

GUIDELINES FOR MONITORING DISCHARGE INFORMATION ZONES

General Guidance:

Characterization of the Discharge Information Zone (DIZ) as required by ADEM Administrative Code 8-2-.12 should consist of measurements of basic physiochemical parameters of the water column, collecting sediment core samples for textural characterization and chemical analysis and collection, identification and enumeration of benthic infaunal organisms.

Seasonal Timing:

DIZ monitoring can be conducted as a discrete study over a relatively short period of time or as part of a facility's ongoing monitoring program. Because potential impacts to water quality and the benthic community are more pronounced during lower flow conditions and higher ambient water temperatures, the short-term DIZ studies should be conducted in the late Summer/early Fall months. Any variation from this timing must be justified and coordinated with the Department.

Numbers and Siting of Monitoring Stations:

The monitoring stations should be located at a distance of 400 feet and 800 feet from the existing or proposed discharge point. The arrangement of stations for open water estuarine locations should, at a minimum, consist of 2 concentric rings (more or less) around the discharge with a minimum of four equally spaced stations in each ring for a total of eight stations per DIZ.

For riverine environments, station transects should be established 800 feet and 400 feet upstream of the discharge and 400 feet and 800 feet downstream of the discharge. At each of the four transects, samples should be collected from two separate stations, one at approximately $\frac{1}{4}$ to $\frac{1}{3}$ of the stream width out from the right bank and another at approximately $\frac{1}{4}$ to $\frac{1}{3}$ of the stream width out from the left bank. Thus making for a minimum of four stations each upstream and downstream and eight stations total per DIZ.

These configurations are offered only as examples and may be modified, including a combination of the above arrangements, as physical conditions of the DIZ warrant.

Insitu Monitoring of Water Quality:

Measurements of water temperature, dissolved oxygen and conductivity should be performed *insitu* at all stations. These parameters should be measured near the surface (approx. 1 ft.), at mid-depth and near the bottom. Dissolved oxygen should also be measured at the 5 ft depth in the water column for any station over 10 ft total depth. Water clarity should be determined *insitu* at each station by means of a secchi disk,

submersible transmissiometer or other approved device. In waters where conductivity exceeds 1000 micromhos per cm, salinity (in parts per thousand) should also be reported.

Benthic Infaunal Monitoring:

Bottom samples should be collected from each station. Collection of samples should be performed with a standard 9-inch by 9-inch Ponar grab, box corer with at least a 6-inch by 6-inch box or a standard Shipek grab. Other similar collection equipment may be utilized upon approval by the Department. Replicate samples are to be collected at each station. The number of replicates to be collected for DIZ monitoring purposes should be sufficient to recover at least 75% of the number of benthic species present. This determination may be assisted by the utilization of data from previous surveys of similar, nearby habitats or in the absence of suitable data a brief initial survey of the benthic infauna might be necessary to determine the number of replicates required to accurately evaluate the benthic community.

All benthic samples should be washed and sieved through a 0.5mm mesh (No. 35) screen sieve, all material retained on the sieves promptly fixed in 10% formalin, and all macroinvertebrate organisms identified to the lowest practical identification level (LPIL) and preserved in 70% ethanol. All identified organisms should be enumerated and basic faunal characteristics calculated. These characteristics include diversity (Shannon-Weiner Index using log base 2), evenness (Pielou's Index using log base 2) and richness (Margalef's Index using log base 10). A voucher collection should be maintained and made available to the Department for quality assurance purposes.

Sediments:

Sediments should be collected at all stations and analyzed for texture (grain size) and chemistry. Sample collection should be accomplished with a standard core type sampler utilizing core tubes made of acetate, Teflon or other suitable polymer. A set of duplicate cores should be collected at each station for grain sizing and a separate set of duplicate cores collected for chemical analyses; a total of 4 cores per station. Only the top 5 cm (2 in)) of each core should be retained for analyses. Grain size distribution should be determined by ASTM method D422 and textural description reported using Folk's terminology (Folk, 1974).

Chemical analyses of sediments should, at a minimum, include determination of aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, tin and zinc. All sediment samples are to be subjected to a total digestion method in the manner described by Windom (1989). Additional analyses for other metals and organic compounds may be required where process wastewater or municipal sewage has the potential for containing metals and/or organics of concern, in particular, the priority pollutants listed on Form 2d-3 of a facility's NPDES permit application are to be considered for analysis.

Reporting:

Formal reports should be submitted to the Department within 90 days following sample collection. One copy is to be transmitted to the permit writer in Montgomery and one copy is to be sent to the Mobile Branch Office. When possible, reports should be submitted in both electronic and hardcopy format.

Reports should contain, at the minimum, the following:

1. Description of the study area including an illustration depicting the area and showing the locations of sampling stations.
2. Description of materials and methods.
3. All data, including benthic community indices, in tabular form.
4. A brief discussion of results.

Subsequent DIZ Monitoring:

Once an initial DIZ monitoring program or study has been established and a report submitted, subsequent DIZ monitoring efforts should be conducted in accordance with this initial plan. When possible, use the same sample methodologies, station locations and seasonal timing. This facilitates the comparison of data to establish status and trends in water quality and benthic communities over time.

References Cited:

Folk, R.L. 1974. Petrology of Sedimentary Rocks. Hemphill Publishing Company, Austin, Texas. 182 pp.

Windom, H.L.; R.G. Smith and C. Rawlinson. 1989. Particulate trace metal composition and flux across the Southeastern U.S. Continental Shelf. *Marine Chemistry*, 27:283-297.