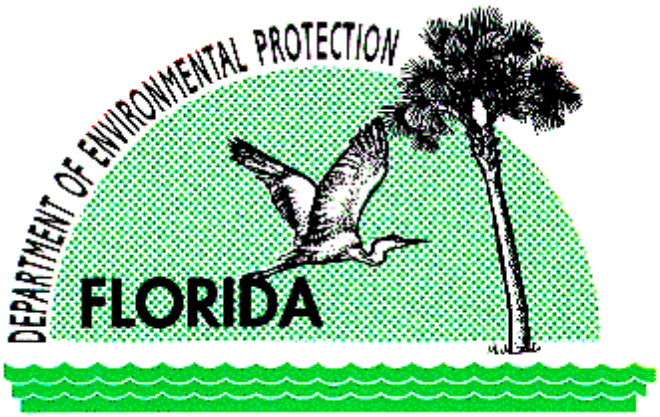


Bio-Recon Assessment of

Ashland Chemical, Inc.

Duval County

Sampled March 1998

July 1998

Bureau of Laboratories
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No's:
Laboratories- 870346G & 870688G
Field- 980028

Executive Summary

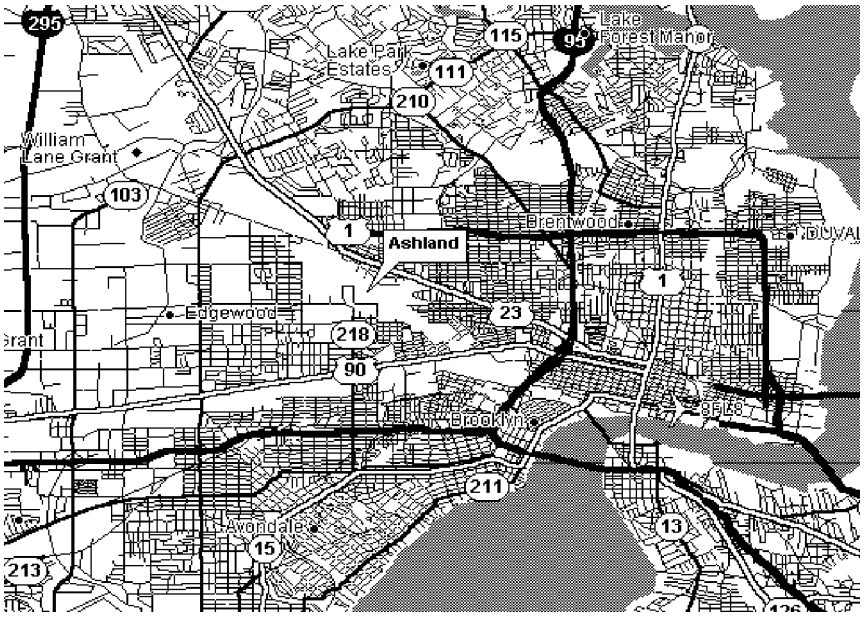
The FDEP Hazardous Waste Regulation Section requested staff from the FDEP Bureau of Laboratories to visit Ashland Chemical, Inc., and provide information on potential effects on the north fork of McCoy Creek.

Benthic macroinvertebrate communities at this site marginally exceeded the expectations for the northeastern regions of Florida. Considering the low flow and lack of habitat, the biological results were better than expected, suggesting the groundwater contamination was not having additional adverse effects on the stream biota. The test site nitrate-nitrite concentration (0.54 mg/L) exceeded the values found in 80 percent of other Florida streams, possibly related to groundwater inputs.

Introduction

Ashland Chemical of Florida is located in Duval County, Florida. The facility is currently inactive, but past operations have apparently resulted in volatile organic compounds (1,1-dichloroethene and 1,1-dichloroethane) entering local groundwater. These compounds have been detected in ground water monitoring wells on site and south of the facility. McCoy Creek, which flows through a culvert under the facility, runs north-south through the eastern part of the facility and into the contamination plume south of the facility. There was concern that the volatile organic constituents were reaching the creek through groundwater and having possible adverse effects on the stream biota.

The Florida Department of Environmental Protection's (FDEP) Hazardous Waste Regulation Section requested the FDEP Bureau of Laboratories to visit this site and provide information on the health of the biological community in McCoy Creek. With this goal in mind, a biological reconnaissance (Bio-Recon) was conducted on March 23, 1998.



Map of Area

Bio-Recon is a screening tool, designed to determine which systems are biologically healthy. Streams that fail the Bio-Recon are only suspected to be impaired, and it is suggested that follow-up, definitive sampling (using Stream Condition Index methods) be performed for further evaluation.

Methods

The focus of this investigation was to collect biological, habitat, and physical/chemical information from McCoy Creek at both a test and reference site. The Benthic macroinvertebrate communities were evaluated by performing biological reconnaissance (Bio-Recon) at this site (FDEP 1996, Biology Section Standard Operating Procedure #BA-29).

For Bio-Recon, invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, roots, vegetation) using four discrete dip net sweeps. The resulting samples were field sorted and brought back to the laboratory for identification under the dissecting microscope. A physical/chemical characterization (FDEP 1996b, BA-17) and habitat assessment (FDEP 1996b, BA-18) were also performed at each study site.

Explanation of Measurements of Community Health

Selected measurements of macroinvertebrate community health were employed to assess a site. These are briefly discussed here.

Habitat Assessment: Seven attributes known to have potential effects on the stream biota were evaluated and scored, with 20 points possible for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points).

Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy.

Ephemeroptera/Plecoptera/Trichoptera Index: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

The following personnel were involved in this investigation: Russel Frydenborg, Rebecca Northup, Tom Frick (FDEP Bureau of Laboratories), and Susan Bland, Camille Stein, Merlin Russell (FDEP Hazardous Waste Regulation Section).

Results and Discussion

This study's original sampling scheme called for the establishment of a reference site (located upstream of the facility in the north fork of McCoy Creek) and test site (downstream of the groundwater contamination). However, upon arrival at the site, it was observed that McCoy Creek was virtually dry upstream of the facility, with only stagnant puddles present. These puddles were choked with iron/sulfur bacteria (see Habitat Assessment sheets in Appendix). Cursory examination indicated very few organisms present, and it was decided not to sample the puddles.

	Ashland Test Site
# Taxa	19
FI Index	4
EPT	3
NO2NO3 (mg/L)	0.54
TKN (mg/L)	0.32
TP (mg/L)	0.044
Conductivity	560
DO	6.5
pH	7.5
Temp	15.7

Table 1: Biological & Chemical Data

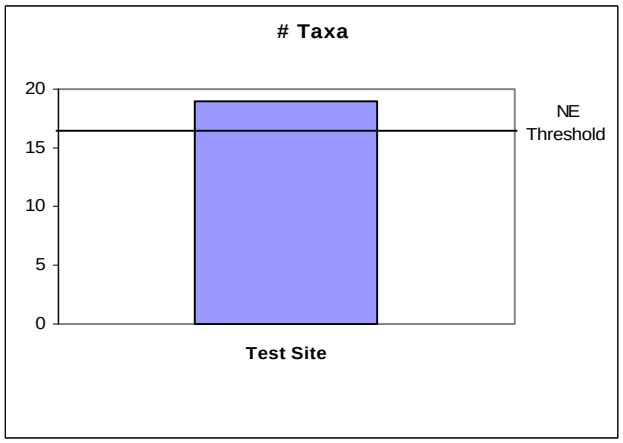
There was some flow in the north fork of McCoy Creek at the test site, although it scored in the "poor" category for water velocity (<0.05 m/sec). Overall habitat quality was at the bottom of the "suboptimal" category at the test site (74 points), due to minimal available habitat (less than 5%) and silt accumulation. The creek had been channelized in the past but had somewhat recovered, and bank stability was good (see Habitat Assessment sheets in Appendix).

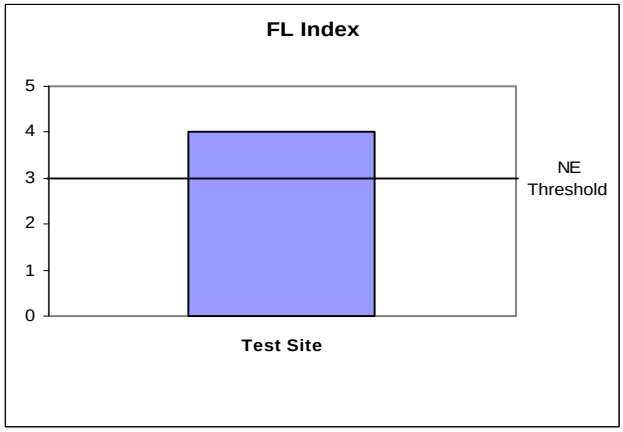
The pH (7.5 SU) and conductivity (560 mmho/cm) measurements at the test site were higher than expected, suggesting ionic inputs from some source (e.g., groundwater). The dissolved oxygen concentration (6.5 mg/L) was adequate to support aquatic life. (see Table 1). The nitrate-nitrite concentration (0.54 mg/L) exceeded the values found in 80 percent of other Florida streams, possibly related to groundwater inputs.

Bio-Recon is a screening tool, utilizing an abbreviated sampling strategy and a purposely limited taxonomic evaluation of the study system. EPT taxa and non-chironomid taxa that receive Florida Index points are emphasized. Bio-Recon appears to be useful in identifying streams where biological health is good. The method will also identify systems where the biota are suspected to be impaired, although more rigorous, follow-up sampling would be necessary to confirm the evaluation and determine the degree of impairment. Three measures of community health are calculated from Bio-Recon results (with minimum expected values for Northeastern Florida streams in parentheses): Recon taxa richness (17), Bio-Recon Florida Index (6), and Recon EPT Index (3). Note that the minimum threshold values for these metrics are considered interim, and may be modified as more data are gathered. Currently, if two out of three metrics achieve the minimum thresholds, the site is considered healthy (FDEP 1996b, #BA-29). If not, the site is suspected to be impaired. Future modifications of the Bio-recon interpretation scheme will probably include the provision that a site must pass all three metrics to be considered healthy.

These three metrics were calculated and are presented in Table 1. The test site surpassed the threshold for taxa richness (19) and equaled the threshold for Recon EPT Index (3). The test site Florida Index value (4), however failed to meet the threshold for the northeastern area of Florida, which is currently set at 6 Florida Index points Pollution sensitive taxa found at the test site included the odonate, *Argia tibialis*, and the caddisfly, *Cheumatopsyche* sp.

Considering the low flow and lack of habitat, the biological results were better than expected, suggesting the groundwater contamination was not having additional adverse effects on the stream biota.





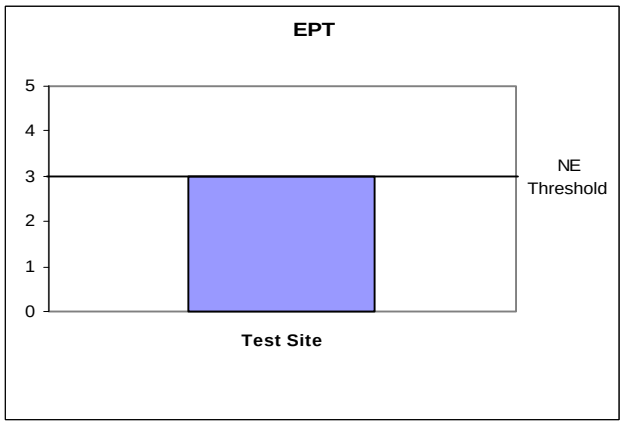


Figure 1: Selected

Conclusions

Benthic macroinvertebrate communities at this site marginally exceeded the expectations for the northeastern regions of Florida. Considering the low flow and lack of habitat, the biological results were better than expected, suggesting the groundwater contamination was not having additional adverse effects on the stream biota. The test site nitrate-nitrite concentration (0.54 mg/L) exceeded the values found in 80 percent of other Florida streams, possibly related to groundwater inputs.

Literature Cited

FDEP. 1996. Standard operating procedures for biological assessment. Fla. Dept. Environ. Prot. Biology Section. Unpaginated.

Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.