

## **Supplemental Ecological Report (SER), Naval Air Warfare Center (NAWC), Trenton, New Jersey**

### **Summary**

An ERA was conducted for the Naval Air Warfare Center (NAWC), Trenton, NJ, to address concerns at an offsite location (Gold Run System). Following the *Remedial Investigation Report* (RI) prepared in 1994, the Navy undertook supplemental studies to address outstanding issues related to the RI. This report presents the results of the supplemental studies, which included both onsite and offsite investigations. The offsite investigations evaluated the Gold Run System.

### **Objectives**

The objectives of the ERA were to complete the sampling in the offsite location (Gold Run and Pond 1), to perform more intensive chemical and biological sampling of the offsite location, to characterize the pond habitat and evaluate potential effects of contaminants of potential concern, to test surface water for volatile organic compounds, and to develop preliminary remediation goals (PRG) for contaminants of potential concern if necessary.

The *Final Work Plan Letter Report for Additional Sampling at Naval Air Warfare Center, Trenton, New Jersey* presents the plan of study approved by the New Jersey Department of Environmental Protection (NJDEP) to achieve these objectives.

### **RESULTS OF SAMPLING AND ANALYSIS**

Sediment and surface water samples were collected at eight locations within Pond 1 and Gold Run. Fish tissue samples were also collected using electrofishing methods for whole-body analytical analysis.

The nutrient and general chemistry parameters for water and sediment from Pond 1 and Gold Run are similar to the screening and upstream reference values. Trichloroethylene (TCE) was detected in the surface water at three locations, but at concentrations well below the screening value.

The metals identified in water from the RI, SER, and this Technical Memorandum were found to be below reference station concentrations; therefore, metals in water were excluded from further consideration with respect to potential for ecological risk.

Among the inorganic compounds identified in sediment, six metals that exceeded ecological screening values (chromium, copper, lead, mercury, silver, and zinc) were identified in the Draft SER as being NAWC related. Even though further assessment of these metals indicated that there is limited potential for risk, each of these metals was evaluated in the food web models.

Fifteen metals were detected in the fish tissue samples. Of the 15 metals detected, 4 are essential nutrients (calcium, iron, magnesium, and potassium). Of the metals identified as COPC, silver

was not detected in fish tissue and the others (chromium, copper, lead, mercury, and zinc) were present at levels within the range of national background concentrations. Fish tissue concentrations of NAWC Trenton COPC do not indicate a risk to Pond 1 resources. Furthermore, none of the metals found in fish tissue indicate an adverse effect.

Statistical comparisons of mean metal concentrations on day 28 *Lumbriculus variegatus* were performed between each site tissue sample and the control tissue sample. Of the metals identified as COPC in sediment, only copper and zinc were present at levels statistically higher than in control tissue. Mercury and silver were not detected in any bioaccumulation test tissues. Lead and chromium were present in test tissues at concentrations similar to the control tissues.

## **FOOD UPTAKE MODEL RESULTS**

Food uptake modeling was performed for eight metals. Six (chromium, copper, lead, mercury, silver, and zinc) were identified as COPC in the screening of the sediment data. Arsenic and selenium were identified in the Work Plan for evaluation of bioaccumulation effects. Measured concentrations for fish and invertebrates (*L. variegatus*), and sediment and water were used in the model. Analytes were assumed to be 100 percent bioavailable at the maximum detected concentration in each medium. Calculated doses were compared to NOAELs for the raccoon, belted kingfisher, and snapping turtle as presented in the Work Plan or derived from the literature.

A summary of the hazard quotients is presented in Table 1. When a conservative area use factor of 100 percent is assumed, only the hazard quotients for chromium and zinc for the belted kingfisher exceed 1.0 (3.25 and 2.11, respectively). When an actual area use factor is assumed for the belted kingfisher, none of the hazard quotients exceed 1.0. Consequently, the food web model results indicate that the COPC from NAWC Trenton present a negligible risk to biota in Pond 1.

## **CONCLUSIONS**

Based on the results of this investigation of sediment, invertebrate bioaccumulation, fish population and tissue levels, and uptake to mammalian, avian, and reptilian receptors, there is no indication that metals in Pond 1 represent a risk to ecological resources.

**TABLE 1 HAZARD QUOTIENT SUMMARIES**

<b>100 % AREA USE</b>			
<b>Constituents of Potential Concern</b>	<b>Raccoon</b>	<b>Belted Kingfisher</b>	<b>Snapping Turtle</b>
	<b>NOAEL TRV</b>	<b>NOAEL TRV</b>	<b>NOAEL TRV</b>
	<b>HQ</b>	<b>HQ</b>	<b>HQ</b>
Arsenic	0.88	0.07	0.01
Chromium	0.00	3.25	0.81
Copper	0.13	0.08	0.02
Lead	0.21	0.76	0.17
Mercury	0.00	0.49	0.05
Selenium	0.46	0.40	0.04
Silver	NA	NA	NA
Zinc	0.06	2.11	0.30

<b>ACTUAL AREA USE</b>			
<b>Constituents of Potential Concern</b>	<b>Raccoon</b>	<b>Belted Kingfisher</b>	<b>Snapping Turtle</b>
	<b>NOAEL TRV</b>	<b>NOAEL TRV</b>	<b>NOAEL TRV</b>
	<b>HQ</b>	<b>HQ</b>	<b>HQ</b>
Arsenic	0.01	0.02	0.01
Chromium	0.00	0.91	0.81
Copper	0.00	0.02	0.02
Lead	0.00	0.21	0.17
Mercury	0.00	0.14	0.05
Selenium	0.00	0.11	0.04
Silver	NA	NA	NA
Zinc	0.00	0.59	0.30

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