	< 0.064	J 0.14
Thorium 232 (counting error)	pCi/g	0.034	0.31	0.122	J 0.084	J 0.087	J 0.051	< 0.034	< 0.057	J 0.087	< 0.063	J 0.084
Thorium 234	pCi/g	101	671	254.5625	671	126	193	350	226	130	589	196
Thorium 234 (counting error)	pCi/g	7.9	53	20.60625	53	13	17	29	15	9.8	43	15
Uranium 234	pCi/g	113	726	264.5625	726	113	138	326	298	206	663	381
Uranium 234 (counting error)	pCi/g	12	77	29.3125	77	12	16	37	34	24	66	41
Uranium 235	pCi/g	5.9	35.4	13.81625	35.4	6.7	10	18.7	12.1	8.46	34.4	12.5
Uranium 235 (counting error)	pCi/g	0.81	3	1.4825	3	1.1	1.2	2	1.2	0.91	2.6	1.3
Uranium 235/236	pCi/g	4.9	33.5	12.4875	J 25	J 5.8	J 9.7	J 14.2	J 17.8	J 5.5	J 33.5	J 22.5
Uranium 235/236 (counting error)	pCi/g	1.8	10	4.7375	J 10	J 2	J 3.4	J 6	J 6.4	J_3.1	J 9.5	J 7.1
Uranium 238	pCi/g	120	745	272.125	745	120	139	326	311	203	695	404
Uranium 238 (counting error)	pCi/g	13	78	30.0625	78	13	16	37	35	24	69	43

#### Notes:

B = Estimated result. Result is less than RL.



## Table D-3 D Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	D-8 Lower	D-8 Upper	D-10 Lower	D-10 Upper	D-11 Lower	D-11 Upper	D-17 Lower	D-17 Upper
Bismuth 214	pCi/g	0.46	1.91	0.938571	0.71	0.5	0.74	0.86	0.89	1.32	1.91	0.99
Bismuth 214 (counting error)	pCi/g	0.25	0.79	0.405714	0.33	0.26	0.27	0.29	0.41	0.52	0.79	0.39
Lead 212	pCi/g	-0.21	0.22	0.059643	< 0.16	< -0.01	< 0.09	< 0.01	< 0.05	< 0.2	< -0.21	< 0.06
Lead 212 (counting error)	pCi/g	0.13	0.79	0.264286	< 0.13	< 0.22	< 0.18	< 0.13	< 0.3	< 0.24	< 0.79	< 0.22
Lead 214	pCi/g	0.26	1.51	0.98	0.78	0.62	0.82	< 0.26	0.91	1.26	0.85	1.49
Lead 214 (counting error)	pCi/g	0.22	0.62	0.366429	0.24	0.29	0.26	< 0.22	0.37	0.46	0.46	0.39
Potassium 40	pCi/g	3	10	6.516667	6	1	3	9.7	5.3	6.4	5.6	9.3
Potassium 40 (counting error)	pCi/g	1.1	2.8	2.05	1.3	<b></b>	1.1	2.8	2.1	2.5	2.2	2.2
Protactinium 231	pCi/q	-1.2	1.1	-0.28286	< -0.9	< 09	< -0.6	< -0.4	< -0.2	< -1.2	< -0.7	< -0.3
Protactinium 231 (counting error)	pCi/g	1.6	5.2	3.1	< 2.2	< 2	< 2.5	< 2.1	< 4.3	< 4	< 5	< 2.6
Protactinium 234	pCi/g	1.93	990	320.77	419	135	431	28	1.93		<u>Ŭ</u>	
Protactinium 234 (counting error)	pCi/g	0.95	100	38,10556	40	26	44	18	0.95		·	<b> </b>
Protactinium 234M	pCi/g	170	1200	569.5					755	337	1200	273
Protactinium 234M (counting error)	pCi/g	30	110	64.16667					76	52	110	41
Radium (226)	pCi/g	0.46	1.91	0.938571	J 0.71	J 0.5	J 0.74	J 0.86	J 0.89	1.32	1.91	J 0.99
Radium (226) (counting error)	pCi/q	0.25	0.79	0.405714		J 0.26	J 0.27	J 0.29	J 0.41	0.52	0.79	J 0.39
Thorium 228	pCi/g	-0.19	2.86	0.629714	J 2.86	2.31	< -0.19	< 0.21	J 0.44	< 0.008	< -0.09	< 0.09
Thorium 228 (counting error)	pCi/g	0.094	0.78	0.338857	J 0.78	0.53	< 0.25	< 0.41	J 0.32	< 0.2	< 0.45	< 0.16
Thorium 230	pCi/g	1.08	9.8	2.465	9.8	2.38	1.52	2.49	J 2.07	J 1.33	J 3.1	J 1.58
Thorium 230 (counting error)	pCi/g	0.34	3	0.862857	3	0.53	0.68	0.98	J 0.59	J 0.65	J 1.4	J 0.51
Thorium 232	pCi/g	-0.1	0.57	0.081429	< -0.05	< 0.15	< -0.09	< -0.01	< 0.15	< 0	< 0.15	< 0.08
Thorium 232 (counting error)	pCi/g	0.18	5.5	1.130714	< 0.51	< 0.36	< 5.2	< 0.34	< 0.49	< 0.63	< 0.51	< 0.38
Thorium 234	pCi/g	56.6	1110	422.7286	312	122	421	56.6	756	321	1110	294
Thorium 234 (counting error)	pCi/g	7.8	87	36.05	33	11	43	7.8	61	28	87	25
Uranium 234	pCi/q	1,15	12900	1229.061	2.3	2.4	481	423	1040	763	12900	513
Uranium 234 (counting error)	pCi/q	0.66	1200	116.8186	1,6	1.5	43	39	100	74	1200	50
Uranium 235	pCi/g	3.46	56.7	21.39	17.7	7.4	21.2	3.6	38.6	16.3	56.7	13.7
Uranium 235 (counting error)	pCi/g	0.8	4.4	2.137143	1.6	1.2	2	0.82	3.6	2	4.4	1.8
Uranium 235/236	pCi/g	-0.27	710	65.75386	< -0.23	< -0.046	23.2	22.7	63	32.7	710	J 20
Uranium 235/236 (counting error)	pCi/g	0.091	130	13.61079	< 0.2	< 0.091	4.4	4.6	15	9	130	J 5.9
Uranium 238	pCi/g	1.2	13700	1288.965	2.7	< 1.2	505	465	1030	771	13700	511
Uranium 238 (counting error)	pCi/a	0.96	1200	117.1829		< 1.1	46	42	99.9	75	1200	50

#### Notes:

### Table D-3 D Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	D-19 Lower	D-19 Upper	D-26 Lower	D-26 Upper	D-29 Lower	D-29 Upper
Bismuth 214	pCi/g	0.46	1.91	0.938571	0.91	0.73	< 0.61	< 0.46	0.95	1.56
Bismuth 214 (counting error)	pCi/g	0.25	0.79	0.405714	0.27	0.25	< 0.57	< 0.37	0.5	0.46
Lead 212	pCi/g	-0.21	0.22	0.059643	< -0.04	< 0.005	< 0.1	< 0.22	< 0.15	< 0.05
Lead 212 (counting error)	pCi/g	0.13	0.79	0.264286	< 0.24	< 0.14	< 0.39	< 0.28	< 0.29	< 0.15
Lead 214	pCi/g	0.26	1.51	0.98	0.78	0.88	1.51	0.97	1.14	1.45
Lead 214 (counting error)	pCi/g	0.22	0.62	0.366429	0.26	0.28	0.62	0.49	0.4	0.39
Potassium 40	pCi/g	3	10	6.516667	7.6	7		5	3.3	10
Potassium 40 (counting error)	pCi/g	1.1	2.8	2.05	2.1	2.1		1,8	1.9	2.5
Protactinium 231	pCi/g	-1.2	1.1	-0.28286	< 0.04	< 0	< 1.1	< -1.1	< -0.9	< 0.3
Protactinium 231 (counting error)	pCi/g	1.6	5.2	3.1	< 1.6	< 2.1	< 5.2	< 4	< 3.7	< 2.1
Protactinium 234	pCi/g	1.93	990	320.77	191	82	990	609		
Protactinium 234 (counting error)	pCi/g	0.95	100	38.10556	32	20	100	62		
Protactinium 234M	pCi/g	170	1200	569.5					682	170
Protactinium 234M (counting error)	pCi/g	30	110	64.16667					76	30
Radium (226)	pCi/g	0.46	1.91	0.938571	J 0.91	J 0.73	< 0.61	< 0.46	J 0.95	1.56
Radium (226) (counting error)	pCi/g	0.25	0.79	0.405714	J 0.27	J 0.25	< 0.57	< 0.37	J 0.5	0.46
Thorium 228	pCi/g	-0.19	2.86	0.629714	J 1.53	J 1.41	< -0.12	< 0.048	< 0.1	< 0.21
Thorium 228 (counting error)	pCi/g	0.094	0.78	0.338857	J 0.38	J 0.43	< 0.38	< 0.094	< 0.13	< 0.23
Thorium 230	pCi/g	1.08	9.8	2.465	2.6	J 1.43	J 2	J 1.08	2.03	J 1.1
Thorium 230 (counting error)	pCi/g	0.34	3	0.862857	1	J 0.42	J 1.1	J 0.34	0.48	J 0.4
Thorium 232	pCi/g	-0.1	0.57	0.081429	< 0.17	< 0.07	< 0.57	< -0.1	< 0.05	< 0
Thorium 232 (counting error)	pCi/g	0.18	5.5	1:130714	< 0.28	< 0.24	< 0.72	< 5.5	< 0.49	< 0.18
Thorium 234	pCi/g	56.6	1110	422.7286	138	61.6	896	618	677	135
Thorium 234 (counting error)	pCi/g	7.8	87	36.05	12	7.9	72	49	54	14
Uranium 234	pCi/g	1.15	12900	1229.061	2.7	1.15	315	42.3	537	184
Uranium 234 (counting error)	pCi/g	0.66	1200	116.8186	1.6	0.66	30	4.1	70	20
Uranium 235	pCi/g	3.46	56.7	21.39	8.6	3.46	44	29.8	31.8	6.6
Uranium 235 (counting error)	pCi/g	0.8	4.4	2.137143	1.1	0.8	4	2.6	2.9	1.1
Uranium 235/236	pCi/g	-0.27	710	65.75386	< -0.27	< 0.29	15.2	2.21	J 22	J 9.8
Uranium 235/236 (counting error)	pCi/g	0.091	130	13.61079	< 0.22	< 0.36	3.7	0.58	J 13	J 3.5
Uranium 238	pCi/g	1.2	13700	1288.965	< 1.3	2.51	312	39.8	513	191
Uranium 238 (counting error)	pCi/g	0.96	1200	117.1829	< 1.2	0.96	30	3.9	68	21

#### Notes:

## Table E-3 E Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	E-2	E-10 Lower	E-10 Upper	E-12 Lower	E-12 Upper	E-16 Lower	E-16 Upper
Bismuth 214	pCi/g	-0.1	1.06	0.681613	0.79	0.87	0.73	0.63	< 0.31	< 0.18	0.77
Bismuth 214 (counting error)	pCi/g	0.23	4.7	0.437742	0.34	0.32	0.32	0.27	< 0.24	< 0.25	0.31
Lead 212	pCi/g	-0.08	0.27	0.061742	< 0.03	< 0.02	< 0.06	< 0.12	< 0.04	< 0.16	< -0.01
Lead 212 (counting error)	pCi/g	0.13	5.3	0.365484	< 0.21	< 0.19	< 0.2	< 0.15	< 0.2	< 0.16	< 0.27
Lead 214	pCi/g	0.45	1.19	0.827097	0.72	0.63	0.99	0.83	0.71	0.69	0.93
Lead 214 (counting error)	pCì/g	0.21	0.37	0.275806	0.29	0.26	0.26	0.24	0.25	0.25	0.37
Potassium 40	pCi/g	4.6	9.8	6.957895		5.8					7.7
Potassium 40 (counting error)	pCi/g	1.7	2.6	2.110526		1.7			I		1.9
Protactinium 231	pCi/g	-1.4	1.9	0.065387	< 0.2	< -0.7	< -0.2	< -0.4	< -1.4	< 0.005	< 0.01
Protactinium 231 (counting error)	pCi/g	_1.6	3.8	2.390323	< 2.2	< 2.5	< 2.2	< 1.9	< 2.9	< 2.6	< 2.9
Protactinium 234M	pCi/g	62	556	229.129	374	363	279	210	305	283	359
Protactinium 234M (counting error)	pCi/g	_20	64	35.74194	51	44	44	35	38	44	44
Radium (226)	pCi/g	-0.1	1.06	0.681613	J 0.79	J 0.87	J 0.73	J 0.63	< 0.31	< 0.18	J 0.77
Radium (226) (counting error)	pCi/g	0.23	4.7	0.437742	J 0.34	J 0.32	J 0.32	J 0.27	< 0.24	< 0.25	J 0.31
Thorium 228	pCi/g	-0.015	0.21	0.071003	< 0.08	< 0.021	< 0.021	< 0.12	< 0.1	< 0.021	< 0.12
Thorium 228 (counting error)	pCi/g	0.07	0.27	0.119406	< 0.14	< 0.081	< 0.07	< 0.27	< 0.11	< 0.071	< 0.16
Thorium 230	pCi/g	0.8	3.04	1.712581	J 1.24	J 1.14	J 1.2	2.25	J 1.5	J 1.3	3.02
Thorium 230 (counting error)	pCi/g	0.26	0.73	0.433226	J 0.37	J 0.34	J 0.35	0.73	J 0.4	J 0.37	0.63
Thorium 232	pCi/g	-0.1	0.37	0.052548	< -0.03	< 0.18	< 0.08	< -0.07	< 0.14	< -0.1	< 0.1
Thorium 232 (counting error)	pCi/g	0.28	150	5.678065	< 0.48	< 0.29	< 0.35	< 0.34	< 0.32	< 11	< 0.35
Thorium 234	pCi/g	70.7	490	210.8452	375	319	234	204	252	269	322
Thorium 234 (counting error)	pCi/g	7.2	40	18.77097	32	27	21	18	22	24	28
Uranium 234	pCi/g	53.8	1820	266,171	290	220	170	160	209	1030	474
Uranium 234 (counting error)	pCi/g	5.1	160	24.87419	31	23	19	18	20	92	45
Uranium 235	pCi/g	3.58	26.7	11.01871	18.4	16.1	12	10.2	14.2	14.3	16.2
Uranium 235 (counting error)	pCi/g	0.82	2.9	1.458387	2.3	1.7	1.6	1.3	1.6	1.7	1.8
Uranium 235/236	pCi/g	2	88	12.91903	J 15.3	J 10.5	J 9.9	J 8.5	10	49.4	22.7
Uranium 235/236 (counting error)	pCi/g	0.58	15	2.78	J 5	J 3.4	J 3.3	J 3.1	2.5	8.3	5.4
Uranium 238	pCi/g	51.9	1930	275.3452	318	226	181	155	208	1080	478
Uranium 238 (counting error)	pCi/g	4.9	170	25.59032	33	23	19	17	20	96	45

#### Notes:

B = Estimated result. Result is less than RL.



## Table E-3 E Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	E-23 Lower	E-23 Upper	E-27 Lower	E-27 Upper	E-38 Lower	E-38 Upper	E-41 Lower	E-41 Upper
Bismuth 214	pCi/g	-0.1	1.06	0.681613	0.81	1	0.57	0.77	< 0.32	0.65	< -0.1	0.61
Bismuth 214 (counting error)	pCi/g	0.23	4.7	0.437742	0.32	0.35	0.34	0.3	< 0.25	0.23	< 4.7	0.25
Lead 212	pCi/g	-0.08	0.27	0.061742	< 0.07	< 0.08	< 0.1	< -0.05	< 0.13	< 0.02	< 0.05	< -0.08
Lead 212 (counting error)	pCi/g	0.13	5.3	0.365484	< 0.22	< 0.16	< 0.23	< 5.3	< 0.17	< 0.13	< 0.18	< 0.73
Lead 214	pCi/g	0.45	1.19	0.827097	0.94	0.86	0.72	0.86	0.86	0.84	< 0.45	0.72
Lead 214 (counting error)	pCi/g	0.21	0.37	0.275806	0.33	0.32	0.3	0.25	0.29	0.22	< 0.29	0.21
Potassium 40	pCi/g	4.6	9.8	6.957895	6.1					5.8		9.6
Potassium 40 (counting error)	pCi/g	1.7	2.6	2.110526	1.8					2		2.1
Protactinium 231	pCi/g	-1.4	1.9	0.065387	< -1.3	< 0.2	< 0.7	< -0.008	< 0.2	< 0.7	< -0.2	< 0
Protactinium 231 (counting error)	pCi/g	1.6	3.8	2.390323	< 3.3	< 2.1	< 2.9	< 1.8	< 2.3	< 1.7	< 3	< 2.3
Protactinium 234M	pCi/g	62	556	229.129	415	196	556	74	275	139	294	115
Protactinium 234M (counting error)	pCi/g	20	64	35.74194	47	36	64	24	41	26	48	25
Radium (226)	pCi/g	-0.1	1.06	0.681613	J 0.81	J 1	J 0.57	J 0.77	< 0.32	J 0.65	< -0.1	J 0.61
Radium (226) (counting error)	pCi/g	0.23	4.7	0.437742	J 0.32	J 0.35	J 0.34	J 0.3	< 0.25	J 0.23	< 4.7	J 0.25
Thorium 228	pCi/g	-0.015	0.21	0.071003	< 0.17	< 0.05	J 0.21	< -0.002	J 0.14	< 0.05	< 0.12	< 0.044
Thorium 228 (counting error)	pCi/g	0.07	0.27	0.119406	< 0.2	< 0.11	J 0.16	< 0.087	J 0.12	< 0.12	< 0.14	< 0.092
Thorium 230	pCi/g	0.8	3.04	1.712581	J 0.97	J 1.7	2.14	2.37	J 1.26	2.18	J 1.32	J 1.25
Thorium 230 (counting error)	pCi/g	0.26	0.73	0.433226	J 0.43	J 0.46	0.51	0.56	J 0.34	0.5	J 0.37	J 0.35
Thorium 232	pCi/g	-0.1	0.37	0.052548	< -0.08	< 0.07	< -0.1	< -0.001	< 0.05	< 0.19	< -0.1	< 0.05
Thorium 232 (counting error)	pCi/g	0.28	150	5.678065	< 0.34	< 0.35	< 150	< 0.38	< 0.4	< 0.29	< 4.7	< 0.28
Thorium 234	pCi/g	70.7	490	210.8452	346	207	490	77.5	245	101	280	97.3
Thorium 234 (counting error)	pCi/g	7.2	40	18.77097	29	19	40	7.2	21	8.6	25	8.5
Uranium 234	pCi/g	53.8	1820	266.171	952	150	1820	63.3	218	89.1	232	79.7
Uranium 234 (counting error)	pCi/g	5.1	160	24.87419	86	17	160	8.9	19	8.2	21	7.3
Uranium 235	pCi/g	3.58	26.7	11.01871	19.7	10.5	26.7	4.28	12	5.85	14.4	5.51
Uranium 235 (counting error)	pCi/g	0.82	2.9	1.458387	2.2	1.3	2.9	0.84	1.6	0.87	1.8	0.93
Uranium 235/236	pCi/g	2	88	12.91903	45.6	J 6.5	88	J 2	11.2	4.04	10.9	4.43
Uranium 235/236 (counting error)	pCi/g	0.58	15	2.78	8.8	J 2.7	15	J 1.5	1.9	0.85	1.8	0.87
Uranium 238	pCi/g	51.9	1930	275.3452	961	160	1930	66.6	222	91.8	238	79.9
Uranium 238 (counting error)	pCi/g	4.9	170	25.59032	87	18	170	9.2	20	8.4	21	7.3

#### Notes:

B = Estimated result. Result is less than RL.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

#### Table E-3 E Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	E-44 Lower	E-44 Upper	E-51 Lower	E-51 Upper	E-65 Lower	E-65 Upper	E-67 Lower	E-67 Upper
Bismuth 214	pCi/g	-0.1	1.06	0.681613	1.06	0.65	1.06	0.95	0.92	0.89	< 0.31	0.61
Bismuth 214 (counting error)	pCi/g	0.23	4.7	0.437742	0.3	0.24	0.34	0.25	0.35	0.29	< 0.3	0.23
Lead 212	pCi/g	-0.08	0.27	0.061742	< 0.11	< 0.15	< 0.09	< 0.006	< 0.27	< 0.11	< -0.002	< 0.09
Lead 212 (counting error)	pCi/g	0.13	5.3	0.365484	< 0.17	< 0.15	< 0.18	< 0.16	< 0.21	< 0.17	< 0.21	< 0.13
Lead 214	pCi/g	0.45	1.19	0.827097	0.65	0.67	0.93	1.04	1.17	1.12	0.73	0.73
Lead 214 (counting error)	pCi/g	0.21	0.37	0.275806	0.21	0.22	0.27	0.26	0.34	0.29	0.34	0.24
Potassium 40	pCi/g	4.6	9.8	6.957895			4.6	7.9	5.4	5.7	6.2	9.8
Potassium 40 (counting error)	pCi/g	1.7	2.6	2.110526			1.8	1.9	1,9	1.9	2.2	2.4
Protactinium 231	pCi/g	-1.4	1,9	0.065387	< -1.4	< -0.3	< 0.04	< 0.7	< -0.2	< -0.02	< 1.9	< 0.4
Protactinium 231 (counting error)	pCi/g	1.6	3.8	2.390323	< 2.6	< 1.7	< 2.7	< 2.1	< 3.8	< 2.4	< 2.8	< 1.6
Protactinium 234M	pCi/g	62	556	229.129	240	159	276	125	343	97	261	119
Protactinium 234M (counting error)	pCi/g	20	64	35.74194	36	31	39	24	42	21	41	25
Radium (226)	pCi/g	-0.1	1.06	0.681613	1.06	J 0.65	1.06	J 0.95	J 0.92	J 0.89	< 0.31	J 0.61
Radium (226) (counting error)	pCi/g	0.23	4.7	0.437742	0.3	J 0.24	0.34	J 0.25	J 0.35	J 0.29	< 0.3	J 0.23
Thorium 228	pCi/g	-0.015	0,21	0.071003	< 0.064	< 0.12	< 0.09	J 0.17	< 0.06	< 0.01	< -0.015	< 0.037
Thorium 228 (counting error)	pCi/g	0.07	0.27	0.119406	< 0.092	< 0.12	< 0.13	J 0.14	< 0.1	< 0.12	< 0.079	< 0.088
Thorium 230	pCi/g	0.8	3.04	1.712581	2.66	J 1.48	2.75	J 1.28	2.61	J 1.04	2.28	J 1.18
Thorium 230 (counting error)	pCi/g	0.26	0.73	0.433226	0.54	J 0.4	0.55	J 0.36	0.52	J 0.33	0.48	J 0.33
Thorium 232	pCi/g	-0.1	0.37	0.052548	< 0.18	< -0.05	< 0.16	< 0.06	< 0.23	< 0	< -0.1	< 0.01
Thorium 232 (counting error)	pCi/g	0.28	150	5.678065	< 0.32	< 0.69	< 0.35	< 0.33	< 0.41	< 0.45	< 0.4	< 0.39
Thorium 234	pCi/g	70.7	490	210.8452	224	133	268	128	332	81	252	102
Thorium 234 (counting error)	pCi/g	7.2	40	18.77097	20	13	21	12	28	9	22	8.7
Uranium 234	pCi/g	53.8	1820	266.171	170	107	239	100	228	58.1	188	88.7
Uranium 234 (counting error)	pCi/g	5.1	160	24.87419	15	9.7	25	12	20	5.4	17	8.2
Uranium 235	pCi/g	3.58	26.7	11.01871	12.5	6.6	16	6.6	16.6	4.3	12.4	6.01
Uranium 235 (counting error)	pCi/g	0.82	2.9	1.458387	1.7	1.1	1.7	1	2.1	1	1.7	0.94
Uranium 235/236	pCi/g	2	88	12.91903	8.8	5.3	J 6.9	J 6.1	11.4	3.6	8.4	4.87
Uranium 235/236 (counting error)	pCi/g	0.58	15	2.78	1.5	1	J 2.9	J 2.5	1.9	0.74	1.5	0.98
Uranium 238	pCi/g	51.9	1930	275.3452	175	106	243	101	239	60.5	194	95.6
Uranium 238 (counting error)	pCi/g	4.9	170	25.59032	16	9.6	25	12	21	5.7	17	8.8

#### Notes:

B = Estimated result. Result is less than RL.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.



#### Table E-3 E Pond - Isotope Analytical Summary

Parameter	Units	Minimum	Maximum	Mean	E-74 Lower	E-74 Upper	E-79 Lower	E-79 Upper	E-80 Lower	E-80 Upper	E-97 Lower	E-97 Upper	E-103 Lower	E-103 Upper
Bismuth 214	pCi/g	-0.1	1.06	0.681613	0.93	< 0.39	0.99	0.86	0.83	0.58	0.71	0.48	0.7	0.8
Bismuth 214 (counting error)	pCi/g	0.23	4.7	0.437742	0.39	< 0.24	0.33	0.28	0.34	0.26	0.41	0.23	0.31	0.29
Lead 212	pCi/g	-0.08	0.27	0.061742	< 0.1	< 0.05	< 0.11	< 0.06	< -0.01	< -0.03	< 0.05	< 0.02	< 0.06	< 0.02
Lead 212 (counting error)	pCi/g	0.13	_5.3	0.365484	< 0.2	< 0.15	< 0.2	< 0.14	< 0.25	< 0.2	< 0.17	< 0.14	< 0.15	< 0.13
Lead 214	pCi/g	0.45	1.19	0.827097	0.75	0.62	1.1	1.19	0.74	0.59	1.01	0.85	0.94	0.59
Lead 214 (counting error)	pCi/g	0.21	0.37	0.275806	0.3	0.21	0.31	0.3	0.28	0.23	0.3	0.32	0.25	0.19
Potassium 40	pCi/g	4.6	9.8	6.957895	8.1	8.8	5.6	5.1	6.4	9.8	4.9	8.9	9.2	7.4
Potassium 40 (counting error)	pCi/g	1.7	2.6	2.110526	2.6	2.2	2.1	2.4	2.4	2.2	2	2.6	2.7	2.2
Protactinium 231	pCi/g	-1.4_	1.9	0.065387	< -0.1	< -0.2	< 1.2	< 0	< 1.1	< -0.2	< 1.1	< 0.2	< 0.9	< -0.2
Protactinium 231 (counting error)	pCi/g	1.6	3.8	2.390323	< 2.6	< 1.7	< 2.8	< 1.6	< 2.4	< 1.9	< 2.4	< 2.4	< 1.8	< 1.6
Protactinium 234M	pCi/g	62	556	229.129	255	96	314	78	184	103	154	62	92	64
Protactinium 234M (counting error)	pCi/g	20	64	35.74194	44	20	43	23	36	20	29	23	23	19
Radium (226)	pCi/g	-0.1	1.06	0.681613	J 0.93	< 0.39	J 0.99	J 0.86	J 0.83	J 0.58	J 0.71	J 0.48	J 0.7	J 0.8
Radium (226) (counting error)	pCi/g	0.23	4.7	0.437742	J 0.39	< 0.24	J 0.33	J 0.28	J 0.34	J 0.26	J 0.41	J 0.23	J 0.31	J 0.29
Thorium 228	pCi/g	-0.015	0.21	0.071003	< 0.08	< 0.028	< 0.07	< 0.18	< 0.0261	< 0.02	< -0.009	< 0.005	< 0.07	< 0.005
Thorium 228 (counting error)	pCi/g	0.07	0.27	0.119406	< 0.14	< 0.078	< 0.1	< 0.15	< 0.0996	< 0.15	< 0.1	< 0.084	< 0.11	< 0.092
Thorium 230	pCi/g	0.8	3.04	1.712581	J 1.95	J 0.93	3.04	J 0.87	J 1.8	2.06	J 1.52	J 0.8	J 1.07	J 0.59
Thorium 230 (counting error)	pCi/g	0.26	0.73	0.433226	J 0.45	J 0.3	0.58	J 0.29	J 0.42	0.52	J 0.39	J 0.26	J 0.33	J 0.23
Thorium 232	pCi/g	-0.1	0.37	0.052548	< 0.1	< -0.01	< 0.17	< 0	< 0.01	< 0.37	< 0.17	< -0.05	< 0	< -0.08
Thorium 232 (counting error)	pCi/g	0.28	150	5.678065	< 0.28	< 0.3	< 0.41	< 0.37	< 0.39	< 0.3	< 0.38	< 0.38	< 0.53	< 0.34
Thorium 234	pCi/g	70.7	490	210.8452	239	77.5	296	70.7	177	82.2	162	93	91	63.1
Thorium 234 (counting error)	pCi/g	7.2	40	18.77097	22	8.6	26	8.6	17	8.7	16	11	10	6
Uranium 234	pCi/g	53.8	1820	266.171	173	57.9	229	53.8	139	63.8	123	75.9	73.6	62.9
Uranium 234 (counting error)	pCi/g	5.1	160	24.87419	16	5.4	20	5.1	13	5.9	11	7	7	6
Uranium 235	pCi/g	3.58	26.7	11,01871	12.4	4.26	14.6	3.79	8.9	3.58	7	5.7	5.28	3.49
Uranium 235 (counting error)	pCi/g	0.82	2.9	1.458387	1.8	0.82	1.7	0.84	1.4	0.87	1.1	1	0.97	0.8
Uranium 235/236	pCi/g	2	88	12.91903	8.9	3.2	11.9	2.38	6.9	3.26	6	3.61	3.9	2.94
Uranium 235/236 (counting error)	pCi/g	0.58	15	2.78	1.6	0.69	2	0.58	1.3	0.7	1.1	0.77	0.9	0.73
Uranium 238	pCi/g	51.9	1930	275.3452	177	58.2	225	51.9	146	63.9	129	75.3	74.1	63
Uranium 238 (counting error)	pCi/g	4.9	170	25.59032	16	5.5	20	4.9	13	5.9	12	7	7	6

#### Notes:

B = Estimated result. Result is less than RL.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Table B-4
B Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units	Result
B-2	Arsenic	mg/L	0.141
B-5 Lower	Arsenic	mg/L	< 0.02
B-5 Upper	Arsenic	mg/L	< 0.02
B-10 Lower	Arsenic	mg/L	B 0.0115
B-10 Upper	Arsenic	mg/L	0.0816
B-18 Lower	Arsenic	mg/L	B 0.0113
B-18 Upper	Arsenic	mg/L	0.0981
B-19 Upper	Arsenic	mg/L	B 0.0039
B-30 Lower	Arsenic	mg/L	0.0209
B-30 Upper	Arsenic	mg/L	B 0.0091
B-35	Arsenic	mg/L	B 0.0093
B-2	Barium	mg/L	J 0.164
B-5 Lower	Barium	mg/L	B J 0.0591
B-5 Upper	Barium	mg/L	B J 0.0408
B-10 Lower	Barium	mg/L	J 0.103
B-10 Upper	Barium	mg/L	J 0.161
B-18 Lower	Barium	mg/L	B J 0.0561
B-18 Upper	Barium	mg/L	J 0.117
B-19 Upper	Barium	mg/L	B J 0.0538
B-30 Lower	Barium	mg/L	B J 0.0766
B-30 Upper	Barium	mg/L	B J 0.0552
B-35	Barium	mg/L	B J 0.0332
B-2	Cadmium	mg/L	< 0.01
B-5 Lower	Cadmium	mg/L	< 0.01
B-5 Upper	Cadmium	mg/L	< 0.01
B-10 Lower	Cadmium	mg/L	< 0.01
B-10 Upper	Cadmium	mg/L	< 0.01
B-18 Lower	Cadmium	mg/L	< 0.01
B-18 Upper	Cadmium	mg/L	< 0.01
B-19 Upper	Cadmium `	mg/L	< 0.01
B-30 Lower	Cadmium	mg/L	< 0.01
B-30 Upper	Cadmium	mg/L	< 0.01
B-35	Cadmium	mg/L	B 0.0015

Table B-4
B Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units	Result
B-2	Chromium	mg/L	0.0229
B-5 Lower	Chromium	mg/L	B 0.0147
B-5 Upper	Chromium	mg/L	B 0.011
B-10 Lower	Chromium	mg/L	B 0.0169
B-10 Upper	Chromium	mg/L	0.0359
B-18 Lower	Chromium	mg/L	< 0.02
B-18 Upper	Chromium	mg/L	0.0275
B-19 Upper	Chromium	mg/L	B 0.0096
B-30 Lower	Chromium	mg/L	< 0.02
B-30 Upper	Chromium	mg/L	B 0.017
B-35	Chromium	mg/L	B 0.0153
B-2	Lead	mg/L	< 0.04
B-5 Lower	Lead	mg/L	< 0.04
B-5 Upper	Lead	mg/L	< 0.04
B-10 Lower	Lead	mg/L	< 0.04
B-10 Upper	Lead	mg/L	< 0.04
B-18 Lower	Lead	mg/L	< 0.04
B-18 Upper	Lead	mg/L	B J 0.0078
B-19 Upper	Lead	mg/L	< 0.04
B-30 Lower	Lead	mg/L	< 0.04
B-30 Upper	Lead	mg/L	< 0.04
B-35	Lead	mg/L	< 0.04
B-2	Mercury	mg/L	B 0.00024
B-5 Lower	Mercury	mg/L	< 0.001
B-5 Upper	Mercury	mg/L	< 0.001
B-10 Lower	Mercury	mg/L	< 0.001
B-10 Upper	Mercury	mg/L	B 0.00034
B-18 Lower	Mercury	mg/L	< 0.001
B-18 Upper	Mercury	mg/L	< 0.001
B-19 Upper	Mercury	mg/L	< 0.001
B-30 Lower	Mercury	mg/L	< 0.001
B-30 Upper	Mercury	mg/L	< 0.001
B-35	Mercury	mg/L	< 0.001

Table B-4
B Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units	Result
B-2	Selenium	mg/L	< 0.03
B-5 Lower	Selenium	mg/L	< 0.03
B-5 Upper	Selenium	mg/L	< 0.03
B-10 Lower	Selenium	mg/L	< 0.03
B-10 Upper	Selenium	mg/L	< 0.03
B-18 Lower	Selenium	mg/L	< 0.03
B-18 Upper	Selenium	mg/L	< 0.03
B-19 Upper	Selenium	mg/L	< 0.03
B-30 Lower	Selenium	mg/L	< 0.03
B-30 Upper	Selenium	mg/L	< 0.03
B-35	Selenium	mg/L	< 0.03
B-2	Silver	mg/L	< 0.02
B-5 Lower	Silver	mg/L	< 0.02
B-5 Upper	Silver	mg/L	< 0.02
B-10 Lower	Silver	mg/L	< 0.02
B-10 Upper	Silver	mg/L	< 0.02
B-18 Lower	Silver	mg/L	< 0.02
B-18 Upper	Silver	mg/L	< 0.02
B-19 Upper	Silver	mg/L	< 0.02
B-30 Lower	Silver	mg/L	< 0.02
B-30 Upper	Silver	.mg/L	< 0.02
B-35	Silver	mg/L	< 0.02

#### Notes:

B = Estimated result. Result is less than RL.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Table C-4
C Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units	Result
C-2	Arsenic	mg/L	< 0.02
C-5	Arsenic	mg/L	< 0.02
C-9	Arsenic	mg/L	< 0.02
C-10 Lower		mg/L	B 0.0133
C-10 Upper		mg/L	B 0.0127
C-17	Arsenic	mg/L	< 0.02
C-19 Lower		mg/L	0.0231
C-19 Upper		mg/L	< 0.02
C-21	Arsenic	mg/L	< 0.02
C-24	Arsenic	mg/L	< 0.02
C-26 Lower		mg/L	B 0.005
C-26 Upper		mg/L	< 0.02
C-30 Lower		mg/L	B 0.012
C-30 Lower		mg/L	< 0.02
C-30 Opper	Arsenic	mg/L	< 0.02
C-34	Arsenic	mg/L	B 0.0082
C-35	Barium	mg/L	B J 0.0288
C-2 C-5	Barium	mg/L mg/L	B J 0.0266
C-9	Barium		
C-10 Lower		mg/L mg/L	B J 0.0337
C-10 Lower		mg/L	B J 0.0537
C-10 Opper	Barium		B J 0.0537
C-19 Lower		mg/L	
	Barium	mg/L	
C-19 Opper C-21	Barium	mg/L	
C-24	Barium	mg/L	
C-26 Lower		mg/L mg/L	B J 0.0336
C-26 Upper		mg/L	B J 0.0623
C-20 Opper	Barium	mg/L	B J 0.0635
C-30 Upper		mg/L	B J 0.0461
С-30 Оррег	Barium	mg/L	B J 0.0344
C-35	Barium	mg/L	B J 0.0664
C-35	Cadmium	mg/L	< 0.01
C-2 C-5	Cadmium		< 0.01
C-9	Cadmium	mg/L	< 0.01
C-10 Lower		mg/L	< 0.01
		mg/L	
C-10 Upper C-17	Cadmium	mg/L	
	<del></del>	mg/L	
C-19 Lower		mg/L	< 0.01
C-19 Upper		mg/L	< 0.01
C-21	Cadmium	mg/L	< 0.01
C-24	Cadmium	mg/L	< 0.01
C-26 Lower	Cadmium	mg/L	< 0.01
C-26 Upper		mg/L	< 0.01
C-30 Lower	Cadmium	mg/L	< 0.01
C-30 Upper	Cadmium	mg/L	< 0.01
C-34	Cadmium	mg/L	< 0.01
C-35	Cadmium	mg/L	< 0.01

Table C-4
C Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units		Result
C-2	Chromium	mg/L		0.0244
C-5	Chromium	mg/L	В	0.0138
C-9	Chromium	mg/L	В	0.0128
C-10 Lower	Chromium	mg/L	В	0.0066
C-10 Upper		mg/L	В	0.0106
C-17	Chromium	mg/L	В	0.0117
C-19 Lower		mg/L	В	0.0105
	Chromium	mg/L	В	0.0172
C-21	Chromium	mg/L		0.0216
C-24	Chromium	mg/L	В	0.0177
C-26 Lower		mg/L	В	0.0091
C-26 Upper		mg/L	В	0.0088
C-30 Lower		mg/L	В	0.0076
C-30 Upper		mg/L	В	0.0127
C-34	Chromium	mg/L		0.0202
C-35	Chromium	mg/L		0.0311
C-2	Lead	mg/L		0.04
C-5	Lead	mg/L	<	0.04
C-9	Lead	mg/L	<	0.04
C-10 Lower		mg/L	~	0.04
C-10 Upper		mg/L	~	0.04
C-17	Lead	mg/L	В	0.0183
C-19 Lower		mg/L	-	0.04
C-19 Upper		mg/L	-	0.04
C-21	Lead	mg/L	<	0.04
C-24	Lead	mg/L	~	0.04
C-26 Lower		mg/L	-<	0.04
C-26 Upper		mg/L	-	0.04
C-30 Lower		mg/L	_	0.04
	Lead	mg/L	<	0.04
C-34	Lead	mg/L	~	0.04
C-35	Lead	mg/L	~	0.04
C-2	Mercury	mg/L	<	0.001
C-5	Mercury	mg/L	<	0.001
C-9	Mercury	mg/L	~	0.001
C-10 Lower		mg/L	<	0.001
C-10 Upper		mg/L		0.001
C-17	Mercury	mg/L		0.00028
	Mercury	mg/L		0.00020
C-19 Upper		mg/L	В	0.001
C-19 Opper	Mercury		\ \ \	0.00049
C-24	Mercury	mg/L mg/L	-	0.001
C-26 Lower		mg/L	-	0.001
C-26 Upper			<u>B</u>	
C-26 Opper	Mercury	mg/L	ВJ	0.0005
C-30 Lower		mg/L		
C-30 Opper	Mercury	mg/L	< D 1	0.001
C-34 C-35	Mercury	mg/L	BJ	0.00066
<u> </u>	Mercury	mg/L	<	0.001

Table C-4
C Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units	Result	
C-2	Selenium	mg/L	< 0.03	
C-5	Selenium	mg/L	< 0.03	$\neg$
C-9	Selenium	mg/L	< 0.03	$\neg$
C-10 Lower	Selenium	mg/L	< 0.03	$\neg$
C-10 Upper	Selenium	mg/L	< 0.03	$\neg$
C-17	Selenium	mg/L	< 0.03	
C-19 Lower	Selenium	mg/L	< 0.03	
C-19 Upper	Selenium	mg/L	< 0.03	
C-21	Selenium	mg/L	< 0.03	
C-24	Selenium	mg/L	< 0.03	
C-26 Lower	Selenium	mg/L	< 0.03	
C-26 Upper	Selenium	mg/L	< 0.03	
C-30 Lower	Selenium	mg/L	< 0.03	
C-30 Upper	Selenium	mg/L	< 0.03	
C-34	Selenium	mg/L	< 0.03	
C-35	Selenium	mg/L	< 0.03	
C-2	Silver	mg/L	< 0.02	
C-5	Silver	mg/L	< 0.02	
C-9	Silver	mg/L	< 0.02	
C-10 Lower	Silver	mg/L	< 0.02	
C-10 Upper	Silver	mg/L	< 0.02	
C-17	Silver	mg/L	< 0.02	
C-19 Lower		mg/L	< 0.02	
C-19 Upper	Silver	mg/L	< 0.02	
C-21	Silver	mg/L	< 0.02	
C-24	Silver	mg/L	< 0.02	
C-26 Lower		mg/L	< 0.02	
C-26 Upper		mg/L	< 0.02	
C-30 Lower	Silver	mg/L	< 0.02	
C-30 Upper	Silver	mg/L	< 0.02	
C-34	Silver	mg/L	< 0.02	
C-35	Silver	mg/L	< 0.02	

#### Notes:

B = Estimated result. Result is less than RL.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Sample ID	Parameter	Units	Result	
D-8 Lower	Arsenic	mg/L	0.0211	
D-8 Upper	Arsenic	mg/L	B 0.0161	$\neg$
D-10 Lower	Arsenic	mg/L	0.0338	
D-10 Upper	Arsenic	mg/L	0.0246	$\neg$
D-11 Lower	Arsenic	mg/L	0.0464	
D-11 Upper	Arsenic	mg/L	0.138	
D-17 Lower	Arsenic	mg/L	0.0392	
D-17 Upper	Arsenic	mg/L	B 0.019	
D-19 Lower	Arsenic	mg/L	0.0789	
D-19 Upper	Arsenic	mg/L	0.0716	
D-26 Lower	Arsenic	mg/L	0.0402	
D-26 Upper	Arsenic	mg/L	0.269	
D-29 Lower	Arsenic	mg/L	0.0351	П
D-29 Upper	Arsenic	mg/L	0.0648	٦
D-8 Lower	Barium	mg/L	B J 0.0521	
D-8 Upper	Barium	mg/L	B J 0.0559	
D-10 Lower	Barium	mg/L	B J 0.0476	
D-10 Upper	Barium	mg/L	B J 0.0398	
D-11 Lower	Barium	mg/L	B J 0.0356	
D-11 Upper	Barium	mg/L	BJ 0.0879	٠.
D-17 Lower		mg/L	B J 0.0495	
D-17 Upper	Barium	mg/L	B J 0.0552	
D-19 Lower		mg/L	B J 0.0485	
D-19 Upper		mg/L	B J 0.0368	
D-26 Lower		mg/L	B J 0.0617	
D-26 Upper	Barium	mg/L	BJ 0.0879	
D-29 Lower		mg/L	B J 0.0597	
D-29 Upper		mg/L	J 0.153	
D-8 Lower	Cadmium	mg/L	< 0.01	
D-8 Upper	Cadmium	mg/L	< 0.01	
D-10 Lower	Cadmium	mg/L	< 0.01	
D-10 Upper		mg/L	< 0.01	
D-11 Lower	Cadmium	mg/L	< 0.01	
D-11 Upper	Cadmium	mg/L	< 0.01	•
D-17 Lower		mg/L	< 0.01	
D-17 Upper		mg/L	< 0.01	
D-19 Lower	Cadmium	mg/L	B 0.001	
D-19 Upper	Cadmium	mg/L	B 0.001	
D-26 Lower		mg/L	< 0.01	
D-26 Upper		mg/L	B 0.0012	
D-29 Lower		mg/L	< 0.01	
D-29 Upper	Cadmium	mg/L	B 0.00092	

Sample ID	Parameter	Units		Result
D-8 Lower	Chromium	mg/L	В	0.0074
D-8 Upper	Chromium	mg/L	В	0.0092
D-10 Lower	Chromium	mg/L	<b>~</b>	0.02
D-10 Upper	Chromium	mg/L	<	0.02
D-11 Lower	Chromium	mg/L	<	0.02
D-11 Upper	Chromium	mg/L	В	0.0064
D-17 Lower	Chromium	mg/L	<	0.02
D-17 Upper	Chromium	mg/L	В	0.0094
D-19 Lower	Chromium	mg/L		0.279
D-19 Upper	Chromium	mg/L		0.724
D-26 Lower	Chromium	mg/L	В	0.0082
D-26 Upper	Chromium	mg/L	В	0.0107
D-29 Lower	Chromium	mg/L	<	0.02
D-29 Upper		mg/L	В	0.0064
D-8 Lower	Lead	mg/L	_ <	0.04
D-8 Upper	Lead	mg/L	<	0.04
D-10 Lower	Lead	mg/L	<b>~</b>	0.04
D-10 Upper	Lead	mg/L	<	0.04
D-11 Lower	Lead	mg/L	<	0.04
D-11 Upper	Lead	mg/L	<	0.04
D-17 Lower	Lead	mg/L	<	0.04
D-17 Upper	Lead	mg/L	<b>~</b>	0.04
D-19 Lower	Lead	mg/L	<b>'</b>	0.04
D-19 Upper	Lead	mg/L	<	0.04
D-26 Lower	Lead	mg/L	<	0.04
D-26 Upper	Lead	mg/L	<	0.04
D-29 Lower	Lead	mg/L	<	0.04
D-29 Upper	Lead	mg/L	٧	0.04
D-8 Lower	Mercury	mg/L	٧.	0.001
D-8 Upper	Mercury	mg/L	٧	0.001
D-10 Lower	Mercury	mg/L	٧	0.001
D-10 Upper	Mercury	mg/L	٧	0.001
D-11 Lower	Mercury	mg/L	٧	0.001
D-11 Upper	Mercury	mg/L	٧	0.001
D-17 Lower		mg/L	٧	0.001
D-17 Upper		mg/L	<	0.001
D-19 Lower	Mercury	mg/L	<	0.001
D-19 Upper	Mercury	mg/L	<	0.001
D-26 Lower		mg/L	В	0.00025
D-26 Upper	Mercury	mg/L	٧	0.001
D-29 Lower		mg/L	٧	0.001
D-29 Upper	Mercury	mg/L	<	0.001

#### Table D-4 D Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units	Result
D-8 Lower	Selenium	mg/L	< 0.03
D-8 Upper	Selenium	mg/L	< 0.03
D-10 Lower	Selenium	mg/L	< 0.03
D-10 Upper	Selenium	mg/L	< 0.03
D-11 Lower	Selenium	mg/L	< 0.03
D-11 Upper	Selenium	mg/L	< 0.03
D-17 Lower		mg/L	< 0.03
D-17 Upper	Selenium	mg/L	< 0.03
D-19 Lower		mg/L	< 0.03
D-19 Upper	Selenium	mg/L	< 0.03
D-26 Lower	Selenium	mg/L	< 0.03
D-26 Upper	Selenium	mg/L	< 0.03
D-29 Lower		mg/L	< 0.03
D-29 Upper	Selenium	mg/L	< 0.03
D-8 Lower	Silver	mg/L	< 0.02
D-8 Upper	Silver	mg/L	< 0.02
D-10 Lower	Silver	mg/L	< 0.02
D-10 Upper	Silver	mg/L	< 0.02
D-11 Lower	Silver	mg/L	< 0.02
D-11 Upper	Silver	mg/L	< 0.02
D-17 Lower		mg/L	< 0.02
D-17 Upper	Silver	mg/L	< 0.02
D-19 Lower		mg/L	< 0.02
D-19 Upper		mg/L	< 0.02
D-26 Lower		mg/L	< 0.02
D-26 Upper	Silver	mg/L	< 0.02
D-29 Lower		mg/L	< 0.02
D-29 Upper	Silver	mg/L	< 0.02

#### Notes:

B = Estimated result. Result is less than RL.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Sample ID	Parameter	Units	Result
E-2	Arsenic	mg/L	B 0.0045
E-10 Lower	Arsenic	mg/L	0.0586
E-10 Upper	Arsenic	mg/L	0.153
E-12 Lower	Arsenic	mg/L	0.0556
E-12 Upper	Arsenic	mg/L	0.033
E-16 Lower	Arsenic	mg/L	0.0592
E-16 Upper	Arsenic	mg/L	0.0752
E-23 Lower	Arsenic	mg/L	0.0565
E-23 Upper	Arsenic	mg/L	0.132
E-27 Lower	Arsenic	mg/L	0.0349
E-27 Upper	Arsenic	mg/L	0.185
E-38 Lower	Arsenic	mg/L	0.0667
E-38 Upper	Arsenic	mg/L	0.481
E-41 Lower	Arsenic	mg/L	0.0392
E-41 Upper	Arsenic	mg/L	0.222
E-44 Lower	Arsenic	mg/L	0.0978
E-44 Upper	Arsenic	mg/L	0.389
E-51 Lower	Arsenic	mg/L	0.146
E-51 Upper	Arsenic	mg/L	0.413
E-65 Lower	Arsenic	mg/L	0.128
E-65 Upper	Arsenic	-mg/L	0.427
E-67 Lower	Arsenic	mg/L	0.104
E-67 Upper	Arsenic	mg/L	0.3
E-74 Lower	Arsenic	mg/L	0.0881
E-74 Upper	Arsenic	mg/L	0.555
E-79 Lower	Arsenic	mg/L	0.138
E-79 Upper	Arsenic	mg/L	0.315
E-80 Lower	Arsenic	mg/L	0.126
E-80 Upper	Arsenic	mg/L	0.219
E-97 Lower	Arsenic	mg/L	0.0875
E-97 Upper	Arsenic	mg/L	0.118
E103 Lower		mg/L	0.209
E-103 Upper	Arsenic	mg/L	0.187

Sample ID	Parameter	Units	Result
E-2	Barium	mg/L	B J 0.0545
E-10 Lower	Barium	mg/L	B J 0.0656
E-10 Upper	Barium	mg/L	B J 0.0489
E-12 Lower	Barium	mg/L	B J 0.0647
E-12 Upper	Barium	mg/L	B J 0.0501
E-16 Lower	Barium	mg/L	B J 0.0791
E-16 Upper	Barium	mg/L	B J 0.0686
E-23 Lower	Barium	mg/L	B J 0.0489
E-23 Upper	Barium	mg/L	B J 0.0846
E-27 Lower	Barium	mg/L	B J 0.0522
E-27 Upper	Barium	mg/L	B J 0.0572
E-38 Lower	Barium	mg/L	B J 0.0518
E-38 Upper	Barium	mg/L	B J 0.0557
E-41 Lower	Barium	mg/L	B J 0.0454
E-41 Upper	Barium	mg/L	B J 0.0726
E-44 Lower	Barium	mg/L	B J 0.0477
E-44 Upper	Barium	mg/L	B J 0.0396
E-51 Lower	Barium	mg/L	B J 0.0577
E-51 Upper	Barium	mg/L	B J 0.0651
E-65 Lower	Barium	mg/L	B J 0.0543
E-65 Upper	Barium	mg/L	B J 0.06
E-67 Lower	Barium	mg/L	B J 0.0504
E-67 Upper		mg/L	B J 0.0628
E-74 Lower		mg/L	B J 0.0263
E-74 Upper		mg/L	B J 0.034
E-79 Lower		mg/L	B J 0.0673
E-79 Upper		mg/L	B J 0.0592
E-80 Lower		mg/L	B J 0.0518
E-80 Upper		mg/L	B J 0.0538
E-97 Lower		mg/L	B J 0.0541
E-97 Upper		mg/L	B J 0.0573
E103 Lower		mg/L	B J 0.0425
E-103 Upper	Barium	mg/L	B J 0.074

Sample ID	Parameter	Units		Result
E-2	Cadmium	mg/L	٧	0.01
E-10 Lower	Cadmium	mg/L	٧	0.01
E-10 Upper	Cadmium	mg/L	٧	0.01
E-12 Lower	Cadmium	mg/L	٧	0.01
E-12 Upper	Cadmium	mg/L	<b>'</b>	0.01
E-16 Lower		mg/L	٧	0.01
E-16 Upper	Cadmium	mg/L	<	0.01
E-23 Lower	Cadmium	mg/L	<	0.01
E-23 Upper	Cadmium	mg/L	<	0.01
E-27 Lower	Cadmium	mg/L	<	0.01
E-27 Upper	Cadmium	mg/L	<	0.01
E-38 Lower	Cadmium	mg/L	<	0.01
E-38 Upper	Cadmium	mg/L	<	0.01
E-41 Lower	Cadmium	mg/L	<	0.01
E-41 Upper	Cadmium	mg/L	В	0.0024
E-44 Lower	Cadmium	mg/L	٧	0.01
E-44 Upper	Cadmium	mg/L	٧	0.01
E-51 Lower	Cadmium	mg/L	٧	0.01
E-51 Upper	Cadmium	mg/L	٧	0.01
E-65 Lower	Cadmium	mg/L	٧	0.01
E-65 Upper	Cadmium	mg/L	٧	0.01
E-67 Lower	Cadmium	mg/L	<	0.01
E-67 Upper	Cadmium	mg/L	В	0.0018
E-74 Lower	Cadmium	mg/L	<	0.01
E-74 Upper	Cadmium	mg/L	В	0.0013
E-79 Lower	Cadmium	mg/L	<_	0.01
E-79 Upper		mg/L	<	0.01
E-80 Lower	Cadmium	mg/L	<	0.01
E-80 Upper		mg/L	<	0.01
E-97 Lower	Cadmium	mg/L	<	0.01
E-97 Upper		mg/L	В	0.0012
E103 Lower		mg/L	<	0.01
E-103 Upper	Cadmium	mg/L	В	0.0024

Sample ID	Parameter	Units	[	Result
E-2	Chromium	mg/L	В	0.0111
E-10 Lower	Chromium	mg/L	В	0.0064
E-10 Upper	Chromium	mg/L	В	0.0168
E-12 Lower	Chromium	mg/L	В	0.0071
E-12 Upper	Chromium	mg/L	В	0.0101
E-16 Lower	Chromium	mg/L	<	0.02
E-16 Upper	Chromium	mg/L	В	0.0105
E-23 Lower	Chromium	mg/L	В	0.0077
E-23 Upper	Chromium	mg/L	В	0.0085
E-27 Lower	Chromium	mg/L	<	0.02
E-27 Upper	Chromium	mg/L	<	0.02
E-38 Lower	Chromium	mg/L	В	0.0155
E-38 Upper	Chromium	mg/L	<	0.02
E-41 Lower	Chromium	mg/L	В	0.009
E-41 Upper	Chromium	mg/L	В	0.0186
E-44 Lower	Chromium	mg/L	<	0.02
E-44 Upper	Chromium	mg/L	<	0.02
E-51 Lower	Chromium	mg/L	<	0.02
E-51 Upper	Chromium	mg/L	<	0.02
E-65 Lower		mg/L	<	0.02
E-65 Upper		mg/L	<	0.02
E-67 Lower	Chromium	mg/L	<	0.02
E-67 Upper	Chromium	mg/L	<	0.02
E-74 Lower	Chromium	mg/L	<	0.02
E-74 Upper	Chromium	mg/L	<u> </u>	0.0303
E-79 Lower	Chromium	mg/L	В	0.0104
E-79 Upper	Chromium	mg/L	В	0.009
E-80 Lower	Chromium	mg/L	В	0.0109
E-80 Upper	Chromium	mg/L	В	0.0104
E-97 Lower	Chromium	mg/L	В	0.0167
E-97 Upper	+	mg/L	В	0.0081
E103 Lower		mg/L	В	0.0092
E-103 Upper	Chromium	mg/L	В	0.0185

Sample ID	Parameter	Units		Result
E-2	Lead	mg/L	<	0.04
E-10 Lower	Lead	mg/L	<	0.04
E-10 Upper	Lead	mg/L	٧	0.04
E-12 Lower	Lead	mg/L	<	0.04
E-12 Upper	Lead	mg/L	٧	0.04
E-16 Lower	Lead	mg/L	٧	0.04
E-16 Upper	Lead	mg/L	٧	0.04
E-23 Lower	Lead	mg/L	٧	0.04
E-23 Upper	Lead	mg/L	٧	0.04
E-27 Lower	Lead	mg/L	٧	0.04
E-27 Upper	Lead	mg/L	٧	0.04
E-38 Lower	Lead	mg/L	<	0.04
E-38 Upper	Lead	mg/L	٧.	0.04
E-41 Lower	Lead	mg/L	<b>'</b>	0.04
E-41 Upper	Lead	mg/L	В	0.0065
E-44 Lower	Lead	mg/L	<_	0.04
E-44 Upper		mg/L	<	0.04
E-51 Lower	Lead	mg/L	<	0.04
E-51 Upper	Lead	mg/L	<	0.04
E-65 Lower	Lead	mg/L	<	0.04
E-65 Upper	Lead	mg/L	<	0.04
E-67 Lower	Lead	mg/L	<	0.04
E-67 Upper	Lead	mg/L	<	0.04
E-74 Lower	Lead	mg/L	<	0.04
E-74 Upper	Lead	mg/L	<	0.04
E-79 Lower	Lead	mg/L	<	0.04
E-79 Upper	Lead	mg/L	<	0.04
E-80 Lower	Lead	mg/L	<	0.04
E-80 Upper	Lead	mg/L	<_	0.04
E-97 Lower	Lead	mg/L	<	0.04
E-97 Upper		mg/L	<_	0.04
E103 Lower		mg/L	<_	0.04
E-103 Upper	Lead	mg/L	<	0.04

Table E-4
E Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units		Result
E-2	Mercury	mg/L	٧	0.001
E-10 Lower	Mercury	mg/L	ΒJ	0.00022
E-10 Upper	Mercury	mg/L	٧	0.001
E-12 Lower	Mercury	mg/L	٧	0.001
E-12 Upper	Mercury	mg/L	ВJ	0.00025
E-16 Lower	Mercury	mg/L	٧	0.001
E-16 Upper	Mercury	mg/L	ВJ	0.00027
E-23 Lower	Mercury	mg/L	ВJ	0.00029
E-23 Upper	Mercury	mg/L	ВJ	0.00025
E-27 Lower	Mercury	mg/L	<b>~</b>	0.001
E-27 Upper	Mercury	mg/L	<	0.001
E-38 Lower	Mercury	mg/L	<	0.001
E-38 Upper	Mercury	mg/L	В	0.00025
E-41 Lower	Mercury	mg/L	<	0.001
E-41 Upper	Mercury	mg/L		0.0014
E-44 Lower	Mercury	mg/L	<	0.001
E-44 Upper	Mercury	mg/L	В	0.00023
E-51 Lower	Mercury	mg/L	<	0.001
E-51 Upper	Mercury	mg/L		0.0014
E-65 Lower	Mercury	mg/L	В	0.00024
E-65 Upper	Mercury	mg/L	<	0.001
E-67 Lower	Mercury	mg/L	<	0.001
E-67 Upper	Mercury	mg/L	В	0.00044
E-74 Lower	Mercury	mg/L	<	0.001
E-74 Upper	Mercury	mg/L	В	0.00058
E-79 Lower	Mercury	mg/L	ВJ	8000.0
E-79 Upper	Mercury	mg/L	<	0.001
E-80 Lower	Mercury	mg/L	J	0.0011
E-80 Upper	Mercury	mg/L	<	0.001
E-97 Lower	Mercury	mg/L	ВJ	0.00081
E-97 Upper	Mercury	mg/L	ΒJ	0.0008
E103 Lower	Mercury	mg/L	<	0.001
E-103 Upper	Mercury	mg/L	<	0.001

Sample ID	Parameter	Units		Result
E-2	Selenium	mg/L	<	0.03
E-10 Lower	Selenium	mg/L	٧	0.03
E-10 Upper	Selenium	mg/L	٧	0.03
E-12 Lower	Selenium	mg/L	<	0.03
E-12 Upper	Selenium	mg/L	٧	0.03
E-16 Lower	Selenium	mg/L	<	0.03
E-16 Upper	Selenium	mg/L	<	0.03
E-23 Lower	Selenium	mg/L	<	0.03
E-23 Upper	Selenium	mg/L	<	0.03
E-27 Lower	Selenium	mg/L	<	0.03
E-27 Upper	Selenium	mg/L	<	0.03
E-38 Lower	Selenium	mg/L	<	0.03
E-38 Upper	Selenium	mg/L	<	0.03
E-41 Lower	Selenium	mg/L	<	0.03
E-41 Upper	Selenium	mg/L	<b>/</b>	0.03
E-44 Lower	Selenium	mg/L	<	0.03
E-44 Upper	Selenium	mg/L	<	0.03
E-51 Lower	Selenium	mg/L	<	0.03
E-51 Upper	Selenium	mg/L	В	0.0277
E-65 Lower	Selenium	mg/L	<	0.03
E-65 Upper	Selenium	mg/L	<	0.03
E-67 Lower	Selenium	mg/L	<	0.03
E-67 Upper	Selenium	mg/L	<	0.03
E-74 Lower	Selenium	mg/L	<	0.03
E-74 Upper	Selenium	mg/L	<	0.03
E-79 Lower	Selenium	mg/L	<	0.03
E-79 Upper	Selenium	mg/L	<	0.03
E-80 Lower		mg/L	<	0.03
E-80 Upper	Selenium	mg/L	<_	0.03
E-97 Lower	Selenium	mg/L	<	0.03
E-97 Upper		mg/L	<	0.03
E103 Lower		mg/L	<	0.03
E-103 Upper	Selenium	mg/L	<	0.03

Table E-4
E Pond - RCRA TCLP Metals Analytical Summary

Sample ID	Parameter	Units		Result
E-2	Silver	mg/L	<	0.02
E-10 Lower	Silver	mg/L	<	0.02
E-10 Upper	Silver	mg/L	<	0.02
E-12 Lower	Silver	mg/L	<	0.02
E-12 Upper	Silver	mg/L	<	0.02
E-16 Lower	Silver	mg/L	<	0.02
E-16 Upper	Silver	mg/L	<	0.02
E-23 Lower	Silver	mg/L	<	0.02
E-23 Upper	Silver	mg/L	<b>'</b>	0.02
E-27 Lower	Silver	mg/L	<	0.02
E-27 Upper	Silver	mg/L	<	0.02
E-38 Lower	Silver	mg/L	<	0.02
E-38 Upper	Silver	mg/L	<	0.02
E-41 Lower	Silver	mg/L	<	0.02
E-41 Upper	Silver	mg/L	В	0.0123
E-44 Lower	Silver	mg/L	<	0.02
E-44 Upper	Silver	mg/L	<	0.02
E-51 Lower	Silver	mg/L	<	0.02
E-51 Upper	Silver	mg/L	<	0.02
E-65 Lower	Silver	mg/L	<	0.02
E-65 Upper		mg/L	<	0.02
E-67 Lower	Silver	mg/L	<	0.02
E-67 Upper	Silver	mg/L	<	0.02
E-74 Lower	Silver	mg/L	<	0.02
E-74 Upper	Silver	mg/L	<	0.02
E-79 Lower	Silver	mg/L	<	0.02
E-79 Upper	Silver	mg/L	<	0.02
E-80 Lower	Silver	mg/L	<	0.02
E-80 Upper		mg/L	<	0.02
E-97 Lower	Silver	mg/L	<	0.02
E-97 Upper		mg/L	<	0.02
E103 Lower		mg/L	<	0.02
E-103 Upper	Silver	mg/L	<	0.02

#### Notes:

B = Estimated result. Result is less than RL.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Table B-5
B Pond - Paint Filter Test & pH Analytical Summary

Sample ID	Parameter	Units	Result	рН
B-2	Paint Filter Test	No Units	CNF	11.7
B-5 Lower	Paint Filter Test	No Units	CNF	12.4
B-5 Upper	Paint Filter Test	No Units	CNF	12.1
B-10 Lower	Paint Filter Test	No Units	CNF	12.5
B-10 Upper	Paint Filter Test	No Units	CNF	12.4
B-18 Lower	Paint Filter Test	No Units	CNF	12.2
B-18 Upper	Paint Filter Test	No Units	CNF	11.8
B-19 Lower	Paint Filter Test	No Units	CNF	12.9
B-19 Upper	Paint Filter Test	No Units	CNF	12.3
B-26 Lower	Paint Filter Test	No Units	CNF	12.8
B-26 Upper	Paint Filter Test	No Units	CNF	12.6
B-30 Lower	Paint Filter Test	No Units	CNF	12.7
B-30 Upper	Paint Filter Test	No Units	CNF	12.6
B-35	Paint Filter Test	No Units	CNF	12.2

Note:

CNF = Contains No Free Liquids

Table C-5
C Pond - Paint Filter Test & pH Analytical Summary

Sample ID	Parameter	Units	Result	рН
C-2	Paint Filter Test	No Units	CNF	12.4
C-5	Paint Filter Test	No Units	CNF	12.5
C-9	Paint Filter Test	No Units	CNF	12.6
C-10 Lower	Paint Filter Test	No Units	CNF	12.8
C-10 Upper	Paint Filter Test	No Units	CNF	12.5
C-17	Paint Filter Test	No Units	CNF	12.6
C-19 Lower	Paint Filter Test	No Units	CNF	12.8
C-19 Upper	Paint Filter Test	No Units	CNF	12.7
C-21	Paint Filter Test	No Units	CNF	12.5
C-24	Paint Filter Test	No Units	CNF	12.6
C-26 Lower	Paint Filter Test	No Units	CNF	12.7
C-26 Upper	Paint Filter Test	No Units	CNF	12.6
C-30 Lower	Paint Filter Test	No Units	CNF	12.6
C-30 Upper	Paint Filter Test	No Units	CNF	12.6
C-34	Paint Filter Test	No Units	CNF	12.6
C-35	Paint Filter Test	No Units	CNF	12.5

Note:

CNF = Contains No Free Liquids

Table D-5
D Pond - Paint Filter Test & pH Analytical Summary

Sample ID	Parameter	Units	Result	рН
D-8 Lower	Paint Filter Test	No Units	CNF	12.6
D-8 Upper	Paint Filter Test	No Units	CNF	12.2
D-10 Lower	Paint Filter Test	No Units	CNF	12.5
D-10 Upper	Paint Filter Test	No Units	CNF	12.4
D-11 Lower	Paint Filter Test	No Units	CNF	12.6
D-11 Upper	Paint Filter Test	No Units	CNF	12.5
D-17 Lower	Paint Filter Test	No Units	CNF	12.5
D-17 Upper	Paint Filter Test	No Units	CNF	12.5
D-19 Lower	Paint Filter Test	No Units	CNF	11.2
D-19 Upper	Paint Filter Test	No Units	CNF	10.6
D-26 Lower	Paint Filter Test	No Units	CNF	12.6
D-26 Upper	Paint Filter Test	No Units	CNF	12
D-29 Lower	Paint Filter Test	No Units	CNF	12.5
D-29 Upper	Paint Filter Test	No Units	CNF	12

Note:

CNF = Contains No Free Liquids

Table E-5
E Pond - Paint Filter Test & pH Analytical Summary

Sample ID	Parameter	Units	Result	рН
E-2	Paint Filter Test	No Units	CNF	12
E-10 Lower	Paint Filter Test	No Units	CNF	12.4
E-10 Upper	Paint Filter Test	No Units	CNF	12.7
E-12 Lower	Paint Filter Test	No Units	CNF	12.2
E-12 Upper	Paint Filter Test	No Units	CNF	12.1
E-16 Lower	Paint Filter Test	No Units	CNF	12.8
E-16 Upper	Paint Filter Test	No Units	CNF	12.6
E-23 Lower	Paint Filter Test	No Units	CNF	12.7
E-23 Upper	Paint Filter Test	No Units	CNF	12.6
E-27 Lower	Paint Filter Test	No Units	CNF	12.5
E-27 Upper	Paint Filter Test	No Units	CNF	12.4
E-38 Lower	Paint Filter Test	No Units	CNF	12.6
E-38 Upper	Paint Filter Test	No Units	CNF	12.2
E-41 Lower	Paint Filter Test	No Units	CNF	12.2
E-41 Upper	Paint Filter Test	No Units	CNF	12.3
E-44 Lower	Paint Filter Test	No Units	CNF	12.2
E-44 Upper	Paint Filter Test	No Units	CNF	12.3
E-51 Lower	Paint Filter Test	No Units	CNF	12.2
E-51 Upper	Paint Filter Test	No Units	CNF	12.2
E-65 Lower	Paint Filter Test	No Units	CNF	12.5
E-65 Upper	Paint Filter Test	No Units	CNF	12.4
E-67 Lower	Paint Filter Test	No Units	CNF	12.6
E-67 Upper	Paint Filter Test	No Units	CNF	12.4
E-74 Lower	Paint Filter Test	No Units	CNF	12:6
E-74 Upper	Paint Filter Test	No Units	CNF	12.5
E-79 Lower	Paint Filter Test	No Units	· CNF	12.4
E-79 Upper	Paint Filter Test	No Units	CNF	12.5
E-80 Lower	Paint Filter Test	No Units	CNF	12.4
E-80 Upper	Paint Filter Test	No Units	CNF	12.2
E-97 Lower	Paint Filter Test	No Units	NT	12.4
E-97 Upper	Paint Filter Test	No Units	NT	12.4
E-103 Lower	Paint Filter Test	No Units	CNF	12.4
E-103 Upper	Paint Filter Test	No Units	CNF	12.2

Note:

CNF = Contains No Free Liquids

NT = Not Tested

Table B-6
B Pond - Total Organic Carbon Analytical Summary

Sample ID	Parameter	Units	Result
B-18 Lower	Total Organic Carbon	g/kg	B 1.7
B-18 Upper	Total Organic Carbon	g/kg	B 1.2
B-19 Upper	Total Organic Carbon	g/kg	B 1.2
B-26 Lower	Total Organic Carbon	g/kg	B 0.98

Note:

B = Estimated result. Result is less than RL.

Table C-6
C Pond - Total Organic Carbon Analytical Summary

Sample ID	Parameter	Units	Result
C-2	Total Organic Carbon	g/kg	3.1
C-5	Total Organic Carbon	g/kg	2.9
C-19 Lower	Total Organic Carbon	g/kg	B 1.8
C-19 Upper	Total Organic Carbon	g/kg	10.7

#### Note:

B = Estimated result. Result is less than RL.

## Table D-6 D Pond - Total Organic Carbon Analytical Summary

Sample ID	Parameter	Units	Result
D-10 Lower	Total Organic Carbon	g/kg	3.3
D-10 Upper	Total Organic Carbon	g/kg	3.6
D-17 Lower	Total Organic Carbon	g/kg	5.6
D-17 Upper	Total Organic Carbon	g/kg	4.5
D-19 Lower	Total Organic Carbon	g/kg	3
D-19 Upper	Total Organic Carbon	g/kg	4
D-26 Lower	Total Organic Carbon	g/kg	11
D-26 Upper	Total Organic Carbon	g/kg	3.1

Table E-6
E Pond - Total Organic Carbon Analytical Summary

Sample ID	Parameter	Units	Result
E-65 Lower	Total Organic Carbon	g/kg	2.7
E-65 Upper	Total Organic Carbon	g/kg	B 0.77
E-80 Lower	Total Organic Carbon	g/kg	2.9
E-80 Upper	Total Organic Carbon	g/kg	B 1.3
E-97 Lower	Total Organic Carbon	g/kg	B 1
E-97 Upper	Total Organic Carbon	g/kg	2
E-103 Lower	Total Organic Carbon	g/kg	3.9
E-103 Upper	Total Organic Carbon	g/kg	3.8

Note:

B = Estimated result. Result is less than RL.

## Table B-7 B Pond - Bulk Density Analytical Summary

Sample ID	Parameter	Units	Result
B-18 Lower	Bulk Density	g/mL	1.6
B-18 Upper	Bulk Density	g/mL	1.7
B-19 Upper	Bulk Density	g/mL	1.4
B-26 Lower	Bulk Density	g/mL	1.6

## Table C-7 C Pond - Bulk Density Analytical Summary

Sample ID	Parameter	Units	Result
C-2	Bulk Density	g/mL	1.6
C-5	Bulk Density	g/mL	1.7
C-19 Lower	Bulk Density	g/mL	1.6
C-19 Upper	Bulk Density	g/mL	1.5

# Table D-7 D Pond - Bulk Density Analytical Summary

Sample ID	Parameter	Units	Result
D-8 Lower	Bulk Density	g/mL	1.5
D-8 Upper	Bulk Density	g/mL	1.6
D-10 Lower	Bulk Density	g/mL	1.4
D-10 Upper	Bulk Density	g/mL	1.5
D-17 Lower	Bulk Density	g/mL	1.5
D-17 Upper	Bulk Density	g/mL	1.6
D-26 Lower	Bulk Density	g/mL	1.8
D-26 Upper	Bulk Density	g/mL	1.9

## Table E-7 E Pond - Bulk Density Analytical Summary

Sample ID	Parameter	Units	Result
E-65 Lower	Bulk Density	g/mL	1.3
E-65 Upper	Bulk Density	g/mL	1.5
E-80 Lower	Bulk Density	g/mL	1.5
E-80 Upper	Bulk Density	g/mL	1.5
E-97 Lower	Bulk Density	g/mL	1.2
E-97 Upper	Bulk Density	g/mL	1.1
E-103 Lower	Bulk Density	g/mL	1.7
E-103 Upper	Bulk Density	g/mL	1.7

## Table B-8 B Pond - Cation Exchange Capacity Analytical Summary

Sample ID	Parameter	Units	Result
B-18 Lower	Cation Exchange Capacity	meq/100g	7.1
B-18 Upper	Cation Exchange Capacity	meq/100g	6.7
B-19 Upper	Cation Exchange Capacity	meq/100g	6.8
B-26 Lower	Cation Exchange Capacity	meq/100g	7.1

## Table C-8 C Pond - Cation Exchange Capacity Analytical Summary

Sample ID	Parameter	Units	Result
C-2	Cation Exchange Capacity	meq/100g	24.8
C-5	Cation Exchange Capacity	meq/100g	6.7
C-19 Lower	Cation Exchange Capacity	meq/100g	21.5
C-19 Upper	Cation Exchange Capacity	meg/100g	14.6

### Table D-8 D Pond - Cation Exchange Capacity Analytical Summary

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Sample ID	Parameter	Units	Result
D-8 Lower	Cation Exchange Capacity	meq/100g	11
D-8 Upper	Cation Exchange Capacity	meq/100g	10.5
D-10 Lower	Cation Exchange Capacity	meq/100g	7.5
D-10 Upper	Cation Exchange Capacity	meq/100g	11.6
D-17 Lower	Cation Exchange Capacity	meq/100g	7.4
D-17 Upper	Cation Exchange Capacity	meq/100g	6.7
D-26 Lower	Cation Exchange Capacity	meq/100g	7
D-26 Upper	Cation Exchange Capacity	meg/100g	12.6

## Table E-8 E Pond - Cation Exchange Capacity Analytical Summary

Sample ID	Parameter	Units	Result
E-65 Lower	Cation Exchange Capacity	meq/100g	9.1
E-65 Upper	Cation Exchange Capacity	meq/100g	10.2
E-80 Lower	Cation Exchange Capacity	meq/100g	9.6
E-80 Upper	Cation Exchange Capacity	meq/100g	8.2
E-97 Lower	Cation Exchange Capacity	meq/100g	9.4
E-97 Upper	Cation Exchange Capacity	meq/100g	10.1
E-103 Lower	Cation Exchange Capacity	meq/100g	11.5
E-103 Upper	Cation Exchange Capacity	meq/100g	B 1.9

## Table B-9 B Pond - Total Chloride & Sulfide Analytical Summary

Sample ID	Parameter	Units	Result
B-18 Lower	·Total Chloride	mg/kg	15.6
B-18 Lower	Total Sulfide	mg/kg	< 10
B-18 Upper	Total Chloride	mg/kg	24.5
B-18 Upper	Total Sulfide	mg/kg	< 10
B-19 Upper	Total Chloride	mg/kg	8.8
B-19 Upper	Total Sulfide	mg/kg	< 10
B-26 Lower	Total Chloride	mg/kg	11.8
B-26 Lower	Total Sulfide	mg/kg	< 10

# Honeywell International Inc. Metropolis Works

Table C-9
C Pond - Total Chloride & Sulfide Analytical Summary

Sample ID	Parameter	Units	Result
C-2	Total Chloride	mg/kg	3.6
C-2	Total Sulfide	mg/kg	50
C-5	Total Chloride	mg/kg	6.9
C-5	Total Sulfide	mg/kg	140
C-19 Lower	Total Chloride	mg/kg	17.9
C-19 Lower	Total Sulfide	mg/kg	< 10
C-19 Upper	Total Chloride	mg/kg	17.1
C-19 Upper	Total Sulfide	mg/kg	60

# Honeywell International Inc. Metropolis Works

Table D-9
D Pond - Total Chloride & Sulfide Analytical Summary

Sample ID	Parameter	Units	Result
D-8 Lower	Total Chloride	mg/kg	J 28.7
D-8 Lower	Total Sulfide	mg/kg	< 10
D-8 Upper	Total Chloride	mg/kg	J 19.7
D-8 Upper	Total Sulfide	mg/kg	< 10
D-10 Lower	Total Chloride	mg/kg	J 30
D-10 Lower	Total Sulfide	mg/kg	< 10
D-10 Upper	Total Chloride	mg/kg	J 26.6
D-10 Upper	Total Sulfide	mg/kg	< 10
D-17 Lower	Total Chloride	mg/kg	J 28.1
D-17 Lower	Total Sulfide	mg/kg	< 10
D-17 Upper	Total Chloride	mg/kg	J 17.8
D-17 Upper	Total Sulfide	mg/kg	< 10
D-19 Lower	Total Chloride	mg/kg	J 9.8
D-19 Lower	Total Sulfide	mg/kg	< 10
D-19 Upper	Total Chloride .	mg/kg	J 7.7
D-19 Upper	Total Sulfide	mg/kg	< 10
D-26 Lower	Total Chloride	mg/kg	J 23.1
D-26 Lower	Total Sulfide	mg/kg	< 10
D-26 Upper	Total Chloride	mg/kg	J 6.3
D-26 Upper	Total Sulfide	mg/kg	< 10

#### Note:

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

# Honeywell International Inc. Metropolis Works

Table E-9
E Pond - Total Chloride & Sulfide Analytical Summary

Sample ID	Parameter	Units	Π	Result
E-65 Lower	Total Chloride	mg/kg	J	24.3
E-65 Lower	Total Sulfide	mg/kg	<	10
E-65 Upper	Total Chloride	mg/kg	J	18.3
E-65 Upper	Total Sulfide	mg/kg	<	10
E-80 Lower	Total Chloride	mg/kg	J	36
E-80 Lower	Total Sulfide	mg/kg	<	10
E-80 Upper	Total Chloride	mg/kg	J	19.1
E-80 Upper	Total Sulfide	mg/kg	<	10
E-97 Lower	Total Chloride	mg/kg	J	24.2
E-97 Lower	Total Sulfide	mg/kg	<	10
E-97 Upper	Total Chloride	mg/kg	J	13.1
E-97 Upper	Total Sulfide	mg/kg	<	10
E-103 Lower	Total Chloride	mg/kg		20.1
E-103 Lower	Total Sulfide	mg/kg	<	10
E-103 Upper	Total Chloride	mg/kg		10.4
E-103 Upper	Total Sulfide	mg/kg	<	10

## Note:

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.



# Table B-10 B Pond - Total Uranium Matrix Spike and Matrix Spike Duplicate Summary

Laboratory Sample ID	Sample ID	Sample Type (MS or MSD)	Laboratory Batch ID	Parameter	Units	Measured Value of Unspiked Sample	RL	Spike Amount	Measured Value of Spiked Sample	Percent Recovery	RPD
F9C130321001S	B-1	MS	9082045	Uranium	mg/kg	238	50	100	316	78	9.9
F9C130321001D	B-1	MSD	9082045	Uranium	mg/kg	238	50	100	349	111	9.9
F9C190122009D	B-13 LIQ	MSD	9082046	Uranium	mg/kg	455	50	100	456	0.87	62
F9C190122009S	B-13 LIQ	MS	9082046	Uranium	mg/kg	455	50	100	861	406	62
F9C260105001S	B-30 Upper	MS	9090230	Uranium	mg/kg	298	50	100	345	47	21
F9C260105001D	B-30 Upper	MSD	9090230	Uranium	mg/kg	298	50	100	427	129	21

- 1. Method 6010c specifies the percent recovery to be within ± 25% and the RPD to be within ±20%.
- 2. MS = Matrix Spike.
- 3. MSD = Matrix Spike Duplicate.
- 4. RL = Reporting Limit.
- 5. RPD = Relative Percent Difference.



Table C-10
C Pond - Total Uranium Matrix Spike and Matrix Spike Duplicate Analytical Summary

Laboratory Sample ID	Sample ID	Sample Type (MS or MSD)	Laboratory Batch ID	Parameter	Units	Measured Value of Unspiked Sample	RL	Spike Amount	Measured Value of Spiked Sample	Percent Recovery	RPD
F9D030324001S	C-9	MS	9096062	Uranium	mg/kg	145	50	182	238	93	20
F9D030324001D	C-9	MSD	9096062	Uranium	mg/kg	145	50	100	291	146	20
F9C270267001S	C-10 Upper	MS	9090231	Uranium	mg/kg	103	50	100	188	85	8.2
F9C270267001D	C-10 Upper	MSD	9090231	Uranium	mg/kg	103	50	100	204	101	8.2
F9D030318001D	C-13	MSD	9096061	Uranium	mg/kg	133	50	100	290	157	5.4
F9D030318001S	C-13	MS	9096061	Uranium	mg/kg	133	50	100	306	173	5.4
F9D080316002D	C-34	MSD	9103207	Uranium	mg/kg	555	50	100	693	138	1.8
F9D080316002S	C-34	MS	9103207	Uranium	mg/kg	555	93	100	706	151	1.8

- 1. Method 6010c specifies the percent recovery to be within ± 25% and the RPD to be within ±20%.
- 2. MS = Matrix Spike.
- 3. MSD = Matrix Spike Duplicate.
- 4. RL = Reporting Limit.
- 5. RPD = Relative Percent Difference.



## Table D-10 D Pond - Total Uranium Matrix Spike and Matrix Spike Duplicate Summary

Laboratory Sample	Sample ID	Sample Type (MS or MSD)	Laboratory Batch ID	Parameter	Units	Measured Value of Unspiked Sample	RL	Spike Amount	Measured Value of Spiked Sample	Percent Recovery	RPD
F9F190210001D	D-14	MSD	9174136	Uranium	mg/kg	389	50	100	407	18	21
F9F190210001S	D-14	MS	9174136	Uranium	mg/kg	389	50	100	504	115	21
F9F190210009S	D-15 U	- MS	9175246	Uranium	mg/kg	698	50	100	953	255	15
F9F190210009D	D-15 U	MSD	9175246	Uranium	mg/kg	698	50	100	1,110	410	15
F9F120114001D	D-31	MSD	9167137	Uranium	mg/kg	76.3	50	100	154	78_	12
F9F120114001S	D-31	MS	9167137	Uranium	mg/kg	76.3	50	100	174	98	12
F9F190219001S	D-26 Upper	MS	9180110	Uranium	mg/kg	60.7	50	100	158	97	19
F9F190219001D	D-26 Upper	MSD	9180110		mg/kg	60.7	50	100	191	130	19
F9G020279001D	D-28	MSD	9187052	Uranium	mg/kg	307	50	100	494	187	10
F9G020279001S	D-28	MS	9187052	Uranium	mg/kg	307	50	100	547	239	10
F9G020284001D	D-29 Upper	MSD	9190064	Uranium	mg/kg	137	50	100	232	95	3.2
F9G020284001S	D-29 Upper	MS	9190064	Uranium	mg/kg	137	50	100	240	102	3.2

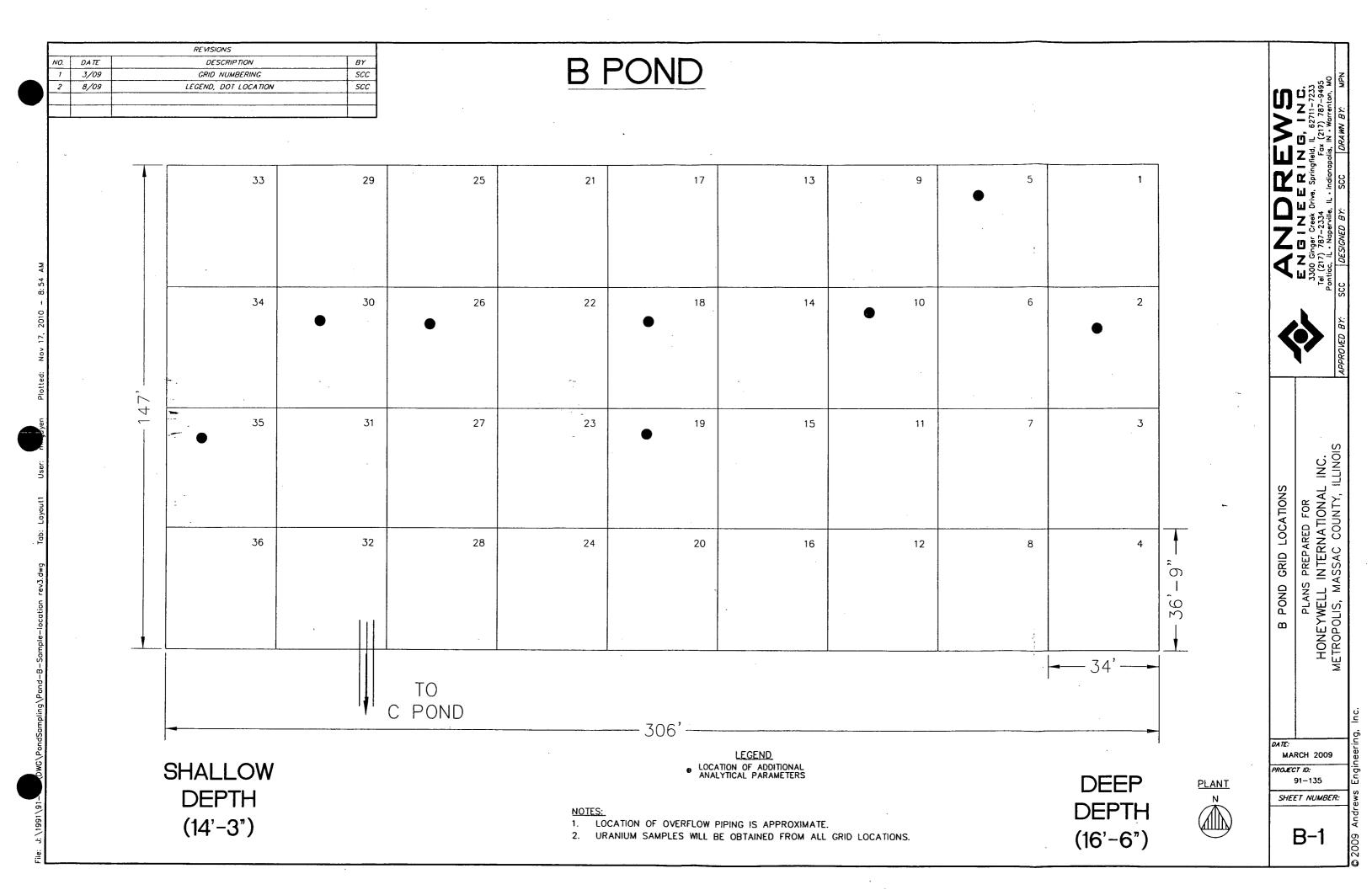
- 1. Method 6010c specifies the percent recovery to be within ± 25% and the RPD to be within ±20%.
- 2. MS = Matrix Spike.
- 3. MSD = Matrix Spike Duplicate.
- 4. RL = Reporting Limit.
- 5. RPD = Relative Percent Difference.

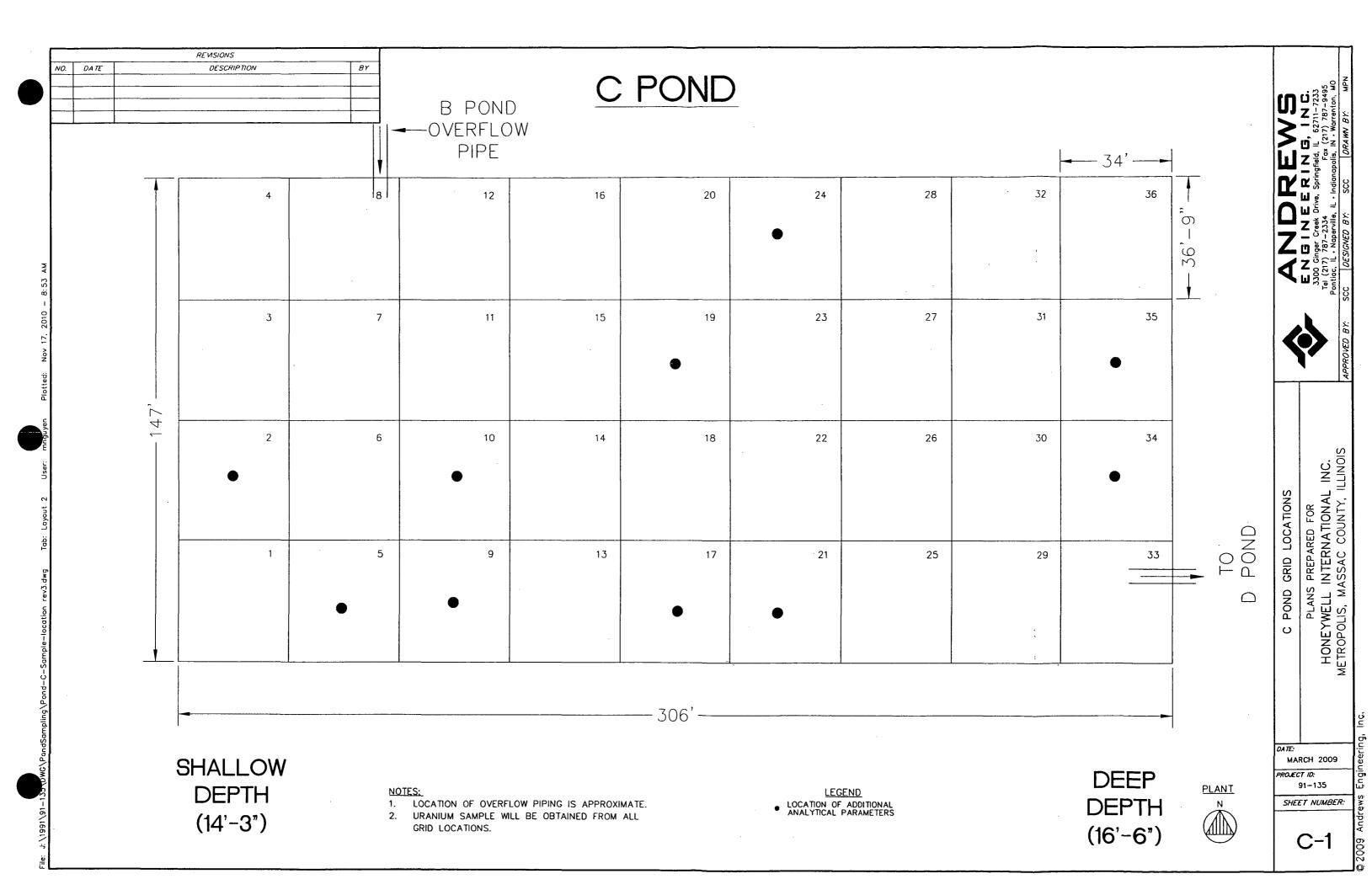


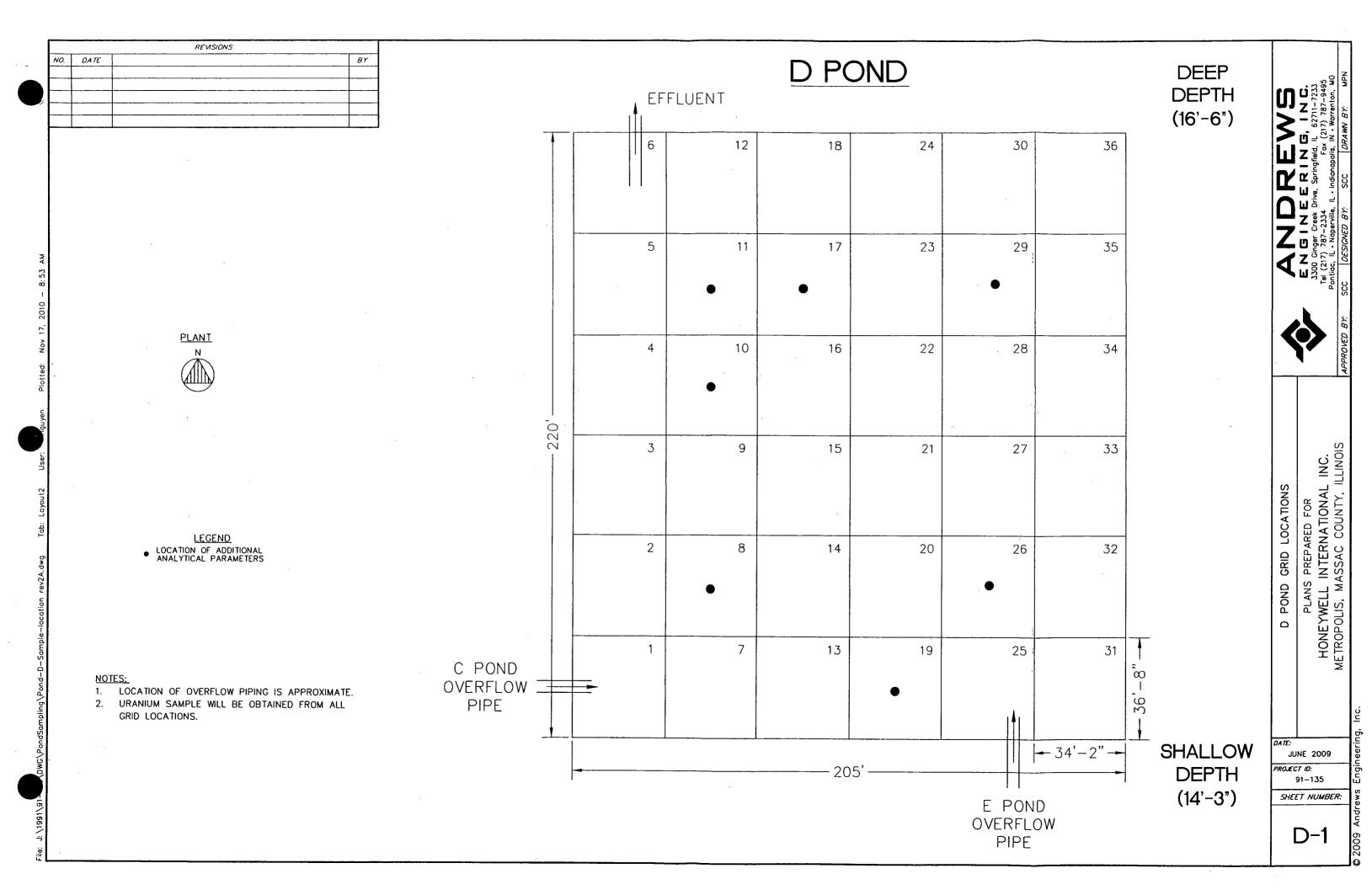
# Table E-10 E Pond - Total Uranium Matrix Spike and Matrix Spike Duplicate Summary

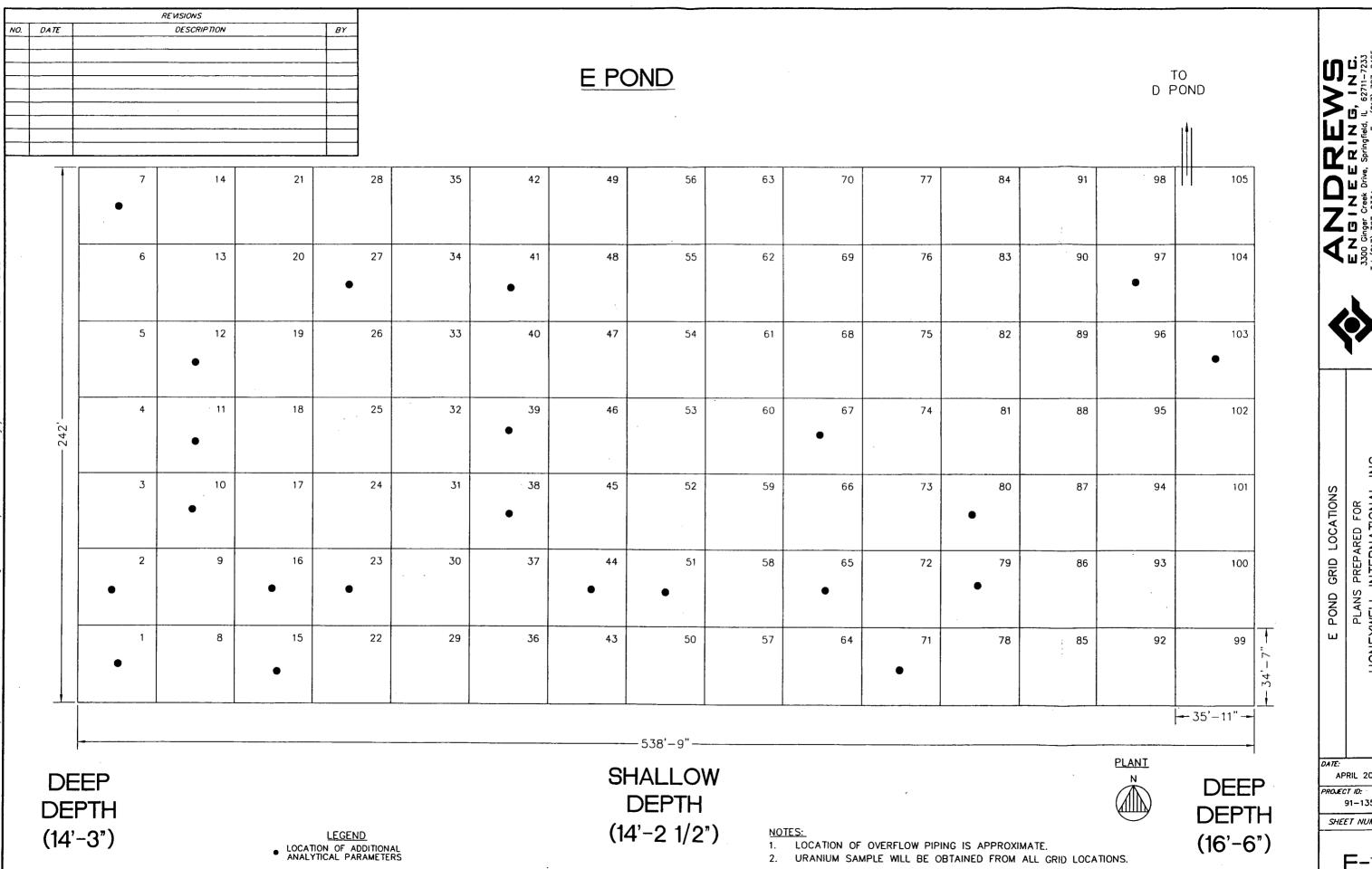
Laboratory Sample ID	Sample ID	Sample Type (MS or MSD)	Laboratory Batch ID	Parameter	Units	Measured Value of Unspiked Sample	RL	Spike Amount	Measured Value of Spiked Sample	Percent Recovery	RPD
F9D170288001D	E-7	MSD	9110114	Uranium	mg/kg	139	50	100	298	159	10
F9D170288001S	E-7	MS	9110114	Uranium	mg/kg	139	50	100	330	191	10
F9D170288021S	E-25	MS	9110357	Uranium	mg/kg	106	50	100	246	140	27
F9D170288021D	E-25	MSD	9110357	Uranium	mg/kg	106	50	100	323	217	27
F9D230339001D	E-34	MSD	9114039	Uranium	mg/kg	344	50	100	403	59	11
F9D230339001S	E-34	MS	9114039	Uranium	mg/kg	344	50	100	448	104	11
F9D230339021D	E-48	MSD	9114040	Uranium	mg/kg	126	50	100	238	112	8.9
F9D230339021S	E-48	MS	9114040	Uranium	mg/kg	126	50	100	260	134	8.9

- 1. Method 6010c specifies the percent recovery to be within ± 25% and the RPD to be within ±20%.
- 2. MS = Matrix Spike.
- 3. MSD = Matrix Spike Duplicate.
- 4. RL = Reporting Limit.
- 5. RPD = Relative Percent Difference.











PLANS PREPARED FOR HONEYWELL INTERNATIONAL INC. METROPOLIS, MASSAC COUNTY, ILLINOIS

APRIL 2009

91-135

SHEET NUMBER:

E-1

**EXHIBIT 1** 

**PHOTOGRAPHS** 

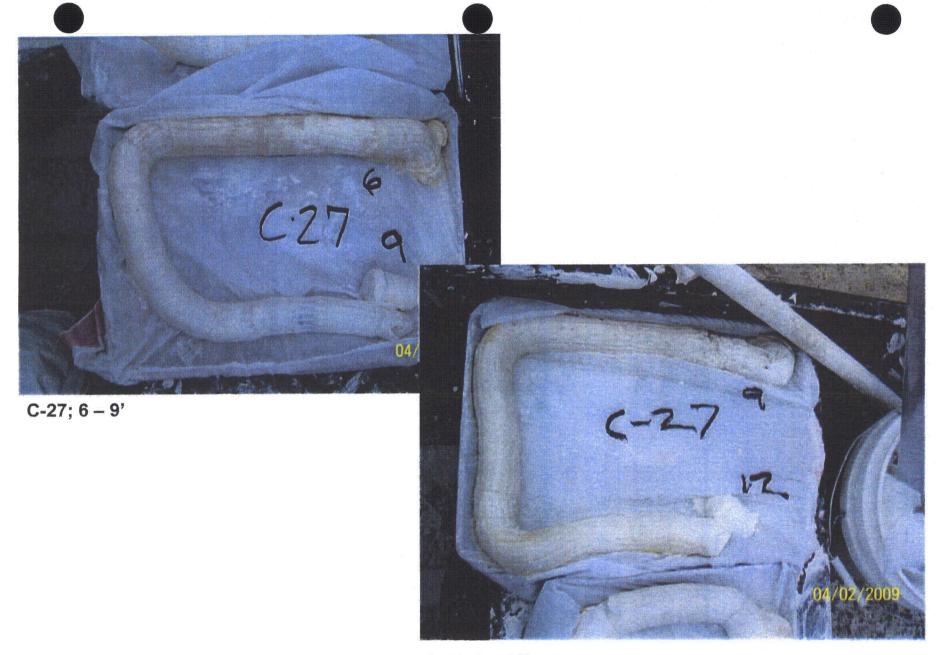
# Honeywell MTW Pond CaF₂ Material Characterization Sampling

Honeywell International Inc. Andrews Engineering, Inc.



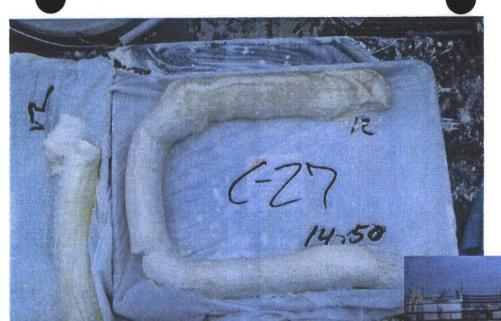
Field Sampling Event Photo Log March – July 2009



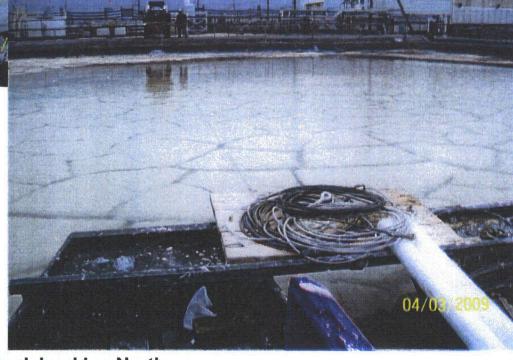


C-27: 9 - 12'





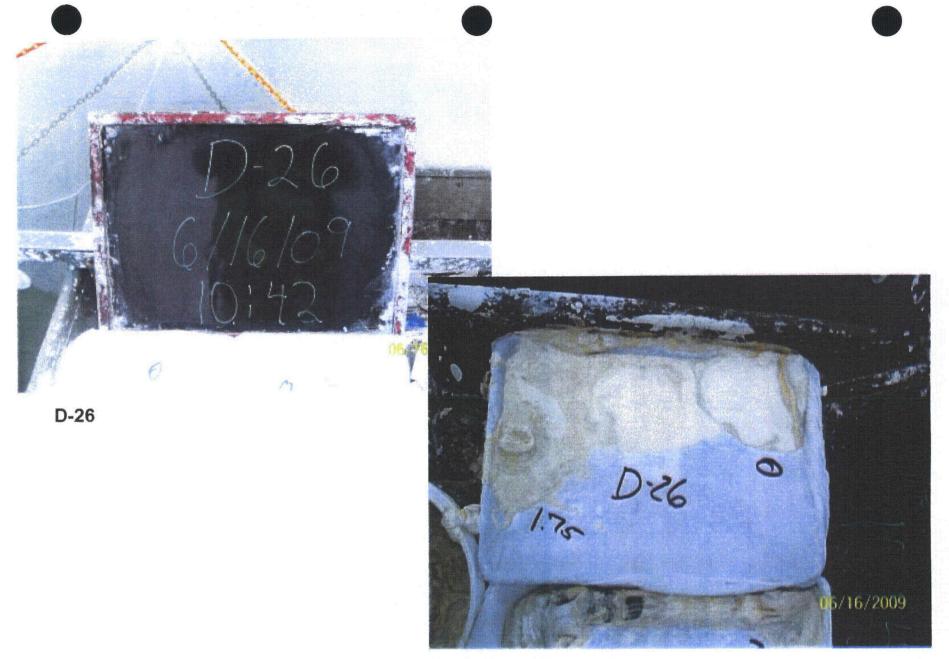
C-27; 12 - 14.5'



C Pond, Looking North



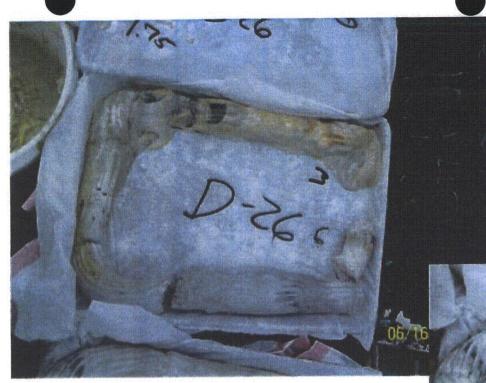




D-26: 0 - 1.75'





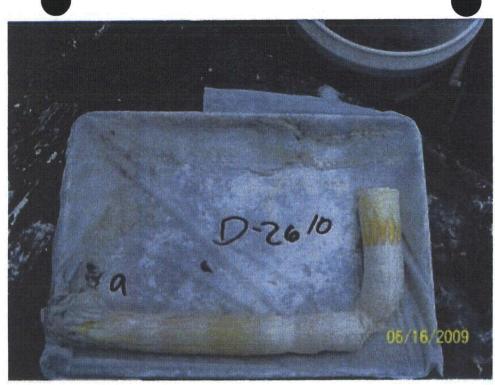


D-26: 3 - 6'



D-26: 6 - 9'





D-26: 9 - 10'



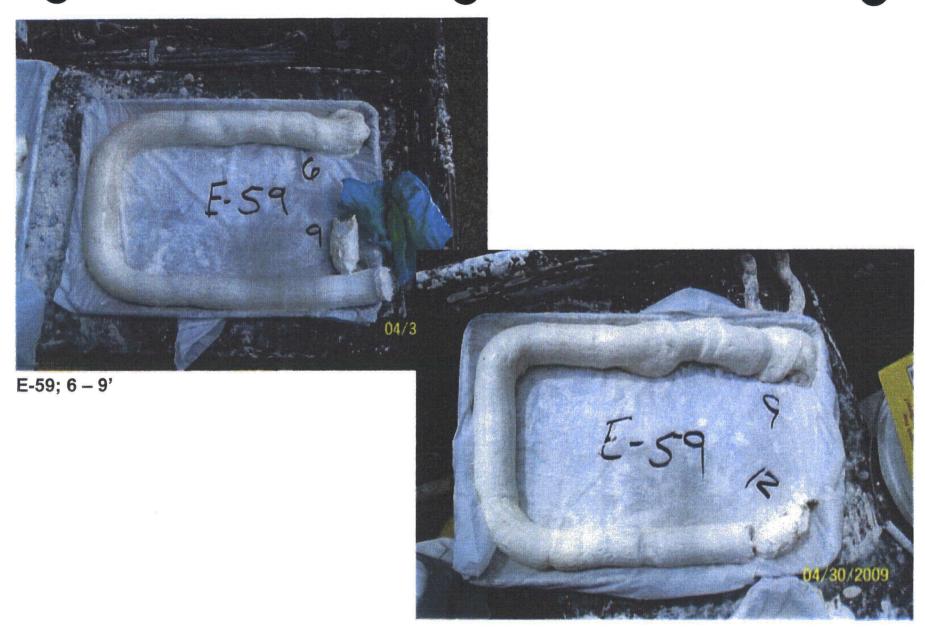


E-59; 0 - 2'



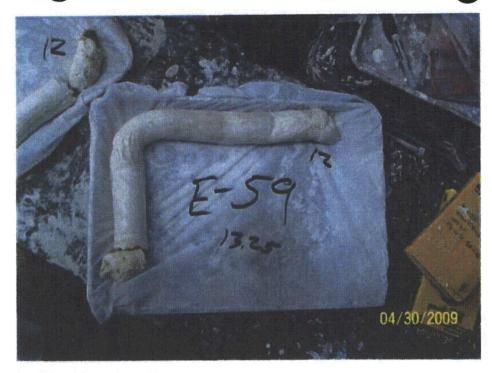
E-59: 3 - 6'





E-59: 9 - 12'





E-59; 12 - 13.25'



## **EXHIBIT 2**

LABORATORY ANALYTICAL REPORTS

## **EXHIBIT 3**

U.S. EPA APRIL 23, 1993 MEMORANDUM

9443.1993(05)

United States Environmental Protection Agency Washington, D.C. 20460
Office of Solid Waste and Emergency Response

April 23, 1993

**MEMORANDUM** 

SUBJECT: Interpretation of "Aqueous" as Applied to the Corrosivity Characteristic (40 CFR 261.22)

TO: Joseph R. Franzmathes, Director Waste Management Division

FROM: David Bussard, Director
Characterization and Assessment Division

This memorandum responds to your memorandum to Bruce Diamond dated March 11, 1993 requesting clarification of the term "aqueous" as it applies to the corrosivity characteristic. Your memorandum references a September 1992 "Hotline Questions and Answers" publication produced by the RCRA/Superfund Hotline contractors and concurred upon by my Division and by OSW.

The Hotline publication correctly defines "aqueous," for the purposes of the corrosivity characteristic, to mean in a form amenable to pH measurement. This interpretation is consistent with the supporting documentation found in the background document for the corrosivity characteristic final rulemaking (Background Document: Section 261.22 - Characteristic of Corrosivity, May 2, 1980). I have attached the applicable section for your information.

A more specific interpretation of "aqueous" for the purpose of the corrosivity characteristic may be found in the method referenced in the actual regulatory text for the corrosivity characteristic at 40 CFR 261.22(a)(1). The regulation states that "[the EPA test method for pH is specified as Method 5.2, in "Test Methods for the Evaluation "of Solid Waste, Physical/Chemical Methods" (see attachment). Method 5.2, pH Electrometric Measurement, which was renumbered to Method 9040 specifies under scope and application that the method "is used to measure the pH of

aqueous wastes and those wastes where the aqueous phase constitutes at least 20% of the total volume of "waste." Therefore, any waste for which this method is applicable must contain at least 20% free water by volume. This method is also attached for your information.

If you or your staff should have any questions regarding this memorandum, please call me or have your staff call Al Collins, of my staff, at 202-260-4791.

**Attachments** 

## **EXHIBIT 4**

**GRAIN SIZE DISTRIBUTION CURVES** 

# TestAmerica South Burlington, VT

Sample Data Summary Package

9C190122



TestAmerica Laboratories, Inc.

April 10, 2009

Mr. Terry Romanko TestAmerica, Inc. 13715 Rider Trail North Earth City, MO 63045

Re: Laboratory Project No. 29014 Case: HONEYWEL; SDG: 9C190122

Dear Mr. Romanko:

Enclosed are the analytical results for the samples that were received by TestAmerica Burlington on March 26th, 2009. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client	Sample	Sample
	<u>Sample ID</u>	<u>Date</u>	<u>Matrix</u>
	Received: 03/26/09 ETR No:	130882	
790231	B-18 LOWER	03/17/09	SOLID
790232	B-18 UPPER	03/17/09	SOLID

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

### Particle Size Analysis by ASTM D422:

There were no exceptions to the method quality control criteria during the analyses of these samples.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.



If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Ron Pentkowski Project Manager

Enclosure

F9C190122

## INTER-COMPANY LOG

COMMENTS:

Project Manager:

**WORK LOCATION:** 

Project: rt Type: 1991-135-11/002

Honeywell Pond B

Report Due Date:

2009-03-18

Date Received: Analytical Due Date:

2009-04-13 2009-04-15

Standard Report

472876 - Andrews Engineering, Inc.

H2

TestAmerica Burlington

CLIENT ID: B-18 LOWER

20090317 DATE SAMPLED:

MATRIX: SOLID Α

SAMPLE COMMENTS:

METHOD:

NONE ZZ

NONE

**Archive** 

NO SAMPLE PREPARATION PERFORMED / QC TYPE: 01

STANDARD TEST SET

WORKORDER

K8RN41A3

METAL: XX

SMP#: 11

SMP#: 10

CLIENT ID: B-18 UPPER **SAMPLE COMMENTS:** 

DATE SAMPLED:

20090317

MATRIX:

SOLID

**EXTRACTION: 88** 

METHOD:

ZZ **EXTRACTION: 88** 

NONE

Archive

NONE

NO SAMPLE PREPARATION PERFORMED / QC TYPE: 01 STANDARD TEST SET

WORKORDER

K8RP71A1

METAL: XX

The sample(s) listed on this form are being sent to your location for the specified analysis. If you have any questions, please contact the Project Manager listed above. PLEASE RETURN THE ORIGINAL SIGNED FORM WITH THE REPORT AT THE COMPLETION OF ANALYSIS.

Thank You

TA- St. Louis Sample Receiving

**RELINQUISHED BY:** 

RECEIVED FOR LAB BY:



## Sample Data Summary – Geotechnical

## Particle Size of Soils by ASTM D422

nt Code:	STLMOS	
emple ID:	B-18 LOWER	
i ab iD:	790231	

SDG: 9C190122 ETR(s): 130882 
 Date Received:
 3/26/2009

 Start Date:
 3/27/2009

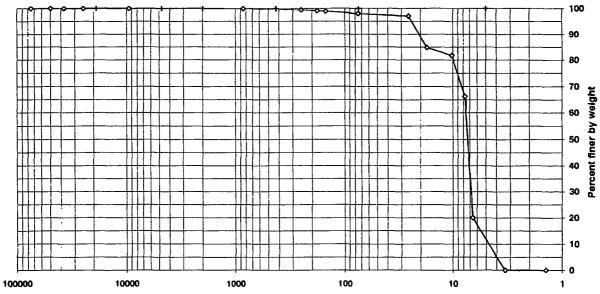
 End Date:
 4/9/2009

Percent Solids: 58.1%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

 Non-soll material:
 na

 Shape (> #10):
 na

 Hardness (> #10):
 na



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.1
#40	425	99.7	0.2
#60	250	99.4	0.3
#80	180	99.1	0.3
#100	150	98.9	0.2
#200	75	98.0	1.0
Hydrometer	25.6	97.1	0.9
	17.4	84.8	12.3
	10.2	81.7	3.1
	7.8	66.3	15.4
	6.6	20.0	46.2
	3.3	0.0	20.0
V	1.4	0.0	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	2.0
Coarse Sand	0.0
Medium Sand	0,3
Fine Sand	1.8
Silt	77.9
Clay	20.0

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with

a metal paddle.

Dispersion Period: 1 minute

## Particle Size of Soils by ASTM D422

ent Code:	STLMOS	
mple ID:	B-18 UPPER	
lah IDr	790232	

**SDG**: 9C190122 **ETR(s)**: 130882 
 Date Received:
 3/26/2009

 Start Date:
 3/27/2009

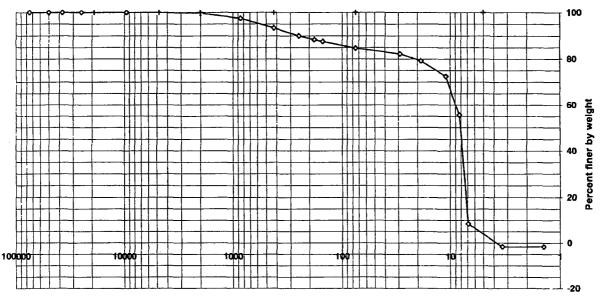
 End Date:
 4/9/2009

Percent Solids: 58.1%
Specific Gravity: 2.650
Maximum Particle Size: Crs sand

 Non-soll material:
 na

 Shape (> #10):
 angular

 Hardness (> #10):
 hard



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.7	0.3
#20	850	97.5	2.2
#40	425	93.4	4.1
#60	250	90.0	3.4
#80	180	88.4	1.6
#100	150	87.6	8.0
#200	75	84.8	2.9
Hydrometer	29.0	82.2	2.5
	18.5	79.2	3.1
	11.0	72.4	6.7
	8.3	55.6	16.8
	6.9	8.4	47.2
	3.4	-1.7	10.1
V	1.4	-1.7	0.0

Soil	Percent of	
Classification	Total Sample	
Gravel	0.0	
Sand	15.2	
Coarse Sand	0.3	
Medium Sand	6.3	
Fine Sand	8.6	
Sint	76.4	
Clay	8.4	

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with

a metal paddle.

Dispersion Period: 1 minute

# TestAmerica South Burlington, VT

Sample Data Summary Package

9C200257



TestAmerica Laboratories, Inc.

April 10, 2009

Mr. Terry Romanko TestAmerica, Inc. 13715 Rider Trail North Earth City, MO 63045

Re: Laboratory Project No. 29014 Case: HONEYWEL; SDG: 9C200257

Dear Mr. Romanko:

Enclosed are the analytical results for the samples that were received by TestAmerica Burlington on March 26th, 2009. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client	Sample	Sample
	<u>Sample ID</u>	<u>Date</u>	<u>Matrix</u>
	Received: 03/26/09 ETR No:	130884	
790233	B-19 UPPER	03/18/09	SOLID
790234	B-26 LOWER	03/19/09	SOLID

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

#### Particle Size Analysis by ASTM D422:

There were no exceptions to the method quality control criteria during the analyses of these samples.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.



If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Ron Pentkowski Project Manager

Enclosure

## F9C200257

## INTER-COMPANY LOG

COMMENTS:

Project Manager:

Project:

**WORK LOCATION:** 

1991-135-11/002

Honeywell Pond B

Date Received:

2009-03-20

Analytical Due Date:

2009-04-15

Report Due Date:

2009-04-17

nt Type:

SMP#: 5

Type: 8

Standard Report

Charles Dane

NONE

472876 - Andrews Engineering, Inc.

H2

TestAmerica Buriington

CLIENT ID: B-19 UPPER

DATE SAMPLED: 20090318

MATRIX: A SOLID

**SAMPLE COMMENTS:** 

METHOD: ZZ EXTRACTION: 88

NONE

Archive

0 0 1 1 P) E PREPARATION REPEO

NO SAMPLE PREPARATION PERFORMED / QC TYPE: 01

STANDARD TEST SET

WORKORDER

K8WTK1A2

METAL: XX

SMP#: 12

CLIENT ID: B-26 LOWER

SAMPLE COMMENTS:

DATE SAMPLED: 20090319

MATRIX: A

A SOLID

METHOD:

ZZ NONE

NONE

Archive

**EXTRACTION: 88** 

NO SAMPLE PREPARATION PERFORMED / QC TYPE: 01

STANDARD TEST SET

WORKORDER

K8WXX1AP

METAL: XX

The sample(s) listed on this form are being sent to your location for the specified analysis. If you have any questions, please contact the Project Manager listed above. PLEASE RETURN THE ORIGINAL SIGNED FORM WITH THE REPORT AT THE COMPLETION OF ANALYSIS.

Thank You

TA- St. Louis Sample Receiving

RELINQUISHED BY:

DATE:

3-25.09 17

RECEIVED FOR LAB BY:

 $_{\perp}$  DATE:Q

7 1019

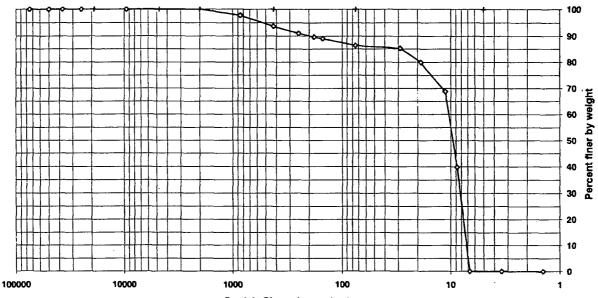


# **Sample Data Summary – Geotechnical**

rt Code: STLMOS nple ID: B-19 UPPER Lab ID: 790233

SDG: 9C200257 ETR(s): 130884 Date Received: 3/26/2009 Start Date: 4/1/2009 End Date: 4/9/2009

Percent Solids: 57.9% Specific Gravity: Maximum Particle Size: Med sand Non-soil material: Shape (> #10): Hardness (> #10):



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um finer		percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	. 0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	97.7	2.3
#40	425	93.7	4.0
#60	250	91.0	2.7
#80	180	89.6	1.3
#100	150	89.0	0.6
#200	75	86.3	2.7
Hydrometer	28.8	85.3	1.0
	18.6	79.9	5.4
1	11.3	68.7	11.2
	8.8	39.8	28.9
	6.7	0.0	39.8
	3.4	0.0	0.0
V	1.4	0.0	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	13.7
Coarse Sand	0.0
Medium Sand	6.3
Fine Sand	7.3
Silt	86.3
Clay	0.0

Preparation Method:

Dispersion Device: Mechanical mixer with

a metal paddle.

nt Code: STLMOS
nple iD: B-26 LOWER
Lab ID: 790234

SDG: 9C200257 ETR(s): 130884 
 Date Received:
 3/26/2009

 Start Date:
 4/1/2009

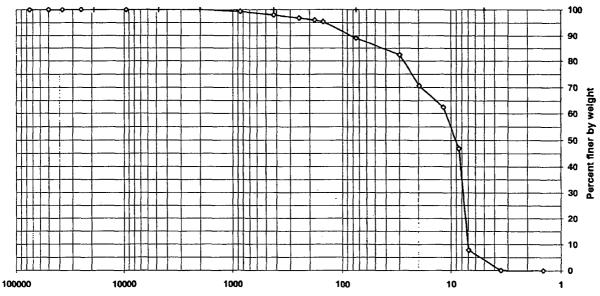
 End Date:
 4/9/2009

Percent Solids: 52,7%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

 Non-soll material:
 na

 Shape (> #10):
 na

 Hardness (> #10):
 na



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch_	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.3	0.7
#40	425	98.0	1.4
#60	250	96.8	1.2
#80	180	96.0	0.8
#100	150	95.4	0.6
#200	75	89.0	6.4
Hydrometer	29.9	82.3	6.7
	19.6	70.6	11.7
	11.7	62.5	8.1
	8.5	46.9	15.6
	6.9	7.8	39.1
1	3.5	0.0	7.8
V	1.4	0.0	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	11.0
Coarse Sand	0.0
Medium Sand	2.0
Fine Sand	9.0
Sift	81.2
Clay	7.8

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with

a metal paddle.



TestAmerica Laboratories, Inc.

## ANALYTICAL REPORT

PROJECT NO. HONEYWELL METROPOLIS

Honeywell Pond B

Lot #: F9C270267

Sean Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Terry Romanko Project Manager

April 22, 2009

## Case Narrative LOT NUMBER: F9C270267

This report contains the analytical results for the 16 samples received under chain of custody by STL St. Louis on March 27, 2009. These samples are associated with your Honeywell Pond B project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by STL St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

## Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

## **Cation Exchange Capacity**

#### Batch 9092126:

The samples were analyzed at a dilution due to high concentrations of salts. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.

## **Affected Samples:**

F9C270267 (8): C-5

F9C270267 (12): C-2

#### Trace ICP Metals

#### Batch9080231:

The samples were analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.

#### **Affected Samples:**

F9C270267 (2): C-10 LOWER

F9C270267 (4): C-6 U 12.00'-12.50'

F9C270267 (3): C-6 U 2.00'-2.50'

F9C270267 (13): C-7

There were no nonconformances or observations noted with any other analysis on this lot.

## **METHODS SUMMARY**

## F9C270267

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density Cation-Exchange Capacity Chloride Gamma Spectroscopy - Radium-226 & Hits Isotopic Thorium by Alpha Spectroscopy Isotopic Uranium by Alpha Spectroscopy	ASTM D-5057-90 SW846 9081 MCAWW 300.0A EML GA-01-R MOD EML A-01-R MOD EML A-01-R MOD	ASTM D-5057-90 SW846 9081 MCAWW 300.0A
Mercury in Liquid Waste (Manual Cold-Vapor) Method D2216 Percent H20 Dry 105 Degrees C, Weigh Paint Filter Test Soil and Waste pH Sulfide Total Organic Carbon Trace Inductively Coupled Plasma (ICP) Metals Trace Inductively Coupled Plasma (ICP) Metals	SW846 7470A	SW846 1311/7470 ASTM ASTM 2216 SW846 9095 SW846 DI-LEACHA MCAWW 376.1 SW846 9060

## References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

## SAMPLE SUMMARY

#### F9C270267

WO # 5	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
K89AQ	001	C-10 UPPER	03/26/09	13:50
K89CF	002	C-10 LOWER	03/26/09	13:50
K89CG	003	C-6 U 2.00'-2.50'	03/26/09	08:50
K89CH	004	C-6 U 12.00'-12.50'	03/26/09	08:50
K89CJ	005	C-12	03/26/09	10:50
K89CK	006	C-6 (COMPOSITE)	03/26/09	08:50
K89CL	007	C-8	03/25/09	
K89CM	800	C-5	03/25/09	14:20
K89CN	009	C-3	03/25/09	12:50
K89CP	010	B-36	03/25/09	09:00
K89CR	011	B-35	03/25/09	08:35
K89CT	012	C-2	03/25/09	13:10
K89DH	013	C-7	03/26/09	09:55
K89DK	014	C-1	03/25/09	13:40
K89DM	015	C-11	03/26/09	13:00
K89DN	016 .	C-4	03/25/09	12:30

## NOTE(S):

⁻ The analytical results of the samples listed above are presented on the following pages.

All calculations are performed before rounding to avoid round-off errors in calculated results.

⁻ Results noted as "ND" were not detected at or above the stated limit.

⁻ This report must not be reproduced, except in full, without the written approval of the laboratory.

⁻ Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

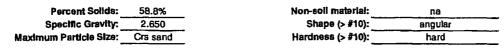


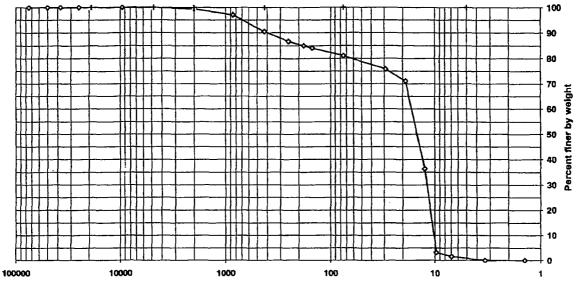
# Sample Data Summary – Geotechnical

Lot# F9C270267 67 of 73

 Sample ID:
 C-5
 ETR(s):
 131014
 Start Date:
 4/2/2009

 Lab ID:
 791170
 End Date:
 4/15/2009





Particle Size, microns (um)

Sleve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 Inch	50000	100.0	0.0
1.5 Inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 Inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.5	0.5
#20	850	97.0	2.5
#40	425	90.5	6.6
#60	250	86.7	3.8
#80	180	85.0	1.7
#100	150	84.1	0.9
#200	75	B1.0	3.1
Hydrometer	29.0	75.8	5.2
1	18.7	71.0	4.7
1	12.4	36.3	34,7
	9.7	3.2	33.2
j	6.9	1.6	1.8
	3.3	0.0	1.6
٧	1.4	0.0	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	19.0
Coarse Sand	0.5
Medium Sand	9.0
Fine Sand	9.5
Silt	79.4
Clay	1.6

Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddle.
Dispersion Period: 1 minute

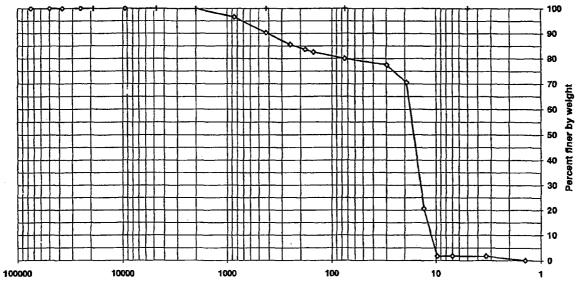
| STLMOS | STLMOS | Sample ID: | C-2 | Lab ID: | 791171 | |

SDG: 9C270267 ETR(s): 131014 
 Date Received:
 4/2/2009

 Start Date:
 4/6/2009

 End Date:
 4/15/2009

Percent Solids: 58.5%
Specific Gravity: 2.650
Maximum Particle Size: Crs sand



Particle Size, microns (um)

Sleve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 Inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 Inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	96.6	3.3
#40	425	90.3	6.3
#60	250	85.5	4.8
#80	180	83.6	1.9
#100	150	82.5	1.0
#200	75	80.0	2.5
Hydrometer	29.6	77.4	2.6
	19.3	70.5	6.9
	13.1	20.6	49.9
	9.7	1.7	18.9
	7.0	1.7	0.0
	3.3	1.7	0.0
Ÿ	1.4	0.0	1.7

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	20.0
Coarse Sand	0.1
Medium Sand	9.6
Fine Sand	10.3
Silt	78.3
Clay	1.7

Preparation Method:

Dispersion Device: Mechanical mixer with a metal paddie.

D2217

# TestAmerica South Burlington, VT

Sample Data Summary Package

9D030324



TestAmerica Laboratories, Inc.

April 15, 2009

Mr. Terry Romanko TestAmerica, Inc. 13715 Rider Trail North Earth City, MO 63045

Re: Laboratory Project No. 29014 Case: HONEYWEL; SDG: 9D030324

Dear Mr. Romanko:

Enclosed are the analytical results for the samples that were received by TestAmerica Burlington on April 4th, 2009. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client	Sample	Sample
	<u>Sample ID</u>	<u>Date</u>	<u>Matrix</u>
	Received: 04/04/09 ETR No:	131082	
791807	C-19 UPPER	04/01/09	SOLID SOLID
791808	C-19 LOWER	04/01/09	

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

#### Particle Size Analysis by ASTM D422:

There were no exceptions to the method quality control criteria during the analyses of these samples.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.



If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Ron Pentkowski Project Manager

Enclosure

F9D030324

## INTER-COMPANY LOG

COMMENTS:

Project Manager:

Project:

1991-135-11/002

Honeywell Ponds

Date Received:

Report Due Date:

2009-04-03

Analytical Due Date:

2009-04-29 2009-05-01

Report Type:

**WORK LOCATION:** 

R

Standard Report

472876 - Andrews Engineering, Inc. H₂

TestAmerica Burlington

SMP#: 2 CLIENT ID: C-19 UPPER DATE SAMPLED: 20090401

MATRIX: A SOLID

SAMPLE COMMENTS:

**EXTRACTION: 88** 

METHOD:

NONE ZZ

NONE

Archive

NO SAMPLE PREPARATION PERFORMED / QC TYPE: 01

STANDARD TEST SET

WORKORDER

K9K8A1A1

METAL: XX

SMP#: 3

CLIENT ID: C-19 LOWER

DATE SAMPLED:

20090401

MATRIX:

SOLID

SAMPLE COMMENTS:

METHOD:

NONE ZZ

NONE

**Archive** 

**EXTRACTION: 88** 

NO SAMPLE PREPARATION PERFORMED / QC TYPE: 01

STANDARD TEST SET

WORKORDER

K9K8H1AC

METAL: XX

The sample(s) listed on this form are being sent to your location for the specified analysis. If you have any questions, please contact the Project Manager listed above. PLEASE RETURN THE ORIGINAL SIGNED FORM WITH THE REPORT AT THE COMPLETION OF ANALYSIS.

Thank You

TA- St. Louis Sample Receiving

RELINQUISHED BY:

DATE:

RECEIVED FOR LAB BY:

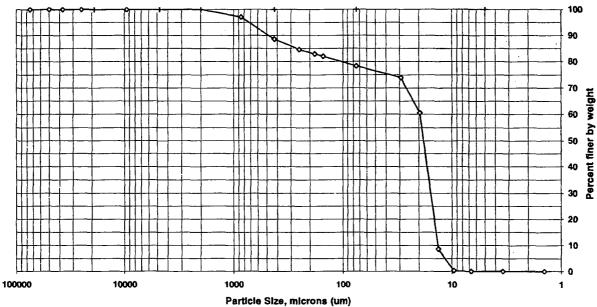


# Sample Data Summary – Geotechnical

nt Code: STLMOS mple ID: C-19 UPPER Lab ID: 791807

SDG: 9D030324 ETR(s): 131082 Date Received: 4/9/2009 Start Date: 4/9/2009 End Date: 4/14/2009

Percent Sollds: 53.8% Specific Gravity: 2.650 Maximum Particle Size: Med sand Non-soli material: Shape (> #10): na Hardness (> #10): na



Particle	e Size,	microns	(un
----------	---------	---------	-----

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	97.1	2.9
#40	425	88.6	8.5
#60	250	84.6	4.0
#80	180	82.9	1.7
#100	150	82.0	0.9
#200	75	78.3	3.7
Hydrometer	29.2	73.9	4.4
	19.5	60.5	13.4
i	13.3	8.6	51.9
1	9.6	0.3	8.4
	6.7	0.0	0.3
	3.4	0.0	0.0
V	1.4	0.0	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	21.7
Coarse Sand	0.0
Medium Sand	11.4
Fine Sand	10.3
Silt	78.3
Clay	0.0

Preparation Method:

Dispersion Device: Mechanical mixer with

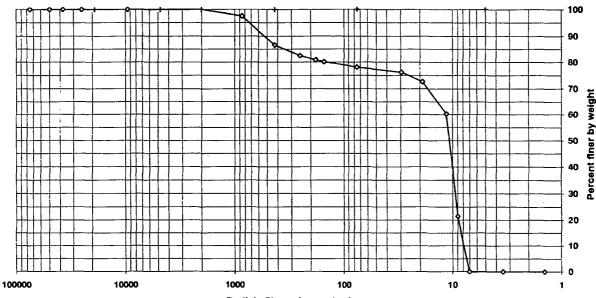
a metal paddie.

STLMOS nt Code: mple ID: C-19 LOWER Lab ID: 791808

SDG: 9D030324 ETR(s): 131082 Date Received: 4/9/2009 Start Date: 4/9/2009 End Date: 4/14/2009

Percent Solids: 53.5% Specific Gravity: 2.650 Maximum Particle Size: Med sand

Non-soll material: Shape (> #10): Hardness (> #10):



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 Inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	97.5	2.5
#40	425	86.6	10.9
#60	250	82.5	4.1
#80	180	80.9	1.6
#100	150	80.2	0.8
#200	75	78.1	2.1
Hydrometer	29.4	76.2	1.9
	18.9	72.6	3.5
	11,4	60.3	12.4
	9.0	21.5	38.8
	7.0	0.0	21.5
	3.5	0.0	0.0
· V	1.4	0.0	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	21.9
Coarse Sand	0.0
Medium Sand	13.4
Fine Sand	8.5
Silt	78.1
Clay	0.0

Preparation Method:

Dispersion Device: Mechanical mixer with

a metal paddle.



TestAmerica Laboratories, Inc.

## ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds D

Lot #: F9F120116

. Seän Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Terry Romanko Project Manager

July 8, 2009

### Case Narrative LOT NUMBER: F9F120116

This report contains the analytical results for the four samples received under chain of custody by TestAmerica St. Louis on June 11, 2009. These samples are associated with your Honeywell Ponds D project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Grain size analysis was performed at the Burlington, VT laboratory. TOC analysis was performed at the Denver, CO laboratory.

## Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

## **Bulk Density**

There was insufficient sample to perform the analysis of a duplicate for density batch 9188234.

## **Affected Samples:**

F9F120116 (3): D-8 UPPER

F9F120116 (4): D-8 LOWER

### **Cation Exchange Capacity**

#### Batch 9169422:

- The samples were analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.
- The RPD is not within method acceptance criteria. The sample is non-homogeneous. Method performance is demonstrated by acceptable LCS recovery.

#### Affected Samples:

F9F120116 (3): D-8 UPPER

F9F120116 (4): D-8 LOWER

### **Gamma Spectroscopy**

- There was insufficient sample to fill a tuna can geometry for Radium-226 by gamma spec which could potentially bias the results low due to the loss of Radon into the headspace of the container.
- The Americium 241, Cesium 137 and Cobalt 60 LCS was used and recoveries are within QC limits.

#### **Affected Samples:**

F9F120116 (1): D-19 UPPER F9F120116 (2): D-19 LOWER F9F120116 (3): D-8 UPPER F9F120116 (4): D-8 LOWER

## **TCLP Preparation**

The standard volume for TCLP non-volatiles preparation is 100 grams of sample. There was insufficient sample to perform analysis at the standard amount. A reduced sample amount was used, maintaining the 20:1 leachate to sample ratio.

Affected Samples:

F9F120116 (1): D-19 UPPER

F9F120116 (2): D-19 LOWER

There were no nonconformances or observations noted with any other analysis on this lot.

## **METHODS SUMMARY**

#### F9F120116

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density	ASTM D-5057-90	ASTM D-5057-90
Cation-Exchange Capacity	SW846 9081	SW846 9081
Chloride	MCAWW 300.0A	MCAWW 300.0A
Gamma Spectroscopy - Radium-226 & Hits	EML GA-01-R MOD	
Isotopic Thorium by Alpha Spectroscopy	EML A-01-R MOD	
Isotopic Uranium by Alpha Spectroscopy	EML A-01-R MOD	
Mercury in Liquid Waste (Manual Cold-Vapor)	SW846 7470A	SW846 1311/7470
Method D2216 Percent H2O Dry 105 Degrees C, Weigh	ASTM Moisture,	ASTM ASTM 2216
Paint Filter Test	SW846 9095	SW846 9095
Soil and Waste pH	SW846 9045C	SW846 DI-LEACHA
Sulfide	MCAWW 376.1	MCAWW 376.1
Total Organic Carbon	SW846 9060	SW846 9060
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 1311/3010

## References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

## SAMPLE SUMMARY

#### F9F120116

<u>wo # s</u>	SAMPLE‡	CLIENT SAMPLE ID		AMP IME
LERPH LERP6	001 002	D-19 UPPER D-19 LOWER	06/09/09 09 06/09/09 09	
LERP7	003	D-8 UPPER	06/10/09 12	
LERQL	004	D-8 LOWER	06/10/09 12	2:55

## NOTE (S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.



# Sample Data Summary – Geotechnical

 Client Code:
 STLMOS
 SDG:
 9F120116

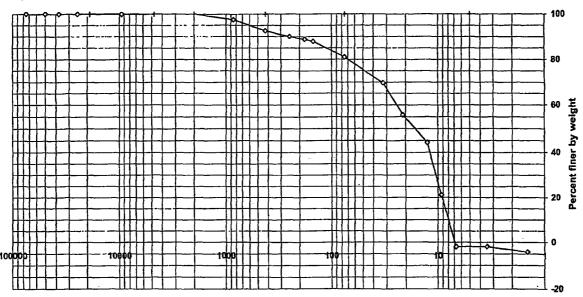
 Sample ID:
 D-8 UPPER
 ETR(s):
 132255

 Lab ID:
 798625
 TOPER
 TOPER
 TOPER

Date Received: 6/18/2009
Start Date: 6/19/2009
End Date: 6/30/2009

Percent Solids: 52.7%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

Non-soll material: N/A
Shape (> #10): N/A
Hardness (> #10): N/A



## Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 Inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	97.6	2.4
#40	425	92.6	5.0
#60	250	90.0	2.6
#80	180	88.8	1.3
#100	150	87.9	0.9
#200	75	81.0	6.9
Hydrometer	32.4	69.6	11.4
1	21.2	55.7	13.8
ı	12.6	44.2	11.5
l l	9.3	21.1	23.1
l l	6.7	-1.9	23.1
1	3.4	-1.9	0.0
V	1.4	-4.2	2.3

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	19.0
Coarse Sand	0.0
Medium Sand	7.4
Fine Sand	11.6
Silt	82.9
Clay	-1.9

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with

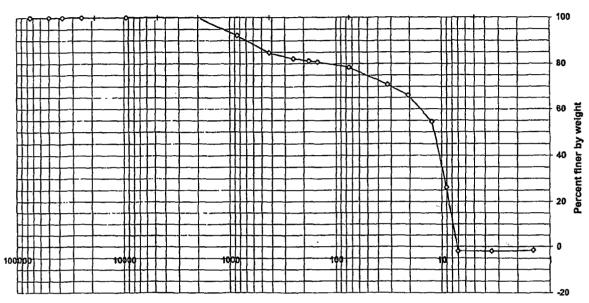
a metal paddle.

Sample ID: D-8 LOWER
Lab ID: 798626

SDG: 9F120116 ETR(s): 132255 Date Received: 6/18/2009
Start Date: 6/19/2009
End Date: 6/30/2009

Percent Solids: 49.7%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

Non-soil material: N/A
Shape (> #10): N/A
Hardness (> #10): N/A



#### Particle Size, microns (um)

Sleve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 Inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	92.3	7.7
#40	425	84.8	7.5
#60	250	82.2	2.6
#80	180	81.1	1.1
#100	150	80.7	0.4
#200	75	78.4	2.3
Hydrometer	32.4	70.8	7.6
1	20.7	66.1	4.7
1	12.3	54.4	11.7
1	9.1	26.2	28.2
	7.1	-2.0	28.2
	3.5	-2.0	0.0
V	1.4	-1.6	-0.4

Soil	Percent of	
Classification	Total Sample	
Gravel	0.0	
Sand	21.6	
Coarse Sand	0.0	
Medium Sand	15.2	
Fine Sand	6.3	
Silt	80.4	
Clay	-2.0	

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with

a metal paddle.



TestAmerica Laboratories, Inc.

## ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds

Lot #: F9F190219

Sean Chisek

Andrews Engineering, Tnc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Project Manager

July 14, 2009

## Case Narrative LOT NUMBER: F9F190219

This report contains the analytical results for the two samples received under chain of custody by TestAmerica St. Louis on June 18, 2009. These samples are associated with your Honeywell Ponds project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Grain size analysis was performed at the Burlington, VT laboratory. TOC analysis was performed at the Denver, CO laboratory.

## Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

## **Trace ICP Metals**

Batch 9180110:

The MS (MSD) recovery for uranium is outside the established QC limits. The RPD is within method acceptance criteria indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recovery.

**Affected Samples:** 

F9F190219 (1): D-26 UPPER

F9F190219 (2): D-26 LOWER

The sample was analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted only for those targets reported from the dilution run.

Affected Samples:

F9F190219 (2): D-26 LOWER

Batch 9177271 (TCLP):

The CCV recovery was outside the upper QC limit (greater than 110%) for barium indicating a potential high bias for this analyte in the samples associated with this CCV. This analyte was not detected above the reporting limit in the associated samples.

## **Bulk Density**

There was insufficient sample provided to perform the analysis of a duplicate for density batch 9188234. Affected Samples:

F9F190219 (1): D-26 UPPER

F9F190219 (2): D-26 LOWER

There were no nonconformances or observations noted with any other analysis on this lot.

## **METHODS SUMMARY**

## F9F190219

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density Cation-Exchange Capacity	ASTM D-5057-90 SW846 9081	ASTM D-5057-90 .SW846 9081
Chloride  Gamma Spectroscopy - Radium-226 & Hits  Isotopic Thorium by Alpha Spectroscopy	MCAWW 300.0A EML GA-01-R MOD EML A-01-R MOD	MCAWW 300.0A
Isotopic Uranium by Alpha Spectroscopy Mercury in Liquid Waste (Manual Cold-Vapor) Method D2216 Percent H2O Dry 105 Degrees C, Weigh		SW846 1311/7470 ASTM ASTM 2216
Paint Filter Test Soil and Waste pH Sulfide	SW846 9095 SW846 9045C MCAWW 376.1	SW846 9095 SW846 DI-LEACHA MCAWW 376.1
Total Organic Carbon Trace Inductively Coupled Plasma (ICP) Metals Trace Inductively Coupled Plasma (ICP) Metals	SW846 9060 SW846 6010B SW846 6010B	SW846 9060 SW846 1311/3010

## References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

## SAMPLE SUMMARY

#### F9F190219

WO #	SAMPLE#	# CLIENT SAMPLE ID		SAMP TIME
LE9P8	001	D-26 UPPER	06/16/09 :	
LE9RP	002	D-26 LOWER	06/16/09 :	

#### NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.



# Sample Data Summary – Geotechnical

Lot# F9F190219 36 of 41

 Client Code:
 STLMOS

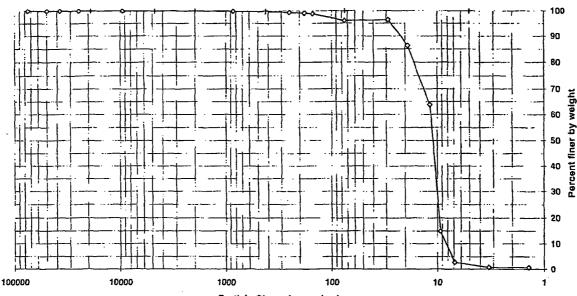
 Sample ID:
 D-26 UPPER

 Lab ID:
 798865

SDG: 9F190219 ETR(s): 132299 Date Received: 6/20/2009
Start Date: 6/22/2009
End Date: 7/6/2009

Percent Solids: 49.5%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

Non-soil material: na
Shape (> #10): na
Hardness (> #10): na



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.1
#40	425	99.7	0.2
#60	250	99.4	0.3
#80	180	99.1	0.3
#100	150	98.8	0.3
#200	75	96.1	2.7
Hydrometer	28.8	96.4	-0.3
	18.9	86.2	10.2
	11.7	63.8	22.4
. 1	9.4	14.9	48.9
	6.9	2.7	12.2
	3.3	0.7	2.0
V	1.4	0.7	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	3.9
Coarse Sand	0.0
Medium Sand	0.3
Fine Sand	3.6
Silt	93.4
Clay	2.7

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with a metal paddle.

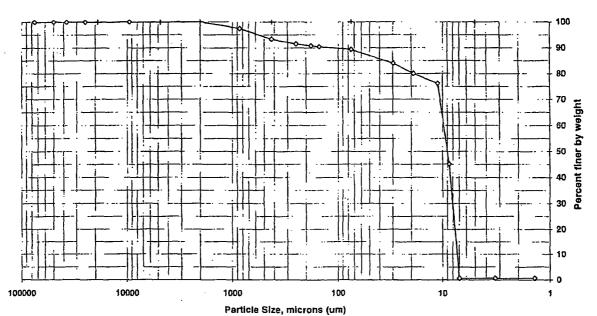
a metal paddie

Client Code: STLMOS Sample ID: D-26 LOWER Lab ID: 798866

SDG: 9F190219 ETR(s): 132299

Date Received: 6/20/2009 Start Date: 6/22/2009 End Date: 7/6/2009

Percent Solids: 2.650 Specific Gravity: Maximum Particle Size: Med sand Non-soil material: Shape (> #10): Hardness (> #10):



Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	97.5	2.5
#40	425	93.3	4.1
#60	250	91.6	1.8
#80	180	90.8	0.7
#100	150	90.4	0.4
#200	75	89.3	1.1
Hydrometer	29.7	83.9	5.4
	19.0	80.1	3.9
	11.1	76.2	3.9
	8.6	45.2	31.0
	6.9	0.6	44.6
	3.3	0.6	0.0
V	1.4	0.6	0.0

Soil	Percent of	
Classification	Total Sample	
Gravel	0.0	
Sand	10.7	
Coarse Sand	0.0	
Medium Sand	6.7	
Fine Sand	4.0	
Silt	88.7	
Clay	0.6	

Preparation Method: Dispersion Device: Mechanical mixer with

a metal paddle.

D2217



TestAmerica Laboratories, Inc.

## ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds D

Lot #: F9F260219

Sean Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Terry Romanko Project Manager

July 22, 2009

# Case Narrative LOT NUMBER: F9F260219

This report contains the analytical results for the two samples received under chain of custody by TestAmerica St. Louis on June 26, 2009. These samples are associated with your Honeywell Ponds D project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Grain size analysis was performed at the Burlington, VT laboratory. TOC analysis was performed at the Denver, CO laboratory.

#### **Observations/Nonconformances**

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

#### Chloride by IC

Batch 9196208:

The MS recovery is outside the established QC limits. A matrix interference is evident in the sample. Method performance is demonstrated by acceptable LCS recovery.

**Affected Samples:** 

F9F260219 (1): D-10 UPPER

F9F260219 (2): D-10 LOWER

#### **Gamma Spectroscopy**

The presence of Thorium 234/Uranium 238 indicate the presence of Proactinium 234m. The Proactinium 234m results were calculated above the MDA in the samples, however, the results may be biased high due to the low abundance at keyline 1001.3 keV.

Affected Samples:

F9F260219 (1): D-10 UPPER

F9F260219 (2): D-10 LOWER

## **Trace ICP Metals**

Batch 9180110:

The MS (MSD) recovery for uranium is outside the established QC limits. The RPD is within method acceptance criteria indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recovery.

**Affected Samples:** 

F9F260219 (1): D-10 UPPER

F9F260219 (2): D-10 LOWER

Batch 9183253 (TCLP):

The LLC recovery for cadmium is outside the upper QC limit, indicating a potential positive bias for that analyte. This analyte was non-detect, indicating that the samples were not affected by this excursion.

Affected Samples:

F9F260219 (1): D-10 UPPER

F9F260219 (2): D-10 LOWER

There were no nonconformances or observations noted with any other analysis on this lot.

## **METHODS SUMMARY**

## F9F260219

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density	ASTM D-5057-90	ASTM D-5057-90
Cation-Exchange Capacity	SW846 9081	SW846 9081
Chloride	MCAWW 300.0A	MCAWW 300.0A
Gamma Spectroscopy - Radium-226 & Hits	EML GA-01-R MOD	
Isotopic Thorium by Alpha Spectroscopy	EML A-01-R MOD	
Isotopic Uranium by Alpha Spectroscopy	EML A-01-R MOD	
Mercury in Liquid Waste (Manual Cold-Vapor)	SW846 7470A	SW846 1311/7470
Method D2216 Percent H2O Dry 105 Degrees C, Weigh	ASTM Moisture,	ASTM ASTM 2216
Paint Filter Test	SW846 9095	SW846 9095
Soil and Waste pH	SW846 9045C	SW846 DI-LEACHA
Sulfide	MCAWW 376.1	MCAWW 376.1
Total Organic Carbon	SW846 9060	SW846 9060
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 1311/3010

#### References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

# **SAMPLE SUMMARY**

#### F9F260219

WO # SAMPLE	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LFPDH 001	D-10 UPPER	06/25/09	
LFPD8 002	D-10 LOWER	06/25/09	

## NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.



# **Sample Data Summary – Geotechnical**

Client Code: STLMOS

Sample ID: D-10 UPPER

Lab ID: 799491

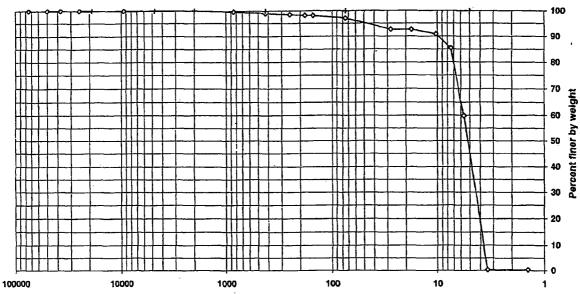
SDG: 9F260219 ETR(s): 132397 Date Received: 6/27/2009
Start Date: 6/29/2009
End Date: 7/7/2009

Percent Solids: 52.3%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

 Non-soil material:
 na

 Shape (> #10):
 na

 Hardness (> #10):
 na



Particle Size, microns (um)

Sleve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 Inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 Inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.7	0.3
#40	425	99.0	0.7
#60	250	98.5	0.6
#80	180	98.2	0.3
#100	150	98.1	0.1
#200	75	97.1	1.1
Hydrometer	28,0	92.6	4.5
	17,7	92.6	0.0
	10.3		1.8
	7.4	85.4	5.4
	5.7	59.8	25.6
	3.4	0.3	59.5
	1.4	0.3	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	2.9
Coarse Sand	0.0
Medium Sand	1.0
Fine Sand	2.0
Silt	37,2
Clay	59.8

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with a metal paddle.

 Cilent Code:
 STLMOS

 Sample ID:
 D-10 LOWER

 Lab ID:
 799492

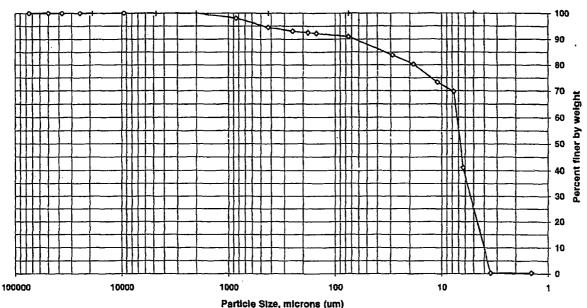
SDG: 9F260219 ETR(s): 132397 Date Received: 6/27/2009
Start Date: 6/29/2009
End Date: 7/7/2009

Percent Solids: 51.2%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

 Non-soli material:
 na

 Shape (> #10):
 na

 Hardness (> #10):
 na



Particle	Size,	microns	(um)

Sieve	Particle	Percent	Incremental
size	size, um	<u>finer</u>	percent
3 inch	75000	100.0	0.0
2 Inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	98.1	1.9
#40	425	94.5	3.5
#60	250	93.1	1.4
#80	180	92.5	0.6
#100	150	92.2	0.3
#200	75	90.9	1.3
Hydrometer	28.8	83.8	7.1
	18.5	80.3	3.5
	11.0	73.2	7.1
	7.7	69.7	3.5
	6.3	41.0	28.6
	3.5	0.3	40.7
V	1.4	0.3	0.0

Soll	Percent of
Classification	Total Sample
Gravel	0.0
Sand	9.1
Coarse Sand	0.0
Medium Sand	5.5
Fine Sand	3,6
Silt	49.9
Clay	41.0

Preparation Method: D2217
Dispersion Device: Mechanical mixer with a metal paddle.



TestAmerica Laboratories, Inc.

# ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds

Lot #: F9G020284

Sean Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Tenry Romanko Project Manager

July 28, 2009

# Case Narrative LOT NUMBER: F9G020284

This report contains the analytical results for the six samples received under chain of custody by TestAmerica St. Louis on July 2, 2009. These samples are associated with your Honeywell Ponds project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Grain size analysis was performed at the Burlington, VT laboratory. TOC analysis was performed at the Denver, CO laboratory.

#### Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

#### Chloride

The MS recovery for Chloride in batch 9196208 is outside the established QC limits. A matrix interference is evident in the sample. Method performance is demonstrated by acceptable LCS recovery.

#### Affected Samples:

F9G020284 (3): D-17 UPPER

F9G020284 (4): D-17 LOWER

## **Density**

There was insufficient sample remaining to perform the analysis of a duplicate for batch 9188234. Affected Samples:

F9G020284 (3): D-17 UPPER

F9G020284 (4): D-17 LOWER

#### **Gamma Spectroscopy**

The presence of Thorium 234/Uranium 238 indicate the presence of Proactinium 234m. The Proactinium 234m results were calculated above the MDA in the samples, however, the results may be biased high due to the low abundance at keyline 1001.3 keV.

#### Affected Samples:

F9G020284 (1): D-29 UPPER F9G020284 (4): D-17 LOWER F9G020284 (2): D-29 LOWER F9G020284 (5): D-11 UPPER F9G020284 (3): D-17 UPPER F9G020284 (6): D-11 LOWER

# **Trace ICP Metals**

Batch 9190064:

The samples were analyzed at a dilution due to high concentrations of target and interfering analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed. **Affected Samples:** 

F9G020284 (4): D-17 LOWER

F9G020284 (6): D-11 LOWER

There were no nonconformances or observations noted with any other analysis on this lot.

# **METHODS SUMMARY**

## F9G020284

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density Cation-Exchange Capacity Chloride Gamma Spectroscopy - Radium-226 & Hits Isotopic Thorium by Alpha Spectroscopy Isotopic Uranium by Alpha Spectroscopy	ASTM D-5057-90 SW846 9081 MCAWW 300.0A EML GA-01-R MOD EML A-01-R MOD EML A-01-R MOD	ASTM D-5057-90 SW846 9081 MCAWW 300.0A
Mercury in Liquid Waste (Manual Cold-Vapor) Method D2216 Percent H2O Dry 105 Degrees C, Weigh Paint Filter Test Soil and Waste pH Sulfide Total Organic Carbon	SW846 7470A ASTM Moisture, SW846 9095 SW846 9045C MCAWW 376.1 SW846 9060	SW846 1311/7470 ASTM ASTM 2216 SW846 9095 SW846 DI-LEACHA MCAWW 376.1 SW846 9060
Trace Inductively Coupled Plasma (ICP) Metals Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B SW846 6010B	SW846 1311/3010

## References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

# SAMPLE SUMMARY

#### F9G020284

WO # SAMPLE# CLIENT	SAMPLE ID	SAMPLED DATE	SAMP TIME
LF187 001 D-29 UF LF19Q 002 D-29 LO LF19T 003 D-17 UF LF198 004 D-17 LO LF2AA 005 D-11 UF LF2AD 006 D-11 LO	OWER PPER OWER PPER	06/30/09 06/30/09 06/30/09 06/30/09 06/30/09	07:30 09:45 09:45 10:15

#### NOTE(S):

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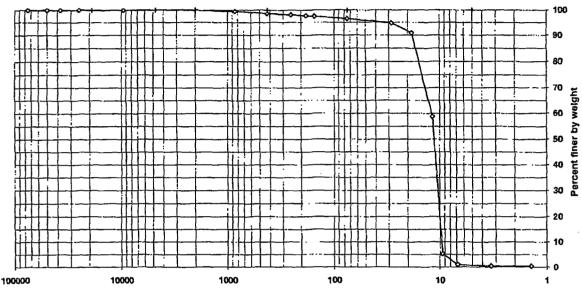
# Sample Report Summary – Geotechnical

Lot# F9G020284 52 of 58

SDG: 9G020284 ETR(s): 132479 Date Received: 7/3/2009
Start Date: 7/7/2009
End Date: 7/13/2009

Percent Solids: 50.6%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

50.6% 2.650 Med sand Non-soil material: na
Shape (> #10): na
Hardness (> #10): na



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.5	0.5
#40	425	98.7	0.9
#60	250	98.1	0.6
#80	180	97.7	0.3
#100	150	97.4	0.3
#200	75	96.6	0.9
Hydrometer	28.3	94.8	1.8
	18.2	90.8	4.0
	11.7	58.8	32.0
	9.4	5.3	53.5
	6.8	1.0	4.3
	3.3	0.3	0.7
V	1.4	0.3	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	3.4
Coarse Sand	0.0
Medium Sand	1.3
Fine Sand	2.1
Slit	95.6
Clay	1.0

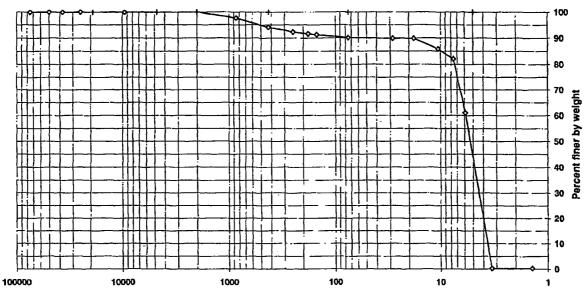
Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddle.

Client Code: STLMOS Sample ID: D-17 LOWER Lab ID: 799912

SDG: 9G020284 ETR(s): 132479 Date Received: 7/3/2009 Start Date: 7/7/2009 End Date: 7/13/2009

Percent Solids: 50.3% Specific Gravity: 2.650 Maximum Particle Size: Med sand Non-soil material: Shape (> #10): Hardness (> #10):



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	97.7	2.3
#40	425	94.1	3.6
#60	250	92.3	1.8
#80	180	91.6	0.7
#100	150	91.2	0.4
#200	75	90.2	1.1
Hydrometer	28.3	89.9	0.3
	17.9	89.9	0.0
	10.5	85.8	4.1
	7.6	82.0	3.8
	5.9	61.1	21.0
	3.3	0.3	60.8
V	1.4	0.3	0.0

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	9.8
Coarse Sand	0.0
Medium Sand	5,9
Fine Sand	3.9
Silt	29.1
Clay	61.1

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with

a metal paddle.



TestAmerica Laboratories, Inc.

# ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds

Lot #: F9E070213

Sean Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Terry Romanko Project Manager

June 3, 2009

#### Case Narrative LOT NUMBER: F9E070213

This report contains the analytical results for the six samples received under chain of custody by STL St. Louis on May 6, 2009. These samples are associated with your Honeywell Ponds project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by STL St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

#### Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

## **Cation Exchange Capacity**

Batch 9133197:

The samples were analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.

**Affected Samples:** 

F9E070213 (1): E-65 UPPER

F9E070213 (6): E-65 LOWER

#### Gamma Spectroscopy

The presence of Thorium 234/Uranium 238 indicate the presence of Proactinium 234m. The Proactinium 234m results were calculated above the MDA in the samples, however, the results may be biased high due to the low abundance at keyline 1001.3 keV.

#### Affected Samples:

F9E070213 (1): E-65 UPPER	F9E070213 (4): E-74 LOWER
F9E070213 (2): E-67 UPPER	F9E070213 (5): E-67 LOWER
F9E070213 (3): E-74 UPPER	F9E070213 (6): E-65 LOWER

#### **Reactive Cyanide**

LCS/MS recoveries for Reactive cyanide are outside the established QC limits. All results are non-detect for this batch. Since this test is semi-qualitative no further action is required.

#### Affected Samples:

F9E070213 (6): E-65 LOWER

#### **TCLP Preparation**

Due to limited sample volume, a reduced sample amount was used for the TCLP extraction. The 20:1 leachate:sample ratio was maintained.

## **Affected Samples:**

F9E070213 (1): E-65 UPPER

F9E070213 (6): E-65 LOWER

# **Trace ICP Metals**

Batch 9131193:

The sample was analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.

**Affected Samples:** 

F9E070213 (5): E-67 LOWER

There were no nonconformances or observations noted with any other analysis on this lot.

# **METHODS SUMMARY**

## F9E070213

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density	ASTM D-5057-90	ASTM D-5057-90
Cation-Exchange Capacity	SW846 9081	SW846 9081
Chloride	MCAWW 300.0A	MCAWW 300.0A
Gamma Spectroscopy - Radium-226 & Hits	EML GA-01-R MOD	
Isotopic Thorium by Alpha Spectroscopy	EML A-01-R MOD	
Isotopic Uranium by Alpha Spectroscopy	EML A-01-R MOD	
Mercury in Liquid Waste (Manual Cold-Vapor)	SW846 7470A	SW846 1311/7470
Method D2216 Percent H2O Dry 105 Degrees C, Weigh	ASTM Moisture,	ASTM ASTM 2216
Paint Filter Test	SW846 9095	SW846 9095
Reactive Cyanide	SW846 7.3.3	SW846 7.3.3
Reactive Sulfide	SW846 7.3.4	SW846 7.3.4
Soil and Waste pH	SW846 9045C	SW846 DI-LEACHA
Sulfide	MCAWW 376.1	MCAWW 376.1
Total Organic Carbon	SW846 9060	SW846 9060
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 1311/3010

## References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"  HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", $EPA-600/4-79-020$ , March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

# **SAMPLE SUMMARY**

## F9B070213

WO # S	SAMPLE	CLIENT SAMPLE ID	SAMPLED SAMP DATE TIME
LCJNP	001	E-65 UPPER	05/04/09 14:00
LCJPG	002	E-67 UPPER	05/05/09 10:15
LCJPM	003	E-74 UPPER	05/06/09 10:30
LCJPV	004	E-74 LOWER	05/06/09 10:30
LCJP3	005	E-67 LOWER	05/05/09 10:15
LCJP6	006	E-65 LOWER ·	05/04/09 14:00

# NOTE (S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.



# Sample Data Summary – Geotechnical

client Code: STLMOS
Sample ID: E-65 UPPER
Lab ID: 794744

SDG: 9E070213 ETR(s): 131603

 Date Received:
 5/8/2009

 Start Date:
 5/8/2009

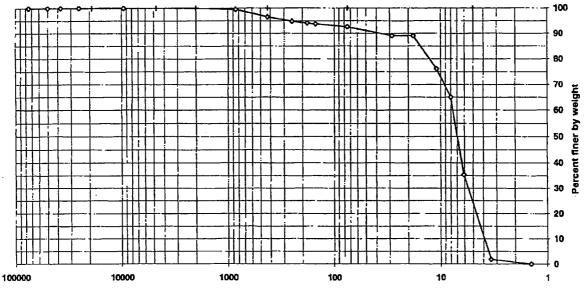
 End Date:
 5/18/2009

Percent Solids: 54.3%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

 Non-soli material:
 na

 Shape (> #10):
 na

 Hardness (> #10):
 na



Particle Size, microns (um)

Sieve	Particle	Percent	incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.5	0.5
#40	425	96.6	2.9
#60	250	94.8	1.8
#80	180	94.1	0.7
#100	150	93.8	0.4
#200	75	92.6	1.2
Hydrometer	28.4	89.1	3.5
	18.0	89.1	0.0
1	10.9	76.1	12.9
l	8.0	65.0	11.1
]	6.1	35.4	29.6
	3.4	1.8	33.6
V	1.4	0.0	1.8

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	· 7,4
Coarse Sand	0.0
Medium Sand	3.4
Fine Sand	4.0
Silt	57.2
Clay	35.4

Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddie.

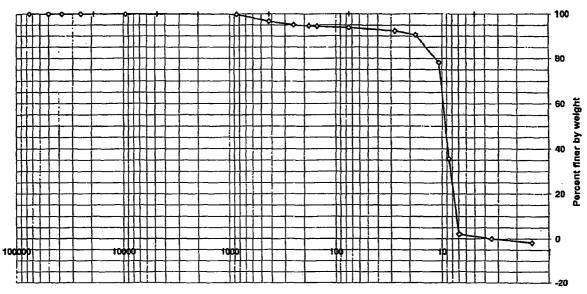
 Rient Code:
 STLMOS
 SDG:
 9E070213
 Date Received:
 5/8/2009

 Sample ID:
 E-65-LOWER
 ETR(s):
 131603
 Start Date:
 5/8/2009

 Lab ID:
 794745
 End Date:
 5/18/2009

Percent Solids: 50.4% Non-soli material: na
Specific Gravity: 2.650 Shape (> #10): na

Maximum Particle Size: Med sand Hardness (> #10): na



#### Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 Inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 Inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.8	0.2
#40	425	96.7	3.1
#60	250	95.1	1.6
#80	180	94.7	0.4
#100	150	94.5	0.2
#200	75	93.8	0.6
Hydrometer	27,5	92.4	1.5
	17,5	90.6	1.8
	10.7	78.2	12.4
	8.6	35.7	42.5
	7.0	2.1	33.6
Î	3.5	0.0	2.1
٧	1.4	-1.8	1.8

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	6.2
Coarse Sand	0.0
Medium Sand	3.3
Fine Sand	2.8
Silt	91.8
Clay	2.1

Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddle.



TestAmerica Laboratories, Inc.

# ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds

Lot #: F9B140145

Sean Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Terry Romanko Project Manager

June 19, 2009

#### Case Narrative LOT NUMBER: F9E140145

This report contains the analytical results for the four samples received under chain of custody by STL St. Louis on May 13, 2009. These samples are associated with your Honeywell Ponds project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by STL St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Grain size analysis was performed at the Burlington, VT laboratory. TOC analysis was performed at the Denver, CO laboratory.

#### Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

## **Cation Exchange Capacity**

#### Batch 9149113:

The samples were analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.

#### **Affected Samples:**

F9E140145 (1): E-80 UPPER

F9E140145 (2): E-80 LOWER

#### **Trace ICP Metals**

#### Batch 9135064:

The MS (MSD) recovery for uranium is outside the established QC limits. The RPD is within method acceptance criteria indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recovery.

## **Affected Samples:**

F9E140145 (1): E-80 UPPER F9E140145 (2): E-80 LOWER F9E140145 (3): E-79 UPPER F9E140145 (4): E-79 LOWER

## Batch 9140214 (TCLP):

The CRI for arsenic spiked at 10ppb was outside the upper limit of the established QC criteria (130.5%). The concentrations of the samples were at such a level as to make the quantification of a spiked standard at this level unnecessary.

## **Affected Samples:**

F9E140145 (1): E-80 UPPER F9E140145 (2): E-80 LOWER F9E140145 (3): E-79 UPPER F9E140145 (4): E-79 LOWER

There were no nonconformances or observations noted with any other analysis on this lot.

# **METHODS SUMMARY**

## F9B140145

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density Cation-Exchange Capacity Chloride	ASTM D-5057-90 SW846 9081	ASTM D-5057-90 SW846 9081
Gamma Spectroscopy - Radium-226 & Hits Isotopic Thorium by Alpha Spectroscopy Isotopic Uranium by Alpha Spectroscopy	MCAWW 300.0A EML GA-01-R MOD EML A-01-R MOD EML A-01-R MOD	MCAWW 300.0A
Mercury in Liquid Waste (Manual Cold-Vapor) Method D2216 Percent H2O Dry 105 Degrees C, Weigh Paint Filter Test	SW846 7470A	SW846 1311/7470 ASTM ASTM 2216 SW846 9095
Soil and Waste pH Sulfide	SW846 9045C MCAWW 376.1	SW846 DI-LEACHA MCAWW 376.1
Total Organic Carbon Trace Inductively Coupled Plasma (ICP) Metals Trace Inductively Coupled Plasma (ICP) Metals	SW846 9060 SW846 6010B SW846 6010B	SW846 9060 SW846 1311/3010

# References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

# SAMPLE SUMMARY

#### F9B140145

<u>wo # s</u>	SAMPLE:	CLIENT SAMPLE ID	SAMPLED SAMP DATE TIME
LC1M0	001	E-80 UPPER	05/12/09 10:15
LC1M6	002	E-80 LOWER	05/12/09 10:24
LC1M7	003	E-79 UPPER	05/12/09 13:10
LC1NA	004	E-79 LOWER	05/12/09 13:20

## NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
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# Sample Data Summary – Geotechnical

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# Particle Size of Soils by ASTM D422

Sample ID: E-80 UPPER
Leb ID: 795433

SDG: 9E140145 ETR(s): 131733 
 Date Received:
 5/15/2009

 Start Date:
 5/19/2009

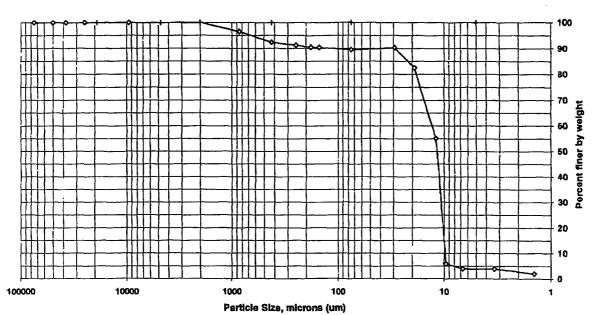
 End Date:
 6/1/2009

Percent Solids: 55.6%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

 Non-soll material:
 na

 Shape (> #10):
 na

 Hardness (> #10):
 na



Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	96.5	3.5
#40	425	92.4	4.1
#60	250	91.2	1.2
#80	180	90.5	0.7
#100	150	90.4	0.1
#200	75	89.5	0.9
Hydrometer	29.2	90,3	-0.8
	19.0	82.5	7.8
	12.0	55.1	27.4
	9.6	5.9	49.2
	6.7	3.9	2.0
	3.3	3.9	0.0
٧	1.4	2.0	2.0

Soll	Percent of
Classification	Total Sample
Gravel	0.0
Sand	10.5
Coarse Sand	0,0
Medium Sand	7.6
Fine Sand	2.9
Silt	85.6
Clay	3.9

Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddle.

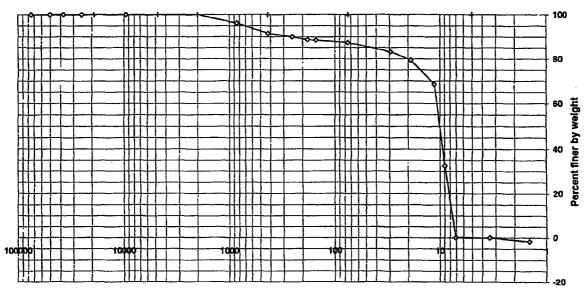
SDG: 9E140145 ETR(s): 131733 
 Date Received:
 5/15/2009

 Start Date:
 5/19/2009

 End Date:
 6/1/2009

Percent Solids: 50.5%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

Non-soil material: na
Shape (> #10): na
Hardness (> #10): na



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	96.2	3.8
#40	425	91.5	4.7
#60	250	B9.9	1.6
#80	180	88.6	1.3
#100	150 88.4		0.2
#200	75	87.3	1.1
Hydrometer	29.2	83.2	4.2
	18.9	79.3	3.9
	11.3	68.5	10.8
	9.0	32.4	36.0
	7.1	0,0	32.4
	3,4	0.0	0.0
V	1.4	-1.8	1.8

Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	12.7
Coarse Sand	0.0
Medium Sand	8.5
Fine Sand	4.2
Silt	87.3
Clay	0.0

Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddle.



TestAmerica Laboratories, Inc.

# ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds R

Lot #: F9E150228

Sean Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Terry Romanko
Project Manager

June 19, 2009

#### Case Narrative LOT NUMBER: F9E150228

This report contains the analytical results for the two samples received under chain of custody by STL St. Louis on May 15, 2009. These samples are associated with your Honeywell Ponds E project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by STL St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Grain size analysis was performed at the Burlington, VT laboratory. TOC analysis was performed at the Denver, CO laboratory.

#### Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

#### **Trace ICP Metals**

Batch 9140214 (TCLP):

The CRI for arsenic spiked at 10ppb was outside the upper limit of the established QC criteria (130.5%). The concentrations of the samples were at such a level as to make the quantification of a spiked standard at this level unnecessary.

Affected Samples:

F9E150228 (1): E-97 LOWER

F9E150228 (2): E-97 UPPER

#### **Cation Exchange Capacity**

Batch 9149113:

The samples were analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.

**Affected Samples:** 

F9E150228 (1): E-97 LOWER

F9E150228 (2): E-97 UPPER

There were no nonconformances or observations noted with any other analysis on this lot.

# **METHODS SUMMARY**

## F9B150228

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density	ASTM D-5057-90	ASTM D-5057-90
Cation-Exchange Capacity Chloride	SW846 9081 MCAWW 300.0A	SW846 9081 MCAWW 300.0A
Gamma Spectroscopy - Radium-226 & Hits	EML GA-01-R MOD	HCHW 500.0A
Isotopic Thorium by Alpha Spectroscopy	EML A-01-R MOD	
Isotopic Uranium by Alpha Spectroscopy	EML A-01-R MOD	
Mercury in Liquid Waste (Manual Cold-Vapor)	SW846 7470A	SW846 1311/7470
Method D2216 Percent H2O Dry 105 Degrees C, Weigh	ASTM Moisture,	ASTM ASTM 2216
Soil and Waste pH	SW846 9045C	SW846 DI-LEACHA
Sulfide	MCAWW 376.1	MCAWW 376.1
Total Organic Carbon	SW846 9060	SW846 9060
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 1311/3010

#### References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

# SAMPLE SUMMARY

## F9B150228

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LC5V8	001	E-97 LOWER	05/14/09	
LC50M	002	E-97 UPPER	05/14/09	

## NOTE (S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.



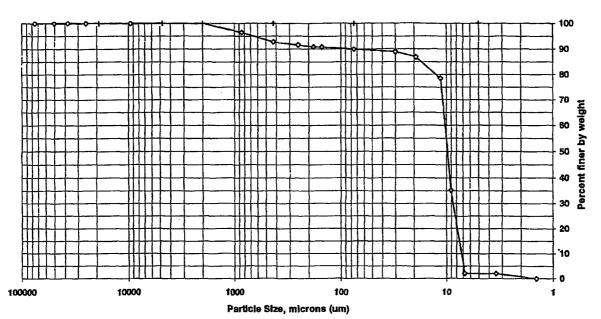
# Sample Data Summary – Geotechnical

38 of 43

Client Code: STLMOS
Sample ID: E-97 LOWER
Lab ID: 795770

SDG: 9E150228 ETR(s): 131779 Date Received: 5/18/2009
Start Date: 5/19/2009
End Date: 6/1/2009

Percent Solids: 53.7%
Specific Gravity: 2.650
Maximum Particle Size: Med sand



Sieve	Particle	Percent	incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 Inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	96.5	3.5
#40	425	92.7	3.8
#60	250	91.6	1.2
#80	180	90.8	0.7
#100	150	90.7	0.1
#200	75	89.9	8,0
Hydrometer	30.0	88.9	1.0
	19.1	86.8	2.1
1	11.3	78,6	8.3
	9.0	35.1	43.4
	6.7	2.1	33.1
	3.4	2.1	0.0
V	1.4	0.0	2.1

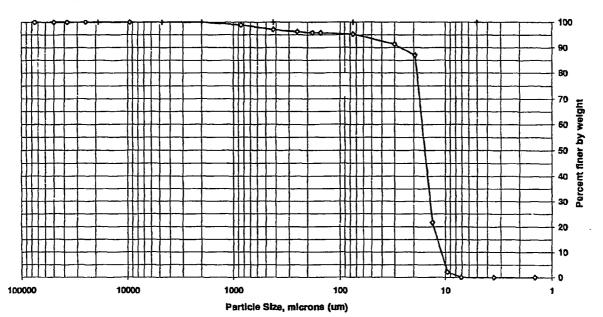
Soil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	10.1
Coarse Sand	0,0
Medium Sand	7.3
Fine Sand	2.8
Silt	87.9
Clay	2.1

Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddle,

SDG: 9E150228 ETR(s): 131779 Date Received: 5/18/2009
Start Date: 5/19/2009
End Date: 6/1/2009

Percent Solids: 53.6%
Specific Gravity: 2.650
Maximum Particle Size: Med sand



Sieve	Particle	Percent	incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch_	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	98.9	1.1
#40	425	97.1	1.B
#60	250	96.3	0.9
#80	180	95.8	0.4
#100	150	95.8	0.0
#200	75	95.3	0.5
Hydrometer	30.1	91.3	4.1
	19.3	86.9	4.3
	13.2	21.6	65.3
	9.6	2.2	19.5
	7.1	0.0	2.2
	3.5	0.0	0.0
V	1.4	0.0	0.0

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	4.7
Coarse Sand	0.0
Medium Sand	2.9
Fine Sand	1.8
Silt	95.3
Clay	0.0

Preparation Method: D2217
Dispersion Device: Mechanical mixer with

a metal paddle.



TestAmerica Laboratories, Inc.

# ANALYTICAL REPORT

PROJECT NO. 1991-135-11/002

Honeywell Ponds

Lot #: F9F050289

Sean Chisek

Andrews Engineering, Inc. 3300 Ginger Creek Drive Springfield, IL 62711

TESTAMERICA LABORATORIES, INC.

Project Manager

July 1, 2009

## Case Narrative LOT NUMBER: F9F050289

This report contains the analytical results for the two samples received under chain of custody by TestAmerica St. Louis on June 5, 2009. These samples are associated with your Honeywell Ponds project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Grain size analysis was performed at the Burlington, VT laboratory. TOC analysis was performed at the Denver, CO laboratory.

#### Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

## **Cation Exchange Capacity**

- The samples were analyzed at a dilution due to high concentrations of target analytes. The reporting limit has been adjusted for the dilution since no analysis at a lesser dilution was performed.
- The RPD is not within method acceptance criteria. The sample is non-homogeneous. Method performance is demonstrated by acceptable LCS recovery.

#### Affected Samples:

F9F050289 (1): E-103 UPPER

F9F050289 (2): E-103 LOWER

#### **Bulk Density**

A duplicate was not performed due to insufficient volume.

#### **Affected Samples:**

F9F050289 (1): E-103 UPPER

F9F050289 (2): E-103 LOWER

#### **TCLP Extraction**

Due to limited sample volume, a reduced sample amount was used for the TCLP extraction for metals, maintaining the 20:1 sample to leachate ratio.

## Affected Samples:

F9F050289 (1): E-103 UPPER

F9F050289 (2): E-103 LOWER

#### **Trace ICP Metals**

Batch 9159092:

The MS (MSD) recovery for uranium is outside the established QC limits. The RPD is within method acceptance criteria indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recovery.

#### **Affected Samples:**

F9F050289 (1): E-103 UPPER

F9F050289 (2): E-103 LOWER

There were no nonconformances or observations noted with any other analysis on this lot.

## **METHODS SUMMARY**

## P9F050289

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Bulk Density Cation-Exchange Capacity Chloride Gamma Spectroscopy - Radium-226 & Hits Isotopic Thorium by Alpha Spectroscopy	ASTM D-5057-90 SW846 9081 MCAWW 300.0A EML GA-01-R MOD EML A-01-R MOD	ASTM D-5057-90 SW846 9081 MCAWW 300.0A
Isotopic Uranium by Alpha Spectroscopy Mercury in Liquid Waste (Manual Cold-Vapor) Method D2216 Percent H2O Dry 105 Degrees C, Weigh Paint Filter Test Soil and Waste pH Sulfide Total Organic Carbon Trace Inductively Coupled Plasma (ICP) Metals	EML A-01-R MOD SW846 7470A ASTM Moisture, SW846 9095 SW846 9045C MCAWW 376.1 SW846 9060 SW846 6010B	SW846 1311/7470 ASTM ASTM 2216 SW846 9095 SW846 DI-LEACHA MCAWW 376.1 SW846 9060
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 1311/3010

#### References:

ASTM	Annual Book Of ASTM Standards.
EML	"ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL" HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY
MCAWW	"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

## SAMPLE SUMMARY

#### F9F050289

WO #	SAMPLE#	CLIEN.	SAMPLE ID	SAMPLED DATE	SAMP TIME
LEE33 LEE4P	001 002	E-103 E-103		06/03/09 06/03/09	

#### NOTE (S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.



# Sample Data Summary – Geotechnical

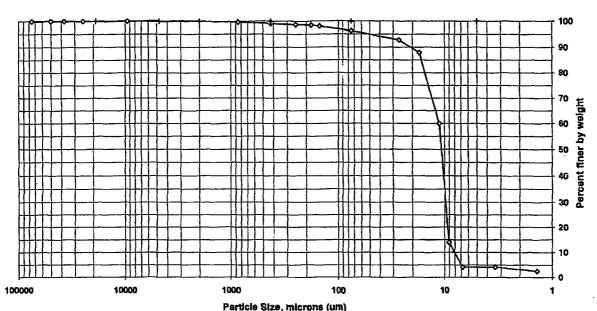
Lot# F9F050289 35 of 40

## Particle Size of Soils by ASTM D422

STLMOS Client Code: Sample ID: E-103 UPPER Lab ID: 797954

SDG: 9F050289 ETR(s): 132154 Date Received: 6/11/2009 Start Date: 6/11/2009 End Date: 6/26/2009

Percent Solids: 52.0% Specific Gravity: 2.650 Maximum Particle Size: Med sand Non-soll material: Shape (> #10): Hardness (> #10): na



				(=-
Clove	Porticio	Dercont	Incremental	

Sieve	Particle	Percent	Incremental	
size	size, um	finer	percent	
3 inch	75000	100.0	0.0	
2 inch	50000	100.0	0.0	
1.5 Inch	37500	100.0	0.0	
1 inch	25000	100.0	0.0	
3/4 inch	19000	100.0	0.0	
3/8 inch	9500	100.0	0.0	
#4	4750	100.0	0.0	
#10	2000	100.0	0.0	
#20	850	99.6	0.4	
#40	425	99.2	0.4	
#60	250	98.7	0.5	
#80	180	98.5	0.2	
#100	150	98.2	0.4	
#200	75	96.3	1.9	
Hydrometer	26.5	92.7	3.5	
	17.2	87.8	4.9	
	11.2	59.9	27.9	
	9.1	14.0	46.0	
	6.8	4.1	9.8	
	3.4	4.1	0.0	
v	1.4	2.5	1.6	

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	3.7
Coarse Sand	0.0
Medium Sand	0.8
Fine Sand	2.9
Sint	92.2
Clay	4.1

Preparation Method: Dispersion Device: Mechanical mixer with

D2217

a metal paddle.

Dispersion Period: 1 minute

### Particle Size of Soils by ASTM D422

 Citent Code:
 STLMOS

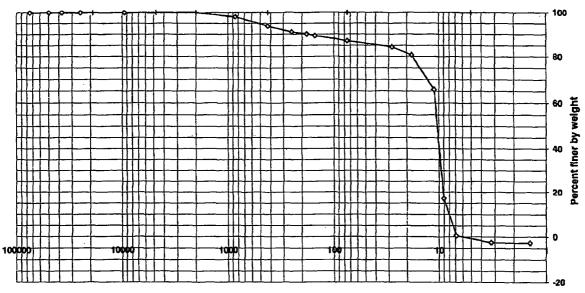
 Sample ID:
 E-103 LOWER

 Lab ID:
 797955

SDG: 9F050289 ETR(s): 132154 Date Received: 6/11/2009
Start Date: 6/11/2009
End Date: 6/26/2009

Percent Solids: 50.5%
Specific Gravity: 2.650
Maximum Particle Size: Med sand

Non-soil material: na
Shape (> #10): na
Hardness (> #10): na



Particle Size, microns (um)

Sieve	Particle	Percent	Incremental
size	size, um	finer	percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	98.0	2.0
#40	425	93.7	4.3
#60	250	91.0	2.7
#80	180	90.0	1.0
#100	150	89.3	0.7
#200	75	87.1	2.2
Hydrometer	27.8	84.2	2.8
	18.0	80.6	3.6
	11.1	65.6	15.0
	9.0	17.2	48.4
	6.9	0.6	16.7
	3.2	-2.5	3.1
V	1.4	-2.8	0.3

Šoil	Percent of
Classification	Total Sample
Gravel	0.0
Sand	12.9
Coarse Sand	0.0
Medium Sand	6.3
Fine Sand	6.6
Silt	86.5
Clay	0.6

Preparation Method:

D2217

Dispersion Device: Mechanical mixer with a metal paddle,

a metal paddle

Dispersion Period: 1 minute

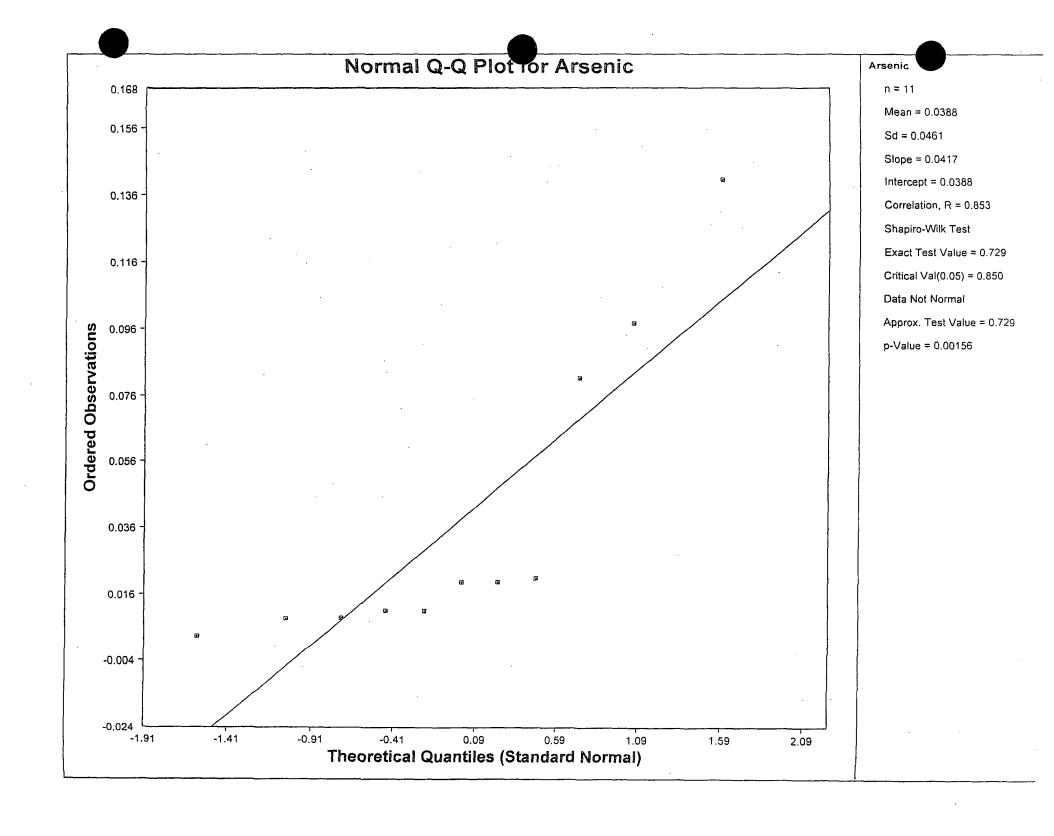
# **EXHIBIT 5**

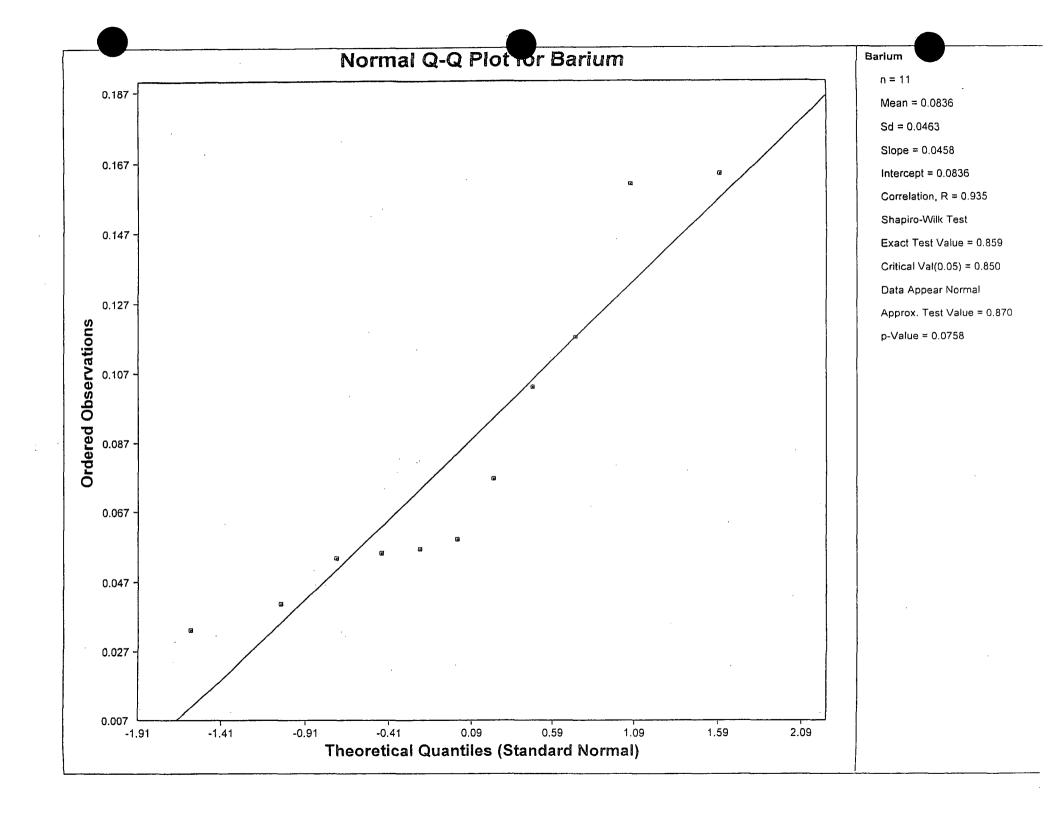
**SCOUT STATISTICAL OUTPUT** 

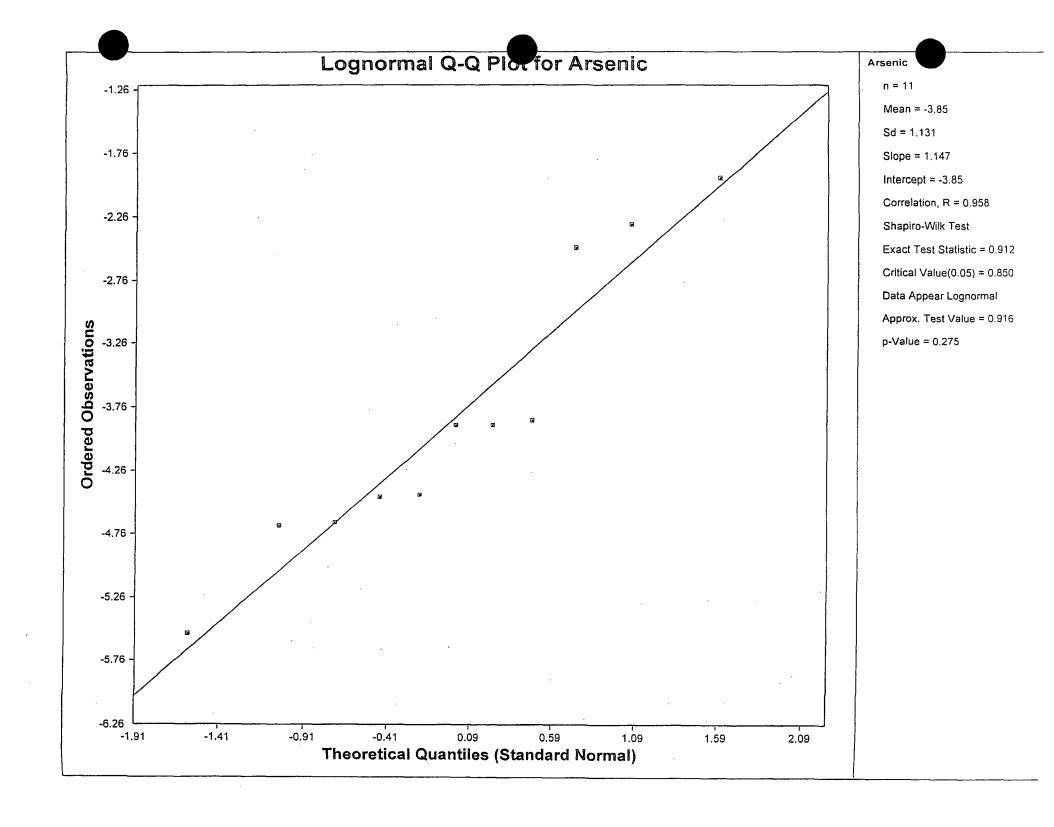
**B POND** 

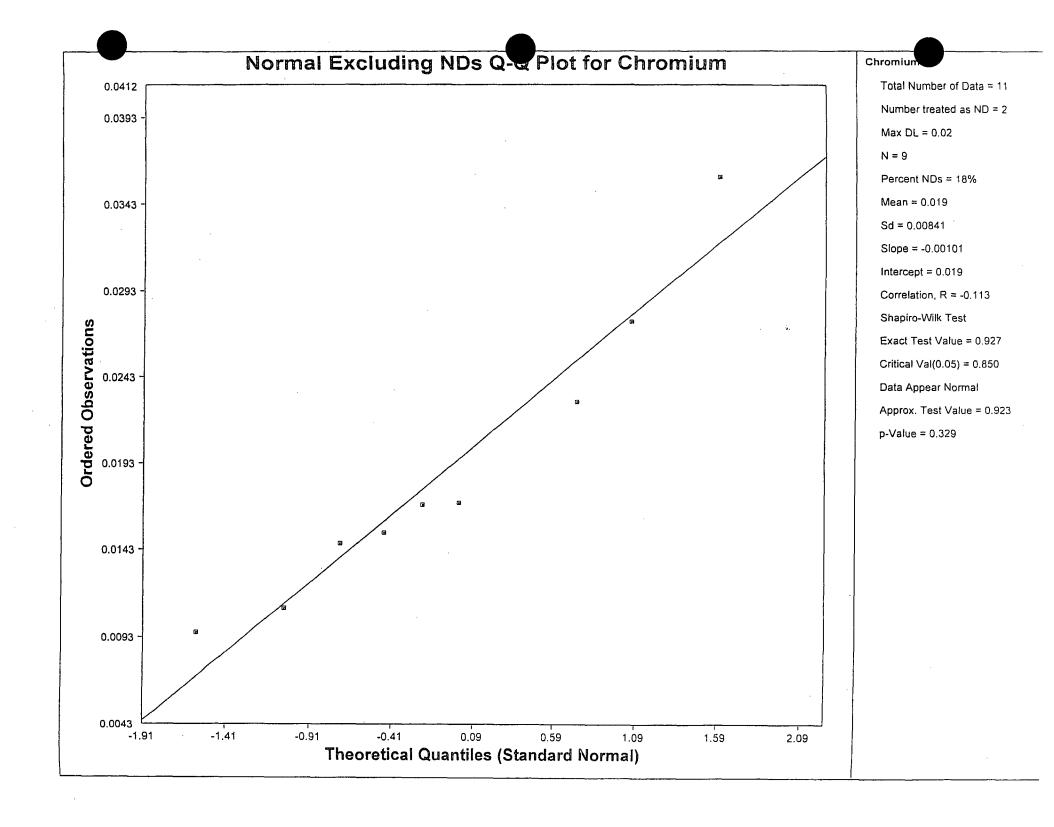
	Univariate Des	criptive Statistic	s for Datasets v	vith NDs				
Date/Time of Computation	8/14/2009 8:48	:17 AM						
User Selected Options								
From File	J:\1991\91-135	:\1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\B Pond\Metals.wst						
Full Precision	OFF							
	Arsenic	Chromium	Mercury					
Number of Observations	11	11	11					
Number of Missing Values	0	0	0					
Number of Detects	9	9	2					
Number of Non-Detects	2	2	9	<u> </u>		<del> </del>		
Percentage of Non-Detects	18.18%	18.18%	81.82%	<del>                                     </del>				
Minimum Observed Detected Value	0.0039	0.0096	2.4000E-4					
Maximum Observed Detected Value	0.141	0.0359	3.4000E-4				<del>                                     </del>	
Mean of Detected Values	0.043	0.019	2.9000E-4					
Median of Detected Values	0.0115	0.0169	2.9000E-4					· <del> </del>
Standard Deviation of Detected Values	0.0505	0.00841	7.0711E-5	<u> </u>		1		
MAD of Detected Values	0.0076 ·	0.0059	5.0000E-5					
MAD / 0.6745 of Detected Values	0.0113	0.00875	7.4129E-5					
Skewness of Detected Values	1.192	1.093	N/A					-
Kurtosis of Detected Values	-1.031	-0.51	16768					<del> </del>
CV of Detected Values	1.176	0.443	0.244					
(Q1) 25% Percentile (All Obs)	0.00925	0.0138	8.3500E-4					1
(Q2) Median (All Obs)	0.0115	0.0169	2.9000E-4				<u> </u>	
(Q3) 75% Percentile (All Obs)	0.0361	0.0207	0.001				<del></del>	+
90% Percentile (All Obs)	0.0965	0.027	0.001			1	1	<del> </del>
95% Percentile (All Obs)	0.117	0.0313	0.001					
99% Percentile (All Obs)	0.136	0.035	0.001					<del> </del>
	l .							

	Univariate Descriptive Statistics for Datasets with No NUs							
Date/Time of Computation	8/14/2009 8:4	9:17 AM			- <del></del>		<del></del>	
User Selected Options								
From File	:\1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\B Pond\Metals.wst							
Full Precision	OFF			,				
	Barium				4 4			
Number of Observations	11							
Number of Missing Values	0							
Minimum Observed Value	0.0332							
Maximum Observed Value	0.164							
Mean	0.0836							
10% Percentile	0.034							
15% Percentile	0.0381							
(Q1) 25% Percentile	0.0506							
(Q2) Median	0.0591							
(Q3) 75% Percentile	0.107							
90% Percentile	0.157							
95% Percentile	0.162	T				<u> </u>		
99% Percentile	0.164						<u> </u>	
Standard Deviation	0.0463	<del>                                     </del>						
Variance	0.00214	<del>                                     </del>						
Median of Absolute Deviation (MAD)	0.0183					<u> </u>		
MAD / 0.6745	0.0271	-					İ	
Mean of Abs. Deviation (AD) Median	0.0348							1
Mean of AD Median/0.6745	0.0516			1	-			<u> </u>
IQR	0.0632							
IQR / 1.35	0.0468					<u> </u>		[
Skewness	0.906							
Kurtosis	-0.523							1
CV	0.553					1		









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Date/Time of Computation	8/14/2009 10:4	9:30 AM							
User Selected Options									
From File	J:\1991\91-135	NMON\Lab Data	a\2009\Pond	s\Sludge\Sco	ut\B Pond\M	letals.wst			
Full Precision	OFF	·							
Number of Bootstrap Operations	2000								
Confidence Coefficient	0.8								
	<u> </u>		<del> </del>	·····					
Arsenic									
General Statistic	s								
Numbe	er of Valid Data	11							
Number of	Detected Data	9				***			
Number of Distinct	Detected Data	9					1		
Min	mum Detected	0.0039			<del>-</del>				
Max	mum Detected	0.141							
Number of N	on-Detect Data	2							<del></del>
Perce	nt Non-Detects	18.18%			- 174	-	<del> </del>		
Minim	um Non-detect	0.02					<del> </del>		
Maxim	um Non-detect	0.02					<del> </del>		
Raw Statistics		·				<del></del>	+		
Mean of	Detected Data	0.043						<del></del>	<del> </del>
SD of	Detected Data	0.0505					-		<del></del>
	<u> i</u>		L			l			
	Warning	g: There are or	nly 9 Detecte	ed Values in t	his data				
									1
Note: It	should be note	d that even tho	ugh bootstra	ap may be pe	rformed on	this data s	et		
	should be note e resulting cald						et		
							el		
	e resulting cald	culations may n	ot be reliabl	e enough to	draw conclu	usions			
th	e resulting cald	culations may n	ot be reliabl	e enough to	draw conclu	usions			
th	e resulting cald	culations may n	ot be reliabl	e enough to	draw conclu	usions			
th	e resulting cald	culations may n	ot be reliabl	e enough to	draw conclu	usions			
It is recommen	e resulting cald	culations may n	ot be reliabl	e enough to	draw conclu	usions			
It is recommen	e resulting calconded to have 10 ates (MLEs)	-0.00921	ot be reliabl	e enough to	draw conclu	usions			
It is recommen	e resulting calconded to have 10 ates (MLEs)	-0.00921	ot be reliabl	e enough to	draw conclu	usions			
It is recommen	e resulting calconded to have 10 ates (MLEs)  MLE Mean  MLE Stdv	-0.00921	ot be reliabl	e enough to	draw conclu	usions			
It is recomment  Maximum Likelihood Estim	ded to have 10 ates (MLEs) MLE Mean MLE Stdv	-0.00921	ot be reliabl	e enough to	draw conclu	usions			
It is recomment  Maximum Likelihood Estim	e resulting calconded to have 10 ates (MLEs) MLE Mean MLE Stdv	-0.00921 0.0897	ot be reliabl	e enough to	draw conclu	usions			
It is recomment  Maximum Likelihood Estim  Normal (MLE) Confidence	e resulting calconded to have 10 ates (MLEs) MLE Mean MLE Stdv	-0.00921 0.0897	ot be reliabl	e enough to	draw conclu	usions			
It is recomment  Maximum Likelihood Estim  Normal (MLE) Confidence	ded to have 10 ates (MLEs) MLE Mean MLE Stdv ce Interval Lower Limit -0.0463	-0.00921 0.0897	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  MLE (t	ded to have 10 ates (MLEs) MLE Mean MLE Stdv ce Interval Lower Limit -0.0463	-0.00921 0.0897	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Muse (t	ded to have 10 ates (MLEs) MLE Mean MLE Stdv ce Interval Lower Limit -0.0463	-0.00921 0.0897 Upper Limit 0.0279	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Muse (t	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463	-0.00921 0.0897 Upper Limit 0.0279	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Muse (t	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463  stics  mal ROS Data	-0.00921 0.0897 Upper Limit 0.0279	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  MLE (t	ded to have 10 ates (MLEs) MLE Mean MLE Stdv  ce Interval Lower Limit -0.0463  stics mal ROS Data	-0.00921 0.0897 Upper Limit 0.0279	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Maximum Likelihood Estim  Normal (MLE) Confidence  MLE (t)  Normal ROS Static  Mean of No  Stdv of No	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463  stics  mal ROS Data  mal ROS Data  a Intervals  Lower Limit	-0.00921 0.0897  Upper Limit 0.0279  0.0374 0.0473	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  MLE (t	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463  stics  mal ROS Data  mal ROS Data  a Intervals  Lower Limit	-0.00921 0.0897 Upper Limit 0.0279	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Normal ROS Station  Normal ROS Confidence  ROS Student's	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463  stics  mal ROS Data  mal ROS Data  a Intervals  Lower Limit  0.0178	-0.00921 0.0897  Upper Limit 0.0279  0.0374 0.0473	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Normal ROS Stati  Mean of No  Stdv of No  ROS Student's  Gamma ROS Stati	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463  stics  mal ROS Data  mal ROS Data  mal ROS Data  Lower Limit  0.0178	-0.00921 0.0897  Upper Limit 0.0279  0.0374 0.0473  Upper Limit 0.057	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Normal ROS Stati  Mean of No  Stdv of No  ROS Student's  Gamma ROS Stati	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463  stics  mal ROS Data  mal ROS Data  a Intervals  Lower Limit  0.0178	-0.00921 0.0897  Upper Limit 0.0279  0.0374 0.0473  Upper Limit 0.057	ot be reliabl	e enough to	draw conclu	usions			
Normal (MLE) Confidence  Maximum Likelihood Estima  Mule (to the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state	ded to have 10  ates (MLEs)  MLE Mean  MLE Stdv  ce Interval  Lower Limit  -0.0463  stics  mal ROS Data  mal ROS Data  a Intervals  Lower Limit  0.0178	-0.00921 -0.0897  Upper Limit 0.0279  0.0374 -0.0473  Upper Limit 0.057	ot be reliabl	e enough to	draw conclu	usions			

Gamma intervals								
Gamma Lower Limit	Upper Limit							
ROS Approximate Gamma 0.0266	0.068							
ROS Adjusted Gamma 0.0253	0.0731							
	<u> </u>							
Log-Transformed Statistics								
Mean of Log-Transformed Detected Data	-3.836							
Stdv of Log-Transformed Detected Data	1.264							
Mean of Lognormal ROS Data	,			<u> </u>				
Stdv of Lognormal ROS Data	,		1					
				ļ		<del></del>		
Lognormal Confidence Intervals								
	le r							
Lognormal Lower Limit	Upper Limit	<u> </u>						
ROS Land's H 0.0224	0.0926							
ROS % Bootstrap 0.0196	0.0558							
ROS BCA Bootstrap 0.0218	0.0595							
Kaplan Meier Distribution Free Statistics								
Kaplan Meier Mean	0.0368	<b>†</b>						
Kaplan Meier Stdv	0.0451	<u> </u>						
Kaplan Meier SEM	0.0144	<del> </del>	ļ	<del> </del>	<del> </del>			
	1							
Nonparametric Confidence Intervals	······································	<u> </u>			<u> </u>			
Nonparametric Lower Limit	Upper Limit	<del> </del>						
Kaplan Meier (t) 0.017	0.0566				1			
Kaplan Meier (z) 0.0183	0.0553		-		1			<u> </u>
Kaplan Meier % Bootstrap 0.02	0.054		{ 	<del> </del>				
Kaplan Meier BCA Bootstrap 0.0183	0.0542	·		<del></del>				
Kaplan Meier Chebyshev 0.00456	0.069	<del> </del>		<u> </u>	<del> </del>			
Adplant moles Grossyania - Grossia		<del> </del>			<u> </u>			
Unable to Winsorize Data!	<del></del>	ļ						
Olidpie (0 Mili20lize Odia:		ļ	}	ļ	<del> </del>			
Obserview		ļ	<u> </u>		<del> </del>			
Chromium		ļ		<u> </u>	<u> </u>			
	<del></del>	ļ			ļ <u>.</u>			
General Statistics	<del></del>							
Number of Valid Data								
Number of Detected Data			<u> </u>					
Number of Distinct Detected Data	9							
Minimum Detected	0.0096							
Maximum Detected	0.0359							
Number of Non-Detect Data	2			T				
Percent Non-Detects	18.18%							
Minimum Non-detec	0.02	1		<del> </del>	<del>                                     </del>	<u> </u>		
Maximum Non-detec	0.02	<del></del>		<b> </b>	<del>                                     </del>		<del>                                     </del>	ļi
		<del> </del>		<del> </del>	<del> </del>	<b> </b>	<del> </del>	<u> </u>
Raw Statistics	<del></del>	+	<del> </del>	<del> </del>	<del> </del>	ļ	<del>                                     </del>	
Mean of Detected Data	0.019		-	<del> </del>	<del> </del>	<del> </del>	ļ	
SD of Detected Data	.L	<del> </del>	<del> </del>			<del> </del>	<del> </del>	<b> </b>
	1	1	1	I	į.	i	l	1
	<del></del>		·	<del></del>	.d	4	L	L

Note: It should be noted that even though bootstrap may be performed on this data set

the	e resulting calc	ulations may r	not be reliable	enough to	draw conclu	sions	· · · · · ·		
It is recommend	led to have 10	-15 or more di	stinct observa	ations for a	ccurate and	meaningful r	esults.		
			· · · · · · · · · · · · · · · · · · ·					-	
Maximum Likelihood Estima									
	MLE Mean	0.0295							
	MLE Stdv	0.00538							
Normal (MLE) Confidence									
		Upper Limit							
MLE (t)	0.0273	0.0317					·		
								·········	
Normal ROS Statis									
	mal ROS Data	0.0182							
Stdv of Nor	mal ROS Data	0.00782							
Normal ROS Confidence									
		Upper Limit							
ROS Student's t	0.015	0.0214							
Gamma ROS Statis	stics								
k Star of Gan	nma ROS Data	5.424							
Theta Star of Gan	nma ROS Data	0.00348							
Nu Star of Gan	nma ROS Data	119.3							
Gamma Interval									
Gamma	Lower Limit	Upper Limit							
ROS Approximate Gamma		0.0225							
ROS Adjusted Gamma	0.0158	0.023							
Log-Transformed Sta									
Mean of Log-Transformed		}							
Stdv of Log-Transformed		1							
Mean of Logno		ļ							
Stdv of Logno	rmal ROS Data	0.00782							
Lognormal Confidence									
Lognormal	Lower Limit	Upper Limit							
ROS Land's H	i	0.0219							
ROS % Bootstrap	!	0.0209							
ROS BCA Bootstrap	0.0157	0.0219							
	·	***							
Kaplan Meier Distribution F									
Кар	an Meier Mean	0.0181							
Ка	olan Meier Stdv	0.00751			<u> </u>				
Кар	olan Meier SEM	0.00244			1				
						1		<del> </del>	
Nonparametric Confidence	e Intervals		1		1				<b> -</b>
Nonparametric	Lower Limit	Upper Limit	1		1		<u> </u>	<del> </del>	
Kaplan Meier (t	0.0147	0.0214	1		1				
Kaplan Meier (z	0.015	0.0212			T				

Kaplan Meier % Bootstrap	0.0151	0.0212		1		!	1
Kaplan Meier BCA Bootstrap	0.0151	0.0209					
Kaplan Meier Chebyshev	0.0126	0.0236					
Inable to Winsorize Data!							

Confidence In	ervals/Limits (CL	s) for Data	sets Withou	t Non-Dete	cts			
Date/Time of Computation 8/14/2009 10:5	0:44 AM	<del></del>						
User Selected Options								
From File J:\1991\91-135	\MON\Lab Data\2	2009\Ponds	\Sludge\Sco	ut\B Pond\M	letals.wst			
Full Precision OFF								
ber of Bootstrap Operations 2000						-		
Confidence Coefficient 0.8	<del></del>				<u></u>			
Barium							<del></del>	
							<del>_</del>	
Number of Valid Observations	11							
Number of Distinct Observations								
Trumber of District Codervations	1 ''		-					
Raw Statistics								
Mean	0.0836							
Minimum	ii							
5% Percentile	1							
	I							
10% Percentile	l							
1st Quartile	l							
Mediar	1							
3rd Quartile	1							
90% Percentile	Į l							
95% Percentile	1							
Maximur	l							
Standard Deviation	l							
MAD / 0.6745	1							
IQR / 1.35	0.0468							
Normal Statistics								
1% Percentile (z								
5% Percentile (z	J			<del></del>				
10% Percentile (z	1							
1st Quartile (z								<del></del>
Median (z	1		<del> </del>					
3rd Quartile (z	1							
90% Percentile (z						ļ		
95% Percentile (z	1 1							
99% Percentile (z	0.191							
Normal Confidence Intervals								
Normal Lower Limit	Upper Limit							
Student's t 0.0645	0.103							
Gamma Statistics								
k ha								
Theta ha								
nu ha	1							
k sta	.1							
Theta sta	1 1							
MLE of Mea								
MLE of Standard Deviatio	1 1							
nu sta	r 64.22	-						

	Chisquare (2k)	8.355							
Gamma Confidence	Intervals								
Confidence	Lower Limit	Upper Limit							
Approximate Gamma	0.0679	0.107							
Adjusted Gamma	0.0661	0.11							
		· · · · · · · · · · · · · · · · · · ·							
Log-Transformed S	Statistics								
Mean of Log-Tra	ensformed Data	-2.614			<u> </u>		<del></del>		
Standard Deviation of Log-Tra	ensformed Data	0.536							
MVU Esti	mate of Median	0.0723		<del> </del>					
MVU E:	stimate of Mean	0.0833		<del> </del>	+	<u> </u>			
MVU	Estimate of SD	0.0458	<del> </del>						
MVU Estimate of Standar	d Error of Mean	0.0138	<del> </del>		<del> </del>			,	
		<u></u>	<del> </del>	<del> </del>	<del> </del>	<del> </del>			
Lognormal Confidence	e Intervals		<u> </u>		<del> </del>	<u> </u>			
Confidence	Lower Limit	Upper Limit	<del> </del>		<del> </del>	<del> </del>			
Land's H	0.0683	0.111			<del> </del>				<u> </u>
Chebyshev (MVUE)	0.0525	0.114	ļ		<del> </del>				
	L	<u> </u>			-				<u> </u>
Nonparametric Confide	nce Intervals		<del> </del>		<del> </del>				
Confidence	Lower Limit	Upper Limit	<del> </del>		<del> </del>				
Central Limit Theorem	0.0657	0.102	<del> </del>		+				
Jackknife	0.0645	0.103	<del></del>	<del> </del>	<del> </del>				
Standard Bootstrap	0.067	0.1	<del> </del>			<del> </del>			
Bootstrap-t		0.107		<del> </del>		<del>                                     </del>			
Percentile Bootstrap	0.0665	0.101	<del> </del>	<del> </del>	<del> </del>				
BCA Bootstrap	l	0.103	<del> </del>	<del> </del>	<del> </del>	<del> </del>	·		
Chebyshev		0.115	<del> </del>	<del> </del>	<del> </del>	-		<del> </del>	
Modified (t)	J	0.103	·			<del> </del>		<del> </del>	
Adjusted CLT		0.104	<del> </del>		1	<del> </del>			
	<u> </u>	<u> </u>		-		<u> </u>		-	

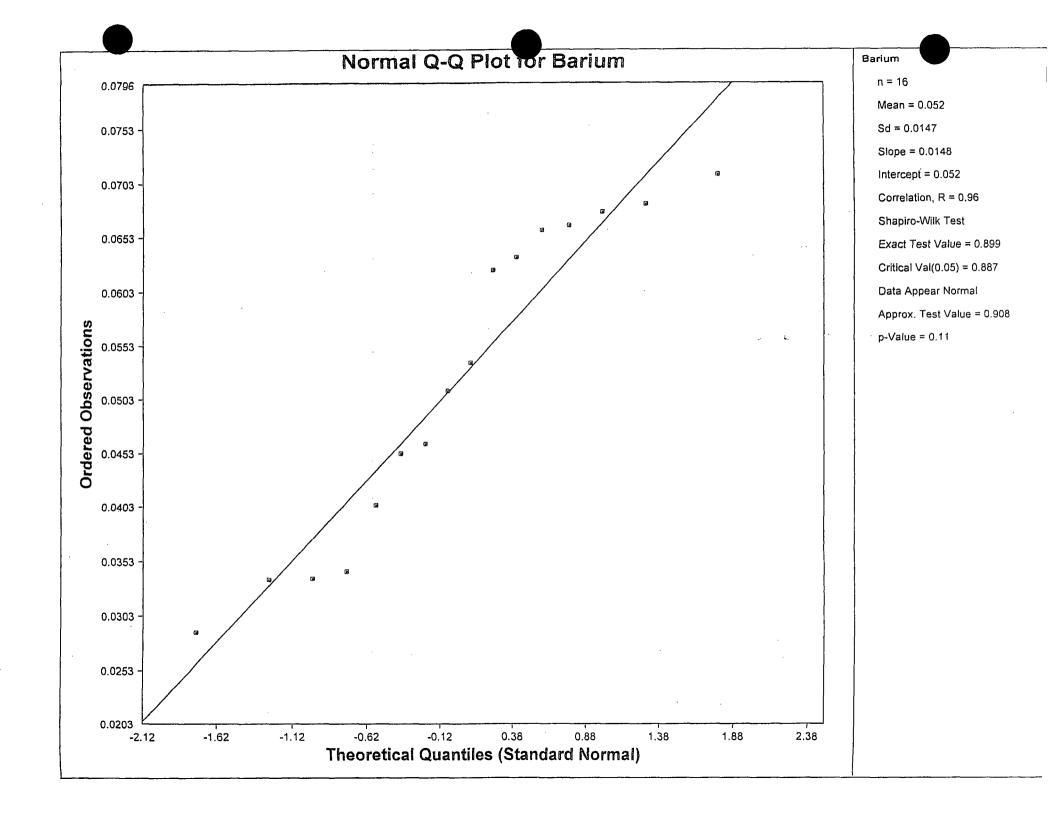
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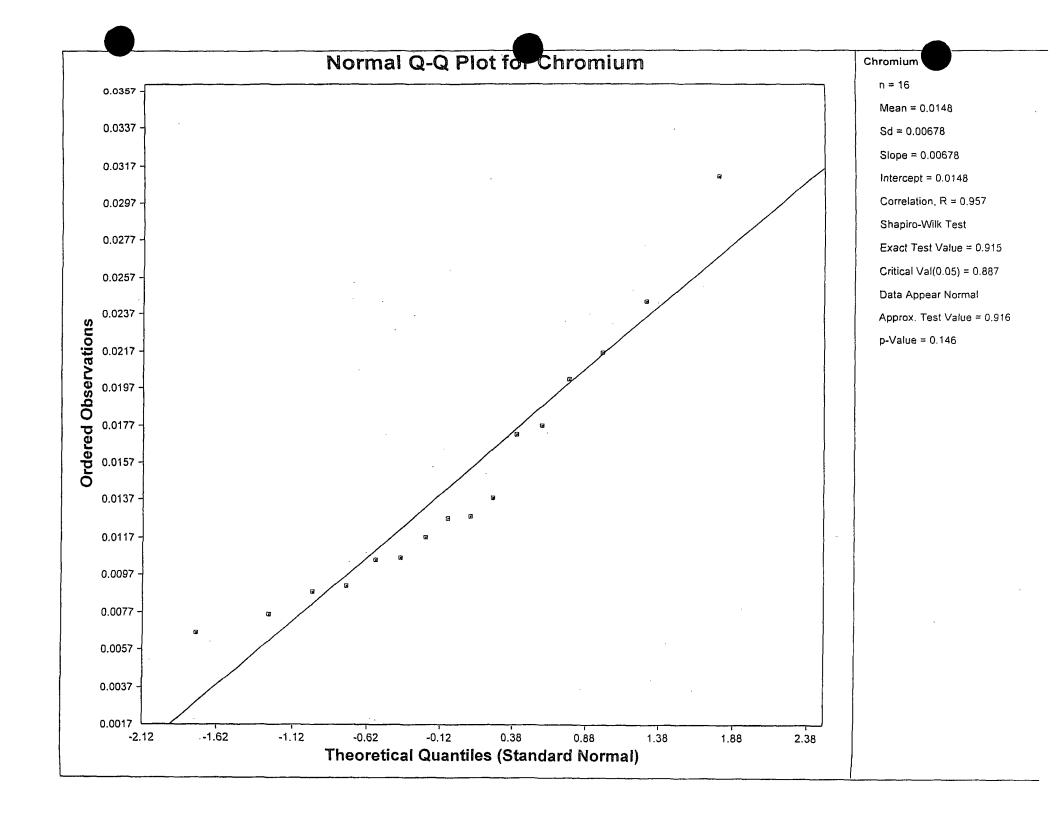
ACCOUNTS AND ASSESSMENT OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE	Univariate Des	nivariate Descriptive Statistics for Datasets with No NDs								
Date/Time of Computation	8/14/2009 9:07	:17 AM								
User Selected Options						<u></u>		-		
From File	J:\1991\91-135	MON\Lab Data\	2009\Ponds	\Sludge\Sco	ut\C Pond\N	letals.wst	<del></del>			
Full Precision	OFF			· · · · · · · · · · · · · · · · · · ·	<del></del>	<del></del>				
	·									
	Barium	Chromium								
Number of Observations	16	16								
Number of Missing Values	0	0								
Minimum Observed Value	0.0288	0.0066			1	<del></del>				
Maximum Observed Value	0.0711	0.0311		1		_				
Mean	0.052	0.0148								
10% Percentile	0.0317	0.0072								
15% Percentile	0.0336	0.00808						†		
(Q1) 25% Percentile	0.0344	0.0344 0.0091								
(Q2) Median	0.0524	0.0524 0.0128								
(Q3) 75% Percentile	0.066	0.066 0.0177								
90% Percentile	0.068	0.0227		<del> </del>		-	<del> </del>	<del> </del>		
95% Percentile	0.0689	0.0257		<del> </del>		<del>-  </del>		<del>                                     </del>		
99% Percentile	0.0707	0.03		<u> </u>			<del> </del>			
Standard Deviation	0.0147	0.00678		<del> </del>		-	<del> </del>	<del>                                     </del>		
Variance	2.1736E-4	4.6009E-5	<u> </u>	<del> </del>	1	_		-		
Median of Absolute Deviation (MAD)	0.0138	0.0042								
MAD / 0.6745	0.0205	0.00623		<del> </del>	<del>                                     </del>		<del> </del>	<del>                                     </del>		
Mean of Abs. Deviation (AD) Median	0.0129	0.00508		<del> </del>	-	<del> </del>	<b> </b>			
Mean of AD Median/0.6745	0.0191	0.00752		<b></b>	<b>†</b>	·	<del> </del>	<del>                                     </del>		
IQR	0.0304	0.0101		<del>                                     </del>			<del>                                     </del>			
IQR / 1.35	0.0225	0.0075					<del>                                     </del>			
Skewness	-0.215	1.038		1	<b>-</b>			<del> </del>		
Kurtosis	-1.577	0.666				1	<b>†</b>			
CV	0.283	0.459			<del>- </del>		!	†		
	L		J	<u> </u>				1		

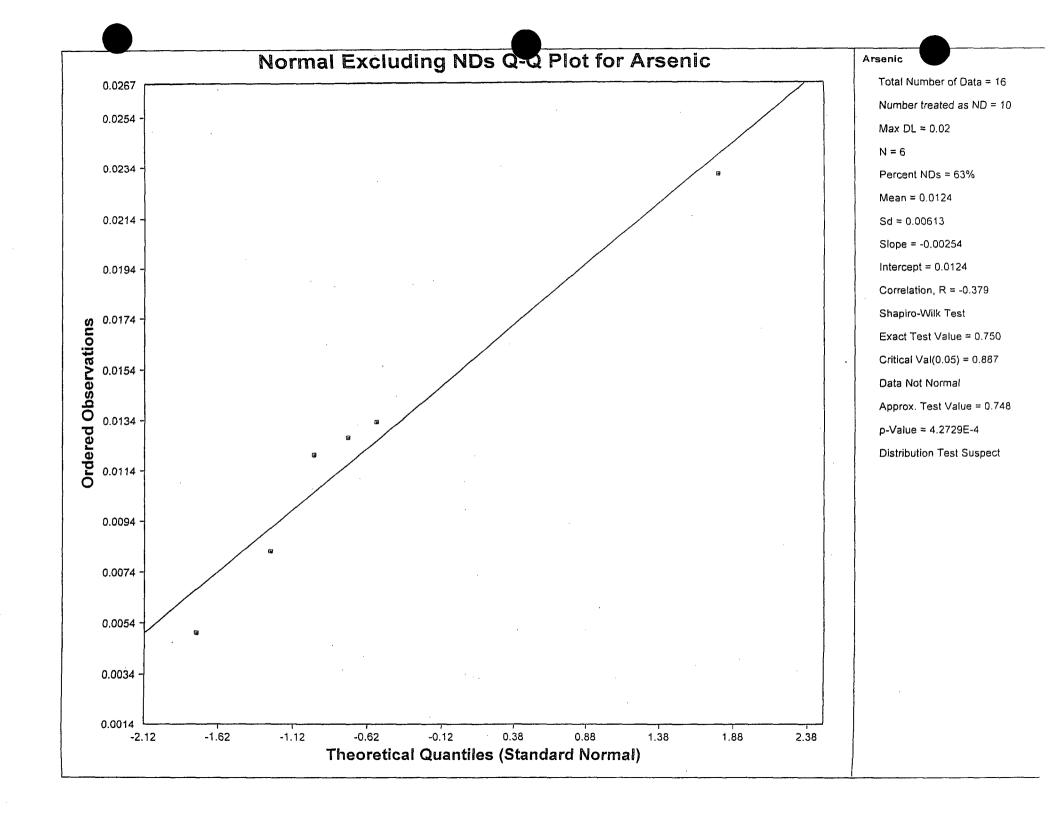
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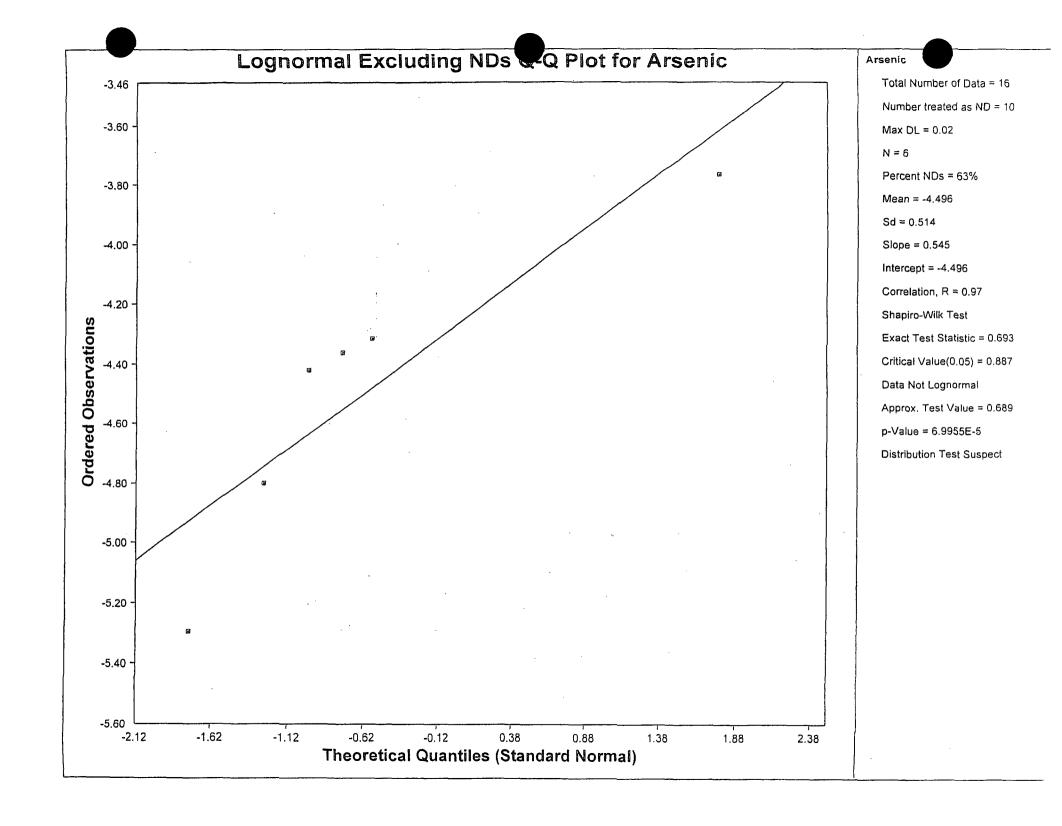
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Full Precision	)FF									
	, , , , , , , , , , , , , , , , , , , ,									
	Arsenic									
Number of Observations	16									
Number of Missing Values	0									
Number of Detects	6									
Number of Non-Detects	10									
Percentage of Non-Detects	62.5%									
Minimum Observed Detected Value	0.005									
Maximum Observed Detected Value	0.0231									
Mean of Detected Values	0.0124									
Median of Detected Values	0.0124									
Standard Deviation of Detected Values	0.00613									
MAD of Detected Values	0.00255									
MAD / 0.6745 of Detected Values	0.00378									
Skewness of Detected Values	0.984									
Kurtosis of Detected Values	-0.174									
CV of Detected Values	0.495									
(Q1) 25% Percentile (All Obs)	0.0127									
(Q2) Median (All Obs)	0.0124									
(Q3) 75% Percentile (All Obs)	0.02									
90% Percentile (All Obs)	0.02									
95% Percentile (All Obs)	0.0206									
99% Percentile (All Obs)	0.0226									
	·	L	<u> </u>							

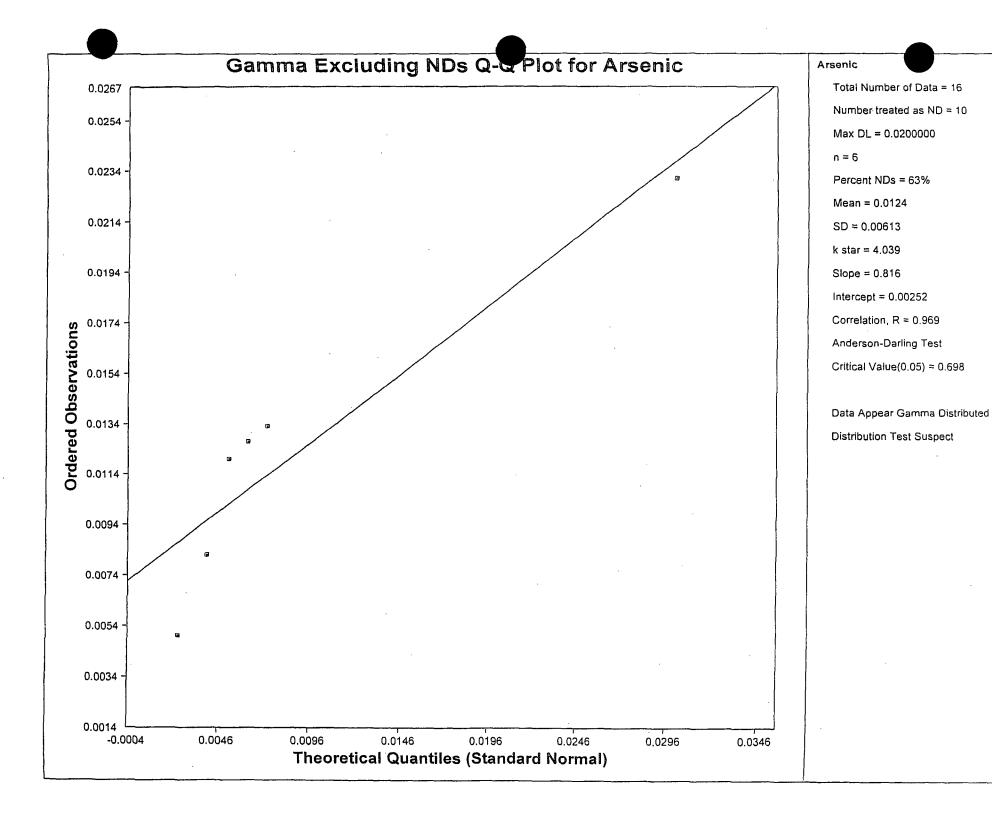
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Date/Time of Computation	8/14/2009 9:11:	12 AM					······································		
User Selected Options									
From File	J:\1991\91-135\I	MON\Lab Data\2	009\Ponds\SI	udge\Scout\(	C Pond\Meta	ls.wst			
Full Precision	OFF	<del></del>					<del></del>		
rmber of Bootstrap Operations	2000						· · · · · · · · · · · · · · · · · · ·		
Confidence Coefficient	0.8		············					<del></del>	
Barium									
							··		
Number of Val	id Observations	16							
Number of Distin	ct Observations	16							
Raw Statisti	cs								
	Mean	0.052							
	Minimum	0.0288	1						
	5% Percentile	0.0288							
	10% Percentile	0.0317							
	1st Quartile	0.0344						,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	Median	0.0524	1						
	3rd Quartile	0.066		····					
	90% Percentile	0.068							
	95% Percentile	0.0689							
	Maximum	0.0711							
Sta	ndard Deviation	0.0147							
	MAD / 0.6745	0.0205					<del></del>		
	IQR / 1.35	0.0225							
Normal Statis	itics	······································	<u> </u>						
1	% Percentile (z)	0.0177							
5	% Percentile (z)	0.0278	<u> </u>						
10	% Percentile (z)	0.0331							
	1st Quartile (z)	0.0421	<u> </u>						
	Median (z)	0.052							
·	3rd Quartile (z)	0.062		·					
90	% Percentile (z)	0.0709			<del> </del>				
95	% Percentile (z)	0.0763	<del>                                     </del>						
99	% Percentile (z)	0.0863	1						
			†						
Normal Confidence	intervals	<del></del>		<u> </u>					
Normal	Lower Limit	Upper Limit	<del>                                     </del>	<u> </u>				<del>                                     </del>	
Student's		0.057	<del> </del>					<del> </del>	<del></del>
	<u> </u>		+			-			
Gamma Stati	stics		+	<del> </del>			<u> </u>	<del> </del>	· · · · · · · · · · · · · · · · · · ·
	k hat	12.18	<del>                                     </del>		<del> </del>	<del> </del>		<u> </u>	
	Theta hat	0.00427	<del></del>	<del> </del>	<b> </b>	<del> </del>	ļ		
	nu hat				<del> </del>			ļ	
	k star	9.939			<del> </del>	<del> </del>	<del> </del>		<del></del>
	Theta star	0.00524	-	<del> </del>	<del> </del>			ļ	
	MLE of Mean		<del> </del>	<del> </del>	<del> </del>	<del>                                     </del>	<u> </u>		
MLE of Sta	andard Deviation			ļ	ļ	<del> </del>	<del> </del>		
	nu stər		+	<del> </del>	<del> </del>	<del> </del>	<del> </del>		
		<u> </u>		1	1	1	<u> </u>	1	

80% Percentile of	Chisquare (2k)	24.9		ļ				1	1
					·····				
Gamma Confidence	intervals								
		Upper Limit							
Approximate Gamma	0.0472	0.0578							
Adjusted Gamma	0.0468	0.0584							
Log-Transformed S									
Mean of Log-Tra		-2.998							
Standard Deviation of Log-Tra		0.306		-					
	mate of Median	0.0498							
	stimate of Mean	0.0521							
MVU	Estimate of SD	0.0161							
MVU Estimate of Standar	d Error of Mean	0.00403							
Lognormal Confidence	e intervals								
Confidence	Lower Limit	Upper Limit	1						
Land's H	0.0473	0.0584							
Chebyshev (MVUE)	0.0431	0.0612							
	<u></u>	<u>'                                     </u>							
Nonparametric Confide	nce Intervals								
Confidence	Lower Limit	Upper Limit							
Central Limit Theorem	0.0473	0.0568	-						
Jackknife	0.0471	0.057							
Standard Bootstrap	0.0475	0.0565							
Bootstrap-t	0.047	0.0567					1		<del></del>
Percentile Bootstrap	0.0475	0.0567			,			<del> </del>	
BCA Bootstrap	0.0471	0.0565				İ			
Chebyshev	0.0438	0.0603						<del>                                     </del>	
Modified (t)	0.0471	0.0569						<u> </u>	
Adjusted CLT	0.0474	0.0566					1		
	<u> </u>	<u>!</u>		<u></u>				<u> </u>	
Chromium	1							<u> </u>	
						<u> </u>	<del> </del>	<u> </u>	
Number of Va	lid Observations					<del> </del>	<del> </del>	<b></b>	
Number of Distin	ct Observations	16 .				1	<del> </del>	<del> </del>	<del> </del>
		L	<del>                                     </del>			†	<del> </del>	<del> </del>	<del> </del>
Raw Statisti	ics		<del> </del>			<del> </del>	<del> </del>		
	Mean	0.0148			<u> </u>		<b> </b>	1	
	Minimum	0.0066			ļ	- <del></del>	<u> </u>	<del></del>	<u> </u>
	5% Percentile	l	<del>- </del>		<del> </del>	<del> </del>	<u> </u>		
	10% Percentile	1	<del> </del>	<u> </u>		<del> </del>	<del> </del>		<del></del>
	1st Quartile	}		ļ	<del> </del>	<del> </del>	<del> </del>	<del> </del>	
	Median	<u>L</u>	<del></del>			<del> </del>	<del> </del>	}	
	3rd Quartile	L			-	<del> </del>	<del> </del>		<del> </del>
	90% Percentile	l		<b> </b> -	<del> </del>		<del> </del>	<del> </del>	<del> </del>
	95% Percentile	1	<del> </del>		<del> </del>	<del> </del>	<del></del>	<del> </del>	<b> </b>
	Maximum	L	<del> </del>		<del> </del>	-	1	-	
Cir	andard Deviation	<u> </u>				-			<u> </u>
Sia	MAD / 0.6745	3	_		-	<del> </del>		<u> </u>	<b></b>
	IQR / 1.35	1		<del> </del>			<b> </b>	<del> </del>	ļ
	FUN / 1.30	0.0073		<del></del>	<b> </b>	<del> </del>	-	<del> </del>	<del> </del>
			1	<u> </u>	1		1	<u> </u>	1

Normal Statist	ics				•	<u> </u>	1	}	1
19	6 Percentile (z)	-0.001	<del> </del>						
5%	6 Percentile (z)	0.00362							
109	6 Percentile (z)	0.00608	<del> </del>			<del> </del>			
	1st Quartile (z)	0.0102	1			<b> </b>			
	Median (z)	0.0148						<u> </u>	
	3rd Quartile (z)	0.0194		<u> </u>		<del> </del>			
909	% Percentile (z)	0.0235		<u>                                     </u>		<del> </del>	}		
959	% Percentile (z)	0.0259							
999	% Percentile (z)	0.0306	<del> </del>						
			<u> </u>			<del>                                     </del>		<u> </u>	
Normal Confidence	Intervals						<u> </u>		
Normal	Lower Limit	Upper Limit							
Student's t	0.0125	0.017				<u> </u>			
	1								
Gamma Statist	tics			-		-		<del> </del>	
Gamma Glade	k hat	5.594	<u> </u>		<b></b>	<del> </del>			
	Theta hat	0.00264	1	-	<u> </u>			1	
		179	<u> </u>	ļ			ļ		
	nu hat	L		<u> </u>					
	k star	4.587		<u> </u>					l
	Theta star	0.00322					<u> </u>		
	MLE of Mean	0.0148		ļ					
MLE of Star	ndard Deviation	0.0069							
	nu star	146.8							
80% Percentile of	Chisquare (2k)	12.45			}	<u> </u>			
Gamma Confidence		<b>,</b>							
		Upper Limit							
Approximate Gamma	0.0128	0.0173		<u> </u>					
Adjusted Gamma	0.0127	0.0176							
		· · · · · · · · · · · · · · · · · · ·							
Log-Transformed S									
Mean of Log-Tra		]			<u> </u>				
Standard Deviation of Log-Tra		ł				<u> </u>			
	mate of Median	1							
	stimate of Mean	<u> </u>							
	Estimate of SD	<b>{</b>							
MVU Estimate of Standar	d Error of Mean	0.00166							
Lognormal Confidence	e Intervals								
Confidence	Lower Limit	Upper Limit							
Land's H	0.0129	0.0176							
Chebyshev (MVUE)	0.011	0.0185						1	
	<u> </u>	L							
Nonparametric Confide	nce Intervals			<u> </u>		<b>†</b>		1	
Confidence	Lower Limit	Upper Limit	1			<del>                                     </del>	<del>                                     </del>	<del> </del>	
Central Limit Theorem	0.0126	0.0169	<del> </del>	<del>                                     </del>		1	<del>                                     </del>		
Jackknife	0.0125	0.017	†	<u> </u>		1	1	<del> </del>	
Standard Bootstrap	<b>1</b>	0.0169	<del> </del>		<del>                                     </del>	1	<del> </del>	<del> </del>	
Bootstrap-t	L	0.0175		+	<del>                                     </del>	-	<del>                                     </del>	<b> </b>	<u> </u>
Percentile Bootstrap		0.017	-	+		<del> </del>	<del>                                     </del>	<del>                                     </del>	
BCA Bootstrap	<u> </u>	0.0174	-	<del> </del>	<b> </b>		<del> </del>	<del> </del>	
	l	1	_1	5	.!	<u> </u>	1	<u> </u>	<u> </u>

Chebyshev	0.011	0.0186				
Modified (t)	0.0126	0.0171				
Adjusted CLT	0.0123	0.0173				
		<u>-h</u>				

Confidence Inte	rvals Datasets	with Non-Det	ects	ation Land and the second of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second seco	en al Composition de la Republica de	linesigipusesileitenedeleisi	
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f Detected Data	6						
t Detected Data	6						
nimum Detected	0.005						
kimum Detected	0.0231						
lon-Detect Data	10						
ent Non-Detects	62.50%						
num Non-detect	0.02						
num Non-detect	0.02						
	· · · · · · · · · · · · · · · · · · ·					l	
cs							
of Detected Data	0.0124						
of Detected Data	0.00613						
				····		<b>4</b>	<u> </u>
Warnir	g: There are o	only 6 Detected	d Values in this	data			
It should be note	ed that even th	ough bootstra	may be perfor	med on this dat	ta set		
the resulting cal	culations may	not be reliable	enough to drav	v conclusions			
ended to have 1	0-15 or more d	istinct observa	ations for accura	ate and meanin	gful results.		
							.,
MLE Stdv	N/A						
Lower Limit	Upper Limit	1	ŀ	1			
		ļ <u>t</u>				·	
t) N/A	N/A						
	N/A						
atistics							
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	8/14/2009 9:12:  J:\1991\91-135\ OFF 2000 0.8  stics per of Valid Data of Detected Data nimum Detected ximum Detected ximum Detected ximum Non-Detects mum Non-detect mum Non-detect the resulting cal ended to have 1  timates (MLEs) MLE Mean MLE Stdv  ence Interval	8/14/2009 9:12:03 AM  J:\1991\91-135\MON\Lab Data OFF 2000 0.8  stics per of Valid Data	8/14/2009 9:12:03 AM  J:\1991\91-135\MON\Lab Data\2009\Ponds\S  OFF  2000  0.8  stics  per of Valid Data	8/14/2009 9:12:03 AM  J:\1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\C P  OFF  2000  0.8  stics  per of Valid Data	B/14/2009 9:12:03 AM  J/1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\C Pond\Metals.wsi  OFF 2000  0.8  ditics  per of Valid Data	8/14/2009 9:12:03 AM  JA1991\91-135\MONNLab Data\2009\Ponds\Studge\Scout\C Pond\Metals.wst  OFF 2000  0.8  stics  per of Valid Data	JA1991\91-135\MONNLab Data\2009\Ponds\Sludge\Scout\C Pond\Metals.wst  OFF 2000  0.8  detailed Data

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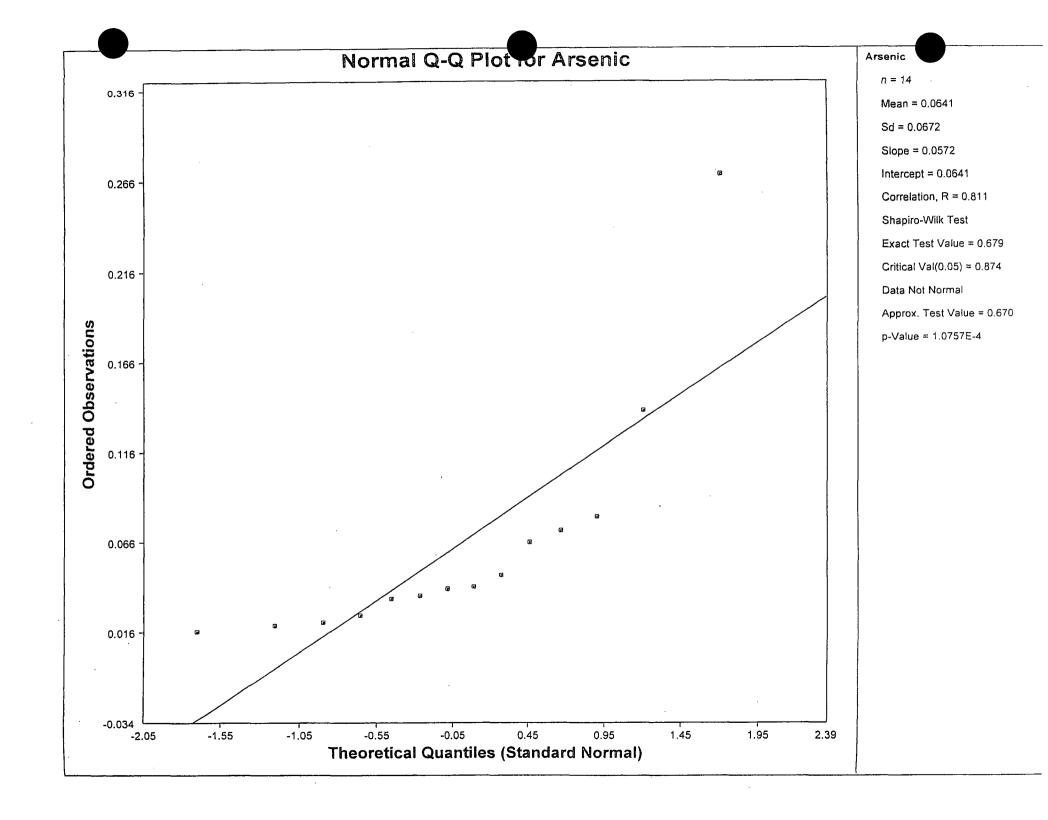
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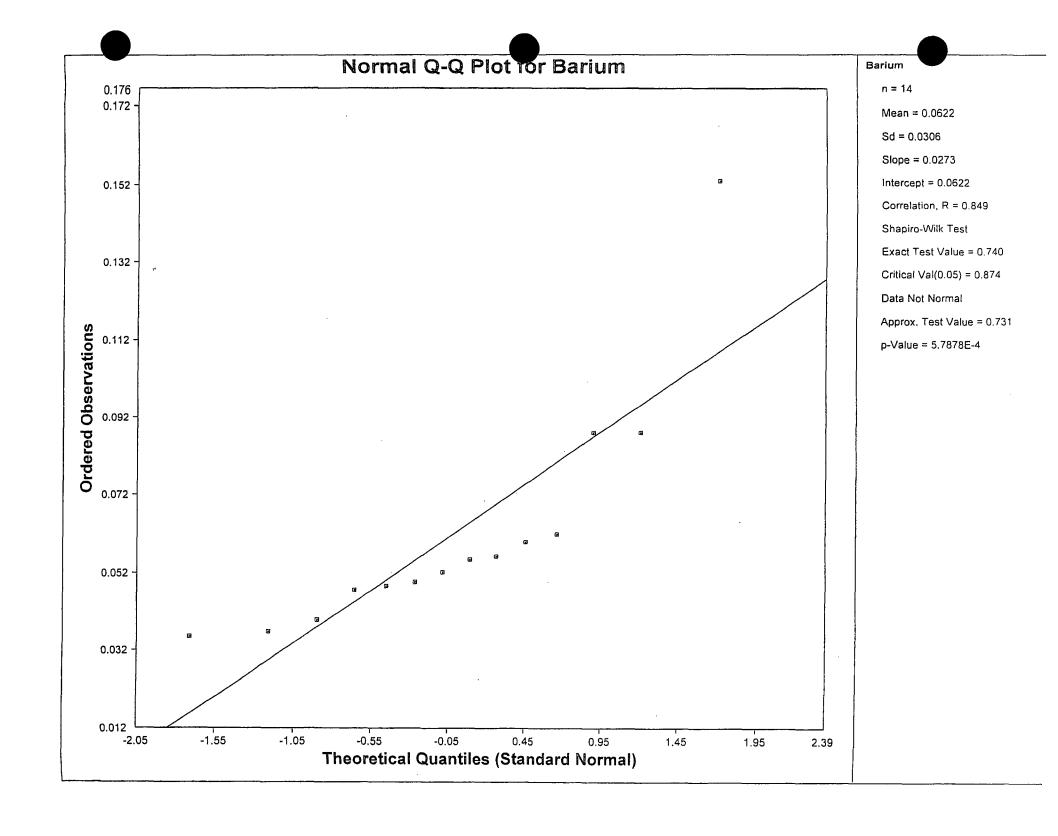
Gamma Intervals  Gamma Lower Limit Upper Limit  ROS Approximate Gamma 0.0111 0.0136  ROS Adjusted Gamma 0.011 0.0137  Log-Transformed Statistics	3					
ROS Approximate Gamma 0.0111 0.0136  ROS Adjusted Gamma 0.011 0.0137  Log-Transformed Statistics						
ROS Adjusted Gamma 0.011 0.0137  Log-Transformed Statistics		`				
Log-Transformed Statistics						<u> </u>
					ı	i
		<del>                                     </del>	İ			
Mean of Log-Transformed Detected Data -4.496						
Stdv of Log-Transformed Detected Data 0.514						
Mean of Lognormal ROS Data 0.0109		-				
Stdv of Lognormal ROS Data 0.00467						
			<del> </del>			
Lognormal Confidence Intervals						
Lognormal Lower Limit Upper Limit						
ROS Land's H 0.00959 0.0129						
ROS % Bootstrap 0.00945 0.0124						
ROS BCA Bootstrap 0.00963 0.0125						
Kaplan Meier Distribution Free Statistics						
Kaplan Meier Mean 0.011						
Kaplan Meier Stdv 0.00437						·
Kaplan Meier SEM 0.00169						
					·	
Nonparametric Confidence Intervals		<del> </del>				
Nonparametric Lower Limit Upper Limit						
Kaplan Meier (t) 0.00878 0.0133						I
Kaplan Meier (z) 0.00888 0.0132						
Kaplan Meier % Bootstrap 0.009 0.0132	İ					
Kaplan Meier BCA Bootstrap 0.00913 0.0133						
Kaplan Meier Chebyshev 0.00727 0.0148		† ·				
Unable to Winsorize Data!						

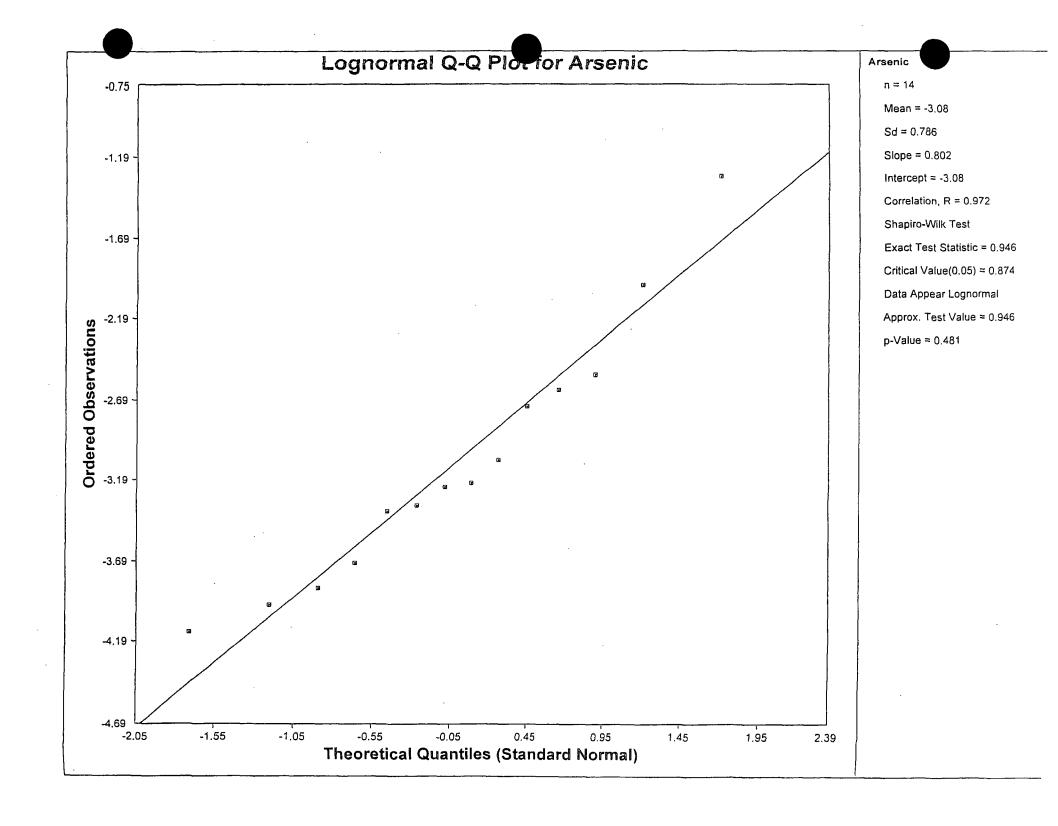
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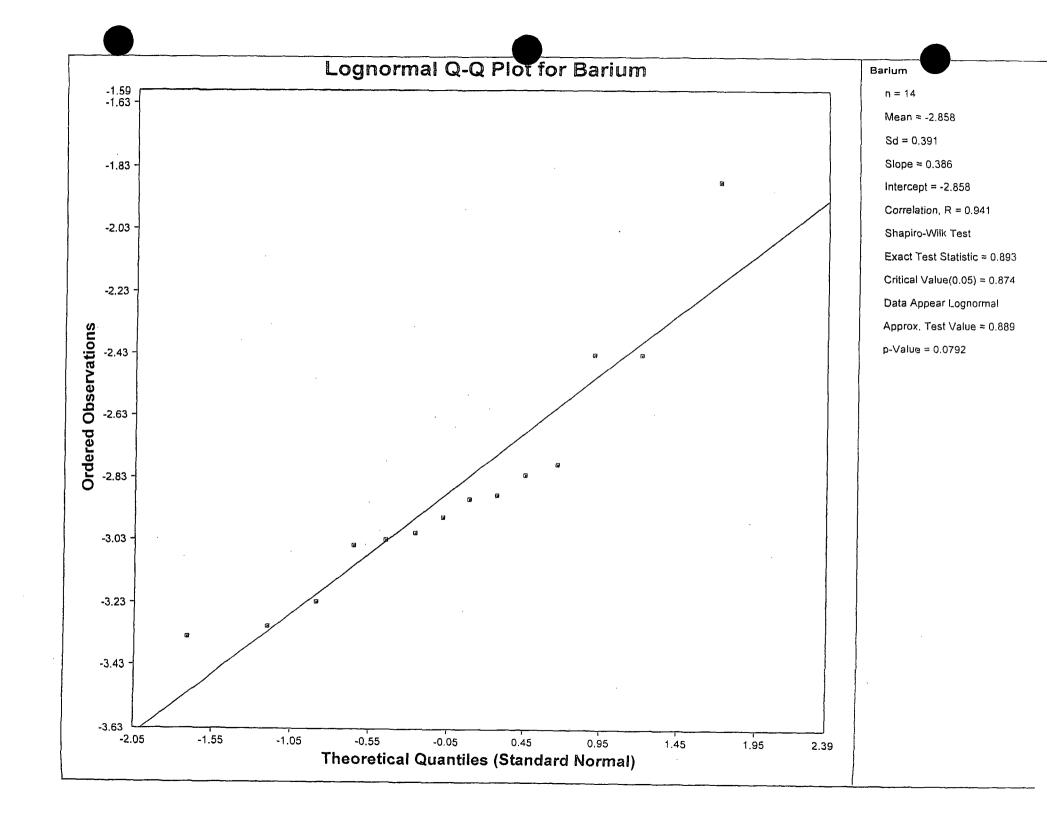
User Selected Options	14 0 61 0.0356 9 0.153 41 0.0622 73 0.0361 92 0.0371 29 0.0437 97 0.0537	Pata\2009\Por	nds\Sludge\S	Scout\D Pon	d\Metals.ws	SI .		
From File J:\1991\\ Full Precision OFF  Arser  Number of Observations 14  Number of Missing Values 0  Minimum Observed Value 0.016  Maximum Observed Value 0.26  Mean 0.064  10% Percentile 0.017  15% Percentile 0.019  (Q1) 25% Percentile 0.023  (Q2) Median 0.039	nic Barium  14  0  61  0.0356  9  0.153  41  0.0622  73  0.0361  92  0.0371  92  0.0437  97  0.0537	Pata\2009\Por	nds\Sludge\\$	Scout\D Pon	d\Metals.ws	st .		
Arser  Number of Observations 14  Number of Missing Values 0  Minimum Observed Value 0.26  Mean 0.064  10% Percentile 0.017  15% Percentile 0.019  (Q1) 25% Percentile 0.023  (Q2) Median 0.039	nic Barium  14  0  61  0.0356  9  0.153  41  0.0622  73  0.0361  92  0.0371  92  0.0437  97  0.0537	ata\2009\Por	nds\Sludge\\$	Scout\D Pon	d\Metals.ws	SI		
Arser Number of Observations 14 Number of Missing Values 0 Minimum Observed Value 0.016 Maximum Observed Value 0.26 Mean 0.064 10% Percentile 0.015 15% Percentile 0.019 (Q1) 25% Percentile 0.022 (Q2) Median 0.039	14 0 61 0.0356 9 0.153 41 0.0622 73 0.0361 92 0.0371 29 0.0437 97 0.0537							
Number of Observations 14  Number of Missing Values 0  Minimum Observed Value 0.016  Maximum Observed Value 0.26  Mean 0.064  10% Percentile 0.015  15% Percentile 0.019  (Q1) 25% Percentile 0.022  (Q2) Median 0.039	14 0 61 0.0356 9 0.153 41 0.0622 73 0.0361 92 0.0371 29 0.0437 97 0.0537							
Number of Observations 14  Number of Missing Values 0  Minimum Observed Value 0.016  Maximum Observed Value 0.26  Mean 0.064  10% Percentile 0.015  15% Percentile 0.019  (Q1) 25% Percentile 0.022  (Q2) Median 0.039	14 0 61 0.0356 9 0.153 41 0.0622 73 0.0361 92 0.0371 29 0.0437 97 0.0537							
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Minimum Observed Value 0.016  Maximum Observed Value 0.26  Mean 0.064  10% Percentile 0.015  15% Percentile 0.019  (Q1) 25% Percentile 0.022  (Q2) Median 0.039	61     0.0356       9     0.153       41     0.0622       73     0.0361       92     0.0371       29     0.0437       97     0.0537							
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10% Percentile 0.017 15% Percentile 0.019 (Q1) 25% Percentile 0.022 (Q2) Median 0.039	73 0.0361 92 0.0371 29 0.0437 97 0.0537							
15% Percentile 0.019 (Q1) 25% Percentile 0.022 (Q2) Median 0.039	0.0371 0.0437 0.0537							
(Q1) 25% Percentile 0.022 (Q2) Median 0.039	29 0.0437 07 0.0537							
(Q2) Median 0.039	0.0537							1
* *	ļ			1	i		1	
(Q3) 75% Percentile 0.068	2 2 2 2 2 2							
	32 0.0607	_						
90% Percentile 0.11			-					
95% Percentile 0.17		_						
99% Percentile 0.25							_	
Standard Deviation 0.06					_			
Variance 0.004	1							
Median of Absolute Deviation (MAD) 0.019	1							
MAD./ 0.6745 0.029	1							
Mean of Abs. Deviation (AD) Median 0.03	ļ							
Mean of AD Median/0.6745 0.05	l.	<del></del>	<u> </u>		_			
IQR 0.04	1							
IQR / 1.35 0.036	i	<del></del>	<del></del> -					_
Skewness 2.53	ı							
Kurtosis 7.00	1							
CV 1.04				<u> </u>				
7.0	0.402			1				
								<u> </u>

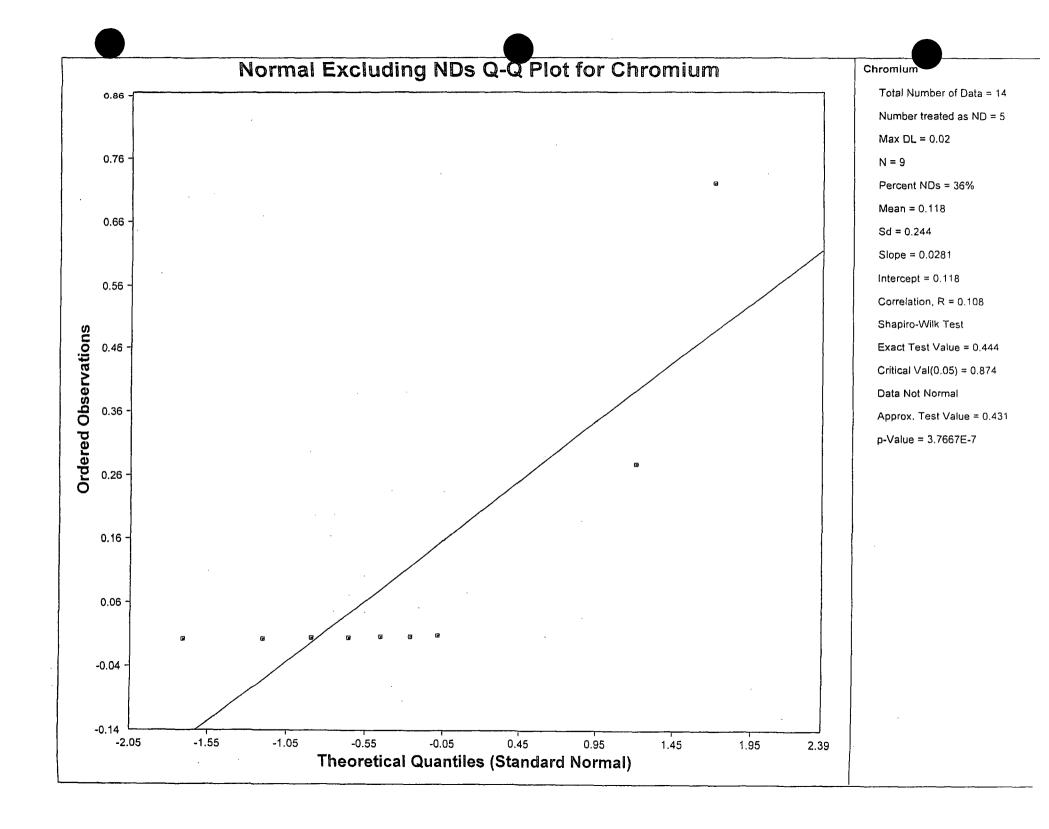
Company Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparrage of the Sparra	Univariate Descriptive Statistics for Datasets with NDs								
Date/Time of Computation	8/14/2009 9:24:38 AM								
User Selected Options									
From File	J:\1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\D Pond\Metals.wst								
Full Precision	DFF								· · · · · · · · · · · · · · · · · · ·
		***************************************		-					
	Chromium								
Number of Observations	14								
Number of Missing Values	0								
Number of Detects	9								
Number of Non-Detects	5			**************************************			<u> </u>	<del></del>	
Percentage of Non-Detects	35.71%			****					
Minimum Observed Detected Value	0.0064						<del>                                     </del>		
Maximum Observed Detected Value	0.724					<del>                                     </del>	<u> </u>	<del>                                     </del>	
Mean of Detected Values	0.118						1		
Median of Detected Values	0.0092								
Standard Deviation of Detected Values	0.244	-		-		<del> </del>	<b>†</b>	<del>                                     </del>	
MAD of Detected Values	0.0018					<del> </del>	†		
MAD / 0.6745 of Detected Values	0.00267						<del>                                     </del>		
Skewness of Detected Values	2.399						<del> </del>	<u> </u>	
Kurtosis of Detected Values	0.87						<del>                                     </del>		
CV of Detected Values	2.073						<u> </u>	<del> </del>	
(Q1) 25% Percentile (All Obs)	0.0078							<del> </del>	
(Q2) Median (All Obs)	0.0092						1	1	
(Q3) 75% Percentile (All Obs)	0.02	<del></del>					1		
90% Percentile (All Obs)	0.175					<b> </b>	<del>                                     </del>	<del> </del>	
95% Percentile (All Obs)	0.413					1	1	<del> </del>	
99% Percentile (All Obs)	0.662					<del>                                     </del>	1	<del> </del>	
	LL				L			<u>. L</u>	
						<del></del>	·	<del></del>	

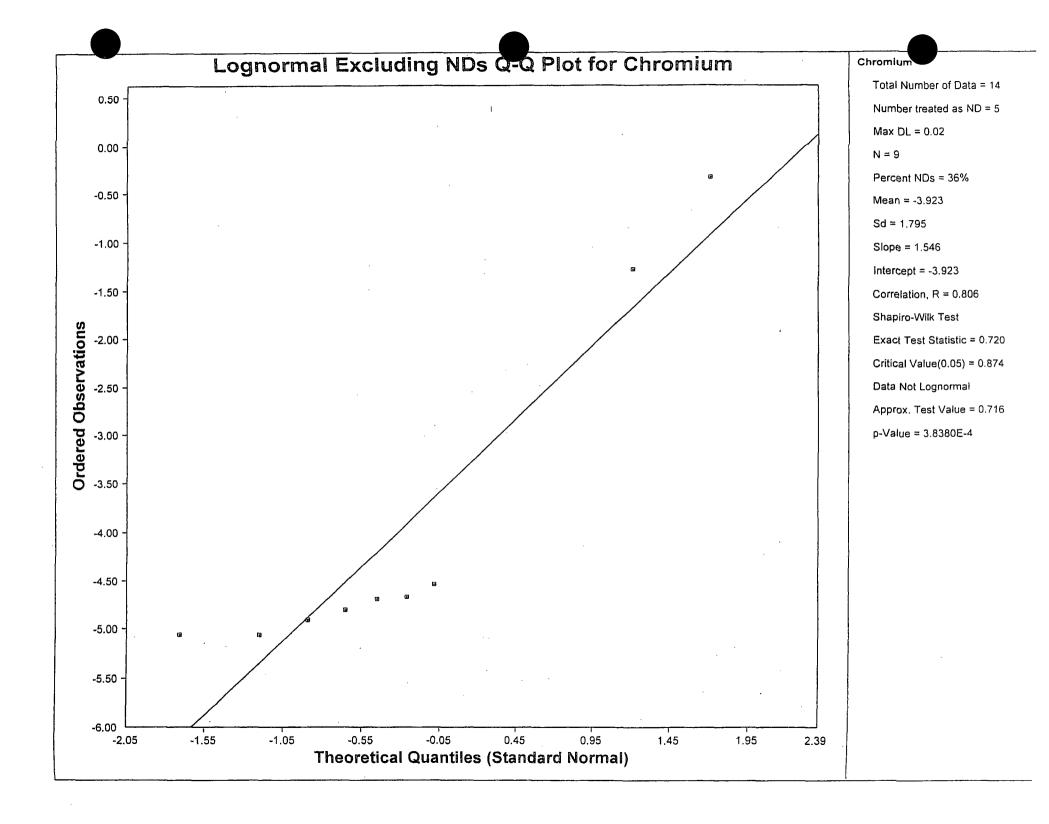


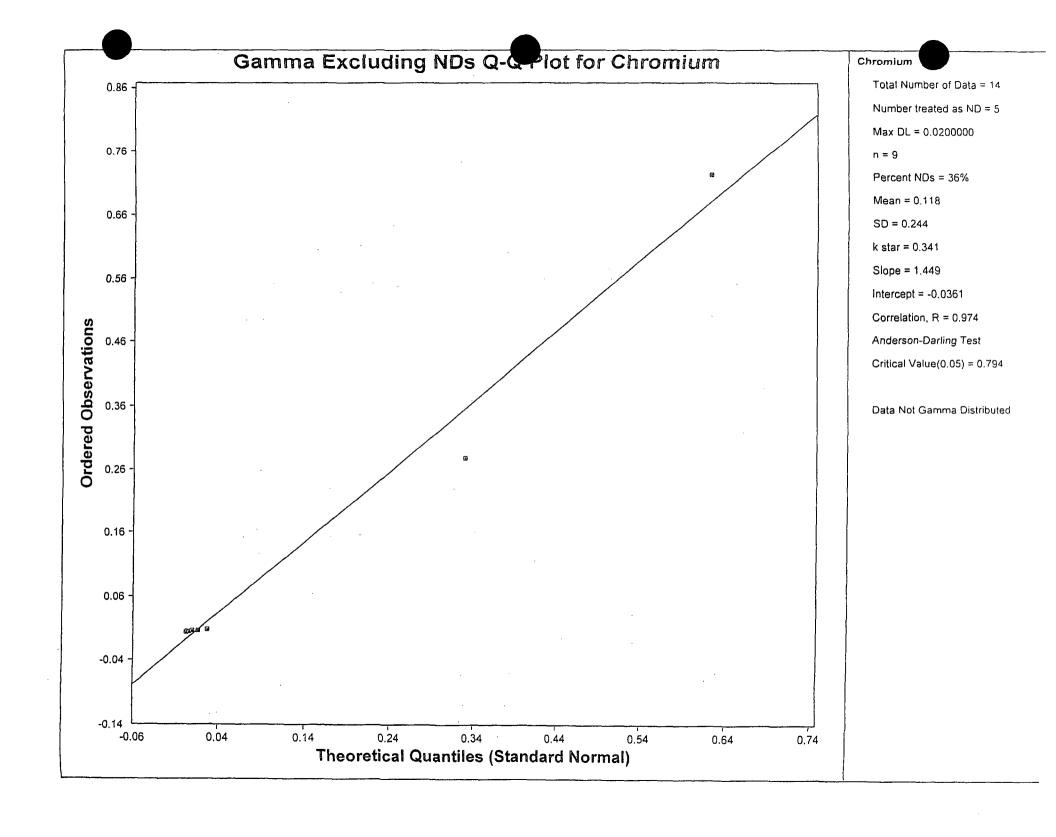


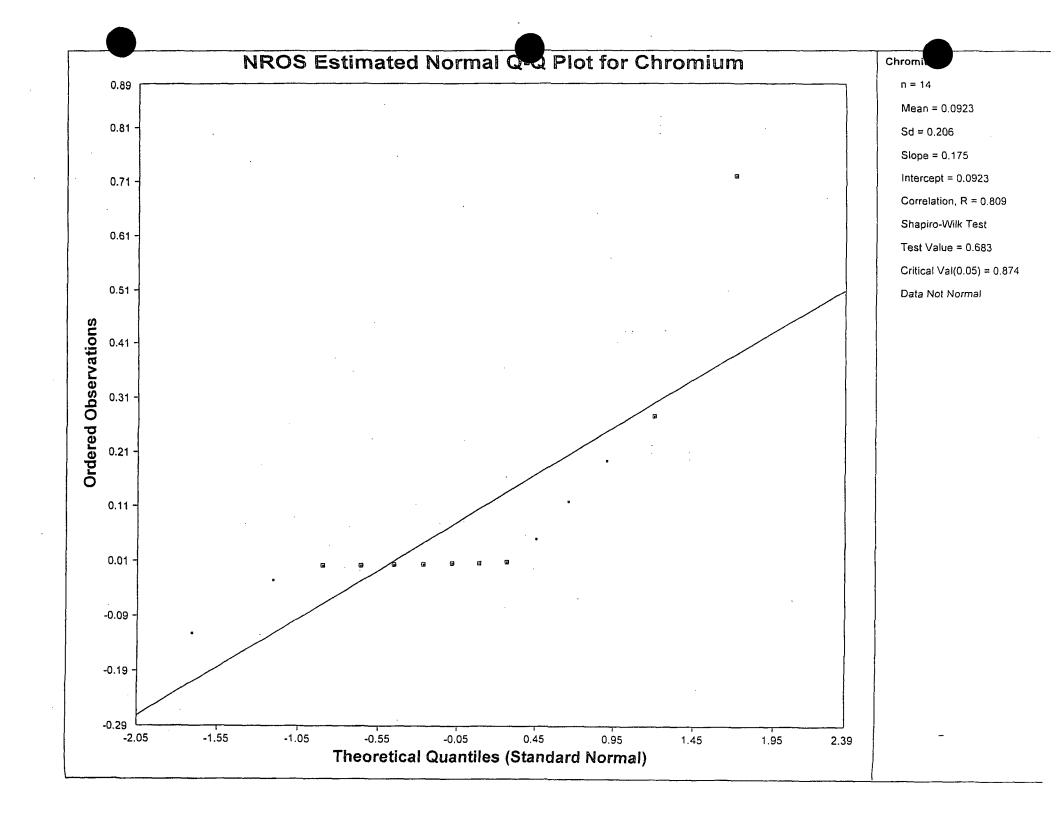












Confidence Intervals/Limits (CLs) for Datasets Without Non-Detects    Date/Time of Computation   8/14/2009 9:29:02 AM	
From File J:\1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\D Pond\Metals.wst  Full Precision OFF  ber of Bootstrap Operations 2000  Confidence Coefficient 0.8  Arsenic Number of Valid Observations 14	
Full Precision OFF  ber of Bootstrap Operations 2000  Confidence Coefficient 0.8  Arsenic  Number of Valid Observations 14	
Confidence Coefficient 0.8  Arsenic Number of Valid Observations 14	
Confidence Coefficient 0.8  Arsenic  Number of Valid Observations 14	
Arsenic Number of Valid Observations 14	
Number of Valid Observations 14	
Number of Valid Observations 14	
Raw Statistics	
Mean 0.0641	
Minimum 0.0161	
5% Percentile 0.0161	
10% Percentile 0.0173	
1st Quartile 0.0229	
Median 0.0397	
3rd Quartile 0.0682	
90% Percentile 0.114	
95% Percentile 0.177	
Maximum 0.269	
Standard Deviation 0.0672	
MAD / 0.6745 0.0291	
IQR / 1.35 0.0368	
Normal Statistics	
1% Percentile (z) -0.0922	
5% Percentile (z) -0.0464	
10% Percentile (z) -0.022	
1st Quartile (z) 0.0188	
Median (z) 0.0641	
3rd Quartile (z) 0.109	
90% Percentile (z) 0.15	
95% Percentile (z) 0.175	
99% Percentile (z) 0.22	
Normal Confidence Intervals	
Normal Lower Limit Upper Limit	
Student's t 0.0399 0.0884	
Gamma Statistics	
k hat 1.647	
Theta hat 0.0389	
nu hat 46.12	
k star 1.342	
Theta star 0.0478	
MLE of Mean 0.0641	
MLE of Standard Deviation 0.0554	
nu star 37.57	

80% Percentile of Chisquare (2k)	4.202			<del></del>	!			
Gamma Confidence Intervals								
	Upper Limit							
Approximate Gamma 0.0492	0.0893							
Adjusted Gamma 0.0478	0.0925							
Log-Transformed Statistics								
Mean of Log-Transformed Data	-3.08							
Standard Deviation of Log-Transformed Data	0.786							
MVU Estimate of Median	0.0449 0.0609							
MVU Estimate of Mean  MVU Estimate of SD								
MVU Estimate of Standard Error of Mean								
MVU Estimate of Standard Error of Mean				<u> </u>				
I am and Confidence between								
Lognormal Confidence Intervals  Confidence Lower Limit				<u> </u>				
Confidence Lower Limit  Land's H 0.0471	Upper Limit 0.0923	<del> </del>	1			<u> </u>		
	0.0923	<del> </del>				<u> </u>		
Chebyshev (MVUE) 0.0306	0.0912							<u> </u>
Nonparametric Confidence Intervals			<u> </u>		1			
	Upper Limit			1		1	<u> </u>	
Central Limit Theorem 0.0411	0.0872							
Jackknife 0.0399	0.0872			<u> </u>				
Standard Bootstrap 0.0421	0.0862						]	
Bootstrap-t 0.0454	0.122	<del> </del>		<u> </u>	1	<del> </del>	ļ	
Percentile Bootstrap 0.0424	0.0885						<u> </u>	
BCA Bootstrap 0.0472	0.0966					<u> </u>		
Chebyshev 0.024	0.104							
Modified (t) 0.0419	0.0904	-		<u> </u>		<del> </del>	<del> </del>	<u> </u> 
Adjusted CLT 0.0324	0.0958	+						
							<del>                                     </del>	
Barium			1					
							<u> </u>	<u> </u>
Number of Valid Observations	14			<u> </u>				
Number of Distinct Observations	13							
	<u></u>			<u> </u>				
Raw Statistics								
Mean	0.0622						<u> </u>	
Minimum	0.0356	-	<u> </u>	<del>                                     </del>				
5% Percentile	0.0356							
10% Percentile	0.0361				<b>†</b>	<u> </u>		
1st Quartile	0.0437				1			
Median	0.0537						<del> </del>	
3rd Quartile	0.0607							
90% Percentile	0.0879							
95% Percentile	0.107	_			ŀ			
Maximum	Maximum 0.153							
Standard Deviation	0.0306							
MAD / 0.6745								
IQR / 1.35								
		1						

15- Percentile   27   0.0028	Normal Statistic	CS								
19th Percentile (2)	1%	Percentile (z)	-0.00898							
Institute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Constitute   Cons	5%	Percentile (z)	0.0119					-		
Median (2)	10%	Percentile (z)	0.023							
3rd Outsrile (r)   0.029		1st Quartile (z)	0.0416							
SOFF Percentile (2)		Median (z)	0.0622							
		}	0.0829							
Normal Confidence Intervals	90%	Percentile (z)	0.101	-						
Normal   Lower Limit   Upper Limit	95%	Percentile (z)	0.113							
Normal   Lower Limit   Upper Limit	99%	Percentile (z)	0.133							
Normal   Lower Limit   Upper Limit										
Student's   0.0512   0.0733										
Camma Statistics	Normal									
K hat   6.296	Student's t	Student's t 0.0512								
K hat   5.296										
Theta hat   0.00988	Gamma Statist									
No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.   No.		6.296								
Name		Theta hat	0.00988		1		1			
Theta star		nu hat	176.3				<u> </u>			
MLE of Standard Deviation   0.0622		k star	4.994				<u> </u>		<u> </u>	
NILE of Standard Deviation   0.0278		Theta star	0.0125							
Number   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139.8   139		MLE of Mean	0.0622							
Somma Confidence Intervals	MLE of Stan	dard Deviation	0.0278						<u> </u>	
Gamma Confidence   Lower Limit   Upper Limit		139.8								
Confidence   Lower Limit   Upper Limit	80% Percentile of	13.43					İ			
Confidence   Lower Limit   Upper Limit										
Approximate Gamma	Gamma Confidence									
Log-Transformed Statistics	Confidence	Lower Limit	Upper Limit							
Log-Transformed Statistics	Approximate Gamma	0.0538	0.0732							
Nean of Log-Transformed Data   -2.858	Adjusted Gamma	0.053	0.0745							
Nean of Log-Transformed Data   -2.858										
Standard Deviation of Log-Transformed Data   0.391   MVU Estimate of Median   0.057   MVU Estimate of Median   0.0616   MVU Estimate of SD   0.0245   MVU Estimate of SD   0.0245   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00655   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Error of Mean   0.00726   MVU Estimate of Standard Err	_									
MVU Estimate of Median   0.057	<u> </u>									
MVU Estimate of Mean			ŀ							
MVU Estimate of SD   0.0245			l							
Lognormal Confidence Intervals   Confidence   Lower Limit   Upper Limit   Land's H   0.054   0.0726   Chebyshev (MVUE)   0.0469   0.0762     Chebyshev (MVUE)   0.0469   0.0762     Confidence   Lower Limit   Upper Limit   Upper Limit   Confidence   Lower Limit   Upper Limit   Central Limit Theorem   0.0517   0.0727   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Upper Limit   Uppe			1 .							
Lognormal Confidence Intervals										
Confidence   Lower Limit   Upper Limit     Land's H   0.054   0.0726     Chebyshev (MVUE)   0.0469   0.0762     Nonparametric Confidence Intervals     Confidence   Lower Limit   Upper Limit     Central Limit Theorem   0.0517   0.0727     Jackknife   0.0512   0.0733     Standard Bootstrap   0.0522   0.0722     Bootstrap-t   0.0535   0.0849	MVU Estimate of Standard	d Error of Mean	0.00655							
Confidence   Lower Limit   Upper Limit										
Land's H   0.054   0.0726	· · · · · · · · · · · · · · · · · · ·									
Chebyshev (MVUE)   0.0469   0.0762	Confidence						·			
Nonparametric Confidence Intervals   Confidence   Lower Limit   Upper Limit   Upper Limit   Central Limit Theorem   0.0517   0.0727	Land's H	0.054	0.0726							
Confidence   Lower Limit   Upper Limit	Chebyshev (MVUE)	0.0469	0.0762							
Confidence   Lower Limit   Upper Limit										
Central Limit Theorem   0.0517   0.0727	Nonparametric Confide	Nonparametric Confidence Intervals								
Jackknife         0.0512         0.0733           Standard Bootstrap         0.0522         0.0722           Bootstrap-t         0.0535         0.0849	Confidence	Lower Limit	Upper Limit							
Standard Bootstrap 0.0522 0.0722	Central Limit Theorem	0.0517	0.0727							
Bootstrap-t 0.0535 0.0849	Jackknife	0.0512	0.0733		1					
	Standard Bootstrap	0.0522	0.0722			1	1			
Percentile Bootstrap 0.0526 0.0724	Bootstrap-t	0.0535	0.0849	İ		<u> </u>		1		
	Percentile Bootstrap	0.0526	0.0724							
BCA Bootstrap 0.0546 0.0764	BCA Bootstrap	0.0546	0.0764		1			<u> </u>		

Chebyshev	0.0439	0.0805				1	
Modified (t)	0.052	0.0741					
Adjusted CLT	0.0482	0.0763		-			

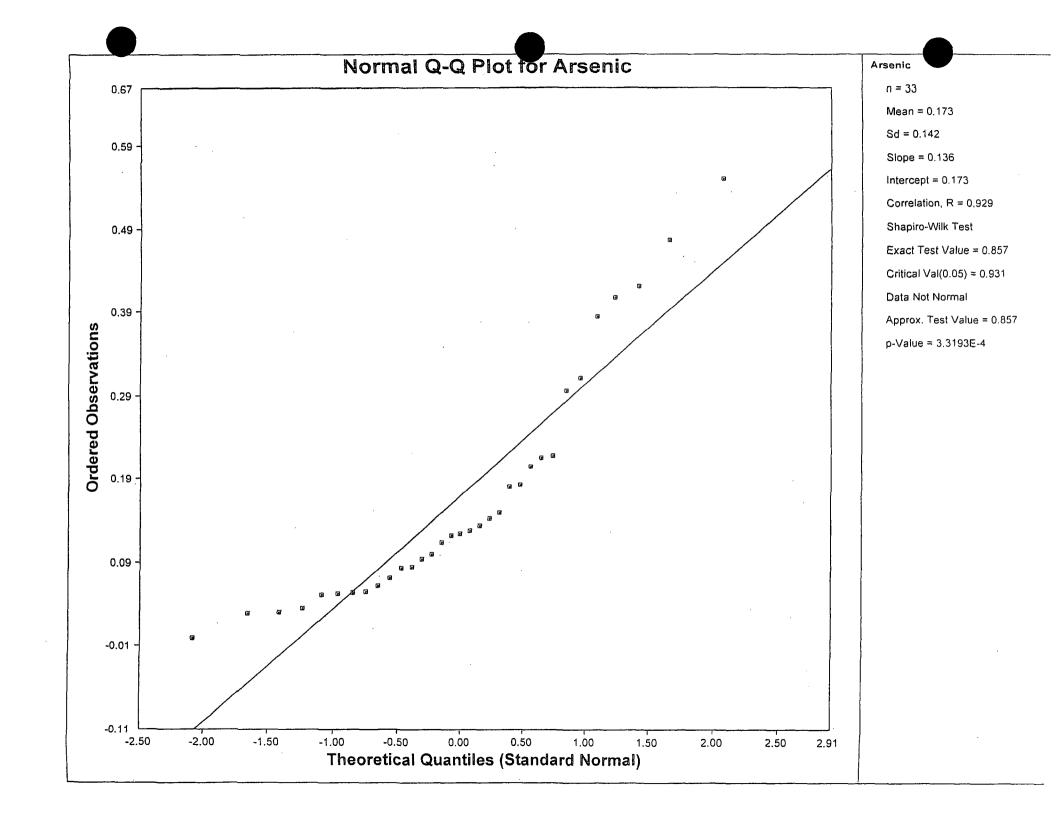
non-teneral, means 1 mag.	Confidence Int	ervals Dataset	s with Non-D	etects					1
Date/Time of Computation	8/14/2009 9:29	45 AM							
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From File	J:\1991\91-135	MON\Lab Data	3\2009\Ponds	s\Sludge\Sco	ut\D Pond\M	etals.wst			
Full Precision	OFF								
ober of Bootstrap Operations	2000		<u> </u>						
. Confidence Coefficient	0.8			,					
					**				
Chromium									
General Statis	tics								
Numb	er of Valid Data	14							
Number o	f Detected Data	9							
Number of Distinct	t Detected Data	8	ļ						
Mir	Minimum Detected 0.0064								
Max	Maximum Detected 0.724								
Number of N	Number of Non-Detect Data 5								
Perce	ent Non-Detects	35.71%							
Minir									
Maxir									
		<u> </u>							
Raw Statisti									
Mean o									
SD o									
				1	L				
	Warni	ng: There are	only 9 Deter	ted Values i	n this data		<u> </u>		
Note:	It should be not	ed that even t	hough boots	trap may be	performed o	n this data s	et	· , ,	
	the resulting ca	lculations may	not be relia	ble enough	o draw conc	lusions			·
							*		
It is recomm	ended to have	10-15 or more	distinct obse	ervations for	accurate an	d meaningfu	l results.		
Maximum Likelihood Es	imates (MLEs)								
	MLE Mean	-0.86							
	MLE Stdv	0.84	T						
		·	1						
Normal (MLE) Confidence	ence Interval								
	Lower Limit	Upper Limit	<del>                                     </del>	<b></b>				-	
MLE (I	) -1.163	-0.557	<del> </del>	-					
MLE (t) -1.163 -0.557				1	1	1		<u> </u>	
	<u> </u>	<u> </u>		1				Į.	
Normal ROS St	atistics								
*	atistics	0.0923							
Mean of N		]							
Mean of N	ormal ROS Data								
Mean of N	ormal ROS Data ormal ROS Data	]							
Mean of N Stdv of N	ormal ROS Data ormal ROS Data nce Intervals	0.206					,		
Mean of N Stdv of N Normal ROS Confide	ormal ROS Data ormal ROS Data nce Intervals Lower Limit	0.206							
Mean of N Stdv of N	ormal ROS Data ormal ROS Data nce Intervals Lower Limit	0.206					,		
Normal ROS Confide  ROS Student's	ormal ROS Data ormal ROS Data nce Intervals Lower Limit t 0.0179	0.206					,		
Mean of N Stdv of N Normal ROS Confide ROS Student's Gamma ROS S	ormal ROS Data ormal ROS Data nce Intervals Lower Limit t 0.0179	0.206 Upper Limit 0.167					,		
Normal ROS Confide  ROS Student's  Gamma ROS S  k Star of Ga	ormal ROS Data ormal ROS Data nce Intervals Lower Limit t 0.0179 tatistics	0.206 Upper Limit 0.167					,		
Mean of N Stdv of N Normal ROS Confide ROS Student's Gamma ROS S k Star of Gamma ROS S	ormal ROS Data ormal ROS Data nce Intervals Lower Limit t 0.0179 tatistics	0.206  Upper Limit 0.167  0.273 0.421							

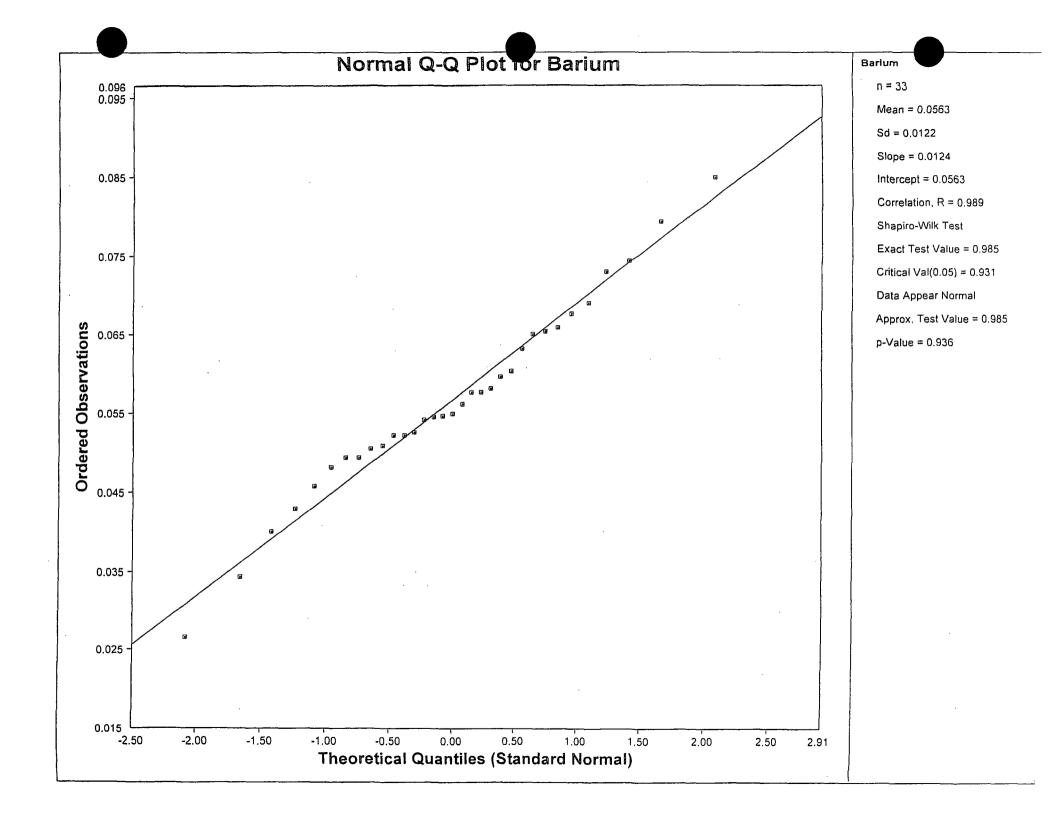
				<u> </u>					
Gamma Interv									
	Lower Limit	Upper Limit							
ROS Approximate Gamma	1	0.27							
ROS Adjusted Gamma	0.0644	0.296							
Log-Transformed S	Statistics								
Mean of Log-Transformed	Detected Data	-3.923							
Stdv of Log-Transformed									
Mean of Logno	1			<del></del>					
Stdv of Logno	1								
	<del>                                     </del>	<del>                                     </del>		<del></del>					
Lognormal Confidence	e Intervals		<del>                                     </del>						
Lognormal	Lower Limit	Upper Limit	1	<u> </u>					
ROS Land's H	0.0274	0.167	<del> </del>	<del> </del>					
ROS % Bootstrap	ļ	0.151	1	<u> </u>					<u> </u>
ROS BCA Bootstrap	l	0.201							
NOS BEA GOOISHAD	0.0000	0.201	-	ļ					
Kaplan Meier Distribution	Fron Statistics			-		<del></del>			<u> </u>
	lan Meier Mean	ł		ļ					
	plan Meier Stdv	1							
Ka	plan Meier SEM	0.0544							
	····								
Nonparametric Confide									
Nonparametric	Lower Limit	Upper Limit							
Kaplan Meier (t		0.152							
Kaplan Meier (z)	0.00895	0.148							
Kaplan Meier % Bootstrap		0.149							
Kaplan Meier BCA Bootstrap	0.00853	0.136							
Kaplan Meier Chebyshev	<u> </u>						<u> </u>		
		<del></del>		<del>                                     </del>					
Unable to Winsorize Data!				†	<del>                                     </del>		<u> </u>		
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			1	1	1 '	P .	1	5	1

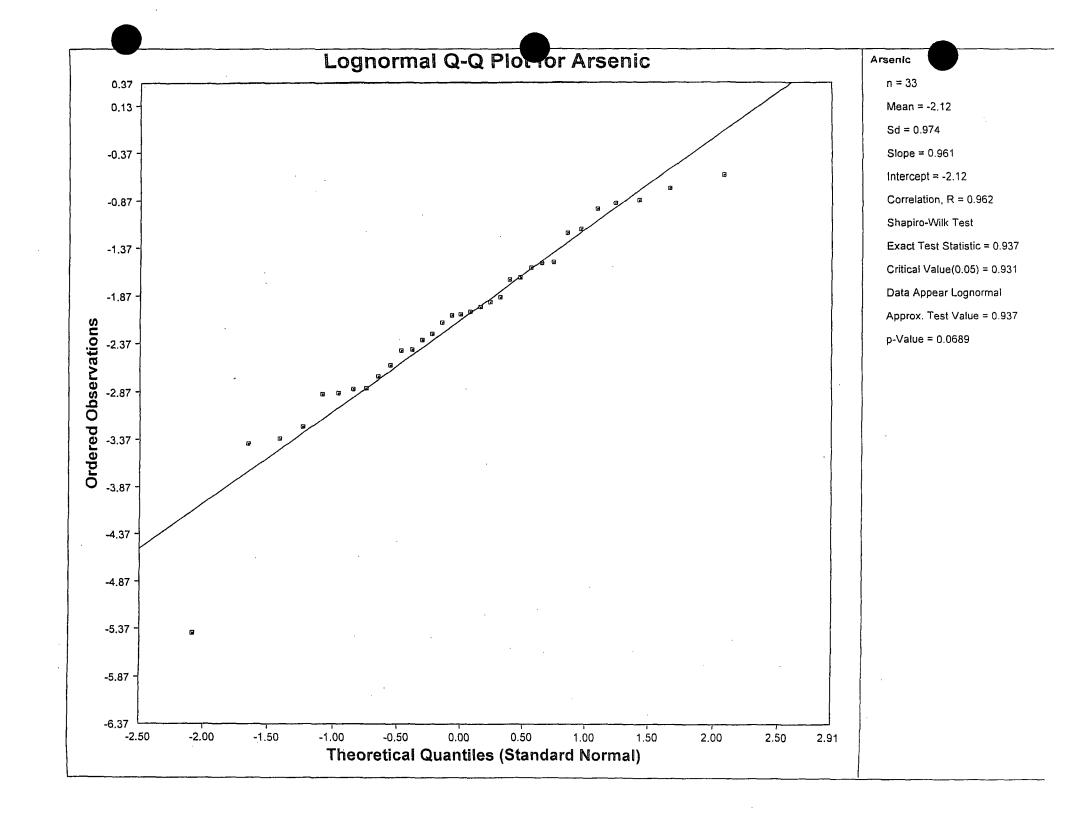
**E POND** 

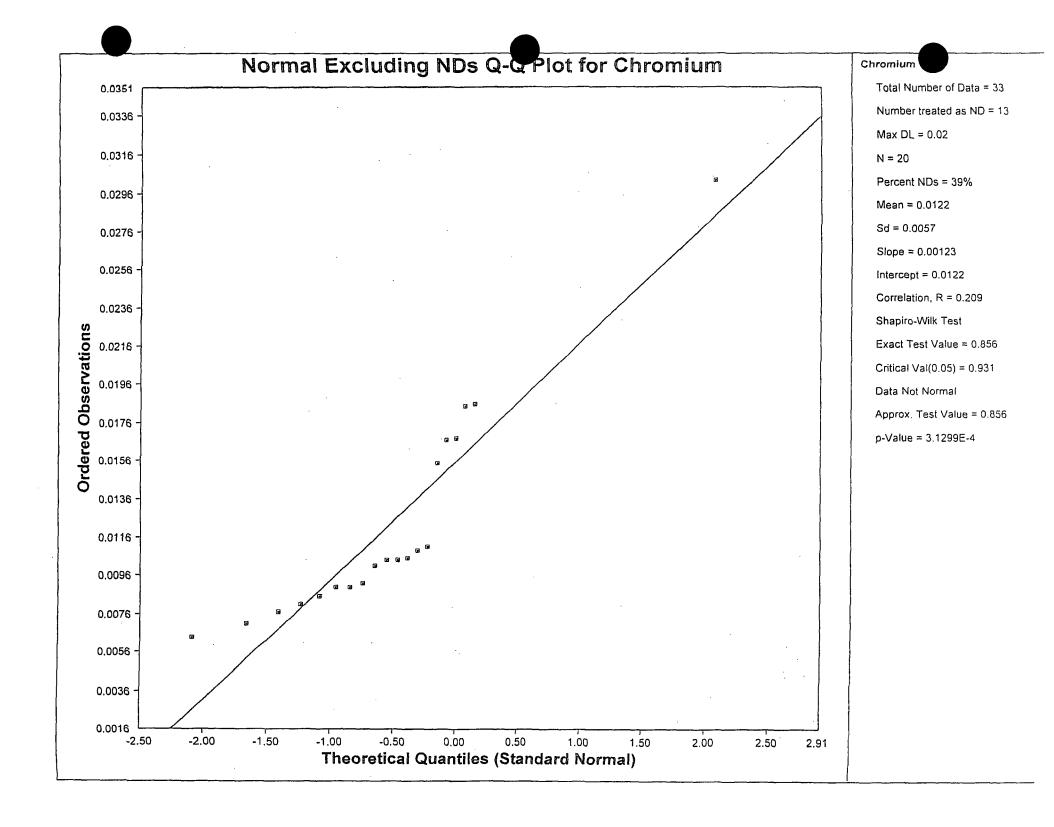
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Date/Time of Computation	8/14/2009 9:36	:03 AM	·····								
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From File	J:\1991\91-135	\MON\Lab Data	\2009\Ponds	\Sludge\Scc	out\E Pond\N	/letals.wst					
Full Precision	OFF	)FF									
	Arsenic	Barium									
Number of Observations	33	33									
Number of Missing Values	0	0							<del>                                     </del>		
Minimum Observed Value	0.0045	0.0263									
Maximum Observed Value	0.555	0.0846				1					
Mean	0.173	0.0563			1	<del>                                     </del>					
10% Percentile	0.0362	0.0405			<del>                                     </del>	-		<del>                                     </del>			
15% Percentile	0.0548	0.0453	-			<del>                                     </del>					
(Q1) 25% Percentile	0.0611	0.0492	<del>                                     </del>						<del> </del>		
(Q2) Median	0.128	0.0545	<u> </u>		<u> </u>						
(Q3) 75% Percentile	0.217	0.0642									
90% Percentile	0.406	0.0714									
95% Percentile	0.446	0.0758				İ					
99% Percentile	0.531	0.0828									
Standard Deviation	0.142	0.0122									
Variance	0.0202	1.4977E-4									
Median of Absolute Deviation (MAD)	0.0694	0.0056						1			
MAD / 0.6745	0.103	0.0083						-	<del> </del>		
Mean of Abs. Deviation (AD) Median	0.102	0.00908									
Mean of AD Median/0.6745	0.151	0.0135					1	-	<u> </u>		
IQR	0.158	0.0154	1-1-1-1					ļ			
IQR / 1.35	0.117	0.0114							<del> </del>		
Skewness	1.241	0.022									
Kurtosis	0.72	0.628						T			
CV	0.823	0.217									
	<u></u>	<u> </u>	<del>'</del>	1	_L,,,,,	<del></del>		.1	<u> </u>		
								<del></del>			

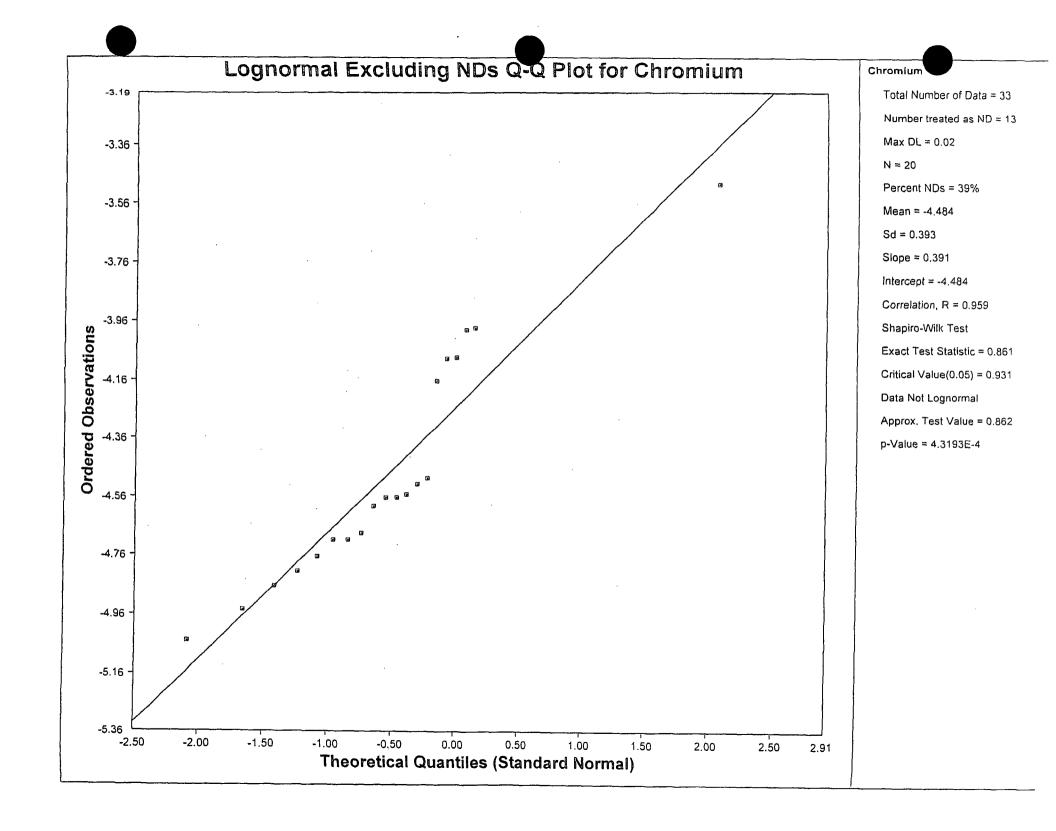
all and a second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	Univariate Descriptive Statistics for Datasets with NDs	1
Date/Time of Computation	8/14/2009 9:36:36 AM	
User Selected Options		
From File	J:\1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\E Pond\Metals.wst	
Full Precision	OFF	
	Chromium	
Number of Observations	33	
Number of Missing Values	0	
Number of Detects	20	
Number of Non-Detects	13	
Percentage of Non-Detects	39.39%	
Minimum Observed Detected Value	0.0064	
Maximum Observed Detected Value	0.0303	
Mean of Detected Values	0.0122	
Median of Detected Values	0.0104	
Standard Deviation of Detected Values	0.0057	
MAD of Detected Values	0.0021	
MAD / 0.6745 of Detected Values	0.00311	
Skewness of Detected Values	1.874	
Kurtosis of Detected Values	2.443	
CV of Detected Values	0.466	
(Q1) 25% Percentile (All Obs)	0.00943	
(Q2) Median (All Obs)	0.0104	
(Q3) 75% Percentile (All Obs)	0.02	
90% Percentile (All Obs)	0.02	
95% Percentile (All Obs)	0.02	
99% Percentile (All Obs)	0.0269	

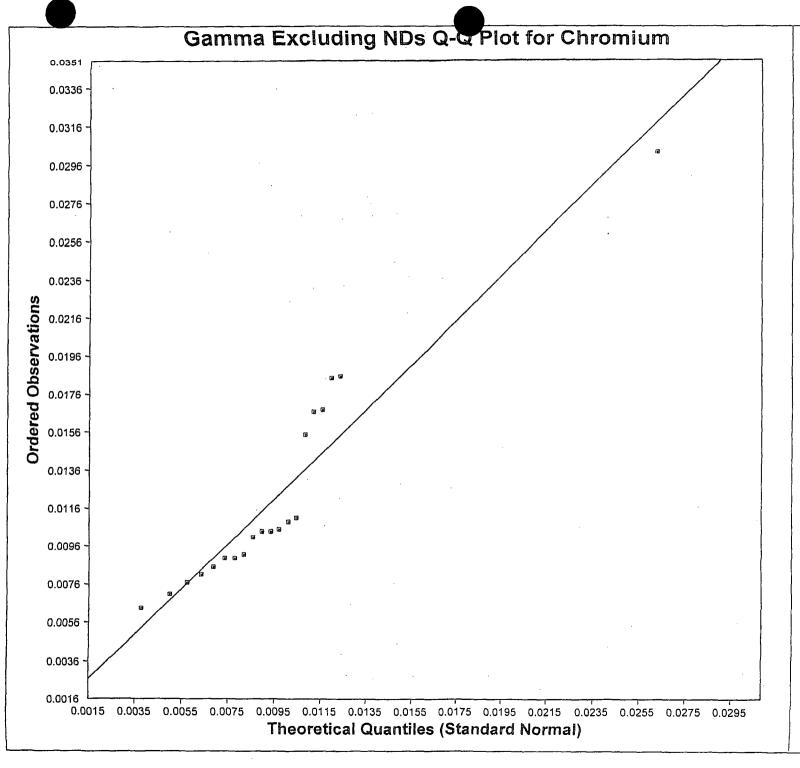












#### Chromium

Total Number of Data = 33

Number treated as ND = 13

Max DL = 0.0200000

n = 20

Percent NDs = 39%

Mean = 0.0122

SD = 0.0057

k star = 5.786

Slope = 1.039

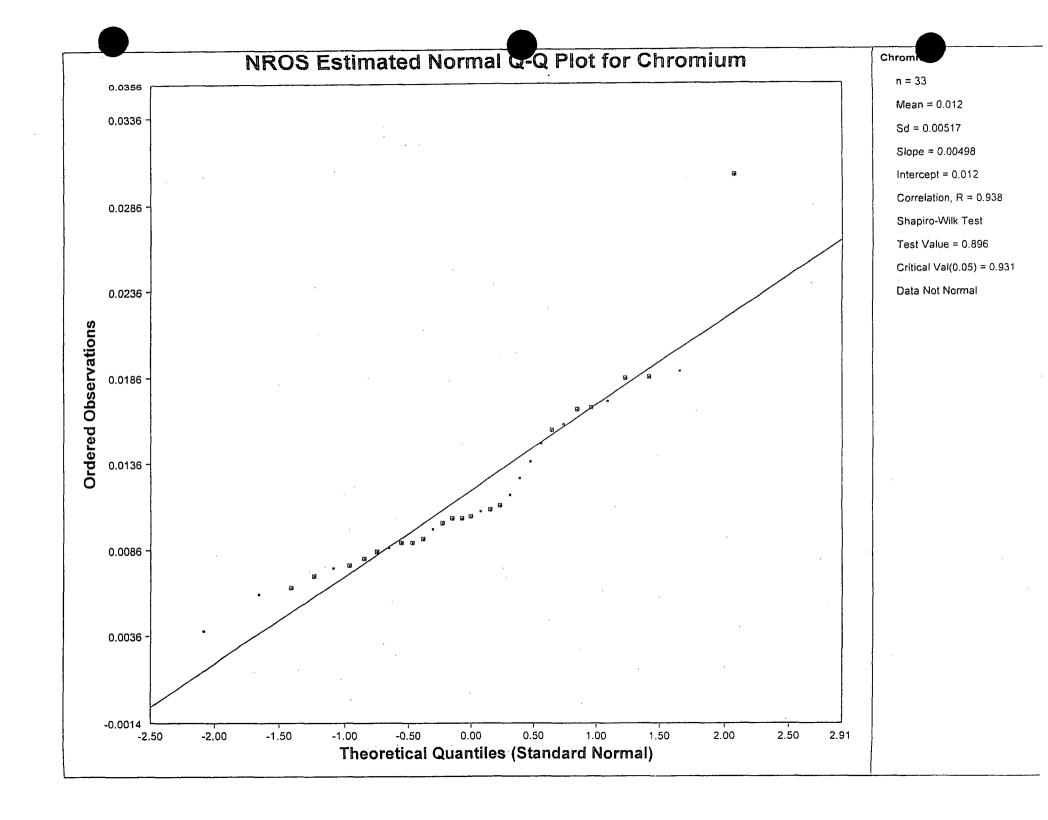
Intercept = -4.352E-4

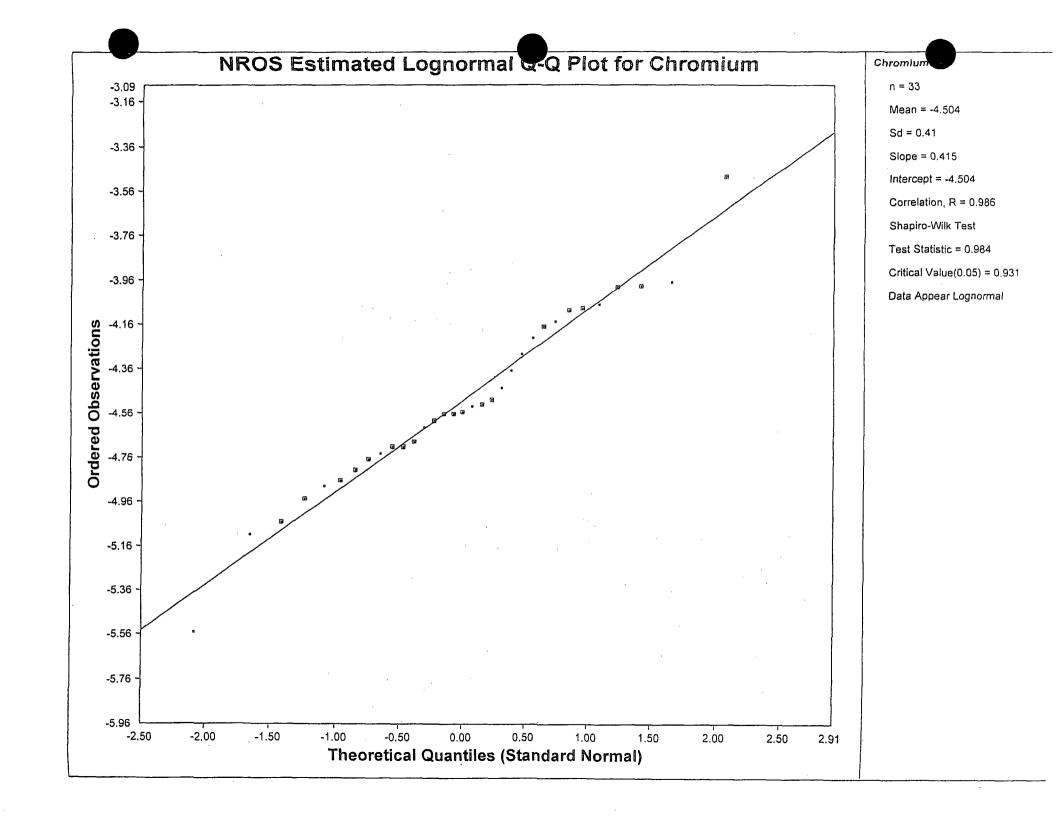
Correlation, R = 0.944

Anderson-Darling Test

Critical Value(0.05) = 0.744

Data Not Gamma Distributed





	Confidence Inte	ervals/Limits (C	CLs) for Data	sets Without	Non-Detec	š			-
Date/Time of Computation	8/14/2009 9:42:	48 AM					**		
User Selected Options									
From File	J:\1991\91-135\	MON\Lab Data	\2009\Ponds	\Sludge\Scot	ut\E Pond\M	etals.wst			
Full Precision	OFF								
Number of Bootstrap Operations	2000								
Confidence Coefficient	0.8								
	<del></del>	<del> </del>							
Arsenic		·							
Number of Val	d Observations	33							
Number of Distin	Number of Distinct Observations 33								
Raw Statistic					-				
	. Mean 0.173					***********			
	Minimum	0.0045							
	5% Percentile								
	10% Percentile	0.023 0.0362							<del> </del>
	1st Quartile	0.0611			<u> </u>				
	Median	0.128							<u> </u>
	3rd Quartile	0.217							
	90% Percentile	0.406			·				
	95% Percentile	0.446							
	Maximum	0.555	ļ						
Sto	ndard Deviation	0.142							
Sta	MAD / 0.6745	0.142	ļ						
	1								
	IQR / 1.35	0.117							
Normal Statis	tion		-						
	% Percentile (z)	-0.158							
	% Percentile (z)	-0.0611							
	% Percentile (z)	-0.00945							
10									
	1st Quartile (z)	0.0769							
	Median (z)	0.173	<u> </u>						
	3rd Quartile (z)	0.269							
	% Percentile (z)	0.355							
	% Percentile (z)								
99	% Percentile (z)	0.504							
Normal Confidence									
Normal	Lower Limit	Upper Limit							
Student's	t 0.14	0.205							
Gamma Stati	stics		ļ.	1					
	k hat	1.515	1					<b> </b>	
	Theta hat 0.114			<del>                                     </del>		<del> </del>		<del>                                     </del>	
	nu hat 100				<del>                                     </del>	<del> </del>		<del>                                     </del>	<del> </del>
	k star 1.398		+		-				
	Theta star 0.124				<u> </u>	-	<del> </del>	<u> </u>	<u> </u>
	MLE of Mean 0.173			<del> </del>		<del> </del>	<del> </del>	<del> </del>	
MLE of Sta	MLE of Standard Deviation 0.146			<del> </del>			<del> </del>	<del> </del>	<del> </del>
	nu star	<del> </del>	-	<del> </del>	-	-	ļ	<u> </u>	
		<u> </u>		<u> </u>	<u> </u>	<u> </u>	1	!	لــــا

80% Percentile of 0	80% Percentile of Chisquare (2k) 4.359								
Gamma Confidence									
	Lower Limit	Upper Limit		······································					
Approximate Gamma	0.145	0.212							
Adjusted Gamma	0.144	0.213							
Log-Transformed S									
Mean of Log-Trai		1		**					
Standard Deviation of Log-Trai	nate of Median	1							<u> </u>
	imate of Mean								
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MVU Estimate of Standard		<b>\$</b>							
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Lognormal Confidence  Confidence	Lower Limit	l loner ! !!	1						<u> </u>
Confidence Land's H	0.151	Upper Limit 0.263				ļ	1		
Chebyshev (MVUE)		0.263						<u> </u>	<u> </u>
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Central Limit Theorem	0.141	0.205				<u> </u>	ļ		
Jackknife	0.141	0.205							
Standard Bootstrap	0.142	0.204	· ·		-				<u> </u>
Bootstrap-t	0.144	0.212	-				<del> </del>		-
Percentile Bootstrap		0.206		•		<u> </u>	<u> </u>	<u> </u>	<u> </u>
BCA Bootstrap		0.207							
Chebyshev		0.228							<del>                                     </del>
Modified (t)	l	0.206						-	<del> </del>
Adjusted CLT		0.208	<del></del>		<u> </u>				
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Number of Vali	d Observations	33	<del>                                     </del>				<del> </del>	<del> </del>	
Number of Distinct	t Observations	31				<u> </u>	<del> </del>	<del> </del>	
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Raw Statistic	:s		<del>                                     </del>			<del>                                     </del>		<b></b>	
	Mean	0.0563		<del> </del>	<del> </del>	<u> </u>	<del> </del>	<del> </del>	
	Minimum	0.0263			<del>                                     </del>	<del> </del>	1	<del> </del>	<del> </del>
	5% Percentile	0.0313		<u> </u>	<del> </del>	<del>                                     </del>		<del> </del>	<del> </del>
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	1st Quartile	0.0492					1		<del>  </del>
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	3rd Quartile	0.0642			<del>                                     </del>	†	<del>                                     </del>	<del> </del>	<del>  </del>
	90% Percentile	0.0714		<b> </b>				<del> </del>	
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1st Quartile (z	i		[		<u> </u>	<del> </del>		<del> </del>	
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3rd Quartile (z	·	<del> </del>	( <u>-</u>	<del>                                     </del>	<del>                                     </del>		<del></del>		-[
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99% Percentile (z	1	+	·	<del></del>	<del>                                     </del>		+	<u> </u>	
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Normal Confidence Intervals  Normal Lower Limit	Upper Limit		<del></del>	+	1	-	-	<u> </u> '	_
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Gamma Confidence Intervals	·····		İ	1	<del> </del>	<del>                                     </del>		<del> </del> '	1
Confidence Lower Limit	Upper Limit	+	<u> </u>		+		<u> </u>	+	1
Approximate Gamma 0.0535	0.0594	+		-	-	+			-
Adjusted Gamma 0.0534	0.0595	+	<del> </del>	<del> </del>		+	<del>                                     </del>	<del> </del>	-
- 1		-	<u> </u>		1				-
Log-Transformed Statistics			+	+	<del>                                     </del>	+	+	'	-
Mean of Log-Transformed Dat	ta -2.902		+		<del> </del>	+			-
Standard Deviation of Log-Transformed Date	i i				-	-	+		-
MVU Estimate of Media	1		-	+		<del> </del>	<del> </del>		-
MVU Estimate of Mea	l	<u> </u>	-	<del></del>	+	-	-	<u> </u>	-
MVU Estimate of Mea				-	-				_
MVU Estimate of Standard Error of Mea	•	<del></del> '				-		<u> </u>	_
MVU EStimate of Standard Enter of twee	en 0.00232	<u> </u>	<del></del>	<del> </del>	<b></b>	<del> </del>	<del> </del>	<u> </u>	_
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Lognormal Confidence Intervals	1 1	<u> </u>						<u> </u>	_
Confidence Lower Limit	Upper Limit	,						<u> </u> '	
Land's H 0.0535	0.0597					]			
Chebyshev (MVUE) 0.0512	0.0616							,	
					Ī				
Nonparametric Confidence Intervals									1
Confidence Lower Limit	Upper Limit							†	1
Central Limit Theorem 0.0536	0.059			+			<del>                                     </del>	<del>                                     </del>	-
Jackknife 0.0535	0.0591	+			+	1	+	†	1
Standard Bootstrap 0.0536	0.0589	<del> </del>		-	+	+	<del> </del>	+	1
Bootstrap-t 0.0536	0.059	-	<del>                                     </del>	<del> </del>	1	+	+	+	-
Percentile Bootstrap 0.0536	0.059	-		+		+		+	-
BCA Bootstrap 0.0535	0.0588	1		<del> </del>			<del> </del>	+	-
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Chebyshev	0.0515	0.0611			1	1	
Modified (t)	0.0535	0.0591					
Adjusted CLT	0.0536	0.059					
		·····					

	Contidence	Intervals Data:	sets with No	n-Detects					_
Date/Time of Computation	8/14/2009 9:	43:23 AM		<del></del>					
User Selected Options									
From File	J:\1991\91-135\MON\Lab Data\2009\Ponds\Sludge\Scout\E Pond\Metals.wst								
Full Precision	OFF								
Number of Bootstrap Operations	2000								
Confidence Coefficient	0.8							·	
Chromium									
				· · · · · · · · · · · · · · · · · · ·					
General Statistic	s						·		
Number	of Valid Data	33							
Number of D	etected Data	20							
Number of Distinct D	etected Data	18							
Minim	um Detected	0.0064							
Maxim	um Detected	0.0303	-						
Number of Nor	-Detect Data	13		·					
Percent	Non-Detects	39.39%							
Minimu	n Non-detect	0.02	<del></del>						
Maximu	n Non-detect	0.02	-						<del></del>
Raw Statistics		<u></u>							
Mean of D	etected Data	0.0122							
SD of D	etected Data	0.0057							
		<u> </u>							
Maximum Likelihood Estim	ates (MLEs)	<del></del>							
	MLE Mean	N/A						<u> </u>	<u> </u>
	MLE Stdv				<del> </del>		<u> </u>	<del></del> -	
	1		<u> </u>						
Normal (MLE) Confidence	e Interval	<del></del>	<u></u>		<del> </del>				
	Lower Limit	Upper Limit			<u> </u>	<del> </del>			
MLE (t	) N/A	N/A							
Normal ROS Statis	tics								
Mean of Nom	nal ROS Data	0.012						<u> </u>	
Stdv of Norn	nal ROS Data	0.00517		· · · · · · · · · · · · · · · · · · ·	<del>                                     </del>				<del> </del>
				· · · · · ·	<del> </del>				
Normal ROS Confidence	Intervals				<del>                                     </del>				
	Lower Limit	Upper Limit		<u></u>	<del>                                     </del>				
ROS Student's	_1	0.0132			-				<del> </del>
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Gamma ROS Stati	stics				<u> </u>	<u> </u>			ļ
	k Star of Gamma ROS Data 9.155				<del> </del>				<u> </u>
Theta Star of Gamma ROS Data 0.00134				<del> </del>	<u> </u>		ļ	<u> </u>	
Nu Star of Gamma ROS Data 604.3				<del> </del>	ļ <u>.</u>	ļ	<b></b>	ļI	
IND Stat of Game	na nos bala	004.3			<u> </u>	<del> </del>	ļ		ļ
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ROS Adjusted Gamm	0.0114	0.0133	ļ		<b></b>	<u> </u>	ļ		<u> </u>
Log-Transformed St	atietice		ļ		ļ				
Log-Transformed St			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		

Mean of Log-Transformed Detected Data -4.484				1			ļ		1
Sldv of Log-Transformed Detected Date 0.393									
Mean of Lognormal ROS Data 0.0119				-					
Stdv of Lognorma	l ROS Data	0.00494							
	,	· · · · · · · · · · · · · · · · · · ·							
Lognormal Confidence In	ntervals								
Lognormal	Lower Limit	Upper Limit							
ROS Land's H	0.0109	0.013	1						
ROS % Bootstrap	0.0108	0.013	1						
ROS BCA Bootstrap	0.0109	0.0131	<del>                                     </del>			<u> </u>	<del></del>		
		L							
Kaplan Meier Distribution Free Statistics			<b> </b>						
Kaplan Meier Mean 0.0119									
Kaplan Meier Stdv 0.00496		<del> </del>							
Kaplan Meier SEM 0.00104		<del>                                     </del>							
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Nonparametric Confidence Intervals			<del> </del>	<del> </del>					
Nonparametric	Lower Limit	Upper Limit	<del> </del>						
Kaplan Meier (t)	0.0105	0.0132	<del> </del>	<del> </del>					
Kaplan Meier (z)	0.0105	0.0132	<del>                                     </del>	<del> </del>	<del> </del>				
Kaplan Meier % Bootstrap	0.0106	0.0132							
Kaplan Meier BCA Bootstrap	0.0104	0.0131	<del>                                     </del>				)		
Kaplan Meier Chebyshev	0.00953	0.0142	+	<del> </del>		<u> </u>			<b></b>
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Unable to Winsorize Data!				<u> </u>				<del> </del>	
	<del></del>	<del></del>		<del> </del>					
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### APPENDIX U

**Construction Quality Assurance Plan** 

# Honeywell International Inc., Metropolis Works Massac County, Illinois

# RCRA Pond Closure Construction Quality Assurance Plan

November 2010

Honeywell

Prepared for:
Honeywell International Inc.
2768 North US 45 Road
Metropolis, IL 62960



3300 Ginger Creek Drive Springfield, Illinois 62711 Tel: (217) 787-2334; Fax: (217) 787-9495

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8.	MATERIAL STABILIZATION	4
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## **TABLES**

Table 1	Material Stabilization and Grading
Table 2	Common Fill
Table 3	Anchor Trenches
Table 4	Geosynthetic Clay Liner (GCL)
Table 5	High Density Polyethylene (HDPE) Geomembranes
Table 6	Geocomposite Drainage Layer
Table 7	Granular Drainage/Filter Layer
Table 8	Protective Soil Layer
Table 9	Surface Water Control Structures

## LIST OF ACRONYMS

CQA	Construction Quality Assurance
EPA	Illinois Environmental Protection Agency
GCL	Geosynthetic Clay Liner
HDPE	High Density Polyethylene
RCRA	Resource Conservation and Recovery Act
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture

#### 1. INTRODUCTION

This Construction Quality Assurance (CQA) Program has been developed to ensure the surface impoundment cover system over B, C, D, and E Ponds is installed in a manner that ensures the cover system will meet the applicable RCRA and NRC closure performance standards and is protective of human health and the environment. This CQA program provides an outline of inspection activities and responsibilities to ensure proper installation and performance of the cap components.

#### 2. CQA OFFICER

A third-party contractor, independent of the owner, operator, and Project Manager, will be designated as the CQA Officer. The CQA Officer will be an Illinois Registered Professional Engineer and will supervise, approve, and be responsible for all inspections, testing, and other activities required in this program. The CQA Officer will be responsible for providing documentation and as-built record drawings of completed construction and maintaining records of the construction sequences throughout the capping project.

The CQA Officer may utilize one or more inspectors to assist with the various inspections and testing to be conducted in the field. Any such inspector will work under the direct supervision of the CQA Officer and will be properly trained and/or experienced as appropriate. If the CQA Officer is unable to be present, he/she will designate a person who will exercise professional judgment in carrying out the duties of a CQA Officer as the designated CQA Officer-in-absentia. At a minimum, the CQA Officer will be on site at the start and end of major construction activities and once per week during construction.

#### 3. INSPECTION ACTIVITIES

The CQA Officer will be present to provide supervision and assume responsibility for performing inspections of the following activities:

- 1. Site preparation work, including but not necessarily limited to:
  - a. Removal of fencing surrounding the ponds
  - b. Borrow area preparation
  - c. Installation of temporary roadways
- 2. Material stabilization and grading
- 3. Common fill installation
- 4. Installation of the geosynthetic clay liner (GCL)
- 5. Installation of the high density polyethylene (HDPE) cover
- 6. Installation of the composite drainage net (CDN)
- 7. Installation of the granular drainage/filter layer
- 8. Installation of the protective soil cover

#### 4. SAMPLING PLAN

A sampling plan will be implemented as part of the CQA Program for all construction activities.

The CQA Officer will review all specifications and requirements for the manufactured items used and will approve all materials based on satisfaction of their individual specification. Furthermore, he/she will ensure that proper construction and installation methods are used.

Below is a listing of tables summarizing the minimum sampling frequencies for the various cap components.

Facility Component	Sample Program Location
Material Stabilization and Grading	Table 1
Common Fill	Table 2
Anchor Trenches	Table 3
Geosynthetic Clay Liner	Table 4
HDPE Geomembranes	Table 5
Geocomposite Drainage Layer	Table 6
Granular Drainage/Filter Layer	Table 7
Protective Soil Layer	Table 8
Surface Water Control Structures	Table 9

All tables are included at the end of this CQA Program.

Additional testing and sampling may be required at the discretion of the CQA Officer if in his/her judgment it is necessary to ensure proper materials usage and construction procedures set forth by Federal and State Regulations.

#### 5. CONSTRUCTION MEETINGS

The CQA Officer may hold meetings prior to, and during, construction to ensure:

- Proper construction techniques are utilized
- Project staff understand the specifications and plans
- Proper handling of deviations from the plans necessitated by site-specific field conditions
- Review of the appropriate chain-of-command is used if unsuitable work is discovered

Meetings should be held with all Contractors and Honeywell representatives involved with the project to discuss their individual responsibilities.

#### 6. DOCUMENTATION

#### 6.1 Daily Summary Report

A daily summary report, prepared by or under the direct supervision of the CQA Officer during each day of activity, will contain, at a minimum:

- 1. The date
- 2. A summary of the weather conditions
- 3. A summary of locations where construction is occurring
- 4. Equipment and personnel on the project
- 5. A summary of any meetings held and attendees
- 6. A description of materials used and references or results of testing and documentation
- 7. The calibration and recalibration of test equipment
- 8. The daily inspection report from each inspector

#### 6.2 Daily Inspection Reports

Each construction inspector will complete a daily inspection report containing:

- 1. The location of inspection
- 2. The type of inspection
- 3. The procedure used
- 4. Test data
- 5. Acceptable limits for construction testing analysis
- 6. In the event of unsuitable materials or construction techniques, documentation regarding corrective action taken and causes for the incongruity
- 7. Results of the activity
- 8. Personnel involved in the inspection and sampling activities
- 9. The signature of the inspector

References may be made to other documents in order to preclude redundant reporting of information. Multiple inspectors may collaborate and complete a single inspection report summarizing their activities. If deemed appropriate by the CQA Officer, the Daily Summary Report and Daily Inspection Report(s) may be combined into a single daily report.

#### 6.3 Photographic Records

Photographs will be used as tools to document the progress and acceptability of the work and may be incorporated into a daily summary report, a daily inspection report, and/or the construction acceptance report. Each photograph will be identified with:

- 1. The date and time
- 2. The name of the photographer

3. Identification on a map showing the approximate photographer location and direction of the photograph

#### 6.4 Acceptance Report

Upon completion of the construction of the RCRA cover, the CQA Officer will submit a construction acceptance report to the Illinois EPA and Honeywell. At a minimum, the construction acceptance report will contain:

- 1. A certification by the CQA Officer the cover has been constructed in accordance with the engineering design.
- 2. Documentation of any changes to the design made during construction.
- 3. All daily summary and inspection reports.
- 4. Documentation of materials used during construction.
- 5. Documentation of testing as required by this CQA plan.
- 6. Copies of waste manifests and/or bills of lading for materials sent off-site for disposal.
- 7. As-built record drawings.

#### 7. WASTE DISPOSAL

Waste generated during construction activities will be managed at an authorized facility. Documentation of waste management, such as manifests, bills of lading, etc., will be included in the construction acceptance report.

#### 8. MATERIAL STABILIZATION

During material stabilization activities, the CQA Officer will be present and will ensure:

- 1. The proper mix of binder is utilized
- Proper techniques for tracking the extent of stabilized material are used
- 3. Stabilized material has the required strength
- 4. Final elevation and grades of stabilized material

Samples of the material/binder mix will be obtained at the frequency identified in Table 1.

If an uncured sample is obtained, in a location next to the pond from which it was obtained, the sample will be allowed to cure at approximately the same conditions as the material in the ponds.

If a cured sample is obtained, the location where the sample was obtained will be backfilled with concrete and/or cement and will be noted on the record drawings.

A topographic survey of the top of the stabilized material will be conducted. The stabilized material finished surface will be surveyed on a spacing, which should not exceed 25-feet in any ordinate direction.

#### 9. COMMON FILL

The CQA Officer will be present during all phases of the common fill construction to ensure:

- 1. Uniformity of coverage by compaction equipment
- 2. A minimum of six inches of clean soil is placed as the top layer of common fill
- 3. The final top surface of common fill is smooth
- 4. Use of methods to bond successive lifts together is appropriate
- 5. Contemporaneous placement of protective covering to prevent drying and desiccation, where necessary
- 6. Prevention of the placement of frozen material or the placement of material on frozen ground
- 7. Prevention of damage to completed sections
- 8. Construction only proceeds during favorable climatic conditions

The material will be placed in thin lifts (8-inch loose max.), worked to ensure proper lift binding and homogeneous moisture and density and then thoroughly recompacted. Each lift is to receive a minimum of two complete passes of the soil compactor prior to placing additional material.

The common fill will be protected from freezing and desiccation during and after construction. If necessary, this may be achieved by applying a random soil layer of sufficient thickness to provide protection. Additional moisture may also be added. Plastic sheeting or other appropriate coverings may also be used in lieu of, or in addition to, the above methods, as necessary, to protect against desiccation.

If moisture is added to the soil to increase water content, then water will be uniformly applied to the soil. The soil will be allowed to absorb the water throughout the particles before being recompacted. Double handling may be necessary or water added to the material source prior to excavation.

Minimum testing of the common fill will be according to the sampling schedule presented in Table 2. Test results will meet the limits shown or the deficiency will be corrected.

In addition to the laboratory testing, it will be equally important to continually perform visual inspections of the common fill material during construction. The inspections should ensure:

- 1. The thickness of each lift is no more than 8 inches loose
- 2. The adequacy of the binding between lifts
- 3. Compaction is occurring uniformly across the lift
- 4. The finished grade conforms to the design grades and lines

If the inspection reveals a deficiency, the Contractor will be promptly notified and corrective action taken. In addition, the deficiency location and corrective action taken will be noted on the daily inspection report. If additional testing is warranted in the area of the nonconformity then it will be completed and/or the suspect soil recompacted or removed and replaced as appropriate to acceptable limits.



All cover placement activities will be conducted to promote drainage to the extent possible. Protection of the common fill from erosion due to run-on and runoff will be maintained at all times, as practicable.

A topographic survey of the top of the common fill will be conducted to ensure design elevations have been met. The common fill finished surface will be surveyed on a spacing that should not exceed 25 feet in any ordinate direction. The surface grades will be considered acceptable if the grades when compared to the design grades yield a difference of no greater than ±0.1 foot.

#### 10. ANCHOR TRENCH

The anchor trench dimensions are specified in the design plans. The location will be marked prior to excavation. The anchor trench will be surveyed and visually inspected for proper dimensions, location, and roundness or corners prior to geosynthetic deployment.

No loose soils will be present in the anchor trench. Corners of the anchor trench shall be rounded to minimize the potential for damage to the synthetic materials.

Prior to deployment of geosynthetics, the base of the anchor trench will be surveyed at 25-foot intervals.

After deployment of the geosynthetic materials, the anchor trench shall be filled in lifts and compacted as specified.

#### 11. GEOSYNTHETIC CLAY LINER

#### 11.1 Manufacturing

The GCL manufacturer will provide the CQA Officer with a written certification signed by a responsible party that the materials actually delivered have properties that meet or exceed all property values guaranteed for that type of GCL. The CQA Officer will examine all manufacturer certifications to ensure that the property values listed on the certifications meet or exceed those specified for the particular type of GCL.

#### 11.2 Labeling

The GCL manufacturer will identify all rolls of GCL with the:

- GCL manufacturer's name
- Product identification
- Lot number
- Roll number
- Roll weight
- Roll dimensions (length and width)

In addition, if any special handling of the GCL is required, it will be so marked on the top surface (e.g., "This Side Up").



#### 11.3 Shipment and Storage

During shipment and storage, the GCL will be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions.

A visual inspection of each roll will be made during unloading to identify any damaged packaging. Rolls with damaged packaging will be marked, the packaging repaired, and the roll set aside for further inspection.

Rolls of GCL will be stored in a level, dry, and well-drained area away from high traffic areas. All rolls and accessory bentonite will be covered with plastic sheeting until installation. The GCL will not be exposed to precipitation.

Any deviation from the above requirements will be reported to the CQA Officer and Project Manager.

#### 11.4 Conformance Testing

#### 11.4.1 Tests

Upon delivery of the rolls of GCL, the manufacturer shall provide results of quality control tests listed in Table 4. The CQA Officer will ensure that samples are removed and forwarded to the geosynthetic CQA laboratory for testing to ensure conformance to both the design specifications and the guaranteed properties provided by the manufacturer. The GCL material shall conform to the properties described in Table 4.

#### 11.4.2 Sampling Procedures

Samples will be taken across the entire width of the roll. Unless otherwise specified, samples will be three feet long by the roll width. The CQA Officer will mark the machine direction on the samples with an arrow. Samples will be taken at the rate specified in Table 4.

#### 11.4.3 Test Results

The CQA Officer will examine all results from laboratory conformance testing and will report any non-conformance to the Project Manager.

#### 11.4.4 Conformance Test Failure

When a sample fails a conformance test conducted by the geosynthetics CQA laboratory, the following procedures will apply:

- The manufacturer will replace the roll of GCL that is in non-conformance with a roll that meets specifications.
- The installer will remove conformance samples for testing by the geosynthetics CQA laboratory from the closest numerical roll on both sides of the failed roll. These two samples must conform to the specifications. If either of these samples fail, the two numerically closest untested rolls on both sides of the failed sample will be tested by the geosynthetics CQA laboratory. These four samples must conform to the specifications. If any of these samples fail, every roll of GCL on site, and every

subsequently delivered roll that is from the same supplier, must be tested by the geosynthetics CQA laboratory for conformance to the specifications.

The CQA Officer will document actions taken in conjunction with conformance test failures.

#### 11.5 Surface Preparation

The subgrade shall be fine-graded to fill in all voids or cracks and then smooth-rolled to provide the best practicable surface for the GCL, eliminating all protrusions extending more than one-half inch from the surface.

The installer will certify in writing that the surface on which the GCL will be installed is acceptable. The certificate of acceptance will be given by the installer to the CQA Officer prior to the CQA Officer inspecting the area.

The CQA Officer will thoroughly inspect the common fill surface on which the GCL is to be placed prior to installation. The inspector will concentrate on the following and completion of any corrective action required:

- 1. The surface of the common fill cover will be inspected and surveyed, ensuring the grades and lines are consistent with those on the design plans.
- 2. The surface will be examined to ensure all rocks, roots, animal burrows, litter, construction debris, and/or undesirable objects that could weaken the support of the GCL or puncture it are not present.
- 3. All depressions will be filled and raised areas corrected.
- 4. All desiccation cracks larger than one-quarter inch will be corrected as necessary to ensure proper performance of the common fill earthen cover.
- 5. No vegetative growth will be present.
- 6. The common fill earthen cover will be free from chemicals (e.g. solvents, antifreeze, and crankcase and hydraulic oil resulting from construction).
- 7. All common fill cover grade change intersections will be rounded to prevent undue stresses on the GCL cover.
- 8. All common fill cover surfaces are firm and have not been wetted excessively in local areas in the period preceding the GCL installation.
- 9. The common fill will be free of ice or standing water.
- 10. The common fill will be free of any other foreign material that could contact the GCL.

The CQA Officer will certify acceptance of the common fill subgrade prior to GCL placement.

After the supporting materials have been accepted by the CQA Officer, he/she will continue to inspect the base for any change in the supporting materials condition that may require repair work.

#### 11.6 Handling and Placement

The installer will handle all GCL in such a manner as to ensure it is not damaged in any way, and the following will be complied with:



- On slopes, the GCL shall be placed so that seams are parallel to the direction of the slope. Shingle ends of panels in the direction of the grade.
- In the presence of wind, all GCL will be weighted with sandbags or the equivalent. Sandbags will be installed during placement and will remain until replaced with protective cover soils, geomembrane, or waterproof tarpaulin.
- The GCL will be kept continually under tension to minimize the presence of wrinkles.
- If in-place, special care must be taken to protect other materials from damage, which could be caused by the cutting of the GCL. The GCL should be cut using a utility blade in a manner recommended by the manufacturer.
- During placement of the GCL, care will be taken not to entrap stones or moisture in the GCL. Care will be taken not to walk on or drag equipment across the exposed GCL.
- A temporary geosynthetic slip sheet may be used to reduce friction damage during placement.
- A visual examination of the GCL will be carried out over the entire surface after installation, to ensure that no potentially harmful foreign objects are present.
- Only as much GCL shall be deployed as can be covered at the end of the day with a
  geomembrane or temporary waterproof tarpaulin. GCL shall not be left uncovered
  overnight. If GCL is hydrated when no confining stress is present, it may require
  replacement of the hydrated material based on observations of the CQA Officer,
  Project Manager, and consultation with the supplier.

The CQA Officer will note any noncompliance and report it to the Project Manager.

#### 11.7 Anchorage

At the top of slope, the GCL will be placed in an anchor trench or an equivalent runout design will be utilized. If an anchor trench is utilized, the requirements of Section 10 will be followed. If an anchor trench is used, the GCL will cover the entire floor of the trench but will not extend up the rear of the trench wall.

#### 11.8 Seams

Longitudinal seams will be overlapped at a minimum of six inches. If the GCL is manufactured with a grooved cut in the nonwoven geotextile, then no bentonite enhanced seam is required. If the GCL does not have a grooved cut in one of the nonwoven geotextiles in the longitudinal overlap, then bentonite enhanced seams are required.

End-of-roll seams ends will be overlapped a minimum of 24 inches. All end-of-roll seams require bentonite-enhanced seams.

#### Bentonite-Enhanced Seams

To construct a bentonite-enhanced seam, the following procedure will be used.

- 1. A continuous bead of granular bentonite will be applied along the underlying panel edge at a zone defined by the edge of the underlying panel and the 6-inch overlap line.
- 2. Granular bentonite will be applied at a minimum of one-fourth pound per lineal foot.

#### 11.9 Repair

Any holes or tears in the GCL will be repaired as follows:

A patch made from the same GCL will be placed over the damaged area no closer than 12 inches (300 mm) from any edge. Granular bentonite or mastic will be applied around the damaged area prior to placement of the patch. An adhesive may be used to affix the patch in place. The patch will be sandbagged into position until it is covered by the overlying geomembrane. Should any tear exceed 10 percent of the width of the roll, that roll will be removed and replaced.

Care will be taken to remove any soil, or other material, that may have penetrated the torn GCL. The CQA Officer will observe any repair.

#### 11.10 Care After Placement

After placement, soft-soled shoes shall be used when walking upon the GCL. Lightweight, low ground pressure vehicles (i.e., 4-wheel all-terrain vehicles or similar) may be used to facilitate installation of the geomembrane above the GCL.

#### 12. GEOMEMBRANE COVER

#### 12.1 Surface Preparation

The CQA Officer will thoroughly inspect the GCL surface on which the geomembrane is to be laid. The inspector will concentrate on the following and completion of necessary corrective actions:

- 1. The GCL will have been installed in accordance with design parameters.
- 2. The GCL will not be hydrated. If the GCL is hydrated, the procedures in Section 11.6 will be followed.

In conjunction with the monitoring activities described above, the CQA Officer will implement the sampling program summarized in Table 5.

#### 12.2 Panel Layout Plan

Prior to any geomembrane cover installation, the installer will provide the CQA Officer a panel layout plan for the specific area included in his construction bid. The geomembrane cover will be installed on top of the GCL in accordance with the drawings, specifications, and manufacturer's instructions by persons experienced in similar cover installation. Furthermore, the geomembrane cover will be installed in accordance with the installer's panel layout plan and as it may be revised with the approval of the CQA Officer and Project Manager to suit field conditions at the time of installation.

#### 12.3 Field Seaming

All field seaming will be in accordance with the manufacturer's specifications. Any necessary revisions during installation will be reflected on the record "as-built" drawings.

Geomembrane bonding will use fusion welding when possible and extrusion welding as a secondary means. Fusion welding will typically consist of applying dynamic energy, heat and/or

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extrudate between two overlapped panels. This will allow a bonding of the extrudate with the panel material, or panel-to-panel, providing a homogenous mass along the area of the seam. Extrusion welding may be similar to fusion welding but typically lacks the dynamic energy.

Equipment used to bond the geomembrane will be equipped with monitors capable of providing instantaneous temperature readings regarding the zone of contact. This will allow the operator to manually or automatically alter the bonding process to ensure integrity based on changes in environment.

The quality control aspects of the actual geomembrane cover installation will include, but not necessarily be limited to:

- 1. Inspection of the procedures and adequacy used for cleaning and/or drying the surfaces of the geomembrane to be seamed
- 2. Monitoring of the temperature and speed of welding
- 3. Only smooth-soled shoes will be allowed on the geomembrane cover
- 4. No vehicles will be allowed directly on the geomembrane cover

The quality assurance aspects of the actual geomembrane cover installation will include, but not necessarily be limited to:

- 1. Test welds on scrap geomembrane cover materials will be produced by each seamer at least twice daily, in the early morning and afternoon, under the same conditions as production seaming to verify conditions are adequate.
- 2. All field seams will be pressure or vacuum tested over their full length.
- 3. Samples of actual field seams will be tested on an average basis of at least once every 500 feet of seam length by sample removal and laboratory testing for bonded seam strength and peel adhesion. The test results will be considered acceptable if they meet or exceed the minimum values indicated in Table 5. (Patches will be welded over holes created by sampling.)
- 4. Inadequate seams will be cut out and rewelded or an additional layer of cover will be welded over the suspect seam.
- 5. Documentation of the location of each panel, sample point, repaired areas and the test results.

Using the above-mentioned procedures and others that may be required or deemed appropriate by the CQA Officer, upon completion of the geomembrane installation, he will exercise professional judgment to certify that:

- 1. The bedding material contained no undesirable objects.
- 2. The placement plan has been followed.
- 3. The anchor trench and back-fill were constructed to prevent damage to the geomembrane.
- 4. All tears, rips, punctures, and other damage were repaired.
- 5. All geomembrane seams were properly constructed and tested in accordance with the manufacturer's specifications.

#### 13. GEOCOMPOSITE DRAINAGE LAYER

A double-sided geotextile composite will be used as a drainage layer over the HDPE. The geocomposite drainage layer will have a minimum hydraulic transmissivity of 9x10⁻⁴ m²/s.

The geocomposite will be made of polyethylene materials and a geotextile (filter fabric) adhered to its sides to facilitate improved slope stability and separation from overlying materials. Manufacturer testing will be in accordance with Table 6. Installation will be in accordance with recommendations of the manufacturer as approved by the CQA Officer and Project Manager.

The finished surface of the geocomposite drainage layer will be surveyed on a spacing, which should not exceed 25 feet in any ordinate direction. The purpose of this survey is to establish the elevation of the bottom of the granular drainage layer.

#### 14. GRANULAR DRAINAGE/FILTER LAYER

A granular drainage/filter layer will be provided above the CDN. Before use, the source of the granular drainage/filter layer will be sampled under the supervision of the CQA Officer for the parameters listed in Table 7. Additional sampling will be performed as the material is received, ensuring continued satisfaction of the specifications. Care should be taken to avoid contamination of the granular drainage material with soil during stockpiling operations.

The granular drainage layer will be placed (not dropped) using a low-ground pressure crawler end loader or dozer. A uniform 12-inch (min.) thickness of granular material will be placed in one lift.

Operation of equipment on the granular drainage layer will be kept to a minimum. Movement of machinery will be done in straight lines with no sudden turns, starting, or stopping.

A comparison of elevations of the top of the CDN and top of granular drainage/filter layer surface will be used to verify the thickness of the drainage layer. Drainage layer thickness will be measured at least every 25 feet horizontally, and at major grade breaks, and 12-inch (min.) normal to the liner surface.

Construction of the granular drainage/filter layer will be monitored by the CQA Officer to:

- 1. Exercise professional judgment to certify that all materials used for the granular drainage layer meet the required size and hydraulic conductivity requirements.
- 2. Certify materials used for the granular drainage layer are placed in accordance with the design plans.
- 3. Certify the granular drainage layer is a minimum of 1-foot thick.

#### 15. PROTECTIVE LAYER

The final protective layer will consist of a minimum of 24 inches of clean soil. The lower 18 inches of soil should be a free draining soil and slightly compacted as necessary to hold the soil in place and resist erosion. The remaining 6 inches should not be compacted and should be the best readily available soil for supporting vegetation. The thickness of the final protective layer should be documented by comparing the finished elevation of the granular drainage layer with the final

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surface. Upon installation of the granular drainage/filter layer, a minimum of 24 inches of final protective cover must be placed. The minimum thickness of the final protective layer will be placed as soon as possible after placement of the granular drainage layer.

Loams of the USDA soils classification system or USCS classes GM, GC, SM, SC, ML, and CL are all considered suitable protective soils. The final protective layer may include soils from offsite sources and compost.

The finished surface of the final cover system will be surveyed on a spacing that should not exceed 25 feet in any ordinate direction. The minimum required thickness of protective soil is 24 inches. There will be no tolerances for thicknesses less than 24 inches.

Construction of the protective soil layer will be monitored by the CQA Officer to:

- 1. Exercise professional judgment to certify that materials used for the protective soil layer are of the proper type.
- 2. Certify the protective soil layer is a minimum of 24 inches thick.

#### **16. VEGETATIVE COVER**

Finalized areas will be prepared and seeded as soon as practicable to prevent deterioration. Composite soil sample testing may be done to determine the amount of lime and/or fertilizer needed. Seed will typically be incorporated into the upper surface of the final protective layer using a disk or harrow or by using hydroseeding techniques. The seed mixture selected must be amenable to the soil quality/thickness, slopes and moisture/climatological conditions that exist without the need for continued maintenance and with minimal potential for root penetration into the low permeability layer. It will also be consistent with an "open space" post-capping land use. Fertilizer, lime, and mulch should be used at rates necessary to establish proper growth of the seed.

Landscaping or seeding professionals knowledgeable of Massac County's climatological conditions may be consulted in determining necessary soil amendments and application rates based upon specific seasonal conditions at the time of closure. As a guide, the design procedures and specifications presented in the *Illinois Urban Manual* or *Procedures and Standards for Urban Soil Erosion and Sediment Control in Illinois* may be utilized.

Mulch consisting of straw, jute, and/or wood excelsior will be used as necessary to hold the seed in place and conserve moisture.

The CQA Officer will monitor seeding activities and record the amount of seed and amendments (lb/acre) and the boundaries of seeded areas on the as-built drawings.

#### 17. SURFACE WATER CONTROL STRUCTURES

The CQA Officer will monitor installation of surface water control structures, such as ditches, culverts, and sediment control devices to ensure design specifications are met.

As shown in Table 9, ditches cross sections and slopes will be surveyed at 50-foot intervals. Any deviations from the design plans will be noted on the as-built drawings with appropriate

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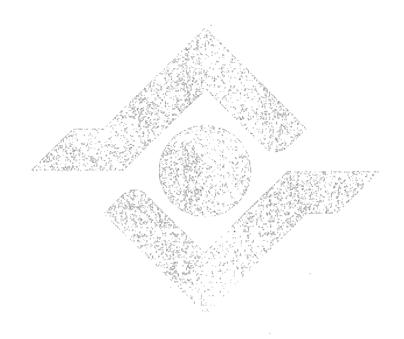
calculations showing the hydraulic carrying capacity remains sufficient. Ditches will be completed with appropriate erosion control coverings as soon as practicable.

The CQA Officer will monitor construction of the surface water control structures to:

- 1. Certify the structures meet the design slopes
- 2. Certify the structures meet the design depth and width

#### 18. EXCEPTIONS

The CQA Officer shall have the authority to modify the design shown on the plans based upon unexpected conditions encountered in the field. Small changes or modifications are historically required on any construction job of this size. Accordingly, any changes or modifications will be incorporated into the Construction Acceptance Report and/or record drawings. Calculations, supporting discussion, etc. shall also be included in the Construction Acceptance Report to validate the adequacy of the changes in relation to the original design.





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### HONEYWELL INTERNATIONAL INC. Metro S Works

## POND CLOSURE PLAN CQA PLAN TABLE 1 - MATERIAL STABILIZATION AND GRADING

TEST/PROCEDURE	TEST METHOD	MINIMUM FREQUENCY	ACCEPTABLE VALUES
Unconfined Compressive Strength	ASTM D5102	1 per 5,000 yd ³ (minimum 2 per pond)	25 psi @ 28 days (min.)
Survey Line and Grade Control		25-foot intervals and at major grade breaks	NA
Survey Location of Cured Sludge Samples		All Cured Sample Locations	NA

### HONEYWELL INTERNATIONAL INC. Metro s Works

## POND CLOSURE PLAN CQA PLAN TABLE 2 - COMMON FILL

TEST/PROCEDURE	TEST METHOD	MINIMUM FREQUENCY	ACCEPTABLE VALUES
Modified Proctor Moisture Density	ASTM D1557	1 per 10,000 yd ³ or soil change	NA
In-Place Density and Moisture	ASTM D6938	2 per lift per acre	Density: 85% of optimum (min.) Moisture: 1 - 5% above optimum
Survey Line and Grade Control		25-foot intervals and at major grade breaks	± 0.1 foot compared to design grades

### HONEYWELL INTERNATIONAL INC. Metrop s Works

# POND CLOSURE PLAN CQA PLAN TABLE 3 - ANCHOR TRENCHES

TEST/PROCEDURE	MINIMUM FREQUENCY	ACCEPTABLE VALUES
Survey Line and Grade Control	25-foot intervals	NA
Visual Inspection of Trench Corners	Continuous	Rounded Corners

### HONEYWELL INTERNATIONAL INC. Metro Works

## POND CLOSURE PLAN CQA PLAN TABLE 4 - GEOSYNTHETIC CLAY LINER (GCL)

TEST/PROCEDURE	TEST METHOD	TEST FREQUENCY	ACCEPTABLE VALUES	
Bentonite (as received)				
Swell Index	ASTM D5890	1 per 50 tons	24 ml/2g (min)	
Fluid Loss	ASTM D5891	1 per 50 tons	18 ml (max.)	
	Geotextiles (as re	ceived)		
Mass Per Unit Area (nonwoven)	ASTM D5261	1 per 25,000 yd²	5.8 oz/yd² (min.)	
Mass Per Unit Area (nonwoven composite)	ASTM D5261	1 per 25,000 yd²	5.9 oz/yd² (min.)	
	GCL (as manufac	tured)		
Mass of Bentonite Per Unit Area	ASTM D5993	1 per 40,000 ft ²	0.75 lb/ft² (min.)	
Moisture Content	ASTM D5993	1 per 5,000 yd²	20 - 40%	
Tensile Strength	ASTM D6768	1 per 200,000 ft ²	25 lb/in (min.)	
Peel Strength	ASTM D6496	1 per 40,000 ft ²	3 lb/in (min.)	
Permeability	ASTM D5887	1 per week	5 x 10 ⁻⁹ cm/sec (max.)	
OR				
Flux	ASTM D5887	1 per week	1 x 10 ⁻⁸ m ³ /sec-m ² (max.)	
GCL Hydrated Internal Shear Strength	ASTM D5321 ASTM D6243	periodic	500 psf typ. at 200 psf	
GCL Permeability (5 psi)	ASTM D6766	yearly	1 x 10 ⁻⁶ cm/sec (max.)	
GCL Permeability (70 psi)	ASTM D6766 modified	yearly	5 x 10 ⁻⁸ cm/sec (max.)	
	Component Dura	ability		
Geotextile and Reinforcing Yarns	GRI-GCL2 Section 5.6.2	yearly	65 % strength retained (min.)	

### POND CLOSURE PLAN CQA PLAN TABLE 5 - HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANES

TEST/PROCEDURE	TEST METHOD	TEST FREQUENCY	ACCEPTABLE VALUES
Laboratory Conformance - Geomembrane Sheet Properties			
Thickness (minimum average)	ASTM D5994	1 per roll	57 mil (min.)
Thickness (lowest individual of 8 of 10 readings)	ASTM D5994	1 per roll	54 mil (min.)
Thickness (lowest individual of 10 readings)	ASTM D5994	1 per roll	51 mil (min.)
Asperity Height	GRI GM12 / ASTM D7466	every 2nd roll	10 mil (min.)
Sheet Density	ASTM D792 or ASTM D1505	1 per 200,000 lb	0.94 g/cc (min.)
Strength at Yield	ASTM D6693	1 per 20,000 lb	126 lb/in (min.)
Strength at Break	ASTM D6693	1 per 20,000 (b	90 lb/in (min.)
Elongation at Yield	ASTM D6693	1 per 20,000 lb	12% (min.)
Elongation at Break	ASTM D6693	1 per 20,000 lb	100% (min.)
Tear Resistance	ASTM D1004	1 per 45,000 lb	42 lb (min.)
Puncture Resistance	ASTM D4833	1 per 45,000 lb	90 lb (min.)
Stress Crack Resistance	ASTM D5397	per GRI GM10	300 hrs (min.)
Carbon Black Content	ASTM D1603	1 per 20,000 lb	2-3%
Carbon Black Dispersion	ASTM D5596	1 per 45,000 lb	For 10 Views: 9 in Categories 1 or 2 1 in Category 3
Oxidative Induction Time	ASTM D3895	1 per 200,000 lb	100 minutes (min.)
Oven Aging with High Pressure OIT % Retained	ASTM D5721 ASTM D5885	1 per each formulation	80% (min.)
UV Resistance with High Pressure OIT (at 1,600 hrs)	GRI GM11 / ASTM D5885	1 per each formulation	50% (min.)

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## POND CLOSURE PLAN CQA PLAN TABLE 5 - HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANES

TEST/PROCEDURE	TEST METHOD	TEST FREQUENCY	ACCEPTABLE VALUES
	Field Seam Te	sting - Machine Pre-Weld Testing	
Seam Peel Specimens (3 specimens) Seam Shear Specimens (1 specimen)	ASTM D6392	1 at startup     1 after machine shutdown exceeding 20 minutes     1 every 5 hours of continuous seaming	Peel Strength (hot wedge): 91 lb/in (min.) Peel Strength (extrusion): 78 lb/in (min.) Shear Strength: 120 lb/in (min.)
	Field Seam Te	sting - Destructive Seam Testing	
Sample Collection (30-inches along seam, 12-inches wide)	ASTM D6392	1 per 500 ft of seam	NA
Seam Peel Adhesion	ASTM D6392	5 specimens per destructive sample location	Hot Wedge: 91 lb/in (min.) Extrusion: 78 lb/in (min.)
Seam Shear Strength	ASTM D6392	5 specimens per destructive sample location	120 lb/in (min.)
	Field Seam Testi	ng - Non-Destructive Seam Testing	
Air Channel Test (30 psi for 5 minutes)	ASTM D4437	All Double Wedge Welds	3 psi loss (max.)
Vacuum Box Test	ASTM D5641	All Double Wedge Welds Not Air Channel Tested All Extrusion Welds	No Apparent Leaks
Seam Length & Location		100% of All Seams	NA

### POND CLOSURE PLAN CQA PLAN TABLE 6 - GEOCOMPOSITE DRAINAGE LAYER

TEST/PROCEDURE	TEST METHOD	TEST FREQUENCY	ACCEPTABLE VALUES	
	Geocomposite			
Transmissivity	ASTM D4716	1 per 500,000 ft ²	9x10-4 m²/s (min.)	
Peel Adhesion	ASTM D7005	1 per 50,000 ft ²	1 lb/in (min.)	
	Geonet Co	mponent		
Thickness	ASTM D5199	1 per 50,000 ft ²	300 mil (min.)	
Peak Tensile Strength	ASTM D5035	1 per 50,000 ft ²	75 lb/in (min.)	
Melt Flow Index	ASTM D1238	1 per resin lot	≤ 1 g/10 minutes	
Density	ASTM D792 B	1 per 50,000 ft ²	0.94 g/cm³ (min.)	
Carbon Black Content	ASTM D4218	1 per 50,000 ft ²	2-3%	
Transmissivity	ASTM D4716	1 per 500,000 ft²	8x10-3 m ² /sec (min.)	
	Geotextile C	omponent		
Mass Per Unit Area	ASTM D5261	1 per 100,000 ft ²	6 oz/yd² (min.)	
Grab Tensile Strength	ASTM D4632	1 per 100,000 ft ²	170 lbs (min.)	
Grab Elongation	ASTM D4632	1 per 100,000 ft ²	50% (min.)	
Trapeziodal Tear Strength	ASTM D4533	1 per 100,000 ft ²	70 lbs (min.)	
Puncture Strength	ASTM D4833	1 per 100,000 ft ²	95 lbs (min.)	
Permitivity	ASTM D4491	1 per 100,000 ft ²	1.6 sec ⁻¹ (min.)	
Water Flow	ASTM D4491	1 per 100,000 ft ²	125 gpm/ft ² (min.)	
Apparent Opening Size US Standard Seive	ASTM D4751	1 per 100,000 ft ²	70 (max.)	
UV Resistance	ASTM D4355	1 per resin lot	70% after 500 hrs (min.)	
	Finised (	Grades		
Top Surface of Geotextile Drainage Layer		25-foot intervals and major grade breaks	NA NA	

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## POND CLOSURE PLAN CQA PLAN TABLE 7 - GRANULAR DRAINAGE/FILTER LAYER

TEST/PROCEDURE	TEST METHOD	MINIMUM FREQUENCY	ACCEPTABLE VALUES
Grain Size Distribution	ASTM C-136	1 per 2,500 yd ³	P ₂₀₀ ≤ 10%
Hydraulic Conductivity	ASTM D2434	1 per 8,000 yd ³	1 x 10 ⁻³ cm/sec (min.)
Top Elevation Survey	NA .	25 foot intervals and at major grade breaks	1 ft (min.)

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# POND CLOSURE PLAN CQA PLAN TABLE 8 - PROTECTIVE SOIL LAYER

TEST/PROCEDURE	MINIMUM FREQUENCY	ACCEPTABLE VALUES
Top Elevation Survey	25-foot intervals and at major grade breaks	2 feet (min.)

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# POND CLOSURE PLAN CQA PLAN TABLE 9 - SURFACE WATER CONTROL STRUCTURES

TEST/PROCEDURE	MINIMUM FREQUENCY	ACCEPTABLE VALUES
Ditch Slope	50-foot intervals	design slope (min.)
Ditch Width	50-foot intervals	design width (min.)
Ditch Depth	50-foot intervals	design depth (min.)