

## Scope of Work for Cave Sink Dye Trace

### Background

An initial dye trace was performed from the cave sink at Neal's Landfill and was detected in Conard's Branch at the culvert crossing. Two milliliters of 50% Fluorescein solution was introduced into the cave sink on 9-17-04 at 1200 hours. The flow was about 28 gpm. The initial detection occurred at 1500 hours in the Conard's Branch station. Another sampler was placed downstream of North Spring in Conard's Branch. No dye was detected at that sampler. It is assumed that most, if not all of the North Spring waters were captured and treated at the treatment plant and that there was little bypass during that test because flows were at drought stage. The EXCEL file with that data is attached.

### Project Goals

The goal of this test is to determine if the excavated cave stream is the source of PCBs in the water that is collected for treatment at North Spring and in waters that enter the stream near North Spring from the stream banks (North Spring bypass flows). If this cave stream is the source of these PCBs, then the feasibility of pumping water at the cave sink directly into the treatment plant can be assessed with the goal of diminishing or eliminating PCB contamination of North Spring and flows which bypass collection near North Spring.

### Set up and Preparation

- Install auto samplers at North Spring and in Conard's Branch about half way between North Spring and the Conard Farm property line. Program the samplers for hourly samples if flows are between 100 and 250 into the treatment plant or half hourly if flows exceed 250 gpm.
- Schedule test for non-storm period when overflow springs are not running and there is little to no flow over the Conard's Branch weir and overall flows are in slow recession. Flow into the spring treatment system should be at least 100 gpm. No rain should occur during the sampling period.
- Prepare 5 ml aliquot of 50% Fluorescein solution
- Verify that the North Spring collection and pump station is working normally.

### Dye Test and Analysis

- Start auto samplers so at least 4 hours of background samples are taken before injection
- Measure the flow in Conard's Branch near the autosampler location with a velocity probe shortly before injecting dye. Note the condition of the plant discharge prior to measuring the flow. It is desirable to measure the stream flow before injecting dye and after sampling is complete. But both

of these measurements should be taken at the same time relative to plant discharge so that the measurements are directly comparable. For example, if the plant is discharging for 15 minutes with 30 minutes between discharges, then measuring the flow consistently right before the start of a discharge cycle would be consistent.

- Pour 5 ml aliquot of 50% Fluorescein solution into the flow at the downstream cave entrance.
- Collect samples and perform dye analysis with fluorometer
- Continue sampling until analysis indicates all dye has passed through all stations and levels have receded to background. If no dye is detected at either station, sample for a maximum of 24 hours.
- Measure the flow in Conard's Branch at the completion of sampling.
- Calculate the spring treatment system flows for the beginning and end of the sampling period.

### Fluorescein Results in Conard Branch (CBR)

2 ml of 50% Fluorescein solution introduced in sinkhole

pit 200' east of EPA-4A at 1200 hours 9-17-04

Second Sampler in Conard Br just north of North Spring (NCBR)

Date/Time	CBR FLR ppb	NCBR FLR ppb
9/17/2004 13:00	0.180	
9/17/2004 13:30	0.156	0.159
9/17/2004 14:00	0.152	0.338
9/17/2004 14:30	0.135	0.109
9/17/2004 15:00	0.675	0.113
9/17/2004 15:30	7.835	0.122
9/17/2004 16:00	24.350	0.143
9/17/2004 16:30	34.200	0.146
9/17/2004 17:00	31.620	0.074
9/17/2004 17:30	25.100	0.113
9/17/2004 18:00	17.260	0.119
9/17/2004 18:30	12.480	0.132
9/17/2004 19:00		0.062
9/17/2004 20:00		0.082
9/17/2004 21:00		0.086
9/17/2004 22:00		0.109
9/17/2004 23:00		0.070
9/18/2004 0:00		0.110
9/18/2004 1:00		0.129
9/18/2004 2:00		0.114
9/18/2004 3:00		0.087
9/18/2004 4:00		0.077
9/18/2004 5:00		0.059
9/18/2004 6:00		0.116