F-3.7.4 Uncertainty Associated with the Ingestion Rate Estimation

Using food intake rates in dry weight/day may result in an overestimate of intake rates because dry weights will contain more contamination/unit of vegetation. Intake (ingestion) estimates used for the terrestrial receptors are based on data in the scientific literature, when available. Food ingestion rates are calculated by use of the allometric equations reported in Nagy (1987). Uncertainties associated with the use of allometric equations could result in either an overestimation or underestimation of ingestion rate resulting in either an overestimation or underestimation of the true dose rate.

F-3.7.5 Uncertainty Associated with the Receptor Site Usage

The calculation of dose incorporated the probability that the receptors may use or inhabit each site. The site use factor is defined as the affected area (ha) divided by the home range (ha) of the receptor. If the home range of a given receptor is larger than the affected area, then it is reasonable to assume that the receptor may not spend 100% of its life within the site area. Incorporation of the site use factor adjusts the dose to account for the estimated time that the receptor spends on the site. The less time spent on the site, the lower the dose. Home ranges for some species are unknown and in these cases, the site use factor equals 1. This may result in an overestimate of the potential exposure to these receptors.

F-3.7.6 Uncertainty Associated with the PUFs and BAFS

The advantages of using PUFs to estimate plant concentrations are that they are easy to use and require minimum data entry (i.e., the measured or estimated concentration of metal in soil and a PUF taken from the literature). A PUF of 0.01 indicates that the plant concentration should be 1/100th of the total concentration in soil. For the WAGs 6 and 10 ERA, PUFs for metals are taken from Baes et al. (1984). Though preference is given to studies that reported the steady-state concentration of metals in plants at edible maturity, various soil properties are not considered and data for numerous plant species (both animal feeds and those consumed by humans) are combined. However, root uptake of metals is a complex process that depends on various soil properties (e.g., pH, the cation exchange capacity, and organic matter content) as well as the metal and type of plant involved. Therefore, the use of generic or crop-specific PUFs taken from the literature may not result in an accurate estimate of the concentration of metals in plants for all environmental conditions and species that may occur in WAGs 6 and 10.

The PUFs for organics are estimated using the geometric mean regression equation (Travis and Arms 1988) and using log K_{ow} values. The reliability of estimated PUFs is directly related to the reliability of the K_{ow} values used for the organics. Because K_{ow} values can vary greatly, use of the regression equation (Travis and Arms 1988) to estimate a PUF for organics may result in either an overestimate or an underestimate of the true dose for organics.

A great deal of uncertainty is associated with the bioaccumulation factors (BAFs) used to calculate dose. Very few BAFs are available in scientific literature because they must be both contaminant- and receptor-specific. The BAFs used for metals are discussed in Appendix H. The regression equation (Travis and Arms 1988) was used to calculate BAFs for the organic contaminants at WAGs 6 and 10 sites. An assumption that terrestrial receptors of concern accumulate metals and organics in a similar way and comparable degree to beef and dairy cattle was incorporated in the dose calculations. In the absence of specific BAFs, a value of 1 was assumed. This assumption could result in either an overestimate or an underestimate of the true dose from the contaminant, and the magnitude of error cannot be quantified. The terrestrial receptors of concern for WAGs 6 and 10 may accumulate organics to a much larger or smaller degree than beef and dairy cattle; therefore, using the regression equation (Travis and Arms 1988) also could result in either an overestimate or an underestimate of the dose from the COPCs. In addition,

the use of BAFs, as discussed in Appendix H, could result in either an overestimate or an underestimate of dose to ecological receptors at the site in the absence of site-specific data.

F-3.7.7 Uncertainty Associated with Soil Ingestion

The exposure assessment incorporates the percentage of soil ingested by each species. Though food ingestion rates have the greatest effect on intake estimates, soil ingestion rates also could influence intake rates and, therefore, dose estimates. The EPA *Wildlife Exposure Factors Handbook* (EPA 1993) and Beyer et al. (1994) were used to assign soil ingestion parameters to four of the 12 functional groups, and the percent of soil ingested was assigned to one species, the pronghorn (Arthur and Gates 1988). Soil ingestion parameters were also taken from the Subsurface Disposal Area biotic data compilation Engineering Design File (Hampton et al. 1995) for three of the mammal species (mule deer, coyote, and deer mouse) and three of the avian species (black-billed magpie, mourning dove, and blue-winged teal). Where information did not exist in the literature on soil ingestion rates for terrestrial biota, soil ingestion rates were assumed to be 2% of the food ingestion rate for all burrowing mammals and birds that consume whole terrestrial prey and 1% for all other receptors. Estimating the percent soil ingested may result in either an overestimate or an underestimate of the dose because the effect of the estimated values on the overall dose outcome is dependent on the concentration of contaminant in the media of concern.

F-3.8 Ecological Effects Assessment

Ecological effects assessment consists of three elements:

- Selecting quantified critical exposure levels
- Developing adjustment factors (AFs)
- Developing TRVs.

The following sections contain a general description of the procedures of ecological effects assessment and a discussions of each of the three elements.

F-3.8.1 General Procedures of the Ecological Effects Assessment

A TRV is defined as a dose for a receptor (including sensitive subgroups such as taxa under regulatory protection) that is likely to be without appreciable risk of deleterious effects from chronic exposure. Application of toxicity data derived from surrogate species introduces uncertainty into the risk assessment. The magnitude of this uncertainty depends largely on (a) the degree of taxonomic difference between the key and test species, (b) the conditions under which the toxicity data are obtained, and (c) the endpoint of interest (e.g., the chronic lowest-observed-adverse-effect level or the no-observed-adverse-effect level) and the endpoint measured (e.g., death). Adjustment factors are applied in the development of the TRVs in an attempt to offset the uncertainties associated with extrapolation of toxicity information from literature to site conditions.

The approach used to develop TRVs and site-wide TRVs for contaminants at the INEEL are documented in Appendix D of the OU 10-04 Workplan (DOE-ID 1999).

F-3.9 Risk Characterization

Risk characterization is the final step of the WAG ERA process. The risk evaluation determines whether there is any indication of risk from the contaminant concentrations and the calculated dose for the

species of concern and considers the uncertainty inherent in the assessment. For a WAG ERA, the risk characterization step has two components starting with a description of the estimation of risk. A summary of the risk evaluation follows the risk estimation. These two components are described in the following sections.

F-3.9.1 Risk Estimation

Risk is estimated by comparing the calculated dose to the TRV. Exposure parameters used to calculate dose to species of concern are outlined in Section F-3.7.8. Table F-11 lists the TRVs for all contaminants evaluated in the WAG 6 & 10 ERA. Soil concentration data developed for the human health risk assessment were used to calculate dose to ecological receptors at each WAGs 6 and 10 site of concern. The results of the dose calculations are presented in Appendix G. The use of chemical concentration data developed for human health risk assessment is assumed to be representative of the range of concentrations to which ecological receptors using a site at WAGs 6 or 10 are likely to be exposed. The effect of uncertainty introduced from sample collection and analysis is reduced by basing risk estimates on the 95% upper confidence limit of the mean for the WAGs 6 and 10 COPC concentration estimates, if available. The resulting concentration estimates that are used to estimate intakes are an upper-bound estimate of the concentrations observed at the retained sites. This approach provides protection for ecological receptors and accounts for the uncertainty introduced by sampling, analysis, seasonality, and natural variation.

If the dose from the contaminant does not exceed its TRV (i.e., if the HQ is less than 1.0 for nonradiological contaminants and 0.1 for radiological contaminants), adverse effects to ecological receptors from exposure to that contaminant are not expected, and no further evaluation of that contaminant is required. Hence, the HQ is an indicator of potential risk. HQs are calculated using the following equation:

$$HQ = \frac{Dose}{TRV} \qquad \text{(F-14)}$$

where

HQ = hazard quotient (unitless)

$Dose$ = dose from all media (mg/kg/day or pCi/g/day)

TRV = toxicity reference value (mg/kg/day or pCi/g/day).

Table F-11 TRVs for Non-radionuclides (mg/kg-d).

Functional groups	1,3,5-Trinitrobenzene	1,3-Dinitrobenzene	2-Amino-4,6-Dinitrotoluene	2-Butanone	2-Methylnaphthalene	2,4-Dinitrotoluene	2,4,6-Trinitrotoluene
Great Basin spadefoot toad	NA	NA	NA	NA	NA	NA	NA
Mourning dove	NA	NA	NA	NA	NA	NA	NA
Blue-winged teal	NA	NA	NA	NA	NA	NA	NA
Sage sparrow	NA	NA	NA	NA	NA	NA	NA
Ferruginous hawk	NA	NA	NA	NA	NA	NA	NA
Loggerhead shrike	NA	NA	NA	NA	NA	NA	NA
Burrowing owl	NA	NA	NA	NA	NA	NA	NA
Black-billed magpie	NA	NA	NA	NA	NA	NA	NA
Mule deer	7.50E+00	1.00E-01	1.70E+00	2.95E+02	8.30E-01	1.20E+00	1.70E+00
Pygmy rabbit	7.50E+00	1.00E-01	1.70E+00	2.95E+02	8.30E-01	1.20E+00	1.70E+00
Townsend's western big-eared bat	7.50E+00	1.00E-01	1.70E+00	2.95E+02	8.30E-01	1.20E+00	1.70E+00
Coyote	7.50E+00	1.00E-01	1.70E+00	2.95E+02	8.30E-01	1.20E+00	1.70E+00
Deer mouse	1.13E+01	2.00E-01	2.50E+00	4.43E+02	1.30E+00	1.80E+00	2.50E+00
Sagebrush lizard	NA	NA	NA	NA	NA	NA	NA
Plants	NA	NA	NA	NA	NA	NA	NA

Functional groups	2,6-Dinitrotoluene	4-Amino-2,6-Dinitrotoluene	4-Methyl-2-Pentanone	Antimony	Arsenic	Barium	Benzo(g,h,i) perylene	Beryllium
Great Basin spadefoot toad	NA	NA	NA	NA	NA	NA	NA	NA
Mourning dove	NA	NA	NA	NA	6.40E-01	NA	NA	NA
Blue-winged teal	NA	NA	NA	NA	1.29E+00	NA	NA	NA
Sage sparrow	NA	NA	NA	NA	4.30E-01	NA	NA	NA
Ferruginous hawk	NA	NA	NA	NA	4.30E-01	NA	NA	NA
Loggerhead shrike	NA	NA	NA	NA	4.30E-01	NA	NA	NA
Burrowing owl	NA	NA	NA	NA	4.30E-01	NA	NA	NA
Black-billed magpie	NA	NA	NA	NA	4.30E-01	NA	NA	NA
Mule deer	1.70E+00	1.70E+00	1.04E+01	4.17E-01	2.70E-01	6.80E-01	8.30E-01	2.20E-01
Pygmy rabbit	1.70E+00	1.70E+00	1.04E+01	4.17E-01	2.70E-01	6.80E-01	8.30E-01	2.20E-01
Townsend's western big-eared bat	1.70E+00	1.70E+00	1.04E+01	4.17E-01	2.70E-01	6.80E-01	8.30E-01	2.20E-01
Coyote	1.70E+00	1.70E+00	1.04E+01	4.17E-01	2.70E-01	6.80E-01	8.30E-01	2.20E-01
Deer mouse	2.50E+00	2.50E+00	1.56E+01	6.25E-01	3.90E-01	1.00E+00	1.30E+00	3.30E-01
Sagebrush lizard	NA	NA	NA	NA	NA	NA	NA	NA
Plants	NA	NA	NA	5.00E+00	1.00E+01	5.00E+02	NA	1.00E+01

Functional groups	Boron	Cadmium	Chloride	Chromium III	Chromium VI	Chrysene	Cobalt	Copper	Fluoride
Great Basin spadefoot toad	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mourning dove	1.44E+01	4.00E-02	NA	1.40E+00	NA	NA	2.13E-01	4.61E+00	1.30E+00
Blue-winged teal	2.88E+01	7.00E-02	NA	1.40E+00	NA	NA	2.13E-01	4.61E+00	1.30E+00
Sage sparrow	9.60E+00	2.00E-02	NA	1.40E+00	NA	NA	2.13E-01	4.61E+00	1.30E+00
Ferruginous hawk	9.60E+00	2.00E-02	NA	1.40E+00	NA	NA	2.13E-01	4.61E+00	2.00E+00
Loggerhead shrike	9.60E+00	2.00E-02	NA	1.40E+00	NA	NA	2.13E-01	4.61E+00	2.00E+00
Burrowing owl	9.60E+00	2.00E-02	NA	1.40E+00	NA	NA	2.13E-01	4.61E+00	2.00E+00
Black-billed magpie	9.60E+00	2.00E-02	NA	2.00E+00	NA	NA	3.19E-01	6.91E+00	1.30E+00
Mule deer	2.92E+00	8.00E-04	2.94E+00	2.50E+02	5.00E-02	3.00E-02	1.40E+00	6.50E-01	1.05E+01
Pygmy rabbit	2.92E+00	8.00E-04	2.94E+00	2.50E+02	5.00E-02	3.00E-02	1.40E+00	6.50E-01	1.05E+01
Townsend's western big-eared bat	2.92E+00	8.00E-04	2.94E+00	2.50E+02	5.00E-02	3.00E-02	1.40E+00	6.50E-01	1.05E+01
Coyote	2.92E+00	8.00E-04	2.94E+00	2.50E+02	5.00E-02	3.00E-02	1.40E+00	1.95E+00	3.14E+01
Deer mouse	4.38E+00	1.00E-03	4.41E+00	3.75E+02	8.00E-02	5.00E-02	2.10E+00	6.50E-01	1.05E+01
Sagebrush lizard	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plants	5.00E-01	3.00E+00	NA	1.00E+00	1.00E+00	NA	NA	1.00E+02	NA

Functional groups	HMX	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Nitrate	Nitrite
Great Basin spadefoot toad	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mourning dove	NA	4.80E-01	NA	7.00E+01	4.00E-03	NA	8.75E+00	8.90E+00	8.90E+00
Blue-winged teal	NA	4.80E-01	NA	7.00E+01	8.00E-03	NA	1.75E+01	8.90E+00	8.90E+00
Sage sparrow	NA	4.80E-01	NA	7.00E+01	3.00E-03	NA	5.83E+00	8.90E+00	8.90E+00
Ferruginous hawk	NA	4.80E-01	NA	7.00E+01	3.00E-03	NA	5.83E+00	8.90E+00	8.90E+00
Loggerhead shrike	NA	4.80E-01	NA	7.00E+01	3.00E-03	NA	5.83E+00	8.90E+00	8.90E+00
Burrowing owl	NA	4.80E-01	NA	7.00E+01	3.00E-03	NA	5.83E+00	8.90E+00	8.90E+00
Black-billed magpie	NA	7.20E-01	NA	1.05E+02	3.00E-03	NA	5.83E+00	1.34E+01	1.34E+01
Mule deer	1.70E+01	2.70E+00	4.30E+00	2.90E+01	2.00E-02	3.30E+00	1.90E+01	1.70E+01	1.70E+01
Pygmy rabbit	1.70E+01	2.70E+00	4.30E+00	2.90E+01	2.00E-02	3.30E+00	1.90E+01	1.70E+01	1.70E+01
Townsend's western big-eared bat	1.70E+01	2.70E+00	2.90E+00	2.90E+01	2.00E-02	3.30E+00	1.90E+01	1.70E+01	1.70E+01
Coyote	1.70E+01	2.70E+00	2.90E+00	2.90E+01	2.00E-02	3.30E+00	1.90E+01	1.70E+01	1.70E+01
Deer mouse	2.50E+01	4.00E+00	2.90E+00	4.40E+01	4.00E-02	5.00E+00	2.85E+01	2.50E+01	2.50E+01
Sagebrush lizard	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plants	NA	5.00E+01	NA	5.00E+02	3.00E-01	2.00E+00	3.00E+01	NA	NA

Functional groups	Pentachlorophenol	RDX	Selenium	Silver	Strontium	Sulfate	Tetryl	Thallium	TPH
Great Basin spadefoot toad	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mourning dove	NA	NA	1.30E-01	1.46E+01	NA	8.64E+00	NA	5.00E-02	NA
Blue-winged teal	NA	NA	2.50E-01	1.46E+01	NA	8.64E+00	NA	5.00E-02	NA
Sage sparrow	NA	NA	8.00E-02	1.46E+01	NA	8.64E+00	NA	5.00E-02	NA
Ferruginous hawk	NA	NA	8.00E-02	1.46E+01	NA	8.64E+00	NA	5.00E-02	NA
Loggerhead shrike	NA	NA	8.00E-02	1.46E+01	NA	8.64E+00	NA	5.00E-02	NA
Burrowing owl	NA	NA	8.00E-02	1.46E+01	NA	8.64E+00	NA	5.00E-02	NA
Black-billed magpie	NA	NA	8.00E-02	2.18E+01	NA	1.30E+01	NA	7.00E-02	NA
Mule deer	4.00E-02	1.00E-01	1.30E-01	1.13E+01	3.20E+01	5.32E+00	1.63E+01	4.00E-02	3.66E+00
Pygmy rabbit	4.00E-02	1.00E-01	1.30E-01	1.13E+01	3.20E+01	5.32E+00	1.63E+01	4.00E-02	3.66E+00
Townsend's western big-eared bat	4.00E-02	1.00E-01	1.30E-01	1.13E+01	3.20E+01	5.32E+00	1.08E+01	4.00E-02	3.66E+00
Coyote	4.00E-02	1.00E-01	1.30E-01	1.13E+01	3.20E+01	5.32E+00	1.08E+01	4.00E-02	3.66E+00
Deer mouse	6.00E-02	1.50E-01	2.00E-01	1.70E+01	4.80E+01	7.98E+00	1.08E+01	6.00E-02	5.49E+00
Sagebrush lizard	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plants	NA	NA	1.00E+00	2.00E+00	NA	NA	NA	1.00E+00	NA

Functional groups	Vanadium	Xylene	Zinc
Great Basin spadefoot toad	NA	NA	NA
Mourning dove	5.70E+00	NA	2.00E+00
Blue-winged teal	1.14E+01	NA	2.00E+00
Sage sparrow	3.80E+00	NA	2.00E+00
Ferruginous hawk	3.80E+00	NA	2.00E+00
Loggerhead shrike	3.80E+00	NA	2.00E+00
Burrowing owl	3.80E+00	NA	2.00E+00
Black-billed magpie	3.80E+00	NA	3.00E+00
Mule deer	4.60E-01	8.60E-02	1.40E+01
Pygmy rabbit	4.60E-01	8.60E-02	1.40E+01
Townsend's western big-eared bat	4.60E-01	8.60E-02	1.40E+01
Coyote	4.60E-01	8.60E-02	1.40E+01
Deer mouse	6.80E-01	1.29E-01	2.10E+01
Sagebrush lizard	NA	NA	NA
Plants	2.00E+02	NA	5.00E+01

NA not available

Toxicity values for functional groups developed from studies evaluated from the literature were presented in the OU 10-04 Workplan (DOE-ID 1999). These values were also used to develop TRVs for selected species in the WAG 6 &10 assessment. Several additional COPCs were identified for ecological receptos and these are included in Attachment 1 of this appendix.

HQs are derived for all contaminants and species of concern identified in WAGs 6 and 10 for each site of concern. The dose estimation and HQ calculations are presented in Table F-10. A summary of the results of the HQ calculations is provided in Table F-6 in Section F-3.3.3.

Table F-10 shows that the order of magnitude for the largest observed HQ across all species within the site varies by at least three orders of magnitude. If information was not available to derive a TRV, then a HQ could not be developed for that particular contaminant and species combination. These data gaps are identified in this table and in the summary discussion in Table F-6.

A HQ greater than the target value indicates that exposure to a given contaminant (at the concentrations and for the duration and frequencies of exposure estimated in the exposure assessment) may cause adverse health effects in exposed populations. However, the level of concern associated with exposure may not increase linearly as HQ values exceed the target value. Therefore, the HQ values cannot be used to represent a probability or a percentage because a HQ of 10 does not necessarily indicate that adverse effects are 10 times more likely to occur than a HQ of 1. It is only possible to infer that the greater the HQ, the greater the concern about potential adverse effects to ecological receptors.

F-3.9.2 Uncertainty Association with Hazard Quotients

For a WAG ERA, a HQ is used as an indicator of risk. The HQ is a ratio of the calculated contaminant dose for a receptor to the TRV. These ratios provide a quantitative index of risk to defined receptors under assumed exposure conditions. The ratio, or HQ method, is commonly used in both human health and ERAs. It is used in WAG ERAs to eliminate from further assessment contaminants and sites that pose no risk to the ecosystem.

In general, the significance of exceeding a target HQ (Table F-10) value depends on the perceived, "value" (ecological, social, or political) of the receptor, the nature of the endpoint measured, and the degree of uncertainty associated with the process as a whole. Therefore, the decision to take no further action, order corrective action, or perform additional assessment should be approached on a site-, chemical-, and species-specific basis. Because the unit of concern in ERA is usually the population as opposed to the individual, with the exception of T/E species (EPA 1992b), exceeding conservative screening criteria does not necessarily mean that significant adverse effects are likely.

A HQ of less than the target value (traditionally 1.0 for nonradionuclide contaminants) implies a "low likelihood" of the adverse effects from that contaminant. Nonradiological and radiological contaminants are treated separately because these two classes of contaminants cause different effects in exposed receptors. The effects from the nonradioactive metals are expected to cause systemic toxicity, while the effects to reproductive processes are typically associated with exposure to ionizing radiation. A separate approach in which the target HQ is set to 1/n, where n is the number of nonradiological or radiological contaminants of concern, also could be used. This approach would be too conservative for nonradiological contaminants, because it assumes cumulative (simultaneous) exposure to all nonradionuclides and that all contaminants within a given group behave synergistically in a given receptor. Given that all receptors may not be simultaneously exposed to all contaminants and that a synergistic effect may not be seen, this approach may be more stringent than necessary to protect all ecological receptors from nonradiological effects. Therefore, the HQ is set to 1 for all nonradiological contaminants. This method may underestimate risk because the method does not account for cumulative exposure to multiple contaminants by a given receptor.

At this level in the ERA approach at the INEEL, both exposure and toxicity assumptions are generally "worst case" and represent the upper bound of potential risks to ecological receptors. The HQ approach does not consider variability and uncertainty in either exposure or toxicity estimates; therefore,

it does not represent a statistical probability of occurrence of adverse ecological effects. HQs provide essentially a "yes or no" determination of risk and are, therefore, well suited for screening-level assessments (EPA 1988). A limitation of the quotient method is that it does not predict the degree of risk or the magnitude of effects associated with specified levels of contamination (EPA 1988), however, "modified quotient methods" are available that attempt to address this issue. For example, in the study of toxicity in fish, a method is used (Barnthouse et al. 1986) in which the conclusions are expressed as "no concern," "possible concern," and "high concern," depending on the ratio of the contaminant concentration to the reference (Barnthouse et al. 1986).

F-3.9.3 BORAX-01 (BORAX II through V Leach Pond)

The COPCs for the ecological risk assessment are residual radionuclides, metals, and volatile organic compound contamination in subsurface soil (from 6.5 to 9.5 ft). The volatile organic compound and residual radionuclide COPCs were eliminated during the soil contaminant screening process (see Appendix C). Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Table F-12. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. HQs for cadmium, cobalt, and mercury ranged from 1 to 800. Risks from these contaminants to reptiles, amphibians, and invertebrates could not be evaluated (along with risks to plants from cobalt) because of the lack of toxicity data from which to develop TRVs. 2,4 dichlorophenol and chloromethane were among the COPCs, but no toxicity information could be found to assess ecological risk for these two chemicals. Concentrations of these compounds were found at very low levels, 0.068 mg/kg for 2,4 dichlorophenol and 0.002 mg/kg for chloromethane, and for this reason they are unlikely to pose significant risk to any ecological receptor and will no longer be evaluated.

The HQs for the COPCs at BORAX-01 are discussed below.

- The HQs for exposure to cadmium ranged from 1 for the sage sparrow (AV222), 9 for Townsend's western big-eared bat (M210A), 300 for the pygmy rabbit (M122A), to 800 for the deer mouse (M422). The EPC in the subsurface soil is 4.14 mg/kg. The exposure point concentration is the lower of the 95 % upper confidence level or the maximum detected concentration. The INEEL background concentration for cadmium is 2.2 mg/kg. The EPC for this contaminant represents an overly conservative value due to exposure modeling using weighted averages and, therefore, would not be likely to pose a significant risk to any of these ecological receptors. Also, the risk may be ameliorated by depth (2 to 2.9 m; 6.7 to

Table F-12. Summary of ERA HQs for BORAX-01.

COPC Receptors	Cadmium HQs	Cobalt HQs	Mercury HQs
Deer mouse	800[a]	4	1
Plants	—	—	1
Pygmy rabbit	300[a]	8	2
Sage sparrow	1	—	—
Townsend's western big-eared bat	9	—	—

COPCs with HQs less than one are not presented in this table.

a. See the bulleted discussion on cadmium following this table as to why this HQ is not retained in the ERA.

9.5 ft) to contamination because neither deer mice nor pygmy rabbits are deep burrowers, they are not expected to reach the contamination. Plant HQ values were below 1 and were subsequently not viewed as a risk. Rooting depth of plants are not expected to reach the depths where concentrations of cadmium were detected. This COPC would be unlikely to pose a significant risk to any of these ecological receptors and will no longer be evaluated in the WAG 6 &10 ERA. However, because of the uncertainty associated with this COPC this contaminant will be retained in the OU 10-04 INEEL-wide ERA.

- The HQs for exposure to cobalt ranged from 4 for the deer mouse (M422) to 8 for the pygmy rabbit (M122A). The EPC in the subsurface soil is 9.12 mg/kg. The INEEL background concentration for cobalt is 11 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to mercury ranged from 1 for the deer mouse (M422) and plants (all vegetation) to 2 for the pygmy rabbit (M122A). The EPC in the subsurface soil is 0.42 mg/kg. The INEEL background concentration for mercury is 0.05 mg/kg. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that the BORAX II-V Leach Pond indicates some potential for risk to ecological receptors from exposure to contaminated subsurface soil. No COPCs were retained in the ERA for this site. Cumulative risks to ecological receptors from exposure to contamination at all BORAX sites are addressed in the OU 10-04 Ecological Risk Assessment (Section 17). Complete ecological risk assessment results are presented in Appendix G.

F-3.9.4 BORAX-02 (BORAX I Burial Site)

The COPCs for the ecological risk assessment on the 1996 data are radionuclides in the surface and subsurface soils. These residual radionuclides were eliminated during the soil contaminant screening process. see Appendix C. The only COPC for the ERA on the 2000 data was strontium. Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Table F-13. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. The HQ for strontium ranged from 1 to 8. Health effects to reptiles, amphibians, birds, plants, and invertebrates could not be evaluated because of the lack of toxicity data for strontium needed to develop toxicity reference values.

Table F-13. Summary of ERA HQs for BORAX-02.

COPC	Strontium
Receptors	**HQs**
Deer mouse	4
Pygmy rabbit	8

COPCs with HQs less than one are not presented in this table.

The HQs for the COPC at BORAX-02 is discussed below.

The HQs for exposure to strontium ranged from 4 for the deer mouse (M422) to 8 for the pygmy rabbit (M122A). The exposure point concentration ranges from 92.6 mg/kg in the surface soil to 130 mg/kg in the subsurface soil. This contaminant was eliminated as a COPC, because the HQ fell below 10, which indicates a low risk to ecological receptors.

No COPCs were retained in the ERA for this site. Cumulative risks to ecological receptors from exposure to contamination at all BORAX sites are addressed in the OU 10-04 Ecological Risk Assessment (Section 17).

F-3.9.5 BORAX-08 (BORAX V Ditch)

The COPCs for the ecological risk assessment at this site are radionuclides, primarily Cs-137, for subsurface soils. This radionuclide along with the other residual radionuclides were eliminated during the soil contaminant screening process because the maximum concentration for Cs-137 fell below the EBSL for this radionuclide,see Appendix C. Cumulative risks to ecological receptors from exposure to contamination at all BORAX sites are addressed in the OU 10-04 Ecological Risk Assessment (Section 17). Complete ecological risk assessment results are presented in Appendix G.

F-3.9.6 BORAX-09 (BORAX II through V Reactor Building)

The COPCs for the ecological risk assessment are radionuclides, metals, and asbestos contamination in the surface and subsurface soil. The radionuclide COPCs were eliminated during the soil contaminant screening process (see Appendix C). Any asbestos found during the D&D activities was contained and packaged and then buried along with the other contaminated structures of this facility. The risk for ecological receptors to become exposed to this contaminant is unlikely because of the lack of a significant pathway. The contaminants for which the HQ equaled or exceeded 1 include manganese and mercury. Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Table F-14. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. Risks from these contaminants to reptiles, amphibians, and invertebrates could not be evaluated because of the lack of toxicity data to develop TRVs.

Table F-14. Summary of ERA HQs for BORAX-09.

COPC **Receptors**	Manganese **HQs**	Mercury **HQs**
Burrowing owl	—	1
Black-billed magpie	—	3
Deer mouse	7	—
Mourning dove	—	3
Plants	9	—
Pygmy rabbit	10	3
Sage sparrow	—	20[a]
Townsend's western big-eared bat	—	2

COPCs with HQs less than one are not presented in this table.

a. See the bulleted discussion on mercury following this table as to why this HQ is not retained in the ERA The HQs for the COPCs at BORAX-09 are discussed below.

The HQs for the COPCs at BORAX-09 are discussed below.

- The HQs for exposure to manganese ranged from 7 for the deer mouse (M422), 8 for plants (all vegetation) to 10 for the pygmy rabbit (M122A). The EPC in the surface soil is 399 mg/kg decreasing to 20 mg/kg in the subsurface soils. The INEEL background concentration for manganese is 490 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQs were equal to or below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to mercury ranged from 1 for the burrowing owl (AV322A), 2 for the Townsend's western big-eared bat (M210A), 3 for the mourning dove (AV122), black-billed magpie (AV422) and pygmy rabbit (M122A), to 20 for the sage sparrow (AV222). The exposure point concentration in the surface soil is 1.2 mg/kg decreasing to 0.06 mg/kg in the subsurface soil. The INEEL background concentration for mercury is 0.05 mg/kg. Most of the HQ values fell below the low risk HQ of 10. This contaminant was eliminated as a COPC because the exposure point concentration (1.2 mg/kg) represents the only elevated value above background and it is representative of a single location in the area. The HQ values from exposure to this contaminant are calculated very conservatively, and therefore, the risk from exposure to this COPC would be very unlikely. Consequently, mercury will no longer be retained for evaluation in the ERA at this site.

The risk evaluation indicates that BORAX-09 has limited risk to ecological receptors from exposure to soils from this site. No COPCs were retained in the ERA for this site. Cumulative risks to ecological receptors from exposure to contamination at all BORAX sites are addressed in the OU 10-04 Ecological Risk Assessment (Section 17). Complete ecological risk assessment results are presented in Appendix G.

F-3.9.7 EBR-03 (EBR-I Seepage Pit)

Samples specific to the EBR-03 excavation area were not collected; however, samples taken from the EBR-04 septic tank were used to evaluate this site because of their similar waste streams. The COPCs for the ecological risk assessment are radionuclides in subsurface soils. These residual radionuclides were eliminated during the soil contaminant screening process under EBR-04.

F-3.9.8 EBR-04 (EBR-I Septic Tank)

The COPCs for the ecological risk assessment are radionuclides in subsurface soils. These residual radionuclides were eliminated during the soil contaminant screening process (see Appendix C). No ERA was performed for these sites. Potential contamination remaining at the seepage pit excavation is all below 10 feet bgs and, therefore, no significant pathway exists to ecological receptors.

F-3.9.9 EBR-08 (EBR-I Fuel Oil Tank)

The COPCs for the ecological risk assessment are total petroleum hydrocarbons (TPHs) in subsurface soils. TPH-diesel and xylene were eliminated as a concern because the detected contamination is below 3 m (10 ft), no significant pathway exists to ecological receptors. Therefore, this site poses limited risk to ecological receptors.

F-3.9.10 EBR-09 (EBR-I Fuel Oil Tank)

The COPCs for the ecological risk assessment are total petroleum hydrocarbons in subsurface soils. Toxicity reference values (TRVs) from benzene were used to assess ecological risk because TRVs are not available for TPH-diesel. Benzene is the most hazardous chemical found in TPH-diesel, and therefore, conservatively bounds the potential effects. Only risk to mammalian receptors was evaluated. Risk from this COPC to birds, reptiles, amphibians, invertebrates and plants could not be evaluated because of the lack of toxicity data to develop TRVs. Hazard Quotients (HQs) for all mammalian receptors were less than 1.0 for benzene. Therefore, this site poses limited risk to ecological receptors and no COPCs were retained in the ERA.

F-3.9.11 EBR-10 (EBR-I Gasoline Tank)

The COPCs for the ecological risk assessment are total petroleum hydrocarbons in subsurface soils. TPH-diesel and xylene were eliminated as a concern because the detected contamination is at or below (3m (10 ft), no significant pathway exists to ecological receptors. Therefore, this site poses limited risk to ecological receptors.

F-3.9.12 EBR-11 (EBR-I Fuel Oil Tank)

The COPCs for the ecological risk assessment are total petroleum hydrocarbons in subsurface soils. TPH-diesel was eliminated as a concern because the detected contamination is 2.4 to 3 m (8 to 10 ft) bgs, no significant pathway exists to ecological receptors. Therefore, this site poses limited risk to ecological receptors.

F-3.9.13 EBR-12 (EBR-I Diesel Tank)

The COPCs for the ecological risk assessment are total petroleum hydrocarbons in subsurface soils. TPH-diesel was eliminated as a concern because the detected contamination is within the 2.7-m (9-ft) range, no significant pathway exists to ecological receptors. Therefore, this site poses limited risk to ecological receptors.

F-3.9.14 EBR-15 (EBR-I Radionuclide Soil Contamination)

The COPCs for the ecological risk assessment are radionuclides in the surface and subsurface soils. These radionuclides were eliminated during the soil contaminant screening process (see Appendix C). No COPCs were retained for the ERA at this site.

F-3.9.15 CPP-66 (Fly Ash Pit)

The COPCs for the ecological risk assessment are metals for the surface and subsurface soils. Rabbitbrush was observed growing on the consolidated fly ash without any visually apparent deleterious effects. Hazard Quotients (HQs) for boron, copper, selenium, and strontium ranged from 1 to 100. Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Table F-15. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. The COPC with HQs less than 1 was selenium. Risks from these contaminants to reptiles, amphibians, and invertebrates could not be evaluated because of the lack of toxicity data to develop TRVs. Risks from exposure to birds and plants could not be evaluated for strontium.

Table F-15. Summary of ERA HQs for the Fly Ash Pit.

COPCs **Receptors**	Boron **HQs**	Copper **HQs**	Strontium **HQs**
Deer mouse	—	5	6
Mule deer	—	—	1
Plants	100[a]	—	—
Pygmy rabbit	2	3	10
Townsend's western big-eared bat	—	8	2

COPCs with HQs less than one are not presented in this table.

a. See the bulleted discussion on boron following this table as to why this HQ is not retained in the ERA.

The HQs for the COPCs at the fly ash pit are discussed below.

- The HQs for exposure to boron ranged from 2 for the pygmy rabbit (M122A) to 100 for plants (all vegetation). The exposure point concentration in the surface soil is 51.1 mg/kg decreasing to 32.8 mg/kg in the subsurface soil. The INEEL background value for boron has not been evaluated or made available at this time. All species except plants have HQs that fall below the low risk HQ of 10. This group was modeled with a conservative PUF of 1.0 because a more realistic PUF has not yet been determined. It is not anticipated that this exposure will occur. The use of more realistic PUFs would likely reduce the HQs for these receptors. For this reason, it would be unlikely for boron to pose significant risk to plant receptors and it will no longer be evaluated as a COPC.

- The HQs for exposure to copper ranged from 3 for the pygmy rabbit (M122A), 5 for the deer mouse (M422), to 8 for the Townsend's western big-eared bat (M210A). The exposure point concentration in the surface soil is 23.1 mg/kg decreasing to 21.8 mg/kg in the subsurface soil. The INEEL background concentration for copper is 22 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

- Selenium HQs at the fly ash pit were all below 1.0.

- The HQs for exposure to strontium ranged from 1 for the mule deer (M122), 2 for the Townsend's western big-eared bat (M210A), 6 for the deer mouse (M422), to 10 for the pygmy rabbit (M122A). The exposure point concentration in the surface soil is 163 mg/kg decreasing to 94.5 mg/kg in the subsurface soil. The INEEL background value for strontium has not been evaluated or made available at this time. This contaminant was eliminated as a COPC because the HQs were equal to or below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that the fly ash pit at CPP has limited risk to ecological receptors from exposure to soils from this area. A potential exists for plants to be subjected to some risk from exposure to boron, however because of the lack of toxicity data this risk cannot be determined. According to field surveys, the threat to plant species from boron is low because some vegetation has already begun to

establish itself on top of the fly ash. No COPCs were retained for further evaluation in the ERA for this site. Complete ecological risk assessment results are presented in Appendix G.

F-3.9.16 LCCDA-01 (Liquid Corrosive Chemical Disposal Area Old Disposal Pit [west end])

The COPCs for the ecological risk assessment are radionuclides and metals for the surface and subsurface soils. The residual radionuclide COPCs were eliminated during the soil contaminant screening process (see Appendix C). Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Table F-16. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. HQs for barium, cobalt, copper, and manganese ranged from 1 to 10. Risks from these contaminants to reptiles, amphibians, and invertebrates could not be evaluated because of the lack of toxicity data to develop TRVs. Risks to plants could not be evaluated for cobalt, and birds could not be assessed for threats from exposure to barium or beryllium. 1,1,2-trichloromethane was among the COPCs, but no toxicity information could be found to assess ecological risk. This compound was considered a low risk because its maximum concentration was 0.0054 mg/kg and it is highly volatile. 1,1,2-trichloromethane will no longer be evaluated because no significant risk is expected to occur from exposure to this contaminant.

Table F-16. Summary of ERA HQs for LCCDA-01.

COPC **Receptors**	Barium **HQs**	Cobalt **HQs**	Copper **HQs**	Manganese **HQs**
Deer mouse	3	—	—	—
Plants	—	—	—	10
Pygmy rabbit	5	4	1	9

COPCs with HQs less than one are not presented in this table.

The HQs for the COPCs at LCCDA-01 are discussed below.

- The HQs for exposure to barium ranged from 3 for the deer mouse (M422) to 5 for the pygmy rabbit (M122A). The EPC in the surface soil is 403 mg/kg decreasing to 355 mg/kg in the subsurface soil. The INEEL background concentration for barium is 300 mg/kg. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

- Beryllium HQs at LCCDA-01 were all below 1.0.

- The only HQ $\geq$ 1 for exposure to cobalt was a 4 for the pygmy rabbit (M122A). The EPC in the surface soil is 8.7 mg/kg decreasing to 9.88 mg/kg in the subsurface soil. The INEEL background concentration for cobalt is 12.5 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

- The only HQs $\geq$ 1 for exposure to copper was a 1 for the pygmy rabbit (M122A). The EPC in the surface soil is 22.6 mg/kg increasing to 23.4 mg/kg in the subsurface soil. The INEEL background concentration for copper is 22 mg/kg. Therefore, a receptor may be exposed to

the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to manganese ranged from 9 for the pygmy rabbit (M122A) to 10 for plants (all vegetation). The EPC in the surface soil is 400 mg/kg increasing to 569 mg/kg in the subsurface soil. The INEEL background concentration for manganese is 490 mg/kg. This contaminant was eliminated as a COPC because the HQ was equal to or below 10, which indicates a low risk to ecological receptors.

- Vanadium HQs at LCCDA-01 were all below 1.0.

The risk evaluation indicates that LCCDA-01 has limited risk to ecological receptors from exposure to soils from this site. No COPCs were retained for further evaluation in the ERA for this site. Complete ERA results are presented in Appendix G.

F-3.9.17 LCCDA-02 (LCCDA Limestone Treatment and Disposal Pit [east end])

The COPCs for the ecological risk assessment are radionuclides and metals for subsurface soils. The residual radionuclide COPCs were eliminated during the soil contaminant screening process (see Appendix C). These HQs and COPCs are presented in Table F-17. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. HQs for copper and manganese ranged from 1 to 10. HQs for copper and manganese ranged from 1 to 6. Risks from these contaminants to reptiles, amphibians, and invertebrates could not be evaluated because of the lack of toxicity data to develop TRVs. Risks to birds could not be assessed for threats from exposure to beryllium. 1,1,2- Trichloromethane was among the COPCs, but no toxicity information could be found to assess ecological risk. This compound was considered a low risk because its maximum concentration was 0.0048 mg/kg and it is highly volatile. 1,1,2-trichloromethane will no longer be evaluated since no significant risk is expected to occur from exposure to this contaminant.

Table F-17. Summary of ERA HQs for LCCDA-02.

COPC **Receptors**	Copper **HQs**	Manganese **HQs**
Plants	—	6
Pygmy rabbit	1	7

COPCs with HQs less than one are not presented in this table.

The HQs for the COPCs at LCCDA-02 are discussed below.

- Beryllium HQs at LCCDA-02 were all below 1.0.

- The only HQs $\geq$ 1 for exposure to copper was a 1 for the pygmy rabbit (M122A). The EPC in the subsurface soil is 16.2 mg/kg. The INEEL background concentration for copper is 22 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to manganese was a 6 for plants (all vegetation) and the pygmy rabbit (M122A). The EPC in the subsurface soil is 327 mg/kg. The INEEL background concentration for manganese is 490 mg/kg. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that LCCDA-02 has limited risk to ecological receptors from exposure to soils from this site. No COPCs were retained for further evaluation in the ERA for LCCDA-02. Complete ERA results are presented in Appendix G.

F-3.9.18 OMRE-01 (Organic-Moderated Reactor Experiment [OMRE] Leach Pond)

The COPCs for the ecological risk assessment are radionuclides, metals, and inorganics for surface and subsurface soils. The residual radionuclide COPCs were eliminated during the soil contaminant screening process (see Appendix C). Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. HQs for chrysene ranged from 1 to 200. Risks from the contaminants to reptiles, amphibians and invertebrates could not be evaluated because of the lack of toxicity data to develop TRVs. Risks to birds and plants could not be assessed for threats from exposure to chrysene. Methacrylonitrile was among the COPCs, but no toxicity information could be found to assess ecological risk. This compound was considered a low risk because its maximum concentration was 0.0037 mg/kg and it is highly volatile. Methacrylonitrile will no longer be evaluated because no significant risk is expected to occur from exposure to this contaminant.

The HQs for the COPCs at OMRE-01 are discussed below.

- The HQs for exposure to chrysene ranged from 4 for the Townsend's western big-eared bat (M210A), 100 for the deer mouse (M422), to 200 for the pygmy rabbit (M122A). The EPC in the surface soil is 2,550 mg/kg decreasing to 128 mg/kg in the subsurface soil. The two maximum chrysene concentrations that were used to help determine the EPCs were associated with degraded asphalt, giving an unrealistically elevated concentration for this compound (see discussion in Section 2.2 of Appendix J). Significant risk from this COPC is not expected to occur and it will no longer be evaluated.

- Lead HQs at OMRE-01 were all below 1.0.

- Selenium HQs at OMRE-01 were all below 1.0.

The risk evaluation indicates that OMRE-01 has limited risk to ecological receptors from exposure to soils from the site. No COPCs were retained for further evaluation in the ERA for OMRE-01. Complete ERA results are presented in Appendix G.

F-3.9.19 Arco High Altitude Bombing Range

There is no evident soil contamination at this site, and the risk from unexploded ordnance to ecological receptors is considered low. See Table 21-1.

F-3.9.20 Naval Ordnance Test Facility (NOTF)

There is no evident soil contamination at this site, and the risk from unexploded ordnance to ecological receptors is considered low. See Table 21-1.

F-3.9.21 CFA-633 Naval Firing Site and Downrange Area

The COPCs for the ecological risk assessment include several inorganics and explosive compounds for the surface soils. The inorganic COPCs were eliminated during the soil contaminant screening process (see Appendix C). Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Table F-18. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. HQs for 2,4,6-trinitrotoluene, HMX, and RDX ranged from 1 to 70. Risks from the COPCs to birds, reptiles, amphibians, invertebrates, and plants could not be evaluated because of the lack of toxicity data to develop TRVs.

Table F-18. Summary of ERA HQs for CFA-633.

COPCs Receptors	2,4,6-TNT HQs	HMX HQs	RDX HQs
Deer mouse	—	2	30[a]
Mule deer	—	—	1
Pygmy rabbit	2	4	70[a]

COPCs with HQs less than one are not presented in this table.

a. See the bulleted discussion on RDX following this table as to why this HQ is not retained in the ERA.

The HQs for the COPCs at the CFA-33 Naval Firing Site and Downrange Area are discussed below.

- 1,3,5-trinitrobenzene HQs at the CFA-633 Naval Firing Site and Downrange Area were all below 1.0.

- The only HQs $\geq$ 1 for exposure to 2,4,6-trinitrotoluene was a 2 for the pygmy rabbit (M122A). The EPC in the surface soil is 6.43 mg/kg decreasing to 0.32 mg/kg in the subsurface soil. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to HMX ranged from 2 for the deer mouse (M422) to 4 for the pygmy rabbit (M122A). The EPC in the surface soil is 25.5 mg/kg decreasing to 1.28 mg/kg in the subsurface soil. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to RDX ranged from 1 for the mule deer (M122), 30 for the deer mouse (M422), to 70 for the pygmy rabbit (M122A). The EPC in the surface soil is 6.3 mg/kg decreasing to 0.32 mg/kg in the subsurface soil. On October 27, 1993, six samples collected in CFA-633 Area A2 ranged from 78 to 130 ppm for RDX. Samples 372XJ (87 ppm RDX) and 449XJ (130 ppm RDX) were field replicates or split samples, i.e., both samples were collected at map location #103 and noted as a 4-in.-diameter surface stain in the project logbook. Samples 373XJ and 374XJ both contained 119 ppm RDX. Sample 373XJ was collected at map location #104 and described in the logbook as a large surface chunk with little surface staining. Sample 374XJ was collected at map location #102 and was noted in the logbook as a 4-in.-diameter patchy surface stain. Sample 379XJ contained 91 ppm RDX and was collected at map #92, which is described in the logbook that the entire

8-in.-diameter template covered the stain and that there was also a heavy subsurface stain. Sample 376XJ, collected at map location #100 and noted in the logbook that no surface stain was present, contained 78 ppm RDX.

Staining is believed to be due to TNT contamination and not RDX contamination. Although staining was noted at four of the five sampling locations, the largest surface and subsurface stain was at map location #92, which also contained the highest TNT concentration (in sample 379XJ) of these six samples. Two other sampling locations with stains, map locations #102 & 103, are very small areas, i.e., 4 in. diameter. The remaining sample location, map location #104, has little staining, and the surface chunk was removed.

Risk to ecological receptors was evaluated using an EPC as discussed in Appendix C. This assumes risk as an average over the whole area. If the "hot spots" are removed from the assessment, the EPC calculated for the remaining samples would be 6.3 mg/kg. The remaining areas or "hot spots" are limited (approximately 201 in. sq) and results in significantly less exposure than modeled. Therefore, risk from exposure to RDX contamination at CFA-633 is not considered hazardous to ecological receptors. This COPCs will no longer be retained or evaluated in the FS. However, because there is some potential for risk from exposure to RDX this COPC will be retained for further evaluation in the INEEL-wide ERA (Section 17).

The risk evaluation indicates that the CFA-633 Naval Firing Site and Downrange Area shows some potential for risk to ecological receptors from exposure to soils at this site. However, this site is highly disturbed and does not provide desirable habitat. No COPCs were retained for further evaluation in the ERA for CFA-633. Complete ERA results are presented in Appendix G. The risk from unexploded ordnance to ecological receptors is considered low. See Table 21-1.

F-3.9.22 CFA Gravel Pit

There is no evident soil contamination at this site, and the risk from unexploded ordnance to ecological receptors is considered low. See Table 21-1.

F-3.9.23 CFA Sanitary Landfill Area

There is no evident soil contamination at this site, and the risk from unexploded ordnance to ecological receptors is considered low. See Table 21-1.

F-3.9.24 Naval Ordnance Disposal Area (NODA)

The COPCs for the ecological risk assessment include several inorganics, TPH and explosive compounds for the surface and subsurface soils. Because this site covers such a large area and in order to characterize the area better, it was divided into three areas. This was also done to help keep the contaminants limited to the area from which they were found. Then, if remediation was needed, it would be limited to the contaminated area and less unnecessary habitat would be destroyed. Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Tables F-19, F-20, and F-21. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. HQs for the COPCs from this site ranged from 1 to 4,000. Risks from these contaminants to reptiles, amphibians, and invertebrates could not be evaluated because of the lack of toxicity data to develop TRVs (as the contaminants are discussed in greater detail below, they may contain a few more data gaps because of the lack of toxicity data and will be discussed more qualitatively). Several COPCs for this site could

not be assessed for ecological risk because of the lack of toxicity information. These are listed under each area as discussed below.

Area 2

HQs for the COPCs from this area ranged from 1 to 4,000. Risks to birds and plants could not be assessed for threats from exposure to 1,3,5-trinitrobenzene, 1,3-dinitrobenzene, 2-amino-4,6-dinitrotoluene, 2-methylnaphthalene, 2,4,6-TNT, 4-amino-2,6-dinitrotoluene, 4-methly-2-pentanone, benzo(g,h,i)perylene, HMX, pentachlorophenol, RDX, strontium, and tetryl. Risk for birds could not be assessed for antimony and barium. Furthermore, risk for plants could not be assessed for cobalt, nitrate, and nitrite. Several explosive and organic contaminants were among the COPCs for this area, but no toxicity information could be found to assess ecological risk. The contaminants, concentrations, and detection frequencies (DF) are as follows:

- 2-hexanone 0.0054 mg/kg 1% DF
- 2-pentanone 51 mg/kg 100% DF
- 4-nitrophenol 1 mg/kg 2% DF
- Chlorobenzene 0.006 mg/kg 5% DF
- Picric acid 0.428 mg/kg 40% DF

These contaminants are considered low risk, because their concentrations are found at low concentrations. The detection frequencies were either 6% or lower, except for 2-pentanone and picric acid, making it unlikely for these contaminants to present a widespread exposure hazard.

Table F-19. Summary of ERA HQs for NODA Area 2.

COPCs Receptors	1,3,5-trinitrobenzene HQs	Barium HQs	Cadmium chromium HQs	Chromium HQs	Cobalt HQs	Copper HQs	Lead HQs
Black-billed magpie	—	—	10	—	20	1	2
Burrowing owl	—	—	—	—	1	—	1
Deer mouse	—	20[a]	400[a]	—	4	20[a]	—
Loggerhead shrike	—	—	20	—	5	—	5
Mourning dove	—	—	—	—	50	2	—
Mule deer	—	—	30	—	1	2	—
Plants	—	—	—	5			—
Pygmy rabbit	2	6	100[a]	—	7	10	—
Sage sparrow	—	—	10	—	6	2	4
Townsend's western big-eared bat	—	70[a]	50[a]	—	1	30[a]	—

COPCs Receptors	Manganese HQs	Mercury HQs	Nitrate HQs	Pentachlorophenol HQs	RDX HQs	Strontium HQs
Black-billed magpie	2	8	1	—	—	—
Burrowing owl	—	2	—	—	—	—
Deer mouse	6	1	1	1	2,000	2
Loggerhead shrike	—	8	2	—	—	—
Mourning dove	6	8	2	—	—	—
Mule deer	2	—	—	—	700	—
Plants	7	—	—	—	—	—
Pygmy rabbit	10	1	1	3	4,000	4
Sage sparrow	—	7	3	—	—	—
Townsend's western big-eared bat	—	1	2	—	3	—

COPCs Receptors	Vanadium HQs	Zinc HQs
Burrowing owl	—	2
Black-billed magpie	—	7
Deer mouse	3	2
Loggerhead shrike	—	6
Mourning dove	—	10
Plants	—	5
Pygmy rabbit	—	2
Sage sparrow	1	10
Townsend's western big-eared bat	10	3

COPCs with HQs less than one are not presented in this table.

a. See the bulleted discussion on barium, cadmium and copper following this table as to why these HQs are not retained in the ERA.

The HQs for the COPCs at NODA Area 2 are discussed below.

- 1,3,5-Trinitrobenzene HQs at NODA Area 2 were all below 1.0.

- The only HQ $\geq$ 1 for exposure to 1,3-dinitrobenzene was a 2 for the pygmy rabbit (M122A). The EPC in the surface soil is 0.28 mg/kg decreasing to 0.16 mg/kg in the subsurface soil. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- 2-amino-4,6-dinitrotoluene HQs at NODA Area 2 were all below 1.0.

- 2-methylnaphthalene HQs at NODA Area 2 were all below 1.0. TRV values from benzo(a)pyrene were used to evaluate this COPC because of their similar characteristics and properties. TRV values for 2-methylnaphthalene could not be developed because of the lack of toxicity data.

- 2,4,6-trinitrotoluene HQs at NODA Area 2 were all below 1.0.

- 4-amino-2,6-dinitrotoluene HQs at NODA Area 2 were all below 1.0.

- 4-methyl-2-pentanone HQs at NODA Area 2 were all below 1.0.

- Antimony HQs at NODA Area 2 were all below 1.0.

- The HQs for exposure to barium ranged from 6 for the pygmy rabbit (M122A), 20 for the deer mouse (M422), to 70 for the Townsend's western big-eared bat (M210A). The EPC in the surface soil is 221 mg/kg decreasing to 156 mg/kg in the subsurface soil. The INEEL background concentration for barium is 300 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. All species except for the deer mouse have HQs that fall below the low risk HQ of 10. The deer mouse was modeled with conservative BAFs (1.0) and it is not anticipated that this exposure will occur. The use of more realistic BAFs would likely reduce the HQs for this receptor. For this reason, it would be unlikely for barium to pose significant risk to this mammalian receptor, and it will no longer be evaluated as a COPC.

- Benzo(g,h,i)perylene HQs at NODA Area 2 were all below 1.0. TRV values from benzo(a)pyrene were used to evaluate this COPC because of their similar characteristics and properties. TRV values for benzo(g,h,i)perylene could not be developed because of the lack of toxicity data.

- The HQs for exposure to cadmium ranged from 10 for the sage sparrow (AV222) and black-billed magpie (AV422), 20 for the loggerhead shrike (AV322), 30 for the mule deer (M122), 100 for the pygmy rabbit (M122A), 400 for the deer mouse (M422), to 500 for the Townsend's western big-eared bat (M210A). The EPC in the surface soil is 1.8 mg/kg decreasing to 1.25 mg/kg in the subsurface soil. The INEEL background concentration for cadmium is 2.2 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. The EPC for this contaminant represents an overly conservative value due to exposure modeling using weighed averages, and therefore would not be likely to pose a significant risk to any of these ecological receptors. This COPC can be eliminated from further evaluation.

- The only HQ $\geq$ 1 for exposure to chromium was a 5 for plants (all vegetation). The EPC in the surface soil is 23.4 mg/kg increasing to 27.2 mg/kg in the subsurface soil. The INEEL background concentration for chromium is 33 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to cobalt ranged from 1 for the burrowing owl (AV322A), mule deer (M122), and Townsend's western big-eared bat (M210A), 4 for the deer mouse (M422); 5 for the loggerhead shrike (AV322), 6 for the sage sparrow (AV222), 7 for the pygmy rabbit (M122A), 20 for the black-billed magpie (AV422), to 50 for the mourning dove (AV122). The EPC in the surface soil is 8.9 mg/kg decreasing to 7.1 mg/kg in the subsurface soil. The INEEL background concentration for cobalt is 12.5 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. The EPC for this contaminant represents an overly conservative value due to exposure modeling using weighed averages and, therefore, would not be likely to pose a significant risk to any of these ecological receptors. This COPC can be eliminated from further evaluation.

- The HQs for exposure to copper ranged from 1 for the black-billed magpie (AV422); 2 for the mourning dove (AV122), mule deer (M122), and the sage sparrow (AV222); 10 for the pygmy rabbit (M122A); 20 for the deer mouse (M422); and 30 for the Townsend's western big-eared bat (M210A). The EPC in the surface soil is 0.79 mg/kg decreasing to 54 mg/kg in the subsurface soil. The INEEL background concentration for copper is 22 mg/kg. This contaminant is above the low risk HQ of 10 for two mammalian species. Four sample results for copper were removed from the data set before the EPCs were calculated. These samples were removed because they were representative of "hot spots." These four sample results have concentrations ranging from 24,000 to 772 mg/kg. Several other sample results showed levels above background, but they were significantly less in concentration. Therefore, risk from exposure to copper contamination at NODA Area 2 is not considered hazardous to ecological receptors. This COPCs will no longer be retained or evaluated in the FS. However, because there is some potential for risk from exposure to copper this COPC will be retained for further evaluation in the INEEL-wide ERA (Section 17).

- HMX HQs at NODA Study Area 2 were all below 1.0.

- The HQs for exposure to lead ranged from 1 for the burrowing owl (AV322A), 2 for the black-billed magpie (AV422), 4 for the sage sparrow (AV222), to 5 for the loggerhead shrike (AV322). The EPC in the surface soil is 36.3 mg/kg decreasing to 25.7 mg/kg in the subsurface soil. The INEEL background concentration for lead is 17 mg/kg. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to manganese ranged from 2 for the black-billed magpie (AV422) and mule deer (M122), 6 for the mourning dove (AV122) and deer mouse (M422), 7 for plants (all vegetation), to 10 for the pygmy rabbit (M122A). The EPC in the surface soil is 350 mg/kg decreasing to 259 mg/kg in the subsurface soil. The INEEL background concentration for manganese is 490 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to mercury ranged from 1 for the deer mouse (M422), Townsend's western big-eared bat (M210A) and pygmy rabbit (M122A); 2 for the burrowing owl (AV322A); 7 for the sage sparrow (AV222); to 8 for the mourning dove (AV122), loggerhead shrike (AV322), and black-billed magpie (AV422). The EPC in the surface soil is 0.30 mg/kg decreasing to 0.27 mg/kg in the subsurface soil. The INEEL background concentration for mercury is 0.05 mg/kg. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- Nickel HQs at NODA Area 2 were all below 1.0.

- The HQs for exposure to nitrate ranged from 1 for the pygmy rabbit (M122A), deer mouse (M422), and black-billed magpie (AV422); 2 for the mourning dove (AV122), loggerhead shrike (AV322), and Townsend's western big-eared bat (M210A); to 3 for the sage sparrow (AV222). The EPC in the surface soil is 98.3 mg/kg increasing to 164 mg/kg in the subsurface soil. The INEEL background value for nitrate has not been evaluated or made available at this time. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to nitrite were 1 for the mourning dove (AV122), sage sparrow (AV222), loggerhead shrike (AV322), and Townsend's western big-eared bat (M210A). TRV values from nitrate were used to evaluate this COPC because of their similar characteristics and properties. TRV values for nitrite could not be developed because of the lack of toxicity data.

- The HQs for exposure to pentachlorophenol ranged from 1 for the deer mouse (M422) to 3 for the pygmy rabbit (M122A). The EPC in the surface soil is 1 mg/kg decreasing to 0.94 mg/kg in the subsurface soil. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to RDX ranged from 3 for the Townsend's western big-eared bat (M210A), 700 for the mule deer (M122), 2,000 for the deer mouse (M422), to 4,000 for the pygmy rabbit (M122A). The EPC in the surface soil is 328 mg/kg decreasing to 131 mg/kg in the subsurface soil. This contaminant is well above the low risk HQ of 10.

- Silver HQs at NODA Area 2 were all below 1.0.

- The HQs for exposure to strontium ranged from 2 for the deer mouse (M422) to 4 for the pygmy rabbit (M122A). The EPC in the surface soil is 64.4 mg/kg decreasing to 57.7 mg/kg in the subsurface soil. The INEEL background value for nitrate has not been evaluated or made available at this time. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- Tetryl HQs at NODA Area 2 were all below 1.0.

- The HQs for exposure to vanadium ranged from 1 for the sage sparrow (AV222), 3 for the deer mouse (M422), to 10 for the Townsend's big-eared bat (M210A). The EPC in the surface soil is 36.3 mg/kg decreasing to 25.7 mg/kg in the subsurface soil. The INEEL UTL background concentration for vanadium is 45 mg/kg. This contaminant was eliminated as a COPC because the HQs were equal to or below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to zinc ranged from 2 for the burrowing owl (AV322A), deer mouse (M422), and pygmy rabbit (M122A); 3 for the Townsend's western big-eared bat (M210A); 5 for plants (all vegetation); 7 for the black-billed magpie (AV422); to 10 for the mourning dove (AV122) and sage sparrow (AV 222). The EPC in the surface soil is 166 mg/kg decreasing to 119 mg/kg in the subsurface soil. The INEEL background concentration for zinc is 150 mg/kg. This contaminant was eliminated as a COPC because the HQs were equal to or below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that Area 2 at NODA has risk to ecological receptors from exposure to copper and RDX.

Area 3

HQs for the COPCs from this area ranged from 1 to 90. Risks to birds could not be assessed for threats from exposure to barium. Risk for plants could not be assessed for cobalt. 2-hexanone and 2-pentanone were among the COPCs, but no toxicity information could be found to assess ecological risk. The concentration of these compounds were found at very low levels, 0.013 mg/kg for 2-hexanone and 48.6 mg/kg for 2-pentanone The detection frequencies for these two contaminants are 10% for 2-hexanone and 100% for 2-pentanone. It would be unlikely for 2-hexanone to cause a significant risk to ecological receptors, however, the risk from 2-pentanone is unknown.

Table F-20. Summary of ERA HQs for NODA Area 3.

COPCs Receptors	Barium HQs	Chromium HQs	Cobalt HQs	Copper HQs	Lead HQs	Manganese HQs	Vanadium HQs	Zinc HQs
Black-billed magpie	—	—	20[a]	—	—	2	—	7
Burrowing owl	—	—	1	—	—	—	—	2
Deer mouse	30[a]	—	5	5	—	8	3	2
Loggerhead shrike	—	—	6	—	2	—	—	6
Mourning dove	—	—	70[a]	—	—	8	—	10
Mule deer	1	—	2	—	—	3	—	—
Plants	—	5	—	—	—	9	—	5
Pygmy rabbit	7	—	10	3	—	20[a]	—	2
Sage sparrow	—	—	8	—	2	—	—	10
Townsend's western big-eared bat	90[a]	—	2	8	—	—	10	2

COPCs with HQs less than one are not presented in this table.

a. See the bulleted discussion on barium, cobalt, and manganese following this table as to why these HQs are not retained in the ERA.

- The HQs for exposure to barium ranged from 1 for the mule deer (M122), 7 for the pygmy rabbit (M122A), 30 for the deer mouse (M422), to 90 for the Townsend's western big-eared bat (M210A). The EPC in the surface soil is 298 mg/kg decreasing to 132 mg/kg in the subsurface soil. The INEEL background concentration for barium is 300 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. All species except for the deer mouse and Townsend's western big-eared bat have HQs that fall below the low risk HQ of 10. These species were modeled with conservative BAFs (1.0), and it is not anticipated that this exposure will occur. The use of more realistic BAFs would likely reduce the HQs for these receptors. For this reason, it would be unlikely for barium to pose significant risk to these mammalian receptors, and it will no longer be evaluated as a COPC.

- The only HQ $\geq$ 1 for exposure to chromium was a 5 for plants (all vegetation). The EPC in the surface soil is 23.7 mg/kg decreasing to 22.7 mg/kg in the subsurface soil. The INEEL background concentration for chromium is 33 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to cobalt ranged from 1 for the burrowing owl (AV322A), 2 for the mule deer (M122) and Townsend's western big-eared bat (M210A), 5 for the deer mouse (M422), 6 for the loggerhead shrike (AV322), 8 for the sage sparrow (AV222), 10 for the pygmy rabbit (M122A), 20 for the black-billed magpie (AV422), to 70 for the mourning dove (AV122). The EPC in the surface soil is 11.4 mg/kg decreasing to 8.2 mg/kg in the subsurface soil. The INEEL background concentration for cobalt is 12.5 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. These species were modeled with conservative BAFs (1.0), and it is not anticipated that this exposure will occur. The use of more realistic BAFs would likely reduce the HQs for these receptors. For this reason, it would be unlikely for cobalt to pose significant risk to these receptors and it will no longer be evaluated as a COPC.

- The HQs for exposure to copper ranged from 3 for the pygmy rabbit (M122A), 5 for the deer mouse (M422), to 8 for the Townsend's western big-eared bat (M210A). The EPC in the surface soil is 24.5 mg/kg to decreasing 17.2 mg/kg in the subsurface soil. The INEEL background concentration for copper is 22 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The only HQ $\geq$ 1 for exposure to lead was a 2 for the sage sparrow (AV222) and loggerhead shrike (AV322). The EPC in the surface soil is 17.8 mg/kg decreasing to 14.5 mg/kg in the subsurface soil. The INEEL background concentration for lead is 17 mg/kg. Therefore, a receptor may be exposed to the same magnitude of risk from exposure to background. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to manganese ranged from 2 for the black-billed magpie (AV322), 3 for the mule deer (M122), 8 for the deer mouse (M422) and mourning dove (AV122), 9 for plants (all vegetation), to 20 for the pygmy rabbit (M122A). The EPC in the surface soil is 453 mg/kg decreasing to 241 mg/kg in the subsurface soil. The INEEL background concentration for manganese is 490 mg/kg. Therefore, a receptor may be exposed to the

same magnitude of risk from exposure to background. The EPC for this contaminant represents an overly conservative value due to exposure modeling using weighed averages and, therefore, would not be likely to pose a significant risk to any of these ecological receptors. This COPC can be eliminated from further evaluation.

- Nickel HQs at NODA Area 3 were all below 1.0.

- The HQs for exposure to vanadium ranged from 3 for the deer mouse (M422) to 10 for the Townsend's western big-eared bat (M210A). The EPC in the surface soil is 24.4 mg/kg decreasing to 18.2 mg/kg in the subsurface soil. The INEEL background concentration for vanadium is 45 mg/kg. This contaminant was eliminated as a COPC because the HQs were equal to or below 10, which indicates a low risk to ecological receptors.

- The HQs for exposure to zinc ranged from 2 for the Townsend's western big-eared bat (M210A); burrowing owl (AV322A), pygmy rabbit (M122A), and deer mouse (M422); 5 for plants (all vegetation); 6 for the loggerhead shrike (AV322); 7 for the black-billed magpie (AV422); to 10 for the mourning dove (AV122) and sage sparrow (AV222). The EPC in the surface soil is 159 mg/kg decreasing to 89.1 mg/kg in the subsurface soil. The INEEL background concentration for zinc is 150 mg/kg. This contaminant was eliminated as a COPC because the HQs were equal to or fell below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that Area 3 at NODA has limited risk to ecological receptors from exposure to soils from this site. Ecological risk from exposure to 2-pentanone is unknown and this COPC may pose a risk to receptors.

Area 4

HQs for the COPCs from this area ranged from 1 to 80. Risks to birds and plants could not be assessed for threats from exposure to chrysene and TPH. Methapyrilene was among the COPCs, but no toxicity information could be found to assess ecological risk. The concentration of this compound was found at very low levels; 1.7 mg/kg (methapyrilene). The detection frequency for this contaminant was 20% for methapyrilene making it unlikely for this contaminant to present a widespread exposure hazard. For this reason, it is unlikely to pose significant risk to any ecological receptor and will no longer be evaluated.

Table F-21. Summary of ERA HQs for NODA Area 4

COPCs Receptors	Manganese HQs	TPH-diesel HQs
Deer mouse	10[a]	40
Plants	10[a]	—
Pygmy rabbit	20[a]	80

COPCs with HQs less than one are not presented in this table.

a. See the bulleted discussion on manganese following this table as to why this HQ is not retained in the ERA.

The HQs for the COPCs at NODA Area 4 are discussed below.

- Chrysene HQs at NODA Area 4 were all below 1.0.

- The HQs for exposure to manganese ranged from 10 for the deer mouse (M422) and plants (all vegetation) to 20 for the pygmy rabbit (M122A). The EPC in the surface soil is 555 mg/kg decreasing to 222 mg/kg in the subsurface soil. The INEEL background concentration for manganese is 490 mg/kg. The EPC for this contaminant represents an overly conservative value due to exposure modeling using weighed averages and, therefore, would not be likely to pose a significant risk to any of these ecological receptors. This COPC can be eliminated from further evaluation.

- Selenium HQs at NODA Area 4 were all below 1.0.

- The HQs for the exposure to TPH-diesel ranged from 40 for the deer mouse (M422) to 80 for the pygmy rabbit (M122A). The EPC in the surface soil is 1,200 mg/kg decreasing to 204 mg/kg in the subsurface soil. TRV values from benzene were used to evaluate this contaminant because benzene is the most hazardous chemical found in TPH-diesel. This was done because TRV values for TPH-diesel could not be developed because of the lack of toxicity data. The HQs for this contaminant are well above the low risk HQ of 10.

The risk evaluation indicates that Area 4 at NODA has risk to ecological receptors from exposure to TPH-diesel.

In summary, based on dose and HQ calculations and background comparisons, the primary potential risk-drivers at NODA include copper (at Area 2), RDX (at Area 2), and TPH (at Area 4) in soil. Complete ERA results are presented in Appendix G. The risk from unexploded ordnance to ecological receptors is considered low. See Table 21-1.

F-3.9.25 Explosive Storage Bunkers North of INTEC

There is no evident soil contamination at this site, and the risk from unexploded ordnance to ecological receptors is considered low. See Table 21-1.

F-3.9.26 National Oceanic and Atmospheric Administration (NOAA) Grid

In order to characterize NOAA better and because this site covers such a large area, it was divided into six separate areas. This was also done to help keep the contaminants limited to the area from which they were found. Then, if remediation was needed, it would be limited to the contaminated area and less unnecessary habitat would be destroyed. The COPCs for the ecological risk assessment include several inorganics and explosive compounds for the surface and subsurface soils. Only COPCs with HQs greater than 10 will be retained for further evaluation in the ERA. These HQs and COPCs are presented in Tables F-22 Through F-28. COPCs with HQs less than or equal to 10 are eliminated from the ERA because they pose a low risk to ecological receptors and no longer need to be evaluated. HQs for the COPCs from this site ranged from 1 to 500. Risks from the COPCs to reptiles, amphibians, and invertebrates could not be evaluated because of the lack of toxicity data to develop TRVs (as the contaminants are discussed in greater detail below, they may contain a few more data gaps because of the lack of toxicity data and will be discussed more quantitatively). Also, a few of the COPCs for this site could not be assessed for ecological risk because of the lack of toxicity information. These COPCs will be discussed in greater detail under their designated area.

Area 1

HQs for the COPCs from this area ranged from 1 to 5. Risk to plants could not be assessed from nitrate and nitrite.

The HQs for the COPCs at NOAA Area 1 are discussed below.

- The HQs for exposure to nitrate ranged from 1 for the black-billed magpie (AV422), 2 for the pygmy rabbit (M122A) and deer mouse (M422), 3 for the mourning dove (AV122), 4 for the loggerhead shrike (AV322) and Townsend's western big-eared bat (M210A), to 5 for the sage sparrow (AV222). The EPC in the surface soil is 290 mg/kg decreasing to 81 mg/kg in the subsurface soil. The INEEL background value for nitrate has not been evaluated or made available at this time. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.

- The only HQs $\geq$ 1 for exposure to nitrite was a 1 for the sage sparrow (AV222). The EPC in the surface soil is 65 mg/kg decreasing to 26 mg/kg in the subsurface soil. The INEEL background value for nitrite has not been evaluated or made available at this time. TRV values from nitrate were used to evaluate this COPC because of their similar characteristics and properties. TRV values for nitrite could not be developed because of the lack of toxicity data. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that Area 1 at NOAA (ORD-08) has limited risk to ecological receptors from exposure to soils from this area. No COPCs were retained for further evaluation in the ERA for NOAA Grid Area 1.

Area 2

HQs for the COPCs from this area ranged from 1 to 5. Risks to birds and plants could not be assessed for threats from exposure to 1,3,5-trinitrobenzene, 2,4,6-TNT, and 4-amino-2,6-dinitrotoluene. Furthermore, risk to plants could not be assessed for nitrate and nitrite.

Table F-22. Summary of ERA HQs for NOAA Grid Area 1.

COPCs Receptors	Nitrate HQs	Nitrite HQs
Black-billed magpie	1	—
Deer mouse	2	—
Loggerhead shrike	4	—
Mourning dove	3	—
Pygmy rabbit	2	—
Sage sparrow	5	1
Townsend's western big-eared bat	4	—

COPCs with HQs less than one are not presented in this table.

Table F-23. Summary of ERA HQs for NOAA Grid Area 2.

COPCs **Receptors**	Nitrate **HQs**	Nitrite **HQs**
Black-billed magpie	1	—
Deer mouse	2	—
Loggerhead shrike	4	1
Mourning dove	3	1
Pygmy rabbit	2	—
Sage sparrow	5	2
Townsend's western big-eared bat	4	1

COPCs with HQs less than one are not presented in this table.

The HQs for the COPCs at NOAA Area 2 are discussed below.

- 1,3,5-trinitrobenzene HQs at NOAA Area 2 were all below 1.0.
- 2,4,6-trinitrotoluene (2,4,6-TNT) HQs at NOAA Area 2 were all below 1.0.
- 4-amino-2,6-dinitrotoluene HQs at NOAA Area 2 were all below 1.0.
- The HQs for exposure to nitrate ranged from 2 for the black-billed magpie (AV422), pygmy rabbit (M122A), and deer mouse (M422); 3 for the mourning dove (AV122); 4 for the loggerhead shrike (AV322) and Townsend's western big-eared bat (M210A); to 5 for the sage sparrow (AV222). The EPC in the surface soil is 310 mg/kg decreasing to 92.5 mg/kg in the subsurface soil. The INEEL background value for nitrate has not been evaluated or made available at this time. This contaminant was eliminated as a COPC because the HQs fell below 10, which indicates a low risk to ecological receptors.
- The HQs for exposure to nitrite ranged from 1 for the mourning dove (AV122), loggerhead shrike (AV322), and Townsend's western big-eared bat (M210A) to 2 for the sage sparrow (AV222). The EPC in the surface soil is 115 mg/kg decreasing to 46 mg/kg in the subsurface soil. The INEEL background value for nitrite has not been evaluated or made available at this time. TRV values from nitrate were used to evaluate this COPC because of their similar characteristics and properties. TRV values for nitrite could not be developed because of the lack of toxicity data. This contaminant was eliminated as a COPC because the HQ fell below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that Area 2 at NOAA (ORD-08) has limited risk to ecological receptors from exposure to soils from this area. No COPCs were retained for further evaluation in the ERA for NOAA Grid Area 2.

Table F-24. Summary of ERA HQs for NOAA Grid Area 2a.

COPCs Receptors	2,4,6-TNT HQs	RDX HQs
Deer mouse	**100**	6
Mule deer	5	—
Pygmy rabbit	**200**	10

COPCs with HQs less than one are not presented in this table.

Area 2a

HQs for the COPCs from this area ranged from 1 to 200. Risks to birds and plants could not be assessed for threats from exposure to 1,3,5-trinitrobenzene, 2,4,6-TNT, and RDX.

The HQs for the COPCs at NOAA Area 1 are discussed below.

- 1,3,5-trinitrobenzene HQs at NOAA Area 2a were all below 1.0.
- The HQs for exposure to 2,4,6-trinitrotoluene ranged from 3 for the mule deer (M122), 100 for the deer mouse (M422), to 200 for the pygmy rabbit (M122A). The EPC in the surface soil is 864 mg/kg decreasing to 43.2 mg/kg in the subsurface soil. This contaminant is well above the low risk HQ of 10.
- The HQs for exposure to RDX ranged from 6 for the deer mouse (M422) to 10 for the pygmy rabbit (M122A). The EPC in the surface soil is 1.17 mg/kg decreasing to 0.058 mg/kg in the subsurface soil. This contaminant was eliminated as a COPC because the HQs were equal to or below 10, which indicates a low risk to ecological receptors.

The risk evaluation indicates that Area 2a at NOAA (ORD-08) has limited risk to ecological receptors, except for exposure to 2,4,6-TNT, from exposure to soils from this area.

Area 3

HQs for the COPCs from this area ranged from 1 to 100. Risks to birds and plants could not be assessed for threats from exposure to 2,4,6-TNT and RDX. Futhermore, risk to plants could not be assessed for nitrate and nitrite.