CHAPTER I.

INTRODUCTION

Purpose, Scope, and Applicability

Georgia's ground water is a valuable, yet vulnerable, resource. It provides a high quality source of drinking water for 1.5 million Georgians. Ground water also contributes to the base flow of our streams and rivers. Land disposal systems if improperly designed, sited, or operated may contaminate ground water and surface water, making the water unfit for its many beneficial uses. A key part of the operation of any land treatment, storage, or disposal facility should be a monitoring program which is designed to assess the impact of the system on ground-water resources.

Water quality monitoring is required by the Georgia Environmental Protection Division (EPD) to detect and quantify contamination, as well as to measure the effectiveness of engineered disposal systems, and the effectiveness of corrective action for improperly sited or poorly operated sites. Authority to require monitoring is set forth in the Georgia Solid Waste Management Act and the Water Quality Control Act which mandate surveillance of waste handling and disposal practices to determine compliance with State standards and regulations.

This manual sets forth the Division guidelines for monitoring well construction, as well as sampling and analytical techniques. It is intended for use as a guide by all persons involved with the design and permitting of land treatment and disposal facilities. The manual is intended to be a dynamic document, reflecting changes with advancing technology, while maintaining the standards of proven techniques. As a guidance document, the methods and procedures layed out in this document are not mandatory. However, where alternative procedures are employed, their use and rationale for selection should be thoroughly documented and approved by EPD to insure compliance with applicable regulatory requirements and permit condition. Comments and suggestions from interested parties are always welcome and will be considered when revisions to the manual are made. If there are any questions concerning ground-water monitoring requirements, please call the Georgia Environmental Protection Division.

Quality Control

The emphasis of this manual is on expert technique in order to obtain an accurate picture of groundwater quality. Poorly constructed wells and careless sample collection and analysis can yield widely varying test results.

Quality control means that boring logs are complete and accurate, well screens are properly sized, gravel packs and seals are carefully placed between the walls of the boring and the casing, and the well is capped and locked for protection. Wells must be thoroughly developed to allow for the collection of sediment-free samples. Sampling equipment must be free of contaminants, and the sample collection and handling method should not alter

the chemical components of interest. Analyses should be conducted promptly, with proper attention given to laboratory quality control. Required laboratory quality assurance data should be submitted as part of the monitoring report.

Error may be introduced at each stage of the monitoring and it is the responsibility of all participants to keep this error to a minimum.

Objectives of Monitoring

The initial monitoring should focus on the area closest to the boundary of the waste management area to detect pollutants as soon as possible. In some cases, monitoring of the unsaturated zone (area above the water table) may be necessary to provide an early warning of disposal system failure.

Should the initial monitoring show contamination as defined in Chapter II of this manual, further monitoring will be necessary to determine extent and magnitude of the problem. This information will aid in the design a of a corrective action system to remedy the problem.

Monitoring should be thought of as a tool used to measure the efficiency of site design and location factors controlling water pollution. Continued monitoring is required after corrective measures have been taken to verify that water quality is improving.

The Two-Stage Monitoring Concept

Monitoring is a two-stage process. The first stage is the early detection of contamination. The second stage, known as the assessment phase, involves determining the magnitude, extent ,and potential impact of contamination. Contamination in this manual is defined as the presence of significantly elevated levels of a chemical parameter and/or a significant physical change in water quality caused by the activities of man. Limits will be set for each parameter at each site based upon background water quality.

In the initial stage the wells and other monitoring points should be located so that they detect contamination as early as possible, while observing standards of good practice and common sense. For example, monitoring wells at sanitary landfills should not pass through refuse or be placed in high-traffic areas, but they should be as close as possible to the outer downgradient edge of the waste. In most cases, the focus of this initial monitoring will be the unsaturated zone and the upper aquifers which are likely to be the first areas impacted.

If the site-specific concentration limits for a given chemical parameter are exceeded, the site operator or permittee should notify EPD of that fact and retest the apparently affected well to verify the results. The Division may also sample the well at that time.

Monitoring Network Design

Just as each site design must be individually engineered, so must its

monitoring network. The types of monitoring points used will vary by site and may include any combination of shallow wells, deep wells, lysimeters, well nests (or other multi-level sampling devices), and surface water points. The method will depend on results of the site's hydrogeologic investigation, engineered design criteria, and waste characteristics.

Shallow wells and lysimeters placed close to the waste will likely be the firstphase monitoring network at most sites. Deep wells, well nests, or multi-level samplers will be used to monitor water moving into deeper levels. Where surface water may be affected by the discharge of contaminated ground water, it should also be monitored.

The preferred drilling method is hollow stem auger, although it may be necessary to use other methods at greater depth. Split spoon samples should be taken at least every 5 feet and at every change in strata to a depth of 50 feet, and at every change in strata below 50 feet.

All test borings should extend to ground water, and ideally to the first confining bed encountered. Additional deeper borings may be required to adequately define the hydrogeologic setting.

At the completion of the field work, a land surface contour map and potentiometric surface maps should be prepared, including elevations referenced to the National Geodetic Vertical Datum (NGVD). The raw data upon which the potentiometric surface map was based (boring logs, measured water levels, etc.) should be attached. Care should be taken when comparing water elevation data from open boreholes, piezometers, and existing wells. Data from these various sources are not strictly comparable, and may lead to faulty conclusions. A narrative should also be prepared, describing the projected path and rate of contaminant movement and methods used to make those projections. Recharge and discharge areas should be defined, and vertical flow components described. Ground water models may be prepared, and for some sites, water-balance studies can also provide valuable information.