

AMWTP-019

**Native American Scenario**

*for the*

*Advanced Mixed Waste Treatment Project Screening Level Risk  
Assessment Work Plan*

**PUBLIC READING ROOM  
U.S. DEPARTMENT OF ENERGY  
IDAHO OPERATIONS OFFICE**

This generic Native American scenario was submitted to the State of Idaho Division of Environmental Quality and the U.S. Environmental Protection Agency, Region 10 (EPA) on July 13, 1999. In a July 15, 1999 letter DEQ/EPA approved the use of this generic scenario as a replacement for the hunter and herdsman scenarios presented in the Advanced Mixed Waste Treatment Project Screening Level Risk Assessment Work Plan.

## AMWTF SLRA Native American Scenario

The archaeological record indicates humans arrived on the eastern Snake River Plain about 11,000 years ago and documents the continuity of the Shoshonean culture from 4,000 years until historic times. The record indicates that the native peoples primarily were hunters of large game, and the major role of plants was to furnish habitat and food for the animals that attracted the hunters to the area. However, while direct use of plants by the aboriginal inhabitants is only infrequently indicated by the archaeological record, artifacts found at one INEEL cave suggest a variety of uses including foods, fiber, and fuel (Anderson, 1996). Plants also were used for medicinal and religious purposes.

Today, Native Americans retain aboriginal rights to hunt and gather natural resources on all unoccupied areas of their aboriginal territory. Access at the INEEL is restricted, in that it is occupied land, due to safety, security, and environmental concerns. But, access is allowed under conditions agreed to in an Agreement in Principle. Therefore, it is important that the PSLRA assess potential risk to Native Americans who may follow a traditional lifestyle and harvest natural resources at the INEEL, and a scenario was developed to address potential risk to Native Americans from AMWTF emissions. Information about historical and traditional Native American practices in the area, as well as current site-specific information and EPA data on average intake rates for Native American people were used to develop a generic Native American scenario. Data derived for use at the Hanford site in Washington state and presented in the paper by Harris and Harper (Harris 1997) were also used, modified for differences in climate, habitats, and cultural activities (e.g., the sagebrush-steppe ecosystem does not support a riparian lifestyle).

The generic scenario is an attempt to bound the estimate of potential risk of a traditional lifestyle without using information that may be considered privileged or private by tribal members, such as the location of sites that are of religious importance to Native Americans. AMWTF representatives have established, and expect to maintain, dialog with Native American representatives to address tribal concerns. If indicated, the generic scenario defined for the PSLRA will be modified for the FSLRA.

Children and breast-feeding infants are included in the assessment. The Native American child is assumed to be exposed to COPCs and ROPCs emitted from the facility through the same exposure pathways as the Native American adult, and the infant is assessed for PCDD/PCDF and ROPC exposure via maternal milk. Assumptions used to derive the generic Native American scenarios are as follow:

**Location:** It is assumed the Native American receptor resides at the high-impact plausible residential location. To bound hunting/gathering activities, it's assumed the receptors spend one 8-hour day each week (evenly distributed) within a 20 km radius of the AMWTF (the hunting/gathering area), with the remainder of the time spent at the residential location, for a total of 350 days/year. It's assumed 15 days each year are spent outside of the impact area. (According to DOE representatives, the value for the amount of time spent on the INEEL is a conservative assumption). The concentrations of COPCs/ROPCs at all points modeled at and within the 20 km radius are averaged to derive an average concentration for COPCs/ROPCs in abiotic (soil and air) and biotic (plants and animals) media in the hunting/gathering area. Gathering is assumed to be practiced year 'round.

**Inhalation:** The adult inhalation rate used for gathering activities for the Native American scenario is based on the EPA rate for heavy outdoor activity of 2.3 m<sup>3</sup>/hour (per Harris 1997). The rate for moderate activity (1.5 m<sup>3</sup>/hour) may be more appropriate, but the selected rate is used for conservatism. For the hours not spent within the gathering area (i.e., the time spent at the residence location), the EPA rate of 0.63 m<sup>3</sup>/hr (15 m<sup>3</sup>/d) for adults is used (EPA 1998a). For the Native American child scenario, an inhalation rate of 1.5 m<sup>3</sup>/hour (36 m<sup>3</sup>/d) is used for hunting/gathering

activities, and 0.3 m<sup>3</sup>/hour (7.2 m<sup>3</sup>/d) is used for the time spent at the residence location. This (0.3 m<sup>3</sup>/hr) is the interim value for children provided in the EPA's HHRAP guidance (EPA 1998a).

**Meat:** It is assumed that all meat consumed by the Native American receptor is wild game (venison).

Because species-specific factors for game are not available, values for beef are used, with modification to account for differences in the animals' body fat. The average wildgame fat content of 2.285% for the edible portion of meat, cooked, is used (USGS 1998). It is also assumed that the Native American receptor uses the organs of harvested animals as 10% of the total meat intake, and that the concentration of COPCs in organ meat is ten times higher than in muscle tissue (Harris 1997). This high percentage of non-muscle tissue is assumed to bound non-food uses of the animal.

- Currently, onsite hunting is limited to a ½ mile hunting zone at designated areas inside the north and east boundary of the INEEL adjacent to agricultural lands, where depredation by elk has been a problem. The sagebrush-steppe ecosystem requires that game animals forage across the site (INEEL research found that radio collared elk traveled an average 5 miles/day during the summer). For the Native American scenario, it is assumed that game animals forage all areas evenly distributed within the hunting/gathering area (i.e., in an area at and within the 20 km radius of the AMWTF site), 365 days/year. This is a conservative assumption, as hunting areas and game populations are generally found outside of this region and seasonal migration out of the area is ignored.
- The average meat intake rate of 250 g/day (for adults) is taken from Harris and Harper (Harris 1997). For the INEEL scenario, it's assumed the entire intake is from game animals foraging as described above. This value is conservative, compared to the subsistence farmer intake value of 160 g/day. The meat/organ meat ingestion rates for children are based on the adult rate, modified by a factor of 30/70 (EPA 1998a).

**Vegetation:** Several plant species found at various locations at or near the INEEL have been identified as being used by aboriginal Native American people for food, medicinal use, smoking, shelter, etc. Some of these plants are found at specific locations, others throughout the site. The archeological record does not provide sufficient detail to determine traditional patterns of use, and data for bio-uptake of various plant species are not available. Therefore, published values for COPC uptake (EPA 1998a) and for ingestion of belowground and aboveground vegetation by one group of Native Americans (Harris 1997) are used. Only a portion of total vegetation consumed (25%) is assumed gathered in the hunting/gathering area; an equal portion (25%) is assumed grown in a home garden at the residence location; and the remaining 50% is assumed to be grown outside of the assessment area. (The assessment area includes both the onsite hunting/gathering location and the residence location.)

- The value of 574 g/70 kg-d (8.2 g/kg-d) is used for adult consumption (wet wt.) (Harper 1997). The Native American child is assumed to ingest vegetation in the same ratios as the Native American adult, with an intake that is 30/70 (EPA 1998a) that of the adult Native American (i.e., 246 g/15 kg-d, or 16.4 g/kg-d).
- 25% of the vegetation consumed by the Native American receptor is assumed gathered at the onsite contaminated area (i.e., within a 20 km radius of the AMWTF site). This is believed to be a conservative value and is intended to bound plant use unrelated to diet (e.g., medicinal). All of the aboveground vegetation gathered at the onsite hunting/gathering area is assumed to be exposed.
- 25% of the vegetation consumed by the Native American receptor is assumed grown in a home garden at the residence location, within the assessment area. The assumptions for aboveground

plants grown in the Native American home garden parallel those for the non-Native American residential scenario, in that the percentage of exposed aboveground and the percentage of protected aboveground vegetation is consistent between the two home garden scenarios.

- Plants gathered from the contaminated areas are assumed to be consumed 350 days/year.
- The approximate percentages of belowground crops (48%) to aboveground vegetables (52%) reported by Hunn and cited by Harris and Harper (Harris 1997) are used.

**Soil:** A totally subsistence hunter/gatherer adult lifestyle has a soil ingestion rate of 200 mg/day (Harris 1997), and a child hunter/gatherer soil ingestion rate of 300 mg/day is assumed. The values used for soil ingestion for a residential lifestyle are 100 mg/day for adults and 200 mg/day for children. For the adult and child Native American scenarios, it's assumed that 25% of the soil ingested per day is associated with gathering or use of gathered materials (thus, is soil from the onsite hunting/gathering area) and 75% of the daily intake is associated with activities at the residential location. For the adult, this yields an intake of 50 mg/day of onsite soil and 75 mg/day of residence soil, for a total adult soil ingestion rate of 125 mg/day of combined onsite and residence soil. The child's soil ingestion rate is 75 mg/day of onsite soil and 150 mg/day of residence soil, for a total child soil ingestion rate of 225 mg/day of combined onsite and residence soil.

### **Exposure factors**

Exposure duration: 40 years adult; 6 years child.

Body weight: 70 kg adult; 15 kg child.

Exposure frequency: Gathering activities; 416 hours/year, with activities evenly distributed within a 20 km radius of the AMWTF. Plant, soil, and animal consumption; 350 days/year. Residence within contaminated area; 7,984 hours/year.

### **Intake rates**

Inhalation: Adult rate at hunting/gathering area, 2.3 m<sup>3</sup>/hour; adult rate at residence, 0.65 m<sup>3</sup>/hour. Child rate at hunting/gathering area, 1.5 m<sup>3</sup>/hour; child rate at residence, 0.3 m<sup>3</sup>/hour.

Incidental soil ingestion: Adult; 50 mg/day onsite (hunting/gathering area) soil, 75 mg/day offsite (residence) soil. Child; 75 mg/day onsite (hunting/gathering area) soil; 150 mg/day offsite (residence) soil.

Vegetation (dry weight): Belowground vegetation 0.51168 g/kg-d (~35.8 g/d adult, 15.4 g/day child). Aboveground vegetation 0.55432 g/kg-d (~38.8 g/d adult, 16.6 g/d child). This assumes a water concentration in vegetation of 87%. For the aboveground vegetation, 32.8 % of the total from the assessment area is exposed, 67.2 % is protected.

Meat: Adult; 250 g/day muscle, 25 g/day organs. Child; 107 g/day muscle, 10.7 g/day organs.

Infant maternal milk consumption: 0.8 liter/day.

## References

Anderson, J.E., K.T. Ruppel, J.M. Glennon, K.E. Holte, and R.C. Rope. 1996. *Plant Communities, Ethnoecology, and Flora of the Idaho National Engineering Laboratory*. Environmental Science and Research Foundation Report Series, Number 005.

EPA, 1998a. *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*, EPA530-D-98-001A, Peer Review Draft, July 1998.

Harris, S. G. and B.L. Harper, 1997. *A Native American Exposure Scenario*, Risk Analysis, Vol. 17, No. 6, 207-216.

USGS Water Resources Division, Personal Communication with Deena F. Green, printout of average annual flow for selected streams from USGS data base, June, 1999.



STATE OF IDAHO  
DIVISION OF  
ENVIRONMENTAL QUALITY

1410 North Hillen • Boise, Idaho 83706-1255 • (208) 378-0502

Dirk Kempthorne, Governor  
C. Stephen Allred, Administrator

June 21, 1999

**CERTIFIED MAIL #P 241 839 257**  
**RETURN RECEIPT REQUESTED**

Mr. Frank Yaklich  
BNFL Inc.  
Suite 207  
1970 East 17th Street  
Idaho Falls, ID 83404

Dear Mr. Yaklich:

RE: Risk Assessment Workplan, Appendix D-6, Book 4, HWMA/TSCA Permit Application for the Advanced Mixed Waste Treatment Facility, EPA ID. Nos. IDR000002881 and ID4890008952

This letter is in response to BNFL Inc.'s submittal of Revision 4 of the Screening Level Risk Assessment Workplan (SLRAWP), May 1999.

The Idaho Division of Environmental Quality (DEQ) and U.S. Environmental Protection Agency, Region 10 (EPA), have completed a review of the revised SLRAWP. DEQ and EPA hereby approve BNFL, Inc.'s SLRAWP, conditioned and clarified as specified in Enclosure A to this letter.

This conditionally approved SLRAWP will be used to conduct the preliminary screening level risk assessment (PSLRA, and should the facility be constructed, the post Trial Burn Risk Assessment). Any additional iterations of the PSLRA deemed necessary by BNFL Inc., which require changes to the initial assumptions stated in the SLRAWP, must be reviewed and approved by DEQ and EPA prior to conducting these iterations.

BNFL Inc. must submit the PSLRA to DEQ and EPA, in accordance with IDAPA 16.01.05.012 [40 CFR §270.11] and 40 CFR §761.70(d), for review and approval. A copy of the SLRAWP and this letter shall be placed in the information repository, in accordance with IDAPA 16.01.05.013 [40 CFR §124.33], within seven (7) days of receipt of this letter. The generic Native American scenario inputs, once approved by the agencies, shall be placed in the repository. A copy of the PSLRA shall be placed in the repository at the time the report is submitted to the agencies.

If you have any questions regarding this letter, please contact Brian English (DEQ) at (208)373-0425 or Catherine Massimino (EPA) at (206) 553-4153.

Sincerely,

Brian R. Monson  
Program Manager  
Waste Program Office

Catherine Massimino  
Senior RCRA/Superfund Technical Specialist  
Office of Waste & Chemicals Management  
EPA - Region 10

BRM/BE:ls english@idwrapp.id

Enclosure

cc: K Trevor INERI Oversight

Greg Hill DOR

C. Massimino (EPA)



STATE OF IDAHO  
DIVISION OF  
ENVIRONMENTAL QUALITY

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Dirk Kempthorne, Governor  
C. Stephen Allred, Administrator

July 15, 1999

**CERTIFIED MAIL #P 241 839 278**

Mr. Frank Yaklich  
BNFL Inc.  
Suite 207  
1970 East 17th Street  
Idaho Falls, ID 83404

Dear Mr. Yaklich:

RE: Corrections, Clarifications, and Generic Native American Scenario Approval for the Risk Assessment Workplan, Appendix D-6, Book 4, HWMA/TSCA Permit Application for the Advanced Mixed Waste Treatment Facility, EPA ID. Nos. IDR000002881 and ID4890008952

This letter is in response to BNFL Inc.'s June 25, 1999 e-mail and letter of July 13, 1999 concerning corrections and clarifications to the Screening Level Risk Assessment Workplan (SLRAWP), May 1999, which was conditionally approved by the Division of Environmental Quality (DEQ) and Environmental Protection Agency Region 10 (EPA) in a June 21, 1999 letter. EPA Region 10 agrees with the findings in this letter.

The enclosure provides responses and documents BNFL's June 25, 1999 e-mail inquiries.

The DEQ and EPA have completed a review of the July 13, 1999 letter and have found the following:

- 1) The generic Native American scenario, submitted as Attachment A to the July 13 letter, satisfies the condition imposed by the June 21 approval letter requiring BNFL Inc. to propose a generic Native American scenario to replace the Hunter and Herdsman scenarios in the Risk Assessments. The generic Native American scenario (adult, child, and infant exposure to breast milk) shall be incorporated into the Workplan in place of the current Hunter and Herdsman scenarios.
- 2) The use of improved analytical techniques to lower the detection limits for selected compounds is appropriate. The use of the Selective Ion Monitoring (SIM) technique for Aldrin, DDE, and Di-N-Octyl Phthalate and California Air Resources Board Method 429 (CARB 429), in place of Method 8270C for analysis of polycyclic aromatic hydrocarbons (PAHs), are approved.
- 3) The use of 8.06 as the log Kow for Di-N-Octyl Phthalate, as stated in the Soil Screening Guidance (EPA/540/R-95/128), is appropriate.

Frank Yaklich Letter.

July 14, 1999

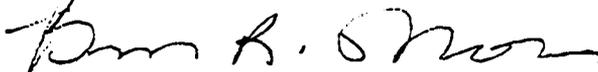
Page 2

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- 4) In order to be consistent with the *Human Health Risk Assessment Protocol*, the soil mixing depths should be one centimeter for untilled soils and 20 centimeters for tilled soil.
- 5) Revision of the soil ingestion rates to 100 mg/kg for adults and 200 mg/kg for children (from 50/100 mg/kg), to be consistent with other risk assessments conducted in EPA Region 10, is appropriate.
- 6) The feed rate to the brine evaporator, to be used in the risk assessment, shall be 2,428 pounds per hour (5 gpm).

If you have any questions regarding this letter, please contact Brian English (DEQ) at (208)373-0425, or Catherine Massimino (EPA) at (206) 553-4153.

Sincerely,



Brian R. Monson  
Program Manager  
Waste Program Office

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cc: K. Trever, INEEL Oversight  
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