MEMORANDUM

DATE: June 5, 2001

TO: Regional Director, FWS, RO, Twin Cities, MN
(ATTN: Stan Smith, FWS, RO, Twin Cities, MN)

FROM: Thomas P. Simon, Ph. D., FWS, BIFO, Bloomington, IN (ES)

SUBJECT: Interim Report for Defining Brine and Oil Threats in the Patoka River National Wildlife Refuge
Project DEC ID #: 200030002.2 FFS#: 3N29

The following interim report is a list of activities being performed in conjunction with the study of oil brine effects on crayfish in the Patoka River National Wildlife Refuge. The objectives of this study are to evaluate the distributions of crayfish and ecological effects from physical and chemical disturbances caused by oil exploration and the discharge of brine effluents. In addition, the development and testing of crayfish surrogate species will be used to evaluate the field data to determine the degree of effect from point and non-point source impacts from oil exploration.

Field collections of crayfish have been conducted at 92 sites in cooperation with Ohio State University, Museum of Biodiversity. By the end of August we will have sampled 122 total sites. These sites are grouped into two classes including those that are in the vicinity of oil derricks and a second group that is in "least-impacted" portions of the watershed (i.e, Hoosier National Forest, State Forest, and portions of the NWR). These two data sets were sampled for qualitative habitat, water chemistry, and crayfish species. Seven species of crayfish have been collected from the watershed including the former Federal candidate species Indiana crayfish, *Orconectes indianaensis*. This species had previously been collected at only 10 sites in Indiana. We have collected the crayfish at 20 sites in the Hoosier National Forest and found the species at two sites on the NWR. In addition, the Indiana cave crayfish *O. inermis inermis* was collected from the headwaters of the Patoka River. Additional crayfish species include the papershell crayfish *O. immunis*, White River crayfish *Procambarus acutus*, digger crayfish *Fallicambarus fodiens*, karst crayfish *Cambarus laevis*, and an undescribed crayfish we are calling the paintedhand mudbug *Cambarus nov. sp. diogenes*. This undescribed crayfish species is the most common species on the NWR.

Water quality evaluations were completed at each of the 92 sites. These sites were sampled for basic water quality parameters such as pH, dissolved oxygen, conductivity, total dissolved solids, oxidation-reduction potential, and salinity. We have also collected and analyzed five sediment samples through Patuxent Analytical Services. These samples were collected for preliminary toxicity testing and analyzed from known contaminated areas. The environmental chamber and all of the toxicology laboratory equipment has been purchased and is ready for operation. Samples will be collected and early life history screening tests for about 100 effluents and surface waters will be performed during August to December. Additional follow up dilution series testing on positive screening samples will be performed during the winter. The Indiana Geological Survey is prepared to complete the effluent and surface water chemical analysis to support the toxicological experiments.

In addition to the field sampling and early life history toxicity tests, a GIS analysis of the Patoka watershed is being cooperatively completed by the Service and the Indiana Geological Survey. The Survey has digitized and georeferenced all of the oil derricks within the Patoka River watershed and has prepared 7.5 minute and 15 minute topographic maps for the study area. We have cooperative agreements with Ohio State University and the Indiana Geological Survey to assist in the completion of this project including data analysis, chemical data analysis, and manuscript preparation.