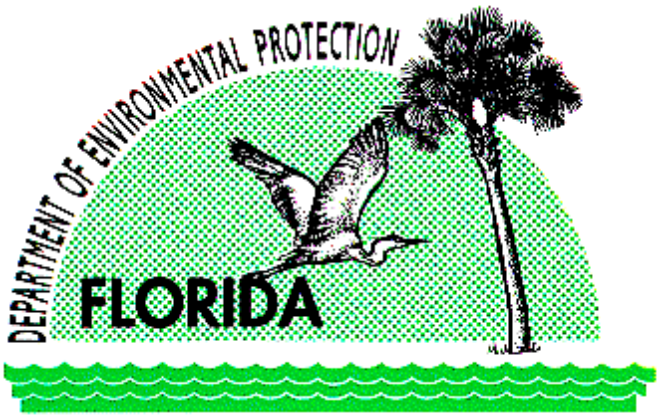


Biological Reconnaissance of

Trinity Industries (Plant #12)

Duval County

Sampled January 1998

March 1998

Bureau of Laboratories
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Ecological Study at Trinity Industries

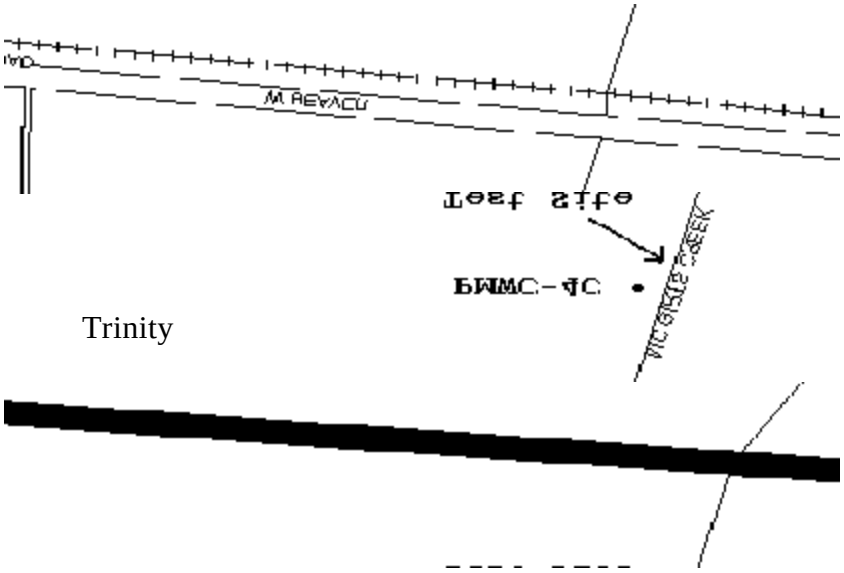


Figure 1: Test Site

Executive Summary

Department staff conducted an ecological study at Trinity Industries to determine potential adverse effects on an adjacent stream, McGirts Creek. The test site was established in McGirts Creek where the greatest possibility of contamination existed. Benthic macroinvertebrate communities at this site appeared healthy, exceeding the expectations for the peninsular and northeastern regions of Florida, for all three of the Bio-Recon metrics (taxa richness, the Florida Index, and the EPT Index). The volatile organic compounds detected in the monitoring well closest to the creek are either not reaching the stream or are diluted below problematic levels. In summary, the groundwater contaminants attributed to Trinity do not appear to be adversely affecting the biological health of McGirts Creek.

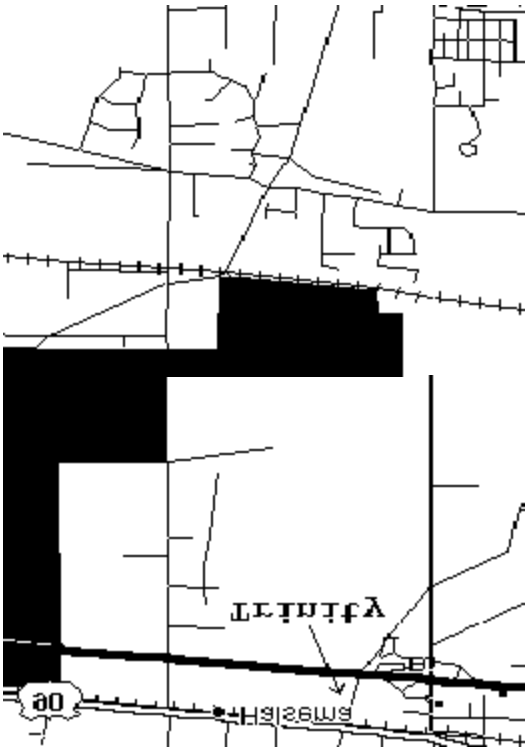


Figure 2: Overview of Area

Introduction

Trinity Industries (Plant #12) is located on U.S. Highway 90, Jacksonville, Duval County, Florida. This site functioned as a liquid propane gas tank (LPG) manufacturing facility from 1968 until 1990. Manufacture of the LPG tanks included spray painting the tanks in the final production processes, this required the use of large amounts of solvents to clean the metal in order for the paint to adhere to it. Volatile organic compounds (1,1-dichloroethene and 1,1-dichloroethane) have been detected in a ground water monitoring well (PMWC-10C) just west of McGirts Creek. The general direction of groundwater movement across the site is to the east and southeast, towards McGirts Creek. Given the flow of groundwater from the monitoring well toward the creek, there was concern that the volatile organic constituents were reaching the creek 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 McGirts Creek. With this goal in mind, a biological reconnaissance (Bio-Recon) was conducted on January 26, 1998.

Bio-Recon is a screening tool, designed to determine which systems are biologically healthy. Streams that fail the Bio-Recon are suspected to be impaired, and depending upon conditions at the site, follow-up, definitive sampling (using Hester-Dendys or Stream Condition Index methods) may be performed for further evaluation.

Methods

The focus of this investigation was to collect biological, habitat, and physical/chemical information from McGirts Creek at a test site down gradient from known areas of solvent contamination. Depending upon the biological results at the test site, an upstream reference site in McGirts Creek would also be sampled to determine the condition of the stream biota prior to contact with the potentially contaminated leachate. The benthic macroinvertebrate communities were evaluated by performing biological reconnaissance (Bio-Recon) at these sites (FDEP 1996, Biology Section Standard Operating Procedure #BA-29).

For Bio-Recon, invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, and roots) using four discrete dip net sweeps. The resulting samples were field sorted and brought back to the DEP 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 the 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.

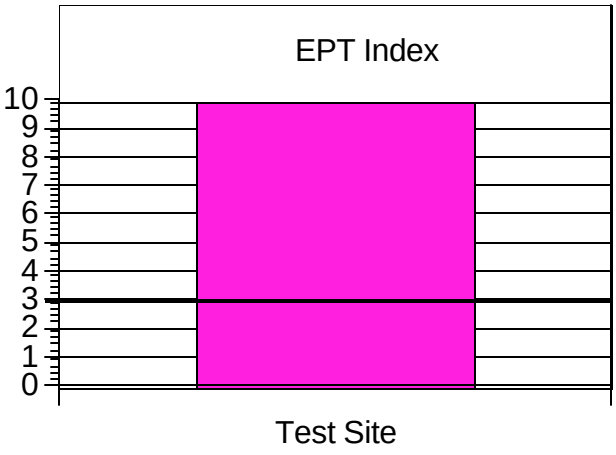
Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index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

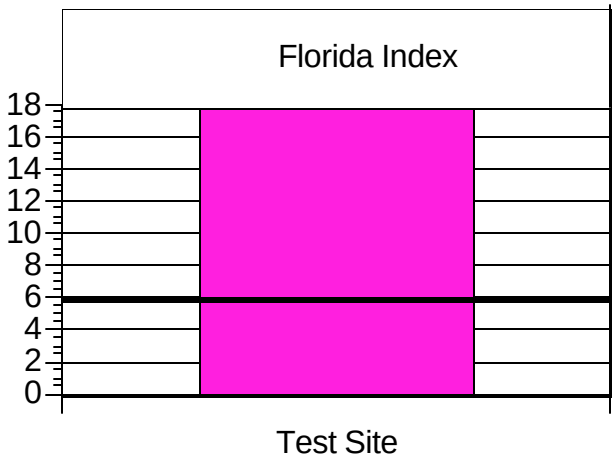
The following personnel were involved in this investigation: Russel Frydenborg, Rebecca Northup, Tom Frick (FDEP Bureau of Laboratories), and; Susan Bland, Camille Stein (FDEP Hazardous Waste Regulation Section). Taxanomic identification and chemical analysis were conducted by the DEP Central Laboratories' Biology and Chemistry Sections, respectively.

Results and Discussion

McGirts Creek has been obviously channelized, probably over 20 years ago, with spoil berms located approximately 5 to 10 m from the stream. At the test site sampling location, between US 90 and Interstate 10, extensive swamps are present on both sides of the stream. The test site was located downstream from a break in the spoil berm where swamp water above the contaminated monitoring well (PMW-10C) was entering McGirts Creek (Figure 1). Based upon the monitoring well data and these physical



conditions observed, the test site was established where the greatest possibility of contamination existed. Because the results at the test site exceeded the minimums for all indices for this region (see below), it was unnecessary to sample an upstream reference site.

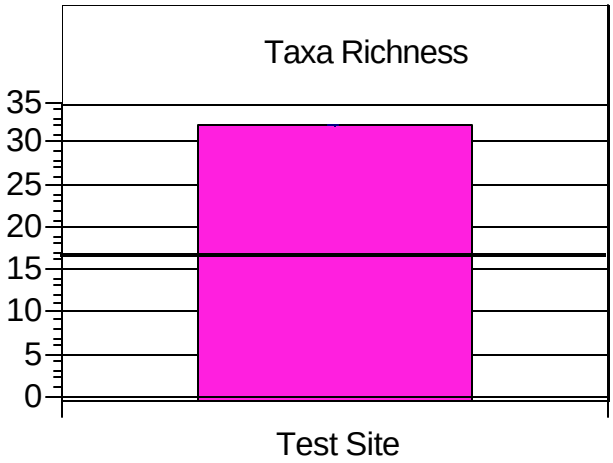


Habitat quality was in the "optimal" category at the test site (117 points). Although the site lost points in the category of artificial channelization, it scored well in the categories of water velocity, (lack of) habitat smothering, bank stability, riparian zone buffer width, and riparian zone vegetation quality. Suitable amounts of in-stream substrates were available for biological communities (see Habitat Assessment sheets in Appendix). The channelization of the stream had occurred many years ago, as evidence by the large trees (exceeding 0.5 m diameter at breast height) growing on top of the spoil berm. In several areas, the stream had developed a sinuous flow-way within the channelized cross section.

Water chemistry measurements were typical for a northeast Florida blackwater stream. The pH (5.9 SU) was slightly acidic (reflecting the tannic, swamp-fed condition of the stream), and the dissolved oxygen concentration (8.1 mg/L) was adequate to support aquatic life. Conductivity (65 µmho/cm) was fairly low, consistent with a swamp water source.

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 which receive Florida Index points are emphasized. Bio-Recon appears to be useful in identifying streams where biological health is good, although there is currently limited reference site Bio-Recon data in the northeastern portion of the State. 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.

A total of 32 taxa were found at the McGirts Creek test site. This taxa richness measurement exceeded the minimum expected value for all three regions of the State, including northeastern Florida (17), the peninsula (18), and the panhandle (24) (Figure 2). The Florida Index at the test site was 18, which was higher than the threshold for the northeast (6) and the peninsula (10). The McGirts Creek test site EPT Index was 10. Again, this value exceeded the minimum expected for the northeast (3) and the peninsula (6). As the Florida Index and EPT Index indicated, many pollution sensitive taxa were common at the test site. These included the odonates, *Argia* sp., *Boyeria* sp., and *Gomphus* sp., the coleopteran, *Ancyronyx variegatus*, the mayfly, *Stenacron floridense*, and the caddisflies, *Hydropsyche* sp., *Lype diversa*, *Triaenodes* sp., and *Phylocentropus* sp. Because the biological health of the test site was apparent during the Bio-recon sampling (indicating no adverse human effects), the upstream site in McGirts Creek was not sampled.



Conclusions

The Trinity test site was established in McGirts Creek where the greatest possibility of contamination existed. Benthic macroinvertebrate communities at this site appeared healthy, exceeding the expectations for the peninsular and northeastern regions of Florida, for all three of the Bio-Recon metrics (taxa richness, the Florida Index , and the EPT Index). The volatile organic compounds detected in the monitoring well closest to the creek are either not reaching the stream or are diluted below problematic levels.

In summary, the groundwater contaminants attributed to Trinity do not appear to be adversely affecting the biological health of McGirts Creek.

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.