Table 7-5. Cancer risks due to COPC concentrations in air.

	Current Onsite Worker		Future Onsite Worker		Future Onsite Resident	
COPCs	Inhalation of Fugitive Dust	Inhalation of Volatiles	Inhalation of Fugitive Dust	Inhalation of Volatiles	Inhalation of Fugitive Dust	Inhalation of Volatiles
Aroclor-1260	—	—	—	—	NTD	NTD
Benzo(a)pyrene	2E-14	1E-17	2E-14	1E-17	2E-14	8E-18
Aluminum	—	—	—	—	NTD	—
Arsenic	1E-15	—	1E-15	—	1E-13	—
Manganese	NTD	—	NTD	—	NTD	—
Mercury	—	—	—	—	NTD	—
Uranium	NTD	—	NTD	—	NTD	—
Am-241	4E-15	—	3E-15	—	1E-14	—
Ce-144	1E-18	—	2E-57	—	3E-57	—
Co-57	3E-23	—	8E-64	—	1E-63	—
Co-58	—	—	—	—	—	—
Co-60	8E-18	—	2E-23	—	1E-22	—
Cs-134	1E-18	—	2E-33	—	6E-33	—
Cs-137	2E-16	—	2E-17	—	1E-15	—
Eu-152	2E-16	—	1E-18	—	4E-18	—
Eu-154	2E-16	—	8E-20	—	2E-19	—
Eu-155	3E-18	—	3E-24	—	5E-24	—
H-3	6E-22	—	2E-24	—	1E-23	—
I-129	9E-18	—	9E-18	—	3E-18	—
K-40	—	—	—	—	5E-20	—
Nb-95	3E-25	—	—	—	—	—
Np-237	1E-15	—	1E-15	—	1E-15	—
Pu-238	3E-15	—	2E-15	—	3E-15	—
Pu-239/240	1E-15	—	1E-15	—	2E-15	—
Pu-241	—	—	—	—	5E-16	—
Pu-242	—	—	—	—	2E-18	—
Ru/Rh-106	8E-19	—	1E-48	—	5E-49	—
Sb-125	2E-20	—	3E-31	—	2E-31	—
Sr-90	3E-16	—	3E-17	—	1E-15	—
Tc-99	4E-20	—	4E-20	—	1E-19	—
U-234	7E-16	—	7E-16	—	5E-16	—
U-235	2E-17	—	2E-17	—	2E-17	—
U-236	—	—	—	—	3E-20	—
U-238	5E-16	—	5E-16	—	4E-16	—
Total Cancer Risk	3E-14	1E-17	3E-14	1E-17	2E-13	8E-18

-- Indicates that the contaminant is not a COPC in the medium or at the site.

NTD indicates that toxicity data is not available.

Table 7-6. Noncarcinogenic hazards due to COPC concentrations in air.

	Current Onsite Worker		Future Onsite Worker		Future Onsite Resident	
COPCs	Inhalation of Fugitive Dust	Inhalation of Volatiles	Inhalation of Fugitive Dust	Inhalation of Volatiles	Inhalation of Fugitive Dust	Inhalation of Volatiles
Aroclor-1260	—	—	—	—	NTD	NTD
Benzo(a)pyrene	NTD	NTD	NTD	NTD	NTD	NTD
Aluminum	—	—	—	—	NTD	—
Arsenic	NTD	—	NTD	—	NTD	—
Manganese	4E-06	—	5E-07	—	5E-07	—
Mercury	—	—	—	—	1E-07	—
Uranium	NTD	—	NTD	—	NTD	—
Am-241		—	—	—	—	—
Ce-144	—	—	—	—	—	—
Co-57	—	—	—	—	—	—
Co-58	—	—	—	—	—	—
Co-60	—	—	—	—	—	—
Cs-134	—	—	—	—	—	—
Cs-137	—	—	—	—	—	—
Eu-152	—	—	—	—	—	—
Eu-154	—	—	—	—	—	—
Eu-155	—	—	—	—	—	—
H-3	—	—	—	—	—	—
I-129	—	—	—	—	—	—
K-40	—	—	—	—	—	—
Nb-95	—	—	—	—	—	—
Np-237	—	—	—	—	—	—
Pu-238	—	—	—	—	—	—
Pu-239/240	—	—	—	—	—	—
Pu-241	—	—	—	—	—	—
Pu-242	—	—	—	—	—	—
Ru/Rh-106	—	—	—	—	—	—
Sb-125	—	—	—	—	—	—
Sr-90	—	—	—	—	—	—
Tc-99	—	—	—	—	—	—
U-234	—	—	—	—	—	—
U-235	—	—	—	—	—	—
U-236	—	—	—	—	—	—
U-238	—	—	—	—	—	—
Total Noncarcinogenic Hazard	4E-06	0E+00	5E-07	0E+00	6E-07	0E+00

— Indicates that the contaminant is not a COPC in the medium or at the site.

NTD indicates that toxicity data is not available.

Table 7-7. Summary of RI/BRA conclusions and recommendations for groups and sites of concern.

Group /Site	Contaminants Identified	Risk Assessment Results[a]	Conclusions and Recommendations
Sites of Exclusive Groundwater Concern (CPP-02,-23, -65, -69, -80, -83, -87, -89)	CPP-02: Radionuclides	CPP-02: Unknown potential for groundwater contamination, site included in the groundwater model.	These sites were evaluated in the RI/BRA to the extent that they are a source of recharge and/or contamination to the SRPA and will be evaluated further in the OU 3-13 Feasibility Study.
	CPP-23: Radionuclides	CPP-23: Significant potential source of groundwater contamination, site included in the groundwater model.	
	CPP-65: Low levels of radionuclides and inorganics	CPP-65: Significant source of water, insignificant source of ground-water contamination, site included in the groundwater model.	
	CPP-69: Radionuclides and metalsCPP-80: Radionuclides	CPP-69: No identified source, site not included in the groundwater model.	
		CPP-80: Unknown potential for groundwater contamination, site included in the groundwater model.	
	CPP-83: Radionuclides and metals	CPP-83: Significant potential source of groundwater contamination, site included in the groundwater model.	
	CPP-87: Radionuclides	CPP-87: No identified route for contamination transport to the aquifer, site not included in the groundwater model.	
	CPP-89: Radionuclides and metals	CPP-89: Unknown potential for groundwater contamination, site. Included in the groundwater model.	
Tank Farm (CPP-20/25, -26, -28, -31, -32W/E, -79)	Radionuclides at all sites	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137)	The potential increased cancer risk is unacceptable regardless of land use assumptions. Alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this group.
		Future occupational: surface risk >1E-04 due to external radiation exposure (Cs-137)	
		Future residential: surface risk >1E-04 due to external radiation exposure (Cs-137)	

Table 7-7. (continued).

Group /Site	Contaminants Identified	Risk Assessment Results[a]	Conclusions and Recommendations
Tank Farm South (CPP-15, -27/33, -58W/E)	Radionuclides at all sites	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137) Future occupational: surface risk >1E-04 due to external radiation exposure (Cs-137) Future residential: surface risk >1E-04 due to external radiation exposure (Cs-137) and ingestion of homegrown produce (Cs-137)	The potential increased cancer risk is unacceptable regardless of land use assumptions. Remedial alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this group.
Waste Calcine Facility (CPP-35, -36/91, -85)	CPP-35: Radionuclides CPP-36/91: Radionuclides CPP-85: No release identified	Current occupational: surface risk > 1E-04 due to external radiation exposure (Cs-137) Future occupational: surface risk > 1E-04 due to external radiation exposure (Cs-137) Future residential: surface risk > 1E-04 due to soil ingestion (Am-241, Cs- 137, Sr-90), homegrown produce ingestion (Cs-137 and Sr-90), and external radiation exposure (Cs-137)	The potential increased cancer risk is unacceptable regardless of land use assumptions. Remedial alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this group.
Old Storage Pool (CPP-01/04/05, -08/09, -10, -11)	Radionuclides for all sites	Current occupational: surface risk > 1E-04 due to external radiation exposure (Co-60, Cs-134, Cs-137, Eu-152, Eu-154) Future occupational: surface risk > 1E-04 due to external radiation exposure (Cs-137, Eu-152) Future residential: surface risk > 1E-04 due to external radiation exposure (Cs-137, Eu-152, Eu-154)	The potential increased cancer risk is unacceptable regardless of land use assumptions. Remedial alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this group.
Storage Yard East of CPP-603 (CPP-03, -17A, -17B)	Radionuclides for the 3 sites	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137) Future occupational: 1E-04> surface risk > 1E-06 due to radiation exposure (Cs-137) Future residential: surface risk > 1E-04 due to external radiation exposure (Cs-137)	The potential increased cancer risk is slightly greater than 1E-04 under current occupational and future residential assumptions. Only site CPP-03 should be evaluated further in the OU 3-13 Feasibility Study.

Table 7-7. (continued).

Group /Site	Contaminants Identified	Risk Assessment Results[a]	Conclusions and Recommendations
CPP-37A/B	Radionuclides and arsenic	Current occupational: 1E-04 > surface risk > 1E-06 due to external radiation exposure (Cs-137) Future occupational: 1E-04 > surface risk > 1E-06 from external radiation exposure (Cs-137, Np-237) Future residential: 1E-04 > surface risk > 1E-06 due to soil ingestion (arsenic) and external radiation exposure (Cs-137, Np-237)	The potential increased cancer incidence at this release site is less than 1E-04 under all land use assumptions; therefore, further evaluation in the OU 3-13 Feasibility Study is not warranted.
CPP-67	Radionuclides	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137) Future occupational: 1E-04> surface risk > 1E-06 due to external radiation exposure (Cs-137, Np-237) Future residential: surface risk >1E-04 due to external radiation exposure (Cs-137)	The potential increased cancer risk is unacceptable under future residential land use assumptions. Remedial alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this site.
CPP-14	Radionuclides	Current occupational: 1E-04>surface risk > 1E-06 due to external radiation exposure (Cs-137, Np-237) Future occupational: 1E-04> surface risk > 1E-06 due to external radiation exposure (Cs-137, Np-237) Future residential: 1E-04> surface risk > 1E-06 due to external radiation exposure (Cs-137, Np-237)	The potential increased cancer incidence at this release site is less than 1E-04 under all land use assumptions; therefore, further evaluation in the OU 3-13 Feasibility Study is not warranted.
CPP-34	Radionuclides	Current occupational: 1E-04> surface risk > 1E-06 external radiation exposure (Cs-137) Future occupational: 1E-04> surface risk > 1E-06 due to external radiation exposure (Cs-137) Future residential: surface risk > 1E-04 due to homegrown produce ingestion (Sr-90) and external radiation exposure (Cs-137)	The potential increased cancer risk is unacceptable under future residential land use assumptions. Remedial alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this site.

Table 7-7. (continued).

Group /Site	Contaminants Identified	Risk Assessment Results[a]	Conclusions and Recommendations
CPP-13	Radionuclides	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137, Eu-154) Future occupational: surface risk > 1E-04 due to external radiation exposure (Cs-137) Future residential: surface risk >1E-04 due to homegrown produce ingestion (Sr-90) and external radiation exposure (Cs-137)	The potential increased cancer risk is unacceptable under all land use assumptions evaluated. Remedial alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this site.
CPP-06	Radionuclides	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137) Future occupational: 1E-04 > surface risk > 1E-06 due to external radiation exposure (Cs-137) Future residential: 1E-04 > surface risk > 1E-06 due to external radiation exposure (Cs-137)	The potential increased cancer incidence at this release site is greater than 1E-04 under current land use but less than 1E-04 under future occupational and residential land use assumptions; therefore, further evaluation of this site in the FS is not warranted.
CPP-19	Radionuclides	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137) Future occupational: 1E-04 > surface risk > 1E-06 due to external radiation exposure (Cs-137) Future residential: surface risk > 1E-04 due to soil ingestion (Cs-137, Sr-90), homegrown produce ingestion (Cs-137, Sr-90) and external radiation exposure (Cs-137, Eu-152, Eu-154)	The potential increased cancer incidence at this release site is greater than 1E-04 under current and future residential land use assumptions but less than 1E-04 under future occupational land use. Remedial alternatives protective of future residents should be evaluated during the OU 3-13 Feasibility Study for this site.
CPP-22	Radionuclides	Current occupational: surface risk >1E-04 due to external radiation exposure (Cs-137) Future occupational: 1E-04 > surface risk > 1E-06 due to external radiation exposure (Cs-137) Future residential: 1E-04 > surface risk > 1E-06 due to external radiation exposure (Cs-137)	The potential increased cancer incidence at this release site is greater than 1E-04 under current land use but less than 1E-04 under future occupational and residential land use assumptions; therefore, further evaluation of this site in the OU 3-13 Feasibility Study is not warranted.

Table 7-7. (continued).

Group /Site	Contaminants Identified	Risk Assessment Results[a]	Conclusions and Recommendations
CPP-90	Radionuclides	Current occupational: 1E-04> surface risk > 1E-06 due to radiation exposure (Cs-137) Future occupational: 1E-04> surface risk > 1E-06 due to radiation exposure (Cs-137) Future residential: 1E-04> surface risk > 1E-06 due to external radiation exposure (Cs-137)	The potential increased cancer incidence at this release site is less than 1E-04 under all land use assumptions; therefore, further evaluation of this site in the OU3-13 Feasibility Study is not warranted.
CPP-88	Radionuclides	Current occupational: 1E-04> surface risk > 1E-06 due to radiation exposure (Cs-137) Future occupational: 1E-04> surface risk > 1E-06 due to radiation exposure (Cs-137) Future residential: 1E-04> surface risk > 1E-06 due to external radiation exposure (Cs-137)	The potential increased cancer incidence at this release site is less than 1E-04 under all land use assumptions; therefore, further evaluation of this site in the OU3-13 Feasibility Study is not warranted.
CPP-92	Radionuclides	The waste boxes that contain radioactive soil were not evaluated quantitatively in the RI/BRA Report.	The disposition of these boxes will be deferred to the OU 3-13 Feasibility Study.
CPP-93	Mercury	Current occupational: HI > 1 Future occupational: HI > 1 Future residential: non-carcinogenic hazard > 1 due to ingestion of home grown produce	The noncarcinogenic hazard under future residential assumptions is > 1; therefore, further evaluation of this site in the OU 3-13 FS is warranted.

a. The risk assessment results in this table do not include the air and groundwater contribution. The contaminant in parenthesis is the risk driver for the predominant exposure route.

Table 7-8. Human health baseline risk assessment summary for WAG 3 sites of concern.

Group	COC	Half-life*	Exposure Scenario Excess Risk of Incurring Cancer: Current Worker	Future Worker (in 2095)	Future Resident (in 2095)
Group 1—INTEC Tank Farm[a]	Cs-137**	30	6 in 10	6 in 100	3 in 10
	Sr-90***	29	5 in 10,000	5 in 100,000	2 in 10,000
	U-235	10^9	5 in10,000	5 in 10,000	2 in 1,000
Group 2—Soils Under Buildings and Structures	NSR[c]		NSR[c]	NSR[c]	NSR[c]
Group 3—Other Surface Soils	Cs-137	30	5 in 100	5 in 1,000	2 in 100
	Eu-152	13.3	2 in 1,000	1 in 100,000	6 in 100,000
	Eu-154	8.8	2 in 1,000	8 in 10,000,000	4 in 1,000,000
	Sr-90	29	1 in 100	1 in 1,000	4 in 1,000
Group 4—Perched Water	Total Pu	10^4	NR[d]	NR[d]	NR[d]
	Sr-90	29	NR[d]	NR[d]	NR[d]
Group 5 – Snake River Plain Aquifer[a, i]	Am-241	432	NR	NR[j]	4 in 2,000,000[e]
	Cs-137	30	NR	NR[j]	4 in 1,000,000[e]
	I-129	1.57×10^7	NR	NR[j]	2 in 100,000[e]
	Np-237	2.1×10^6	NR	NR[j]	8 in 1,000,000[e]
	Sr-90	29	NR	NR[j]	9 in 1,000,000[e]
Group 6—Buried Gas Cylinders	—		NRC[f]	NRC[f]	NRC[f]
Group 7—SFE-20 Hot Waste Tank System[gh]	Pu	2×10^4	NRC[h]	NRC[h]	NRC[h]
	U	10^9	NRC[h]	NRC[h]	NRC[h]

* Half-life (in years) used in modeling for OU 3-13 risk assessment.

** Cs-137 contributes to risk only via direct exposure.

*** Sr-90 contributes to risk via groundwater, soil direct exposure, and ingestion.

a. Pu, which primarily originates from the Tank Farm soils, is predicted to exceed SRPA MCLs and pose a groundwater ingestion risk in the year 2750. Pu is not predicted to exceed MCLs or pose a risk in 2095. Refinement of those predictions and remediation, if necessary, will be addressed in the OU 3-14 RI/FS.

b. Key COCs and their concentrations are assumed to be the same as for Group 3 soils.

c. No surface risks (NSR) due to incomplete exposure pathway while buildings are in place. No risk to future residential receptor if buildings are left in place, or removed with subsequent capping or removal of underlying soil. Release sites pose a potential risk to groundwater via soil contaminant leaching and transport. Risks to groundwater are presented under Group 5. The contaminants from soils are not a significant future impact to groundwater.

d. No risk because perched water is not capable of sustaining a pumping rate needed for future domestic water supplies; therefore, it is not a source of potable water. However, perched water is a source of contamination for the SRPA. Risk calculations on future impacts will be refined under the Tank Farm RI/FS (OU 3-14).

e. These values are predicted risk to future residential in 2095 and beyond. Cumulative groundwater risk to future residential in 2095 and beyond is 5 in 100,000 outside the current INTEC security fence. Risk calculations on future impacts inside the current INTEC security fence will be refined under the Tank Farm RI/FS (OU 3-14).

f. No risks were calculated (NRC) for these sites. These sites present a safety risk and threaten future release of contaminants.

g. High concentrations of radionuclides exist in the tank sludge.

h. No risks were calculated because no exposure pathways currently exist. The tank is housed with a concrete secondary containment vault that may pose a future risk to groundwater if a release occurs.

i. Although workers drink SRPA, the drinking water wells do not intersect the plume.

j. No risk to future worker if institutional controls remain in place or water treatment is implemented.

7.2 Ecological Evaluation

The assessment was performed using the results of a previously conducted screening level ecological risk assessment (SLERA) and the same basic methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessment at the INEL* (VanHorn et al. 1995), subsequently referred to as the Guidance Manual. The SLERA was conducted to screen sites identified in the FFA/CO (DOE-ID 1991) and to identify those contaminants present at WAG 3 that have the potential to cause undesirable ecological effects. The sites and contaminants identified as a result of that assessment, in addition to those sites for which inadequate sampling information existed for inclusion in the SLERA, were analyzed. The SLERA approach and results are described in the sections below. The results of this assessment will be integrated with similar assessments for other INEL WAGs to support the performance of the INEL-wide baseline ERA. The identification of these sites of concern and the associated contaminants also provided input to the data gap analysis for the OU 10-04 ERA.

7.2.1 Site and Contaminant Screening

As discussed in Section 28.2.2 of the OU 3-13 RI/BRA (DOE-ID 1997b), for potentially contaminated soil sites, a preliminary site screening was performed to identify sites of concern to ecological receptors. Sites with contamination at greater than 3-m (10-ft) bgs (no pathway to the environment) or sites that were determined to be uncontaminated (no known source) were eliminated. This screening identified 37 sites of concern. As discussed in Section 28.2.7, any contaminant identified at these sites was initially screened from concern if the maximum contaminant concentrations was less than the 95/95% upper tolerance level (UTL) for background concentrations for composite samples (Rood et al. 1995) and/or was less than ecologically based screening levels (EBSLs). As a result 27 sites of concern remained to be evaluated in the ERA.

Contaminant concentrations in water at CPP-65 and CPP-67 were compared to toxicology benchmarks for nonradionuclides and developed EBSLs for water ingestion for radionuclides as discussed in Section 28 of the OU 3-13 RI/BRA (DOE-ID 1997b). The results of this assessment are presented in Tables 7-9 and 7-10. Any contaminant exceeding these benchmarks for water contamination was retained for discussion in the risk characterization. A list of threatened and endangered species, species of special concern, and sensitive species that may be found on the INEEL is given in Table 7-11.

7.2.2 Exposure Assessment

As discussed in 28.3 in the OU 3-13 RI/BRA (DOE-ID 1997b), the remaining contaminants at each site of concern were then evaluated to determine a dose to the receptor from soil exposure. The magnitude, frequency, and duration of exposure between the environment and the ecological receptors was modeled as discussed in Section 28.3 of the OU 3-13RI/BRA (DOE-ID 1997b). The 95% UCL of the arithmetic mean of the contaminant concentration was used when available. Many sites previously evaluated for human health in Track 1 or 2 efforts did not have these calculations performed and for this step of the ERA the maximum value reported in these documents was used.

7.2.3 Toxicity Assessment

Each contaminant was evaluated to determine a chronic dose that may have potential adverse effects to ecological receptors. The toxicity reference value (TRV) is defined as the dose for a receptor that is likely to be without appreciable risk or deleterious effects from chronic exposure. The TRVs development is presented in Appendix I of the OU –13 RI/BRA report (DOE-ID 1997b).

Table 7-9. Screening of liquid effluent concentrations at the Sewage Treatment Plant, CPP-65.

COPC	Liquid Effluent Concentration (mg/L)[a]	Toxicological Benchmark (mg/L or pCi/L)[b]	Water Concentration of Concern(mg/L)[c]
As	1.0E-03	1.6E-01	X
Ba	8.4E-02	1.56E+01	X
Cd	5.0E-03	2.3E-02	X
Cl	9.5E+01	2.3E+05[c]	X
Cr	6.0E-03	9.36E+00	X
Cu	1.7E-02	4.7E+01	X
Pb	2.8E-03	1.01E+01	X
Hg	1.0E-04	9.1E-02	X
Mo	1.7E-02	3.3E-01	X
Ni	1.5E-02	1.14E+02	X
Se	2.0E-03	9.6E-02	X
Ag	1.0E-03	NA	1.0E-03[d]
Zn	2.7E-02	3.04E+02	X
Nitrate	1.21E+01	1.9E+03	X
Total phosphorous	2.9E+00	NA	2.9E+00[e]
Plutonium-239/240	1.9E-03[f]	NA	X
Strontium-90	3.6E-01[f]	NA	X

a. Effluent concentrations are mean concentrations, except Cl, nitrate, and total phosphorous are maximum observed concentrations. Units are mg/L, except for radionuclides, which are pCi/L.

b. These are toxicological benchmarks for wildlife exposure through drinking water from Opresko et al., (1995) unless otherwise noted. The lowest applicable NOAEL-based benchmark was selected from the Opresko et al. (1995) database for conservative screening purposes. NA = not available.

c. Based on EPA Region IV Water Management Division, Water Quality Standards Unit=s Screening List (Suter II and Tsao, 1966). This contaminate was eliminated form the assessment based on this criteria.

d. Silver toxicity is related to water hardness. At water hardnesses of 50, 100 and 200 $mgAL^{-1}$ as $CaCo_3$, the U.S. EPA (1980) recommended that the concentration of total recoverable silver not exceed 1.2, 4.1 and 13 μgAL^{-1}, respectively, at any time. The water hardness at INEEL has a maximum of 500 mg/L. Therefore toxicity would be lower. Also the concentration in the effluent is within the range seen as background nationally. Kopp (1969) found silver in 6.6% of 1,577 surface waters sampled with a mean detected concentration of 2.6 µg/L (range: 0.1E 38 µg/L). For 1970B1979, according to U.S. surface water sampling data from EPA's STORET database, the annual mean levels ranged from 1 to 9 µg/L and annual maximum concentrations were 94 to 790 µg/L (Scow et al. 1981). Based on this rationale the silver at the concentration in the effluent was eliminated as a concern.

e. Phosphorous is an essential component of the animal body and eliminated as a concern at this level. Excess phosphorous is excreted in the urine (NAS, 1980). This contaminant will be eliminated as a concern based on this rationale.

f. Radionuclide levels acceptable as drinking water for human receptors should be acceptable for ecological receptors as well. These contaminants will be eliminated based on this criterion.

Table 7-10. Screening of nonradionuclide liquid effluent concentrations at CPP-67, Percolation Ponds.

COPC	Liquid Effluent Concentration (mg/L)[a]	Sediment Concentration (mg/kg)	K_d (cm^3/g)[c]	Calculated Water Concentration (mg/L)	Toxicological Benchmark (mg/L)[b]	Results of Screening[d]
Al	ND (4E-02)	X	X	X	2.45E+00	E
As	ND (1.5E-03)	X	X	X	1.6E-01	E
Ba	1.04E-01	X	X	X	1.56E+01	E
Be	X	5.00E-01	250	3.3E-03	1.88E+00	E
Cd	ND (1E-03)	X	X	X	2.3E-02	E
Cl	2.98E+02	X	X	2.98E+02	NA	NB
Cr	6.30E-02	X	X	X	9.36E+00	E
Co	X	4.60E+00	55	8.33E-02	NA	NB
Cu	6.30E-03	X	X	X	4.7E+01	E
Fe	5.70E-02	X	X	X	NA	NB
Pb	ND (1.5E-02)	X	X	X	1.01E+01	E
Mn	1.60E-03	X	X	X	2.51E+02	E
Hg	ND (2.5E-04)	X	X	X	9.1E-02	E
Ni	4.50E-03	X	X	X	1.14E+02	E
Se	ND (1E-03)	X	X	X	9.6E-02	E
Ag	ND (2E-03)	X	X	X	NA	NB
Tl	X	2.10E-01	3,300	6.36E-05	2.1E-02	E
V	X	1.88E+01	1,000	1.88E-02	5.4E-01	E
Zn	X	4.58E+01	18	2.51E+00	3.04E+02	E
Cyanide	X	1.20E-01	0.0000	5.63E-01	1.8E+02	E
Fluoride	ND (5.4E-01)	X	X	X	7.48E+01	E
Nitrate	5.58E+00	X	X	X	1.9E+03	E
Nitrite	ND (8E-0)	X	X	X	NA	NB
Phosphate	5.22E+00	X	X	X	NA	NB
Sulfate	5.15E+01	X	X	X	NA	NB
Sulfide	X	1.57E+01	0.0000	7.34E+01	NA	NB
Anthracene	X	2.40E-01	0.0000	1.13E+00	NA	NB
Benzo(a)anthracene	X	6.20E-01	0.0000	2.91E+00	NA	NB
Benzo(a)pyrene	X	3.50E-01	0.0000	1.64E+00	1.27E+00	X
Benzo(b)fluoranthene	X	4.40E-01	0.0000	2.06E+00	NA	NB
Bis(2-ethylhexyl)phthalate	X	2.50E-01	18.0000	1.37E-02	1.0E+01	E
Chrysene	X	6.00E-01	0.0000	2.81E+00	NA	NB
Fluoranthene	X	1.50E+00	0.0000	7.03E+00	NA	NB
Methylene chloride	X	1.10E-02	0.0000	5.16E-02	1.67E+01	E
Phenanthrene	X	8.10E-01	0.0000	3.80E+00	NA	NB
Pyrene	X	9.30E-01	100	8.08E-00	NA	NB

a. Effluent concentrations are maximum observed concentrations. ND = not detected; detection limit is in parentheses.

b. These are toxicological benchmarks for wildlife exposure through drinking water from Opresko et al. (1995). The lowest applicable NOAEL-based benchmark was selected from the Opresko et al. (1995) database for conservative screening purposes. Concentrations are given if the observed or calculated water concentration exceeds the toxicological benchmark. The resulting final concentrations are used as the water concentrations in the internal ingestion route of exposure. NA = Not available.

c. The K_d values are based on a compilation of available K_d values in the literature, except for Be and V, which are from the Track 2 guidance manual. When no K_d value is available, it is conservatively assumed to be zero.

d. E=Eliminate, NB=no benchmark, X=exceeds benchmark.

Table 7-11. Threatened and endangered species, special species of concern, and sensitive species that may be found on the INEEL.*

Common Names	Scientific Name	Federal Statusb,c	State Statusc	BLM Statusc	USFSf Statusc	INPS Statusc
Plants						
Lemhi milkvetch	*Astragalus aquilonius*	X	X	S	S	S
Painted milkvetch[e]	*Astragalus ceramicus var. apus*	3c	X	X	X	R
Plains milkvetch	*Astragalus gilviflorus*	NL	X	S	S	I
Winged-seed evening primrose	*Camissonia pterosperma*	NL	X	X	X	S
Nipple cactus[e]	*Coryphantha missouriensis*	NL	X	X	X	R
Spreading gilia	*Ipomopsis (Gilia) polycladon*	NL	X	S	X	2
King's bladderpod	*Lesquerella kingii var. cobrensis*	X	X	X	X	M
Tree-like oxytheca[e]	*Oxytheca dendroidea*	NL	X	R	X	R
Inconspicuous phacelia[d]	*Phacelia inconspicua*	C2	SSC	S	S	
Puzzling halimolobos	*Halimolobos perplexa var. perplexa*	X	X	X	S	M
Ute=s ladies tresses[d]	*Spiranthes diluvialis*	LT	X	X	X	X
Birds						
Peregrine falcon	*Falco peregrinus*	LE	E	X	X	
Merlin	*Falco columbarius*	NL	X	S	X	
Gyrfalcon	*Falco rusticolus*	NL	SSC	S	X	
Bald eagle	***Haliaeetus leucocephalus***	**LT**	**T**	**X**	**X**	
Ferruginous hawk	***Buteo regalis***	**C2**	**SSC**	**S**	**X**	
Black tern	***Chlidonias niger***	**C2**	**X**	**X**	**X**	
Northern pygmy owl[d]	*Glaucidium gnoma*	X	SSC	X	X	
Burrowing owl	***Athene cunicularia***	**C2**	**X**	**S**	**X**	
Common loon	*Gavia immer*	X	SSC	X	X	
American white pelican	*Pelicanus erythrorhynchos*	X	SSC	X	X	
Great egret	*Casmerodius albus*	X	SSC	X	X	
White-faced ibis	***Plegadis chihi***	**C2**	**X**	**X**	**X**	
Long-billed curlew	*Numenius americanus*	3c	X	S	X	
Loggerhead shrike	***Lanius ludovicianus***	**C2**	**NL**	**S**	**X**	
Northern goshawk	***Accipiter gentilis***	**C2**	**S**	**X**	**S**	
Swainson's hawk	*Buteo swainsoni*	X	X	S	X	
Trumpeter swan	***Cygnus buccinator***	**C2**	**SSC**	**S**	**S**	
Sharptailed grouse	*Tympanuchus phasianellus*	C2	X	S	S	
Boreal owl	*Aegolius funereus*	X	SSC	S	S	
Flammulated owl	*Otus flammeolus*	X	SSC	X	S	
Mammals						
Gray wolf	*Canis lupus*	LE/XN	E	X	X	
Pygmy rabbit	***Brachylagus (Sylvilagus) idahoensis***	**C2**	**SSC**	**S**	**X**	
Townsend's western big-eared bat	***Plecotus townsendii***	**C2**	**SSC**	**S**	**S**	

Table 7-11. (continued).

Common Names	Scientific Name	Federal Statusb,c	State Statusc	BLM Statusc	USFSf Statusc	INPS Statusc
Merriam's shrew	*Sorex merriami*	X	S	X	X	
Long-eared myotis	***Myotis evotis***	**C2**	X	X	X	
Small-footed myotis	***Myotis subulatus***	**C2**	X	X	X	
Western pipistrelle[d]	*Pipistrellus hesperus*	NL	SSC	X	X	
Fringed myotis[d]	*Myotis thysanodes*	X	SSC	X	X	
California myotis[d]	*Myotis californicus*	X	SSC	X	X	
Reptiles and Amphibians						
Northern sagebrush lizard	***Sceloporus graciosus***	**C2**	X	X	X	
Ringneck snake[d]	*Diadophis punctatus*	C2	SSC	S	X	
Night snake[e]	*Hypsiglena torquata*	X	X	R	X	
Insects						
Idaho pointheaded grasshopper[d]	*Acrolophitus punchellus*	C2	SSC	X	X	
Fish						
Shorthead sculpin[d]	*Cottus confusus*	X	SSC	X	X	

* Species in **bold** are those T/E and Category 2 (C2)[b] species included for the WAG 3 ERA.

a. This list was compiled from the U.S. Fish and Wildlife Service (USFWS) (letter dated July 16, 1997) the Idaho Department of Fish and Game Conservation Data Center threatened, endangered, and sensitive species for the State of Idaho (CDC 1994), and RESL documentation for the INEEL (Reynolds 1994; Reynolds et al. 1986).

b. The USFWS no longer maintains a candidate (C2)species listing but addresses former listed species as "species of concern" (USFWS April 30, 1996). The C2 designation is retained here to maintain consistency between the SLERA and WAG ERA assessments.

c. Status Codes: S = sensitive; 2 = State Priority 2; 3c = no longer considered for listing; M = State monitor species; NL = not listed; 1 = State Priority 1; LE = listed endangered; E = endangered; SSC = species of special concern; and C2 = Category 2 (defined in CDC 1994). BLM = Bureau of Land Management; INPS = Idaho Native Plant Society; XN=Experimental, non-essential, R = removed from sensitive list (non-agency code added here for clarification).

d. No documented sightings at the INEEL; however, the ranges of these species overlap the INEEL and are included as possibilities to be considered for field surveys.

e. Recent updates resulting from Idaho State Sensitive Species meetings (BLM, USFWS, INPS, USFS) - (INPS 1995;1996)

f. United States Forest Service (USFS) Region 4.

Plant uptake factors for contaminants were estimated using reported values in literature and analogous procedures of physicochemical properties. None of these studies were performed at the INEEL and, therefore, are not necessarily representative of local conditions. This may result in overestimation or underestimation of potential health impacts.

7.2.4 Risk Characterization

As discussed in Section 28.4 of the OU 3-13 RI/BRA (DOE-ID 1997b) the modeled exposure dose is divided by the TRV to calculate a HQ. The results are reported in terms of HQs for each contaminant at each site. Any contaminant with a HQ greater than the target value (one for nonradionuclide and 0.1 for radionuclide) was presented in the risk characterization.

Twenty-two sites remained after the HQ analysis. All these sites have nonradiological contamination and eight have radiological contamination with HQ's greater than the target value. This includes CPP-13, -14 (Imhoff tanks, Area 1), -19, -34, -37a, -39, -40, -42, -44, -55, -66, -67, -84, -88, -90, -93, Old Storage Pool Group (CPP-01, -04, -05, -08, -09, -10, -11, -88), Storage Yard Group (CPP-03, -17a, -17b, -88), Tank Farm Group (CPP-20, -25, -26, -28, -31, -32E/W, -79, excavated soil), Tank Farm South Group (CPP-15, -27, -33, -58, -88), and WCF Group (CPP-35, -36, -85, -88, -91). With the exception of the facility ponds (Cieminski 1993, Cieminski and Flake 1995), no formal surveys for presence and use of WAG 3 facilities by threatened and/or endangered (T/E) and species of concern have been conducted. In 1997, a field survey was conducted for individual sites of concern for habitat qualities and potential to support INEEL T/E species or other species of special concern. A low overall site rating for loggerhead shrike, peregrine falcon, and ferruginous hawk was given to sites CPP-34 and CPP-37a. A low overall rating for bats was given at CPP-34 and CPP-37b. Big game was also given a low overall rating at site CPP-34. Sites rated overall as "low" are those having one or two positive attributes and therefore potential for incidental use by wildlife. These sites may generally be discounted as contributing significantly to chronic wildlife contaminant exposures. This survey was conducted to allow evaluation of WAG sites of concern in an ecological context. The duration and rigor of these surveys were not adequate to verify presence or frequency of occurrence. The rankings for sites are subjective, based on professional opinion supported by limited observation.

7.2.5 Additional Screening

An additional screening was used for the further elimination of sites and contaminants for consideration in the FS. It was determined that the evaluation should eliminate unnecessary and undesirable remediation for ecological receptors based on the following rationale.

The exposure scenario used for ecological receptors assumes that the fences are down and the site has a viable habitat that is completely accessible to receptors. However, many of the sites of concern are currently within the fenced area that defines the industrial complex that is the INTEC. Both the fence and the activities associated with this currently active facility should limit the exposure of receptors to much less than that modeled in the ERA. Additionally, (with some exceptions [particularly sites with water sources]) most of these sites are gravel and unsuitable habitat at the present time and would not provide any special attraction to ecological receptors.

It is accepted in the risk assessment process that many of the input parameters are developed to be conservatively protective of the receptors. Particularly, based on limited knowledge and the uncertainty of extrapolating to multiple species, TRV development is very conservative. This is particularly true for native metals, which can vary greatly regionally.

Based on this rationale, an additional screening was determined appropriate for the WAG 3 sites as agreed on in an October 20, 1997 conference call between DOE-ID, EPA, and IDHW.

This screening was composed of two steps:

1. As a risk management decision, it was decided to eliminate ecological contaminants as a concern if the exposure point concentration was less than 10x the background value (Rood et al. 1995). For those contaminants that have no site-specific background the mean for the western United States presented in Shacklette and Boerngen (1984) or other sources was considered acceptable.

2. For those sites that initially used the maximum values, if possible, the 95% UCLs were calculated (see Table 7-12) for each contaminant that was not eliminated in the HQ evaluation of the ERA. This value was also eliminated if the 95% UCL was less than the 10x background.

This screening resulted in eliminating Sites CPP-37A, -39, -40, -42, -84, -88, and -90 as sites of concern. The sites and COCs remaining after the screening are listed in Table 7-13. Four sites pose solely an ecological risk, CPP-14 (the Imhoff Tank), CPP-44, -55, and -66.

Because Sites CPP-14, -44, and -55 presented an unacceptable risk for ecological receptors only, these sites were added to the Other Surface Soils Sites (Group 3) for alternative evaluation. The ecological risk screening approach resulted in establishing conservative risk assumptions. Actions undertaken at sites CPP-44, -14, and –55 are based on the small volume of COC contaminated material and the cost benefit of action now rather than further study. Final assessment for site CPP-66 will be conducted under OU 10-04. For sites that pose a potential threat to both human and ecological receptors, it is assumed that remedial alternatives developed to address human health risks will also be designed to adequately address ecological concerns. This WAG ERA represents the second phase of the three-phased approach to ERA. The first phase is the "preassessment" performed at the WAG level. This screen is performed to reduce the number of sites and contaminants to be addressed in subsequent assessments. This screen for WAG 3 is presented in Section 28 of the RI/BRA (DOE-ID 1997b).

In phase two, the WAG sites and COCs identified by the initial screening are assessed for potential risks to ecological receptors using an approach that parallels the human health risk assessment methodology.

The third phase of the ERA process is the OU 10-04 (INEEL Site-wide) ERA, which is performed to integrate the results of the WAG ERAs to evaluate risk to OU 10-04 ecological resources. The OU 10-04 ERA will integrate the results of the WAG ERAs for all INEEL WAGs to determine whether contamination at the WAGs contributes to potential risk to populations and communities on an ecosystem-wide basis. Those sites previously screened at the WAG level based on either 10x background or 10x HQ will be reevaluated at a population level at this time. If the OU 10-04 ERA determines that those WAG 3 sites screened at less than 10x background or HW less than 10, require further action, that action will be determined during the WAG 3 5-year reviews.

7.3 Basis for Response

Forty-nine sites within WAG 3 have actual or threatened releases of hazardous substances that if not addressed by implementing the response actions selected in this ROD, may pose unacceptable risks to human health or the environment. For analysis of remedial alternatives, release sites were combined into

Table 7-12. Results of additional site/contaminant evaluation and screening.

Site	COC	Maximum Concentration	95% UCL	10X Background	Elimination Rationale
CPP-13	Arsenic	8.30E+00		5.80E+01	Below 10X background
	Mercury	5.95E-01	4.70E-01	5.00E-01	95% UCL below 10X background
CPP-14					
Area 1	Chromium III	5.12E-01		5.80E+01	Below 10X background
	Lead	3.56E+01		1.70E+02	Below 10X background
Area 2	Mercury	1.20E+00		5.00E-01	Sample was taken at approximately 9 ft bgs
	Silver	1.22E+01		3.7E+01	Below 10X background
CPP-19	Arsenic	6.30E+00		5.80E+001	Below 10X background
CPP-34	Arsenic	7.10E+00		5.80E+01	Below 10X background
	Mercury	6.00E-01	2.80E-01	5.00E-01	95% UCL below 10X background
CPP-37A	Mercury	9.60E-01	4.40E-01	5.00E-01	95% UCL below 10X background
CPP-39	Barium	1.10E+03		3.00E+03	Below 10X Background
	Di-2-ethylhexylphthalate	1.40E+01			Contaminant below 15 ft
	Fluoride	9.29E+02		2.80E+03[a]	Below 10X background
	Mercury	1.70E-01		5.00E-01	Below 10X background
	Silver	1.87E+01		3.7E+01	Below 10X background
CPP-40	Chromium III	7.20E+01		3.30E+02	Below 10X background
	Fluoride	1.10E+01		2.80E+03[a]	Below 10X background
	Lead	6.00E+01		1.70E+02	Below 10X background
CPP-42	Barium	1.10E+03		3.00E+03	Below 10X background
CPP-44	Cadmium	8.40E+00		2.20E+01	Below 10 X background
	Chromium III	1.54E+03		3.30E+02	Retain
	Chromium VI	1.54E+01		NA	Retain
	Decanol	9.00E-03		NA	Retain
	Lead	2.81E+02		1.70E+02	Retain
	Mercury	5.00E+00		5.00E-01	Retain
	Nickel	3.44E+02		3.50E+02	Below 10X background
CPP-55	Arsenic	1.34E+01		5.80E+01	Below 10X background
	Chromium III	6.50E+01		3.30E+02	Below 10X background
	Chromium VI	6.50E+01	8.70E+00	NA	Not expected to exist as Chromium
	Lead	3.20E+01		1.70E+02	VI in the environment
	Mercury	5.20E+00	6.10E-01	5.00E-01	Below 10X background
	Nickel	6.50E+01		3.50E+02	Retain
	Selenium	6.40E-01		2.20E+00	Below 10X background
	Silver	300E+00		3.7E+01	Below 10X background
					Below 10X background
CPP-66	Boron	3.10E+02		2.30E+02	Retain
	Fluoride	1.65E+02		2.80E+03[a]	Below 10X background
	Selenium	1.60E+00		2.20E+00	Below 10X background
	Strontium	6.90E+02		2.00E+03[a]	Below 10X background
CPP-88	Arsenic	7.10E+00		5.80E+01	Below 10X background
	Mercury	1.00E+00	3.00E-01	5.00E-01	95% UCL below 10X background
	Nickel	1.63E+02		3.50E+02	Below 10X background
CPP-90	Antimony	9.50E+00		4.80E+01	Below 10X background
	Arsenic	2.95E+01		5.80E+01	Below 10X background
	Mercury	1.00E+00	4.50E-01	5.00E-01	95% UCL below 10X background
CPP-93	Aluminum	1.20E+05		1.60E+05	Below 10X background
	Mercury	1.40E+02	6.80E+01	5.00E-01	Retain
Old Storage	Arsenic	5.90E+00		5.80E+01	Below 10X background
	Mercury	5.52E-01	2.20E-01	5.00E-01	95% UCL below 10X background

Table 7-12. (continued).

Site	COC	Maximum Concentration	95% UCL	10X Background	Elimination Rationale
	Nickel	5.51E+01		3.50E+02	Below 10X background
Storage	Arsenic	5.90E+00		5.80E+01	Below 10X background
Yard	Mercury	5.52E-01	3.30E-01	5.00E-01	95% UCL below 10X background
	Nickel	5.51E+01		3.50E+02	Below 10X background
Tank Farm	Mercury	2.30E-01		5.00E-01	Below 10X background
Tank Farm	Arsenic	5.90E+00		5.80E+01	Below 10X background
	Cadmium	3.42E+00		2.20E+01	Below 10X background
	Mercury	1.51E+00	2.60E-01	5.00E-01	95% UCL below 10X background
	Nickel	5.51E+01		3.50E+02	Below 10X background
WCF	Arsenic	7.30E+00		5.80E+01	Below 10X background
	Mercury	7.50E+00	1.50E+00	5.00E-01	Retain
	Nickel	2.80E+02		3.50E+02	Below 10X background

a. Background from Shacklette and Boerngen (1984).

Table 7-13. Sites and COCs which may present an unacceptable risk to ecological receptors.

Site	Nonradionuclides	Radionuclide	Comments
CPP-13	Mercury	Sr-90	
CPP-14 (Imhoff Tanks)	Mercury		Solely an ecological concern. Approximately 105 m^3 of soil.
Area 1			
CPP-19		Cs-137, Eu-152, Eu-154, Sr-90, Co-60	
CPP-34		Sr-90	
CPP-44	Chromium III, Chromium VI, Lead, mercury		Solely an ecological concern. Approximately 88 m^3 of soil.
CPP-55	Chromium VI		Solely an ecological concern. Approximately 325.5 m^3 of soil.
CPP-66	Boron		Solely an ecological concern. Approximately 79,800 m^3 of soil.
CPP-67	Metals and organics	Am-241, Np-237, Pu-238/239, U-234, and U-238	This site will be remediated based on the HHRA, an assessment beyond the screening level was not deemed necessary.
CPP-93	Mercury		
Old Storage Pool (CPP-01, -04, -05, -08, -09, -10, -11, -88)		Cs-137, Eu-152, Eu-154, Co-60, and Sr-90	
Tank Farm (CPP-20, -25, -26, -28, -31, -32E/W, -79, excavated soil)		Am-137, Cs-137, Eu-154, Pu-239, and Sr-90	
Tank Farm South (CPP-15, -27, -33, -58, -88)		Cs-137	
WCF (CPP-35, -36, -85, -88, -91)	Mercury	Am-241, Cs-134, and Cs-137	

groupings including Tank Farm Soils, Soils Under Buildings and Structures, Other Surface Soils, Perched Water, the SRPA, and Buried Gas Cylinder Sites. Individual sites include the SFE-20 Hot Waste Tank System. The response actions selected in this ROD are designed to reduce the potential threats to human health and/or the environment to acceptable levels.