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Water Quality Monitoring Plan

INTERNATIONAL PAPER – RIEGELWOOD MILL
INDUSTRIAL LANDFILL
Permit Number 24-02

Prepared for:
International Paper – Riegelwood Mill
865 John L. Riegel Road
Riegelwood, North Carolina 28456

INTERNATIONAL PAPER

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WATER QUALITY MONITORING PLAN
INTERNATIONAL PAPER INDUSTRIAL LANDFILL
SITE PLAN APPLICATION
INTERNATIONAL PAPER RIEGELWOOD MILL
COLUMBUS COUNTY, NORTH CAROLINA

TABLE OF CONTENTS

WATER QUALITY MONITORING PLAN
INTERNATIONAL PAPER INDUSTRIAL LANDFILL
SITE PLAN APPLICATION
INTERNATIONAL PAPER RIEGELWOOD MILL
COLUMBUS COUNTY, NORTH CAROLINA

TABLE OF CONTENTS

TABLE

FIGURES

1.0 INTRODUCTION

This Water Quality Monitoring Plan (WQMP) was prepared in accordance with the North Carolina Solid Waste Management Rules (NCSWMR) Section .0504. This WQMP serves as the guidance document for collecting and analyzing groundwater samples, managing groundwater analytical results, and monitoring for any potential releases to the uppermost aquifer from the proposed International Paper Riegelwood Industrial (Captive) Landfill. This WQMP is submitted as part of an Industrial Landfill Permit to Construct Application for the facility. This WQMP complies with the Solid Waste Section memorandum for Construction and Demolition Landfills and Closed Sanitary Landfills for groundwater monitoring, and Rule .0602 for surface water monitoring. The necessary geologic and hydrogeologic characteristics of the proposed industrial landfill are discussed in **Section 4.0**.

2.0 SITE DESCRIPTION

International Paper has constructed a lateral expansion landfill cell on mill property located north of the existing industrial landfill, Permit No. 24-02 at the Riegelwood Pulp and Paper Mill. The mill is located in the northeastern portion of Columbus County, North Carolina, approximately 20 miles northwest of Wilmington, North Carolina.

The proposed limits of the landfill are shown on **Figure 1**. The landfill cell is located adjacent to the existing sanitary landfill in an area previously covered by a wastewater treatment pond. The conceptual landfill footprint covers approximately 30 acres, and will be used for the disposal of industrial solid waste generated at the mill, and a limited amount of site generated construction and demolition waste. A detailed description of the wastes to be placed in the proposed Industrial Landfill is included in the **Permit to Construct Application (approved in December 2002)**.

3.0 SITE HYDROGEOLOGY

The following sections discuss the site hydrogeology and the associated elements that will have an impact on groundwater monitoring for the proposed Industrial Landfill. Additional detailed discussion is presented in the **Construction Permit Application**.

3.1 Site Hydrogeology

The uppermost aquifer beneath the proposed landfill is found in the residual overburden material consisting of the Penholoway Formation and more recent alluvium. The Penholoway Formation is largely a barrier and back barrier system 25 to 60 feet thick. The barrier sands are thin and are comprised mainly of quartz with less than 10 percent feldspar. Backbarrier deposits up to 45 feet thick underlie most of the formation surface. The base is typically a thin sediment zone consisting of shells, wood, and other vertebrate remains. Most of these sediments are interbedded clay, clayey sand, and sand. The Penholoway aquifer displays an average horizontal hydraulic conductivity of 4.65 E-5 foot per second (ft/s) beneath the site.

The Penholoway Formation is underlain by the Peedee Formation in the vicinity of the site. The Peedee Formation is considered to be the lower confining unit of the Penholoway aquifer. The Peedee Formation is predominantly a massive to thick-bedded, dark greenish to gray, slightly to very clayey sand with occasional mica and glauconite. The Peedee Formation increases in thickness from north to south; it is a few feet thick in north and western Columbus County and reaches several hundred feet thick in southern Columbus County. The Peedee Formation confining unit displays an average horizontal hydraulic conductivity of 3.4 E-8 ft/s beneath the site.

4.0 GROUNDWATER MONITORING NETWORK

The proposed monitoring wells will be located and constructed to yield groundwater samples representative of the conditions in the uppermost aquifer underlying the facility. Well placement, well construction methods, well development, and well abandonment procedures are discussed in the following sections.

4.1 Monitoring Network

The proposed monitoring network is displayed on **Figure 1**. The current network of six (6) monitoring wells (two upgradient and four downgradient) will be enhanced by the addition of two additional monitoring points including the underdrain collection system and the secondary containment liner system. Samples of water from these two points will be collected prior to waste placement (if water is available for sampling) to provide background information prior to waste placement in the cell.

Additional wells will not be installed downgradient of the cell at this time due to a ground water reversal caused by the underdrain system. Any wells installed downgradient of the cell would receive ground water flow from the adjacent treatment pond and not from underneath the landfill. Water level measurements in the treatment pond will be collected on a monthly basis to evaluate ground water flow pattern in this area. Should water elevations indicate that the originally proposed two (2) monitoring wells adjacent to the cell would receive ground water flow from under the cell for a period of more than six (6) months, the wells will be installed and added to the monitoring network.

The currently proposed network will consist of upgradient wells MW-1a and MW-1b, four (4) downgradient monitoring wells, the secondary containment liner system and the underdrain system. In the future, the two additional downgradient monitoring wells may be constructed if ground water levels indicate that these wells would actually monitor ground water discharging from underneath the cell. The monitoring network is listed in **Table 1**.

4.2 Installation and Maintenance of Groundwater Monitoring Network

All proposed monitoring wells will be drilled and constructed according to specifications for monitoring wells codified in 15A NCAC Subchapter 2C, Section .0100 and with the *Draft – North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities.* Boring and construction logs for the existing wells are presented in the **Permit to Construct Application**.

The proposed monitoring wells will be used and maintained in accordance with design specifications throughout the life of the monitoring program. Routine monitoring well maintenance will include inspection and correction/repair of, identification labels, cement pad condition, locking caps and locks, and access to the wells. Should it be determined that a background or compliance monitoring well no longer provide samples representative of the groundwater, the Solid Waste Section of the Division of Waste Management of the North Carolina Department of the Environment and Natural Resources (SWS) will be notified. International Paper will reevaluate the monitoring network, and recommendations will be made for modifying, rehabilitating, abandoning, or installing replacement or additional monitoring wells, as appropriate.

4.3 Groundwater Monitoring

The waste placed in the proposed Industrial Landfill will be generated from onsite ancillary operations and manufacturing processes (i.e., boiler ash, wood waste, primary sludge, secondary sludge, caustic plant wastes, construction and demolition waste from onsite activities, and sediment from various onsite tanks and ditches. The major constituents of the waste sludge are calcium, iron, magnesium, sulfate, and chloride, with barium, cobalt, chromium, copper, mercury, nickel, vanadium, and zinc also present. Currently, the site is monitored for the constituents listed in **Table 1**. This list includes 13 metals and indicator parameters, which are the only constituents expected to be associated with this waste stream. The results of the analysis of groundwater data will be submitted to the SWS semiannually.

5.0 GROUNDWATER MONITORING PROGRAM

5.1 Establishment of Background Data

Four independent groundwater samples will be collected from the groundwater monitoring network. At least one sample from every point on the ground water monitoring network will be taken before operations begin in the new cell. The remaining three samples may be taken during the first six months of operating in the new cell.

5.2 Evaluation of Groundwater Monitoring Data

After receipt of the semiannual results, groundwater concentrations from downgradient compliance wells will be evaluated and any exceedances of the NC 2L Drinking Water Standards will be reported to the SWS along with the laboratory certificates-of-analyses. Since the proposed landfill is a double-lined lateral expansion of an existing unlined landfill, this data will also be compared to leachate quality data and analytical data from samples collected from the leak detection system of the proposed landfill.

6.0 GROUNDWATER SAMPLE COLLECTION

The following section outlines procedures for obtaining and analyzing groundwater samples in accordance with the SWS draft document entitled, *Draft - North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities,* March 1995 (see Appendix IV. Details of well purging, sample withdrawal, and decontamination methods, as well as chain-of-custody procedures, are outlined below.

6.1 Sample Collection

6.1.1 Sample Frequency

The required groundwater monitoring constituents (**Table 2**) will be monitored semiannually during the life of the facility and during the post-closure period. Additionally, field parameters (pH, specific conductivity, and temperature) will be monitored semiannually during the life of the facility and during post-closure monitoring.

6.1.2 Static Water Elevations

The static water level and total well depth will be measured with an electronic water level indicator, to the nearest 0.01 foot, in each well prior to purging. Static water elevations will be calculated from depth-to-water measurements and top of casing elevations. A reference point will be marked on the top of casing of each well to ensure the same measuring point is used each time static water levels are measured. Reference elevations of the proposed wells will be obtained from a North Carolina registered land surveyor. Additionally, water elevations will be collected monthly from the treatment pond in the area immediately downgradient of the cell to evaluate local ground water flow patterns.

6.1.3 Well Evacuation

The groundwater monitoring wells will be evacuated using disposable Teflon® bailers. A separate, clean bailer will be used for each monitoring well during each sampling event. Prior to well evacuation, a clean pair of disposable nitrile gloves will be donned.

A low-yield well (one that is incapable of yielding three casing volumes within a reasonable time) will be purged so that water is removed from the bottom of the screened interval. Low-yield wells will be evacuated to dryness once. A high-yield well (one that is capable of yielding more than three casing volumes during purging) will be purged so as to minimize turbidity in the well.

A minimum of three casing volumes will be evacuated from the well prior to sampling. A well volume is defined as the water contained within the well casing and pore spaces of the surrounding filter pack. The well volume will be calculated using the following formulas:

$$V_{well} = V_c + V_p$$

where:

V_{well} = total well volume

V_c = volume in the well casing

V_p = volume in the pore space of the filter pack

$$V_c = (d_c^2/4) \times h_w \times 7.48 \text{ gallons per cubic foot (gal/ft}^3)$$

$$V_c = 0.163 \times h_w \text{ gallons (gal)}$$

where:

d_c = casing diameter in feet (d_c = 0.167 ft for a 2-inch diameter well)

h_w = height of the water column in feet (i.e., well depth minus depth to water)

$$V_p = 4 (d_f^2 - d_c^2) \times h_w{}^* \times 7.48 \text{ gal/ft}^3 \times 0.3$$

$$V_p = 0.391\ h_w{}^* \text{ gal}$$

where:

d_f = filter pack diameter in feet (d_f = 0.5 ft for a 2-inch diameter well)

$h_w{}^*$ = height of the water column in feet, but must <u>not</u> exceed filter pack length

0.3 = assumed porosity in the filter pack.

Field measurements of pH, conductivity, and temperature, using field-calibrated equipment, will be obtained prior to and after purging.

6.1.4 Sample Collection

Each well will be sampled with the disposable Teflon® bailer that is also used to evacuate the well. The bailer will be equipped with a check valve and bottom emptying device. The bailer will be lowered gently into the well to minimize the possibility of degassing the water. All equipment used for sampling will be handled in such a manner to ensure that the equipment remains decontaminated prior to use.

Clean, chemical-resistant latex gloves will be worn by sampling personnel. Measures will be taken to prevent surface soils, which could introduce contaminants into the well being sampled, from coming in contact with the purging and sampling equipment.

The upgradient background well will always be sampled first, followed by the downgradient wells. The order of sampling of the downgradient wells will be evaluated each sampling event to provide a sequence going from less contaminated to more contaminated based on previous analytical data. Samples will be collected as soon as the well recharges, or within 24 hours.

Field measurements of temperature, pH, and specific conductance will be during sample collection. Groundwater samples will be collected and containerized in the order of the volatilization sensitivity of the parameters described below.

- BOD, COD, TOX, TOC, TDS, Sulfate, Chloride, Fluoride Nitrate as NO3-N
- Total Metals (As, Ba, Cd, Cr, Cu, Fe, Pb, Mn Hg, Se, Ag, V, Zn)

Samples will be transferred directly from field sampling equipment into pre-preserved, laboratory-supplied containers.

6.1.5 Decontamination

As previously discussed, the facility monitoring wells will be evacuated using disposable Teflon® bailers. If conditions are such that non-dedicated equipment must be used, then prior to use and between wells, the equipment will be decontaminated using the following procedures.

When the target analytes are inorganic constituents, the equipment shall be cleaned with a phosphate-free detergent, rinsed with a dilute (0.1 N) hydrochloric or nitric acid, rinsed with potable or distilled water, and rinsed with distilled water. When the target analytes are organic constituents, the equipment shall be cleaned with a phosphate free-detergent, rinsed with potable or distilled water, rinsed with distilled water, rinsed with pesticide quality hexane or isopropanol (or similar solvent which is not a target analyte), and rinsed with distilled water. If the target analytes include both organic and inorganic constituents, the decontamination procedure for both inorganic and organic constituents shall be followed.

If conditions are such that the above decontamination procedures cannot be utilized, then a phosphate-free detergent wash and distilled water rinse procedure will be the acceptable alternative. The water level indicator shall be decontaminated between wells and after field sampling by washing with a phosphate-free detergent and rinsed with distilled water. Use of the acid/solvent decontamination procedures outlined above is not recommended for water level meters since they may damage the cable.

6.2 Sample Preservation and Handling

Upon containerizing groundwater samples, the samples will be packed into pre-chilled, ice-filled coolers and either hand-delivered or shipped overnight by a commercial carrier to the laboratory for analysis.

Sample preservation methods will be used to retard biological action and hydrolysis, as well to reduce sorption effects. These methods will include chemical preservation, cooling/refrigeration at 4° C, and protection from light.

6.3 Chain-of-Custody Program

The chain-of-custody program will allow for tracing sample possession and handling from the time of field collection through laboratory analysis. The chain-of-custody program includes sample labels, sample seal, field logbook, and chain-of-custody record.

6.3.1 Sample Labels

Legible labels sufficiently durable to remain legible when wet will contain the following information:

- Job and sample identification number;
- Monitoring well number or other location;
- Date and time of collection;
- Name of collector;
- Parameter to be analyzed; and
- Preservative, if applicable.

6.3.2 Sample Seals

The shipping container will be sealed to ensure that the samples have not been disturbed during transport to the laboratory. The tape is labeled with instructions to notify the shipper if the seal is broken prior to receipt at the laboratory. If the sample cannot be analyzed because of damage or disturbance, the damaged sample will be replaced during the same sampling quarter, whenever possible.

6.3.3 Field Log Book

The field log book will be completed with the following information from each sampling event:

- Identification of the well;
- Well depth;
- Static water level depth and measurement technique;
- Well yield - high or low;
- Purge volume (given in gallons or number of bailers);
- Time well was purged;
- Date and time of sample collection;
- Well sampling sequence;
- Types of sample containers used and sample identification numbers;
- Field analysis data and methods;
- Field observations during sampling event;
- Name of sample collector(s);
- Climatic conditions including air temperatures.

6.3.4 Chain-of-Custody Record

The chain-of-custody record is required to establish the documentation necessary to trace sample possession from time of collection to time of receipt by the laboratory. A chain-of-custody record will accompany each individual shipment. The record will contain the following information:

- Sample destination and transporter;
- Sample identification numbers;
- Signature of sample collector;
- Date and time of sample collection;
- Sample type;
- Identification of sample;
- Number of sample containers in shipping container;
- Parameters requested for analysis;
- Signature of person(s) involved in the chain of possession;
- Inclusive dates of possession; and
- Internal temperature of shipping container upon opening in laboratory (noted by the laboratory).

Chain-of-Custody control will be maintained from sampling through analysis to prevent tampering with analytical specimens. Chain-of-Custody control procedures for all samples will consist of the following:

1. Chain-of-Custody will originate at the laboratory with the shipment of prepared sample bottles and a sealed trip blank. Identical container kits will be shipped by express carrier to the sampler or site or picked up at the laboratory in sealed coolers.

2. Upon receipt of the sample kit, the sampler will inventory the container kit and check its consistency with number and types of containers indicated in the Chain-of-Custody forms and required for the sampling event.

3. Labels for individual sample containers will be completed in the field, indicating the site, time of sampling, date of sampling, sample location/well number, and preservation methods used for the sample.

4. Collected specimens will be placed in the iced coolers and will remain in the continuous possession of the field technician until shipment or transferal as provided by the Chain-of-Custody form has occurred. If the field technician can not maintain continuous possession, the coolers will be temporarily sealed and placed in a secured area.

5. Upon delivery to the laboratory, samples will be given laboratory sample numbers and recorded into a logbook indicating client, well number, and date and time of delivery. The laboratory director or his designee will sign the Chain-of-Custody control forms and formally receive the samples. The field technician, project manager and the laboratory director will work together to insure that proper refrigeration of the samples is maintained.

6. Copies of the complete Chain-of-Custody forms will be placed in the laboratory's analytical project file and attached to the laboratory analysis report upon completion.

Chain-of-Custody forms will be used to transfer direct deliveries from the sampler to the laboratory. A coded, express delivery shipping bill shall constitute the Chain-of Custody between the sampler and laboratory for overnight courier deliveries.

6.4 Field Quality Assurance and Quality Control Program

A field blank will be collected and analyzed during each sampling event to verify that the sample collection and handling processes have not affected the integrity of the field samples. The field blank will be prepared in the field from distilled water. One field blank will be prepared for each sampling event. Exposing water to the sampling environment and sampling equipment/media in the same manner in which groundwater samples are collected will generate the field blank. The laboratory will provide appropriate sample containers for collecting the field blank(s). The field blank will be subjected to the same analysis(es) as the groundwater samples. As with all other samples, the time of the field blank collection will be recorded so that the sampling sequence is documented. The field blank monitors for contamination from the sampling equipment/media, or from cross-contamination that might occur between samples and sample containers as they are opened and exposed to the sampling environment.

Concentration levels of any contaminants found in the field or trip blank will not be used to correct the groundwater data, but will be noted accordingly. Contaminants present in the field blank at concentrations within an order of magnitude of those observed in the corresponding groundwater samples may be cause for resampling. Note that uncontaminated wells would not be affected.

6.5 Laboratory Analysis

The ground and surface water parameters to be analyzed will be those specified in Table 1. These will include field indicators of water quality (pH, conductivity, temperature and turbidity) and selected purgeable organic as listed in Appendix I and Appendix II of 40 CFR.258 and 15 RCRA metals constituents (total metals analysis). All analytical methods are taken from Test Methods For Evaluating Solid Waste - Physical/Chemical Methods (SW-846) or Methods For the Chemical Analysis of Water and Wastes and will be consistent with DSWM's policies regarding analytical methods and PQLs. Analysis will be performed by a laboratory certified by the North Carolina DENR for the analyzed parameters.

Formal environmental laboratory Quality Assurance/Quality Control (QA/QC) procedures are to be utilized at all times. The owner/operator of the landfill is responsible for selecting a laboratory contractor and insuring that the laboratory is utilizing proper QA/QC procedures. The laboratory must have a QA/QC program based upon specific routine procedures outlined in a written laboratory Quality Assurance/Quality Control Manual. The QA/QC procedures listed in the manual shall provide the lab with the necessary assurances and documentation that accuracy and precision goals are achieved in all analytical determinations. Internal quality control checks shall be undertaken regularly by the lab to assess the precision and accuracy of analytical procedures.

During the course of the analyses, quality control data and sample data shall be reviewed by the laboratory manager to identify questionable data and determine if the necessary QA/QC requirements are being followed. If a portion of the lab work is subcontracted, it is the responsibility of the contracted laboratory to verify that all subcontracted work is completed by certified laboratories, using identical QA/QC procedures.

6.6 Documentation

The laboratory analytical results will be submitted to the SWS semiannually. Records of the background groundwater quality data, and all subsequent measurements, including all concentration measurements and the background values will be kept at the landfill, throughout the active life of the facility and the post-closure care period.

7.0 MONITORING OF LANDFILL LEACHATE COLLECTION SYSTEM

Since the landfill expansion is proposed over an area adjacent to the existing unlined landfill, and in an area that has historically been used as a water treatment pond, the proposed landfill will be constructed with a double-liner system. This system will allow for the collection and removal of leachate from the waste, and monitoring of any leakage from the uppermost liner. Any leachate found in the leak detection system will be removed and treated in the same manner as the leachate from the leachate collection system.

7.1 Monitoring of Leachate Collection System

The uppermost liner in the system will collect leachate from the waste. Leachate samples will be collected from this system on a semi-annual basis. These samples will be analyzed for the same constituents as the ground water monitoring samples. Samples from the leachate collection system will be used for comparison with ground water data to evaluate the levels of any constituents detected in the ground water data.

7.2 Monitoring of Secondary Collection System

Leachate collected in the secondary collection system will also be monitored. Samples will be collected on a semi-annual basis and will be analyzed for the same constituents listed for ground water monitoring (**Table 2**). Samples from the secondary collection system will be used for comparison with ground water data to evaluate the levels of any constituents detected in the ground water.

8.0 HYDROGEOLOGIC EVALUATION

After each sampling event, groundwater surface elevations will be evaluated to determine whether the requirements for locating the monitoring wells continue to be satisfied, and to determine the rate and direction of groundwater flow.

The direction of groundwater flow will be determined by comparing the groundwater surface elevations among the monitoring wells, and at least annually, constructing a groundwater surface contour map. The groundwater flow rate shall be determined using the following equation:

$$V = \frac{ik}{n_e}$$

where V = the groundwater flow rate (feet/day)

i = the hydraulic gradient, $\Delta h / \Delta l$ (foot/foot)

k = the hydraulic conductivity (feet/day)

n_e = the effective porosity of the host medium (unitless)

Δh = the change in groundwater elevation between two wells (feet)

Δl = the distance between the same two wells (feet)

If the evaluation shows that the groundwater monitoring system does not satisfy the requirements of the NCDWM, the monitoring system will be modified to comply with those regulations after obtaining approval from the SWS. Groundwater flow and velocity data will be reported to the SWS semiannually.

9.0 RECORD KEEPING AND REPORTING

9.1 Sampling Reports

Copies of all laboratory analytical data will be forwarded to the DWM within 45 calendar days of the sample collection date. The analytical data submitted will specify the date of sample collection, the sampling point identification and include a map of sampling locations. Should a significant concentration of contaminants be detected in ground and surface water, as defined in North Carolina Solid Waste Rules, Ground Water Quality Standards, or Surface Water Quality Standards, the owner/operator of the landfill shall notify the DWM and will place a notice in the landfill records as to which constituents were detected.

9.2 Well Abandonment/Rehabilitation

Should wells become irreversibly damaged or require rehabilitation, the DWM shall be notified. If monitoring wells and/or piezometers are damaged irreversibly they shall be abandoned under the direction of the DWM. The abandonment procedure in unconsolidated materials will consist of over-drilling and/or pulling the well casing and plugging the well with an impermeable, chemically inert sealant such as neat cement grout and/or bentonite clay. For bedrock well completions the abandonment will consist of plugging the interior well riser and screen with an impermeable neat cement grout and/or bentonite clay sealant.

9.3 Additional Well Installations

The data will be analyzed to verify the correct placement of wells and determine locations for future monitoring wells, if necessary. Any additional well installations will be carried out in accordance with DWM directives. If the potentiometric maps reveal that the depths, location, or number of wells is insufficient to monitor potential releases of solid waste constituents from the solid waste management area, new well locations and depths will be submitted to the DWM for approval.

All monitoring wells shall be installed under the supervision of a geologist or engineer who is registered in North Carolina and who will certify to the DWM that the installation complies with the North Carolina Regulations. Upon installation of future wells, the registered geologist or engineer will submit the documentation for each well within 30 days after well construction.

Table 1
Proposed Monitoring Point List
International Paper Mill
Industrial Landfill
Riegelwood, North Carolina

Groundwater Monitoring Points

Monitoring Wells	Location
MW-1a	Upgradient
MW-1b	Upgradient
MW-4a	Downgradient
MW-5a	Downgradient
MW-7a	Downgradient
MW-8a	Downgradient

Other Monitoring Points

Leachate Collection System	LC-1
Secondary Collection System	LC-2
Underdrain System	US-1

Samples will be collected Semi-annually and analyzed for the constituents listed in **Table 2**.

Table 2
Proposed Analyte List
International Paper Mill
Industrial Landfill
Riegelwood, North Carolina

Biological Oxygen Demand (BOD)

Chemical Oxygen Demand (COD)

Total Organic Halogens (TOX)

Total Organic Carbon (TOC)

Total Dissolved Solids (TDS),

Sulfate

Chloride

Fluoride

Nitrate as NO3-N

Total Arsenic

Total Barium

Total Cadmium

Total Chromium

Total Copper

Total Iron

Total Lead

Total Manganese

Total Mercury

Total Selenium

Total Silver

Total Vanadium

Total Zinc

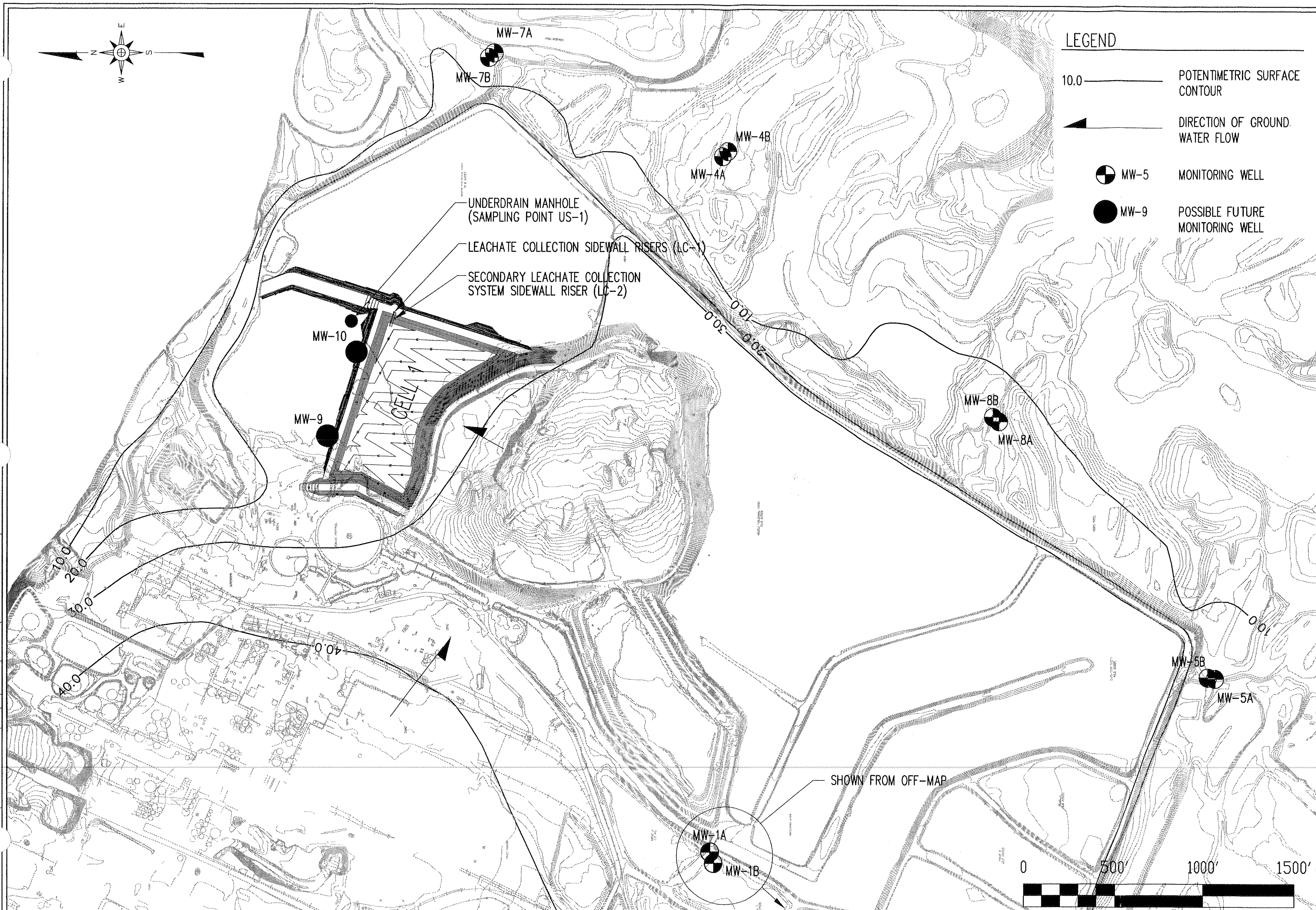

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FIGURE NO.	1
SCALE:	AS SHOWN
FILE NAME	JOYCE-B0029
CHECKED BY:	G.N.R.
PROJECT NO.	JOYCE-2
DRAWN BY:	C.T.J.
DATE:	JAN. 2004

TITLE: POTENTIOMETRIC SURFACE MAP WITH MONITORING WELL LOCATIONS

AD\International Paper\Joyce-2\Sheets\JOYCE-B0029.dwg DATE: JAN 004 TIME: 4:26 PM