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Interaction between Ground Water and Surface Water in the Northern Everglades and Relation to Water Budget and Mercury Cycling: Study Methods and Appendixes

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Prepared in Cooperation with the

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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Interaction between Ground Water and Surface Water in the Northern Everglades and Relation to Water Budgets and Mercury Cycling: Study Methods and Appendixes

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ABSTRACT

The data presented in this report are products of an investigation that quantified interactions between ground water and surface water at several study sites in the northern Everglades. Goals included identifying the major geologic controls and human alterations that affect interactions between ground water and surface water, and determining how those interactions affect mercury contamination. The primary study area was the 3,815-acre Everglades Nutrient Removal (ENR), a wetland constructed in the early 1990s as a prototype Stormwater Treatment Area (STA), to determine the effectiveness in removing excess nutrients from agricultural drainage. In order to ensure that results from ENR are broadly informative, work was also conducted in Water Conservation Area-2A (WCA-2A), a 105,000-acre basin surrounded by levees. In the past 50 years, WCA-2A has experienced extensive re-engineering of water flow, alterations in the pattern of water-level fluctuations and timing of fire frequency, as well as substantial ecological changes. The most visible ecological alteration is the change in dominance over the past 30 years from a sawgrass wetland to cattail wetland in the northeastern part of WCA-2A. The drastic change in vegetation in WCA-2A resulted at least in part from inputs of excess phosphorus from agricultural drainage.

Substantial data collection programs were already in progress in both ENR and WCA-2A when the present work began. The South Florida Water Management District (SFWMD) constructed the ENR project in 1994 to determine the effectiveness of constructed wetlands for water treatment. Measurements of surface water flow and water quality were made frequently in ENR between 1994 and 1998. Fewer ground water data were collected at ENR, and almost all of it was collected from shallow wells emplaced on perimeter levees. In contrast to the short-term nature of data collection in ENR, hydrologic and chemical data were collected over a much longer period in WCA-2A (since at least the mid-1970s), but the number of sites and data-collection frequency is much less. Very little prior ground water data were available in WCA-2A.

Given the availability of prior information, the present study emphasized the collection of ground water field data, particularly in the interior wetland areas of ENR and WCA-2A. New wells were emplaced to permit the geologic, hydraulic, and chemical sampling that was needed to characterize interactions between surface water and ground water. In particular, lithology and hydraulic properties of the Surficial aquifer were determined, ground water flow paths and velocities were delineated, hydrologic fluxes between surface water and ground water were measured, and water budgets and surface-subsurface fluxes of mercury were determined.

The purpose of this report is to compile under one cover all of the data collected in this investigation. In addition, the report contains a detailed description of the study methods and information about study sites, borehole drilling, well construction, seepage meter installation, and hydraulic and geochemical chemical sampling. Data interpretations are the subject of a companion report.

INTRODUCTION

Surface water levels and flows in the northern Everglades are managed extensively to accommodate a large and rapidly growing urban area along the Atlantic Coast of Florida, and to accommodate the Everglades Agricultural Area (EAA). The wetlands are divided into a series of very large artificial basins called Water by evapotranspiration or by recharge to ground water. Some of the recharge that occurs is important in replenishing ground water that will later be withdrawn for domestic use in well fields directly to the east of the Everglades. In some areas, recharge in the wetlands and canals may contribute to high water tables and seepage problems for housing developments that are located just east of the Everglades. During wet periods in South Florida, a large amount of surface water moves eastward through canals and discharges directly to the Atlantic Ocean.

Management of the wetlands for flood control and water supply has changed the character of flow in the northern Everglades. Concern has been growing for many years in South Florida over the long-term decreases in surface flow through the Everglades that actually reaches Everglades National Park, and the effects of diminishing flows and changes in the timing of water level fluctuations on bird populations and wildlife of the Park. Simultaneously, there has been increasing awareness of the deteriorating chemical quality of surface water in Water Conservation Areas and the resulting changes in the ecology of the Everglades. In the past ten years, these concerns have fueled wide-ranging debate on how to improve water management in the Everglades in a way that would restore a more equitable balance between natural ecosystem function and human use.

A plan for restoration of the Everglades developed by Federal and State interests is now in review at Congress. The overall goal of the twenty-year plan is to restore pre-development conditions of surface water flow, including the volume

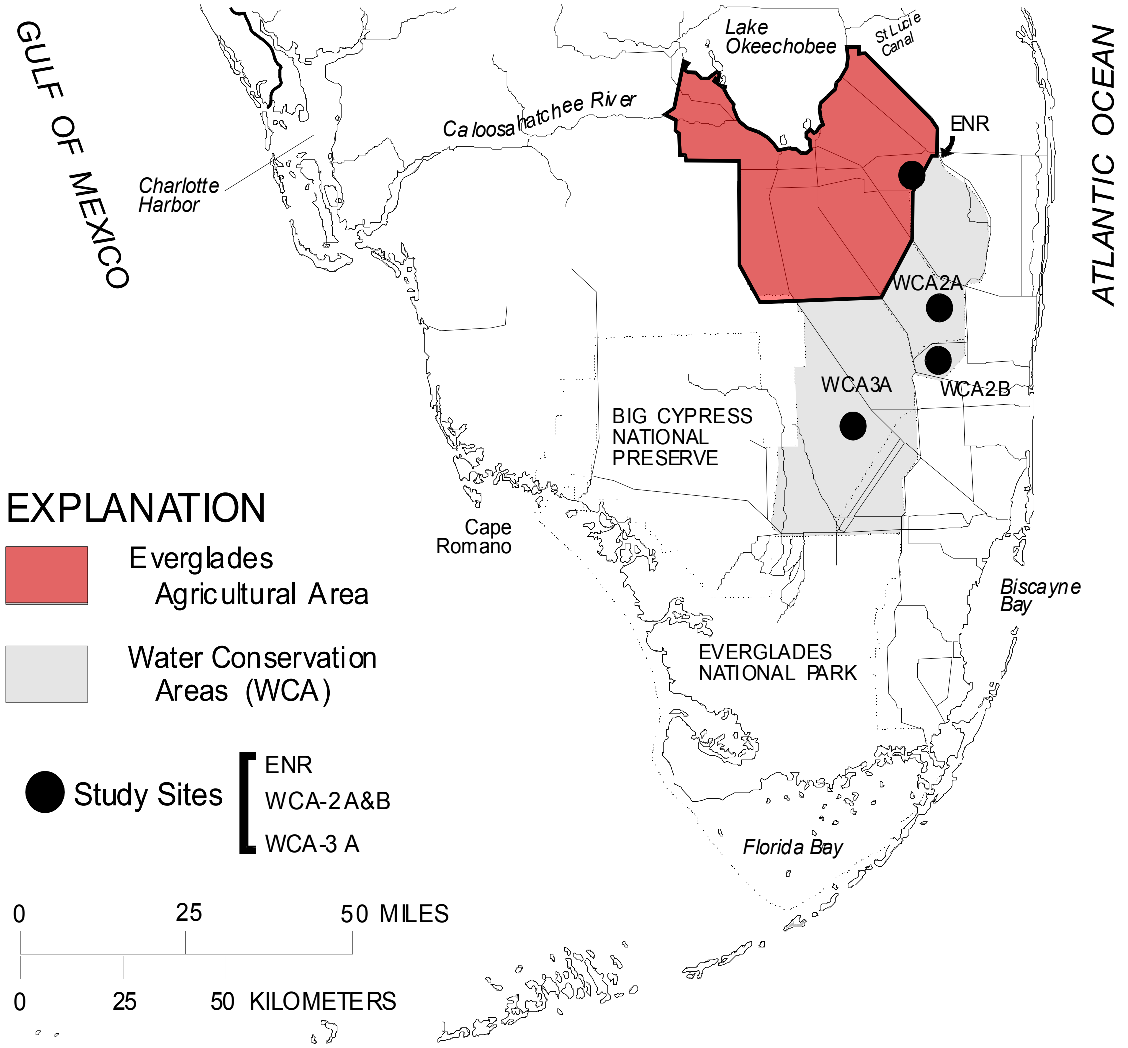

Figure 1. Map of South Florida showing general location of study areas.

of flow, depth of flow, and the duration of standing water. Restoration objectives also include reducing excessive inputs of dissolved and toxic forms of contaminants such as mercury, which have deleterious effects on biogeochemical processes and ecological characteristics in the Everglades (McPherson and Halley, 1996; South Florida Water Management District, 1995; Stober and others, 1996; Gerould and Higer, 1996).

For example, one of the major initiatives that is already underway with State financial backing is the rerouting of a significant proportion of surface water inflows to WCAs through Stormwater Treatment Areas (STAs) to remove excess nutrients before water enters the WCAs. Questions have arisen whether STAs, even if effective at removing nutrients, might at the same time play a role in mobilizing the most bioavailable and toxic forms of mercury.

Interactions between ground water and surface water could affect the fate of nutrients or mercury in at least two ways. First, surface-subsurface fluxes could just be a passive transport mechanism that stores contaminants in ground water or releases them back to surface water. Second, surface-subsurface exchange could interact with biogeochemical processes to enhance the transformation of nutrients or mercury during passage of contaminated water across the interface.

Evaluating the success of ongoing restoration efforts in the Everglades depends on reliable hydrologic and water–quality information, including a thorough understanding of the role of interactions between surface water and ground water. The U.S. Geological Survey (USGS) is providing information about interactions between surface water and ground water as part of a cooperative agreement with the South Florida Water Management District (SFWMD). The goals of the cooperative project were threefold;

(1) to quantify hydrologic fluxes between surface water and ground water in ENR and, if possible, in WCA-2A,

(2) to determine relative importance of geologic and anthropogenic factors in influencing interactions between ground water and surface water, and

(3) to use improved estimates of surface- and ground water exchange fluxes to improve the accuracy of hydrologic budgets and chemical mass balances for mercury in ENR.

PURPOSE AND SCOPE OF REPORT

The purpose of this report is to compile under one cover all of the data that were collected in this investigation. In addition, the report contains a detailed description of the study methods and information about study sites, borehole drilling, aquifer geology, well construction, seepage meter design, installation and operation , and results from hydraulic and geochemical chemical sampling in research wells. Data interpretations are the subject of a companion report. Together the reports constitute the final deliverables for a cooperative agreement between USGS and the South Florida Water Management District (SFWMD C-6661).

ACKNOWLEDGMENTS

Funding, logistical support, and the assistance of many scientists from the South Florida Water Management District were crucial to the success of this investigation. In particular, Larry Fink and his mercury research team provided invaluable assistance. Only through the involvement of Gene Shinn and his project personnel (USGS-St. Petersburg) was it possible to emplace wells in the wetland interior of WCA-2A. Additional funding from the U.S. Geological Survey Place-Based Studies Program is also gratefully acknowledged.

RESEARCH SITE INFORMATION

All of our research was conducted in one of the following areas of the northern Everglades (fig. 1); Everglades Nutrient Removal Area (ENR), Water Conservation Area 2A or 2B (WCA-2A or 2B), or in Water Conservation Area 3 (WCA-3). Measurements were made at 17 sites in ENR, 7 sites in WCA-2A, and one site each in WCA-2B and WCA-3A (figs. 1-3). Each wetland research site had two or more seepage meters to measure vertical water fluxes across the interface directly. Most of the sites (10 sites at the ENR and 7 sites at WCA-2A) also had one or more research wells emplaced in the limestone and sand aquifer beneath the Everglades, and a recording surface water level gage. Locations for individual research sites were chosen both to satisfy the need for broad spatial coverage, as well as to co-locate our activities with previous or ongoing ecological investigations.

The Surficial aquifer is composed of layers of variable thickness of sand, shell, and limestone. The Surficial aquifer is approximately 200 feet thick in the northern Everglades and overlies an aquitard called the Hawthorn Formation that restricts hydrologic exchange with the deeper Floridan aquifer. Hydraulic conductivity in the coastal portion of the Surficial aquifer is relatively high in the east and declines to the west. The marked decrease in hydraulic conductivity from east to west in Palm Beach County accompanies the geological change from high porosity limestones and coarse sands in the east to limestones with variable degrees of cementation and finer sands in the western part of the northern Everglades (Miller, 1987).

Everglades Nutrient Removal Project

The ENR project area is a constructed wetland (3,815 acres) that is relatively small compared to the Water Conservation Areas (which are generally over 100,000 acres). The ENR was built on agricultural land in 1994 to test the ability of a wetland (with controlled hydrology and managed aquatic and emergent wetland plants) to remove nutrients from agricultural drainage waters (fig. 2). The ENR project area is located on the western border of WCA-1, where water levels are maintained at relatively high elevations. To the west of the ENR is EAA, where ground water is drained and pumped away to maintain a low water table for agriculture. Guardo and Tomasello (1995) modeled surface-water hydrodynamics and calculated hydrologic residence times in the ENR project. Both discharge and recharge were expected to be important (Harvey, 1996), due to the step-change in hydraulic head over a distance of several miles across the ENR, from WCA-1 (where water levels are approximately 14 feet) to the EAA (where water levels are approximately 8 feet) (fig. 2). Abtew and Mullen (1997) developed initial estimates of net seepage in ENR as part of a project-wide water balance.

Previous ground water investigations within the ENR project were limited to geotechnical foundation investigations for levee and pump station footings (Burns and McDonell, 1991; Kimley Horn, 1996) and two studies of seepage under the levees (Hutcheon Engineers, 1996; Rohrer, 1999). The latter reports were the only prior

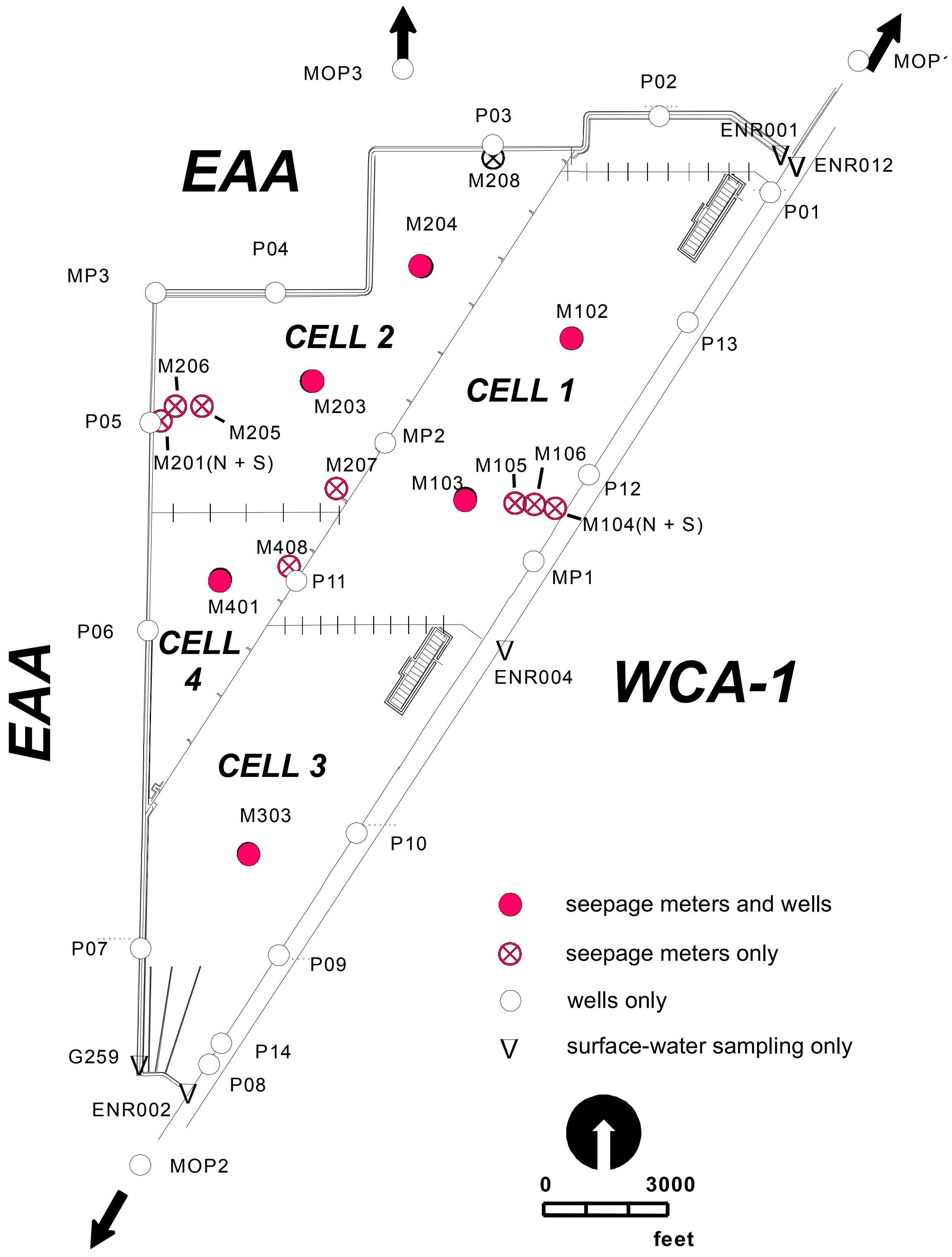

Figure 2. Site map of the Everglades Nutrient Removal (ENR) project.

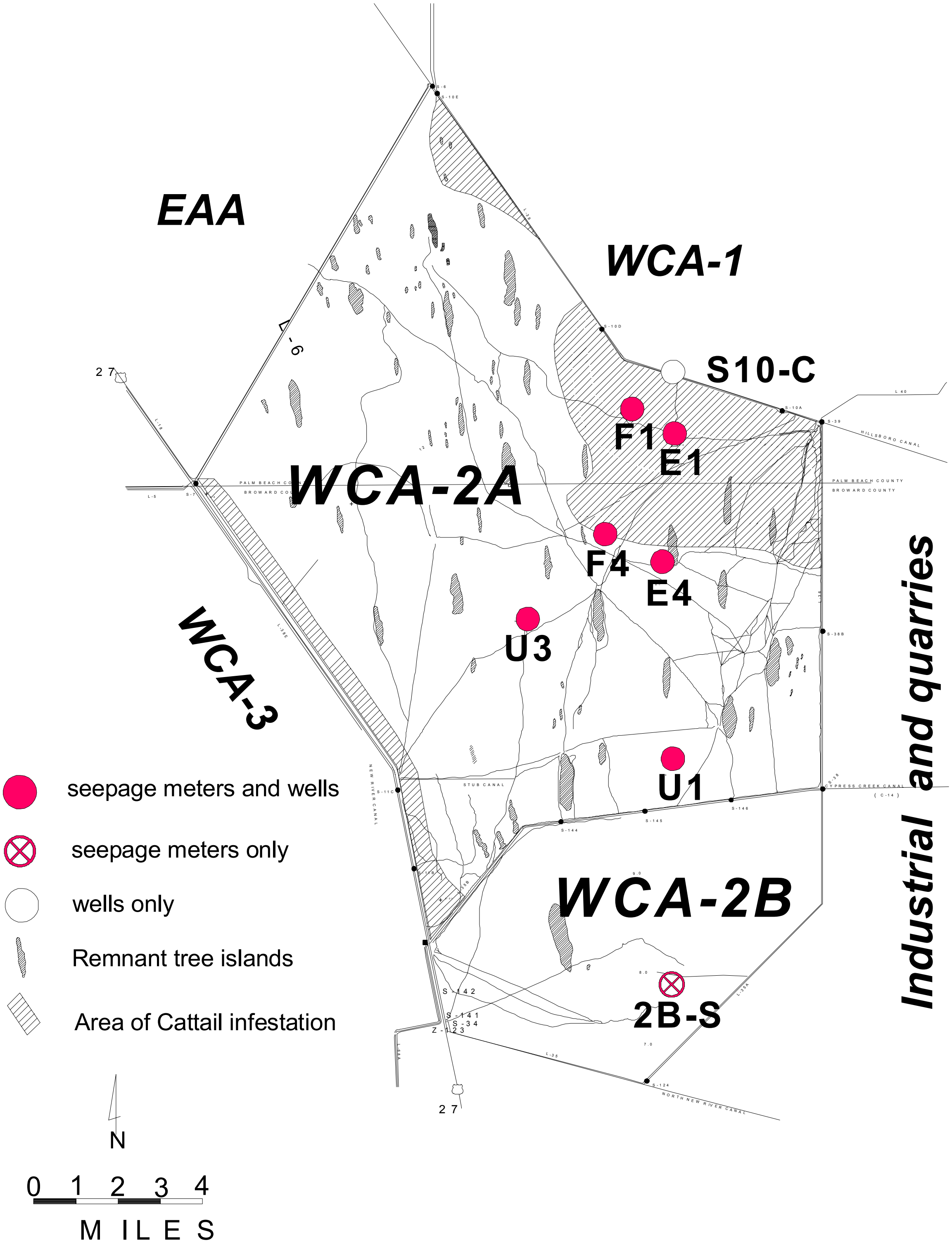

Figure 3. Site map of Water Conservation Area 2 (WCA-2).

investigations that involved ground water measurements at the ENR site.

Water Conservation Area 2A

WCA-2A is located to the south-southeast of ENR (fig. 3). Like ENR, WCA-2A shares a boundary with WCA-1 and is affected by the high water levels that are maintained in WCA-1. With its different location, the selection of WCA-2A helps represent natural variability in hydrogeologic properties of the Surficial aquifer. Unlike ENR, WCA-2 was never drained for long periods of time nor was it ditched, graded, or farmed. Whereas ENR was constructed only recently (1994), the first construction isolating WCA-2 began about 1920. WCA-2A was completely compartmentalized by levees and canals, including the split between WCA-2A and 2B, by 1963. WCA-2A has a history of ecological research (beginning in about 1975), documenting a transition from a sawgrass wetland to one affected by colonization of cattails. Estimating vertical fluxes between ground and surface water in WCA- 2A (105,000 acres) is particularly important because that area has experienced increased concentrations of nutrients over several decades rather than just a few years (Urban and others, 1993; Jensen and others, 1995). Investigations in WCA-2A therefore help represent the range of variability in wetland management in the northern Everglades.

Unlike ENR, where an attempt is being made to maintain relatively stable operating water levels, WCA-2A experiences large (up to four feet) fluctuations in water levels that last from weeks to months. Those fluctuations in water levels result in part from the operation of control structures and in part from natural processes such as rainfall and evapotranspiration. Another difference between WCA-2A and ENR is that, due to the large ratio of surface area to perimeter in the WCA-2A, the water balance in WCA-2A is less likely to be affected by ground water interactions with neighboring areas. Also, since WCA-2A was never farmed extensively like ENR, the hydrology in WCA-2A is not affected by blasting and excavation of extensive irrigation canals, nor is WCA-2A hydrology affected by peat shrinkage and oxidation, as is the case at ENR.

Sellards (1919) completed one of the first reports on Everglades geology based on a transect not far to the south of WCA-2A. Nealon (1983) updated the available geologic information in the vicinity of WCA-2A, but few hydrogeologic data are provided. Miller (1988) and Howie (1987) provided some of earliest detailed hydrogeologic interpretations in the northern Everglades, including some data collected within WCA-2A. A ten-year water balance for WCA-2A completed by SFWMD (1993) suggested that ground water recharge was occurring. Swayze (1988) undertook what was probably the first detailed investigation of seepage in WCA-2 as part of studies focused on the eastern side of WCA-2B.

STUDY METHODS

Location Surveys

All wells and horizontal measuring points were surveyed by global positioning (GPS). Vertical measuring points on land surface, staff gauges, and well tops were determined by leveling. The locations of measuring points are reported with reference to the North American Datum of 1927 (NAD 1927) and the National Geodetic Vertical Datum of 1929 (NGVD 1929). Those datums are the reference systems that describe positions with reference to the size and shape of the earth. Using the Army Corps of Engineers program Corpscon, horizontal coordinates were further transformed to Northings and Eastings in the state planar coordinate system.

Horizontal information was gathered by SFWMD or USGS personnel using the Trimble PRO XR GPS model number 16787-10 unit with the real-time beacon. SFWMD Surveying and Engineering Resources Division staff analyzed the data from the Trimble unit. First order precision is better than 1 in 500,000 and meets National Geodetic Survey standards. The accuracy of these coordinates is estimated as sub-meter. The vertical elevations determined by leveling were determined on the basis of second-order Class I benchmarks in ENR and at site S10C in WCA-2A. Vertical elevations at interior sites in WCA-2A were revised in 1999 by the Florida Department of Environmental Protection (SFWMD Contract 8324) using GPS methods.

Geological Sampling, Geophysical Logging and Monitoring Well Installation

Thirty-five monitoring wells were emplaced in the Surficial aquifer at depths ranging from 15 feet to 180 feet below the wetland sediment surface. Of those wells, eleven were drilled on levees surrounding ENR or WCA-2A. Levee drilling was a more efficient means to use full size drill rigs to obtain core material from the entire depth of the aquifer and to emplace the deep wells that were needed for hydrologic monitoring. Twenty-four monitoring wells were drilled at interior sites in the wetlands, which required the use of a portable tripod-drilling rig in WCA-2A and a specialized floating drilling barge in ENR.

To prevent cross contamination from soil/debris between drilling sites, all equipment was steam cleaned at a staging area located at least 2,000 feet away from the well drilling locations. The contractor was required to bring in city water via the drill rig or the support truck for all operations. The water tank was steam-cleaned prior to using it to haul the city water. The city water was tested for trace levels of mercury prior to any drilling activity. At no time was surface water used for any cleaning or drilling. The water used at the ENR was trucked in from the City of Wellington's Water Treatment Plant. The water used at the S-10C well cluster was from the City of Boca Raton's Water Treatment Plant.

The contractor steam cleaned (utilizing Alconox ^{TM} soap) the rig's major parts prior to starting any drilling efforts. In the case of the floating drill rig, the entire rig was steam-cleaned and checked for leaking hoses, oil drips, and attached debris. The drill rig components (augers, bits, drill rod, temporary and permanent casing) were steam cleaned between holes. All equipment was steam-cleaned on sawhorses, including the new riser and screens, prior to installation of the well into the borehole. If the sites were located in the water, the steam-cleaned items were wrapped in plastic to be transported to the site via airboat. During the installation of the wells, all personnel wore disposable gloves to prevent contamination. Steam cleaning was not conducted as part of the drilling operations at water sites in WCA-2A.

Boreholes were drilled and monitoring wells emplaced on levees by the primary contractor, GFA International Inc. of Boca Raton, Florida (under Contract C-7679), and by a sub-contractor, Amdrill Inc. of Orlando, Florida. All boreholes wells were drilled using the mud-rotary drilling method. A desander was used at each site, and drilling mud weight was maintained at 8.5 to 9.0 lbs./gal. The eight deep wells (greater than 95 feet below land surface) were installed first to allow geophysical logging to be completed. The geophysical logging allowed the onsite evaluation of lithological data and aided in the placement of screen intervals of the monitoring wells. The boreholes at these sites were geologically sampled using either Standard penetration Testing (SPT) and Standard Coring, or Wireline Coring.

Standard Penetration Testing and Standard Coring

The Standard Penetration Test (SPT) pilot hole for each well was drilled using a 2-15/16 inch tri-cone drill bit. Once the borehole was established, a split-spoon sample was taken from the bottom of the hole to two feet beyond. The bit was placed back into the hole and the hole was reamed to the bottom of the previous sample interval. Once the spoon was brought back to land surface, it was opened, the acrylic liner was removed and capped, and the percent recovery was noted in the field log. Samples were then marked with the top, bottom, date, borehole name, sample number and sample depth, and were placed in the truck to be taken back to the lab for future analysis. All spoons were washed between samples. A new liner was installed in the spoon and the process repeated until the total finished depth was reached. Split-spoon or Standard core samples were obtained for the entire length of the borehole. All Standard Penetration Tests (SPT) were performed in accordance with ASTM Standard D 1586-84 (ASTM, 1992). Core samples were collected in accordance with ASTM Standard D-2113-83 (ASTM, 1993). Coring rates (rate/time) were logged in the field and sample containers (i.e. core box) were marked in the standard fashion. Coring results were transferred to daily drilling sheets and used in compilation of final boring logs.

Once lithological sampling was completed with the 2-15/16 inch bit, the hole was circulated with drilling mud. The driller removed the 2-15/16 inch bit and then used a 7-7/8 inch diameter reaming bit. Drilling mud weights were maintained at 8.5 to 9.0 lbs./gal during the reaming process. Upon completion of the reaming process, SFWMD staff conducted geophysical logging measurements.

Wireline Sampling and Coring

Drilling and coring methods with wireline equipment are similar to traditional coring methods except that the outer portion of the core barrel remains downhole while the inner portion of the tool is released and hoisted to land surface via the “wireline” with the geological sample. The inner barrel is placed on a set of sawhorses, the bottom shoe is removed, the upper retainer is removed, then the casing is split into two halves revealing the acrylic liner. Both ends of the acrylic liners are capped, the acrylic liner is removed and the percent recovery noted in the field logs. Samples are then marked top, bottom, date, borehole name, sample number and sample depth below land surface and placed in the truck. The process is continued until the bottom of the hole is reached. There is no ASTM standard for wireline sampling. Wireline coring rates are recorded in a similar fashion to that of traditional coring work. The manufacturer’s recommendations of the Christensen sampler and those of Shuter and Teasdale (1989) were adhered to for all wireline sampling.

Geophysical Logging

Only the seven deepest boreholes (greater than 90 feet in depth) were selected for geophysical logging. Those wells were MP1-A, MP2-A, MP3-A, MOP1-A, MOP2-A, MOP3-A, and S10C-WA. Geophysical logging is an effective method of obtaining a continuous record that can be interpreted to show the physical properties of the subsurface formations and fluids (Bennett, 1999; Lapham and others, 1997). Keys and MacGray (1990) list spontaneous potential, single point, and short normal logs as useful for lithological correlations and bed thickness and long normal and lateral for resistivity of the aquifer water. Caliper, natural gamma, neutron, and lateral logs were obtained. The geophysical tools used in this investigation had not been recently calibrated. For that reason, the geophysical curves are only useful as general indicators for continuity, similar deflection points, and formation resistance. For this study the geophysical logs were used to help interpret the lithology, including determination of paleo-water levels (natural gamma), and quantification of the permeability of the formation and resistivity of the formation water.

The resistivity logs and spontaneous potential logs require the borehole to be uncased and filled with conductive fluid (Lapham and others, 1997). The boreholes were reamed with the 7-7/8 inch drill bit. GFA, Inc. drillers circulated to total borehole depth with clean drilling fluid in preparation for logging. After the pilot holes were reamed and circulated, SFWMD staff logged the holes using SFWMD logging equipment manufactured by Mineral Logging Systems (Model 3500). The logging process was uneventful, except for difficulties at site MP2. A Florida Power and Light 500KV transmission line runs along the levee road and is less than 50 feet away from the wells at that location. The long-normal resistivity and lateral logs could not be completed there due to interference from the power line. The geophysical data were post processed utilizing Geologic Information System (V1.1) software by Geosys Inc. (1992).

Well Installation at ENR and S10-C Levee-Based Sites

The 2-inch diameter wells at ENR and S10-C consisted of a two-foot section of 0.010-inch PVC screen, and ten and five-foot sections 2-inch PVC riser pipe. Disposable gloves were worn by drilling personnel, while the well materials were washed, constructed, and emplaced. Centralizers were placed on each well at 20 foot intervals to assure the well would remain relatively straight within the borehole and to assure a good cement seal in the annular space.

Using a tremie pipe (which allows the pumping/washing of material from land surface to the bottom of the borehole), a 6/20 gravel pack was installed from the bottom of the borehole to a level of about two feet above the top of the well screen. Again using a tremie pipe, a bentonite slurry seal was pumped on top of the sand pack (1-to-2 feet thick) to prevent migration of the cement into the sand pack during the cementing operations. Following that, five-percent bentonite-cement slurry (mixed onsite) was pumped into the annular space until the grout was visible from land surface. Each well was completed and sealed at the surface with a cement pad approximately two-foot square, sloping slightly away from the well, and a cover was installed on the well opening.

Well Installation at ENR Wetland-Interior Sites

Wells and piezometers at the six interior ENR sites were installed by Amdrill, Inc., under contract to GFA International, using a floating drilling barge. All samples were collected by the wireline coring method. Previous work done in this area had indicated that the drilling would primarily be through limestone. The wireline coring method was selected because it is faster and it captures more rock samples compared to standard coring practices.

A Christensen (Model CP) 94-mm wireline rig was used with multiple catcher types (i.e. soft, medium, and hard catchers). The 94-mm coring barrel acted as the pilot hole. The catcher was used to secure the core samples within the barrel. The maximum length of a sample was five feet. A soft catcher was used for sand and unconsolidated sediments (softer limestone); a hard catcher was used for more competent material such as limestone. These pilot holes were then reamed using a 7-7/8 inch diameter drill bit.

These sites were constructed as dual-completion monitor wells in the boreholes in the following manner: a two-inch diameter well was installed consisting of a two-foot section of 0.010-inch PVC screen and five-foot sections of 2-inch riser PVC pipe. A 0.75-inch diameter piezometer was installed in the same borehole, consisting of a one-foot section of 0.010 PVC screen and five-foot sections of PVC pipe. The two-inch well was inserted first until the fifteen-foot below land surface mark was reached. At that time, the 0.75-inch inch piezometer was connected alongside the two-inch pipe with two stainless steel hose clamps and a centering block. From that point, the two wells were installed simultaneously up to land surface. One centralizing block was placed every five feet for the remaining distance until land surface was reached. Centralizers were included at 20-foot intervals on the two-inch pipe to assure the wells and piezometers would remain relatively straight. Disposable gloves were worn by drilling personnel while the well was washed, constructed, and emplaced.

Using a tremie pipe, a 6/20 gravel pack was installed to a level about two feet above the top of the well screen. Again using a tremie pipe, a bentonite seal was placed on top of the sand pack and a five-percent bentonite-cement slurry (mixed onsite) was poured into annular space until the level of the 0.75-inch piezometer was reached. After a sand pack was installed to about 1-foot above the top of the 0.75-inch piezometer screen, a bentonite seal was emplaced, and then grout was added until visible from land surface. Then a 12-foot by 8-inch PVC protective housing was driven into the ground (surrounding the well) by the drill rig until the top of the PVC pipe was slightly below ground surface. Two ½- inch diameter drain holes were placed 180 degrees apart and the protective housing was filled with grout to a point no less than four inches below the dock surface.

Well Installation at WCA-2A Wetland-Interior Sites

Wells at the six interior WCA-2A sites were installed by USGS staff utilizing their portable tripod drill rig with rotary coring capabilities (Shinn, 1984). Surface water was used as the drilling fluid for this operation, and it was pumped down the annular space via hydraulic pumps. No drilling muds were used at the WCA-2A sites. The diameter of the wells was limited to 1.5 inches due to the lightweight and exploratory nature of the drilling operation, which lacked the capacity for standard drilling mud pits, larger drilling bits, or fluid circulating pumps. The depth of drilling under these conditions was limited by running sands that flowed into the borehole. This type of drilling method is ordinarily used for exploratory type wells rather than conventional monitoring wells. Drilling locations were remote (airboat transportation only), which precluded steam cleaning. Biodegradable seed oil was used in the drill rig hydraulic system to prevent contamination of the environment in case of leaks.

The boreholes were drilled and monitor wells installed utilizing standard casing advancement techniques. There was relatively little recirculation of the drilling fluid, so drilling was limited to the depth at which the volume of inflowing sand equaled the flushing capacity of the pumps. Coring was conducted for the full length of the borehole until the inflowing sand overcame the pumping capacity. Percent recovery of consolidated core was variable depending upon the sand content in the borehole. This method did not allow undisturbed sand samples to be collected.

Upon completion of the borehole, a 1.5 -inch diameter well was installed. The well consisted of a two-foot section of PVC screen and five-foot sections of PVC pipe. Centralizers were not used in these wells, and the limited annular space prevented the use of a tremie pipe to pour the sand pack. The sand pack was poured directly into the annular space to a level one-foot above the top of the well screen. Then the cement slurry (mixed on site using surface water) was poured into the annular space to the top of the muck layer. There was no bentonite slurry between the screen gravel pack and the cement.

Well Development

As soon as possible after well emplacement, wells were developed by pumping at high flow rates (10-20 gal/min) for one hour, or until all turbidity had cleared, whichever took longer. Drop hoses were manually lifted to create the surging conditions that help clear turbidity. Equipment and procedures used to develop wells were similar at all levee-based and wetland-interior sites. The exception was site MP3-A, where development was accomplished by air lifting with a compressor. A compressor with an oil and water separator was used to prevent contamination of the well

Lithological and Stratigraphic Analysis

Laboratory Analysis of Sand

Unconsolidated sediment samples were obtained from Split-spoon samples or Wireline samples at five sites in the ENR and at one site located at the S-10C site in WCA-2A. Split-spoon samples were acquired in two-foot sections, which generally provided excellent recovery of unconsolidated materials for sieve analysis. Sand samples were also obtained by Wireline sampling, but recovery problems often prevented two-foot spacing for those samples.

A small amount of unconsolidated sand material was extracted from the SPT liner and continuous cores at two-foot intervals for sieve analysis to identify different depositional environments within the aquifer. GFA International Inc. completed the sieve analyses for each unconsolidated sediment sample. The standard used for the sieve analysis was ASTM-D-422. The standard sieve numbers in this modified set were 10, 20, 30, 40, 50, 60, 80, 100 140, 170 and 200. A tabulated form provided by SFWMD to the contractor was used to record total weight of the sample, weight recovered per sieve, and total percentage recovered after drying. The sieved fraction smaller than a 200 sieve (75 µm) were analyzed by the hydrometer method as prescribed by ASTM standards. All dried and sieved fractions were placed in Ziploc freezer bags marked with the boring number, sample number, sieved fraction, and site location. The samples from each soil boring were boxed and returned to SFWMD.

The sieve results were entered and processed in an appropriate software package (gINT, 1997) to determine cumulative frequencies and to compute statistics such as D_{10}, D_{30}, and D_{60} values. The data were then used to compute the grain-size uniformity coefficient, $C_{u,}$ and the grain-size gradation coefficient, C_G (Kasenow, 1994). Final grain-size data charts and final boring logs were then delivered to SFWMD.

Limestone Core Analysis

All samples of limestone obtained from the coring and drilling operations were reviewed and checked for competence. Only samples collected from the six deep boreholes that were geophysically logged were considered for further analysis. Sixteen competent samples were sent to Core Laboratories Inc. in College Station, Texas for analysis. The samples were analyzed to determine the porosity and hydraulic conductivity of the selected limestones, percent (by weight) of potassium, concentration of uranium and thorium, and total gamma count. In addition, ultraviolet and natural light photographs were taken and thin sections prepared. (Sebian, 1999). Measurements of porosity and hydraulic conductivity are described in more detail below.

Analysis began with a core spectral gamma log of the core samples. Fluids were then removed from the samples by drying in a convection oven. Sample porosity was calculated using bulk volume and grain volume measurements. The grain volume was measured directly using Boyle's Law and the helium expansion method. Bulk volume was determined using caliper measurements and Archimedes Principle. Hydraulic conductivities were calculated in a several step process. A micropermeameter device using the steady state air cross flow methodology was used to determine air permeability vertically and in two horizontal directions. Air permeabilities were then transformed to water permeabilities using standard calculations (Sebian, 1999).

Fossil Identification

Dried and sieved sand fractions was returned to the SFWMD in Ziploc freezer bags marked with the boring number, sample number, sieved fraction and site location. Each soil boring was boxed. Each fraction of dry-sieved sand was sorted through to identify complete shells and or shell fragments. Each soil boring sample was assigned a Munsell color chart number (Munsell, 1994). Once the shells were separated out for each two-foot interval, a hydrogeologist identified them with the aid of a binocular microscope and the following references: Brayfield and Brayfield (1986), Morris (1973), and Olsson and Harbison (1979).

Hydrogeologic Properties of the Surficial Aquifer

Stratigraphic Layers within the Aquifer

During drilling operations, field geologists were able to divide hydrogeologic units with geological sampling devices (i.e. SPT, coring).

Once the geological sampling and geophysical logging were conducted on the deep boreholes, layering schemes were tentatively set in the field. This information was also supplemented by visual inspection of the sediments and cores. This information assisted in the placement of well screens. The tentative layering scheme was used until sieve analyses were completed on the unconsolidated sands. The sieve information was then applied against the tentative layering scheme to finalize the layering scheme and classification of depositional environments.

Hydraulic Conductivity Estimated from Grain-Size Analysis

Grain-size analysis is a cost-effective method of estimating hydraulic conductivity (Kasenow, 1994). A number of equations have been derived to estimated hydraulic conductivity from the results of sieve analysis (Kasenow, 1994; Alyamani and Sen, 1993; Vukovic and Soro, 1992). In general, the reliability of hydraulic conductivities estimated from grain size varies with mean grain size, grain-size variability, porosity, and characteristics of the grain surface, and also depends on which equation is used (Vukovic and Soro, 1992).

SFWMD staff utilized the software program MVASKF (Vukovic and Soro, 1992) to estimate the hydraulic conductivity of each sieve sample. This program uses ten equations and the grain-size statistics to calculate hydraulic conductivity. The ten values of hydraulic conductivity values were then arithmetically averaged to improve the reliability of the estimate. Some samples were naturally poorly sorted, which meant one or more of the equations could not be used. In those instances, the average K was based on the number of formulas actually used (Vukovic and Soro, 1992).

At each borehole depth-averaged estimates of hydraulic conductivity were computed for each layer in the aquifer using the sieve-based estimates of *K*. Both horizontal and vertical estimates of depth-average *K* were computed using the equations provided by Todd (1980).

Hydraulic Conductivity Estimated from Drawdown Tests

Hydraulic conductivity was also determined by field drawdown tests. Field tests have the advantage of averaging *K* over larger spatial scales, and well as providing estimates in limestone layers where computations based on grain size are impossible. Field drawdown tests were scheduled only after the wells had been fully developed and after at least one round of water quality sampling. Prior to initiating a field test the ground immediately surrounding the land-based wells was covered with plastic sheeting to protect the wells from surface debris. All equipment to be placed in the well (water level tape sensor, transducer, transducer cable, pipe/hose and check valves) was washed with a dilute mixture of Liquinox™ and tap water and rinsed with tap water prior to placement at each well.

The test method was the same at each site. First the water level was measured using an electric water level tape. A pressure transducer (In-Situ Model PTX-161, range of 30 psi, and polyurethane 40-foot cable) was then lowered in the well to a depth of about 20 feet from top of the casing. The transducer was then connected to a data logger (In-Situ Hermit 2000 Model SE2000 or Model SE1000B) using the polyurethane cable and programmed for the site. Prior to beginning each test, the water level in the well was allowed to recover after placement of the equipment in the monitoring well. The reference point was set to zero in the computer before the pumping began.

A centrifugal pump (Honda Model WB-15) was used to pump water from the wells. The pumping rate was adjusted to a rate that provided consistent drawdown. For most wells, the pumping rate ranged from approximately 10 to 12 gallons per minute (gpm). Maintaining stable drawdown was difficult for a number of wells; this appeared to be based on the rapid recovery rates, the length of hose from the water surface to the pump and the standard limitations of a centrifugal pump. This method did provide stable drawdown levels of five or more feet for the majority of wells, although some drawdowns were significantly less. When sufficient stability in drawdown was obtained, the data logger was activated and simultaneously the pump was turned off and the discharge valve closed to prevent surging. The water level was allowed to recover to ambient level (pre-pumping level) and the data logger deactivated.

Analysis of the data was done using an Excel spreadsheet program written by Paul Linton of the SFWMD. This program uses the calculations of Bouwer (1989) and Bouwer and Rice (1976) to analyze the drawdown tests for the condition of partially penetrating wells in an unconfined aquifer. For this analysis it was assumed that the porosity of the aquifer was 0.2 and the porosity of the gravel pack was 0.3.

After the initial analysis, we found that the rapid recovery occasionally generated data that could not be used to reliably estimate *K*. In those instances, we returned later to those sites with larger diameter drop pipes and hoses and completed additional tests at higher flow rates until satisfactory drawdown was achieved.

Water Levels, Hydraulic Gradients, and Ground Water Flow Velocities

The method and frequency of measuring water level varied with the type of site and the time of the measurement. Initially, the water levels in all wells and piezometers were measured manually at least monthly. An electric water level tape (Solinst model 15225 or similar equipment) was used for this purpose. As soon as possible, all 1.5-inch and 2-inch wells were instrumented with transducers (Design Analysis Model H310 -15 psi). An exception to this was site MOP3, where a significant potential for vandalism existed. Additionally, the surface water at all ENR and WCA-2A interior sites and sites MP3, MOP1, and S10C had surface water encoders and floats (Handar Model 436B). These water levels were read every 15 minutes by the transducers and encoders and recorded by a data logger (Campbell Scientific Model CR-10X). Data from WCA-2A sites was manually downloaded each month from the data loggers by an independent contractor. Data from the ENR sites was downloaded weekly via telemetry.

The downloaded data were received and processed by the SFWMD Data Management division using their standard data analysis programs. After standard QA/QC review of the data, the data were loaded into the SFWMD DBHydro database. Average daily water levels are reported in feet in the DBHydro database. Water levels in the 0.75-inch piezometers and other non-instrumented sites at ENR were measured manually on a monthly basis for the duration of the project. Those data are maintained by the project manager.

Hydraulic Gradients and Flow Velocities

Hydraulic gradients were calculated in order to determine the magnitude and direction of driving forces that could influence flow across the interface between ground water and surface water. At each study site, vertical hydraulic gradients were calculated between all adjacent pairs of wells, and between each well and the wetland sediment surface. Vertical distances used in calculations were the distances between the top of each well screens or the ground surface respectively. Horizontal gradients were computed using wells with screens of similar elevations that lay on horizontal transects of interest. The Pythagorean theorem was used to calculate the horizontal distances involved from geographic coordinates. Daily average hydraulic heads were used for all computations.

Our initial studies in the ENR indicated the potential for vertical hydrologic exchange to vary seasonally and spatially (Harvey, 1996). To identify spatial variation, we computed vertical and horizontal hydraulic gradients and plotted them as functions of depth in the aquifer or horizontal position. To better identify temporal variation, hydraulic gradients were plotted as a function of time.

Horizontal velocities in the aquifer were characterized by calculating the solute velocity,

$$v_s = -K \frac{dh}{dx} \cdot \frac{1}{n}, \qquad [1]$$

where: v_s = solute velocity (feet/day),

K = hydraulic conductivity (feet/day),

dh/dx = hydraulic gradient (unitless), and

n = porosity (assumed 0.30).

Water-Quality Sampling

Spatial and seasonal variation of water chemistry is often informative about interactions between surface water and ground water. For this study, wells and surface water were sampled from September 1997 through June 1998. Samples were also obtained from WCA-2A sites during the summer of 1997. To assure accuracy and consistency in data collection, all sampling was conducted in compliance with the Comprehensive Quality Assurance Plan of SFWMD (1998a).

Collection of Ground Water and Surface Water Samples

All wells were purged of at least three borehole volumes of water, or until water quality parameters had stabilized, whichever took longer. To allow water quality parameters to be continually measured during purging, the discharge hose was attached to a flow-through chamber that was instrumented with YSI sensors (models 610 DM or 610D handheld units attached to 600XL sondes). The water-quality parameters included temperature (degrees centigrade), pH, specific conductivity (microSiemans), oxidation-reduction potential corrected for pH (millivolts), and dissolved oxygen (milligrams per liter).

Purging was accomplished with three different types of pumps. Each pump had advantages and constraints. The centrifugal pump (Honda Model WB-15) was operated at a slow rate (about 1 gpm) in order to maintain accurate dissolved oxygen (DO) levels. This slow rate had the problem of heating the water temperature several degrees, as well as greatly increasing the time needed to purge the deepest wells. The stainless steel submersible pump (Grunfos Model Redi-Flo II) required a minimum well diameter of two inches but could readily pump at 3 gpm. The peristaltic pump (GeoTech Model Geopump II) could be used in all wells but pumped at much lower rates (approximately 0.25 gpm).

All ground water and surface water samples were obtained using the peristaltic pump and sampling trains. The sampling trains were made of a four to six foot section of silicone tubing connected to a longer piece of 0.25 OD Teflon tubing, prepared and cleaned by Frontier Geosciences and shipped to the SFWMD in individually sealed plastic bags. The ground water sampling trains were placed in the wells to the maximum depth possible (based on length of the tubing). For surface water sampling the placement of the sampling trains varied based on the water level at the site. The sampling train at surface water sites was positioned at about half the depth of the water, and care was taken to keep the inlet well above flocculent sediments.

Sample Collection, Treatment, and Handling

All equipment that directly or indirectly contacted the water to be sampled was cleaned by scrubbing with Liquinox™, rinsing with tap water, dipping in an acid bath, and final rinsing with deionized water (DI). Sampling trains and bottles for mercury samples were cleaned by Frontier Geosciences in accordance with their published standards (Bloom, 1995).

Disposable sample bottles used were precleaned as necessary by the vendor to meet SFWMD CQAP standards. Bottles used for dissolved gases, water stable isotopes, sulfide, ^{34}S samples, or nutrients to be analyzed by USGS were precleaned or otherwise prepared by USGS according to the standard procedures of the appropriate USGS laboratory in Reston, Virginia.

Both filtered and unfiltered samples were obtained at each site. In accordance with SFWMD CompQAP guidelines (South Florida Water Management District, 1998a), samples were obtained in the following order:

- Unfiltered samples, requiring no preservation,
- Unfiltered samples, requiring preservation,
- Filtered samples, requiring no preservation,
- Filtered samples, requiring preservation,
- Mercury samples.

Sampling personnel put on clean gloves prior to collecting each sample. All sample bottles, except for water stable isotopes and sulfides, were rinsed with sample water three times before filling. After collecting the unfiltered samples a new QED 0.45 micron inline filter was placed on the sampling train while the pump was turned down to a lower speed setting. The speed was lowered to prevent surging that could disturb sediments at the bottom of the well or at the bottom of the surface-water column. The remaining bottles were then filled.

The mercury samples were all obtained using standard ultraclean sampling procedures. Briefly, this technique requires two samplers - one designated as clean hands (CH) and the other as dirty hands (DH). CH touches only surfaces that are clean, such as new gloves, new plastic bags, or surfaces that were cleaned in an ultra-trace mercury facility. The bottles were rinsed and filled according to the procedures, taking care to both protect the open bottle from airborne contaminants and to avoid breathing near the bottles. All of our mercury samples were filtered through the QED inline filters

Samples were preserved immediately after sampling. The TOC and DOC samples were preserved using 50% H_2SO_4. The cation samples were preserved with 50% HNO_3 to a pH level less than 2.0. Sulfide samples were preserved with zinc acetate. After preservation, the major ion, nutrient, and dissolved gas samples were placed in a cooler half to three-quarters filled with shaved ice. The bottles were immersed in the ice up to the bottom of their caps to maintain a temperature of 4°C. Mercury samples were kept out of the light.

Samples to be analyzed for major ions and nutrients by SFWMD were delivered to the SFWMD Analytical Laboratory in West Palm Beach on the day of sampling. On the few occasions when samples were collected on a Sunday, the samples were delivered early on Monday morning. Mercury samples were shipped to Frontier Geosciences at least every other day, but frequently on a daily basis. All nutrient samples were immediately placed in a freezer upon return from the field. Dissolved gas samples were stored in a refrigerator. All nutrient and dissolved gas samples to be analyzed in Reston, Va. were shipped overnight on ice the week after sampling was completed. The ^{34}S, sulfide, and water stable isotope samples were stored in an air-conditioned building for several weeks prior to shipping to Reston.

Rain Water Collection

Rain water samples were collected periodically and analyzed for water stable isotopes. To obtain samples, rain water was collected in 2 liter HDPE bottles that had been mounted to a pole or fence stake in a holder constructed of PVC pipe. Rain water was actually captured by falling on a funnel mounted above the bottle, and delivered to the bottle by a 0.5 inches diameter plastic tube that extended to the bottom of the bottle. Mineral oil was poured into the bottle to a depth of ¼-inch. Rain water flowed down the tube and under the mineral oil, which protected the accumulating water from evaporation. Sample collection frequency varied depending on the amount of rainfall in a given season, and on the time needed to fill the collection bottle at least half way. Collections were typically made every two months, with more frequent visits in the wet season and less frequent visits in the dry season. After a bottle was half full, it was removed from the site and the water carefully extracted from beneath the mineral oil by siphon. Water samples were siphoned directly into sample bottles and delivered by overnight mail to a USGS laboratory in Reston, Va.

Quantifying Vertical Hydrologic Exchange through Peat

Seepage meters originally designed in the 1970's for use in the sandy sediments of lake shores (Lee, 1977), have proved to be a useful means of rapidly assessing vertical hydrologic exchange in lakes, estuaries, and rivers (Belanger and others, 1984; Shaw and others, 1990; Taniguchi and Fokuo, 1990). A seepage meter is an inverted funnel or cutoff drum inserted in the sediment and connected by a bulkhead fitting to a flexible collection bag that has been partially prefilled with water. A change in water volume over time in the collection bag of a seepage meter represents a seepage flux across the sediment interface. Despite wide use of seepage meters in a variety of environments, they have rarely been used in wetlands. Wetland sediments are fibrous and easily compressed, which makes meters difficult to install, and the sediments sometimes produce large amounts of gas. Surface water levels also vary rapidly in wetlands and may decline to a point where meters are inoperative. The performance of seepage meters has not previously been tested under these conditions.

Seepage Meter Design Considerations

For this project, seepage meters were constructed from ¼-inch high-density polyethylene sheets. They were shaped in a circular ring 30 inches in diameter with a 1-foot wall, and with a conical top attached. This design provides an approximately 80 percent larger contact area with sediment than the typical 55-gallon drum ends, while the conical top reduces the possibility of gas storage or flow obstruction above the sediment surface. The cost of our specially manufactured meters was approximately $100 per meter, which is ten times higher than the cost of a meter obtained by cutting off the end of a 55-gallon drum. Due to cost considerations, we later supplemented our stock of custom meters with the more economical variety.

In addition to meter design, the performance of seepage meters depends also on the meter-to-bag connectors, the bags used, the prefill amounts in the bag, and the method of bag deployment and retrieval. A laboratory and field study in Canada showed that prefilling the seepage bags with water was critical to accurate seepage measurements (Shaw and Prepas, 1989). Empty bags apparently exert a slight suction that pulls water from the meter as the bags slowly unfold. Prefilling seepage bags reduces the problem of anomalous short-term inflow to seepage bags and also allows exchange fluxes with the sediment in either direction (discharge and recharge) to be measured. We followed standard procedures of prefilling seepage bags to allow measurement of either water loss or gain and to avoid the problem of measuring anomalous inflows or outflows resulting from an almost empty or overly full bag, respectively. Our experience also indicated that a larger meter–to-bag connector than normally used was needed in wetlands so as not to restrict flow or allow blockage of the outlet by organic debris. We used connectors 3/4-inch in diameter. Clear plastic kitchen bags (turkey roasting size) worked well as seepage bags. Bags were deployed and retrieved from a raft so as not to disturb the sediment around the meters.

Adjustments for Operation During Changing Water Levels

At different water levels, seepage meters require adjustments to maintain performance. When seepage collection bags are completely underwater, any accumulation of gas in the bag has the potential of creating suction and anomalous inflow by stretching the bag upward toward the surface. It is our opinion that accuracy of measurements in wetlands is improved if the bag is deployed near the surface, which allows a more natural resting state of the bag with a lower bag surface -to -water volume ratio. To accommodate changing water levels, the height of seepage bags was adjusted by changing meter riser pipes -- the proper height kept most of the bag submerged but allowed gas that entered the bag to rest above the surface without stretching the bag. To facilitate the height adjustment of the seepage bag in the water column, our design incorporated a riser pipe from the meter to the seepage bag. The bag is attached to the riser pipe about 8 - 10 inches below the water surface (about 3/4 the length of the seepage bag) to minimize errors due to bag stretching.

Seepage Meter Installation in Compressible Wetland Sediments

Seepage meters are difficult to install in peat. The meter walls commonly cannot be pushed directly into undisturbed peat if coarse, undecomposed stems and roots are present. Use of a slim cutting tool to make a vertical slot through fibrous peat is sometimes necessary to make a slot for the wall to fit into snugly. Flocculent organic debris beneath the meter can sometimes create problems by blocking the outlet of the meter. Before installation, we removed coarse stems, roots, and very loose flocculent organic material from the wetland surface to prevent clogging of the meter or channeling of water along meter walls. Site preparation before meter installation has the added benefit of possibly reducing gas production in sediment beneath meters.

Another possible complication of using seepage meters in wetlands is compression or swelling of peat that may occur naturally or as a result of personnel standing on the peat while installing or operating the meters. We have no measurements or direct knowledge, however, of peat compression or swelling at our sites in the northern Everglades. Natural peat compression and dilation is expected in wetlands with mostly organic sediment if the water table falls significantly below the wetland surface (Nuttle and others, 1990). Natural compression and dilation is probably not a concern for operating seepage meters because seepage meter measurements are taken only when the wetland is flooded. Compression and dilation due to standing on the peat, however, may be a concern. We took the precaution of servicing meters from a rubber raft to minimize disturbance to sediment during operation of the meters. During installation of seepage meters, there is inevitably some compression of the peat. To be cautious, we allowed a relaxation time of several weeks after installation before collecting data.

Effect of Gas Ebullition from Sediments on Seepage Measurements

Gas produced in the sediment as a result of decomposition and its effect on seepage meter performance is not a problem unique to wetlands. Gas production is often reported even in sandy sediments. As long as gas is not stored in the meter, but instead moves into the bag, gas is usually presumed not to affect seepage measurements. By observing test meters in a swimming pool, we found that gas movement from the meter to the bag can pump water from the meter to the bag, possibly causing an overestimate of the ground water flux. At wetland sites, we often observed that the rate of gas production from the sediment declined over time after installation. There also appeared to be a seasonal pattern in gas production beneath meters, with the highest production occurring in summer and the lowest in winter following changes in water temperature. Actual errors in seepage meter measurements due to gas are difficult to quantify. Our best approach to the problem was to try to minimize it by removing the very soft flocculent peat from the wetland surface prior to emplacement of meters. This approach seemed to reduce gas production, possibly because the flocculent organic material is more labile and subject to faster degradation than the firmer peat beneath.

Estimating Limit of Detection and Uncertainty of Seepage Meter

Seepage meter errors and uncertainties have been evaluated both in laboratories and in sandy sediments at field sites other than wetlands.

Under controlled conditions in the laboratory, seepage meters were found to underestimate fluxes by 10-30%, due to the resistance of water flow along the walls and through the outlet of the meter (Belanger and Montgomery, 1992). For our study, we characterized the reliability of seepage meter measurements using six test meters to determine the limit of detection. To determine uncertainty, we submerged the test meters in the wetland on plywood sheets that sat on the bottom sediment. Spacers between the meter's lower edge and the plywood maintained a 1/4-inch separation that allowed exchange of water beneath the meter with the surface water column. The test meters were operated normally in the deployment and retrieval of bags. Under the foregoing conditions, any water exchange measured in seepage bags was caused by errors, such as water pumping by gas bubbles or small pressure differences on seepage bags caused by wind, waves, or currents. Three test meters were deployed at each of two sites, referred to as the northern and southern test sites. The two sites differed in water depth and in the degree of protection from wind and waves. The six meters were set up for measurements lasting between 1 and 26 days to test for a time–of-deployment effect. In addition to testing for temporal effects, the volume of prefill water in seepage bags was varied by a factor of three (2000, 4000, or 6000 milliliters) to test for a prefill effect. Results for 24 deployments of the test meters were summarized as the geometric mean of absolute values of 'apparent seepage'. The mean value represented our best estimate of the limit of detection in measuring actual seepage.

Site Selection, Seepage Meter Deployment, and Monitoring Schedule

Seepage meter data were collected from August 1996 to April 1997 at ENR (17 sites), WCA-2A (6 sites), WCA-2B (one site), and WCA-3A (one site). Most seepage meter sites at ENR and WCA-2A were located on transects parallel to the principal ground water flow direction (for example, sites M104, M106, M105, M103, M207, M205, M206, M201 at ENR; sites F1, F4, U3, E1, E4, and U1 at WCA-2A). A few other sites were selected at ENR to complete spatial coverage, and one site each was chosen in WCA-2B and WCA-3A in the interest of acquiring at least some limited information from those areas. Originally, two or more meters were installed at each site. Individual meters are identified as A, B, …C, etc. (e.g., ENR103-A). Over time, many of those meters were removed and then reinstalled a short distance away. By half way through the study period, almost all meters had been reinstalled. Reinstallation was needed to replace some meters with others of superior design. In other cases, the same meter was reinstalled lower in the water column so that measurements could be made at lower water levels. Fluxes that were computed from reinstalled meters were assigned the number 2 behind the site name (e.g. M103-A2) to distinguish those results from the original installations (e.g. M103-A).

The uncertainty (precision) of a seepage flux measurement was estimated by averaging two or more simultaneous measurements at a site. To represent uncertainty, a coefficient of variation was computed for each set of measurements by dividing the standard deviation of side-by-side measurements by the mean of those measurements. Coefficients of variation were then averaged over time for each site.

Estimating Vertical Hydraulic Conductivity of Wetland Peat

Hydraulic conductivity of the wetland peat was estimated by two methods. The first method (referred to as the Darcy-based technique) calculated *K* from Darcy's law on the basis of seepage meter flux measurements and a vertical hydraulic gradient measured in the peat. The second method determined hydraulic conductivity from bail tests in piezometers installed in the peat (also referred to as drawdown tests). Bail tests required a measurement of the equilibrium water level in the drivepoint, after which water was pumped out of the drivepoint and the rate of water-level recovery toward equilibrium measured. Hydraulic conductivity was calculated from recovery data using the approach outlined by Luthin and Kirkham (1949).

Drivepoint piezometers were constructed of stainless-steel (3/8 - inch OD) or PVC (ranging from ¾ -inch to 1 ¼ -inch OD), with screens near the tip ranging in length between 1 cm and 12.5 cm. Drivepoints were installed by pushing them into the sediment to various depths ranging between 1 foot and 3 feet below the peat surface. Piezometer screens were kept clear of sediment during emplacement in two ways. Surface water was pumped through the 3/8 - inch OD piezometers during installation. Then the direction of pumping was reversed and the piezometer developed for 20 minutes, or until the turbidity had cleared, whichever took longer. The larger diameter piezometers were covered with a narrow sleeve that was lifted far enough to expose the screen after piezometer installation. All piezometers were revisited on a later date to measure equilibrium water levels and to perform bail tests.

If hydraulic conductivity in peat is anisotropic (and we are uncertain about this), then the Darcy-based measurement technique would be more likely to estimate the vertical hydraulic conductivity and the bail test would be more likely to estimate the horizontal hydraulic conductivity.

Mass-Balance Modeling to Estimate Discharge and Recharge Fluxes

The water budget equations that apply to the surface water – ground water interaction at the ENR are presented here. Using the conceptual model of water flow in the ENR (fig. 4) and mass conservation, the governing water budget equation is,

$$\frac{dV}{dt} = \frac{V(t) - V(t-1)}{\Delta t}$$
$$= S_i + P + R_i + L_i + G_i - S_o - ET - R_o - G_o, \quad [2]$$

where S_i and G_i are the rates of surface water inflow and ground water discharge, respectively, S_o and G_o are the rates of surface water outflow and ground water recharge, respectively. P and ET are the rates of precipitation and evapotranspiration, respectively. V is the volume of water in the ENR at the present and previous time step, and t and Δt are time and time interval, respectively. There are also several measured fluxes that are unique to the ENR site that must be included in the balance. L_i is shallow seepage through the L-7 levee collected by a ditch and delivered by roadside culverts into ENR. In addition, R_i is the rate of surface water pumping to the ENR from the seepage canal to the ENR, and R_o is the rate of surface water outflow from the ENR to the seepage canal (R_o is almost always zero).

For our water balance we used four years of data (1994 - 1998) that was supplied to us by the South Florida Water Management District. The reader is refered to Abtew and Mullen (1997) for a complete description of hydrologic monitoring at ENR. For our study, all components of input and output (L^3/T) are averaged over two-week periods in order to consider both the hydrologic residence time of approximately 20 days in surface water (Guardo 1999), and time interval of chemical monitoring by South Florida Water Management District (14 days). We chose to use units of flow (hectare-meter/day) that were consistent with the data base of South Florida Water Management District (1 hectare-m/day = 0.116 meter^3/seccond). Using the 14-days averaged fluxes, equation [1] is rewritten as;

$$V(t) = V(t-1) +$$
$$\Delta t \cdot \left\{ \overline{S}_i + \overline{P} + \overline{R}_i + \overline{L}_i + \overline{G}_i - \overline{S}_o - \overline{ET} - \overline{R}_o - \overline{G}_o \right\}, \quad [3]$$

where Δt equals 14 days and the overbars denote 14-day averaged fluxes. Using equation [3], we can solve for the two unknowns (G_i and G_o) in terms of a net exchange between ENR surface water and ground water by substituting *V(t)-V(t-1)* by ΔV and rearranging [3] to yield;

$$\overline{G}_i - \overline{G}_o = \frac{\Delta V}{\Delta t} - \overline{S}_i - \overline{P} - \overline{R}_i - \overline{L}_i + \overline{S}_o + \overline{ET} + \overline{R}_o,$$

. [4]

Combined Water and Solute Mass Balance

In using only the surface-water budget balance data, we cannot take the further step of partitioning the net ground- water exchange (G_i - G_o) to solve for G_i and G_o individually. In order to solve for the two unknowns (G_i and G_o), we need a second mass balance equation, such as one for solute tracer. Using the same conceptual model for water fluxes in the ENR, the solute mass balance for a solute in surface water is

$$\begin{aligned}\frac{dM}{dt} &= \frac{V(t)C(t) - V(t-1)C(t-1)}{\Delta t} \\ &= \overline{S}_i \overline{C}_{S_i} + \overline{PC}_P + \overline{R}_i \overline{C}_{R_i} + \overline{L}_i \overline{C}_{L_i} + \overline{G}_i \overline{C}_{G_i} \\ &\quad - \overline{S}_o \overline{C}_{S_O} - \overline{R}_o \overline{C}_{R_O} - \overline{G}_o \overline{C}_{G_O},\end{aligned}$$

[5]

where:

M is the mass storage of the designated solute in the ENR,

C(t) is the area-averaged solute concentration in ENR surface water at time t,

$\overline{C}_{S_i}$ is the solute concentration in surface inflow from ENR supply canal,

$\overline{C}_P$ is the solute concentration in precipitation,

$\overline{C}_{R_i}$ is the solute concentration in surface inflow from seepage canal,

$\overline{C}_{L_i}$ is the solute concentration in shallow seepage collected by L-7 culverts,

$\overline{C}_{G_i}$ is the solute concentration of ground water discharge into ENR,

$\overline{C}_{S_O}$ is the solute concentration of surface outflow from ENR,

$\overline{C}_{R_O}$ is the solute concentration of surface outflow to seepage canal,

$\overline{C}_{G_O}$ is the solute concentration of ground water recharge from ENR.

Being able to calculate both G_i and G_o is the main advantage of the combined approach using water and solute mass balance relations. This is accomplished by rearrangement of [4] and substitution for G_o in [5];

$$\begin{aligned}\overline{G}_i = \{&\frac{1}{\Delta t} \cdot (V_0 + \Delta V) \cdot C_t - \frac{1}{\Delta t} \cdot V_0 \cdot C_0 - \overline{S}_i \cdot \overline{C}_{S_i} \\ &- \overline{P} \cdot \overline{C}_P - \overline{R}_i \cdot \overline{C}_{R_i} - \overline{L}_i \cdot \overline{C}_{L_i} + \overline{S}_0 \cdot \overline{C}_{S_0} \\ &+ \overline{R}_0 \cdot \overline{C}_{R_0} + \overline{S}_i \cdot \overline{C}_{G_O} + \overline{P} \cdot \overline{C}_{G_O} \\ &+ \overline{R}_i \cdot \overline{C}_{G_O} + \overline{L}_i \cdot \overline{C}_{G_O} - \overline{S}_0 \cdot \overline{C}_{G_O} \\ &- \overline{ET} \cdot \overline{C}_{G_O} - \overline{R}_0 \cdot \overline{C}_{G_O} - \frac{1}{\Delta t} \cdot \Delta V \cdot \overline{C}_{G_O}\} \\ &/\left(\overline{C}_{G_i} - \overline{C}_{G_O}\right),\end{aligned}$$

[6]

The result for $\overline{G}_i$ from equation [6] can be substituted back into equation [4] to compute ground water recharge.

The following steps were undertaken in the estimation procedure. First, hydrologic and chemical data were acquired for the ENR from the South Florida Water Management District. The initial volume of surface water in ENR, $V_{o,}$ was estimated using measurements of surface water depth and area of each cell. Chemical concentrations monitored by the South Florida Water Management District were available on approximately biweekly basis at each surface input and output flow locations and at each interior site in ENR We evaluated several potential tracers (Cl, Na, Mg, and Ca) for the present study and selected chloride as the best ionic solute tracer for the ENR.

The Cl concentration of ground water discharge ($\overline{C}_{G_i}$) was estimated by averaging the Cl measuements from 3 wells located on the eastern side of the ENR (near L-7 Canal). In addition, Cl concentration of ground water recharge ($\overline{C}_{G_O}$) was estimated from average concentration of surface water in cell 2, where hydraulic gradient and seepage meter data suggest that most ground water recharge is likely to occur . The average Cl concentration in surface water of the ENR (C_t) was estimated using water volume fractions in each cell and average Cl concentrations in each cell determined from 3 or 4 representative monitoring sites in each cell. Using the combined hydraulic and chemical data set and equations [4, 5, and 6], the ground water discharge ($\overline{G}_i$) and recharge ($\overline{G}_o$) were estimated every 14 days over the study period of 4 years (1994 to 1998).

Uncertainty Analysis

A general characteristic of hydrologic mass balance equations is that they appear deceptively simple, i.e., mass in equals mass out plus or minus change in storage (Eq. [2] and [5]). In reality, however, the errors in inputs to the mass balance equations affect the reliability of the outcome. Errors are usually generated from three major sources:

(1) measurement errors from imperfect instruments and inadequate sampling design and data collection procedures,

(2) interpretation errors resulting from spatial interpolation of point data, and

(3) model errors that are caused by inaccurate statement of the problem, e.g., not including an important flux in the mass balance equation.

Ideally, all of these errors should be assessed before final conclusions are drawn. For this study, we estimated the uncertainty of net ground water exchange and ground- water discharge using standard techniques for propagating error through numerical calculations. For the case where a quantity y is determined as a function of multiple variables $x_1, x_2, \ldots, x_n$, the uncertainty in y is expressed by the following (Peters and others 1974; Meyer 1975; Taylor 1982; Kline 1985);

$$\varepsilon_y = \sqrt{\left(\frac{\partial y}{\partial x_1}\varepsilon_{x_1}\right)^2 + \left(\frac{\partial y}{\partial x_2}\varepsilon_{x_2}\right)^2 + \left(\frac{\partial y}{\partial x_3}\varepsilon_{x_3}\right)^2 \cdots\cdots + \left(\frac{\partial y}{\partial x_n}\varepsilon_{x_n}\right)^2}, \quad [7]$$

where ε_y represents the uncertainty in a calculated variable y and $\varepsilon_{X1, X2,\ldots, Xn}$ represent uncertainties of measured variables $x_1, x_2, \ldots, x_n$. Equation [7] is a simplified form of a more general expression that considers covariance between variables (i.e., the case where the uncertainty in one variable may depend on another). In the present study, we adhered to the usual assumption in hydrological studies that the uncertainty of each variable was independent of that of other variables (Winter 1981). We estimated uncertainties of measured variables at ENR by considering instrument errors and interpolation errors associated with averaging point data to represent larger areas. We referred to previous works (e.g. Winter 1981; Nuttle and Harvey 1995) in developing our uncertainty estimates.

Mercury Transport between Surface Water and Ground Water

Mercury transport and transformation in the ENR project has been characterized through substantial efforts by SFWMD scientists and their collaborators (Miles and Fink, 1998; South Florida Water Management District, 1998b). The purpose of our work was to supplement the work of the SFWMD mercury group by providing more detailed estimates of the flux of dissolved mercury that recharges or discharges with flowing ground water in ENR. Our calculations were based on measurements of filtered and unfiltered concentrations of total mercury (HgTot) and methyl mercury (HgMM) collected by SFWMD or USGS staff between the years 1994 and 1998 at the ENR project area. Samples were collected both in surface water and in wells located on the eastern and western side of ENR. Our results are reported as average annual fluxes. The basis for computing the annual averages are approximately biweekly data sets for mercury concentrations and water fluxes at ENR for the four-year study period.

Filterable concentrations of mercury at ENR may be overestimated due to a slight contamination that inconsistently occurs in the QED filters used in the study (South Florida Water Management District, 1998b). That means that any particular filtered sample concentration could be unreliable due to the possible contamination. We therefore agree with SFWMD staff that caution is advisable when interpreting filtered mercury data. However, we also agree that that overall trends, such as the trend in higher filtered concentrations of HgTot in wells located on the western side of ENR compared with the eastern side, are real.

The final results of our calculations are reported as four principal types of mercury fluxes:

- average discharge of filterable mercury (both HgTot and HgMM) from ground water to wetland peat,
- average recharge of mercury from ENR surface water to peat,
- average recharge of mercury from peat to ground water, and
- average discharge of mercury from ground water to the seepage canal on the western side of ENR.

The following four-year averaged quantities were used to make the above calculations:

- average mercury concentrations in ground water wells located on eastern and western sides of ENR,
- average concentration of mercury in surface water (using the record of measurements at site ENR203),
- average ground water discharge in ENR,
- average ground water recharge in ENR, and
- average surface water flow in seepage canal.

The calculations described above estimate only advective fluxes of mercury. Diffusive fluxes of mercury, particularly the diffusion of HgMM across the wetland surface into surface water, could be as large or even larger than advective fluxes of mercury. In order to develop a complete balance for surface-subsurface exchange of mercury in the ENR, advective flux calculations should be combined with diffusive flux estimates determined by other investigators at ENR (South Florida Water Management District, 1998b).

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APPENDIXES

All project data that were quality assured at the time of preparation of this report are included in the following appendixes.

APPENDIX I

Research Site Locations

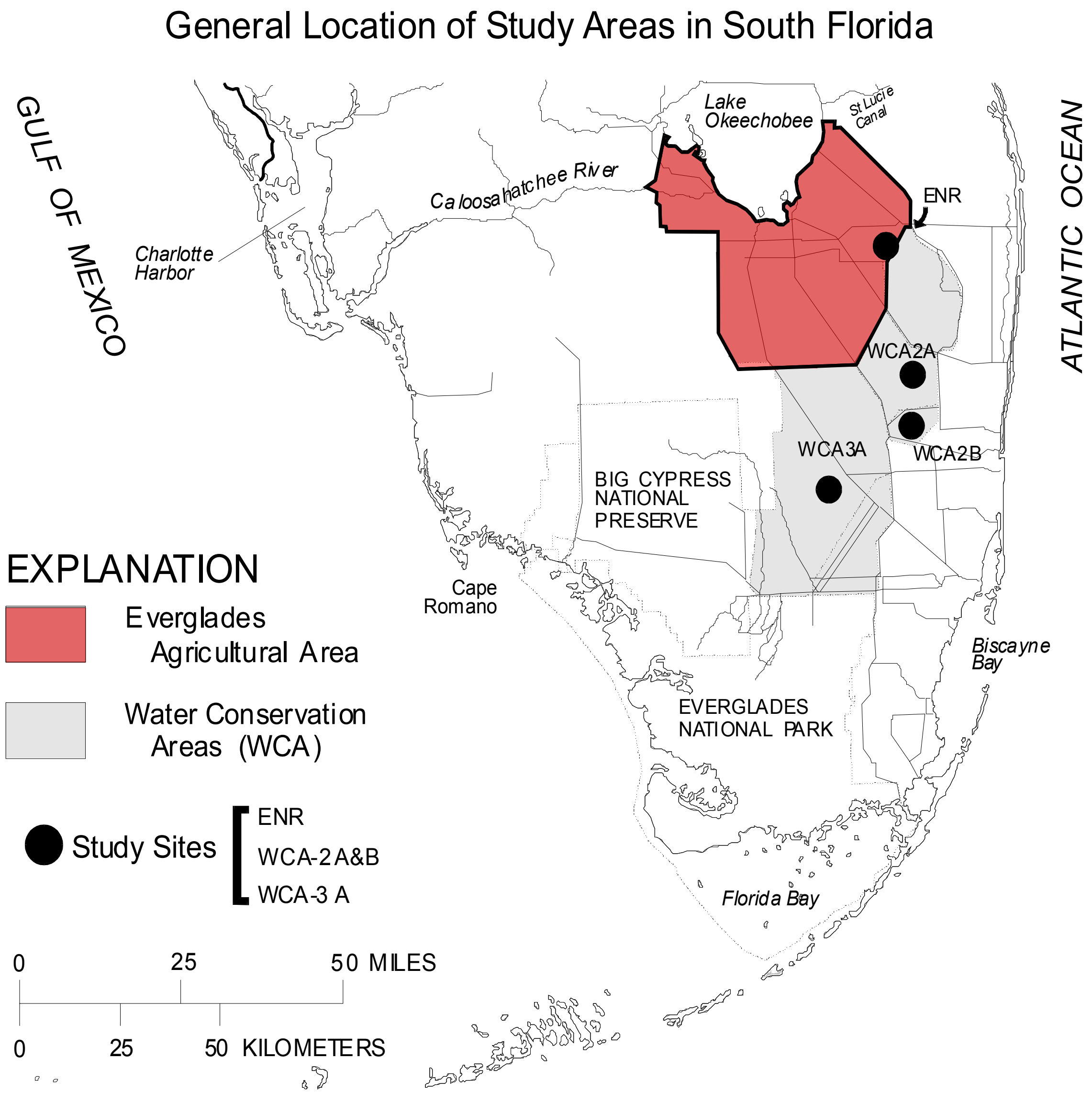

Figure 4. Map of South Florida showing general location of study areas.

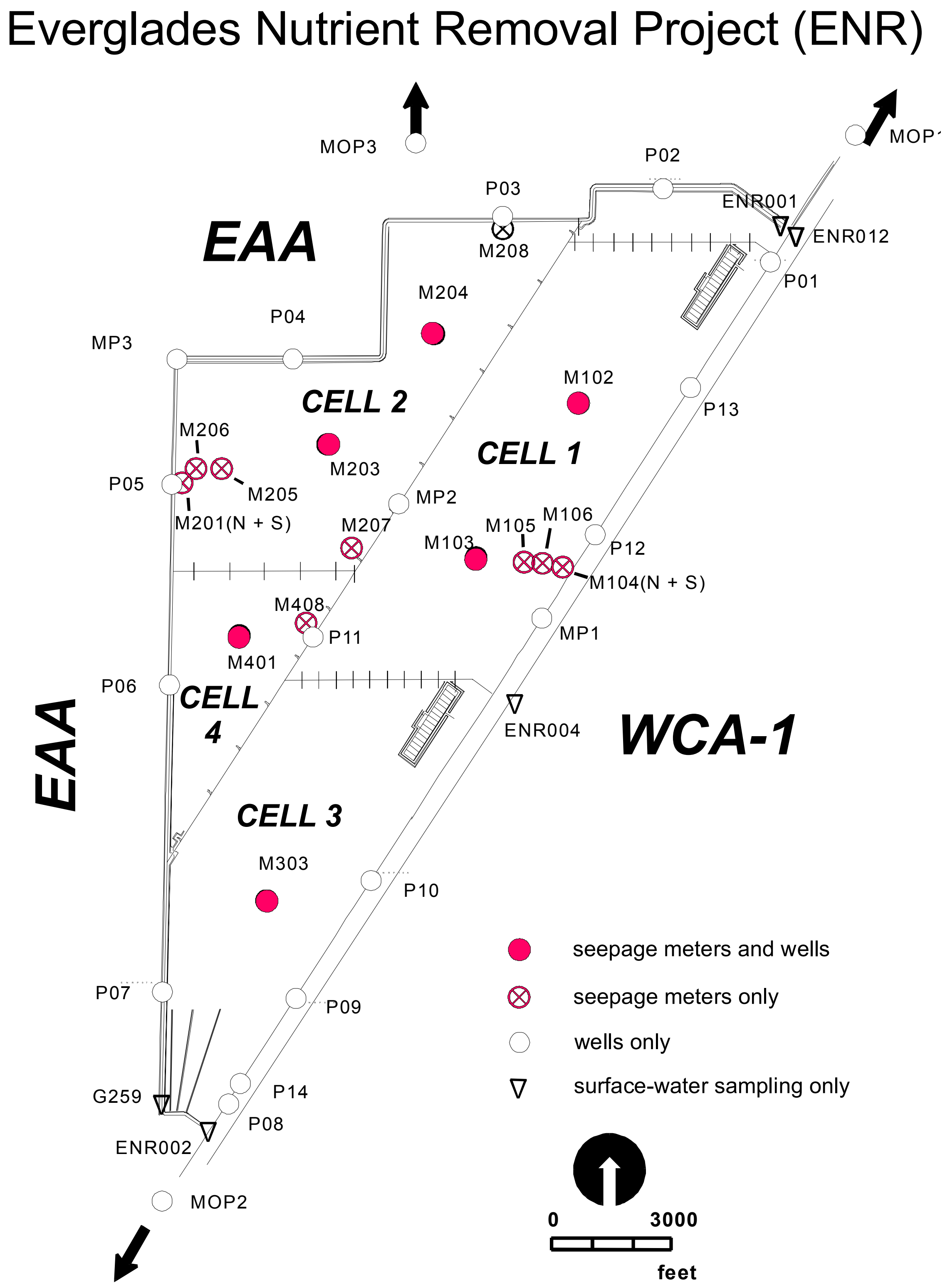

Figure 5. ENR site location map.

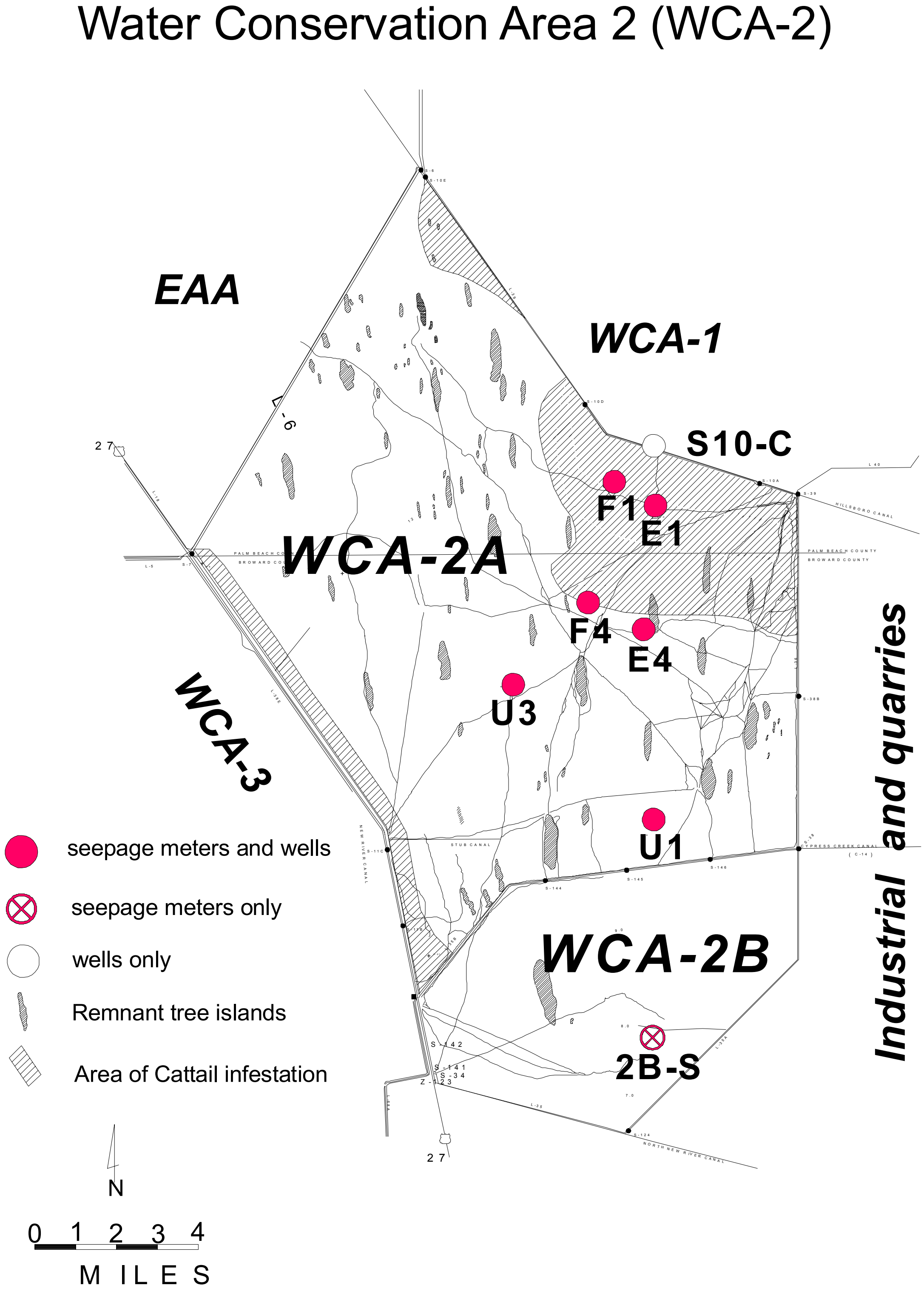

Figure 6. WCA-2A and WCA-2B Site Map.

APPENDIX II

Research Site Information

Summary of Research Sites and Measurement Types

Table 1. Summary of Research Site Locations, Data Types, and Measurement Periods in ENR, WCA2-A&B, and WCA 3A Page 1 of 7

Site Location	Site ID	Type of Site	Depth from TOC (feet)	# of Seepage Meters	Type of Data Collected	Nominal Record Period		Latitude	Longitude	State Planar	
						Begin	End			Easting 1928 Datum (Feet)	Northing 1928 Datum (Feet)
ENR	MP3-A	Well	190.90	n/a	H,QW,K	7/5/97	10/15/98*	263854.402	802640.220	681445.298	841741.747
ENR	MP3-B	Well	96.36	n/a	H,QW,K	7/5/97	10/15/98*	263854.402	802640.220	681445.298	841741.747
ENR	MP3-C	Well	62.81	n/a	H,QW,K	7/5/97	10/15/98*	263854.402	802640.220	681443.398	841732.147
ENR	MP3-D	Well	26.85	n/a	H,QW,K	7/5/97	10/15/98*	263854.402	802640.220	681453.298	841752.977
ENR	MP2-A	Well	100.90	n/a	H,QW,K	7/5/97	10/15/98*	263819.387	802538.495	687061.692	838231.116
ENR	MP2-B	Well	62.80	n/a	H,QW,K	7/5/97	10/15/98*	263819.387	802538.495	687061.692	838241.716
ENR	MP2-C	Well	25.80	n/a	H,QW,K	7/5/97	10/15/98*	263819.387	802538.495	687061.692	838262.116
ENR	MP1-A	Well	101.48	n/a	H,QW,K	7/5/97	10/15/98*	263757.600	802453.550	691007.560	836051.941
ENR	MP1-B	Well	60.03	n/a	H,QW,K	7/5/97	10/15/98*	263757.600	802453.550	691023.110	836052.441
ENR	MP1-C	Well	20.61	n/a	H,QW,K	7/5/97	10/15/98*	263757.600	802453.550	691034.300	836051.441
ENR	MP1-D	Well	27.94	n/a	H,QW,K	7/5/97	10/15/98*	263757.600	802453.550	691150.280	836049.441
ENR	MOP1-A	Well	102.10	n/a	H,QW,K	7/5/97	10/15/98*	264101.011	802233.817	703740.013	854628.588
ENR	MOP1-B	Well	64.97	n/a	H,QW,K	7/5/97	10/15/98*	264101.011	802233.817	703746.713	854650.188
ENR	MOP2-A	Well	101.65	n/a	H,QW,K	7/5/97	10/15/98*	263533.215	802645.848	681022.636	821426.200
ENR	MOP2-B	Well	59.26	n/a	H,QW,K	7/5/97	10/15/98*	263533.215	802645.848	681050.736	821425.700
ENR	MOP2-C	Well	31.50	n/a	H,QW,K	7/5/97	10/15/98*	263533.215	802645.848	680994.536	821426.700
ENR	MOP3-A	Well	95.41	n/a	H,QW,K	7/5/97	03/11/99	264037.230	802540.419	686824.812	852148.139
ENR	M102-P	Well	40.28	n/a	H,QW,K	6/26/97	10/10/98*	263848.307	802451.467	691315.771	841170.438
ENR	M102-PZ	Well	22.04	n/a	H	6/26/97	12/21/98**	263848.307	802451.467	691315.771	841170.438
ENR	M103-P	Well	37.51	n/a	H,QW,K	6/26/97	10/10/98*	263811.610	802522.596	688508.012	837452.400
ENR	M103-PZ	Well	19.93	n/a	H,QW	6/26/97	12/21/98**	263811.610	802522.596	688508.012	837452.400
ENR	M203-P	Well	37.87	n/a	H,QW,K	6/26/97	10/10/98*	263835.054	802601.548	684962.848	839803.665
ENR	M203-PZ	Well	21.06	n/a	H,QW	6/26/97	12/21/98**	263835.054	802601.548	684962.848	839803.665
ENR	M204-P	Well	37.44	n/a	H,QW,K	6/26/97	10/10/98*	263902.993	802524.223	688336.938	842639.741
ENR	M204-PZ	Well	19.94	n/a	H	6/26/97	12/21/98**	263902.993	802524.223	688336.938	842639.741
ENR	M303-P	Well	36.37	n/a	H,QW,K	6/26/97	10/10/98*	263638.348	802622.330	683128.764	828011.781
ENR	M303-PZ	Well	14.49	n/a	H	6/26/97	12/21/98**	263638.348	802622.330	683128.764	828011.781
ENR	M401-P	Well	37.61	n/a	H,QW,K	6/26/97	10/10/98*	263746.312	802624.110	682937.224	834873.266
ENR	M401-PZ	Well	23.04	n/a	H	6/26/97	12/21/98**	263746.312	802624.110	682937.224	834873.266
ENR	P01-B	Well	93.00	n/a	H	6/1/95	12/21/98**	263915.058	802353.778	696537.496	843895.809

Table 1. Summary of Research Site Locations, Data Types, and Measurement Periods in ENR, WCA2-A&B, and WCA3A
Page 2 of 7

Site Location	Site ID	Type of Site	Depth from TOC (feet)	# of Seepage Meters	Type of Data Collected	Nominal Record Period		Latitude	Longitude	State Planar	
						Begin	End			Easting 1927 Datum (Feet)	Northing 1927 Datum (Feet)
ENR	P01-A	Well	100.00	n/a	H	6/1/95	12/21/98**	263914.167	802354.406	696480.877	843805.579
ENR	P02-A	Well	21.40	n/a	H	8/31/95	12/21/98**	263935.679	802424.313	693757.336	845964.891
ENR	P02-B	Well	11.34	n/a	H	8/31/95	12/21/98**	263935.679	802424.313	693757.336	845964.891
ENR	P03-A	Well	22.80	n/a	H	8/31/95	12/21/98**	263927.555	802508.760	689728.637	845126.055
ENR	P03-B	Well	10.45	n/a	H	8/31/95	12/21/98**	263927.555	802508.760	689728.637	845126.055
ENR	P04-A	Well	22.40	n/a	H	8/31/95	12/21/98**	263855.037	802608.424	684330.015	841818.570
ENR	P04-B	Well	9.45	n/a	H	8/31/95	12/21/98**	263855.037	802608.424	684330.015	841818.570
ENR	P05-A	Well	27.90	n/a	H	8/31/95	12/21/98**	263827.925	802640.854	681399.382	839068.193
ENR	P05-B	Well	12.22	n/a	H	8/31/95	12/21/98**	263826.531	802640.921	681393.953	838927.444
ENR	P06-A	Well	20.80	n/a	H	8/31/95	12/21/98**	263732.210	802642.870	681244.820	833441.496
ENR	P06-B	Well	10.41	n/a	H	8/31/95	12/21/98**	263732.205	802642.827	681244.820	833441.496
ENR	P07-A	Well	26.50	n/a	H	8/31/95	12/21/98**	263626.223	802644.851	681090.018	826778.718
ENR	P07-B	Well	12.14	n/a	H	8/31/95	12/21/98**	263626.260	802644.868	681088.407	826782.420
ENR	P08-B	Well	96.90	n/a	H	6/1/95	12/21/98**	263600.690	802623.803	683011.745	824209.025
ENR	P09-A	Well	15.00	n/a	H	6/1/95	12/21/98**	263624.788	802613.390	683946.218	826646.303
ENR	P10-A	Well	21.30	n/a	H	6/1/95	12/21/98**	263654.734	802542.108	686772.130	829682.415
ENR	P10-B	Well	15.50	n/a	H	6/1/95	12/21/98**	263654.717	802542.075	686775.115	829680.706
ENR	P11-A	Well	26.30	n/a	H	6/1/95	12/21/98**	263750.892	802600.504	685077.336	835345.178
ENR	P11-B	Well	9.25	n/a	H	6/1/95	12/21/98**	263750.892	802600.504		
ENR	P12-A	Well	23.90	n/a	H	6/1/95	12/21/98**	263811.276	802442.926	692107.957	837435.037
ENR	P12-B	Well	18.20	n/a	H	6/1/95	12/21/98**	263811.226	802442.990	692102.106	837429.993
ENR	P13-A	Well	27.50	n/a	H	6/1/95	12/21/98**	263848.381	802414.328	694685.570	841193.481
ENR	P13-B	Well	19.92	n/a	H	6/1/95	12/21/98**	263848.381	802414.328		
ENR	P14-B	Well	62.00	n/a	H	6/1/95	12/21/98**	263601.084	802623.496	683039.412	824248.882
ENR	P23-A	Well	30.45	n/a	H	8/1/96	8/31/96	263927.578	802517.209	688962.114	845124.928
ENR	P23-B	Well	18.05	n/a	H	8/1/96	8/31/96				
ENR	P23-C	Well	27.98	n/a	H	8/1/96	8/31/96				
ENR	P23-D	Well	26.49	n/a	H	8/1/96	8/31/96				

Table 1. Summary of Research Site Locations, Data Types, and Measurement Periods in ENR, WCA2-A&B, and WCA3A Page 3 of 7

Site Location	Site ID	Type of Site	Depth from TOC (feet)	# of Seepage Meters	Type of Data Collected	Nominal Record Period				State Planar	
						Begin	End	Latitude	Longitude	Easting 1927 Datum (Feet)	Northing 1927 Datum (Feet)
ENR	P24-A	Well	32.16	n/a	H	8/1/96	8/31/96	263855.083	802623.237	682985.933	841817.248
ENR	P24-B	Well	17.21	n/a	H	8/1/96	8/31/96				
ENR	P24-C	Well	27.85	n/a	H	8/1/96	8/31/96				
ENR	P24-D	Well	27.64	n/a	H	8/1/96	8/31/96				
ENR	P25-A	Well	30.97	n/a	H	8/1/96	8/31/96	263847.924	802640.563	681417.013	841087.543
ENR	P25-B	Well	17.99	n/a	H	8/1/96	8/31/96				
ENR	P25-C	Well	27.72	n/a	H	8/1/96	8/31/96				
ENR	P26-A	Well	32.14	n/a	H	8/1/96	8/31/96	263837.986	802640.887	681392.016	840084.076
ENR	P26-B	Well	17.96	n/a	H	8/1/96	8/31/96				
ENR	P26-C	Well	26.60	n/a	H	8/1/96	8/31/96				
ENR	P27-A	Well	32.42	n/a	H	8/1/96	8/31/96	263818.145	802641.500	681345.096	838080.504
ENR	P27-B	Well	18.15	n/a	H	8/1/96	8/31/96				
ENR	P27-C	Well	27.43	n/a	H	8/1/96	8/31/96				
ENR	P27-D	Well	27.70	n/a	H	8/1/96	8/31/96				
ENR	P28-A	Well	32.61	n/a	H	8/1/96	8/31/96	263804.347	802615.451	683714.943	836697.698
ENR	P28-B	Well	18.09	n/a	H	8/1/96	8/31/96				
ENR	P29-A	Well	31.81	n/a	H	8/1/96	8/31/96	263804.309	802604.405	684714.374	836698.245
ENR	P29-B	Well	17.63	n/a	H	8/1/96	8/31/96				
ENR	P30-A	Well	30.72	n/a	H	8/1/96	8/31/96	263824.232	802534.716	687402.453	838721.864
ENR	P30-B	Well	17.98	n/a	H	8/1/96	8/31/96				
ENR	P31-A	Well	32.75	n/a	H	8/1/96	8/31/96	263846.521	802517.523	688952.401	840979.394
ENR	P31-B	Well	17.82	n/a	H	8/1/96	8/31/96				
ENR	P32-A	Well	33.92	n/a	H	8/1/96	8/31/96	263907.780	802501.122	690430.723	843132.640
ENR	P32-B	Well	17.82	n/a	H	8/1/96	8/31/96				
ENR	MOP3	SW	n/a	n/a	H	10/15/97	12/21/98**	264037.230	802540.419	686824.812	852148.139
ENR	MP3-HW	SW	n/a	n/a	H,QW	7/5/97	10/15/98*	263854.402	802640.220	681511.098	841752.977
ENR	MP3-TW	SW	n/a	n/a	H,QW	7/5/97	10/15/98*	263854.402	802640.220	681393.998	841752.977

Table 1. Summary of Research Site Locations, Data Types, and Measurement Periods in ENR, WCA2-A&B, and WCA 3A
Page 4 of 7

Site Location	Site ID	Type of Site	Depth from TOC (feet)	# of Seepage Meters	Type of Data Collected	Nominal Record Period		Latitude	Longitude	State Planar	
						Begin	End			Easting 1927 Datum (Feet)	Northing 1927 Datum (Feet)
ENR	M102	SW	n/a	n/a	H,QW	6/26/97	10/10/98*	263848.307	802451.467	691315.771	841170.438
ENR	M103	SW	n/a	n/a	H,QW	6/26/97	10/10/98*	263811.610	802522.596	688508.012	837452.400
ENR	M203	SW	n/a	n/a	H,QW	6/26/97	10/10/98*	263835.054	802601.548	684962.848	839803.665
ENR	M204	SW	n/a	n/a	H,QW	6/26/97	10/10/98*	263902.993	802524.223	688336.938	842639.741
ENR	M303	SW	n/a	n/a	H,QW	6/26/97	10/10/98*	263638.348	802622.330	683128.764	828011.781
ENR	M401	SW	n/a	n/a	H,QW	6/26/97	10/10/98*	263746.312	802624.110	682937.224	834873.266
ENR	ENR002	SW	n/a	n/a	QW	9/15/97	6/15/98	263928.000	802345.000		
ENR	ENR004	SW	n/a	n/a	QW	9/15/97	6/15/98	263732.449	802508.615	689794.606	833504.141
ENR	ENR011	SW	n/a	n/a	QW	9/15/97	6/15/98	263927.000	802348.000		
ENR	ENR012	SW	n/a	n/a	QW	9/15/97	6/15/98	263551.000	802634.000		
ENR	ENRG259	SW	n/a	n/a	QW	9/15/97	6/15/98	263555.000	802647.000		
ENR	P01 In	SW	n/a	n/a	H	6/1/95	12/21/98**			696480.877	843805.579
ENR	P01 Out	SW	n/a	n/a	H	6/1/95	12/21/98**			696567.777	843805.579
ENR	P02 In	SW	n/a	n/a	H	8/31/95	12/21/98**			693757.336	845921.091
ENR	P02 Out	SW	n/a	n/a	H	8/31/95	12/21/98**			693757.336	846032.591
ENR	P03 In	SW	n/a	n/a	H	8/31/95	12/21/98**			689683.537	845126.055
ENR	P03 Out	SW	n/a	n/a	H	8/31/95	12/21/98**			689788.337	845126.055
ENR	P04 In	SW	n/a	n/a	H	8/31/95	12/21/98**			684284.515	841818.570
ENR	P04 Out	SW	n/a	n/a	H	8/31/95	12/21/98**			684393.815	841818.570
ENR	P05 In	SW	n/a	n/a	H	8/31/95	12/21/98**			681428.853	838927.444
ENR	P05 Out	SW	n/a	n/a	H	8/31/95	12/21/98**			681329.853	838927.444
ENR	P06 In	SW	n/a	n/a	H	8/31/95	12/21/98**			681305.520	833441.496
ENR	P06 Out	SW	n/a	n/a	H	8/31/95	12/21/98**			681190.820	833441.496
ENR	P07 In	SW	n/a	n/a	H	8/31/95	12/21/98**			681145.607	826782.420
ENR	P07 Out	SW	n/a	n/a	H	8/31/95	12/21/98**			681033.207	826782.420
ENR	P10 In	SW	n/a	n/a	H	6/1/95	12/21/98**			686690.030	829682.415
ENR	P10 Out	SW	n/a	n/a	H	6/1/95	12/21/98**			686827.630	829682.415
ENR	P11 - N	SW	n/a	n/a	H	6/1/95	12/21/98**			685677.336	836788.148
ENR	P11 - S	SW	n/a	n/a	H	6/1/95	12/21/98**			686277.336	836788.148

Table 1. Summary of Research Site Locations, Data Types, and Measurement Periods in ENR, WCA2-A&B, and WCA 3A   Page 5 of 7

Site Location	Site ID	Type of Site	Depth from TOC (feet)	# of Seepage Meters	Type of Data Collected	Nominal Record Period Begin	End	Latitude	Longitude	State Planar Easting 1927 Datum (Feet)	Northing 1927 Datum (Feet)
ENR	P12 In	SW	n/a	n/a	H	6/1/95	12/21/98**			692027.657	837435.037
ENR	P12 Out	SW	n/a	n/a	H	6/1/95	12/21/98**			692171.457	837435.037
ENR	P13 In	SW	n/a	n/a	H	6/1/95	12/21/98**			694591.770	841193.481
ENR	P13 Out	SW	n/a	n/a	H	6/1/95	12/21/98**			694685.570	841193.481
ENR	P14 In	SW	n/a	n/a	H	6/1/95	12/21/98**			682964.712	824248.882
ENR	P14 Out	SW	n/a	n/a	H	6/1/95	12/21/98**			683083.412	824248.882
ENR	M-103	SM	n/a	2	SM,KP,QWP	6/18/96	4/11/98	263812.184	802522.781	688490.940	837510.290
ENR	M-104-N	SM	n/a	2	SM,KP,QWP	3/26/97	4/8/98	263812.385	802450.789	691393.886	837543.793
ENR	M-104-S	SM	n/a	2	SM,KP,QWP	10/30/96	4/8/98	263811.941	802451.327	691345.251	837498.750
ENR	M-105	SM	n/a	2	SM,KP	12/10/96	4/8/98	263813.392	802500.240	690535.777	837641.511
ENR	M-106	SM	n/a	2	SM,KP	3/28/97	4/8/98	263813.761	802455.610	690955.816	837680.672
ENR	M-201-N	SM	n/a	2	SM,KP	8/17/96	4/15/98	263827.925	802640.854	681399.382	839068.193
ENR	M-201-S	SM	n/a	2	SM,KP,QWP	8/13/96	4/15/98	263826.531	802640.921	681393.953	838927.444
ENR	M-208	SM	n/a	2	SM	8/21/96	12/11/96	263927.267	802508.357	689765.364	845097.211
ENR	M-203	SM	n/a	2	SM,KP	6/18/96	4/12/98	263835.073	802601.995	684922.273	839805.401
ENR	M-204	SM	n/a	2	SM,KP	6/18/96	4/9/98	263902.954	802523.980	688358.956	842635.875
ENR	M-205	SM	n/a	2	SM,KP	10/15/96	4/12/98	263827.875	802627.640	682598.519	839068.393
ENR	M-206	SM	n/a		SM,KP	3/26/97	4/8/98	263825.826	802634.527	681974.476	838858.813
ENR	M-207	SM	n/a	2	SM,KP	6/14/96	4/14/98	263808.702	802549.706	686049.273	837147.715
ENR	M-303	SM	n/a	2	SM	6/18/96	12/4/96	263638.302	802622.083	683151.250	828007.265
ENR	M-408	SM	n/a	2	SM	7/8/96	8/20/96	263745.377	802608.808	684326.190	834784.971
ENR	M-401	SM	n/a	2	SM	6/18/96	1/14/97	263745.942	802624.121	682936.302	834835.870
WCA2A	WC2E1GW1	Well	14.65	n/a	H	2/26/96	11/01/98*	262104.431	802115.104	711487.876	737218.199
WCA2A	WC2E1GW2	Well	14.68	n/a	H	2/26/96	11/01/98*	262104.431	802115.104	711487.876	737218.199
WCA2A	WC2E1GW3	Well	27.20	n/a	H,QW,K	12/11/96	11/01/98*	262104.431	802115.104	711487.876	737218.199
WCA2A	WC2E1GW4	Well	15.68	n/a	H,QW,K	12/11/96	11/01/98*	262104.431	802115.104	711487.876	737218.199
WCA2A	WC2E4GW1	Well	10.00	n/a	H	2/26/96	11/01/98*	261831.114	802126.072	710567.094	718364.458
WCA2A	WC2E4GW2	Well	10.00	n/a	H	2/26/96	11/01/98*	261831.114	802126.072	710567.094	718364.458
WCA2A	WC2E4GW3	Well	23.70	n/a	H,QW,K	12/11/96	11/01/98*	261831.114	802126.072	710567.094	718364.458
WCA2A	WC2E4GW4	Well	13.70	n/a	H,QW,K	12/11/96	11/01/98*	261831.114	802126.072	710567.094	718364.458

Table 1. Summary of Research Site Locations, Data Types, and Measurement Periods in ENR, WCA2-A&B, and WCA 3A
Page 6 of 7

Site Location	Site ID	Type of Site	Depth from TOC (feet)	# of Seepage Meters	Type of Data Collected	Nominal Record Period				State Planar	
						Begin	End	Latitude	Longitude	Easting 1927 Datum (Feet)	Northing 1927 Datum (Feet)
WCA2A	WC2U1GW1	Well	12.70	n/a	H	2/26/96	11/01/98*	261426.021	802121.284	711126.010	693621.154
WCA2A	WC2U1GW2	Well	10.00	n/a	H	2/26/96	11/01/98*	261426.021	802121.284	711126.010	693621.154
WCA2A	WC2U1GW3	Well	28.90	n/a	H,QW,K	12/11/96	11/01/98*	261426.021	802121.284	711126.010	693621.154
WCA2A	WC2U1GW4	Well	21.38	n/a	H,QW,K	12/11/96	11/01/98*	261426.021	802121.284	711126.010	693621.154
WCA2A	WC2F1GW1	Well	15.09	n/a	H	2/26/96	11/01/98*	262138.075	802210.652	706418.181	737220.900
WCA2A	WC2F1GW2	Well	14.93	n/a	H	2/26/96	11/01/98*	262138.075	802210.652	706420.840	737221.711
WCA2A	WC2F1GW3	Well	33.95	n/a	H,QW,K	12/11/96	11/01/98*	262138.075	802210.652	706421.113	737217.797
WCA2A	WC2F1GW4	Well	14.55	n/a	H,QW,K	12/11/96	11/01/98*	262138.075	802210.652	706430.263	737212.427
WCA2A	WC2F4GW1	Well	11.60	n/a	H	2/26/96	11/01/98*	261859.788	802307.310	701340.568	721214.663
WCA2A	WC2F4GW2	Well	10.00	n/a	H	2/26/96	11/01/98*	261859.788	802307.310	701340.568	721214.663
WCA2A	WC2F4GW3	Well	29.30	n/a	H,QW,K	12/11/96	11/01/98*	261859.788	802307.310	701340.568	721214.663
WCA2A	WC2F4GW4	Well	13.05	n/a	H,QW,K	12/11/96	11/01/98*	261859.788	802307.310	701340.568	721214.663
WCA2A	WC2U3GW1	Well	14.85	n/a	H	2/26/96	11/01/98*	261713.664	802441.991	692773.768	710459.902
WCA2A	WC2U3GW2	Well	14.73	n/a	H	2/26/96	11/01/98*	261713.664	802441.991	692773.768	710459.902
WCA2A	WC2U3GW3	Well	34.20	n/a	H,QW,K	12/11/96	11/01/98*	261713.664	802441.991	692773.768	710459.902
WCA2A	WC2U3GW4	Well	13.30	n/a	H,QW,K	12/11/96	11/01/98*	261713.664	802441.991	692773.768	710459.902
WCA2A	S10C-WA	Well	101.39	n/a	H,QW,K	9/1/97	11/01/98*	262215.350	802104.055	712456.958	741014.310
WCA2A	S10C-WB	Well	64.59	n/a	H,QW,K	9/1/97	11/01/98*	262215.350	802104.055	712456.958	741014.310
WCA2A	S10C-WC	Well	31.47	n/a	H,QW,K	9/1/97	11/01/98*	262215.350	802104.055	712456.958	741014.310
WCA2A	WC2E1	SW	n/a	n/a	H,QW,K	2/26/96	11/01/98*	262104.431	802115.104	711487.876	737218.199
WCA2A	WC2E4	SW	n/a	n/a	H,QW	2/26/96	11/01/98*	261831.114	802126.072	710567.094	718364.458
WCA2A	WC2U1	SW	n/a	n/a	H,QW	2/26/96	11/01/98*	261426.021	802121.284	711126.010	693621.154
WCA2A	WC2F1	SW	n/a	n/a	H,QW	2/26/96	11/01/98*	262138.075	802210.652	706418.181	737220.900
WCA2A	WC2F4	SW	n/a	n/a	H,QW	2/26/96	11/01/98*	261859.788	802307.310	701340.568	721214.663
WCA2A	WC2U3	SW	n/a	n/a	H,QW	2/26/96	11/01/98*	261713.664	802441.991	692773.768	710459.902
WCA2A	S10C-Tail	SW	n/a	n/a	H,QW	9/1/97	11/01/98*	262215.350	802104.055	712456.958	741014.310
WCA2A	S10C-Head	SW	n/a	n/a	H,QW	9/1/97	11/01/98*	262215.350	802104.055	712456.958	741014.310

Table 1. Summary of Research Site Locations, Data Types, and Measurement Periods in ENR, WCA2-A&B, and WCA 3A Page 7 of 7

Site Location	Site ID	Type of Site	Depth from TOC (feet)	# of Seepage Meters	Type of Data Collected	Nominal Record Period Begin	Nominal Record Period End	Latitude	Longitude	State Planar Easting 1927 Datum (Feet)	State Planar Northing 1927 Datum (Feet)
WCA2A	WCA2E1	SM	n/a	2	SM,KP	10/10/96	3/31/98	262104.431	802115.104	711487.876	737218.199
WCA2A	WCA2E4	SM	n/a	2	SM,KP	10/10/96	3/31/98	261831.114	802126.072	710567.094	718364.458
WCA2A	WCA2F1	SM	n/a	3	SM,QWP,KP	10/10/96	3/31/98	262137.991	802210.519	706430.263	737212.427
WCA2A	WCA2F4	SM	n/a	2	SM,KP	10/10/96	3/31/98	261859.788	802307.310	701340.568	721214.663
WCA2A	WCA2U1	SM	n/a	2	SM,KP	10/23/96	3/31/98	261426.021	802121.284	711126.010	693621.154
WCA2A	WCA2U3	SM	n/a	2	SM,QWP,KP	10/23/96	3/31/98	261713.664	802441.991	692773.768	710459.902
WCA2B	WCA2B-S	SM	n/a	3	SM	1/16/97	6/4/97	260918.321	802241.470	703973.523	662519.460
WCA3A	WCA3A-15	SM	n/a	3	SM	1/16/97	6/4/97	255825.910	804008.548	608731.073	596303.774

KEY TO DATA TYPES: SW = surface-water measurement location, H = hydraulic head, SM = seepage meter, K = aquifer hydraulic conductivity, KP = peat hydraulic conductivity

QW = surface water or aquifer water chemistry, QWP = peat porewater chemistry.

* = water levels recorded electronically and averaged daily, new data downloaded monthly

** = water levels read monthly (manual)

Table 2. ENR-WCA-2A Mercury Flux in Ground Water Project Research Site Names and Aliases   Page 1 of 3

Location	Project ID	Type of Site	SFWMD DB key	DBHydro ID	Alias ID	General Location
ENR	MP3-A	Well	H1982	ENR202-A		NW corner, on perimeter levee
ENR	MP3-B	Well	H1983	ENR202-B		NW corner, on perimeter levee
ENR	MP3-C	Well	H1984	ENR202-C		NW corner, on perimeter levee
ENR	MP3-D	Well	H1985	ENR202-D		NW corner, on perimeter levee
ENR	MP3-HW	SW	15871	ENR202-H	MP3SW-H	NW corner in Cell 2
ENR	MP3-TW	SW	15872	ENR202-S	MP3-SW (Seepage Canal)	NW corner, in Seepage Canal
ENR	MP2-A	Well	H1995	MP2GW1		Interior levee, between Cells 1 & 2
ENR	MP2-B	Well	H1996	MP2GW2		Interior levee, between Cells 1 & 2
ENR	MP2-C	Well	H1997	MP2GW3		Interior levee, between Cells 1 & 2
ENR	MP1-A	Well	H1972	MP1GW1		East of Cell 1 on L7 levee road
ENR	MP1-B	Well	H1973	MP1GW2		East of Cell 1 on L7 levee road
ENR	MP1-C	Well	H1993	MP1GW3		East of Cell 1 on L7 levee road
ENR	MP1-D	Well	n/a			East of Cell 1 on L7 levee
ENR	MOP1-A	Well	H1976	ENR001A		North of ENR
ENR	MOP1-B	Well	H1977	ENR001B		North of ENR
ENR	MOP1-SW	SW	H15796	ENR001		North of ENR, in inflow canal
ENR	MOP2-A	Well	H1967	MOP2GW1		South of ENR, on L7 levee road
ENR	MOP2-B	Well	H1970	MOP2GW2		South of ENR, on L7 levee road
ENR	MOP2-C	Well	H1971	MOP2GW3		South of ENR, on L7 levee road
ENR	MOP3-A	Well	n/a			North of ENR
ENR	M102-P	Well	H1978	ENR102GW		Interior Cell 1
ENR	M102-PZ	Well	n/a			Interior Cell 1
ENR	M102-SW	SW	H1979	ENR102		Interior Cell 1
ENR	M103-P	Well	H1981	ENR103GW		Interior Cell 1
ENR	M103-PZ	Well	n/a			Interior Cell 1
ENR	M103-SW	SW	H1980	ENR103		Interior Cell 1
ENR	M203-P	Well	H1986	ENR203GW		Interior Cell 2
ENR	M203-PZ	Well	n/a			Interior Cell 2
ENR	M203-SW	SW	15873	ENR203		Interior Cell 2

Table 2. ENR-WCA-2A Mercury Flux in Ground Water Project Research Site Names and Aliases Page 2 of 3

Location	Project ID	Type of Site	SFWMD DB key	DBHydro ID	Alias ID	General Location
ENR	M204-P	Well	H1989	ENR204GW		Interior Cell 2
ENR	M204-PZ	Well	n/a			Interior Cell 2
ENR	M204-SW	SW	H1987	ENR204		Interior Cell 2
ENR	M303-P	Well	H1991	ENR303GW		Interior Cell 3
ENR	M303-PZ	Well	n/a			Interior Cell 3
ENR	M303-SW	SW	H1990	ENR303		Interior Cell 3
ENR	M401-P	Well	H1992	ENR401GW		Interior Cell 4
ENR	M401-PZ	Well	n/a			Interior Cell 4
ENR	M401-SW	SW	15727	ENR401		Interior Cell 4
ENR	MOP3	SW	n/a			North of ENR
ENR	ENR002	SW	15797			Dock at NE corner of the ENR
ENR	ENR004	SW	15842			Dock in WCA1 across from the G253 levee road
ENR	ENR011	SW	15845			Dock at NE corner of the ENR
ENR	ENR012	SW	15849			Dock at SE corner of the ENR
ENR	ENRG259	SW	15915			Dock at SW corner of the ENR
WCA2A	WC2E1GW1	Well	16718		E1GW1	
WCA2A	WC2E1GW2	Well	16719		E1GW2	
WCA2A	WC2E1GW3	Well	F9548		E1GW3	
WCA2A	WC2E1GW4	Well	F9549		E1GW4	
WCA2A	WC2E1SW	SW	16051		E1SW	
WCA2A	WC2E4GW1	Well	16720		E4GW1	
WCA2A	WC2E4GW2	Well	16721		E4GW2	
WCA2A	WC2E4GW3	Well	F9552		E4GW3	
WCA2A	WC2E4GW4	Well	F9553		E4GW4	
WCA2A	WC2E4SW	SW	16047		E4SW	
WCA2A	WC2U1GW1	Well	16726		UIGW1	
WCA2A	WC2U1GW2	Well	FF849		U1GW2	
WCA2A	WC2U1GW3	Well	FF850		U1GW3	
WCA2A	WC2U1GW4	Well	FF851		U1GW4	
WCA2A	WC2U1SW	SW	16048		U1SW	

Table 2. ENR-WCA-2A Mercury Flux in Ground Water Project Research Site Names and Aliases Page 3 of 3

Location	Project ID	Type of Site	SFWMD DB key	DBHydro ID	Alias ID	General Location
WCA2A	WC2F1GW1	Well	16722		F1GW1	
WCA2A	WC2F1GW2	Well	16723		F1GW2	
WCA2A	WC2F1GW3	Well	FF847		F1GW3	
WCA2A	WC2F1GW4	Well	FF848		F1GW4	
WCA2A	WC2F1SW	SW	16045		F1SW	
WCA2A	WC2F4GW1	Well	16724		F4GW1	
WCA2A	WC2F4GW2	Well	16725		F4GW2	
WCA2A	WC2F4GW3	Well	F9550		F4GW3	
WCA2A	WC2F4GW4	Well	F9551		F4GW4	
WCA2A	WC2F4SW	SW	16046		F4SW	
WCA2A	WC2U3GW1	Well	16728		U3GW1	
WCA2A	WC2U3GW2	Well	16729		U3GW2	
WCA2A	WC2U3GW3	Well	F9563		U3GW3	
WCA2A	WC2U3GW4	Well	F9564		U3GW4	
WCA2A	WC2U3SW	SW	16727		U3SW	
WCA2A	S10C-WA	Well	G6491		S10C-A	
WCA2A	S10C-WB	Well	G6492		S10C-B	
WCA2A	S10C-WC	Well	G6493		S10C-C	
WCA2A	S10CTail	SW	G5071		S10C-Tail	
WCA2A	S10CHead	SW	G5070		S10C-Head	

ENR Final Well Construction Information

Table 3. Final Construction Table for ENR Mercury Flux Land and Water Based Monitor Wells Page 1 of 6

Site ID	Comments	Sources of Information in Addition to this Study	Drilling Contractor	Drilling Method	Geologic Sampling	Drilling Mud	Well Installation Date	Latitude	Longitude	State Planar		State Planar	
										Easting 1927 Datum (feet)	Northing 1927 Datum (feet)	Easting 1983 Datum (feet)	Northing 1983 Datum (feet)
MP3-A	Levee Core		GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/01/97	263854.402	802640.220	681445.298	841741.747		
MP3-B	Levee Core		GFA/Amdrill	Mud Rotary	None	Bentonite	05/01/97	263854.402	802640.220	681445.298	841741.747		
MP3-C	Levee Core		GFA/Amdrill	Mud Rotary	None	Bentonite	06/18/97	263854.402	802640.220	681443.398	841732.147		
MP3-D	Levee Core		GFA/Amdrill	Mud Rotary	None	Bentonite	06/20/97	263854.402	802640.220	681453.298	841752.977		
MP2-A	Levee Core		GFA/Amdrill	Mud Rotary	Continuous	Bentonite	03/24/97	263819.387	802538.495	687061.692	838231.116		
MP2-B	Levee Core		GFA/Amdrill	Mud Rotary	None	Bentonite	06/13/97	263819.387	802538.495	687061.692	838241.716		
MP2-C	Levee Core		GFA/Amdrill	Mud Rotary	None	Bentonite	07/25/97	263819.387	802538.495	687061.692	838262.116		
MP1-A			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	04/07/97	263757.600	802453.550	691007.560	836051.941		
MP1-B			GFA/Amdrill	Mud Rotary	None	Bentonite	06/09/97	263757.600	802453.550	691023.110	836052.441		
MP1-C			GFA/Amdrill	Mud Rotary	None	Bentonite	06/10/97	263757.600	802453.550	691034.300	836051.441		
MP1-D			GFA/Amdrill	Mud Rotary	None	Bentonite	06/01/97	263757.600	802453.550	691150.280	836049.441		
MOP1-A			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	04/16/97	264101.011	802233.817	703740.013	854628.588		
MOP1-B			GFA/Amdrill	Mud Rotary	None	Bentonite	06/28/97	264101.011	802233.817	703746.713	854650.188		
MOP2-A			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	03/17/97	263533.215	802645.848	681022.636	821426.200		
MOP2-B			GFA/Amdrill	Mud Rotary	None	Bentonite	06/04/97	263533.215	802645.848	681050.736	821425.700		
MOP2-C			GFA/Amdrill	Mud Rotary	None	Bentonite	06/05/97	263533.215	802645.848	680994.536	821426.700		
MOP3-A			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/09/97	264037.230	802540.419	686824.812	852148.139		
M102-P			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/14/97	263848.307	802451.467	691315.771	841170.438		
M102-PZ			GFA/Amdrill	Mud Rotary	None	Bentonite	05/14/97	263848.307	802451.467	691315.771	841170.438		
M103-P			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/17/97	263811.610	802522.596	688508.012	837452.400		
M103-PZ			GFA/Amdrill	Mud Rotary	None	Bentonite	05/17/97	263811.610	802522.596	688508.012	837452.400		
M203-P			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/20/97	263835.054	802601.548	684962.848	839803.665		
M203-PZ			GFA/Amdrill	Mud Rotary	None	Bentonite	05/20/97	263835.054	802601.548	684962.848	839803.665		
M204-P			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/29/97	263902.993	802524.223	688336.938	842639.741		
M204-PZ			GFA/Amdrill	Mud Rotary	None	Bentonite	05/29/97	263902.993	802524.223	688336.938	842639.741		
M303-P			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/24/97	263638.348	802622.330	683128.764	828011.781		
M303-PZ			GFA/Amdrill	Mud Rotary	None	Bentonite	05/24/97	263638.348	802622.330	683128.764	828011.781		
M401-P			GFA/Amdrill	Mud Rotary	Continuous	Bentonite	05/26/97	263746.312	802624.110	682937.224	834873.266		
M401-PZ			GFA/Amdrill	Mud Rotary	None	Bentonite	05/26/97	263746.312	802624.110	682937.224	834873.266		
ENRP01-A	Levee Core	Rohrer, 1999	Ardaman	Mud Rotary	Partial	Revert	May-95	263914.167	802354.406	696480.877	843805.579		
ENRP01-B		Rohrer, 1999	Ardaman	Mud Rotary	Partial	Revert	May-95	263915.058	802353.778	696537.496	843895.809		

Table 3. Final Construction Table for ENR Mercury Flux Land and Water Based Monitor Wells Page 2 of 6

Site ID	Well Construction Material	Ground Surface Elevation - feet (1)	Measuring Point at Top of Casing - feet (1)	Depth of Well - feet	Depth at Top of Screen - feet	Screen Length - feet	Screen Comments	Screen Slot Size (inch)	Gravel Pack at Screen Interval	Elevation at Top of Well Screen - feet (1)	Elevation at Bottom of Well Screen - feet (1)	Centralizer Used	Owner/ Project Source of Well
MP3-A	2 Inch PVC	17.20	16.95	190.90	175.90	15.00		0.010	6/20	-158.95	-173.95	Yes	Krupa
MP3-B	2 Inch PVC	17.20	16.97	96.36	94.36	2.00		0.010	6/20	-77.39	-79.39	Yes	Krupa
MP3-C	2 Inch PVC	17.20	16.53	62.81	60.81	2.00		0.010	6/20	-44.28	-46.28	Yes	Krupa
MP3-D	2 Inch PVC	17.20	17.00	26.85	24.85	2.00		0.010	6/20	-7.85	-9.85	Yes	Krupa
MP2-A	2 Inch PVC	15.61	15.61	100.90	98.90	2.00		0.010	6/20	-83.29	-85.29	Yes	Krupa
MP2-B	2 Inch PVC	15.61	15.23	62.80	60.80	2.00		0.010	6/20	-45.57	-47.57	Yes	Krupa
MP2-C	2 Inch PVC	15.61	15.37	25.80	23.80	2.00		0.010	6/20	-8.43	-10.43	Yes	Krupa
MP1-A	2 Inch PVC	16.10	16.03	101.48	99.48	2.00		0.010	6/20	-83.45	-85.45	Yes	Krupa
MP1-B	2 Inch PVC	16.10	16.05	60.03	58.03	2.00		0.010	6/20	-41.98	-43.98	Yes	Krupa
MP1-C	2 Inch PVC	16.10	16.05	20.61	18.61	2.00		0.010	6/20	-2.56	-4.56	Yes	Krupa
MP1-D	2 Inch PVC	22.20	22.14	27.94	25.94	2.00		0.010	6/20	-3.80	-5.80	Yes	Krupa
MOP1-A	2 Inch PVC	12.40	12.37	102.10	100.10	2.00		0.010	6/20	-87.73	-89.73	Yes	Krupa
MOP1-B	2 Inch PVC	12.40	12.45	64.97	62.97	2.00		0.010	6/20	-50.52	-52.52	Yes	Krupa
MOP2-A	2 Inch PVC	15.90	16.13	101.65	99.65	2.00		0.010	6/20	-83.52	-85.52	Yes	Krupa
MOP2-B	2 Inch PVC	15.90	15.68	59.26	57.26	2.00		0.010	6/20	-41.58	-43.58	Yes	Krupa
MOP2-C	2 Inch PVC	15.90	16.14	31.50	29.50	2.00		0.010	6/20	-13.37	-15.37	Yes	Krupa
MOP3-A	2 Inch PVC	12.20	12.01	95.41	93.41	2.00		0.010	6/20	-81.40	-83.40	Yes	Krupa
M102-P	2 Inch PVC	7.51	19.12	40.28	38.28	2.00		0.010	6/20	-19.16	-21.16	Yes	Krupa
M102-PZ	.75 Inch PVC	7.51	19.15	22.04	21.04	1.00		0.010	6/20	-1.89	-2.89	Yes	Krupa
M103-P	2 Inch PVC	9.54	18.22	37.51	35.51	2.00		0.010	6/20	-17.29	-19.29	Yes	Krupa
M103-PZ	.75 Inch PVC	9.54	18.74	19.93	18.93	1.00		0.010	6/20	-0.19	-1.19	Yes	Krupa
M203-P	2 Inch PVC	8.63	18.36	37.87	35.87	2.00		0.010	6/20	-17.51	-19.51	Yes	Krupa
M203-PZ	.75 Inch PVC	8.63	18.36	21.06	20.06	1.00		0.010	6/20	-1.70	-2.70	Yes	Krupa
M204-P	2 Inch PVC	8.44	18.30	37.44	35.44	2.00		0.010	6/20	-17.14	-19.14	Yes	Krupa
M204-PZ	.75 Inch PVC	8.44	18.23	19.94	18.94	1.00		0.010	6/20	-0.71	-1.71	Yes	Krupa
M303-P	2 Inch PVC	8.04	18.15	36.37	34.37	2.00		0.010	6/20	-16.22	-18.22	Yes	Krupa
M303-PZ	.75 Inch PVC	8.04	18.14	14.49	13.49	1.00		0.010	6/20	4.65	3.65	Yes	Krupa
M401-P	2 Inch PVC	8.29	18.79	37.61	35.61	2.00		0.010	6/20	-16.82	-18.82	Yes	Krupa
M401-PZ	.75 Inch PVC	8.29	18.83	23.04	22.04	1.00		0.010	6/20	-3.21	-4.21	Yes	Krupa
ENRP01-A	2 Inch PVC	23.20	22.95	100.00	80.00	20.00	Open Hole			-57.05	-77.05	No	Rohrer
ENRP01-B	8 Inch PVC	22.99	22.75	93.00	73.00	20.00	Open Hole			-50.25	-70.25	No	Rohrer

Table 3. Final Construction Table for ENR Mercury Flux Land and Water Based Monitor Wells Page 3 of 6

Site ID	Comments	Sources of Information in Addition to this Study	Drilling Contractor	Drilling Method	Geologic Sampling	Drilling Mud	Well Installation Date	Latitude	Longitude	State Planar		State Planar	
										Easting 1927 Datum (feet)	Northing 1927 Datum (feet)	Easting 1983 Datum (feet)	Northing 1983 Datum (feet)
ENRP02-A		Rohrer, 1999	Ardaman	Mud Rotary	Partial	Revert	Aug-95	263935.679	802424.313	693757.336	845964.891		
ENRP02-B	Levee Core	Rohrer, 1999	Ardaman	Mud Rotary	Partial	Revert	Aug-95						
ENRP03-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263927.555	802508.760	689728.637	845126.055		
ENRP03-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95						
ENRP03-C		Hutcheon, 1996	Ardaman	6" HSA**	Partial	None	Jul-96					845959.288	845333.675
ENRP03-D		Hutcheon, 1996	Ardaman	6" HSA**	Partial	None	Jul-96					845965.048	845453.853
ENRP04-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263855.037	802608.424	684330.015	841818.570		
ENRP04-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95						
ENRP04-C		Hutcheon, 1996	Ardaman	6" HSA**	Partial	None	Jul-96					840580.013	842014.573
ENRP04-D		Hutcheon, 1996	Ardaman	6" HSA**	Partial	None	Jul-96					840578.683	842247.061
ENRP05-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263827.925	802640.854	681399.382	839068.193		
ENRP05-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263826.531	802640.921	681393.953	838927.444	837604.924	839406.174
ENRP05-D		Hutcheon, 1996	Ardaman	6" HSA**	Partial	None	Jul-96		on private	property		836738.041	839406.301
ENRP05-E		Hutcheon, 1996	Ardaman	6" HSA**	Partial	None	Jul-96		on private	property		835673.621	839401.408
ENRP05-F		Hutcheon, 1996	Ardaman	6" HSA**	Partial	None	Jul-96		on private	property		833737.626	839392.225
ENRP06-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263732.210	802642.870	681244.820	833441.496		
ENRP06-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263732.205	802642.827	681244.820	833441.496		
ENRP07-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263626.223	802644.851	681090.018	826778.718		
ENRP07-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	Aug-95	263626.260	802644.868	681088.407	826782.420		
ENRP08-B	Levee Core	Rohrer, 1999	Ardaman	Mud Rotary	Partial	Revert	May-95	263600.690	802623.803	683011.745	824209.025		
ENRP09-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263624.788	802613.390	683946.218	826646.303		
ENRP10-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263654.734	802542.108	686772.130	829682.415		
ENRP10-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263654.717	802542.075	686775.115	829680.706		
ENRP11-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263750.892	802600.504	685077.336	835345.178		
ENRP11-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95						
ENRP12-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263811.276	802442.926	692107.957	837435.037		
ENRP12-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263811.226	802442.990	692102.106	837429.993		
ENRP13-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263848.381	802414.328	694685.570	841193.481		
ENRP13-B	Levee Core	Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95						
ENRP14-A		Rohrer, 1999	Ardaman	8" HSA**	Partial	None	May-95	263601.720	802623.009	683083.340	824313.287		
ENRP14-B	Mud In Hole	Rohrer, 1999	Ardaman	Mud Rotary	Partial	Revert	May-95	263601.084	802623.496	683039.412	824248.882		

Table 3. Final Construction Table for ENR Mercury Flux Land and Water Based Monitor Wells Page 4 of 6

Site ID	Well Construction Material	Ground Surface Elevation - feet (1)	Measuring Point at Top of Casing - feet (1)	Depth of Well - feet	Depth at Top of Screen - feet	Screen Length - feet	Screen Comments	Screen Slot Size (inch)	Gravel Pack at Screen Interval	Elevation at Top of Well Screen - feet (1)	Elevation at Bottom of Well Screen - feet (1)	Centralizer Used	Owner/ Project Source of Well
ENRP02-A	2 Inch PVC	17.30	17.05	21.40	19.40	2.00				-2.35	-4.35	No	Rohrer
ENRP02-B	2 Inch PVC	17.34	17.12	11.34	9.34	2.00				7.78	5.78	No	Rohrer
ENRP03-A	2 Inch PVC	16.14	15.92	22.80	20.80	2.00				-4.88	-6.88	No	Rohrer
ENRP03-B	2 Inch PVC	16.20	15.97	10.45	8.45	2.00				7.52	5.52	No	Rohrer
ENRP03-C	2 Inch PVC		11.87	27.60	22.60	5.00		0.010	20/30	-10.73	-15.73	No	Hutcheon
ENRP03-D	2 Inch PVC		12.00	27.04	22.04	5.00		0.010	20/30	-10.04	-15.04	No	Hutcheon
ENRP04-A	2 Inch PVC	16.37	16.11	22.40	20.40	2.00				-4.29	-6.29	No	Rohrer
ENRP04-B	2 Inch PVC	16.34	16.03	9.45	7.45	2.00				8.58	6.58	No	Rohrer
ENRP04-C	2 Inch PVC	16.30	13.05	27.38	22.38	5.00		0.010	20/30	-9.33	-14.33	No	Hutcheon
ENRP04-D	2 Inch PVC	16.30	14.26	27.04	22.04	5.00		0.010	20/30	-7.78	-12.78	No	Hutcheon
ENRP05-A	2 Inch PVC	16.25	16.06	27.90	25.90	2.00				-9.84	-11.84	No	Rohrer
ENRP05-B	2 Inch PVC	19.10	15.97	12.22	10.22	2.00		0.010	20/30	5.75	3.75	No	Rohrer
ENRP05-D	2 Inch PVC		14.23	27.69	22.69	5.00		0.010	20/30	-8.46	-13.46	No	Hutcheon
ENRP05-E	2 Inch PVC		14.89	27.81	22.81	5.00		0.010	20/30	-7.92	-12.92	No	Hutcheon
ENRP05-F	2 Inch PVC		14.86	27.80	22.80	5.00		0.010	20/30	-7.94	-12.94	No	Hutcheon
ENRP06-A	2 Inch PVC	16.33	16.08	20.80	18.80	2.00		0.010	20/30	-2.72	-4.72	No	Rohrer
ENRP06-B	2 Inch PVC	16.31	16.08	10.41	8.41	2.00		0.010	20/30	7.67	5.67	No	Rohrer
ENRP07-A	2 Inch PVC	15.11	14.91	26.50	24.50	2.00		0.010	20/30	-9.59	-11.59	No	Rohrer
ENRP07-B	2 Inch PVC	15.06	14.70	12.14	10.14	2.00		0.010	20/30	4.56	2.56	No	Rohrer
ENRP08-B	2 Inch PVC	21.06	20.87	96.90	76.90	20.00		0.010	20/30	-56.03	-76.03	No	Rohrer
ENRP09-A	2 Inch PVC		15.45	15.00	5.00	10.00		0.010	20/30	10.45	0.45	No	Rohrer
ENRP10-A	2 Inch PVC	21.53	21.21	21.30	19.30	2.00		0.010	20/30	1.91	-0.09	No	Rohrer
ENRP10-B	2 Inch PVC	21.43	21.26	15.50	13.50	2.00		0.010	20/30	7.76	5.76	No	Rohrer
ENRP11-A	2 Inch PVC	15.11	14.84	26.30	24.30	2.00		0.010	20/30	-9.46	-11.46	No	Rohrer
ENRP11-B	2 Inch PVC	15.11	14.79	9.25	7.25	2.00		0.010	20/30	7.54	5.54	No	Rohrer
ENRP12-A	2 Inch PVC	22.59	22.42	23.90	21.90	2.00		0.010	20/30	0.52	-1.48	No	Rohrer
ENRP12-B	2 Inch PVC	22.62	22.38	18.20	16.20	2.00		0.010	20/30	6.18	4.18	No	Rohrer
ENRP13-A	2 Inch PVC	22.86	22.62	27.50	22.50	5.00		0.010	20/30	0.12	-4.88	No	Rohrer
ENRP13-B	2 Inch PVC	22.85	22.61	19.92	17.92	2.00		0.010	20/30	4.69	2.69	No	Rohrer
ENRP14-A	2 Inch PVC	20.90	20.57	63.00	25.00	38.00	Open Hole			-4.43	-42.43	No	Rohrer
ENRP14-B	8 Inch PVC	20.80	20.80	62.00	24.00	38.00	Open Hole			-3.20	-41.20	No	Rohrer

Table 3. Final Construction Table for ENR Mercury Flux Land and Water Based Monitor Wells Page 5 of 6

Site ID	Comments	Sources of Information in Addition to this Study	Drilling Contractor	Drilling Method	Geologic Sampling	Drilling Mud	Well Installation Date	Latitude	Longitude	State Planar Easting 1927 Datum (feet)	State Planar Northing 1927 Datum (feet)	State Planar Easting 1983 Datum (feet)	State Planar Northing 1983 Datum (feet)
P23-A		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jun-96	263927.578	802517.209	688962.114	845124.928	845196.894	845292.502
P23-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jun-96					845193.572	845292.635
P23-C		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jun-96					845193.623	845328.258
P23-D		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jun-96					845204.554	845452.748
P24-A		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96	263855.083	802623.237	682985.933	841817.248	839215.639	841982.131
P24-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					839222.455	841982.239
P24-C		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					839226.184	842011.230
P24-D		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					839222.692	842137.365
P25-A		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96	263847.924	802640.563	681417.013	841087.543	837648.660	841242.546
P25-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					837648.263	841247.265
P25-C		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					837618.042	841248.308
P26-A		Hutcheon, 1996	Lemenze	6" HSA**	Partial	None	Jul-96	263837.986	802640.887	681392.016	840084.076	837622.958	840246.464
P26-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					837622.936	840242.141
P26-C		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					837589.220	840252.853
P27-A		Hutcheon, 1996	Lemenze	6" HSA**	Partial	None	Jul-96	263818.145	802641.500	681345.096	838080.504	837576.819	838243.465
P27-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					837576.940	838238.572
P27-C		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					837539.605	838243.281
P27-D		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					837428.989	838243.386
P28-A		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96	263804.347	802615.451	683714.943	836697.698	839952.742	836849.438
P28-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					839949.126	836849.283
P29-A		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96	263804.309	802604.405	684714.374	836698.245	840948.159	836853.762
P29-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					840952.729	836854.302
P30-A		Hutcheon, 1996	Lemenze	6" HSA**	Partial	None	Jul-96	263824.232	802534.716	687402.453	838721.864	843643.030	838881.990
P30-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					843637.609	838877.059
P31-A		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96	263846.521	802517.523	688952.401	840979.394	845192.080	841138.535
P31-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					845139.191	841134.080
P32-A		Hutcheon, 1996	Lemenze	6" HSA**	Partial	None	Jul-96	263907.780	802501.122	690430.723	843132.640	846673.695	843288.386
P32-B		Hutcheon, 1996	PSI	6" HSA**	Partial	None	Jul-96					846670.827	843284.818

Table 3. Final Construction Table for ENR Mercury Flux Land and Water Based Monitor Wells Page 6 of 6

Site ID	Well Construction Material	Ground Surface Elevation - feet (1)	Measuring Point at Top of Casing - feet (1)	Depth of Well - feet	Depth at Top of Screen - feet	Screen Length - feet	Screen Comments	Screen Slot Size (inch)	Gravel Pack at Screen Interval	Elevation at Top of Well Screen - feet (1)	Elevation at Bottom of Well Screen - feet (1)	Centralizer Used	Owner/ Project Source of Well
P23-A	2 Inch PVC		18.61	30.45	25.45	5.00		0.010	20/30	-6.84	-11.84	No	Hutcheon
P23-B	2 Inch PVC		18.76	18.05	13.05	5.00		0.010	20/30	5.71	0.71	No	Hutcheon
P23-C	2 Inch PVC		12.23	27.98	24.98	3.00		0.010	20/30	-12.75	-15.75	No	Hutcheon
P23-D	2 Inch PVC		11.71	26.49	21.49	5.00		0.010	20/30	-9.78	-14.78	No	Hutcheon
P24-A	2 Inch PVC		19.21	32.16	27.16	5.00		0.010	20/30	-7.95	-12.95	No	Hutcheon
P24-B	2 Inch PVC		19.28	17.21	12.21	5.00		0.010	20/30	7.07	2.07	No	Hutcheon
P24-C	2 Inch PVC		11.55	27.85	22.85	5.00		0.010	20/30	-11.30	-16.30	No	Hutcheon
P24-D	2 Inch PVC		15.16	27.64	24.64	3.00		0.010	20/30	-9.48	-12.48	No	Hutcheon
P25-A	2 Inch PVC		19.38	30.97	25.97	5.00		0.010	20/30	-6.59	-11.59	No	Hutcheon
P25-B	2 Inch PVC		19.41	17.99	12.99	5.00		0.010	20/30	6.42	1.42	No	Hutcheon
P25-C	2 Inch PVC		13.21	27.72	24.72	3.00		0.010	20/30	-11.51	-14.51	No	Hutcheon
P26-A	2 Inch PVC		20.02	32.14	30.14	2.00		0.010	20/30	-10.12	-12.12	No	Hutcheon
P26-B	2 Inch PVC		20.15	17.96	15.96	2.00		0.010	20/30	4.19	2.19	No	Hutcheon
P26-C	2 Inch PVC		13.02	26.60	23.60	3.00		0.010	20/30	-10.58	-13.58	No	Hutcheon
P27-A	2 Inch PVC		19.60	32.42	30.42	2.00		0.010	20/30	-10.82	-12.82	No	Hutcheon
P27-B	2 Inch PVC		20.09	18.15	16.15	2.00		0.010	20/30	3.94	1.94	No	Hutcheon
P27-C	2 Inch PVC		13.31	27.43	24.43	3.00		0.010	20/30	-11.12	-14.12	No	Hutcheon
P27-D	2 Inch PVC		15.10	27.70	22.70	5.00		0.010	20/30	-7.60	-12.60	No	Hutcheon
P28-A	2 Inch PVC		18.49	32.61	27.61	5.00		0.010	20/30	-9.12	-14.12	No	Hutcheon
P28-B	2 Inch PVC		18.37	18.09	16.09	2.00		0.010	20/30	2.28	0.28	No	Hutcheon
P29-A	2 Inch PVC		18.53	31.81	26.81	5.00		0.010	20/30	-8.28	-13.28	No	Hutcheon
P29-B	2 Inch PVC		18.43	17.63	15.63	2.00		0.010	20/30	2.80	0.80	No	Hutcheon
P30-A	2 Inch PVC		18.65	30.72	25.72	5.00		0.010	20/30	-7.07	-12.07	No	Hutcheon
P30-B	2 Inch PVC		18.72	17.98	15.98	2.00		0.010	20/30	2.74	0.74	No	Hutcheon
P31-A	2 Inch PVC		17.85	32.75	27.75	5.00		0.010	20/30	-9.90	-14.90	No	Hutcheon
P31-B	2 Inch PVC		18.25	17.82	15.82	2.00		0.010	20/30	2.43	0.43	No	Hutcheon
P32-A	2 Inch PVC		19.24	33.92	28.92	5.00		0.010	20/30	-9.68	-14.68	No	Hutcheon
P32-B	2 Inch PVC		18.08	17.82	15.82	2.00		0.010	20/30	2.26	0.26	No	Hutcheon

(1) All elevations are 1929 NGVD * Hollow Stem Auger

WCA-2A Final Well Construction Information

Table 4. Final Construction Table for WCA2-A Mercury Flux Land and Water Based Monitor Wells Page 1 of 2

Site ID	Drilling Contractor	Drilling Method	Geologic Sampling	Drilling Mud	Well Installation Date	Latitude	Longitude	State Planar		Well Construction Material
								Easting 1927 Datum (feet)	Northing 1927 Datum (feet)	
WC2E1GW1	SFWMD	Hand-driven	None	Surface Water	11/01/95	262104.431	802115.104	711487.876	737218.199	2 Inch Gal
WC2E1GW2	SFWMD	Hand-driven	None	Surface Water	11/01/95	262104.431	802115.104	711487.876	737218.199	2 Inch Gal
WC2E1GW3	USGS	Core/Wash	Continuous	Surface Water	12/02/96	262104.431	802115.104	711487.876	737218.199	1.5 Inch PVC
WC2E1GW4	USGS	Core/Wash	Continuous	Surface Water	12/03/96	262104.431	802115.104	711487.876	737218.199	1.5 Inch PVC
WC2E4GW1	SFWMD	Hand-driven	None	Surface Water	11/01/95	261831.114	802126.072	710567.094	718364.458	2 Inch Gal
WC2E4GW2	SFWMD	Hand-driven	None	Surface Water	11/01/95	261831.114	802126.072	710567.094	718364.458	2 Inch Gal
WC2E4GW3	USGS	Core/Wash	Continuous	Surface Water	12/05/96	261831.114	802126.072	710567.094	718364.458	1.5 Inch PVC
WC2E4GW4	USGS	Core/Wash	Continuous	Surface Water	12/06/96	261831.114	802126.072	710567.094	718364.458	1.5 Inch PVC
WC2U1GW1	SFWMD	Hand-driven	None	Surface Water	11/30/95	261426.021	802121.284	711126.010	693621.154	2 Inch Gal
WC2U1GW2	SFWMD	Hand-driven	None	Surface Water	11/30/95	261426.021	802121.284	711126.010	693621.154	2 Inch Gal
WC2U1GW3	USGS	Core/Wash	Continuous	Surface Water	12/05/96	261426.021	802121.284	711126.010	693621.154	1.5 Inch PVC
WC2U1GW4	USGS	Core/Wash	Continuous	Surface Water	12/06/96	261426.021	802121.284	711126.010	693621.154	1.5 Inch PVC
WC2F1GW1	SFWMD	Hand-driven	None	Surface Water	01/02/96	262138.075	802210.652	706418.181	737220.900	2 Inch Gal
WC2F1GW2	SFWMD	Hand-driven	None	Surface Water	01/02/96	262138.075	802210.652	706420.840	737221.711	2 Inch Gal
WC2F1GW3	USGS	Core/Wash	Continuous	Surface Water	12/11/96	262138.075	802210.652	706421.113	737217.797	1.5 Inch PVC
WC2F1GW4	USGS	Core/Wash	Continuous	Surface Water	12/11/96	262138.075	802210.652	706430.263	737212.427	1.5 Inch PVC
WC2F4GW1	SFWMD	Hand-driven	None	Surface Water	01/02/96	261859.788	802307.310	701340.568	721214.663	2 Inch Gal
WC2F4GW2	SFWMD	Hand-driven	None	Surface Water	01/02/96	261859.788	802307.310	701340.568	721214.663	2 Inch Gal
WC2F4GW3	USGS	Core/Wash	Continuous	Surface Water	12/04/96	261859.788	802307.310	701340.568	721214.663	1.5 Inch PVC
WC2F4GW4	USGS	Core/Wash	Continuous	Surface Water	12/05/96	261859.788	802307.310	701340.568	721214.663	1.5 Inch PVC
WC2U3GW1	SFWMD	Hand-driven	None	Surface Water	01/04/96	261713.664	802441.991	692773.768	710459.902	2 Inch Gal
WC2U3GW2	SFWMD	Hand-driven	None	Surface Water	01/04/96	261713.664	802441.991	692773.768	710459.902	2 Inch Gal
WC2U3GW3	USGS	Core/Wash	Continuous	Surface Water	12/08/96	261713.664	802441.991	692773.768	710459.902	1.5 Inch PVC
WC2U3GW4	USGS	Core/Wash	Continuous	Surface Water	12/09/96	261713.664	802441.991	692773.768	710459.902	1.5 Inch PVC
S10C-WA	GFA/Amdrill	Mud Rotary	Continuous	Bentonite + City Wate	03/12/97	262215.350	802104.055	712456.958	741014.310	2 Inch PVC
S10C-WB	GFA/Amdrill	Mud Rotary	Partial	Bentonite + City Wate	03/13/97	262215.350	802104.055	712456.958	741014.310	2 Inch PVC
S10C-WC	GFA/Amdrill	Mud Rotary	Partial	Bentonite + City Wate	03/14/97	262215.350	802104.055	712456.958	741014.310	2 Inch PVC

Table 4. Final Construction Table for WCA2-A Mercury Flux Land and Water Based Monitor Wells Page 2 of 2

Site ID	Ground Surface Elevation - feet (1)	Measuring Point at Top of Casing - feet (1)	Depth of Well - feet	Depth at Top of Screen - feet	Screen Length - feet	Screen Slot Size (inch)	Gravel Pack at Screen Interval	Elevation at Top of Well Screen - feet (1)	Elevation at Bottom of Well Screen - feet (1)	Centralizer Used	Owner/ Project Source of Well
WC2E1GW1	12.50	18.58	14.65		0.00					No	Krupa
WC2E1GW2	12.50	18.75	14.68		0.00					No	Krupa
WC2E1GW3	12.50	18.03	27.20	25.20	2.00	0.010	6/20	-7.17	-9.17	No	Krupa
WC2E1GW4	12.50	18.04	15.68	13.68	2.00	0.010	6/20	4.36	2.36	No	Krupa
WC2E4GW1	11.97	17.74	10.00		0.00					No	Krupa
WC2E4GW2	11.97	17.78	10.00		0.00					No	Krupa
WC2E4GW3	11.97	17.29	23.70	21.70	2.00	0.010	6/20	-4.41	-6.41	No	Krupa
WC2E4GW4	11.97	17.28	13.70	11.70	2.00	0.010	6/20	5.58	3.58	No	Krupa
WC2U1GW1	10.87	18.54	12.70		0.00					No	Krupa
WC2U1GW2	10.87	16.88	10.00		0.00					No	Krupa
WC2U1GW3	10.87	16.79	28.90	26.90	2.00	0.010	6/20	-10.11	-12.11	No	Krupa
WC2U1GW4	10.87	16.80	21.38	19.38	2.00	0.010	6/20	-2.58	-4.58	No	Krupa
WC2F1GW1	11.92	18.53	15.09		0.00					No	Krupa
WC2F1GW2	11.92	18.43	14.93		0.00					No	Krupa
WC2F1GW3	11.92	17.96	33.95	31.95	2.00	0.010	6/20	-13.99	-15.99	No	Krupa
WC2F1GW4	11.92	18.02	14.55	12.55	2.00	0.010	6/20	5.47	3.47	No	Krupa
WC2F4GW1	11.53	18.57	11.60		0.00					No	Krupa
WC2F4GW2	11.53	16.84	10.00		0.00					No	Krupa
WC2F4GW3	11.53	17.38	29.30	27.30	2.00	0.010	6/20	-9.92	-11.92	No	Krupa
WC2F4GW4	11.53	17.57	13.05	11.05	2.00	0.010	6/20	6.52	4.52	No	Krupa
WC2U3GW1	11.16	17.49	14.85		0.00					No	Krupa
WC2U3GW2	11.16	17.59	14.73		0.00					No	Krupa
WC2U3GW3	11.16	17.23	34.20	32.20	2.00	0.010	6/20	-14.97	-16.97	No	Krupa
WC2U3GW4	11.16	17.19	13.30	11.30	2.00	0.010	6/20	5.89	3.89	No	Krupa
S10C-WA	22.41	22.21	101.39	99.39	2.00	0.010	6/20	-77.18	-79.18	Yes	Krupa
S10C-WB	23.12	22.92	64.59	62.59	2.00	0.010	6/20	-39.67	-41.67	Yes	Krupa
S10C-WC	21.84	21.64	31.47	29.47	2.00	0.010	6/20	-7.83	-9.83	Yes	Krupa

(1) All elevations are 1929 NGVD

Gal = galvinized steel pipe

APPENDIX III

Lithology and Hydrogeology of the Surficial Aquifer

Boring Logs for Deep Levee-Based Wells

Note: Numerical values found in the remarks section of the boring logs indicate the fossils found in those sediment sample. The key for the fossil's genus and species can be found in the section entitled "List of Fossils Recovered from Sieve Samples".

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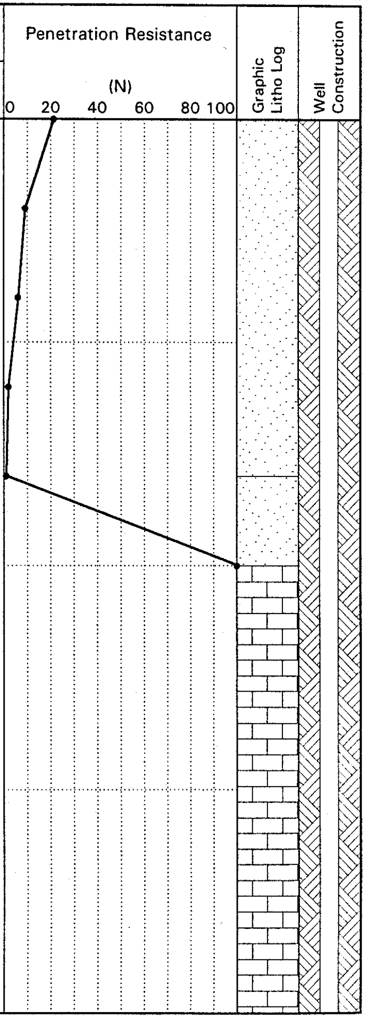
TEST BORING LOG

BORING/WELL NO. **MP-1**
PROJECT NO./NAME **SFWMD #C7679/MERCURY FLUX STUDY**
LOCATION **WCA2A / ENR**
DRILLING CONTRACTOR/DRILLER **GFA International/Scott Smith**
GEOLOGIST/OFFICE **Fred Kaub/GFA/**
DRILLING EQUIPMENT/METHOD **CME 55/SPT / CORE**
SIZE/TYPE OF BIT **7-7/8" rotary wash**
SAMPLING METHOD **SPT/Core**
START/FINISH DATE **4/7/97-4/10/97**
WELL INSTALLED? YES ☒ NO ☐
CASING MAT./DIA. **Sch.40 PVC 2"**
SCREEN: TYPE **Slotted** MAT. **PVC** LENGTH **2'** DIA. **2"** SLOT SIZE **.010**
ELEVATION OF: (FT. ABOVE M.S.L.) GROUND SURFACE **16.1** TOP OF WELL CASING **16.03** TOP & BOTTOM SCREEN **-81.97/-83.97** GW SURFACE DATE **N/A**
REMARKS:

Depth (ft)	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING DESCRIPTION	REMARKS
	S1	7/9/12/10 21	SP		
	S2	3/3/6/7 9	SP	poorly graded Sand 10YR6/2	
5	S3	3/3/3/2 6	SP	poorly graded Sand 10YR6/2	
	S4	1/1/1/2 2		poorly graded Sand 7.5YR6/2	
	S5	1/1/0/2 1		poorly graded Sand	8.0
10	S6	1/0/7/50+ 100		poorly graded Sand with silt and gravel 5/N	10.0
15	S7		SP	sandy Limestone	
	S8		SP	sandy Limestone 2.5Y6/1	core time 3.1 min. 141,239,256



▦ Fine Sand
■ Bentonite Pellets
▨ Cement/Bentonite Grout
☒ Standard Penetration Test
■ Core

Figure 7. Borehole log for ENR site MP1-A. Page 1 of 4

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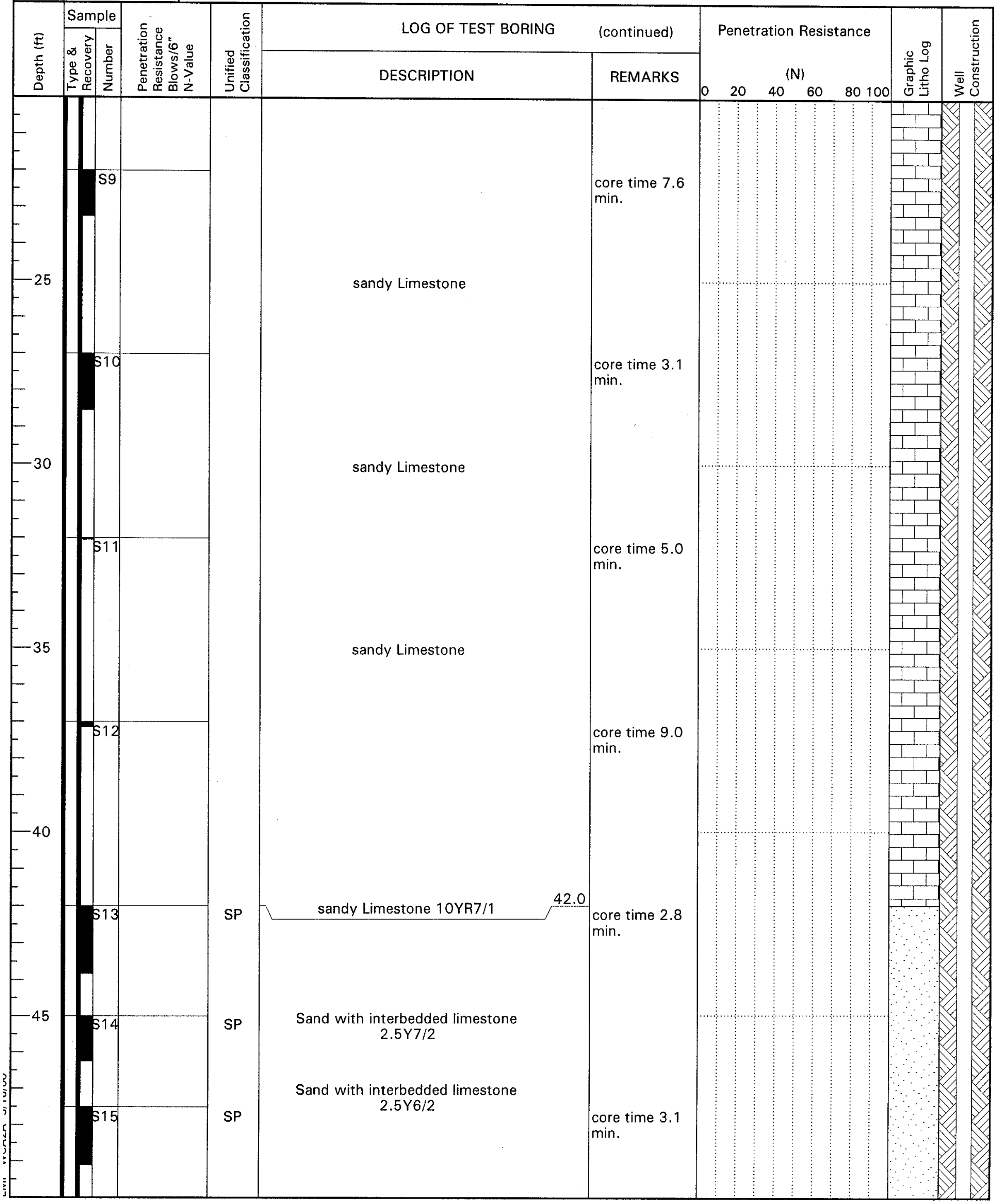
BORING/WELL NO.
MP-1



LOG OF TEST BORING (continued)

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
		S9				core time 7.6 min.
25					sandy Limestone	
		S10				core time 3.1 min.
30					sandy Limestone	
		S11				core time 5.0 min.
35					sandy Limestone	
		S12				core time 9.0 min.
40						
		S13		SP	sandy Limestone 10YR7/1 42.0	core time 2.8 min.
45		S14		SP	Sand with interbedded limestone 2.5Y7/2	
		S15		SP	Sand with interbedded limestone 2.5Y6/2	core time 3.1 min.

Figure 7. Borehole log of ENR site MP1-A. Page 2 of 4

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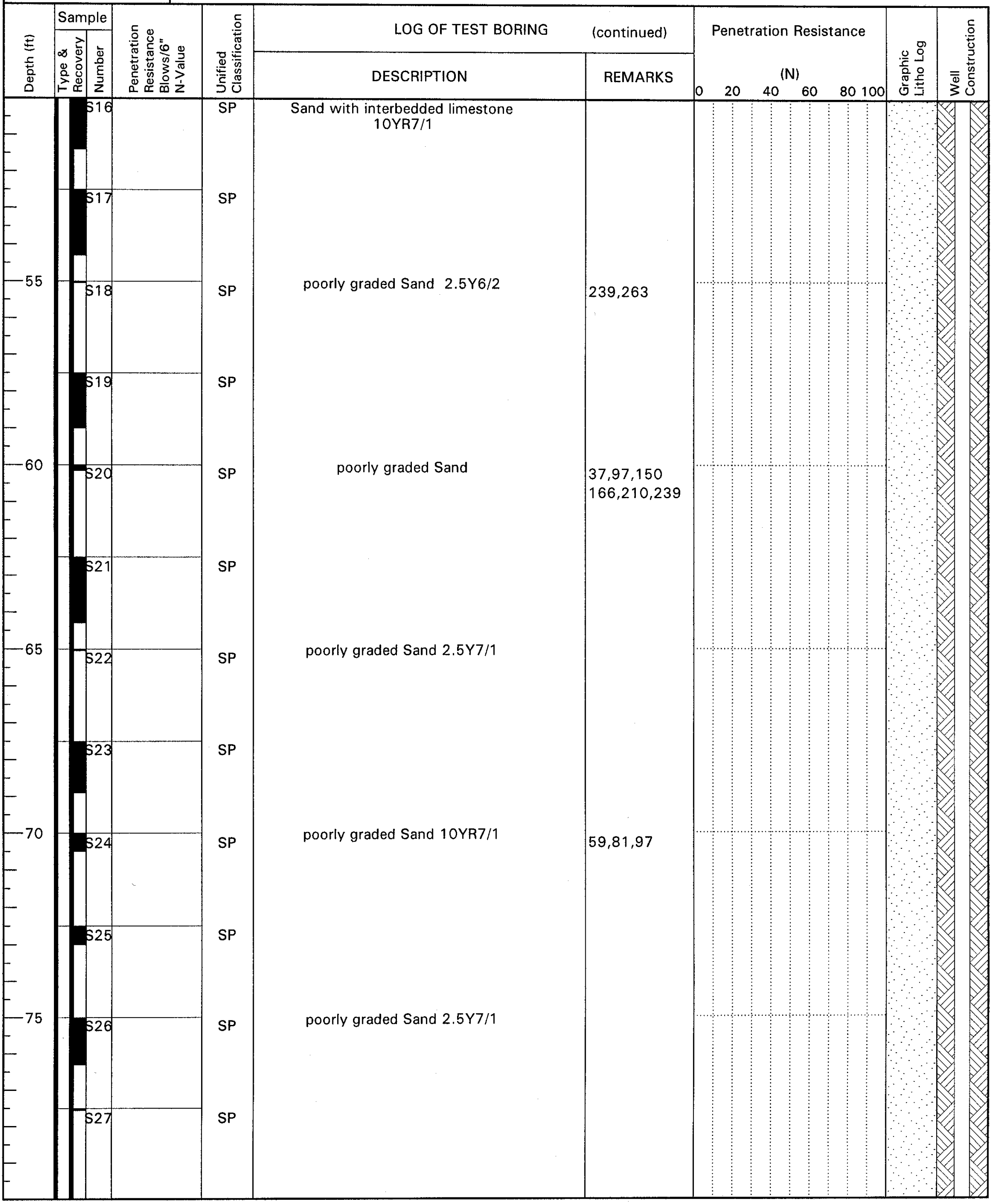
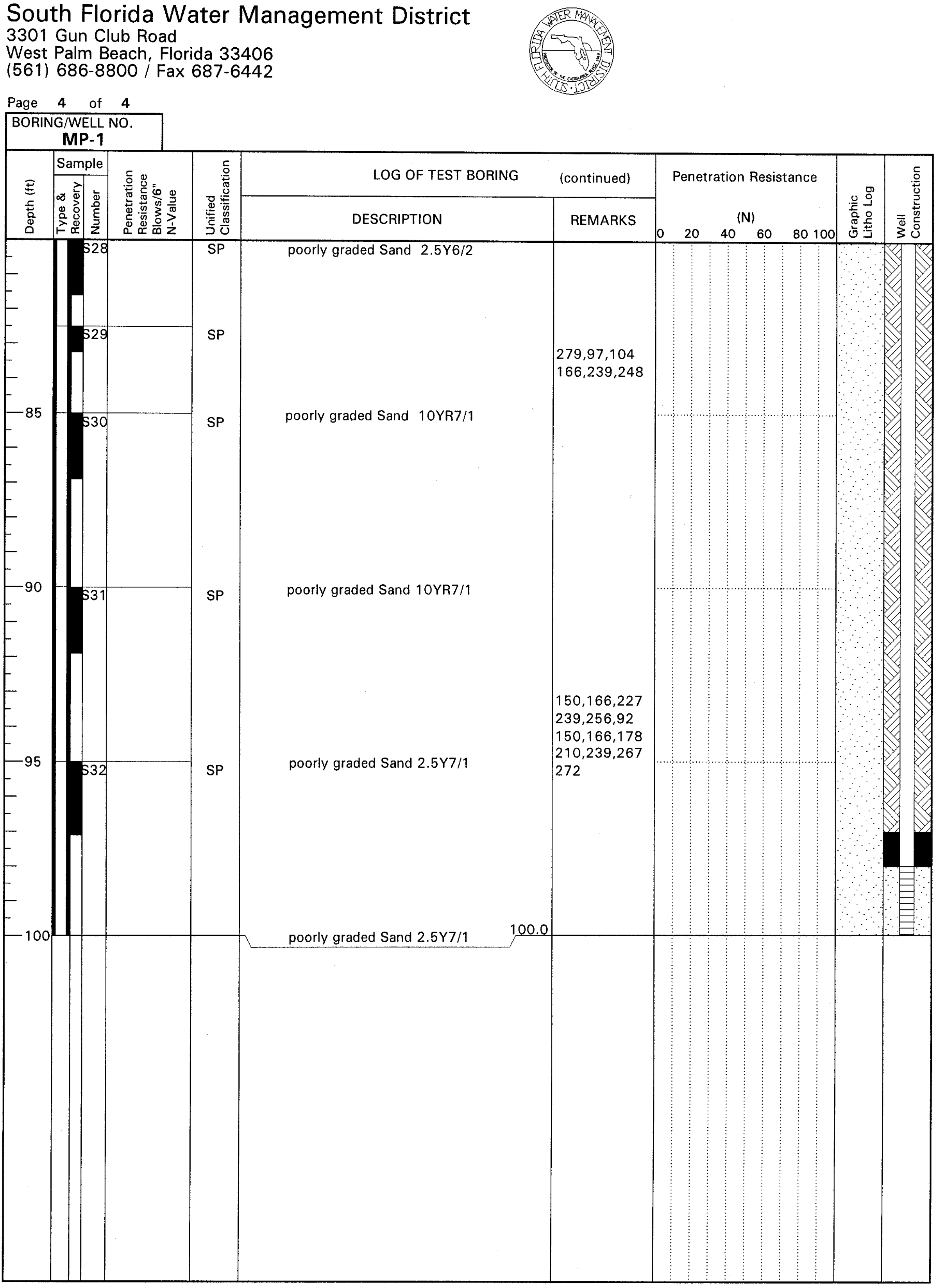
BORING/WELL NO.
MP-1



LOG OF TEST BORING (continued)

Depth (ft)	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
	S16		SP	Sand with interbedded limestone 10YR7/1	
	S17		SP		
55	S18		SP	poorly graded Sand 2.5Y6/2	239,263
	S19		SP		
60	S20		SP	poorly graded Sand	37,97,150 166,210,239
	S21		SP		
65	S22		SP	poorly graded Sand 2.5Y7/1	
	S23		SP		
70	S24		SP	poorly graded Sand 10YR7/1	59,81,97
	S25		SP		
75	S26		SP	poorly graded Sand 2.5Y7/1	
	S27		SP		

Figure 7. Borehole log of ENR site MP1-A. Page 3 of 4



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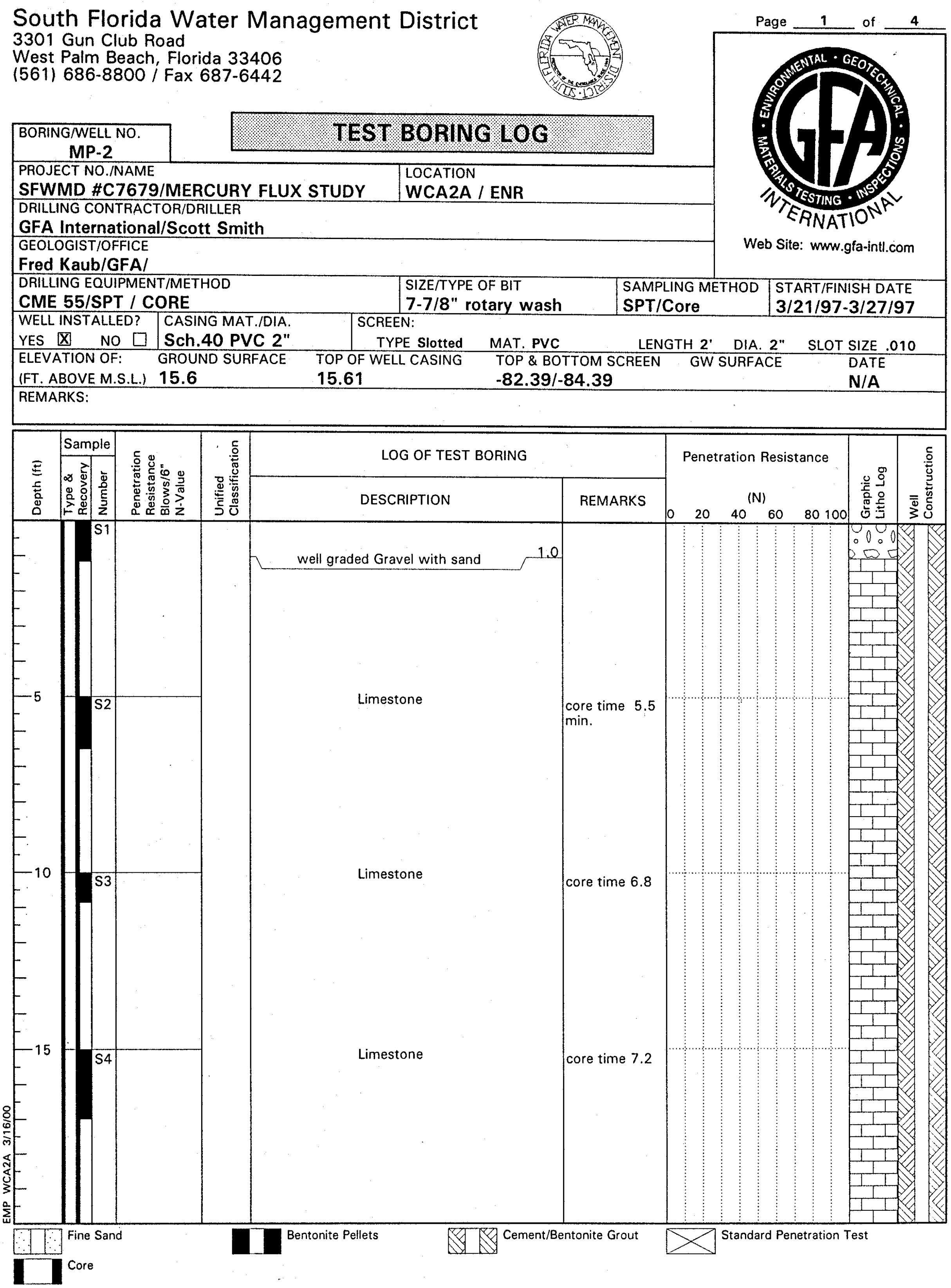
BORING/WELL NO.
MP-1

LOG OF TEST BORING (continued)

Depth (ft)	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
	S28		SP	poorly graded Sand 2.5Y6/2	
	S29		SP		279,97,104 166,239,248
85	S30		SP	poorly graded Sand 10YR7/1	
90	S31		SP	poorly graded Sand 10YR7/1	
95	S32		SP	poorly graded Sand 2.5Y7/1	150,166,227 239,256,92 150,166,178 210,239,267 272
100				poorly graded Sand 2.5Y7/1 100.0	

Figure 7. Borehole log of ENR site MP1-A. Page 4 of 4



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TEST BORING LOG

BORING/WELL NO.: **MP-2**

PROJECT NO./NAME: **SFWMD #C7679/MERCURY FLUX STUDY**

LOCATION: **WCA2A / ENR**

DRILLING CONTRACTOR/DRILLER: **GFA International/Scott Smith**

GEOLOGIST/OFFICE: **Fred Kaub/GFA/**

DRILLING EQUIPMENT/METHOD: **CME 55/SPT / CORE**

SIZE/TYPE OF BIT: **7-7/8" rotary wash**

SAMPLING METHOD: **SPT/Core**

START/FINISH DATE: **3/21/97-3/27/97**

WELL INSTALLED? YES ☒ NO ☐

CASING MAT./DIA.: **Sch.40 PVC 2"**

SCREEN: TYPE **Slotted** MAT. **PVC** LENGTH **2'** DIA. **2"** SLOT SIZE **.010**

ELEVATION OF: (FT. ABOVE M.S.L.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GW SURFACE	DATE
	15.6	15.61	-82.39/-84.39		N/A

REMARKS:

Depth (ft)	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
0	S1			well graded Gravel with sand (1.0)	
5	S2			Limestone	core time 5.5 min.
10	S3			Limestone	core time 6.8
15	S4			Limestone	core time 7.2

Penetration Resistance (N): 0 20 40 60 80 100

Graphic Litho Log

Well Construction

Fine Sand

Bentonite Pellets

Cement/Bentonite Grout

Standard Penetration Test

Core

EMP WCA2A 3/16/00

Figure 8. Borehole log of ENR site MP2-A. Page 1 of 4

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BORING/WELL NO.
MP-2

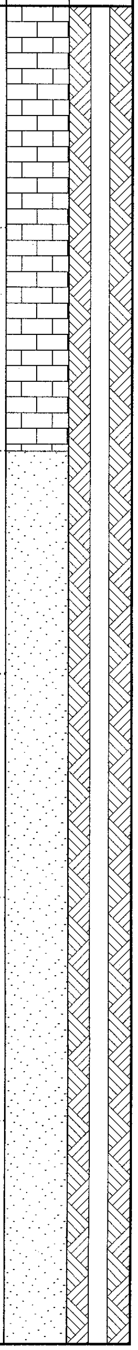
LOG OF TEST BORING (continued)

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
		S5			Limestone	core time 5.9 min.
25		S6			sandy Limestone	core time 2.7 min.
30		S7			sandy Limestone 30.0	core time 2.4 min. 81,97,166
35		S8		SP	Sand with interbedded limestone 2.5Y6/1	core time 1.4 min. 12
40		S9		SP	poorly graded Sand 2.5Y7/1	core time .5 min.
45		S10		SP	poorly graded Sand 2.5Y7/1	97

Penetration Resistance (N)
0 20 40 60 80 100

Graphic Litho Log

Well Construction



EMP WCA2A 3/16/00

Figure 8. Borehole log of ENR site MP2-A. Page 2 of 4

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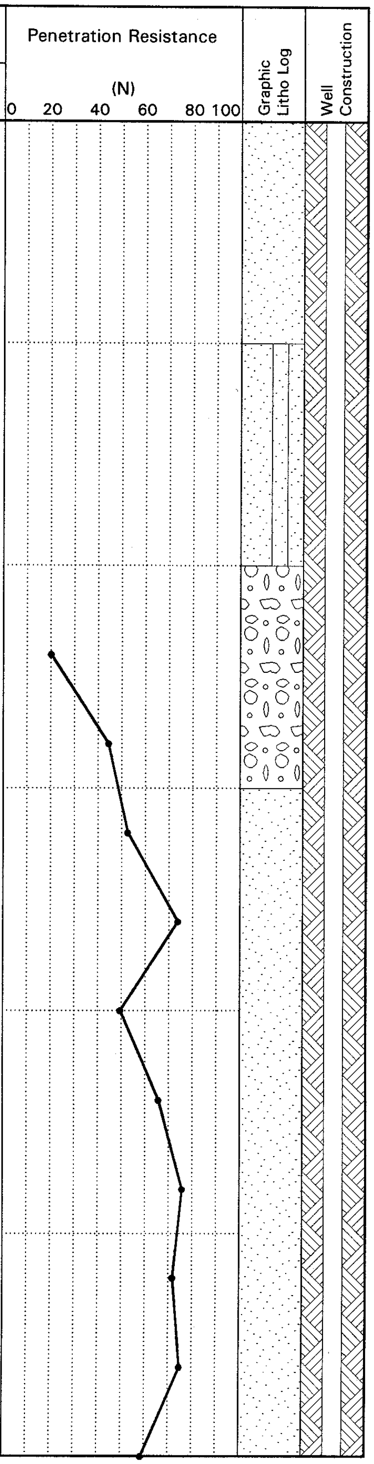
BORING/WELL NO.
MP-2

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued) DESCRIPTION	REMARKS
		S11		SP		core time .5 min. 97,227
55		S12		SP	poorly graded Sand 2.5Y7/1 55.0	97
60		S13		SP-SM	well graded Sand with silt 60.0	core time .85 min.
		S14	3/7/13/31 20	GW		39,97
65		S15	8/21/23/28 44	GW	well graded Gravel with sand 2.5Y7/1 65.0	179,239
		S16	14/19/33/31 52	SP		
		S17	21/29/44/50 73	SP		97,165,267 104,150,161 256
70		S18	19/24/25/31 49	SP	poorly graded Sand 5Y7/1	97
		S19	15/33/32/28 65	SP		227,267
75		S20	11/38/37/46 75	SP	poorly graded Sand 2.5Y7/1	
		S21	18/32/39/37 71	SP		
		S22	21/38/36/41 74	SP	poorly graded Sand 5Y7/1	227,267



EMP WCA2A 3/16/00

Figure 8. Borehole log for ENR site MP2-A. Page 3 of 4

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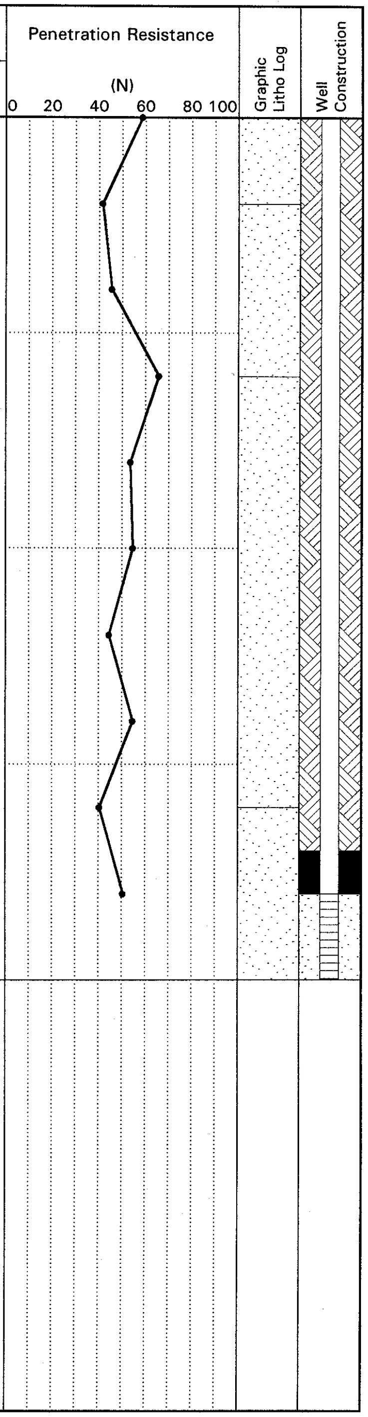
BORING/WELL NO.
MP-2

Depth (ft)	Sample		Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued)	
	Type & Recovery	Number			DESCRIPTION	REMARKS
		S23	24/32/26/34 58	SP		227,238,256 39,227,238 97,140,150 258,267 62,97,137 150,166,238 256
		S24	14/23/18/15 41	SP	poorly graded Sand 2.5Y7/1 82.0	
85		S25	11/18/27/24 45	SP		
		S26	21/31/34/29 65	SP	poorly graded Sand with gravel 2.5Y8/1 86.0	150,263,166 263
		S27	10/22/31/36 53	SP		
90		S28	14/24/30/35 54	SP	poorly graded Sand 2.5Y7/1	258,267
		S29	13/21/23/23 44	SP	poorly graded Sand 7.5YR7/1	
95		S30	18/25/29/27 54	SP		97,179,227 39,150,257 259
		S31	13/18/22/28 40	SP	poorly graded Sand 2.5Y8/1 96.0	
		S32	26/25/25/27 50	SP	poorly graded Sand with gravel 2.5Y8/1	137,178,239 257
100					poorly graded Sand with gravel 10YR8/1 100.0	



EMP WCA2A 3/16/00

Figure 8. Borehole log of ENR site MP2-A. Page 4 of 4

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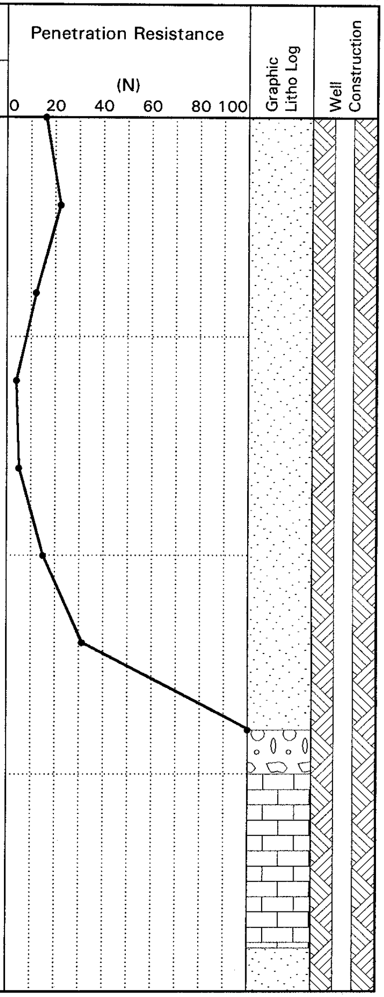
TEST BORING LOG

BORING/WELL NO. **MP-3A**
PROJECT NO./NAME **SFWMD #C7679/MERCURY FLUX STUDY**
LOCATION **WCA2A / ENR**
DRILLING CONTRACTOR/DRILLER **GFA International/Scott Smith**
GEOLOGIST/OFFICE **Fred Kaub/GFA/**
DRILLING EQUIPMENT/METHOD **CME 55/SPT / CORE**
SIZE/TYPE OF BIT **7-7/8" rotary wash**
SAMPLING METHOD **SPT/Core**
START/FINISH DATE **4/24/97-4/25/97**
WELL INSTALLED? YES ☒ NO ☐
CASING MAT./DIA. **Sch.40 PVC 2"**
SCREEN: TYPE **Slotted** MAT. **PVC** LENGTH **2'** DIA. **2"** SLOT SIZE **.010**
ELEVATION OF: (FT. ABOVE M.S.L.) GROUND SURFACE **17.2** TOP OF WELL CASING **16.95** TOP & BOTTOM SCREEN **-81.05/-83.05** GW SURFACE DATE **N/A**
REMARKS:

Depth (ft)	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING: DESCRIPTION	REMARKS
	S1	3/8/8/12 16	SP		
	S2	11/12/10/14 22	SP	poorly graded Sand and gravel	
5	S3	10/6/6/6 12	SP	poorly graded Sand with gravel	
	S4	4/2/2/3 4	SP	poorly graded Sand with gravel	
	S5	3/3/2/3 5	SP	poorly graded Sand with gravel	
10	S6	6/7/8/11 15	SP	poorly graded Sand with gravel 7/N	
	S7	14/10/21/28 31	SP		161
	S8	29/50+ 100	SP	poorly graded Sand with gravel 2.5Y7/1 14.0	97,161
15	S9		GW	well graded Gravel with sand 2.5Y7/1 15.0 sandy Limestone 19.0	



▨ Fine Sand
■ Bentonite Pellets
▨ Cement/Bentonite Grout
☒ Standard Penetration Test
■ Core

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Figure 9. Borehole log of ENR site MP3-A. Page 1 of 4

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BORING/WELL NO.
MP-3A

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued): DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100	Graphic Litho Log	Well Construction
		S10		SP	Sand with interbedded limestone 2.5Y7/1	97,4,55, 97,211,239 263,267 66,72,93			
25		S11		SP	Sand with interbedded limestone	core time 5.1 min.			
30		S12		SP	Sand with interbedded limestone	core time 4.4 min.			
35		S13		SP	poorly graded Sand	core time 2.2 min.			
40		S14		SP	poorly graded Sand	core time 2.6 min.			
45		S15		SP	poorly graded Sand 10YR7/1	core time 1.3 min.			

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Figure 9. Borehole log of ENR site MP3-A. Page 2 of 4

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BORING/WELL NO.
MP-3A

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued) DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100	Graphic Litho Log	Well Construction
		S16		SP	poorly graded Sand 2.5Y6/1	core time 2.1 min 93,150,169 179,239			
55		S17		SP	poorly graded Sand 10YR6/1	core time .9 min. 72,145,150 211,239,59, 66,92,97 169,239,267			
60		S18		SP	poorly graded Sand 10YR6/1	core time .6 min.			
65		S19		SP	poorly graded Sand 2.5Y6/1	core time 1.4 min.			
70		S20		SP	poorly graded Sand 2.5Y6/1	core time .4 min. 104,150,239 256,62,140 150,157,161 199,211,239 256,263,272			
75		S21		SP	75.0 poorly graded Sand 2.5Y6/1 80.0	core time .8 min. 62,239,259 140,178			

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Figure 9. Borehole log of ENR site MP3-A. Page 3 of 4

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BORING/WELL NO.
MP-3A

LOG OF TEST BORING (continued)

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100	Graphic Litho Log	Well Construction
		S22		SP	porly graded Sand with gravel 2.5Y6/1	core time 1.7 min. 39,58,62 104,179,239 272			
85		S23		SP	85.0 poorly graded Sand 2.5Y6/2	core time .6 min. 14,137,150 173			
90		S24		SP	90.0 poorly graded Sand with gravel 10YR7/1	core time 2.1 min. 256,257			
95		S25		SP	poorly graded Sand 10YR7/1	core time .8 min. 143,150,14 97,150,239 227			
100					100.0 poorly graded Sand 10YR6/1	core time .3 min.			

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Figure 9. Borehole log of ENR site MP3-A. Page 4 of 4

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TEST BORING LOG

BORING/WELL NO.: **MOP-1A**

PROJECT NO./NAME: **SFWMD #C7679/MERCURY FLUX STUDY**

LOCATION: **WCA2A / ENR**

DRILLING CONTRACTOR/DRILLER: **GFA International/Scott Smith**

GEOLOGIST/OFFICE: **Fred Kaub/GFA/**

DRILLING EQUIPMENT/METHOD: **CME 55/SPT / CORE**

SIZE/TYPE OF BIT: **7-7/8" rotary wash**

SAMPLING METHOD: **SPT/Core**

START/FINISH DATE: **4/15/97-4/18/97**

WELL INSTALLED? YES ☒ NO ☐

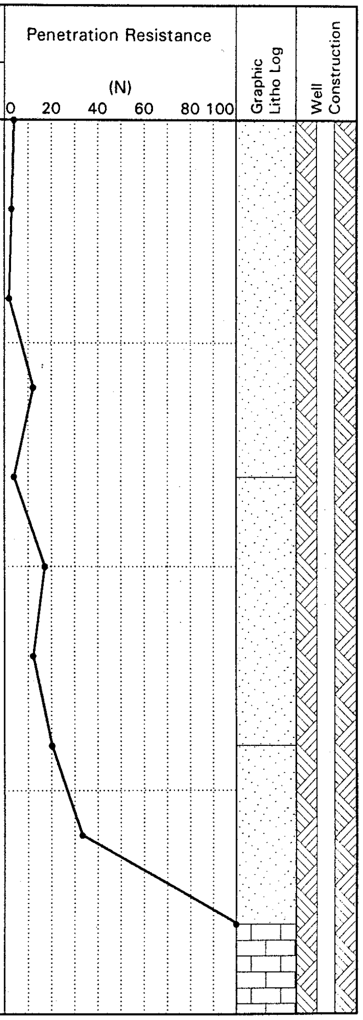
CASING MAT./DIA.: **Sch.40 PVC 2"**

SCREEN: TYPE **Slotted** MAT. **PVC** LENGTH **2'** DIA. **2"** SLOT SIZE **.010**

ELEVATION OF: (FT. ABOVE M.S.L.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GW SURFACE	DATE
	12.5	12.26	-85.74/-87.74		N/A

REMARKS:

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING DESCRIPTION	REMARKS
		S1	5/2/2/2 4			
		S2	1/1/2/2 3		poorly graded Sand	
5		S3	1/1/1/2 2	SP	poorly graded Sand 2.5Y6/1	
		S4	5/6/6/5 12			
		S5	1/2/2/6 4	SP	poorly graded Sand 2.5Y7.1 8.0	
10		S6	5/4/13/25 17	SP	poorly graded Sand with gravel 2.5Y8/1	
		S7	6/6/6/7 12	SP	poorly graded Sand with gravel 2.5Y7/1	
15		S8	4/8/12/17 20	SP	poorly graded Sand with gravel 2.5Y8/1 14.0	
		S9	12/16/17/12 33	SP	poorly graded Sand 2.5Y6/2	
		S10	3/18/50+ 100	SP	poorly graded Sand 2.5YR5/2 18.0	141,239,256
		S11				core time 4.3 min.



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Legend: ▦ Fine Sand; ▮ Bentonite Pellets; ▨ Cement/Bentonite Grout; ☒ Standard Penetration Test; ▮ Core

Figure 10. Borehole log of ENR Site MOP1-A. Page 1 of 4

BORING/WELL NO.
MOP-1A

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued): DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100	Graphic Litho Log	Well Construction
		S12			sandy Limestone 2.5Y7/1				
25		S13			sandy Limestone	core time 8.1 min.			
30		S14			sandy Limestone	core time 9 min.			
35		S15			sandy Limestone 35.0	core time 5.6 min.			
40		S16		SP	Sand with interbedded limestone	core time 12.4 min.			
45		S17		SP	Sand with interbedded limestone 2.5Y7/1	core time 3.9 min.			

Figure 10. Borehole log of ENR site MOP1-A. Page 2 of 4

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BORING/WELL NO.
MOP-1A

LOG OF TEST BORING (continued)

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100	Graphic Litho Log	Well Construction
		S18		SP	Sand with interbedded limestone 2.5Y5/2	core time 2.8 min. 239,263			
55		S19		SP	Sand with interbedded limestone 7.5YR6/1	core time 6.7 min. 37,97,150, 166,210,239			
60		S20			Sand with interbedded limestone 2.5Y7/1	core time 4.9 min.			
65		S21		SP	poorly graded Sand 2.5Y6/1	core time 5.9 min. 59,81,97			
70		S22		SP	poorly graded Sand 2.5Y6/1	core time 5.2 min.			
75		S23		SP	poorly graded Sand 2.5Y7/1				

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Figure 10. Borehole log of ENR site MOP1-A. **Page 3 of 4**

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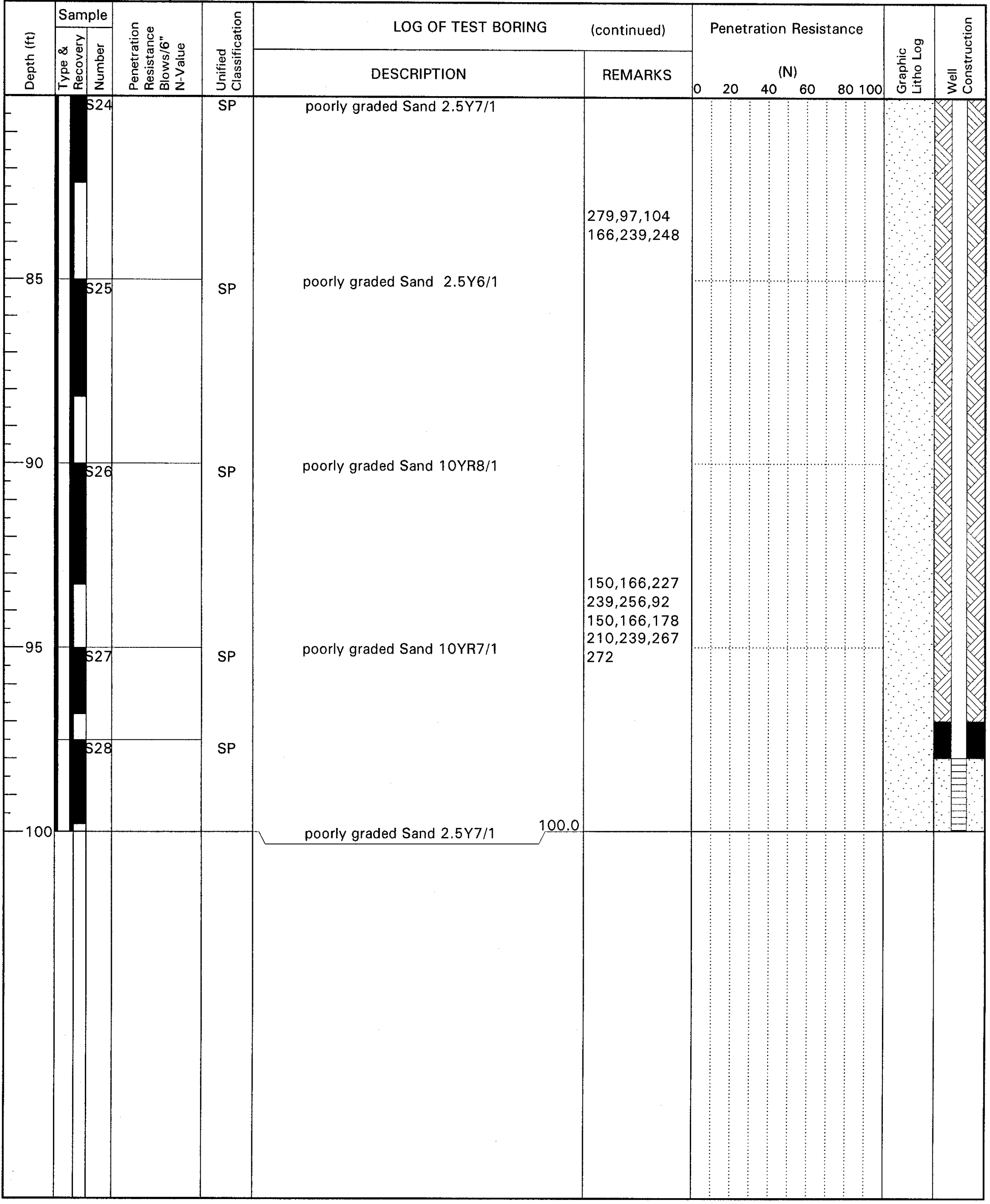
BORING/WELL NO.
MOP-1A



LOG OF TEST BORING (continued)

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
		S24		SP	poorly graded Sand 2.5Y7/1	279,97,104 166,239,248
85		S25		SP	poorly graded Sand 2.5Y6/1	
90		S26		SP	poorly graded Sand 10YR8/1	150,166,227 239,256,92 150,166,178 210,239,267 272
95		S27		SP	poorly graded Sand 10YR7/1	
		S28		SP		
100					poorly graded Sand 2.5Y7/1 100.0	

Figure 10. Borehole log of ENR site MOP1-A. Page 4 of 4

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BORING/WELL NO.
MOP-2A

TEST BORING LOG

PROJECT NO./NAME
SFWMD #C7679/MERCURY FLUX STUDY

LOCATION
WCA2A / ENR

DRILLING CONTRACTOR/DRILLER
GFA International/Scott Smith

GEOLOGIST/OFFICE
Fred Kaub/GFA/

DRILLING EQUIPMENT/METHOD
CME 55/SPT / CORE

SIZE/TYPE OF BIT
7-7/8" rotary wash

SAMPLING METHOD
SPT/Core

START/FINISH DATE
3/18/97-3/20/97

WELL INSTALLED? YES ☒ NO ☐

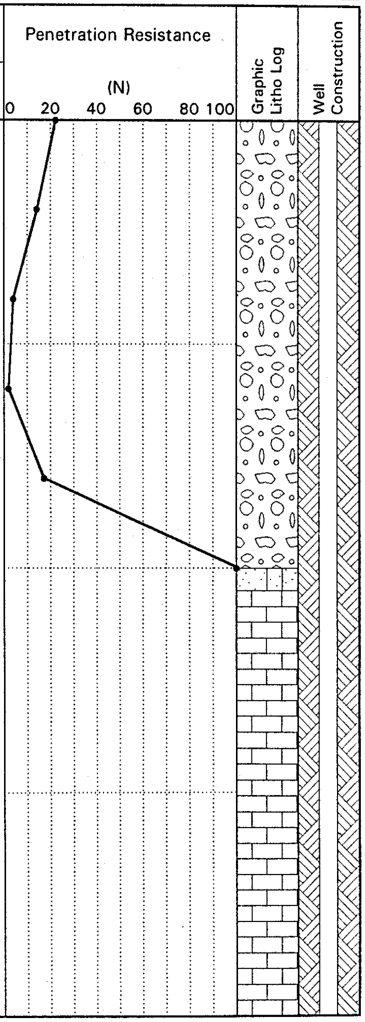
CASING MAT./DIA.
Sch.40 PVC 2"

SCREEN: TYPE **Slotted** MAT. **PVC** LENGTH **2'** DIA. **2"** SLOT SIZE **.010**

ELEVATION OF: (FT. ABOVE M.S.L.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GW SURFACE	DATE
	15.9	16.13	-83.52/-85.32		N/A

REMARKS:

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING DESCRIPTION	REMARKS
		S1	19/11/11/6 22	GW		
		S2	3/6/8/3 14	GW	well graded Gravel with sand 10YR5/1	76
5		S3	3/2/2/1 4	GW		
		S4	2/1/1/2 2	GW		
		S5	1/0/17/70+ 17	GW	well graded Gravel with sand 10YR6/1	
10		S6	50+	SP-SM	well graded Gravel with sand 10YR6/1 10.0	
		S7	100		poorly graded Sand with silt and gravel 10YR7/1 10.5	92,150,227 239,272
15		S8			sandy Limestone	core time 9 min.



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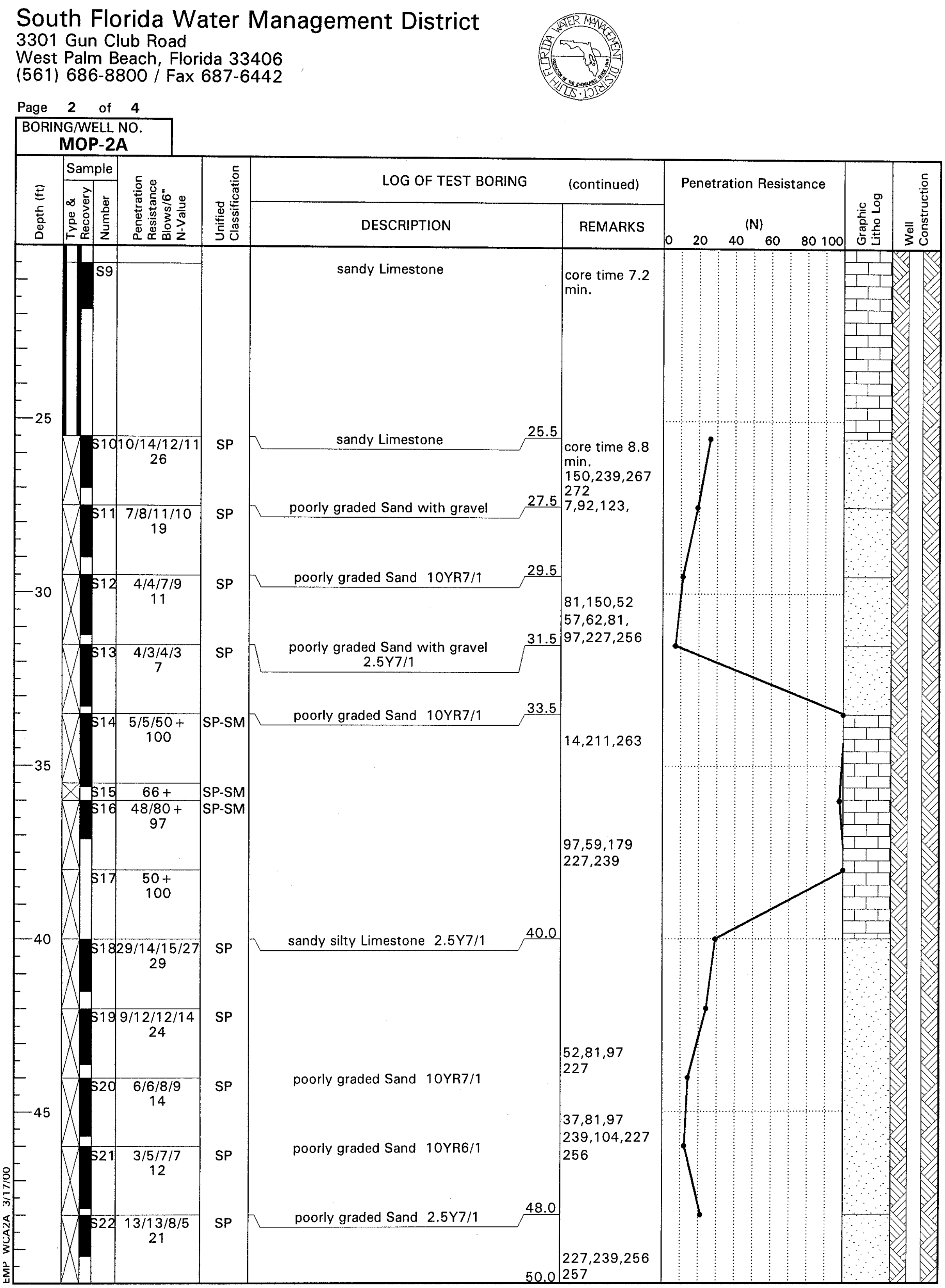
▤ Fine Sand
■ Bentonite Pellets
▧ Cement/Bentonite Grout
☒ Standard Penetration Test
■ Core

Figure 11. Borehole log of ENR site MOP2-A. Page 1 of 4



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BORING/WELL NO.
MOP-2A

LOG OF TEST BORING (continued)

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
		S9			sandy Limestone	core time 7.2 min.
25		S10	10/14/12/11 26	SP	25.5 sandy Limestone	core time 8.8 min. 150,239,267 272
		S11	7/8/11/10 19	SP	27.5 poorly graded Sand with gravel	7,92,123,
30		S12	4/4/7/9 11	SP	29.5 poorly graded Sand 10YR7/1	81,150,52 57,62,81,
		S13	4/3/4/3 7	SP	31.5 poorly graded Sand with gravel 2.5Y7/1	97,227,256
		S14	5/5/50+ 100	SP-SM	33.5 poorly graded Sand 10YR7/1	14,211,263
35		S15	66+	SP-SM		
		S16	48/80+ 97	SP-SM		97,59,179 227,239
		S17	50+ 100			
40		S18	29/14/15/27 29	SP	40.0 sandy silty Limestone 2.5Y7/1	
		S19	9/12/12/14 24	SP		52,81,97 227
45		S20	6/6/8/9 14	SP	poorly graded Sand 10YR7/1	37,81,97
		S21	3/5/7/7 12	SP	poorly graded Sand 10YR6/1	239,104,227 256
		S22	13/13/8/5 21	SP	48.0 poorly graded Sand 2.5Y7/1	227,239,256
					50.0	257

Figure 11. Borehole log of ENR site MOP2-A.. **Page 2 of 4**

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BORING/WELL NO.
MOP-2A

LOG OF TEST BORING (continued)

Depth (ft)	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
	S23		SP	poorly graded Sand with gravel 10YR7/1	239
	S24	4/8/13/9 21	SP	52.0 poorly graded Sand 2.5Y7/1	
55	S25	20/30/52+ 100	SP-SM	54.0 poorly graded Sand with gravel 2.5Y7/1	
	S26	15/37/40/51 77	SP	56.0 poorly graded Sand with silt and gravel 2.5Y8/1	
	S27	20/25/30/49 55	SP		165,239
60	S28	8/12/23/40 35	SP		
	S29	16/36/65/62 100	SP	62.0 poorly graded Sand 2.5Y7/1	227
65	S30	23/50+ 100	SP	poorly graded Sand with interbedded limestone 2.5Y7/1	
	S31	41/50+ 100	SP		97
	S32	15/47/50+ 100	SP-SM	68.0 poorly graded Sand with interbedded limestone 5Y7/1	
70	S33	21/41/45/51 86	SP	70.0 poorly graded Sand with silt and gravel 2.5Y7/1	227,239
	S34	24/24/50+ 100	SP	poorly graded Sand and interbedded limestone 2.5Y7/1	165,227
75	S35	40/50+4" 100	SP		227,239
	S36	38/50+5" 100	SP-SM	76.0 poorly graded Sand & interbedded limestone 2.5Y7/1	97,239
	S37	30/50+4" 100	SP	78.0 silty Sand and interbedded limestone 2.5Y7/1	166,239

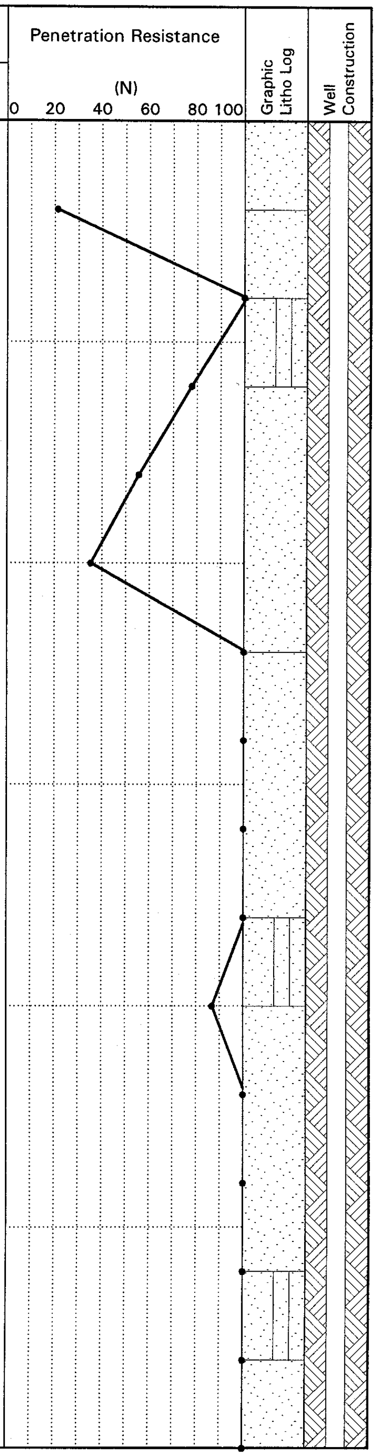

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Figure 11. Borehole log of ENR site MOP2-A. Page 3 of 4

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BORING/WELL NO.
MOP-2A

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued): DESCRIPTION	REMARKS
		S38	30/45/50+ 100	SP		97
		S39	20/44/50 100	SP-SM	poorly graded Sand with interbedded limestone 2.5Y7/1 — 82.0	
85		S40	23/35/35/39 70	SP-SM		161
		S41	17/48/47/50 95	SP	poorly graded Sand with silt and gravel — 86.0	239
		S42	20/42/50+ 100	SP	poorly graded Sand with interbedded limestone 2.5Y7/1 — 88.0	165,179
90		S43	43/50+5" 100	SP		
		S44	34/50+4" 100	SP	poorly graded Sand with interbedded limestone 2.5Y7/1 — 92.0	39,97,150
95		S45	32/36/35/29 71	SP-SM	poorly graded Sand with interbedded limestone 2.5Y7/1 — 94.0	150,263,267
		S46	15/15/16/28 31	SP	poorly graded Sand with silt and gravel 2.5Y7/1 — 96.0	97,140,150 267
		S47	10/26/18/18 44	SP		
100					poorly graded Sand 2.5Y7/1 — 100.0	

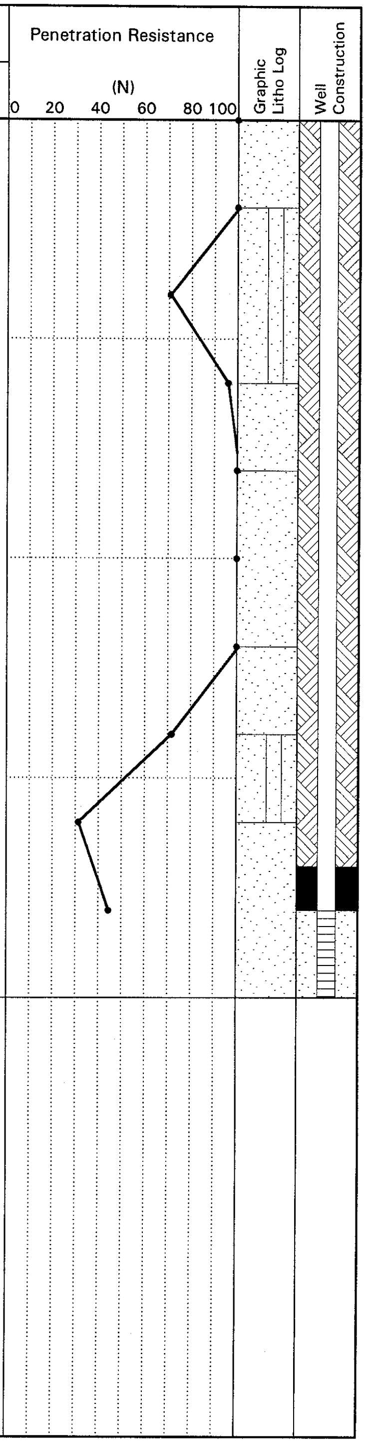

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Figure 11. Borehole log of ENR site MOP2-A. Page 1 of 4

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TEST BORING LOG

BORING/WELL NO.	**MOP-3A**
PROJECT NO./NAME	**SFWMD #C7679/MERCURY FLUX STUDY**
LOCATION	**WCA2A / ENR**
DRILLING CONTRACTOR/DRILLER	**GFA International/Amdrill**
GEOLOGIST/OFFICE	**Fred Kaub/GFA/**
DRILLING EQUIPMENT/METHOD	**CME 55/MUD Rotary**
SIZE/TYPE OF BIT	**7-7/8" rotary wash**
SAMPLING METHOD	**N/A**
START/FINISH DATE	**5/16/97-5/16/97**
WELL INSTALLED?	YES ☒ NO ☐
CASING MAT./DIA.	**Sch.40 PVC 2"**
SCREEN:	TYPE **Slotted** MAT. **PVC** LENGTH **2'** DIA. **2"** SLOT SIZE **.010**
ELEVATION OF: (FT. ABOVE M.S.L.) GROUND SURFACE	**12.2**
TOP OF WELL CASING	**12.01**
TOP & BOTTOM SCREEN	**-85.99/-87.99**
GW SURFACE	
DATE	**N/A**
REMARKS:	

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100
0	G	S-1		SP	poorly graded Gravel and sand 5.0		
5	G	S-2		PT	peat with marl and some shell 10.0		
10	G	S-3		SP-SM	fine Sand, Silt and shell 15.0		
15	G	S-4		SP			

▨ Fine Sand
■ Bentonite Pellets
▧ Cement/Bentonite Grout
☒ Standard Penetration Test
■ Core

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Figure 12. Borehole log of ENR site MOP3-A. Page 1 of 4

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BORING/WELL NO.
MOP-3A

LOG OF TEST BORING (continued)

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100	Graphic Litho Log	Well Construction
	G	S-5		SP	sandy Limestone				
25	G	S-6		SP	sandy Limestone				
30	G	S-7		SP	sandy Limestone				
35	G	S-8		SP	sandy Limestone				
40	G	S-9		SP	sandy Limestone 40.0				
45	G	S-10		SP-SM	fine Sand and shell 45.0				
					50.0				

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Figure 12. Borehole log of ENR site MOP3-A. Page 2 of 4

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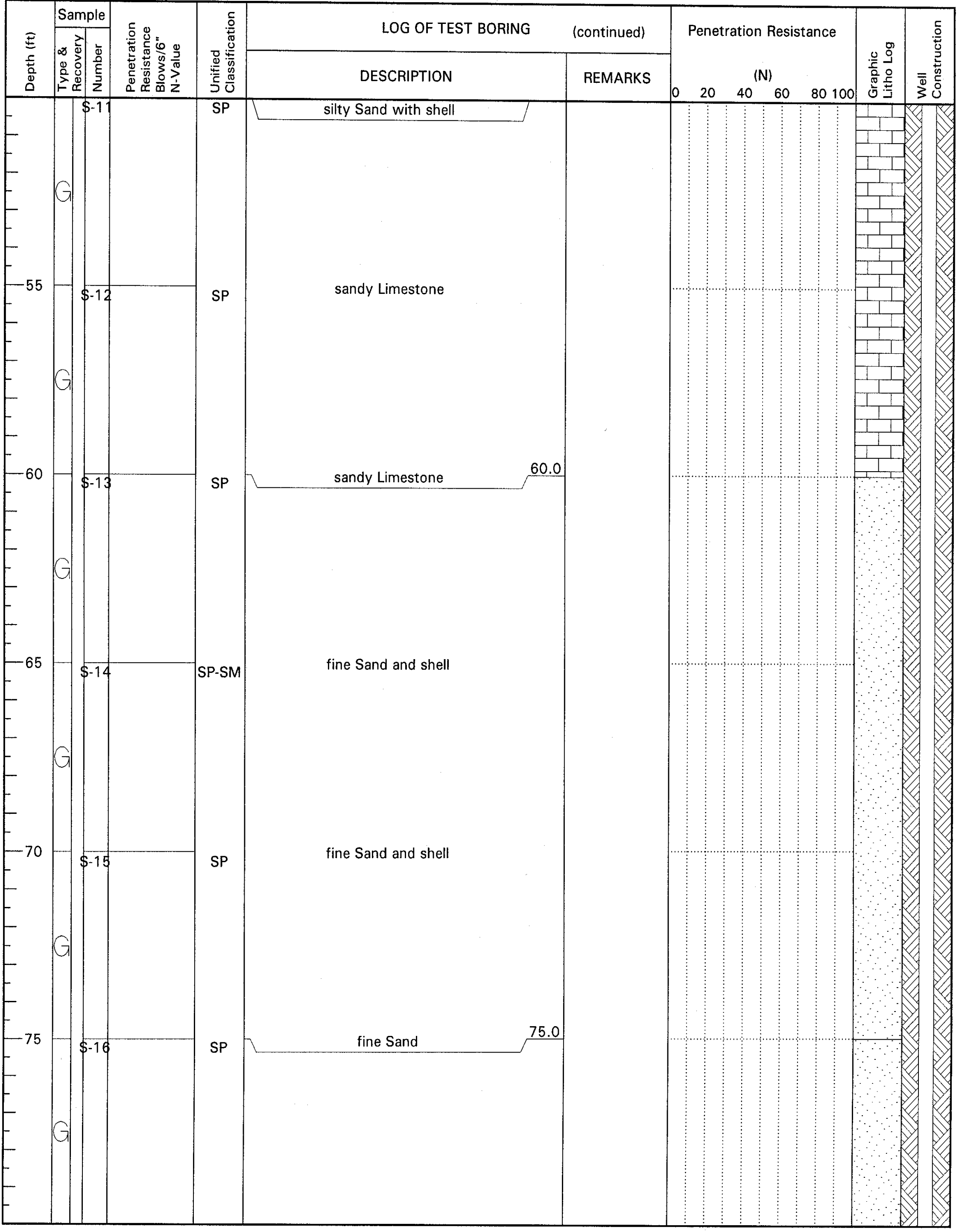
BORING/WELL NO.
MOP-3A



LOG OF TEST BORING (continued)

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100	Graphic Litho Log	Well Construction
	G	S-11		SP	silty Sand with shell				
55	G	S-12		SP	sandy Limestone				
60	G	S-13		SP	sandy Limestone 60.0				
65	G	S-14		SP-SM	fine Sand and shell				
70	G	S-15		SP	fine Sand and shell				
75	G	S-16		SP	fine Sand 75.0				

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Figure 12. Borehole log of ENR site MOP3-A. Page 3 of 4

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BORING/WELL NO.
MOP-3A

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued): DESCRIPTION	REMARKS	Penetration Resistance (N) 0 20 40 60 80 100
	G	S-17		SP	Sand, shell and interbedded limestone		
85	G	S-18		SP	Sand, shell and interbedded limestone		
90	G	S-19		SP	Sand, shell and interbedded limestone		
95	G	S-20		SP	sand, shell and interbedded limestone		
100					Sand, shell and interbedded limestone 100.0		

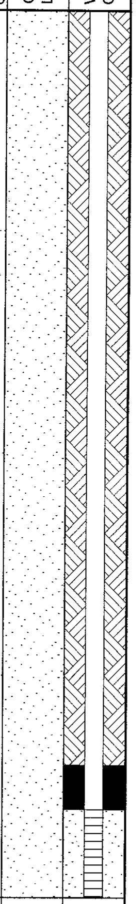

Figure 12. Borehole log of ENR site MOP3-A. Page 4 of 4

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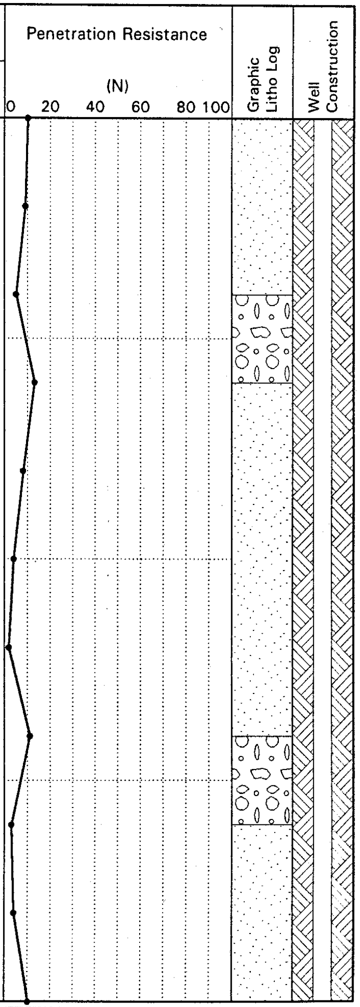
Web Site: www.gfa-intl.com

BORING/WELL NO. **S10-C**

TEST BORING LOG

PROJECT NO./NAME **SFWMD #C7679/MERCURY FLUX STUDY**
LOCATION **WCA2A / ENR**
DRILLING CONTRACTOR/DRILLER **GFA International/Scott Smith**
GEOLOGIST/OFFICE **Fred Kaub/GFA/**
DRILLING EQUIPMENT/METHOD **CME 55/SPT / CORE**
SIZE/TYPE OF BIT **7-7/8" rotary wash**
SAMPLING METHOD **SPT/Core**
START/FINISH DATE **3/4/97-3/12/97**
WELL INSTALLED? YES ☒ NO ☐
CASING MAT./DIA. **Sch.40 PVC 2"**
SCREEN: TYPE **Slotted** MAT. **PVC** LENGTH **2'** DIA. **2"** SLOT SIZE **.010**
ELEVATION OF: (FT. ABOVE M.S.L.)
GROUND SURFACE **22.4**
TOP OF WELL CASING **22.21**
TOP & BOTTOM SCREEN **-77.18 ft/-79.18**
GW SURFACE
DATE **6/98**
REMARKS:

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING DESCRIPTION	REMARKS
		S1	4/5/5/5 10	SP		
		S2	2/3/6/6 9	SP	4.0	
5		S3	3/1/4/5 5	GW	poorly graded Sand with gravel 2.5Y7/1 6.0	
		S4	5/8/5/6 13	SP	well graded Gravel with sand 2.5Y8/1	
		S5	2/3/5/5 8	SP	poorly graded Sand with gravel 2.5Y7/1	
10		S6	1/2/2/2 4	SP	poorly graded Sand with gravel 2.5Y8/1	
		S7	1/1/1/0 2	SP	14.0	
15		S8	4/5/6/5 11	GW	poorly graded Sand with gravel 2.5N 16.0	
		S9	1/2/1/2 3	SP	well graded Gravel with sand 3/N	
		S10	1/1/3/3 4	SP	poorly graded Sand with gravel 3/N	



EMP WCA2A 3/13/00

▦ Fine Sand
▮ Core
▮ Bentonite Pellets
▨ Cement/Bentonite Grout
☒ Standard Penetration Test

Figure 13. Borehole log of WCA-2A site S10C-WA. Page 1 of 4.

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BORING/WELL NO.
S10-C

LOG OF TEST BORING (continued)

Depth (ft)	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
	S11	4/5/5/3 10	SP		
	S12	2/1/1/2 2	SP	poorly graded Sand with gravel	
25	S13	4/7/9/11 16	SP	poorly graded Sand with gravel 2.5Y8/1	
	S14	4/7/8/8 15	SP	poorly graded Sand with gravel 2.5Y7/1	
	S15	16/18/19/14 37	SP	poorly graded Sand with gravel 2.5Y7/1	97
30	S16	23/36/50+ 100	SP		
35	S17			poorly graded Sand with gravel 2.5Y8/1 31.0 sandy Limestone	97 core time 2.2 min
40	S18			sandy Limestone 2.5Y8/1	core time 9.6 min
45	S19				core time 0.9 min
	S20	12/19/20/21 39			
	S21	55+6" 100		sandy Limestone 2.5Y8/1	97,70
	S22				

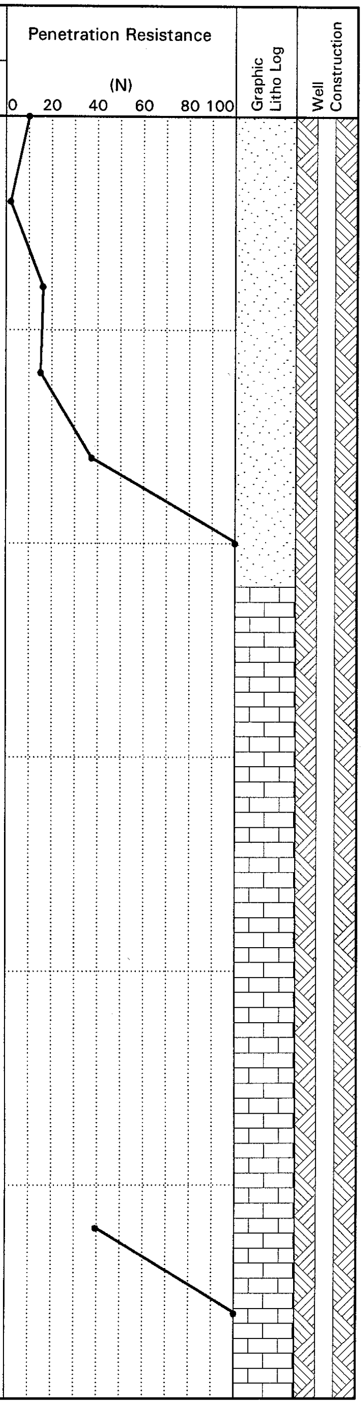

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Figure 13. Borehole log of WCA-2A site S10C-WA. Page 2 of 4

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BORING/WELL NO.
S10-C

LOG OF TEST BORING (continued)

Depth (ft)	Sample Type & Recovery	Sample Number	Penetration Resistance Blows/6" N-Value	Unified Classification	DESCRIPTION	REMARKS
					sandy Limestone 51.0	
					poorly graded Sand with gravel	
55		S23				core time 5.2 min
		S24	4/5/7/22 12		poorly graded Sand with gravel 2.5Y7/1	core time 6.9 min
60		S25	5/7/11/23 18	SP		97,150
		S26	68/36/31/28 67	SP	poorly graded Sand with gravel 2.5Y7/1	37,75,97,123 145,267
65		S27	16/28/22/31 50	SP	poorly graded Sand with gravel 10YR7/1	
		S28	16/17/11/7 28	SP	poorly graded Sand with gravel 2.5Y7/1	143,150,256 263,272
		S29	6/6/8/15 14	SP		52,150,157 182,210
70		S30	11/18/18/14 36	SP		211,214,215 238,239,263 267
		S31	7/8/8/12 16	SP	poorly graded Sand with gravel 2.5Y7/1	14,66,72,143 150,210,238 267
75		S32	7/9/11/21 20	SP		
		S33	17/17/12/11 29	SP		14,43,47,66 72,143,150 238,239
		S34	18/21/21/11 42	SP	poorly graded Sand with gravel 2.5Y7/1	66,123,182 239,267
					80.0	

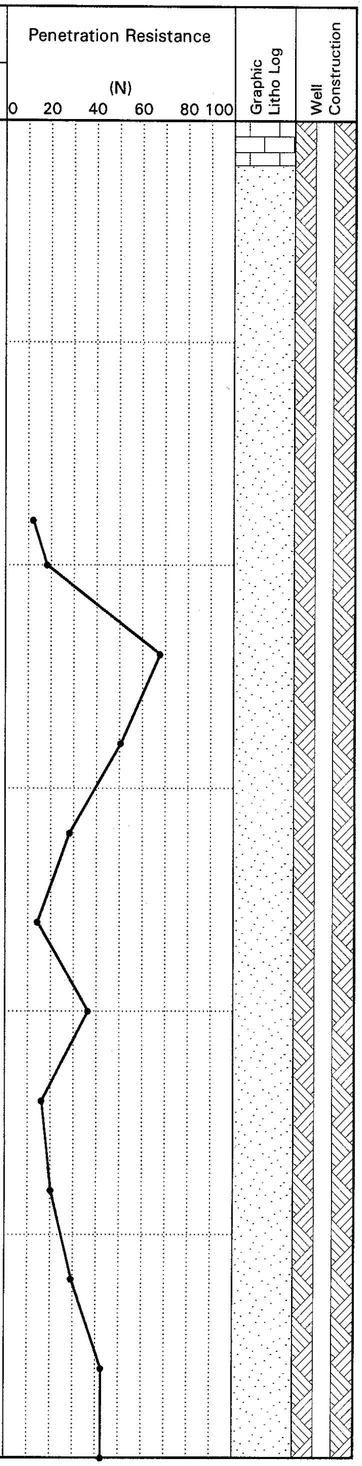

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Figure 13. Borehole log of WCA-2A site S10C-WA. Page 3 of 4

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BORING/WELL NO.
S10-C

Depth (ft)	Sample: Type & Recovery	Sample: Number	Penetration Resistance Blows/6" N-Value	Unified Classification	LOG OF TEST BORING (continued): DESCRIPTION	REMARKS
		S35	19/25/17/23 42	SP	poorly graded Sand with gravel	14,52,70,75 150,267
		S36	30/36/34/31 70	SP-SM	82.0 poorly graded Sand with silt and gravel 2.5Y7/1	14,66,239,97 153,227,277
85		S37	11/10/14/21 24	SP		
		S38	4/8/13/10 21	SP	86.0 poorly graded Sand with gravel 2.5Y7/1	
		S39	9/9/8/11 17	SP-SM	88.0 poorly graded Sand with silt and gravel 2.5Y7/1	72,97,99,150 157,211,215
90		S40	9/13/8/8 21	SP		150,165,239 256
		S41	18/36/63/53 99	SP	poorly graded Sand with gravel 2.5Y7/1	
95		S42	19/20/16/19 36	SP	poorly graded Sand with gravel 2.5Y8/1	66,150,211 277
		S43	67/48/66/29 114	SP		150
		S44	19/68/100+ 100	SP		97,150,211 277 97,150,211
100					100.0 poorly graded Sand with gravel 2.5Y8/1	

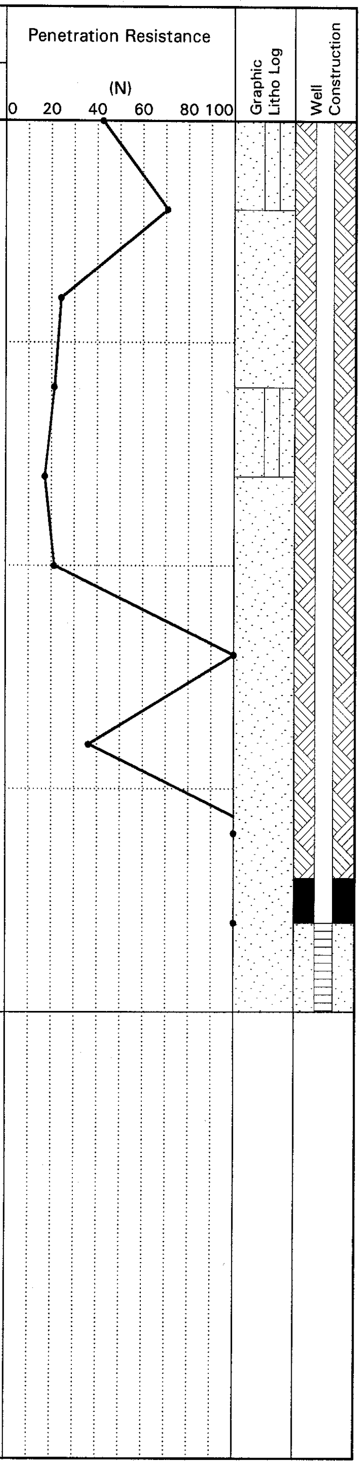

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Figure 13. Borehole log of WCA-2A site S10C-WA. **Page 4 of 4**

Lithologic Descriptions for Selected Shallow Boreholes

Table 5. Table Lithologic Description of WCA-2A F-1 Core Sediment Sample Page 1 of 2

Depth (feet)	Description of Sample	Formation Name	Age/ Q-Unit
0.0-4.5	Freshwater Peat, black (10YR 2/1) to dark reddish Brown (5 YR 3/2), fibrous, massive, organic.	Recent	~ 5,000 years
4.5-9.5	Limestone, packed biomicrite grading to packed biosparite; light gray to very pale brown; 20 percent quartz, sub-angular to sub-rounded, slightly frosted, well sorted, medium to fine grained, finer with depth; numerous marine mollusks including Chione; moderate to low porosity.	Fort Thompson	Q5
9.5-14.5	Limestone, sparse biosparite; light gray to very pale brown; 40 percent quartz, sub-angular to sub-rounded, slightly frosted, well sorted, medium to fine grained, finer with depth; few marine mollusks including Chione; moderate to low porosity, poor core recovery may be mostly sand.	Fort Thompson	Q5
14.5-17.5	Sandy limestone to sandstone; packed biosparite to calcareous sandstone; very pale brown (10YR 8/2); 40 percent quartz, sub-angular to sub-rounded, clear to slightly frosted, moderately sorted, medium to fine grained; numerous marine mollusks including Chione; numerous vugs, casts, heavy solutioning; sparry calcite infilling of voids; high to very high porosity.	Fort Thompson	Q4
17.5-21.5	Limestone; packed biomicrite; white (10YR 8/1) to light gray (10YR 7/1); 20 percent quartz, increasing with depth, sub-angular to sub-rounded, clear to slightly frosted, moderately sorted, medium to fine grained; numerous marine mollusks including Chione; massive; low to moderate porosity.	Fort Thompson	Q4
21.5-24.5	Limestone, packed biomicrite; light gray (10YR 7/1) to gray (10YR 6/1); 5 to 10 percent organics; less than 5 percent quartz, well sorted, sub angular to sub rounded, moderately frosted, fine grained; massive; freshwater mollusks including Planorbella; well developed caliche crust at top, moderate to low porosity.	Fort Thompson	Q3
24.5-27.5	Shell; light gray (10YR 7/1) to light yellowish brown (10YR 6/4); over 95 percent Chione; moderate porosity.	Fort Thompson	Q3

Table 5. Lithologic Description of WCA2-A F-1 Core Sediment Sample Page 2 of 2

Depth (feet)	*Description of Sample*	*Formation Name*	*Age/ Q - Unit*
27.5-28.5	*Limestone, sparse biomicrite; light gray (10YR 7/1) to gray (10YR 6/1); 5 to 10 percent organics; less than 5 percent quartz, well sorted, sub angular to sub rounded, not frosted, fine grained; massive; freshwater mollusks including* Planorbella*; moderate to low porosity.*	*Fort Thompson*	*Q2?*
28.5-29.5	*Limestone; packed biomicrite; light gray; 30 percent quartz, increasing with depth, sub-angular, clear, well sorted, medium to fine grained; numerous marine mollusks including* Chione*; massive; moderate to high porosity.*	*Fort Thompson*	*Q2?*

Table 6. Lithologic Description of WCA2-A F-4 Core Sediment Sample   Page 1of 1

Depth (feet)	*Description of Sample*	*Formation Name*	*Age/ Q - Unit*
0.0-5.0	*Freshwater peat, black (10YR 2/1) to dark reddish brown (5 YR 3/2), fibrous, massive, organic.*	*Recent*	*~ 5,000 years*
5.0-10.0	*Limestone, sparse biomicrite grading to packed biosparite; light gray (10YR 7/1) to very pale brown (10YR 8/2); 10 percent quartz, sub-angular to angular, lightly frosted, moderately well sorted, medium to fine grained; scarce marine mollusks including* Chione*; moderate porosity.*	*Fort Thompson*	*Q5*
10.0-15.0	*Limestone, sparse biosparite to biomicrite; very pale brown (10YR 8/2); 27 percent quartz, sub-angular to sub-rounded, lightly frosted, moderately well sorted, medium to fine grained; scarce marine mollusks including* Chione*; moderate porosity, poor core recovery may be mostly sand.*	*Fort Thompson*	*Q4*
15.0-20.0	*Limestone, sparse biosparite to biomicrite; very pale brown (10YR 8/3); 35 percent quartz, sub-angular to sub-rounded, frosted, moderately well sorted, medium to fine grained; scarce marine mollusks; moderate porosity.*	*Fort Thompson*	*Q3*
20.0-24.0	*Limestone; packed biosparite; light gray (10YR 6/1); 35 percent quartz, increasing with depth, sub-rounded, lightly frosted, moderately well sort, fine grained; numerous marine mollusks including* Chione*; corals; vugs casts and molds; high to very high porosity.*	*Fort Thompson*	*Q3*
24.0-25.0	*Limestone, packed biomicrite; very pale brown (10YR 8/2) 37 percent quartz, sub-angular to sub-rounded, lightly frosted, moderately sorted, fine grained; numerous marine mollusks including* Chione*; moderate porosity.*	*Fort Thompson*	*Q2?*

Table 7. Lithologic Description of WCA2-A E-1 Core Sediment Sample Page 1 of 1

Depth (feet)	*Description of Sample*	*Formation Name*	*Age/ Q - Unit*
0.0-5.0	*Freshwater Peat, black (10YR 2/1) to dark reddish Brown (5 YR 3/2), fibrous, massive, organic.*	*Recent*	*~ 5,000 years*
5.0-6.0	*Sand; light gray (10YR 6/1); quartz, sub-angular to sub-rounded, lightly frosted, moderately well sorted, medium to fine grain; some organics; moderate to low porosity.*	*Fort Thompson*	*Q5*
6.0-7.0	*Limestone, packed biomicrite to biosparite; very pale brown (5YR 7/2); 33 percent quartz, sub-angular to sub-rounded, lightly frosted, well sorted, medium to fine grain; numerous marine mollusks including* Chione*; casts, vugs and molds; moderate to low porosity.*	*Fort Thompson*	*Q5*
7.0-10.0	*Limestone; packed biosparite to biomicrite; pale yellow (2.5YR 7/3) to light gray (10YR 7/2); 30 percent quartz, rounded to sub-rounded, lightly frosted to frosted, moderately well sorted, medium to fine grain; numerous vugs, casts, heavy solutioning; sparry calcite infilling of voids; high to very high porosity.*	*Fort Thompson*	*Q5*
10.0-15.0	*Sandy limestone to sandstone; packed biosparite to calcareous sandstone; light gray (10YR 7/2); 40 percent quartz becoming less sandy with depth, sub-angular to sub-rounded, clear to lightly frosted, well sorted, fine to very fine grained; numerous vugs, casts and molds; moderate to high porosity.*	*Fort Thompson*	*Q4*

Table 8. Lithologic Description of ENR M204 Core Sediment Sample Page 1of 2

Depth (feet)	*Description of Sample*	*Formation Name*	*Age/ Q - Unit*
0.0-4.0	*Freshwater Peat, black (10YR 2/1) to dark reddish brown (5YR 3/2), fibrous, massive, organic.*	*Recent*	*~ 5,000 years*
4.0-6.0	*Limestone, sparse biomicrite; light gray to gray; 5 - 10 % organics; less than 5% quartz, well sorted, sub angular to sub rounded, fine grain; massive; freshwater mollusks including* Planorbella *and* Helisoma*; moderate to low porosity.*	*Fort Thompson*	*~ 20,000 years*
6.0-7.5	*Limestone; packed biomicrite; very dark gray to very pale brown, mottled; 30% quartz, sub-angular to sub-rounded, clear to slightly frosted, moderately sorted, medium to fine grain; numerous marine mollusks including* Chione*; vuggy; moderate to low porosity; possible sub-areal cap at surface.*	*Fort Thompson*	*Q5*
7.5-9.0	*Sandy limestone to sandstone; packed quartz micrite; light brownish gray; 45% quartz, sub-angular to sub-rounded, slightly frosted, moderate to well sorted, medium to fine grain; numerous marine mollusks including* Chione*; massive, some birdseye structure; moderate porosity.*	*Fort Thompson*	*Q5*
9.0-12.0	*Sandy limestone to sandstone; packed quartz micrite to calcareous sandstone; light brownish gray; 45% quartz, sub-angular to sub-rounded, clear to slightly frosted, moderately sorted, medium to fine grain; numerous marine mollusks including* Chione*; numerous vugs, casts, heavy solutioning; sparry calcite infilling of voids; extremely high porosity to moderate to low porosity in sandstone bed at base.*	*Fort Thompson*	*Q4*
12.0-15.0	*Limestone; packed biomicrite; pale yellow; 30% quartz, increasing with depth, sub-angular to sub-rounded, moderately sorted, medium to fine grain; numerous marine mollusks including* Chione *and* Strombus*; moderate porosity.*	*Fort Thompson*	*Q4*
15.0-17.5			

Table 8. Lithologic Description of ENR M204P Core Sediment Sample **Page 2 of 2**

Depth (feet)	*Description of Sample*	*Formation Name*	*Age/ Q - Unit*
17.5-20.0	*Sandy limestone to sandstone; packed biosparite to calcareous sandstone; light gray; 40% quartz, sub-angular to sub-rounded, clear to slightly frosted, moderately sorted, medium to fine grain; numerous marine mollusks including* Chione*, worm tubes(?) at base; numerous vugs, casts, heavy solutioning; sparry calcite infilling of voids; extremely high porosity becoming low porosity in sandstone bed at base.*	*Fort Thompson*	*Q3*
20.0-27.0	*Sand; light gray to light yellowish brown; sub-angular to well rounded, very coarse to fine grained, some quartz pebbles; about 10% heavy minerals including phosphate; numerous marine mollusks including* Chione*; low to moderate porosity.*	*Fort Thompson*	*Q2?*

List of Fossils Recovered from Sieve Samples

Table 9. Summary of Fossils Recovered from Sieve Samples Page 1 of 4

Well Name	Depth below land surface in feet	Fossils Found	Color (Dry) *
MP -1	0 - 2	none identified	10YR 6/2
MP -1	2 - 4	none identified	10YR 6/2
MP -1	4 - 6	none identified	7.5YR 6/2
MP -1	10 - 12	none identified	5/N
MP -1	16 - 18	none identified	2.5Y 6/1
MP -1	40 - 42	20, 49, 61, 86	10YR 7/1
MP -1	42.5 - 45	none identified	2.5Y 7/2
MP -1	45 - 47.5	none identified	2.5Y 6/2
MP -1	47.5 - 50	none identified	10YR 7/1
MP -1	50 - 52.5	none identified	
MP -1	52.5 - 55	none identified	2.5Y 6/2
MP -1	57.5 - 60	1, 28, 61, 93	
MP -1	62.5 - 65	2, 25, 35, 45, 61, 70, 76, 83, 88, 99	2.5Y 7/1
MP -1	67.5 - 70	25, 34, 44?, 78	10YR 7/1
MP -1	75 - 77.5	none identified	2.5Y 7/1
MP -1	80 - 82.5	none identified	2.5Y 6/2
MP -1	82.5 - 85	38, 98	10YR 7/1
MP -1	85 - 90	3, 16, 25, 29, 45, 61, 74, 99	10YR 7/1
MP -1	90 - 95	45, 55, 61, 82, 87, 88, 93, 99	2.5Y 7/1
MP -1	95 - 100	2, 45, 47?, 56, 61, 82, 87, 88, 93, 99	2.5Y 7/1
MOP1-A	4 - 6	none identified	2.5Y 6/1
MOP1-A	6 - 8	none identified	2.5Y 7/1
MOP1-A	8 - 10	13?, 25, 47, 78	2.5Y 8/1
MOP1-A	10 - 12	25	2.5Y 7/1
MOP1-A	12 - 14	25	2.5Y 8/1
MOP1-A	14 - 16	none identified	2.5Y 6/2
MOP1-A	16 - 18	25	10YR 5/2
MOP1-A	18 - 20		2.5Y 7/1
MOP1-A	22 (core)	25, 65	
MOP1-A	30 - 35 (core)	24?, 47	
MOP1-A	35 - 40	18, 24, 25, 26?, 27, 64, 78	
MOP1-A	40 - 45	25, 30, 60, 65?, 78, 82, 88	2.5Y 7/1
MOP1-A	45 - 50	18?	2.5Y 5/2
MOP1-A	50 - 55	52?, 61, 82	7.5YR 6/1
MOP1-A	55 - 60	25, 30, 32?, 61, 78, 82	2.5Y 7/1
MOP1-A	65 - 70	18, 25, 46, 49, 61, 88, 94	2.5Y 6/1
MOP1-A	70 - 75	63?, 86	2.5Y 7/1
MOP1-A	75 - 80	7?, 18, 25, 52, 55, 61, 88	2.5Y 7/1
MOP1-A	80 - 85	24, 49, 61, 88	2.5Y 6/1
MOP1-A	85 - 90	2, 25, 49, 61, 80	10YR 8/1
MOP1-A	90 - 95	4, 15, 73, 88	10YR 7/1
MOP1-A	97.5 - 100	2?, 30, 39, 47, 51, 61, 73, 79, 88, 94	2.5Y 7/1

Note: The key found in this section relates to the fossils found in a particular sample to the boring logs provided in a previous section.

Table 9. Summary of Fossils Recovered from Sieve Samples Page 2 of 4

Well Name	Depth below land surface in feet	Fossils Found	Color (Dry) *
MOP2-A	0 - 2	102	10YR 5/1
MOP2-A	2 - 4	none identified	
MOP2-A	6 - 8	11	10YR 6/1
MOP2-A	10 - 10.5	none identified	2.5Y 7/1
MOP2-A	25.5 - 27.5	47, 55, 61, 87, 88, 93	2.5Y 7/1
MOP2-A	27.5 - 29.5	3, 6 , 8, 47, 61, 82, 87, 88	10YR 7/1
MOP2-A	29.5 - 31.5	78, 88	2.5Y 7/1
MOP2-A	31.5 - 33.5	18, 25, 27, 46, 49, 55, 61, 72, 78, 93	10YR 7/1
MOP2-A	33.5 - 35.5	28, 40, 61, 77, 93	2.5Y 7/1
MOP2-A	36 - 38	25	2.5Y 7/1
MOP2-A	40 - 42	22, 25, 34?, 55, 61, 71	2.5Y 7/1
MOP2-A	42 - 44	22, 25, 46, 55, 61, 78	10YR 7/1
MOP2-A	44 - 46	25, 61, 70, 78	10YR 6/1
MOP2-A	46 - 48	19, 25, 29, 49, 55, 61, 80	2.5Y 7/1
MOP2-A	48 - 50	49, 50, 55?, 61	10YR 7/1
MOP2-A	50 - 52	19, 61	2.5Y 7/1
MOP2-A	52 - 54	none identified	2.5Y 7/1
MOP2-A	54 - 56	none identified	2.5Y 8/1
MOP2-A	56 - 58	none identified	2.5Y 8/1
MOP2-A	58 - 60	none identified	2.5Y 7/1
MOP2-A	60 - 62	30?, 61	2.5Y 7/1
MOP2-A	62 - 64	none identified	2.5Y 7/1
MOP2-A	64 - 66	20, 22, 55, 61, 93	2.5Y 7/1
MOP2-A	66 - 68	25	5Y 7/1
MOP2-A	68 - 70	none identified	2.5Y 7/1
MOP2-A	70 - 72	227, 239	2.5Y 7/1
MOP2-A	72 - 74	30?, 55?	2.5Y 7/1
MOP2-A	74 - 76	55, 61	2.5Y 7/1
MOP2-A	76 - 78	25, 53, 61	2.5Y 7/1
MOP2-A	78 - 80	28?, 61, 99	2.5Y 7/1
MOP2-A	80 - 82	25	2.5Y 7/1
MOP2-A	82 - 84	none identified	2.5Y 7/1
MOP2-A	84 - 86	21, 58	2.5Y 7/1
MOP2-A	86 - 88	61	2.5Y 7/1
MOP2-A	88 - 90	30, 33, 71?	2.5Y 7/1
MOP2-A	90 - 92	90?	2.5Y 7/1
MOP2-A	92 - 94	25, 69?, 88	2.5Y 7/1
MOP2-A	94 - 96	61, 88, 97	2.5Y 7/1
MOP2-A	96 - 98	23, 28, 61, 81, 82, 88?	2.5Y 7/1
MOP2-A	98 - 100	25, 61, 80, 82, 86, 88	2.5Y 7/1

Note: The key found in this section relates to the fossils found in a particular sample to the boring logs provided in a previous section.

Table 9. Summary of Fossils Recovered from Sieve Samples Page 3 of 4

Well Name	Depth below land surface in feet	Fossils Found	Color (Dry) *
S10C-WA	0 - 2	none identified	2.5Y 7/1
S10C-WA	2 - 4	none identified	2.5Y 7/1
S10C-WA	4 - 6	none identified	2.5Y 8/1
S10C-WA	6 - 8	none identified	2.5Y 7/1
S10C-WA	8 - 10	none identified	2.5Y 8/1
S10C-WA	12 - 14	none identified	2.5/N
S10C-WA	14 - 16	none identified	3/N
S10C-WA	16 - 18	none identified	3/N
S10C-WA	18 - 20	none identified	
S10C-WA	20 - 22	none identified	
S10C-WA	22 - 24	none identified	2.5Y 8/1
S10C-WA	24 - 26	none identified	2.5Y 7/1
S10C-WA	26 - 28	25	2.5Y 7/1
S10C-WA	30 -31	25	2.5Y 8/1
S10C-WA	36 - 41	none identified	2.5Y 8/1
S10C-WA	48 - 48.5	25, 61, 84?	2.5Y 8/1
S10C-WA	58 - 60	25, 88	2.5Y 7/1
S10C-WA	60 - 62	8, 12, 25, 70, 73, 82	2.5Y 7/1
S10C-WA	62 - 64	none identified	10YR 7/1
S10C-WA	64 - 66	28?	2.5Y 7/1
S10C-WA	66 - 68	28, 49?, 57, 87, 88	2.5Y 7/1
S10C-WA	68 - 70	none identified	2.5Y 7/1
S10C-WA	70 - 72	2, 24, 28, 46, 60, 61, 66, 75?, 77, 82, 85, 88	2.5Y 7/1
S10C-WA	72 - 74	2, 31, 40, 41?, 57, 61, 82, 88	2.5Y 7/1
S10C-WA	74 - 76	31, 40, 41?, 57, 60, 61, 63, 67?, 88	2.5Y 7/1
S10C-WA	76 - 78	8, 31, 61, 75, 82	2.5Y 7/1
S10C-WA	78 - 80	40, 46, 73, 82, 84, 88	2.5Y 7/1
S10C-WA	80 - 82	31?, 40, 61	2.5Y 7/1
S10C-WA	82 - 84	25, 55, 68?, 95?	2.5Y 7/1
S10C-WA	86 - 88	24?, 25, 26?, 41, 77?, 85, 88	2.5Y 7/1
S10C-WA	88 - 90	30, 49, 61, 88	2.5Y 8/1
S10C-WA	90 - 92	8, 24, 26, 30, 70	2.5Y 7/1
S10C-WA	92 - 94	24, 31, 55, 62, 88, 100	2.5Y 8/1
S10C-WA	94 - 96	88	2.5Y 8/1
S10C-WA	96 - 98	25, 68, 77?, 88	2.5Y 8/1
S10C-WA	98 - 100	25, 77?, 88	
MP3-A	8 - 10	none identified	7/N
MP3-A	12 - 14	58?	2.5Y 7/1
MP3-A	14 - 15	25, 58?	2.5Y 7/1
MP3-A	20 - 22	25	2.5Y 7/1
MP3-A	40 - 45	10, 25, 28, 31, 41, 43, 52, 61, 77, 82	10YR 7/1
MP3-A	45 - 50	none identified	2.5Y 6/1
MP3-A	50 - 55	15, 52, 61, 71, 88	10YR 6/1
MP3-A	55 - 60	12?, 41?, 61, 77, 88	10YR 6/1
MP3-A	60 - 65	15, 25, 31, 34, 47, 61, 80, 82	2.5Y 6/1
MP3-A	65 - 70	none identified	2.5Y 6/1
MP3-A	70 - 75	29, 49, 61, 88	2.5Y 6/1

Note: The key found in this section relates to the fossils found in a particular sample to the boring logs provided in a previous section.

Table 9. Summary of Fossils Recovered from Sieve Samples Page 4 of 4

Well Name	Depth Found (feet below land surface)	Fossils Found	Color (Dry) *
MP2-A	31 - 35	25, 61, 78, 99	2.5Y 6/1
MP2-A	35 - 37	45, 59?, 61	2.5Y 7/1
MP2-A	40 - 42	61	2.5Y 7/1
MP2-A	44 - 47	25, 61, 81	2.5Y 7/1
MP2-A	50 - 52	25, 55, 61	2.5Y 7/1
MP2-A	55 - 57	25, 61	2.5Y 7/1
MP2-A	62 - 64	25, 69	10YR 6/2
MP2-A	64 - 66	19?, 61, 71	2.5Y 7/1
MP2-A	66 - 68	49?, 55?, 61	2.5Y 7/1
MP2-A	68 - 70	25, 30?, 53?, 82	5Y 7/1
MP2-A	70 - 72	21?, 25, 29?, 33?, 49, 58?, 88	5Y 7/1
MP2-A	72 - 74	25, 33?, 49, 55?, 61, 99	2.5Y 7/1
MP2-A	74 - 76	44, 55, 82, 92	2.5Y 7/1
MP2-A	76 - 78	none identified	5Y 7/1
MP2-A	78 - 80	21?, 55, 61, 82, 88?	2.5Y 7/1
MP2-A	80 - 82	55, 60, 69	2.5Y 7/1
MP2-A	82 - 84	23, 25, 49, 51, 53, 55, 60, 81, 82, 86, 88, 96	10YR 7/1
MP2-A	84 - 86	14, 18, 25, 49, 60, 62, 81, 88, 99	2.5Y 8/1
MP2-A	86 - 88	28, 44, 61, 88	2.5Y 8/1
MP2-A	88 - 90	22, 28, 42, 61, 72, 88, 99	2.5Y 7/1
MP2-A	90 - 92	51, 61, 82	7.5YR 7/1
MP2-A	94 - 96	25, 55, 71	2.5Y 8/1
MP2-A	96 - 98	50, 53?, 69, 88, 89, 100	2.5Y 8/1
MP2-A	98 - 100	14, 50, 56?, 61	10YR 8/1

* From Munsell soil color charts

Note: The key found in this section relates to the fossils found in a particular sample to the boring logs provided in a previous section.

Table 10. Index to Summary of Fossil Tables

2 *Anachis caloosaensis*
3 *Anachis fenestrata*
4 *Anadara catasarca*
5 *Anadara improcera*
6 *Anadara lienosa*
7 *Anomia simplex*
8 *Archohelia limonensis*
9 *Arcopsis adamsi*
10 *Barbatia propatula*
11 *Benthonella gaza*
12 *Caecum coronellum*
13 *Caecum inbricatum*
14 *Calliostoma willcoxianum*
15 *Calyptraea centralis*
16 *Cancellaria conradiana*
17 *Cantharus multangulus*
18 *Carditamera arata*
19 *Cerithiopsis emersoni*
20 *Cerithiopsis matara*
21 *Cerithium eburneum*
22 *Cerithium litharium*
23 *Cerithium muscarum*
24 *Cerithium preatratum*
25 *Chione cancellata*
26 *Chione procancellata*
27 *Codakia orbicularis*
28 *Conus stearnsi*
29 *Corbula inaequalis*
30 *Crucibulum multilineatum*
31 *Cyclocardia granulata*
32 *Dinocardium robustum*
33 *Diplodonta punctata*
34 *Divaricella compsa*
36 *Dosinia discus*
37 *Erato maugeriae*
38 *Gemma magna*
39 *Glycymeris americana*
40 *Glycymeris arata*
41 *Laevicardium wagnerianum*
42 *Leucosyrinx tenoceras*
43 *Linga amabilis*
44 *Lucina amiantus*
45 *Lucina multilineata*
46 *Lucina nassula*
47 *Macrocallista maculata*
48 *Marginella belloides*
49 *Marginella onchidella*
50 *Marginella polyspira*
51 *Marginella precursor*
52 *Mercenaria campechiensis*
53 *Mitrella albella*
54 *Modulus carchedonius*
55 *Nassarius vibex*
56 *Natica plicatella*
57 *Neritina sphaerica*
58 *Niso willcoxiana*
59 *Noetia* sp.
60 *Oliva sayana*
61 *Olivella* sp.
62 *Olivella pugilis*
63 *Ostrea sculpturata*
64 *Perna conradiana*
65 *Petaloconchus floridana*
66 *Pisania auritula*
67 *Placunanomia plicata*
68 *Planorbella disstoni*
70 *Plicatula marginata*
71 *Polinices duplicatus*
72 *Prunum bellum*
73 *Raeta plicatella*
74 *Retusa candei*
75 *Sconsia hodgii*
76 *Seila adamsi*
77 *Strombina gunteri*
78 *Tellina alternata*
79 *Tellina fausta*
80 *Terebra* sp.
81 *Terebra concava*
82 *Terebra dislocata*
83 *Terebra vertebralis*
84 *Trachycardium egmontianum*
85 *Trajana pyta*
86 *Turbo castanea*
87 *Turbonilla nivea*
88 *Turritella apicalis*
89 *Turritella exoleta*
90 *Turritella perattenuata*
91 *Turritella subannulata*
92 *Venericardia perplana*
93 *Venericardia tridentata*
94 *Ventricolaria rugatina*
95 *Vermicularia recta*
96 *Vermicularia weberi*
97 *Vexillum holmesii*
98 *Viviparus georgianus*
99 *Crepidula fornicata*
100 *Bullata taylori*
101 *Anodontia alba*
102 *Rangia nasuta*

Lithostratigraphic and Hydrogeologic Cross Sections

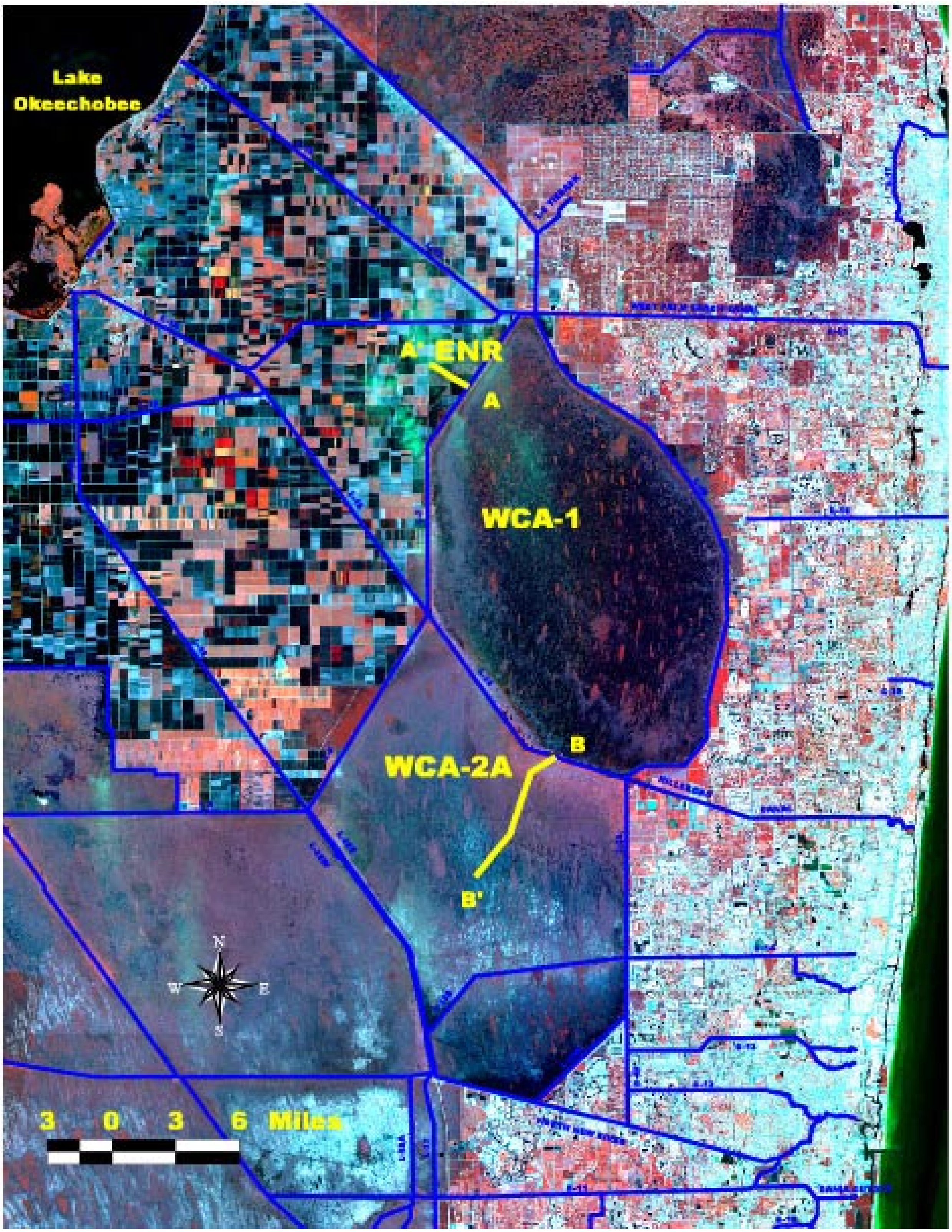

Figure 14. Location map of lithostratigraphic cross sections of the Surficial aquifer for this study.

ENR Lithostratographic Cross Section

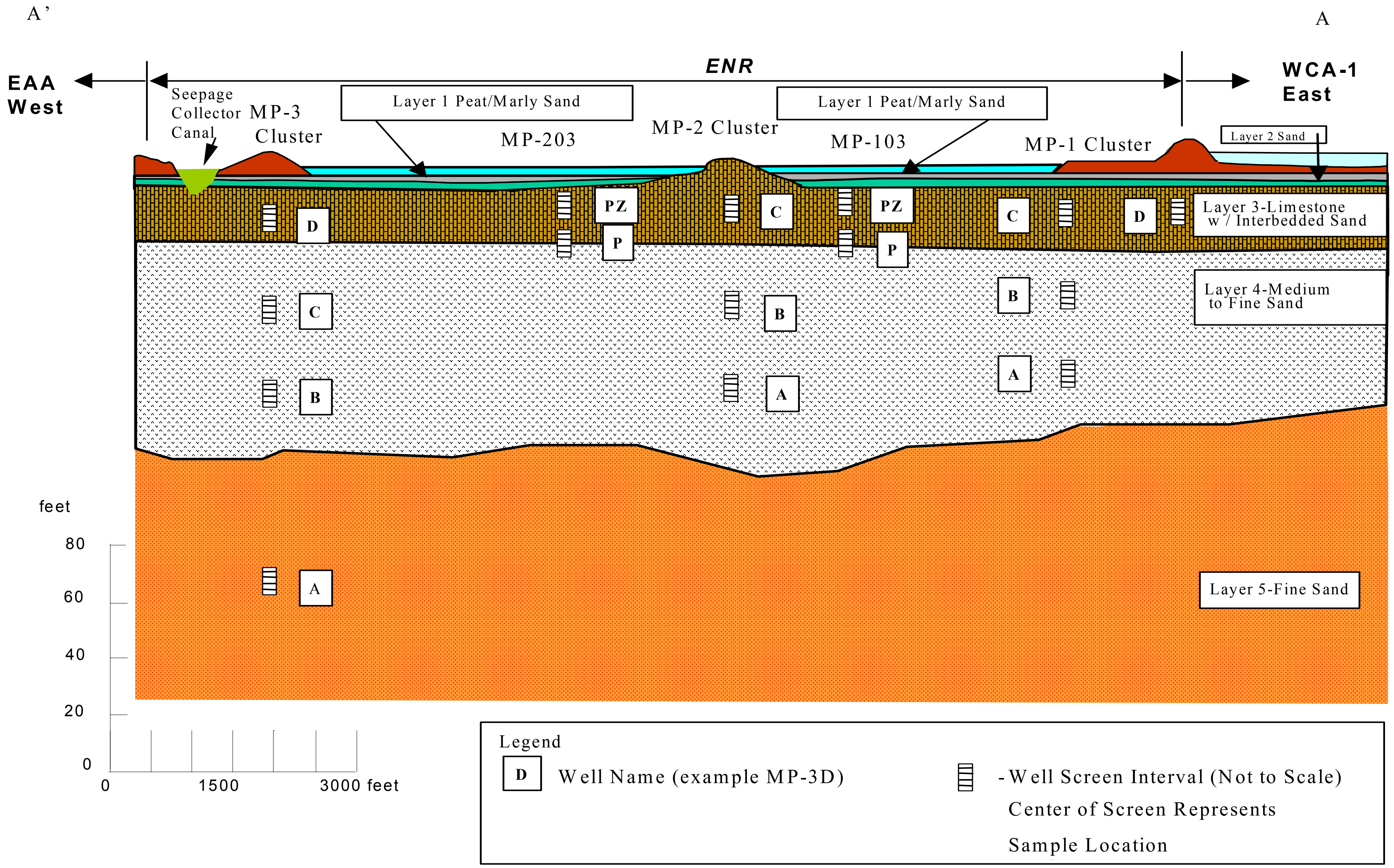

Figure 15. ENR West-East lithostratigraphic cross section.

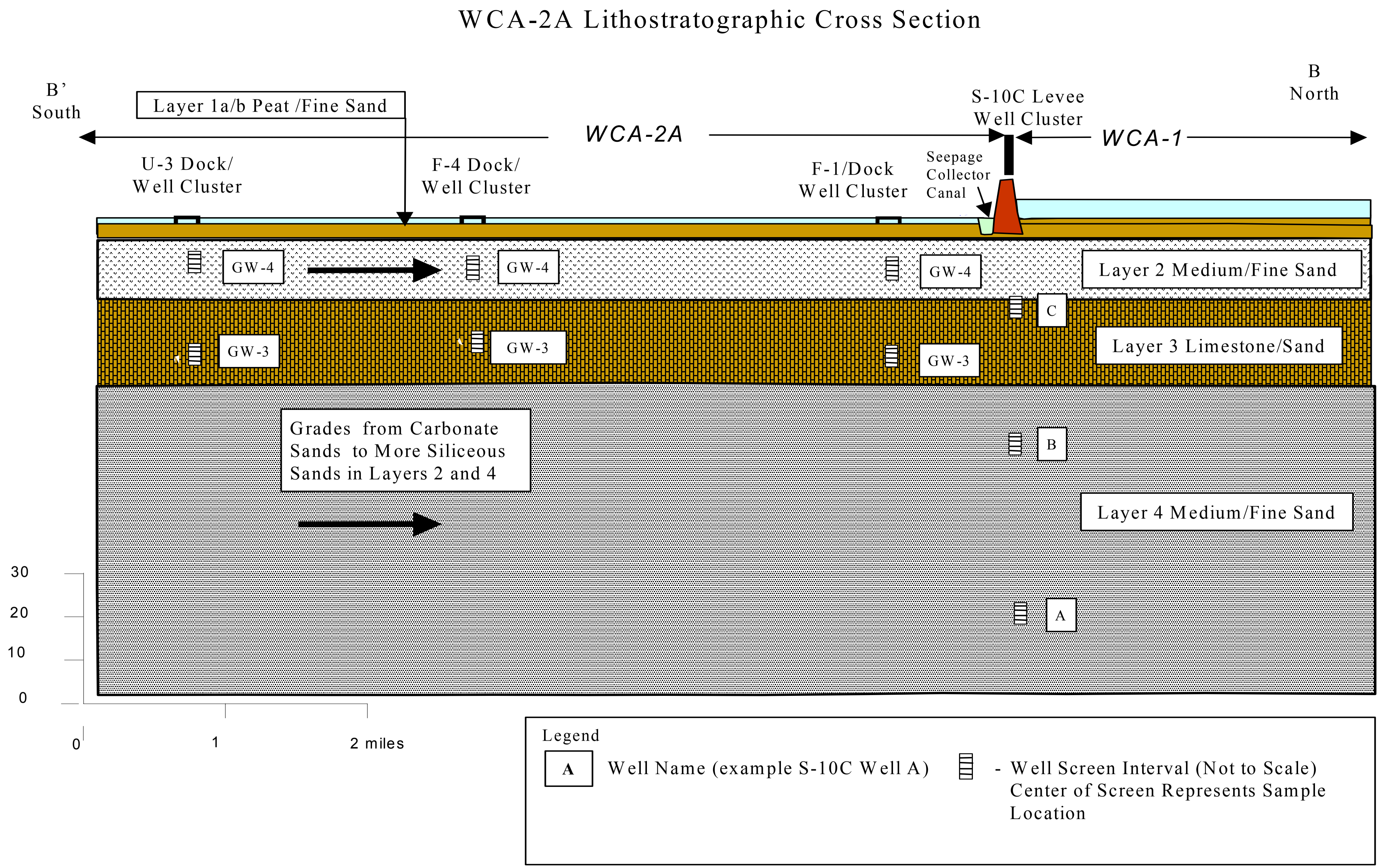

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Figure 16. WCA-2A South-North lithostratigraphic cross section.

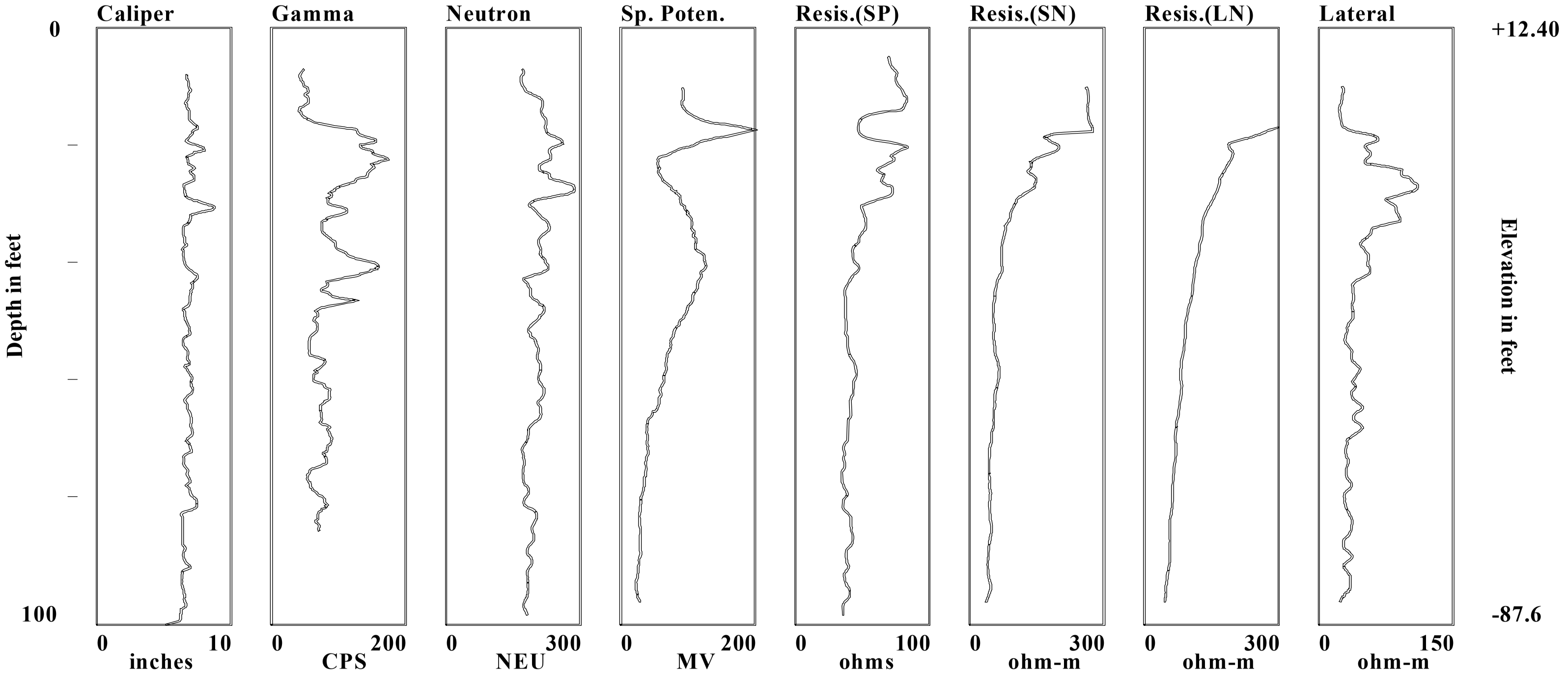
Geophysical Logs

Log Source: South Florida Water Management District

Station Name: 0990000063
Well ID: PB00063
FGS ID: Not Assigned At Time of Report
Other ID: Mercury Flux Program Well MOP-1A
Owner: S.F.W.M.D.
Logs Available: CAL, GAM, NEU, ESP, RES, RSN, RLN, LAT

County: PALM BEACH
Latitude: 26 41 01
Longitude: 80 22 33
Ground Surface Elevation (1929 NGVD): +12.40'
USGS Topo: Loxahatchee N.W.

Date logged: 04/18/97
Depth logged: 100'
Cased Depth: FROM: N/A to: N/A
Water Level: Not Collected
Date measured: N/A



South Florida Water Management District, West Palm Beach, FL.

Figure 17. Geophysical logs of ENR site MOP1-A.

Log Source: South Florida Water Management District

Station Name: 0990000066

Well ID: PB00066

FGS ID: Not Assigned At Time Of Report

Other ID: Mercury Flux Program Well MOP-2A

Owner: S.F.W.M.D.

County: PALM BEACH

Latitude: 26 35 33

Longitude: 80 26 45

Elevation (1929 NGVD): +15.90'

USGS Topo: Loxahatchee N.W.

Date logged: 03/19/97

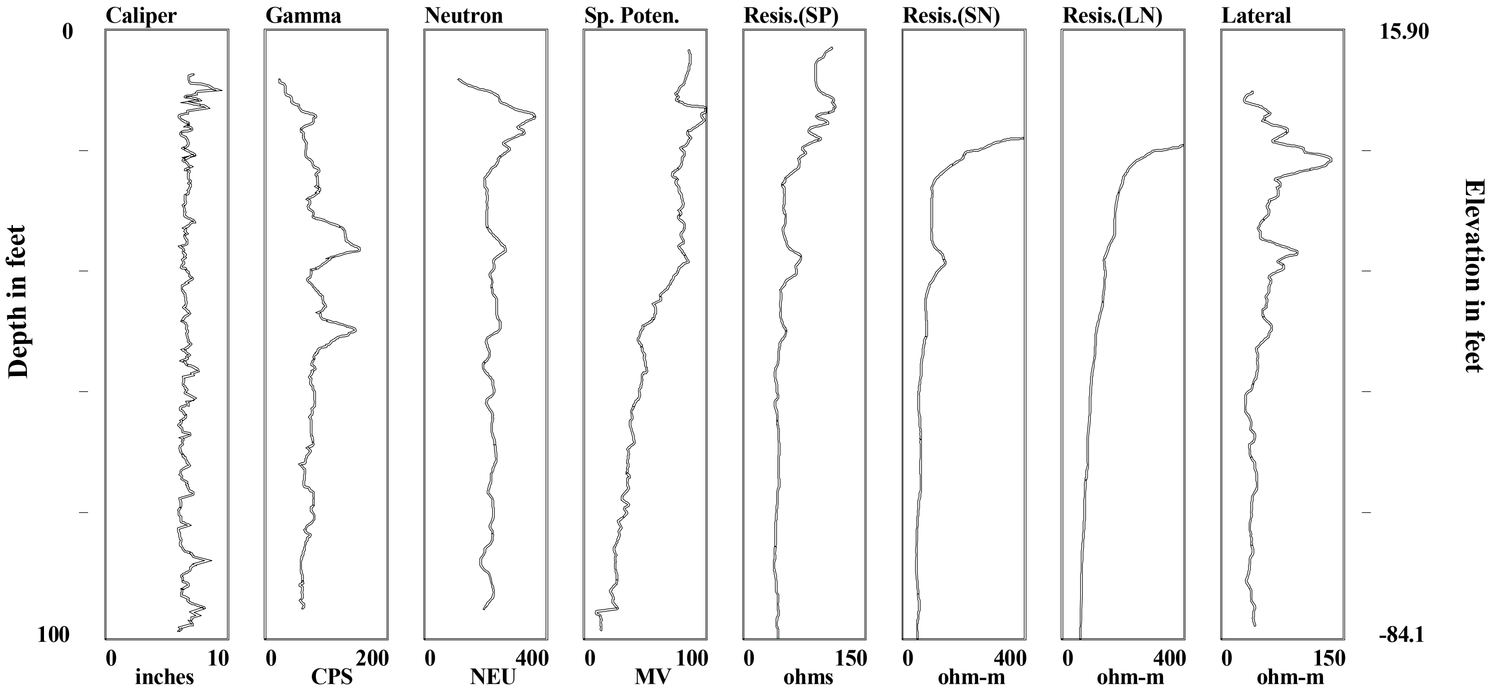
Depth logged: 100'

Cased Depth: FROM: N/A to: N/A

Water Level: Not Collected

Date measured: N/A

Logs Available: CAL, GAM, NEU, ESP, RES, RSN, RLN, LAT



South Florida Water Management District, West Palm Beach, FL.

Figure 18. Geophysical logs of ENR site MOP2-A.

Log Source: South Florida Water Management District

Station Name: 0990000065

Well ID: PB00065

FGS ID: Not Assigned At Time Of Report

Other ID:Mercury Flux Program Well MOP-3A

Owner: S.F.W.M.D.

Logs Available: CAL, GAM, NEU, ESP, RES, RSN, RLN, LAT

County: PALM BEACH

Latitude: 26 40 37

Longitude: 80 25 40

Elevation (1929 NGVD): +12.20'

USGS Topo: Loxahatchee N.W.

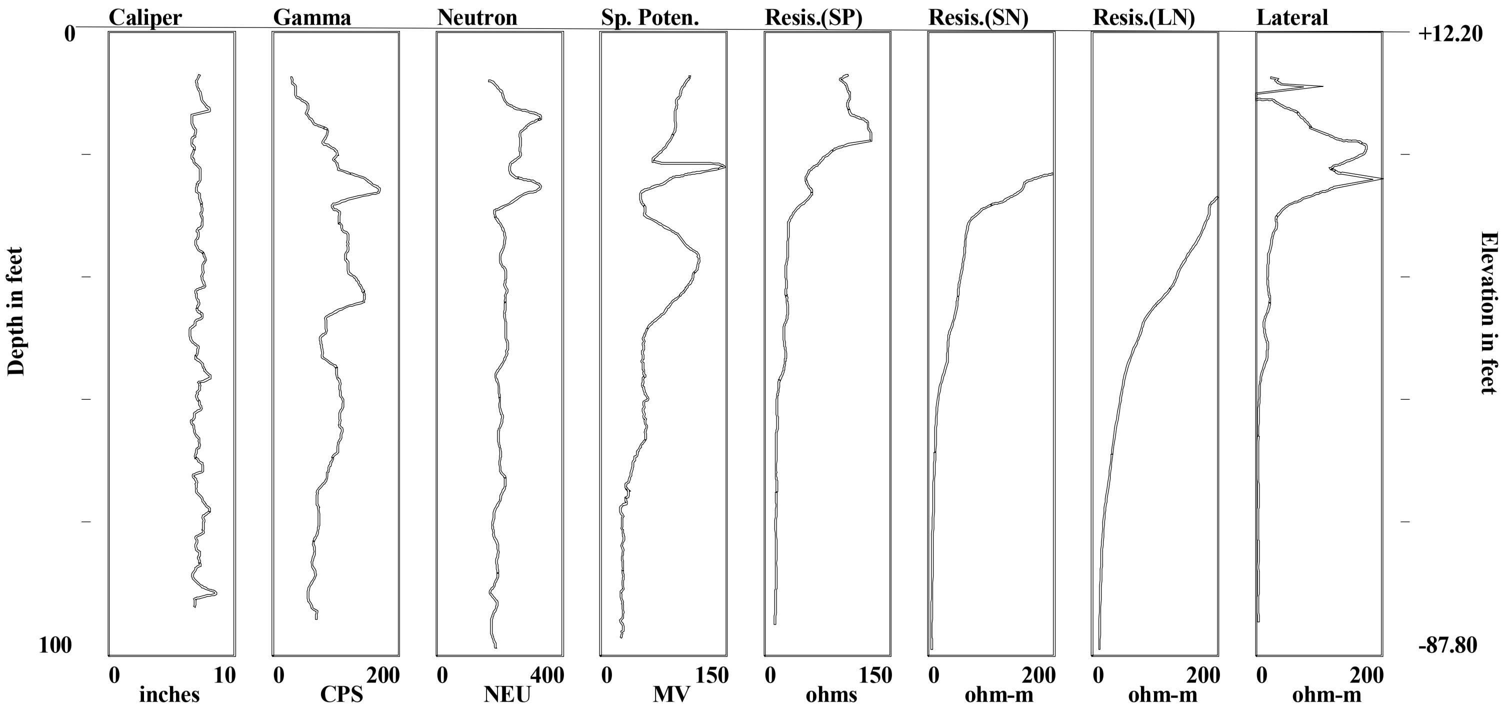
Date logged: 05/09/97

Depth logged: 101'

Cased Depth: FROM: N/A to: N/A

Water Level: Not Collected

Date measured: N/A



South Florida Water Management District , West Palm Beach, FL.

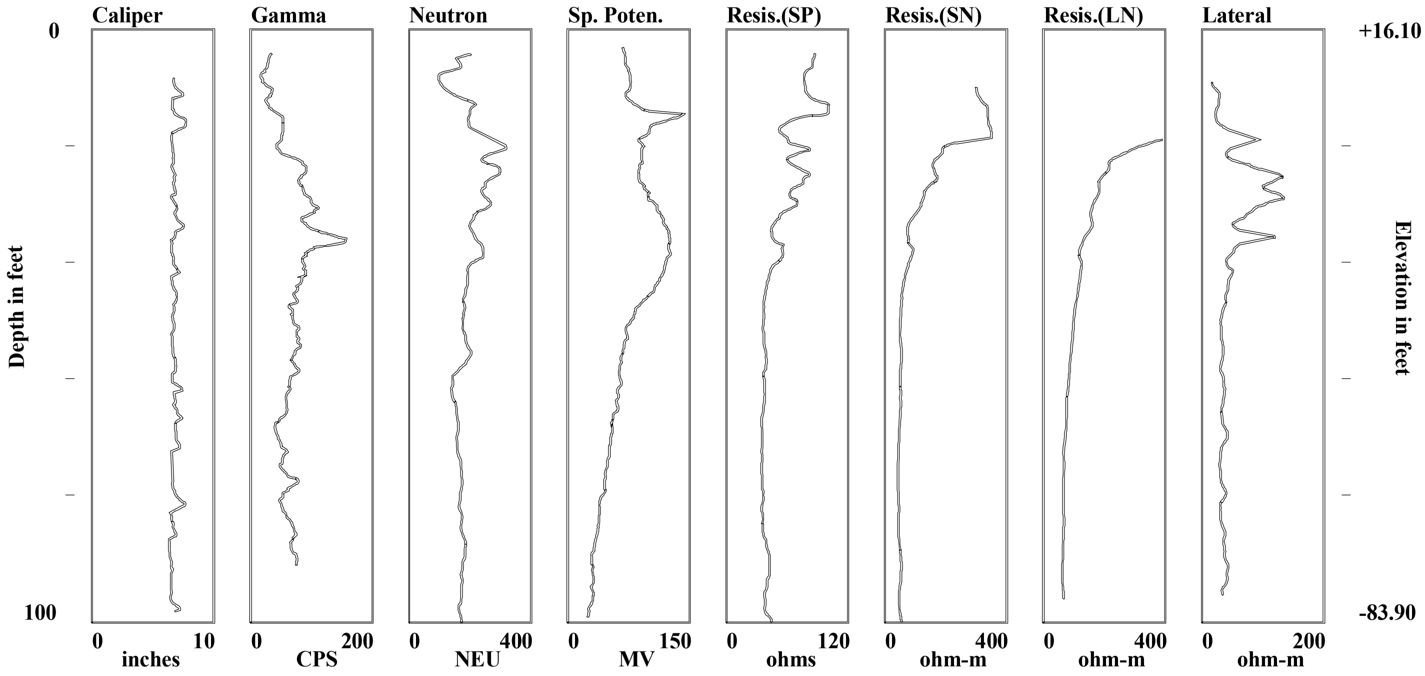
Figure 19. Geophysical logs of ENR site MOP3-A.

Log Source: South Florida Water Management District

Station Name: 0990000062
Well ID: PB00062
FGS ID: Not Assigned At Time Of Report
Other ID: Mercury Flux Program Well MP-1A
Owner: S.F.W.M.D.
Logs Available: CAL, GAM, NEU, ESP, RES, RSN, RLN, LAT

County: PALM BEACH
Latitude: 26 37 58
Longitude: 80 24 54
Elevation (1929 NGVD): +16.10'
USGS Topo:Loxahatchee N.W.

Date logged: 04/10/97
Depth logged: 102'
Cased Depth: FROM: N/A to: N/A
Water Level: Not Collected
Date measured: N/A



South Florida Water Management District, West Palm Beach, FL.

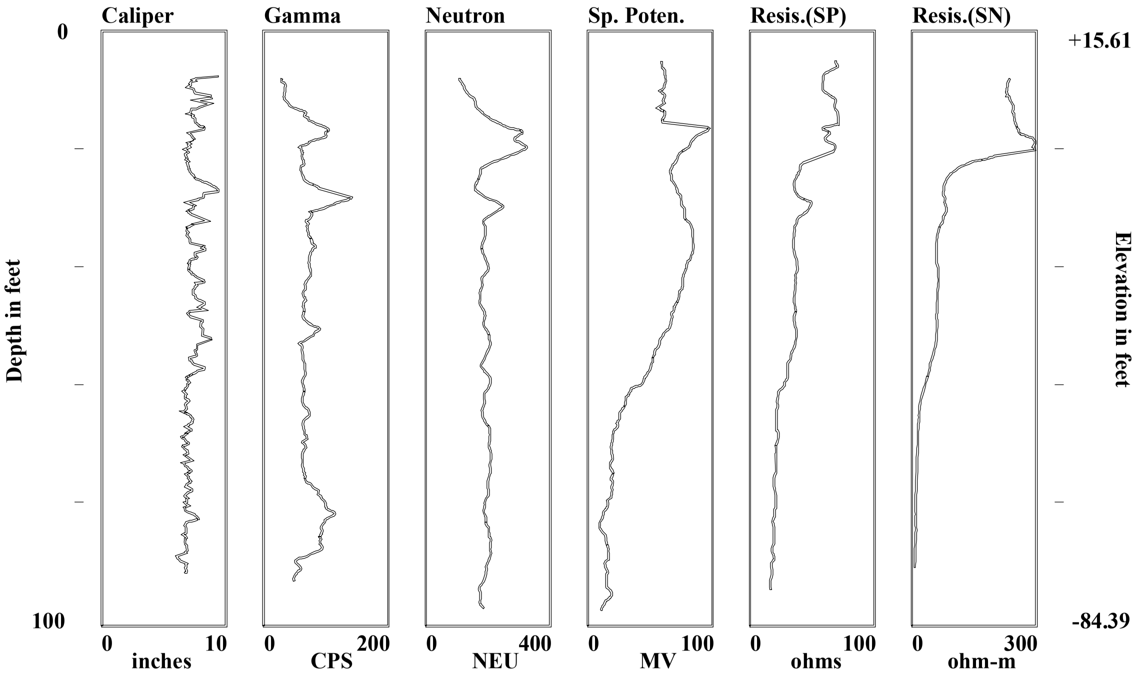
Figure 20. Geophysical logs of ENR site MP1-A.

Log Source: South Florida Water Management District

Station Name: 099000061
Well ID: PB00061
FGS ID: Not Assigned At Time Of Report
Other ID: Mercury Flux Program Well MP-2A
Owner: S.F.W.M.D.
Logs Available: CAL, GAM, NEU, ESP, RES, RSN

County: PALM BEACH
Latitude: 26 38 19
Longitude: 80 25 39
Elevation (1929 NGVD): +15.61'
USGS Topo: Loxahatchee N.W.

Date logged: 03/26/97
Depth logged: 101'
Cased Depth: FROM: N/A to: N/A'
Water Level(msl): Not Collected
Date measured: N/A



South Florida Water Management District, West Palm Beach, FL.

Figure 21. Geophysical logs of ENR site MP2-A.

Log Source: South Florida Water Management District

Station Name: 0990000064

Well ID: PB00064

FGS ID: Not Assigned At Time Of Report

Other ID: Mercury Flux Program Well MP-3A

Owner: S.F.W.M.D.

Logs Available: CAL, GAM, NEU, ESP, RES, RSN, RLN, LAT

County: PALM BEACH

Latitude: 26 38 54

Longitude: 80 26 40

Elevation (1929 NGVD): +17.20'

USGS Topo: Loxahatchee N.W.

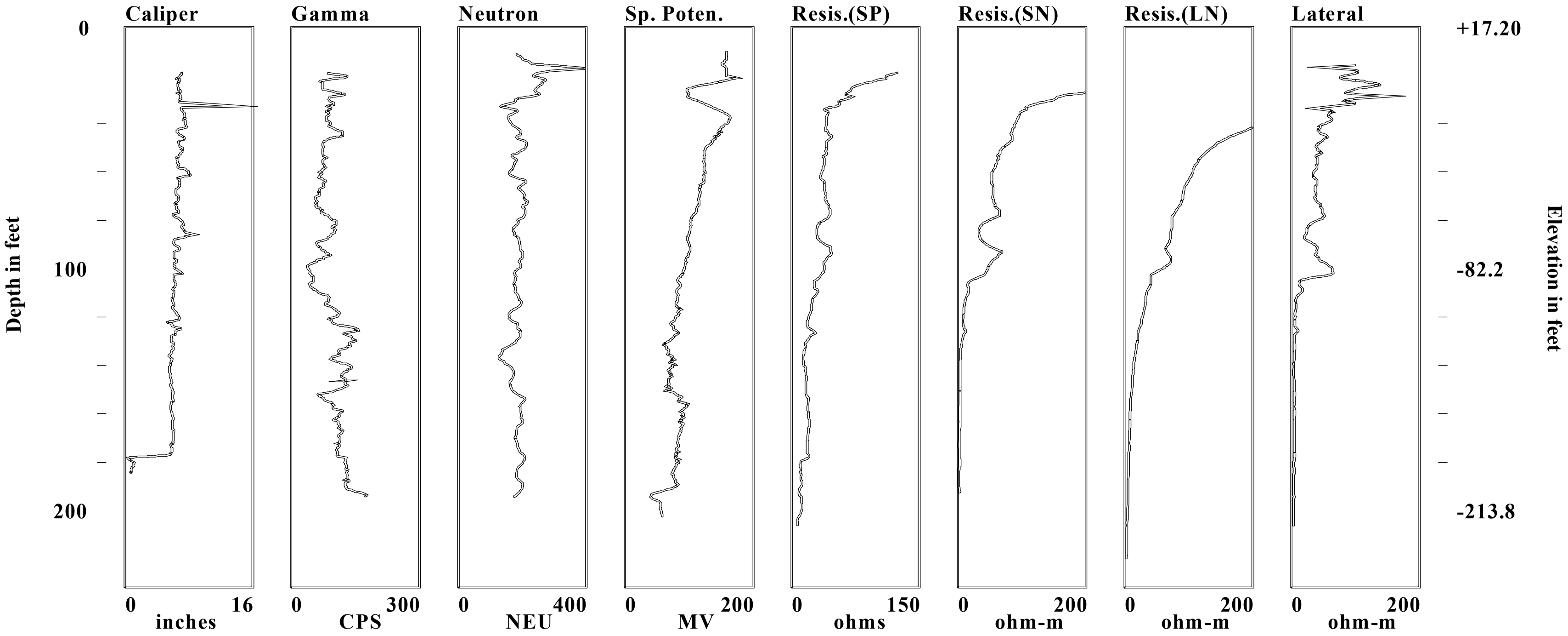
Date logged: 40/29/97

Depth logged: 231'

Cased Depth: FROM: NA to: NA

Water Level: Not Collected

Date measured: N/A



South Florida Water Management District West Palm Beach, FL.

Figure 22. Geophysical logs of ENR site MP3-A.

Log Source: South Florida Water Management District

Station Name: 0990000060

Well ID: PB00060

FGS ID: Not Assigned At Time Of Report

Other ID: Mercury Flux Program Well S-10C

Owner: S.F.W.M.D.

Logs Available: CAL, GAM, NEU, ESP, RES, RSN, RLN, LAT

County: PALM BEACH

Latitude: 26 22 15

Longitude: 80 21 04

Elevation (1929 NGVD): +22.41'

USGS Topo: Coral Springs N.E.

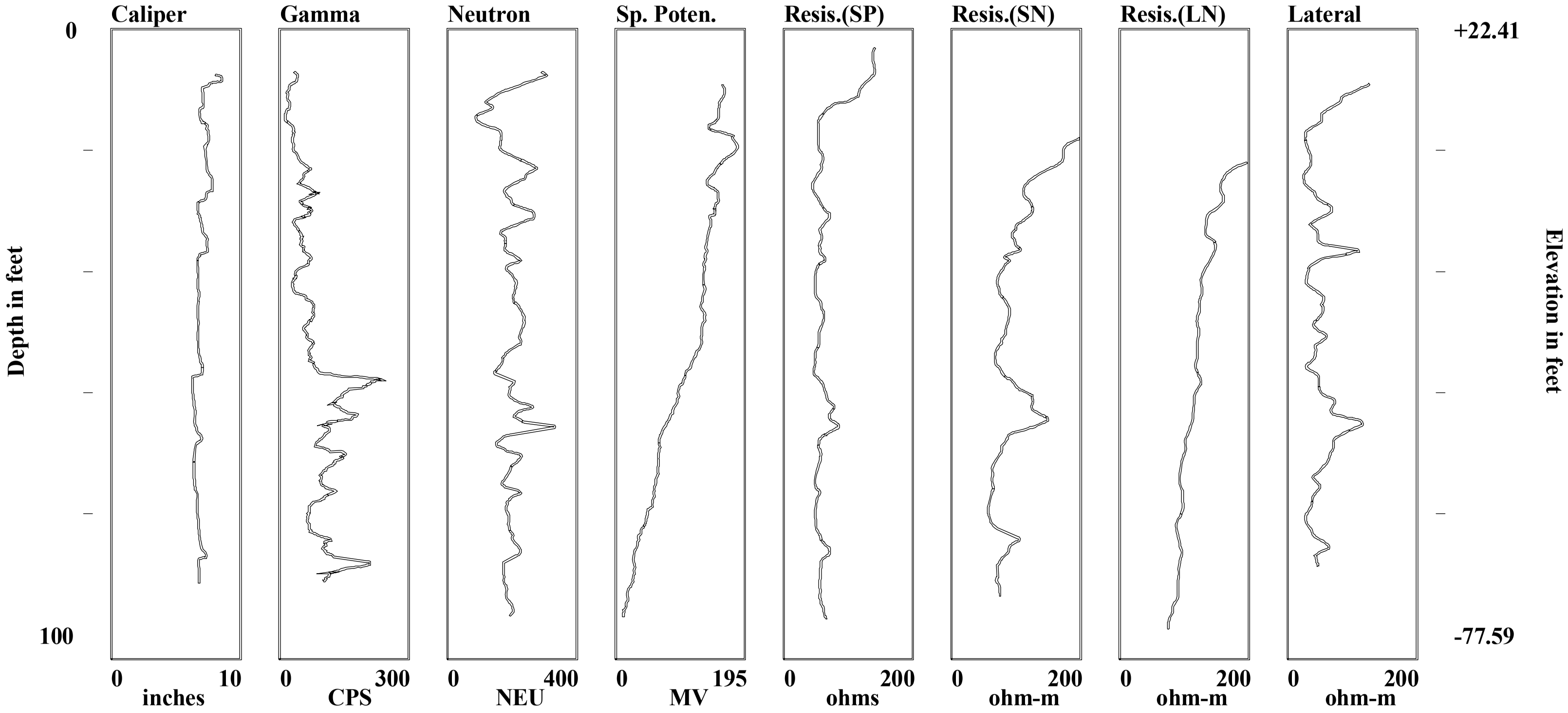
Date logged: 03/06/97

Depth logged: 104'

Cased Depth: FROM: N/A to: N/A

Water Level(msl): Not Collected

Date measured: N/A



South Florida Water Management District, West Palm Beach, FL.

Figure 23. Geophysical logs of WCA-2A site S10C-WA.

Cross Sections of Selected Geophysical Logs

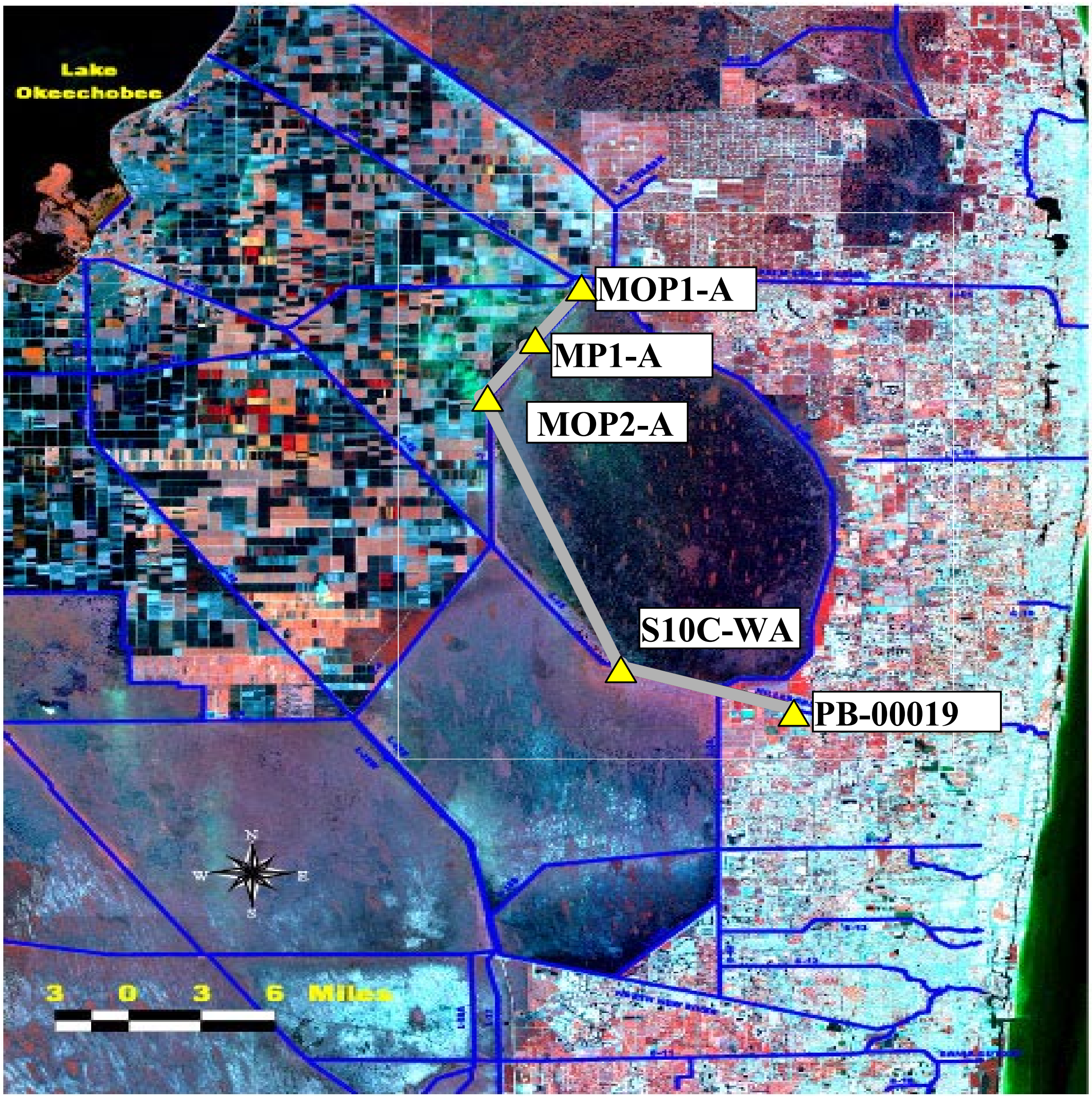


Figure 24. North-South geophysical transect location.

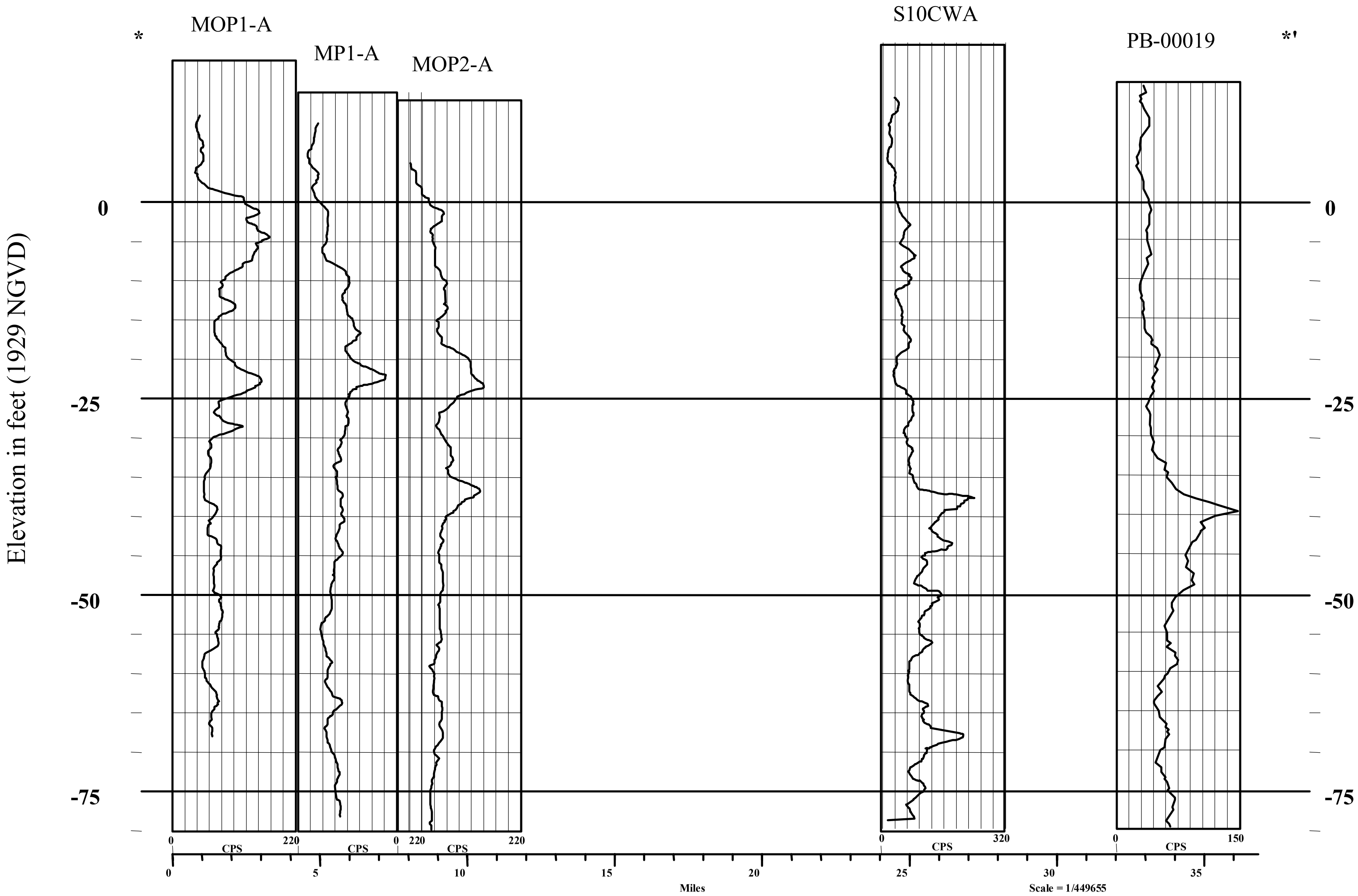


Figure 25. Natural gamma log on North-South cross section.

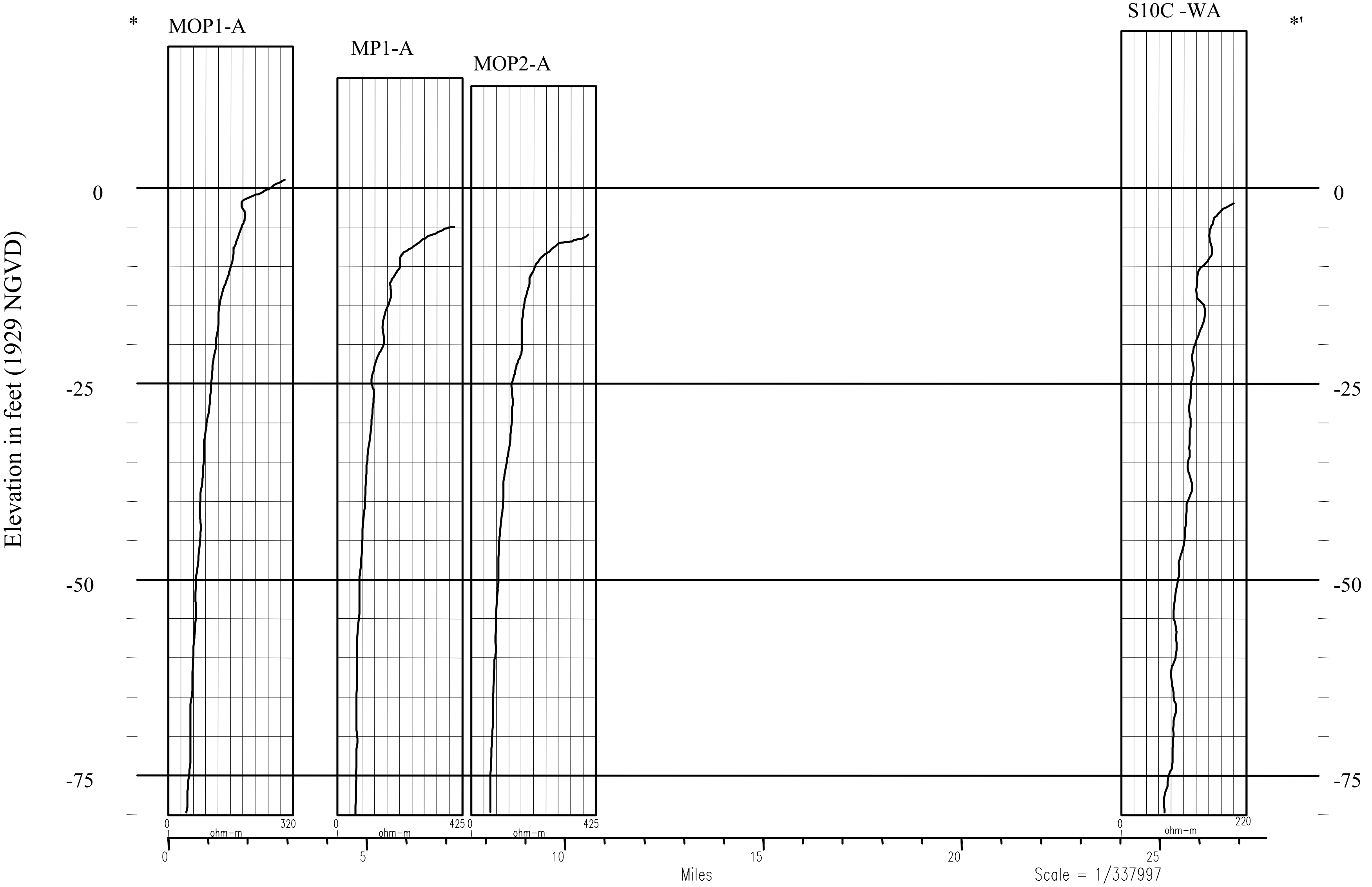


Figure 26. Resistivity long normal on North-South cross section.

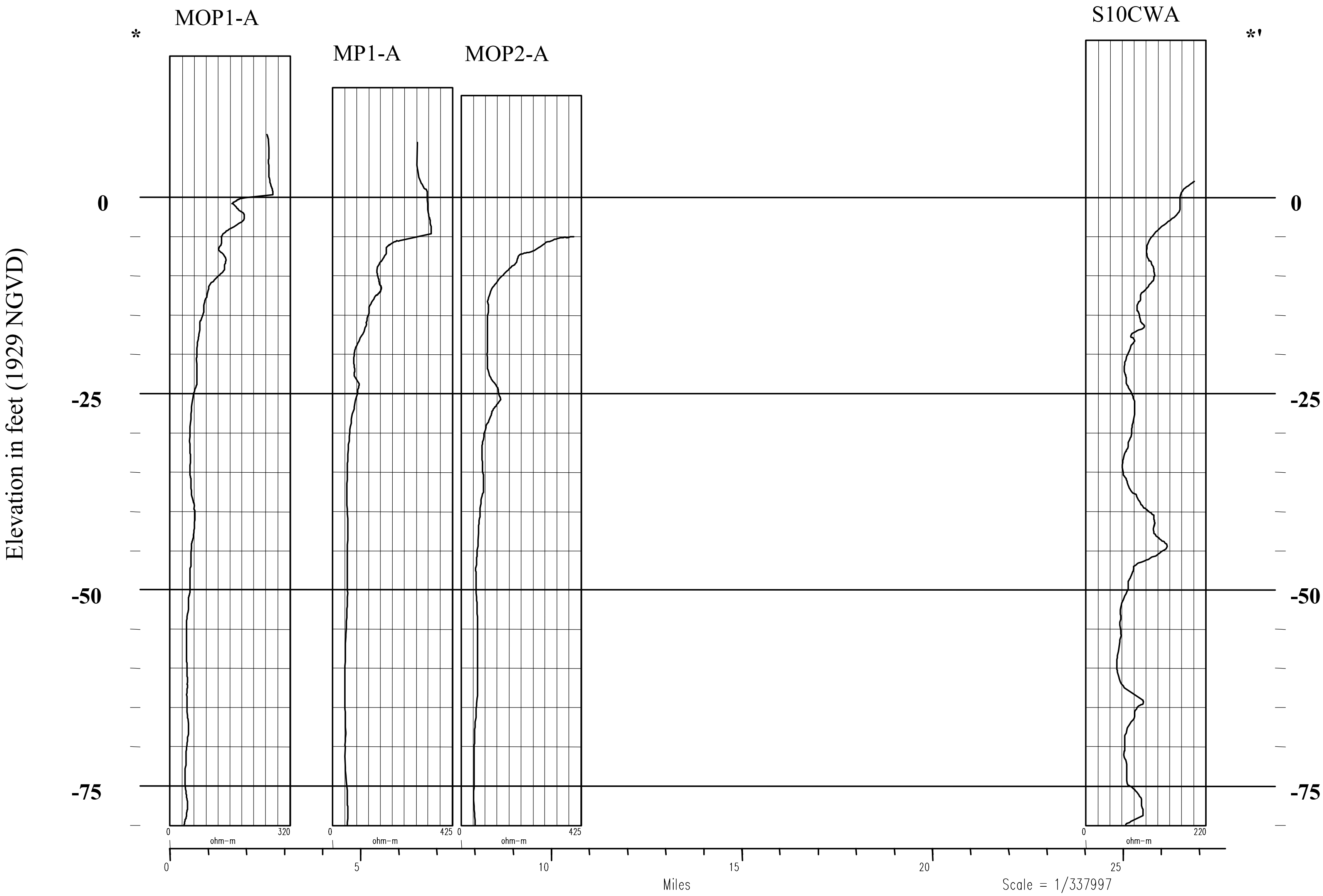


Figure 27. Resistivity short normal on North-South cross section.

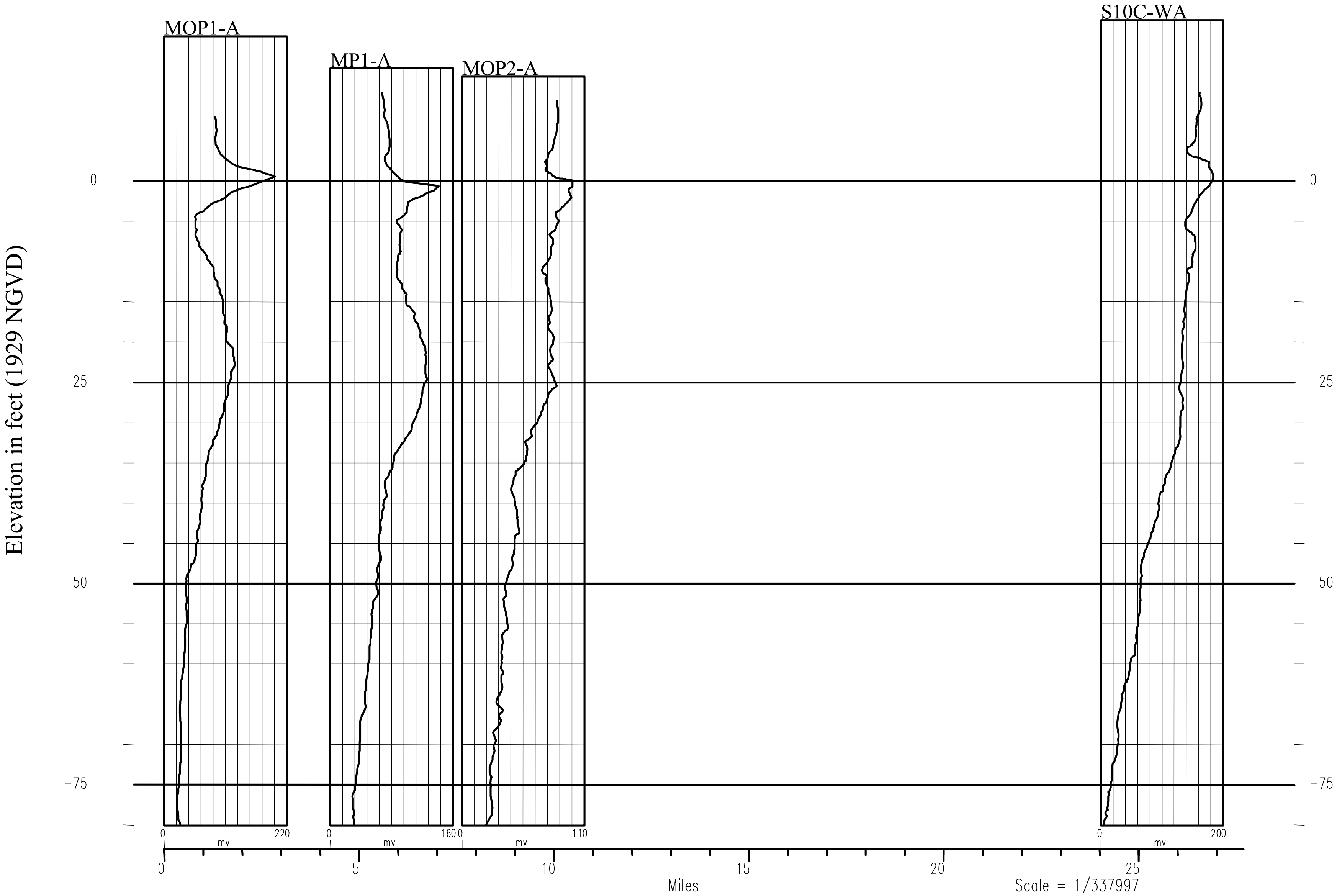


Figure 28. Spontaneous potential on North-South cross section.

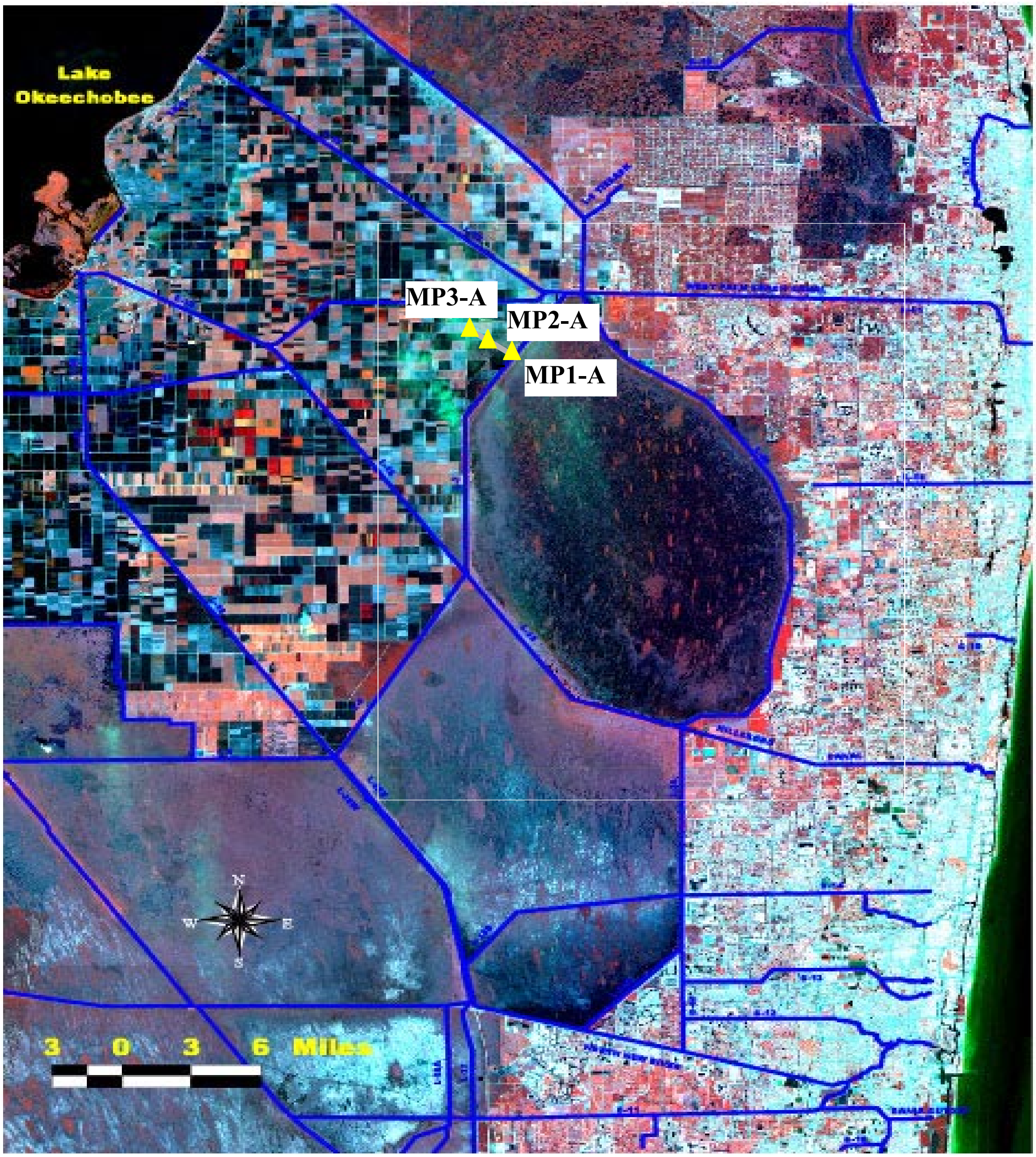


Figure 29. West East geophysical cross section location.

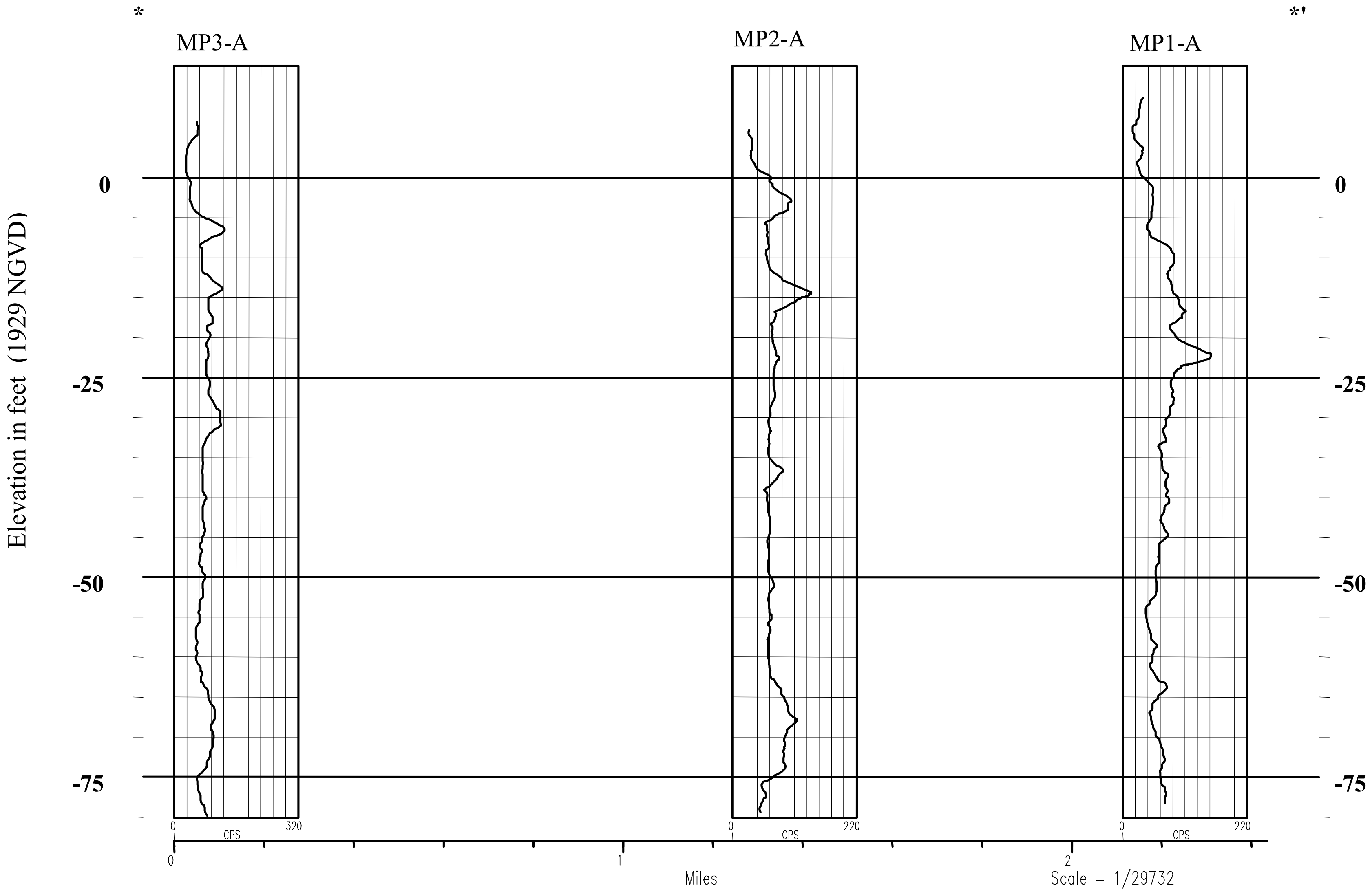


Figure 30. Natural gamma log on West-East cross section.

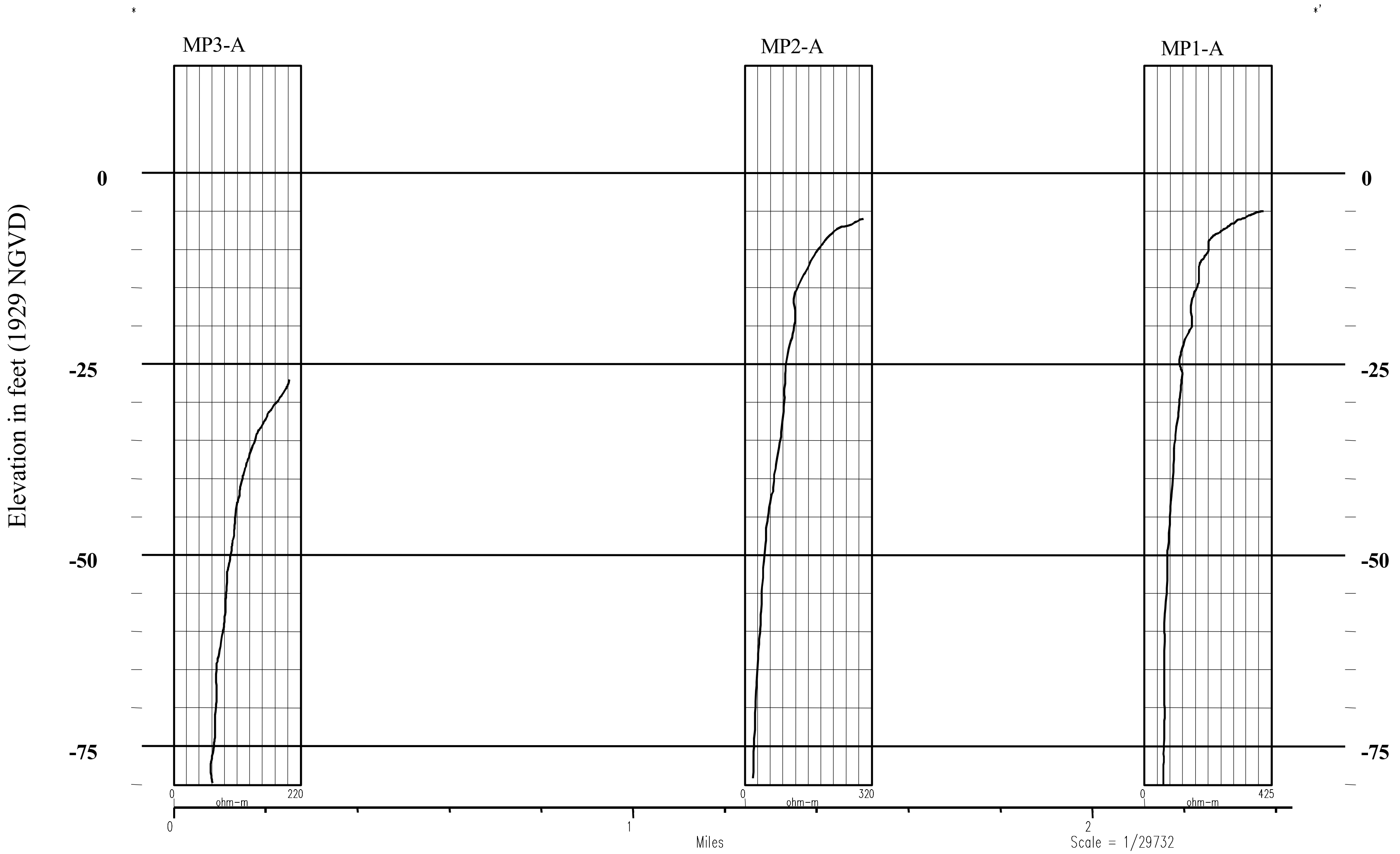


Figure 31. Resistivity long normal on West-East cross section.

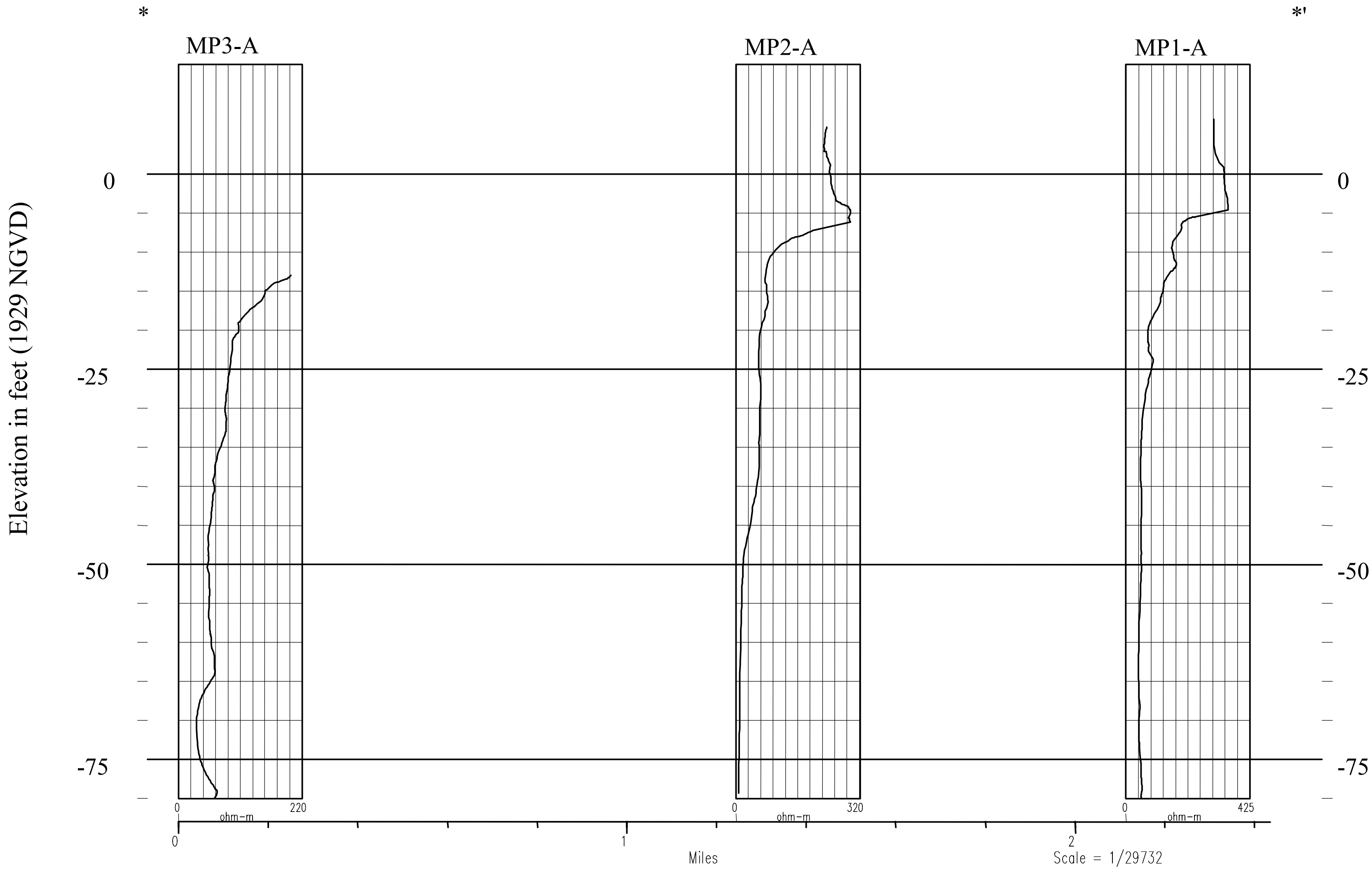


Figure 32. Resistivty short normal on West-East cross section.

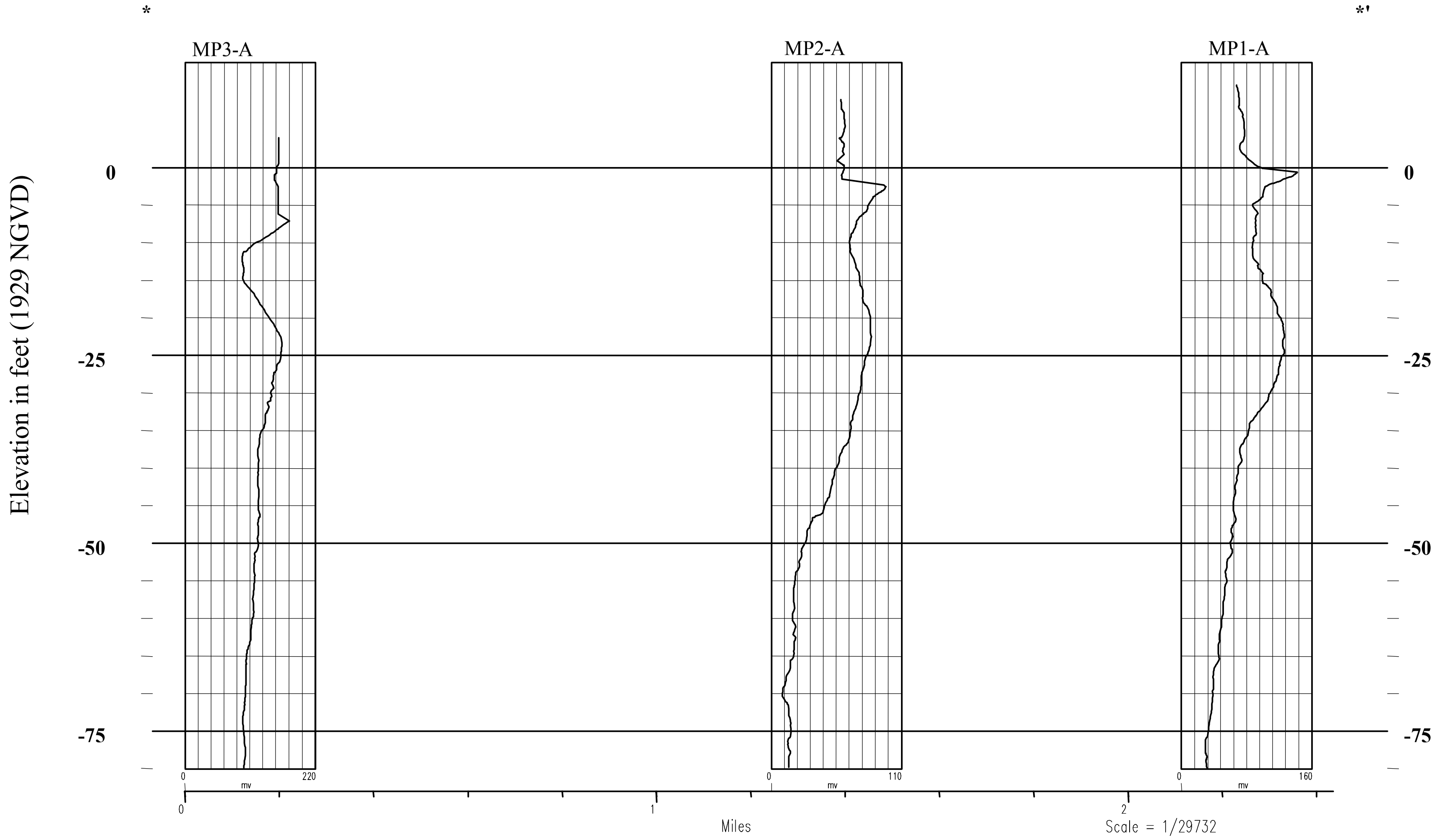


Figure 33. Resistivity short normal on West-East cross section.

Sieve Analysis Tabulated by Borehole

Table 11. Hydraulic conductivity Based on Sieve Analysis at MP1-A Page 1 of 3

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)	Estimated layer average K_{VST} (feet/day)	Recovery K_{HD} for screened interval (feet/day)
S-1	Layer 1	2	0	2	16.1	14.1	19.0	1.9	20	20	
S-2		2	2	4	14.1	12.1	19.0	1.9			
S-3		2	4	6	12.1	10.1	20.0	2.0			
S-4		2	6	8	10.1	8.1					
S-5		2	8	10	8.1	6.1					
S-6	2	2	10	12	6.1	4.1	8.1	0.8			
S-7	Layer 3	2	12	14	4.1	2.1			21	13	
S-8		2	14	16	2.1	0.1					
S-9		2	16	18	0.1	-1.9	50	5.0			
SA		2	18	20	-1.9	-3.9					
SB		2	20	22	-3.9	-5.9					29
SC		2	22	24	-5.9	-7.9					60
SD		2	24	26	-7.9	-9.9					
SE		2	26	28	-9.9	-11.9					
SF		2	28	30	-11.9	-13.9					
SG		2	30	32	-13.9	-15.9					
SH		2	32	34	-15.9	-17.9					
SI		2	34	36	-17.9	-19.9					
SJ		2	36	38	-19.9	-21.9					
SK		2	38	40	-21.9	-23.9					
S-10		2	40	42	-23.9	-25.9	11	1.1			
S-13		3	42	45	-25.9	-28.9	9.7	1.0			
S-14	Layer 4	2.5	45	47.5	-28.9	-31.4	8.6	0.9	11	11	
S-15		2.5	47.5	50	-31.4	-33.9	8.1	0.8			
S-16		2.5	50	52.5	-33.9	-36.4	10	1.0			
S-17		2.5	52.5	55	-36.4	-38.9	7.6	0.8			
S-18		2.5	55	57.5	-38.9	-41.4					
S-19		2.5	57.5	60	-41.4	-43.9	13	1.3			40
S-20		2.5	60	62.5	-43.9	-46.4					
S-21		2.5	62.5	65	-46.4	-48.9	16	1.6			
S-22		2.5	65	67.5	-48.9	-51.4					
S-23		2.5	67.5	70	-51.4	-53.9	9.6	1.0			
S-24		2.5	70	72.5	-53.9	-56.4					
S-25		2.5	72.5	75	-56.4	-58.9					
S-26		2.5	75	77.5	-58.9	-61.4	7.4	0.7			
S-28		2.5	80	82.5	-63.9	-66.4	11	1.1			
S-30		5	85	90	-68.9	-73.9	13	1.3			
S-31		5	90	95	-73.9	-78.9	16	1.6			
S-32		5	95	100	-78.9	-83.9	9.5	0.9			65.0

Table 11. Hydraulic conductivity Based on sieve analysis at MP1-A Page 2 of 3

Sample ID	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-1	0.16	0.18	0.20	0.33	21	0.98	1.9
S-2	0.16	0.19	0.20	0.32	9	0.97	1.9
S-3	0.16	0.20	0.20	0.32	6	0.97	1.9
S-4					2		
S-5					1		
S-6	0.08	0.14	0.18	0.83	7	0.96	10.0
S-7							
S-8							
S-9	0.20	0.38	0.48	6.97		0.90	36.5
SA							
SB							
SC							
SD							
SE							
SF							
SG							
SH							
SI							
SJ							
SK							
S-10	0.11	0.13	0.15	0.46		1.03	1.5
S-13	0.12	0.13	0.13	0.23		1.02	1.6
S-14	0.11	0.12	0.12	0.17		0.96	1.4
S-15	0.12	0.13	0.14	0.20		1.07	1.5
S-16	0.11	0.12	0.12	0.16		0.95	1.4
S-17	0.11	0.11	0.11	0.15		0.94	1.4
S-18							
S-19	0.13	0.15	0.16	0.23		0.87	2.4
S-20							
S-21	0.13	0.15	0.17	0.49		0.60	3.8
S-22							
S-23	0.12	0.13	0.13	0.20		1.06	1.6

Table 11. Hydraulic Conductivity Based on Sieve analysis at MP1-A Page 3 of 3

Sample ID	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-24							
S-25							
S-26	0.11	0.11	0.11	0.15		0.94	1.4
S-28	0.12	0.14	0.15	0.35		0.80	2.7
S-30	0.13	0.15	0.16	0.27		1.01	1.7
S-31	0.13	0.62	0.19	0.41		0.97	2.1
S-32	0.11	0.12	0.13	0.20		0.84	3.1

K_{HS} = Horizontal hydraulic conductivity based on MVASKF software program (Vukovic, 1992) and sieve analysis samples.

K_{VS} = Vertical hydraulic conductivity based on K_{HS} * 0.10 (Walton, 1988).

K_{HST} = Horizontal hydraulic conductivity following Todd (1980).

K_{VST} = Vertical hydraulic conductivity following Todd (1980).

K_{HD} = Horizontal hydraulic conductivity from drawdown tests.

* = Data from gINT software program (1997).

** = Data from MVASKF software program (Vukovic, 1992).

Shaded cells indicate data from gINT software program (1997).

Blank cells indicate no measurement, no analysis, or that the measurement was not applicable at that site.

Table 12. Hydraulic Conductivity Based on Sieve Analysis at MP2-A   Page 1 of 2

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)	Estimated layer average K_{VST} (feet/day)	Recovery K_{HD} for screened interval (feet/day)
S-1	Layer 3	5	0	5	15.61	10.61					
S-2		5	5	10	10.61	5.61					
S-3		5	10	15	5.61	0.61					
S-4		5	15	20	0.61	-4.39					
S-5		5	20	25	-4.39	-9.39					
S-6		5	25	30	-9.39	-14.39					11
S-7		1	30	31	-14.39	-15.39					
S-8	Layer 4	4	31	35	-15.39	-19.39	12	1.2	16	12	
*S-9		5	35	40	-19.39	-24.39	11	1.1			
*S-10		5	40	45	-24.39	-29.39	7.2	0.7			
*S-11		5	45	50	-29.39	-34.39	16	1.6			
*S-12		5	50	55	-34.39	-39.39	16	1.6			
*S-13		5	55	60	-39.39	-44.39	6.7	0.7			
S-14		2	60	62	-44.39	-46.39					
S-15		2	62	64	-46.39	-48.39	56	5.6			68
S-16		2	64	66	-48.39	-50.39	9.3	0.9			
S-17		2	66	68	-50.39	-52.39	8.5	0.9			
S-18		2	68	70	-52.39	-54.39	17	1.7			
S-19		2	70	72	-54.39	-56.39	16	1.6			
S-20		2	72	74	-56.39	-58.39	12	1.2			
S-21		2	74	76	-58.39	-60.39	10	1.0			
S-22		2	76	78	-60.39	-62.39	8.3	0.8			
S-23		2	78	80	-62.39	-64.39	9.4	0.9			
S-24		2	80	82	-64.39	-66.39	20	2.0			
S-25		2	82	84	-66.39	-68.39	49	4.9			
S-26		2	84	86	-68.39	-70.39	20	2.0			
S-27		2	86	88	-70.39	-72.39	13	1.3			
S-28		2	88	90	-72.39	-74.39	10	1.0			
S-29		2	90	92	-74.39	-76.39	29	2.9			
S-30		2	92	94	-76.39	-78.39	33	3.3			
S-31		2	94	96	-78.39	-80.39	11	1.1			
S-32		2	96	98	-80.39	-82.39	40	4.0			
S-33		2	98	100	-82.39	-84.39	33	3.3			50

Table 12. Hydraulic Conductivity Based on Sieve Analysis at MP2-A

Page 2 of 2

Sample ID	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-1							
S-2							
S-3							
S-4							
S-5							
S-6							
S-7							
S-8	0.12	0.13	0.14	0.40		0.59	3.1
*S-9	0.12	0.14	0.15	0.32		0.84	2.4
*S-10	0.10	0.11	0.11	0.22		0.76	2.1
*S-11	0.13	0.19	0.21	0.38		1.07	2.7
*S-12	0.13	0.19	0.21	0.38		1	2.7
*S-13	0.10	0.11	0.11	0.16		0.96	1.5
S-14							
S-15	0.18	0.23	0.28	9.5	20	2.58	57.1
S-16	0.11	0.13	0.14	0.23	44	0.98	2
S-17	0.11	0.12	0.13	0.20	52	1.14	1.6
S-18	0.14	0.20	0.21	0.38	73	1.35	2.6
S-19	0.13	0.17	0.20	0.41	49	1.15	3.2
S-20	0.12	0.13	0.14	0.38	65	0.64	3.1
S-21	0.11	0.13	0.14	0.34	75	0.76	2.8
S-22	0.11	0.12	0.13	0.21	71	0.97	1.8
S-23	0.11	0.13	0.14	0.24	74	0.92	2.1
S-24	0.13	0.20	0.23	0.69	58	1.18	5
S-25	0.20	0.25	0.30	1.78	41	0.72	9.7
S-26	0.14	0.18	0.20	0.76	45	0.49	5.2
S-27	0.12	0.14	0.15	0.32	65	0.78	2.4
S-28	0.11	0.13	0.14	0.33	53	0.77	2.6
S-29	0.17	0.24	0.27	0.63	54	1.01	3.7
S-30	0.20	0.24	0.26	0.63	44	0.83	3.4
S-31	0.11	0.14	0.15	0.35	54	0.87	2.8
S-32	0.21	0.25	0.29	1.06	40	0.8	5.5
S-33	0.19	0.23	0.25	0.94	50	0.72	5.4

K_{HS} = Horizontal hydraulic conductivity based on MVASKF software program (Vukovic, 1992) and sieve analysis samples.

K_{VS} = Vertical hydraulic conductivity based on K_{HS} * 0.10 (Walton, 1988).

K_{HST} = Horizontal hydraulic conductivity following Todd (1980).

K_{VST} = Vertical hydraulic conductivity following Todd (1980).

K_{HD} = Horizontal hydraulic conductivity from drawdown tests.

* = Data from gINT software program (1997).

** = Data from MVASKF software program (Vukovic, 1992).

Shaded cells indicate data from gINT software program (1997).

Blank cells indicate no measurement, no analysis, or that the measurement was not applicable at that site.

Table 13. Hydraulic Conductivity Based on Sieve Analysis at MP3-A **Page 1 of 2**

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)	Estimated layer average K_{VST} (feet/day)	Recovery K_{HD} for screened interval (feet/day)
S-1	Layer 1	2	0	2	17.2	15.2					
S-2		2	2	4	15.2	13.2					
S-3		2	4	6	13.2	11.2					
S-4		2	6	8	11.2	9.2					
S-5		2	8	10	9.2	7.2	45	4.5			
S-6	2	2	10	12	7.2	5.2					
S-7	Layer 3	2	12	14	5.2	3.2	35	3.5	26	17	
S-8		1	14	15	3.2	2.2	170	17			
S-9		5	15	20	2.2	-2.8					
S-10		5	20	25	-2.8	-7.8					
S-11		5	25	30	-7.8	-12.8					73
S-12		5	30	35	-12.8	-17.8					
S-13		5	35	40	-17.8	-22.8					
S-14		5	40	45	-22.8	-27.8	19	1.9			
S-15		5	45	50	-27.8	-32.8	19	1.9			
S-16		5	50	55	-32.8	-37.8	24	2.4			
S-17		5	55	60	-37.8	-42.8	8.8	0.9			
S-18	Layer 4	5	60	65	-42.8	-47.8	31	3.1	23	15	240
S-19		5	65	70	-47.8	-52.8	11	1.1			
S-20		5	70	75	-52.8	-57.8	19	1.9			
S-21		5	75	80	-57.8	-62.8	14	1.4			
S-22		5	80	85	-62.8	-67.8	8.0	0.8			
S-23		5	85	90	-67.8	-72.8	18	1.8			
S-24		5	90	95	-72.8	-77.8	14	1.4			
S-25		5	95	100	-77.8	-82.8	43	4.3			18
*S-26		5	100	105	-82.8	-87.8	65	6.5			
*S-29		5	115	120	-97.8	-102.8	6.5	0.7			

Table 13. Hydraulic Conductivity Based on Sieve Analysis at MP3-A

Page 2 of 2

Sample ID	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-1					50		
S-2					18		
S-3					10		
S-4					7		
S-5	0.19	0.30	0.38	3.7	37	0.92	21.0
S-6					12		
S-7	0.18	0.32	0.38	4.0	6	0.75	24.2
S-8	0.27	0.71	0.96	10	50	1.96	39.2
S-9							
S-10						0.41	9.5
S-11							
S-12							
S-13							
S-14	0.14	0.17	0.18	0.77		0.40	5.5
S-15	0.16	0.20	0.20	0.26		1.00	1.6
S-16	0.17	0.21	0.22	0.43		0.91	2.7
S-17	0.11	0.12	0.13	0.21		1.02	1.8
S-18	0.19	0.23	0.24	0.51		1.03	2.9
S-19	0.12	0.14	0.15	0.22		1.03	1.6
S-20	0.15	0.19	0.20	0.33		0.99	2.0
S-21	0.12	0.15	0.16	0.85		0.35	7.1
S-22	0.11	0.11	0.12	0.17		0.94	1.5
S-23	0.13	0.16	0.17	0.91		0.42	7.1
S-24	0.13	0.16	0.17	0.32		0.86	2.3
S-25	0.23	0.31	0.34	0.49		1.14	2.2
*S-26	0.25	0.35	0.37	0.83			
*S-29	0.08	0.11	0.11	0.70			

K_{HS} = Horizontal hydraulic conductivity based on MVASKF software program (Vukovic, 1992) and sieve analysis samples.

K_{VS} = Vertical hydraulic conductivity based on K_{HS} * 0.10 (Walton, 1988).

K_{HST} = Horizontal hydraulic conductivity following Todd (1980).

K_{VST} = Vertical hydraulic conductivity following Todd (1980).

K_{HD} = Horizontal hydraulic conductivity from drawdown tests.

* = Data from gINT software program (1997).

** = Data from MVASKF software program (Vukovic, 1992).

Shaded cells indicate data from gINT software program (1997).

Blank cells indicate no measurement, no analysis, or that the measurement was not applicable at that site.

Table 14. Hydraulic Conductivity Based on Sieve Analysis at MOP1-A Page 1 of 2

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)	Estimated layer average K_{VST} (feet/day)	Recovery K_{HD} for screened interval (feet/day)
S-1	Layer 1	2	0	2	12.4	10.4					
S-2		2	2	4	10.4	8.4					
S-3		2	4	6	8.4	6.4	17	1.7			
S-4	Layer 2	2	8	10	4.4	2.4	100	10	62	52	
S-5		2	10	12	2.4	0.4	48	4.8			
S-7		2	12	14	0.4	-1.6	38	3.8			
S-8	Layer 3	2	14	16	-1.6	-3.6	28	2.8	26	26	
S-9		2	16	18	-3.6	-5.6	27	2.7			
*S-10		2	18	20	-5.6	-7.6	24	2.4			
S-11		5	20	25	-7.6	-12.6					
S-12		5	25	30	-12.6	-17.6					
S-13		5	30	35	-17.6	-22.6					
S-14	Layer 4	5	35	40	-22.6	-27.6			21	13	
S-16		5	40	45	-27.6	-32.6	8.8	0.9			
S-17		5	45	50	-32.6	-37.6	31	3.1			
S-18		5	50	55	-37.6	-42.6	8.2	0.8			
S-19		5	55	60	-42.6	-47.6	80	8.0			
S-20		5	60	65	-47.6	-52.6					16
S-21		5	65	70	-52.6	-57.6	8.5	0.9			
S-22		5	70	75	-57.6	-62.6	8.5	0.8			
S-23		5	75	80	-62.6	-67.6	6.0	0.6			
S-24		5	80	85	-67.6	-72.6	13	1.3			
S-25		5	85	90	-72.6	-77.6	26	2.6			
S-26		5	90	95	-77.6	-82.6	9.0	0.9			
S-27		2.5	95	97.5	-82.6	-85.1	40	4.0			
S-28		2.5	97.5	100	-85.1	-87.6	38	3.8			73

Table 14. Hydraulic Conductivity Based on Sieve Analysis at MOP1-A Page 2 of 2

Sample ID	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-1					4		
S-2					3		
S-3	0.13	0.18	0.20	0.38	2	0.90	2.7
S-4	0.24	0.39	0.50	6.2	12	0.75	26.7
S-5	0.21	0.29	0.34	4.4	4	0.37	22.1
S-7	0.21	0.24	0.25	2.4	17	0.23	12.4
S-8	0.20	0.21	0.22	0.30	12	0.99	1.5
S-9	0.20	0.21	0.21	0.28	20	0.93	1.5
***S-10**	0.15	0.20	0.21	3.1	33	0.12	20.4
S-11					68		
S-12							
S-13							
S-14							
S-16	0.09	0.11	0.11	0.42		0.67	3.6
S-17	0.20	0.24	0.26	0.38		1.21	2.0
S-18	0.11	0.12	0.12	0.21		0.86	1.8
S-19	0.27	0.41	0.47	2.4		0.79	9.2
S-20							
S-21	0.11	0.12	0.12	0.23		0.83	2.0
S-22	0.11	0.13	0.14	0.23		1.03	2.0
S-23	0.09	0.11	0.11	0.20		0.93	1.9
S-24	0.12	0.16	0.19	0.36		1.08	2.8
S-25	0.17	0.21	0.22	0.74		0.59	4.4
S-26	0.11	0.12	0.12	0.23		0.82	2.0
S-27	0.21	0.27	0.30	1.1		0.58	5.8
S-28	0.22	0.26	0.27	0.40		0.98	1.8

K_{HS} = Horizontal hydraulic conductivity based on MVASKF software program (Vukovic, 1992) and sieve analysis samples.

K_{VS} = Vertical hydraulic conductivity based on K_{HS} * 0.10 (Walton, 1988).

K_{HST} = Horizontal hydraulic conductivity following Todd (1980).

K_{VST} = Vertical hydraulic conductivity following Todd (1980).

K_{HD} = Horizontal hydraulic conductivity from drawdown tests.

* = Data from gINT software program (1997).

** = Data from MVASKF software program (Vukovic, 1992).

Shaded cells indicate data from gINT software program (1997).

Blank cells indicate no measurement, no analysis, or that the measurement was not applicable at that site.

Table 15. Hydraulic Conductivity Based on Sieve Analysis at MOP2-A Page 1 of 4

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)	Estimated layer average K_{VST} (feet/day)	Recovery K_{HD} for screened interval (feet/day)
S-1	Layer 1	2	0	2	15.9	13.9	120	12.0			
S-2		2	2	4	13.9	11.9	100	10.0			
S-3		2	4	6	11.9	9.9					
S-4	Layer 2	2	6	8	9.9	7.9	180	18.0	60.5	17.5	
S-5		2	8	10	7.9	5.9					
*S-6		2	10	12	5.9	3.9	7.1	0.7			
*S-7		3.5	12	15.5	3.9	0.4	25	2.5			
S-8	Layer 3	5	15.5	20.5	0.4	-4.6			11	11	
S-9		5	20.5	25.5	-4.6	-9.6					
S-10		2	25.5	27.5	-9.6	-11.6	11	1.1			
S-11		2	27.5	29.5	-11.6	-13.6	11	1.1			
S-12		2	29.5	31.5	-13.6	-15.6	12	1.2			11
S-13		2	31.5	33.5	-15.6	-17.6	13	1.3			
S-14		2	33.5	35.5	-17.6	-19.6	11	1.1			
S-15		0.5	35.5	36	-19.6	-20.1					
S-16		2	36	38	-20.1	-22.1	8.7	0.9			
S-17		2	38	40	-22.1	-24.1					
S-18		2	40	42	-24.1	-26.1	11	1.1			
S-19		2	42	44	-26.1	-28.1	12	1.2			

Table 15. Hydraulic Conductivity Based on Sieve Analysis at MOP2-A Page 2 of 4

Sample ID	Layer	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-1	Layer 1	0.22	0.53	0.78	9.1	22	1.75	45.10
S-2		0.21	0.45	0.71	8.3	14	1.43	44.20
S-3						4		
S-4	Layer 2	0.36	0.77	0.94	8.8	2	1.00	25.80
S-5						17		
*S-6		0.08	0.11	0.13	0.63	50	0.69	6.90
*S-7		0.14	0.19	0.21	1.4			
S-8	Layer 3							
S-9								
S-10		0.11	0.13	0.14	0.55	26	0.42	4.60
S-11		0.12	0.13	0.14	0.23	19	0.95	2.00
S-12		0.12	0.14	0.15	0.44	11	0.54	3.70
S-13		0.12	0.14	0.15	0.25	7	0.87	2.00
S-14		0.11	0.15	0.16	0.78	58	0.38	6.90
S-15								
S-16		0.09	0.13	0.14	0.71		0.54	7.00
S-17						76		
S-18		0.11	0.13	0.13	0.38	29	0.59	3.20
S-19		0.12	0.13	0.14	0.33	24	0.72	2.50

Table 15. Hydraulic Conductivity Based on Sieve Analysis at MOP2-A Page 3 of 4

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)	Estimated layer average K_{VST} (feet/day)	Recovery K_{HD} for screened interval (feet/day)
S-20	Layer 4	2	44	46	-28.1	-30.1	13	1.3	11	9.0	
S-21		2	46	48	-30.1	-32.1	14	1.4			
S-22		2	48	50	-32.1	-34.1	22	2.2			
*S-23		2	50	52	-34.1	-36.1	13	1.3			
S-24		2	52	54	-36.1	-38.1	17	1.7			
S-25		2	54	56	-38.1	-40.1	5.9	0.6			
S-26		2	56	58	-40.1	-42.1	8.0	0.8			
S-27		2	58	60	-42.1	-44.1	7.6	0.8			31
S-28		2	60	62	-44.1	-46.1	7.1	0.7			
S-29		2	62	64	-46.1	-48.1	8.0	0.8			
S-30		2	64	66	-48.1	-50.1	11	1.1			
S-31		2	66	68	-50.1	-52.1	9.2	0.9			
S-32		2	68	70	-52.1	-54.1	7.6	0.8			
S-33		2	70	72	-54.1	-56.1	11	1.1			
S-34		2	72	74	-56.1	-58.1	10	1.0			
S-35		2	74	76	-58.1	-60.1	11	1.1			
S-36		2	76	78	-60.1	-62.1	7.6	0.8			
S-37		2	78	80	-62.1	-64.1	7.5	0.8			
S-38		2	80	82	-64.1	-66.1	5.8	0.6			
S-39		2	82	84	-66.1	-68.1	6.6	0.7			
S-40		2	84	86	-68.1	-70.1	7.0	0.7			
S-41		2	86	88	-70.1	-72.1	9.4	0.9			
S-42		2	88	90	-72.1	-74.1	10	1.0			
S-43		2	90	92	-74.1	-76.1	8.0	0.8			
S-44		2	92	94	-76.1	-78.1	12	1.2			
S-45		2	94	96	-78.1	-80.1	9.5	0.9			
S-46		2	96	98	-80.1	-82.1	19	1.9			
S-47		2	98	100	-82.1	-84.1	18	1.8			74

Table 15. Hydraulic Conductivity Based on Sieve Analysis at MOP2-A Page 4 of 4

Sample ID	Layer	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-20	Layer 4	0.12	0.14	0.14	0.37	14	0.63	2.90
S-21		0.13	0.15	0.16	0.38	12	0.72	2.80
S-22		0.15	0.20	0.21	1.3	21	0.39	8.90
*S-23		0.12	0.14	0.15	0.26		0.87	2.10
S-24		0.14	0.17	0.19	0.41	21	0.78	2.90
S-25		0.09	0.11	0.11	0.18	82	0.97	1.90
S-26		0.11	0.12	0.12	0.19	77	1.07	1.60
S-27		0.11	0.12	0.12	0.18	55	1.00	1.50
S-28		0.11	0.11	0.11	0.16	35	0.94	1.50
S-29		0.11	0.12	0.12	0.18	101	0.96	1.50
S-30		0.12	0.14	0.15	0.28	50	0.83	2.20
S-31		0.11	0.13	0.13	0.28	50	0.81	2.40
S-32		0.11	0.12	0.12	0.21	97	0.91	1.50
S-33		0.12	0.14	0.16	0.35	86	1.03	2.80
S-34		0.11	0.13	0.14	0.33	72	0.90	2.70
S-35		0.11	0.14	0.15	0.36	50	0.91	2.90
S-36		0.10	0.11	0.12	0.20	50	0.94	1.70
S-37		0.11	0.11	0.12	0.17	50	0.93	1.50
S-38		0.09	0.11	0.11	0.16	95	0.99	1.60
S-39		0.10	0.11	0.12	0.18	94	1.00	1.70
S-40		0.10	0.11	0.12	0.20	70	0.99	1.80
S-41		0.11	0.13	0.14	0.24	95	1.02	2.10
S-42		0.12	0.14	0.15	0.26	92	0.98	2.20
S-43		0.11	0.12	0.13	0.21	50	1.07	1.70
S-44		0.12	0.16	0.17	0.31	50	1.03	2.30
S-45		0.11	0.13	0.14	0.50	71	0.56	4.60
S-46		0.13	0.21	0.25	0.70	31	1.30	5.10
S-47		0.13	0.21	0.23	0.58	44	1.20	4.20

K_{HS} = Horizontal hydraulic conductivity based on MVASKF software program (Vukovic, 1992) and sieve analysis samples.

K_{VS} = Vertical hydraulic conductivity based on K_{HS} * 0.10 (Walton, 1988).

K_{HST} = Horizontal hydraulic conductivity following Todd (1980).

K_{VST} = Vertical hydraulic conductivity following Todd (1980).

K_{HD} = Horizontal hydraulic conductivity from drawdown tests.

* = Data from gINT software program (1997).

** = Data from MVASKF software program (Vukovic, 1992).

Shaded cells indicate data from gINT software program (1997).

Blank cells indicate no measurement, no analysis, or that the measurement was not applicable at that site.

Table 16. Hydraulic Conductivity Based on Sieve Analysis at S10C-WA Page 1 of 4

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)
S-1	Layer 1	2	0	2	22.21	20.21	46	4.6	120
S-2		2	2	4	20.21	18.21	52	5.2	
S-3		2	4	6	18.21	16.21	160	16	
S-4		2	6	8	16.21	14.21	52	5.2	
S-5		2	8	10	14.21	12.21	61	6.1	
S-6		2	10	12	12.21	10.21			
S-7		2	12	14	10.21	8.21	120	12	
S-8		2	14	16	8.21	6.21	510	51	
S-9		2	16	18	6.21	4.21			
S-10		2	18	20	4.21	2.21	66	6.6	
S-11		2	20	22	2.21	0.21	60	6.0	
S-12	Layer 2	2	22	24	0.21	-1.79	110	11	53
S-13		2	24	26	-1.79	-3.79	35	3.5	
S-14		2	26	28	-3.79	-5.79	56	5.6	
S-15		2	28	30	-5.79	-7.79	26	2.6	
S-16		1	30	31	-7.79	-8.79	22	2.2	
SA	Layer 3	1	31	32	-8.79	-9.79			
SB		2	32	34	-9.79	-11.79			
SC		2	34	36	-11.79	-13.79			
SD		2	36	38	-13.79	-15.79			
SE		2	38	40	-15.79	-17.79			
SF		2	40	42	-17.79	-19.79			
SG		2	42	44	-19.79	-21.79			
SH		2	44	46	-21.79	-23.79			

Table 16. Hydraulic Conductivity Based on Sieve Analysis at S10C-WA Page 2 of 4

Sample ID	Layer	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-1	Layer 1	0.22	0.29	0.33	2.09	10	0.51	10.4
S-2		0.22	0.30	0.33	1.63	9	0.44	8
S-3		0.30	0.52	0.75	9.51	5	1.52	33.6
S-4		0.22	0.30	0.34	5.27	13	0.28	26.2
S-5		0.22	0.31	0.35	4.13	8	0.33	20
S-6						4		
S-7		0.30	0.46	0.62	7.14	2		
S-8		0.50	1.01		10.88	11	0.72	26.3
S-9						3	1.26	22.8
S-10		0.24	0.35	0.39	4.67	4	0.76	17.5
S-11		0.22	0.32	0.35	3.12	10	0.62	13.4
S-12	Layer 2	0.29	0.40	0.46	3.46	2	0.33	17.2
S-13		0.12	0.22	0.24	1.77	16	0.48	20.7
S-14		0.22	0.29	0.34	1.70	15	0.37	10.7
S-15		0.16	0.20	0.21	0.88	37	0.34	22.7
S-16		0.15	0.17	0.18	1.72	36	0.43	5.6
SA	Layer 3						0.15	11.6
SB								
SC								
SD								
SE								
SF								
SG								
SH								

Table 16. Hydraulic Conductivity Based on Sieve Analysis at S10C-WA Page 3 of 4

Sample ID	Layer	Length of sample (feet)	Depth from land surface to top of sample (feet)	Depth from land surface to bottom of sample (feet)	Elevation at top of sample - feet (1929 NGVD)	Elevation at bottom of sample - feet (1929 NGVD)	Estimated K_{HS} (feet/day)	Estimated K_{VS} (feet/day)	Estimated layer average K_{HST} (feet/day)	Estimated layer average K_{VST} (feet/day)	Recovery K_{HD} for screened interval (feet/day)
S-20	Layer 4	2	46	48	-23.79	-25.79	30	3.0	21	17	
S-21		0.5	48	48.5	-25.79	-26.29	15	1.5			
SI		1.5	48.5	50	-26.29	-27.79					
SJ		2	50	52	-27.29	-29.29					
SK		2	52	54	-29.29	-31.29					
SL		2	54	56	-31.29	-33.29					
SM		2	56	58	-33.29	-35.29					
S-24		2	58	60	-35.79	-37.79	32	3.2			
S-25		2	60	62	-37.79	-39.79	36	3.6			
S-26		2	62	64	-39.79	-41.79	15	1.5			
S-27		2	64	66	-41.79	-43.79	27	2.7			
S-28		2	66	68	-43.79	-45.79	18	1.8			
S-29		2	68	70	-45.79	-47.79	15	1.5			
S-30		2	70	72	-47.79	-49.79	9	0.9			
S-31		2	72	74	-49.79	-51.79	12	1.2			210
S-32		2	74	76	-51.79	-53.79	13	1.3			
S-33		2	76	78	-53.79	-55.79	13	1.3			
S-34		2	78	80	-55.79	-57.79	8	0.8			
S-35		2	80	82	-57.79	-59.79	9.3	0.9			
S-36		2	82	84	-59.79	-61.79	17	1.7			
S-37		2	84	86	-61.79	-63.79	13	1.3			
S-38		2	86	88	-63.79	-65.79	15	1.5			
S-39		2	88	90	-65.79	-67.79	22	2.2			
S-40		2	90	92	-67.79	-69.79	27	2.7			
S-41		2	92	94	-69.79	-71.79	26	2.6			
S-42		2	94	96	-71.79	-73.79	25	2.5			
S-43		2	96	98	-73.79	-75.79	45	4.5			
S-44		2	98	100	-75.79	-77.79	35	3.5			130

Table 16. Hydraulic Conductivity Based on Sieve Analysis at S10C-WA Page 4 of 4

Sample ID	Layer	D_{10}** (mm)	D_{17}** (mm)	D_{20}** (mm)	D_{60}** (mm)	Standard penetration test (SPT)	Gradation coefficient (Cc)*	Uniformity coefficient (Cu)*
S-20	**Layer 4**	0.16	0.20	0.21	2.74	39		
S-21		0.12	0.16	0.18	0.94	55	0.2	17.6
SI							0.46	8
SJ								
SK								
SL								
SM								
S-24		0.14	0.24	0.33	6.99	12		
S-25		0.21	0.24	0.25	1.50	18	0.92	51
S-26		0.12	0.17	0.20	0.81	77	0.59	6.7
S-27		0.16	0.22	0.24	1.50	50	0.38	7.8
S-28		0.14	0.19	0.20	1.76	28	0.23	28.5
S-29		0.13	0.17	0.18	0.82	14	0.24	12.8
S-30		0.11	0.13	0.14	0.25	36	0.37	6.2
S-31		0.12	0.15	0.16	0.27	16	0.99	2.3
S-32		0.13	0.16	0.17	0.24	20	0.92	2.2
S-33		0.12	0.16	0.18	0.49	29	0.98	1.8
S-34		0.11	0.12	0.12	0.18	42	0.65	3.9
S-35		0.11	0.12	0.13	0.64	43	1.07	1.6
S-36		0.12	0.16	0.18	1.58	70	0.35	5.6
S-37		0.11	0.14	0.15	1.19	24	0.44	12.7
S-38		0.11	0.17	0.21	1.26	21	0.50	11.2
S-39		0.13	0.21	0.24	1.93	17	0.77	11.3
S-40		0.15	0.21	0.23	1.39	21	0.68	14.9
S-41		0.16	0.22	0.23	1.33	99	0.58	9.5
S-42		0.14	0.21	0.24	1.33	36	0.46	8.6
S-43		0.21	0.30	0.35	2.99	114	0.34	21.1
S-44		0.17	0.23	0.26	1.55	68	0.48	18.7

K_{HS} = Horizontal hydraulic conductivity based on MVASKF software program (Vukovic, 1992) and sieve analysis samples.

K_{VS} = Vertical hydraulic conductivity based on K_{HS} * 0.10 (Walton, 1988).

K_{HST} = Horizontal hydraulic conductivity following Todd (1980).

K_{VST} = Vertical hydraulic conductivity following Todd (1980).

K_{HD} = Horizontal hydraulic conductivity from drawdown tests.

* = Data from gINT software program (1997).

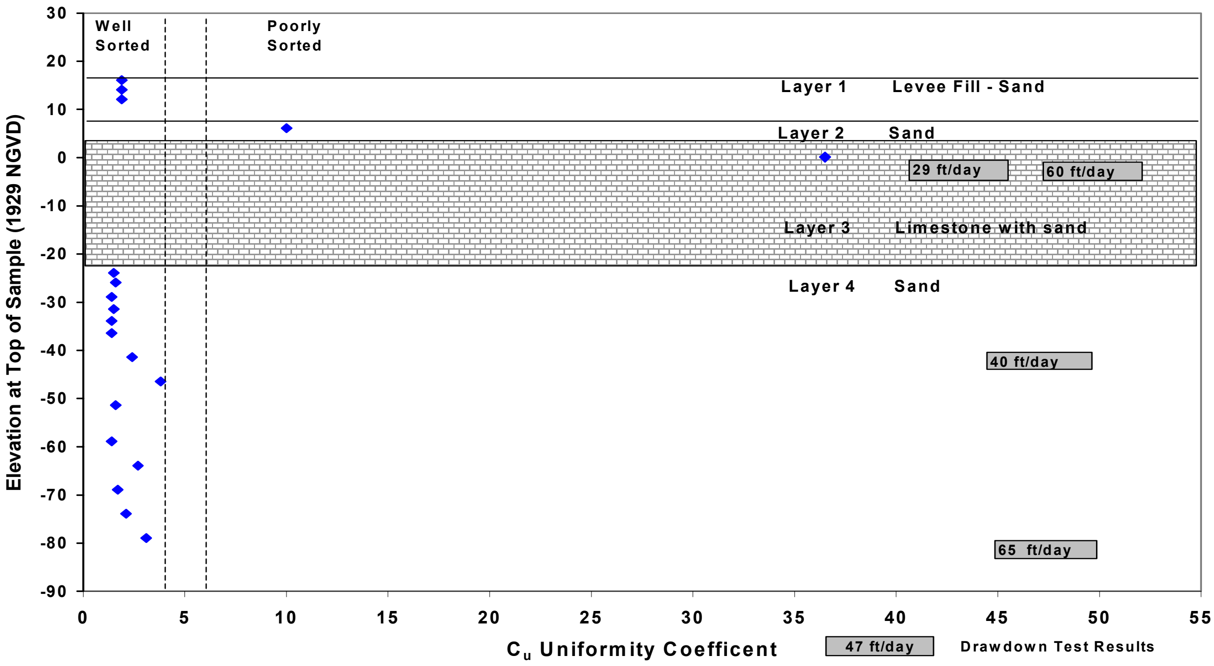
** = Data from MVASKF software program (Vukovic, 1992).

Shaded cells indicate data from gINT software program (1997).

Blank cells indicate no measurement, no analysis, or that the measurement was not applicable at that site.

Sieve Data Compared With Lithology

a. Uniformity and Elevation at the MP1-A Borehole



b. MP1-A - Uniformity Coefficient vs. Gradation Coefficient

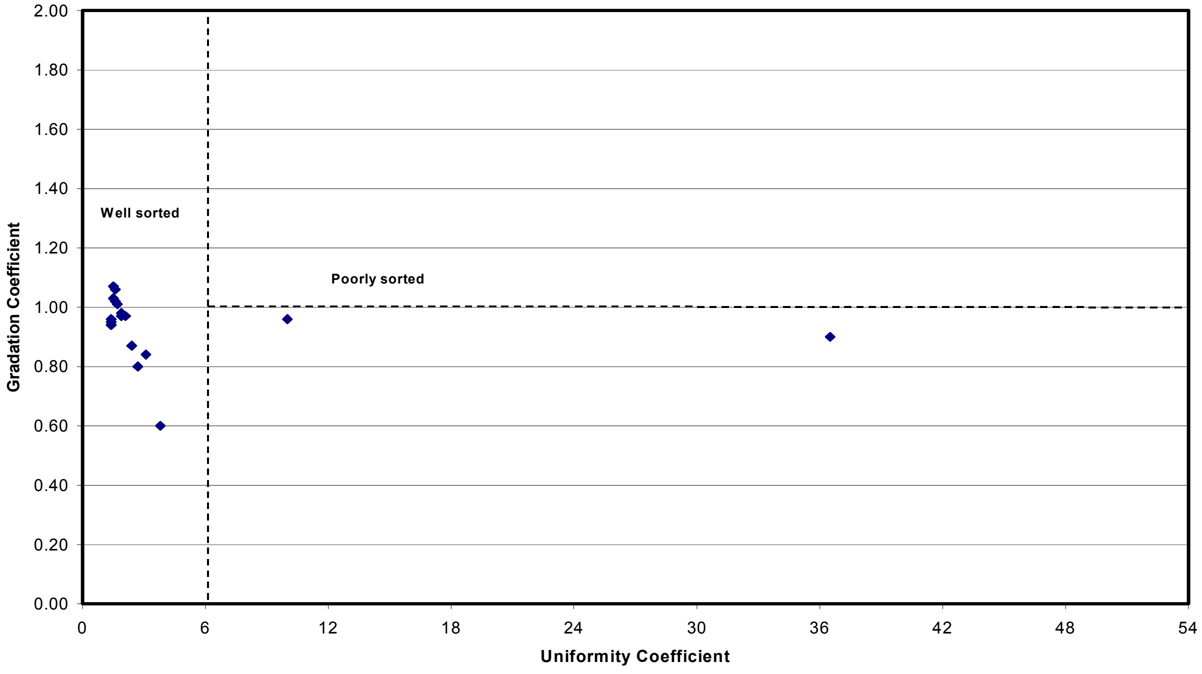
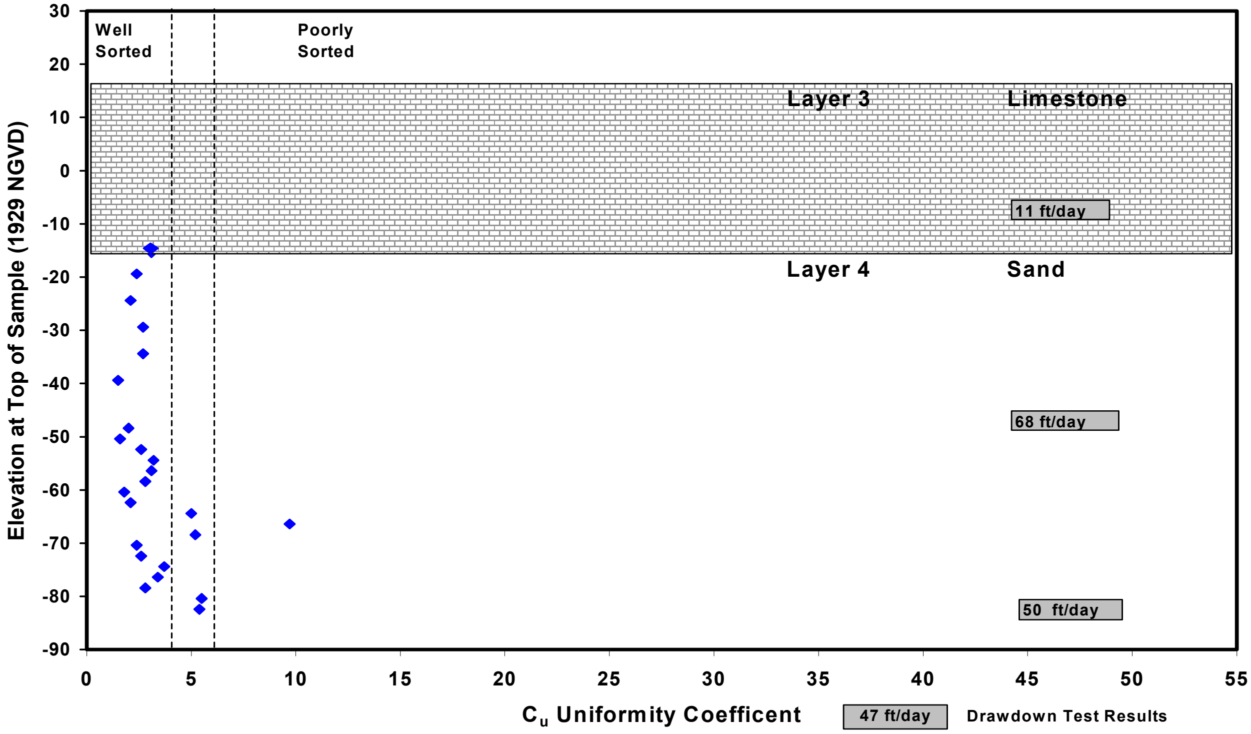


Figure 34. ENR site MP1-A. Uniformity and gradation of sieved sand and hydraulic conductivity at the MP1-A borehole. Drawdown test results are estimated hydraulic conductivities positioned to indicate depths of the well screens.

a. Uniformity and Elevation at the MP2-A Borehole



b. MP2-A - Uniformity Coefficient vs. Gradation Coefficient

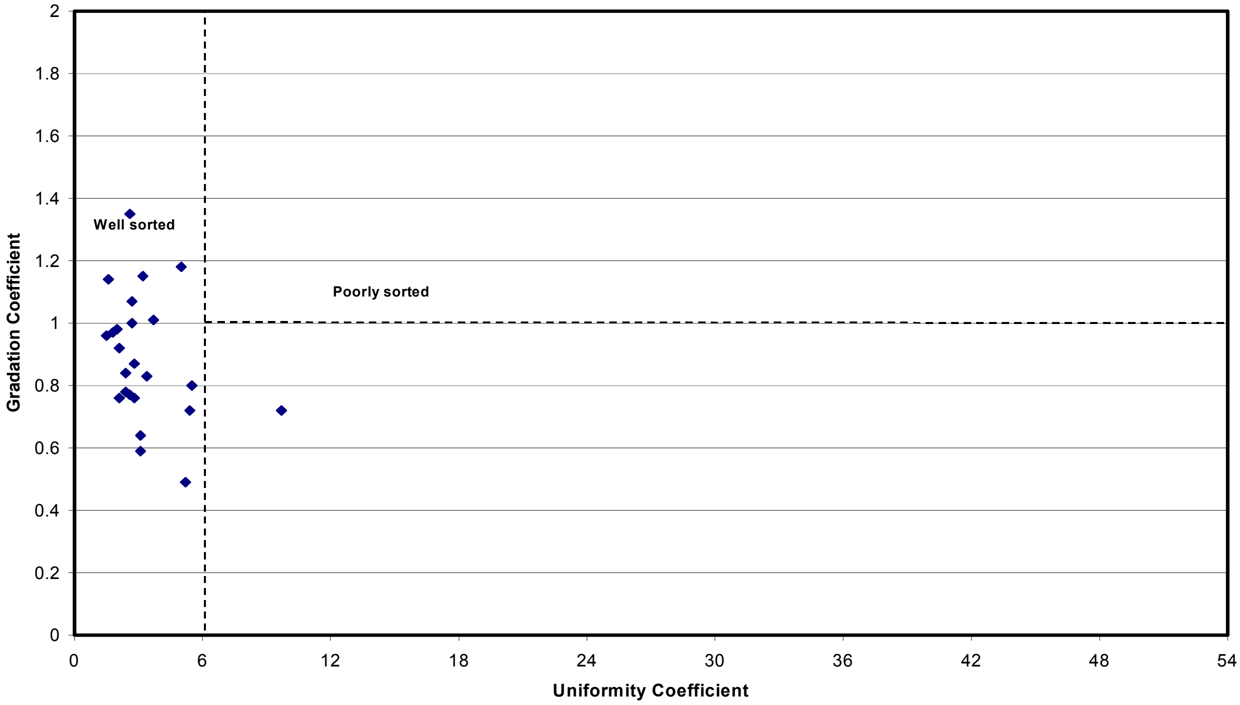
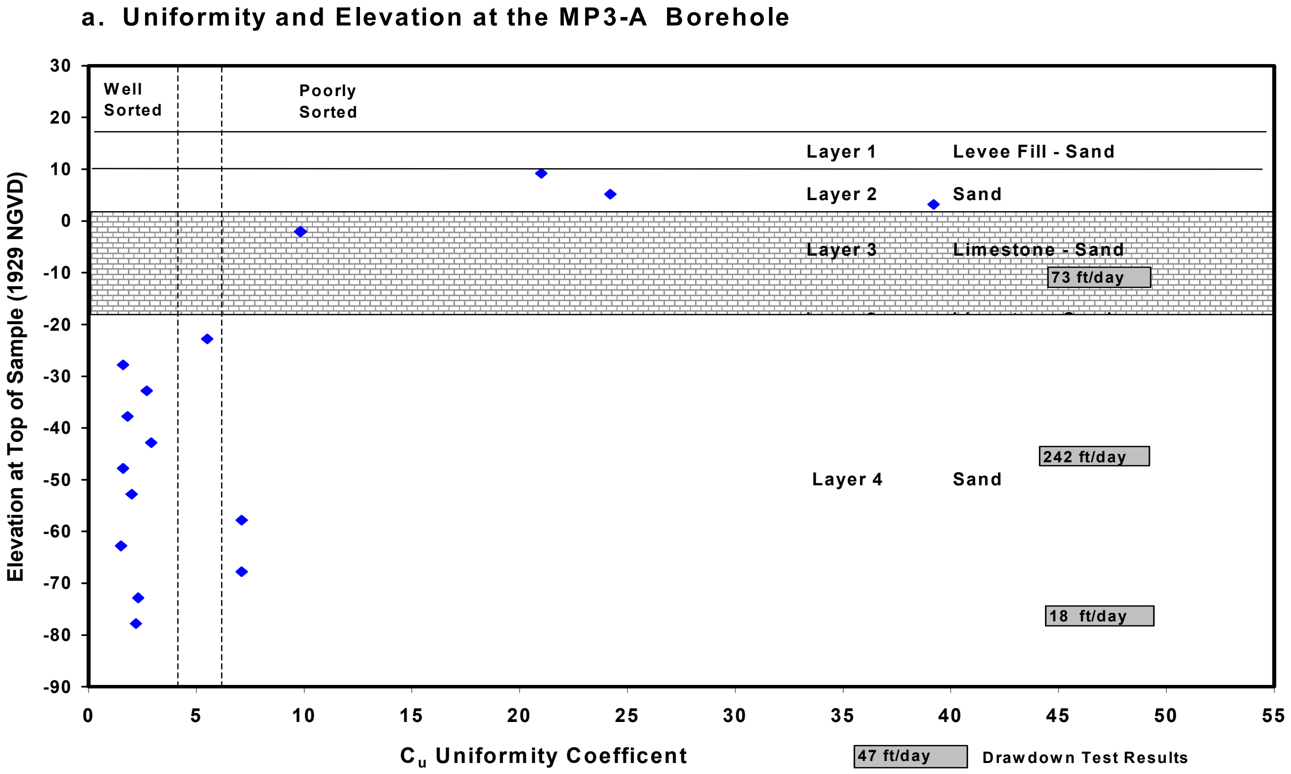


Figure 35. ENR site MP2-A. Uniformity and gradation of sieved sand and hydraulic conductivity at the MP2-A borehole. Drawdown test results are estimated hydraulic conductivities positioned to indicate depths of the well screens.



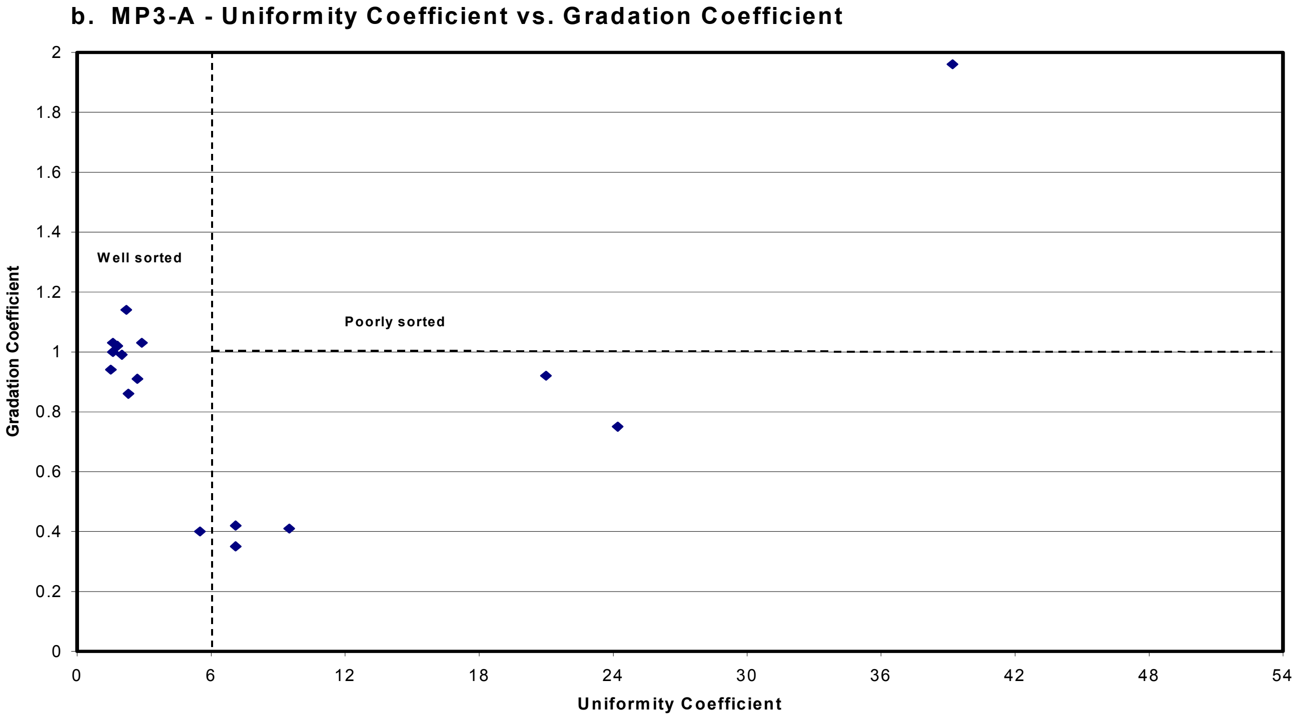
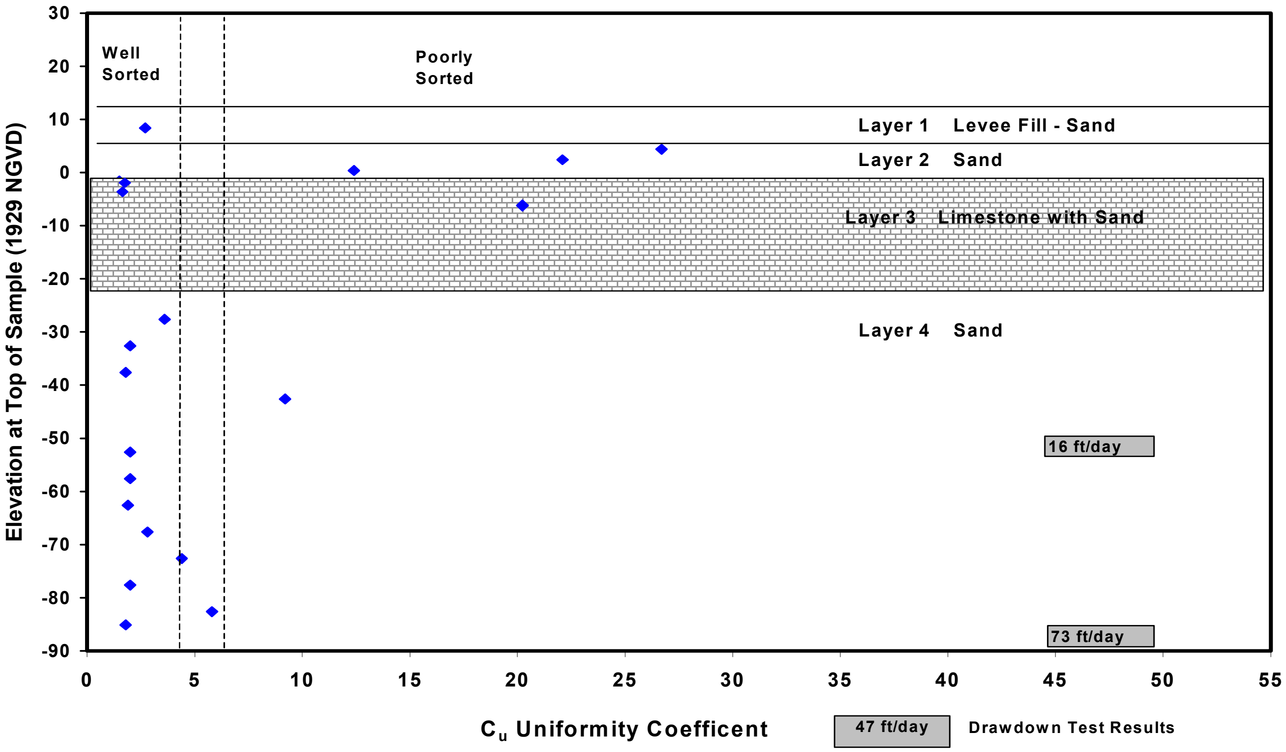


Figure 36. ENR site MP3-A. Uniformity and gradation of sieved sand and hydraulic conductivity at the MP3-A borehole. Drawdown test results are estimated hydraulic conductivities positioned to indicate depths of the well screens.

a. Uniformity and Elevation at the MOP1-A Borehole



b. MOP1-A - Uniformity Coefficient vs. Gradation Coefficient

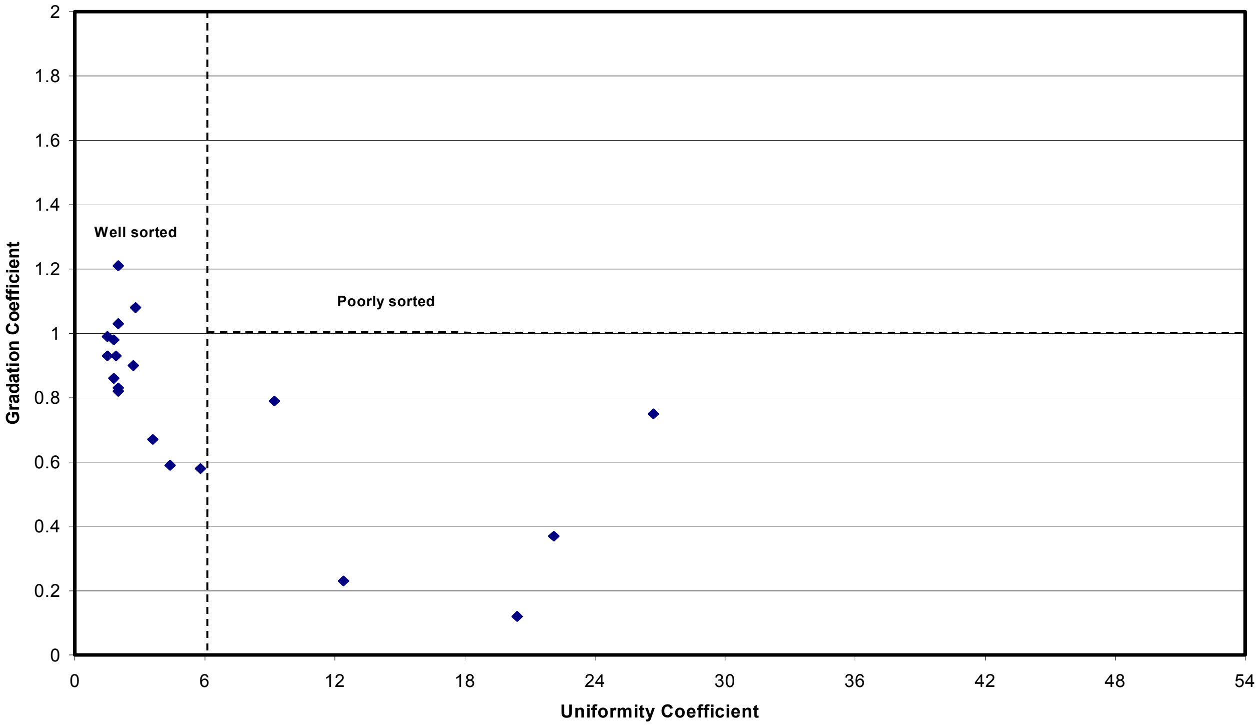
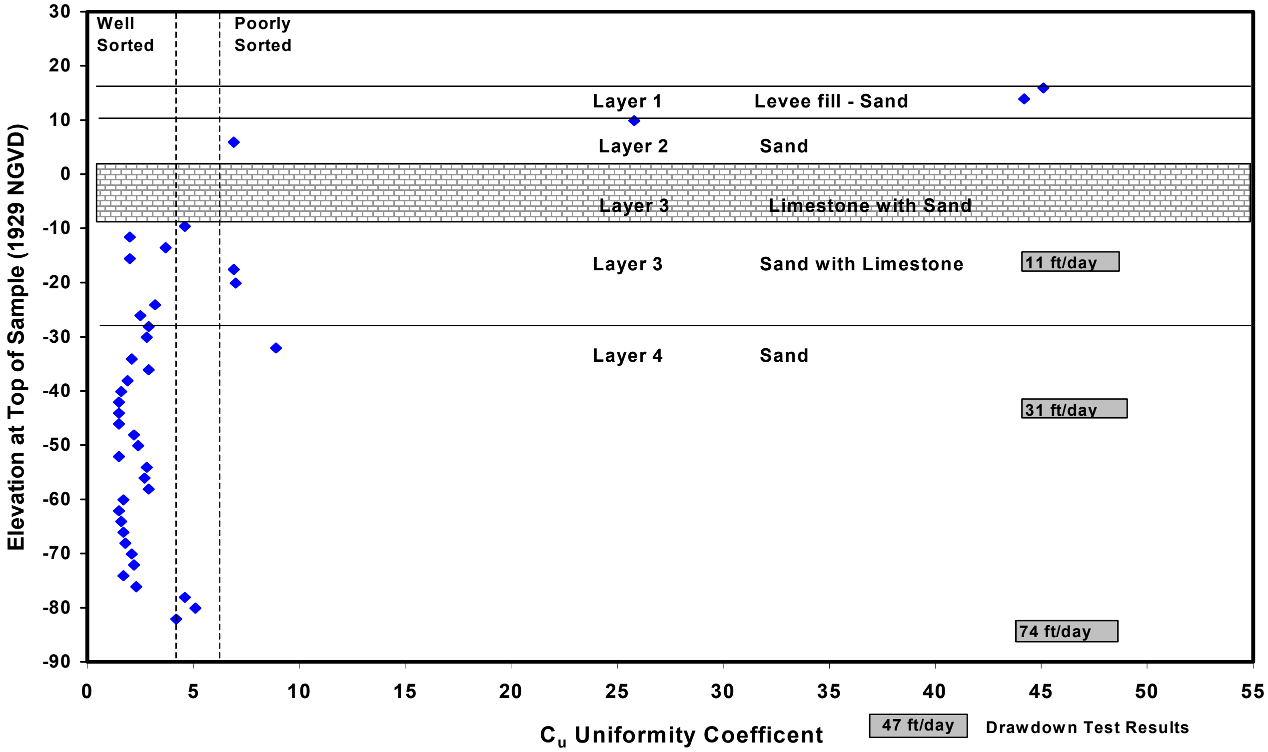
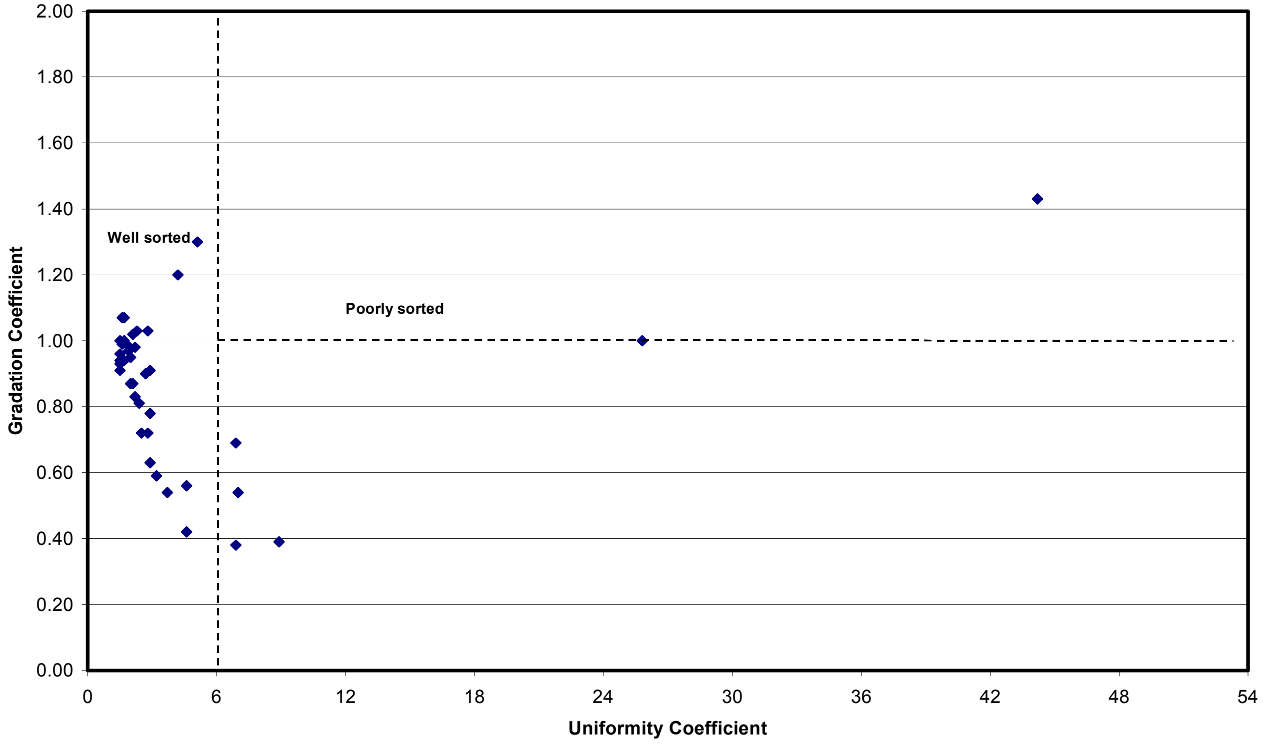


Figure 37. ENR site MOP1-A. Uniformity and gradation of sieved sand and hydraulic conductivity at the MOP1-A borehole. Drawdown test results are estimated hydraulic conductivities positioned to indicate depths of the well screens.

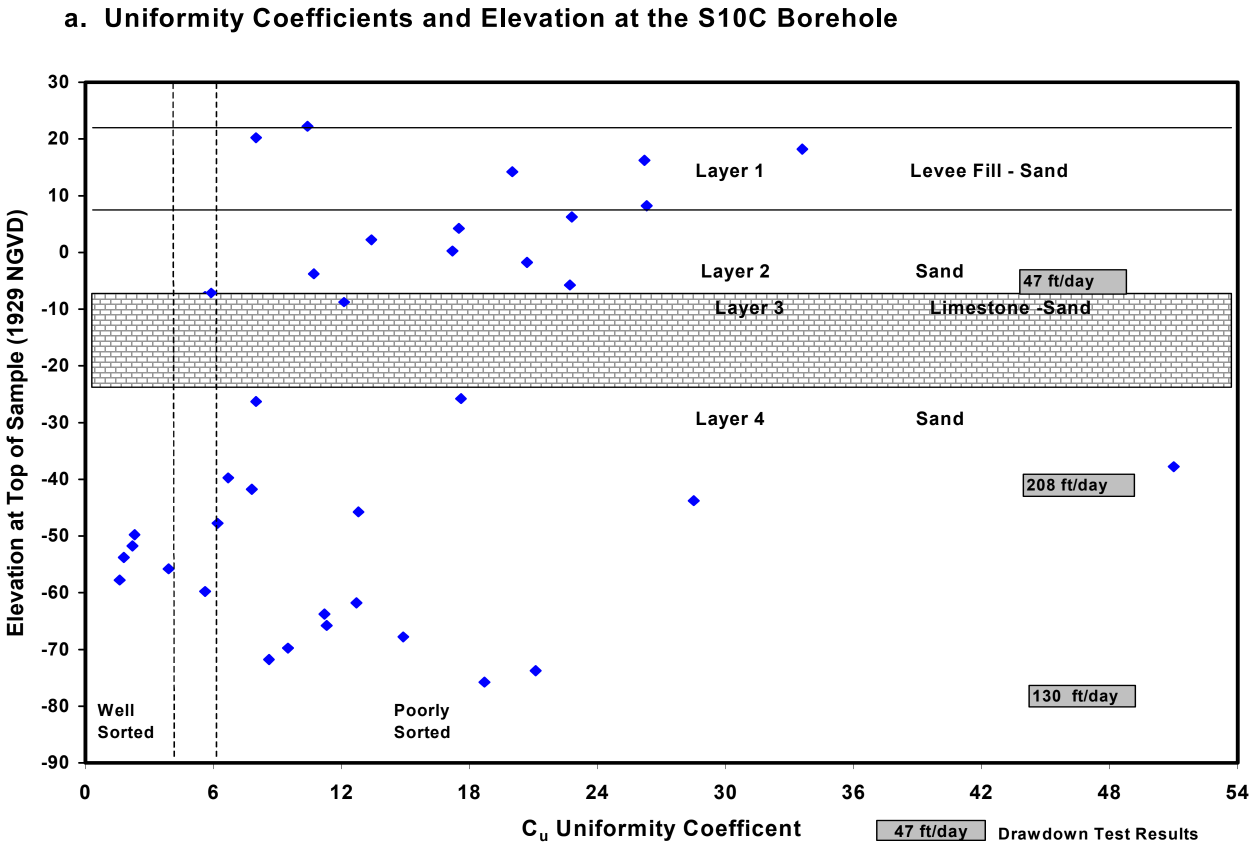


a. Uniformity and Elevation at the MOP2-A Borehole



b. MOP2-A - Uniformity Coefficient vs. Gradation Coefficient

Figure 38. ENR site MOP2-A. Uniformity and gradation of sieved sand and hydraulic conductivity at the MOP2-A borehole. Drawdown test results are estimated hydraulic conductivities positioned to indicate depths of the well screens.



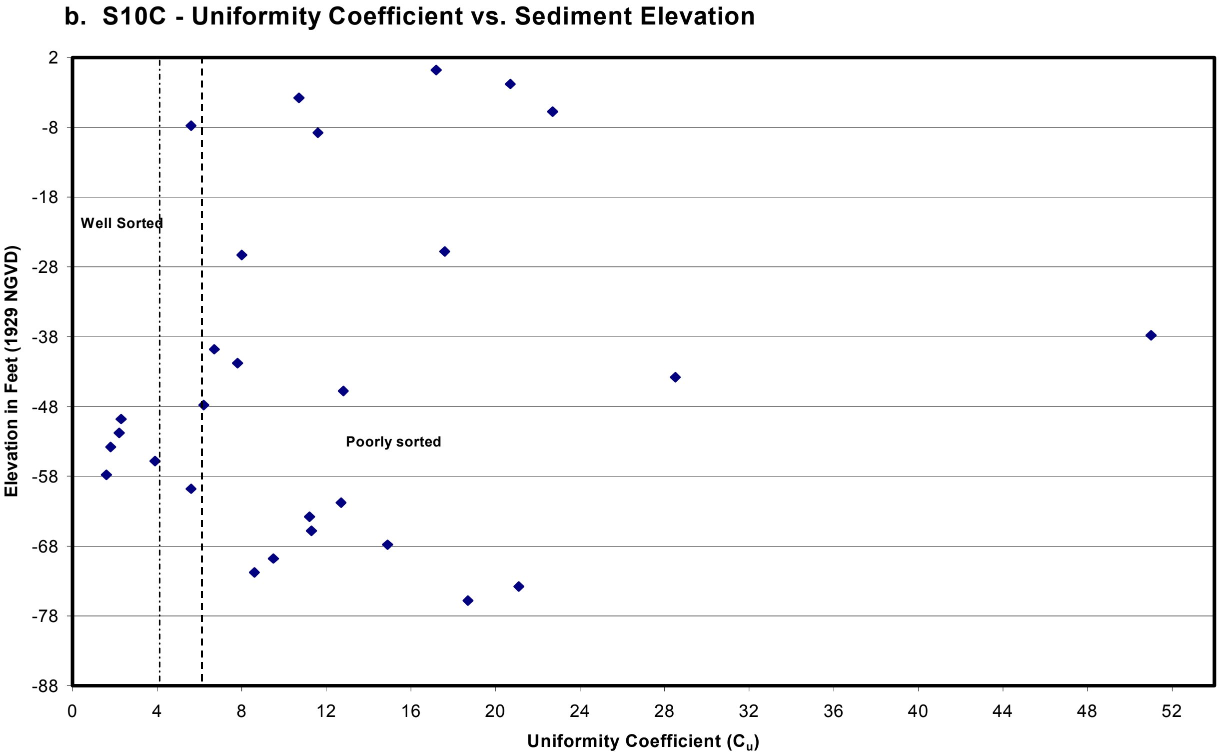


Figure 39. WCA2-A site S10C-WA. Uniformity and gradation of sieved sand and hydraulic conductivity at the S10C-WA borehole. Drawdown test results are estimated hydraulic conductivities positioned to indicate depths of the well screens.

Scatterplots of Sieve Analysis *K* Values Versus Drawdown *K* Values

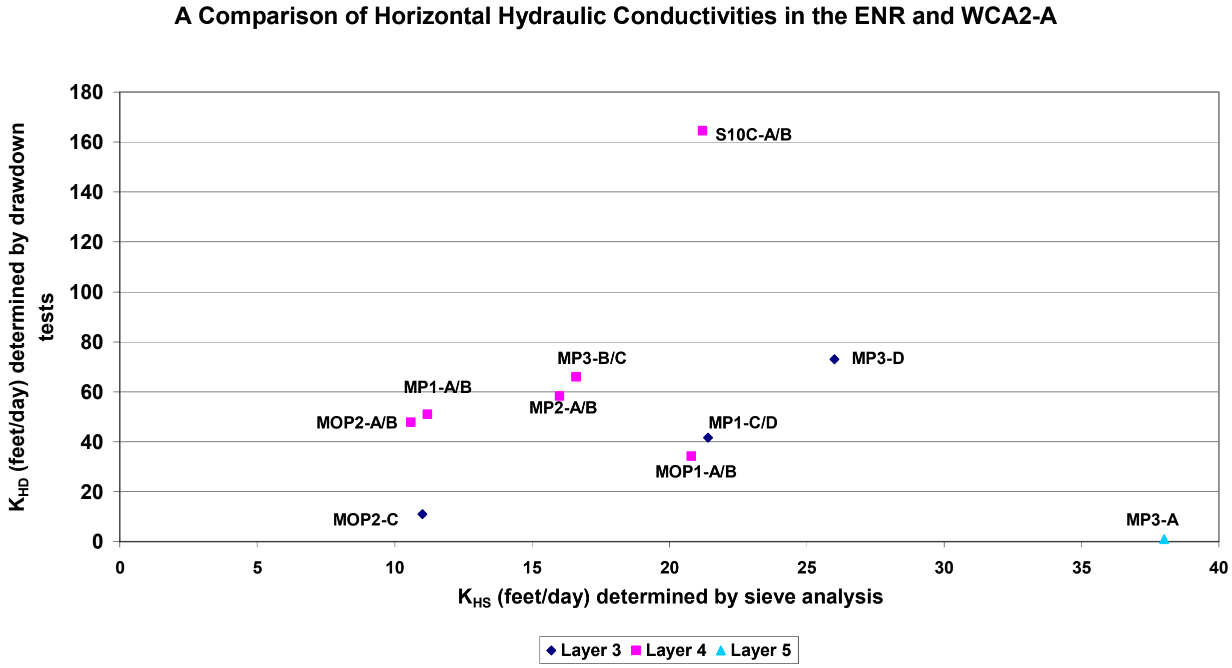
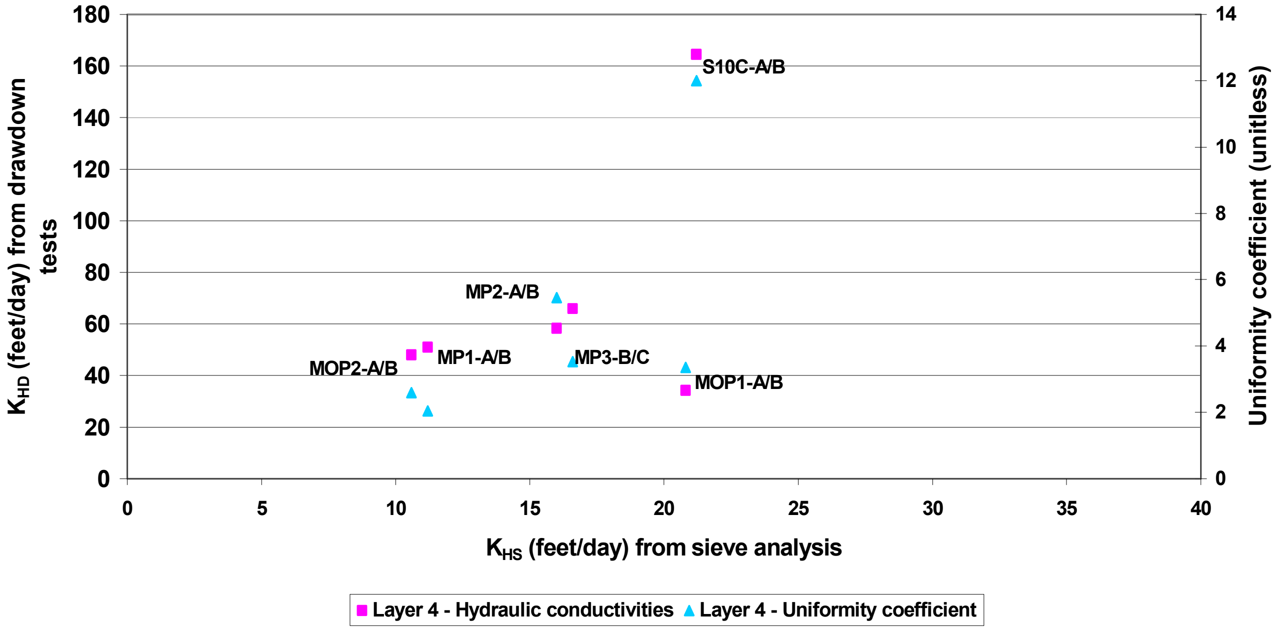
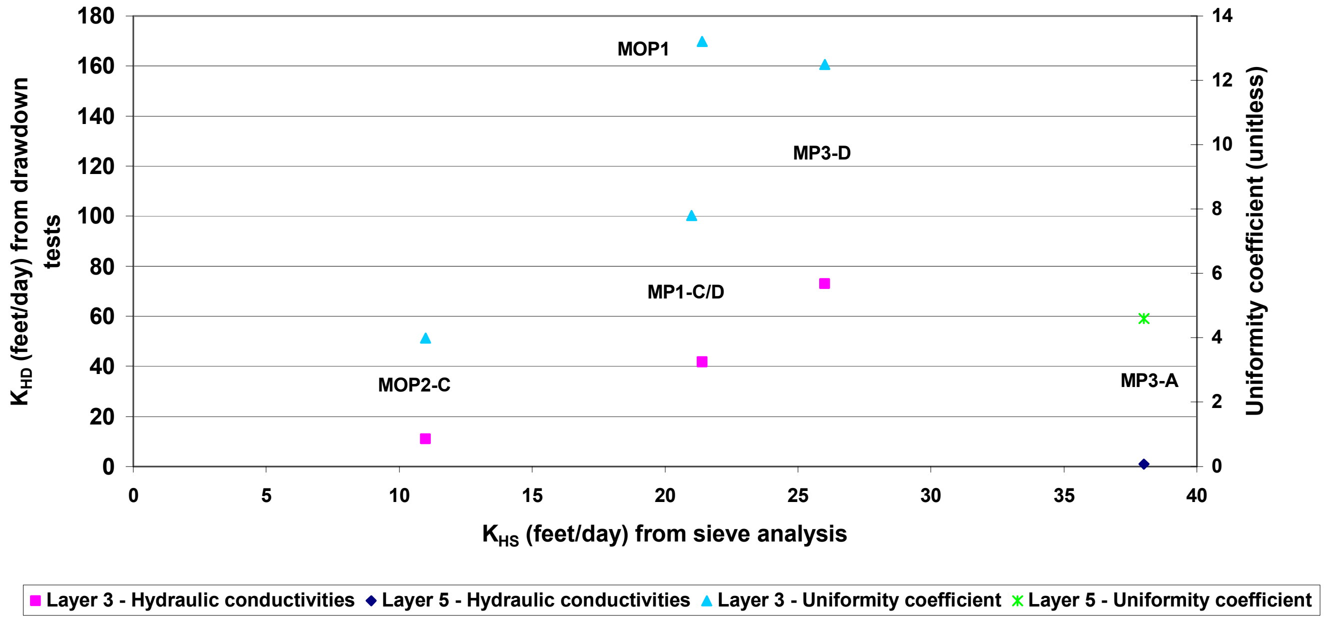


Figure 40. ENR and WCA2-A sites. A comparison of hydraulic conductivities determined by drawdown tests and sieve analysis.



A Comparison of the Uniformity Coefficient and Horizontal Hydraulic Conductivities in ENR and WCA2-A Layer 4



A Comparison of the Uniformity Coefficient and Horizontal Hydraulic Conductivities in ENR Layers 3 and 5

Figure 41. ENR and WCA2-A sites. A comparison of hydraulic conductivities determined by drawdown tests and sieve analysis in layers 3, 4, and 5.

Core Analysis Data

Table 17. Hydraulic Conductivity and Porosity in Core Samples

	Sample ID	Sample depth	Elevation in feet (1929 NGVD)	Vertical hydraulic conductivity (feet/day)	Horizontal hydraulic conductivity – maximum (feet/day)	Horizontal hydraulic conductivity – minimum (feet/day)	Porosity	Lithographic description from Core Laboratories, Inc.*
MOP1-A	K1	19 - 20	-6.5 to -7.5	0.1225	77.1978	0.3137	16.1%	LS, fossils, sandy, slightly moldic
MOP1-A	K2	20 - 25	-7.5 to – 12.5	3403.5350	n/a	n/a	28.8%	LS, fossils, very sandy, moldic
MOP1-A	K3	25 - 30	-12.5 to – 17.5	14.8783	50.7550	32.5191	18.2%	Sand, tan, very fine, very limey, pp
MOP2-A	K4	10 - 15	5.9 to 0.9	0.0435	19.4807	16.5838	16.1%	LS, fossils, sandy, pp, trace moldic
MOP2-A	K5	20.5 – 25.5	-4.6 to –9.6	1008.1688	550.3997	471.8192	23.7%	LS, fossils, sandy, moldic
MP1-A	K6	17 - 22	-0.9 to -5.9	0.0023	0.0303	0.0101	11.0%	LS, fossils, v. sandy, pp, trace moldic
MP1-A	K7	27 - 32	-10.9 to –15.9	401.1406	259.6325	252.5089	26.1%	LS, fossils, v. sandy, pp, slightly moldic
MP2-A	K8	20 - 25	-4.4 to –9.4	1.0494	2.4067	0.6958	11.6%	LS, fossils, sandy, sl pp, slightly moldic
MP2-A	K9	5 - 10	10.6 to 5.6	0.6790	19.9979	13.2924	10.8%	LS, fossils, very sandy, pp
MP2-A	K10	31 - 35	-15.4 to –19.4	0.2837	32.8173	12.7384	22.1%	LS, fossils, very sandy, chalky, pp
MP3-A	K11	125 - 130	-107.8 to –112.8	4.6795	150.6921	66.1489	32.1%	Dolomite, fossils, very sandy, moldic
MP3-A	K12	15 - 20	2.2 to -2.8	6.5314	3.3881	2.9491	9.4%	LS, fossils, sandy, pp
S10CW A	K13	36 - 41	-13.6 to 18.6	8.3109	4.4718	3.7930	25.1%	LS, chalky, slightly sandy, pp
S10C-WA	K14	30 - 35	-7.6 to –12.6	15.7556	141.2517	28.5906	24.3%	LS, fossils, very sandy, pp
MOP2-A	K15	15.5 – 20.5	0.4 to –4.6	3130.8493	685.5559	97.7416	22.4%	LS, fossils, sandy, slightly pp, moldic

* LS = limestone, pp = pinpoint porosity
n/a = the sample could not be tested

Table 18. Hydraulic Conductivity in Core Limestone Samples from Shallow Depths

	Sample depth	Elevation in feet (1929 NGVD)	Vertical hydraulic conductivity (feet/day)	Horizontal hydraulic conductivity – maximum (feet/day)	Horizontal hydraulic conductivity – minimum (feet/day)	Porosity	Lithographic description from Core Laboratories, Inc.*
MOP1-A	19 - 20	-6.5 to -7.5	0.1225	77.1978	0.3137	16.1%	LS, fossils, sandy, slightly moldic
MOP1-A	20 - 25	-7.5 to – 12.5	3403.5350	n/a	n/a	28.8%	LS, fossils, very sandy, moldic
MOP2-A	10 - 15	5.9 to 0.9	0.0435	19.4807	16.5838	16.1%	LS, fossils, sandy, pp, trace moldic
MOP2-A	20.5 – 25.5	-4.6 to –9.6	1008.1688	550.3997	471.8192	23.7%	LS, fossils, sandy, moldic
MP1-A	17 - 22	-0.9 to -5.9	0.0023	0.0303	0.0101	11.0%	LS, fossils, v. sandy, pp, trace moldic
MP1-A	27 - 32	-10.9 to –15.9	401.1406	259.6325	252.5089	26.1%	LS, fossils, v. sandy, pp, slightly moldic

* LS = limestone, pp = pinpoint porosity
n/a = the sample could not be tested

Borehole Information for Levee-Based Wells

Table 19. Hydrogeologic Data by Borehole at ENR and WCA2-A Page 1 of 2

Site ID	MP1	MP2	MP3	MOP1	MOP2	MOP3*	S10C
Latitude	263757.600	263819.387	263854.402	264101.011	263533.215	264037.230	262215.350
Longitude	802453.550	802538.495	802640.220	802233.817	802645.848	802540.419	802104.055
Easting (1927 Datum)	691007.560	687061.692	681445.298	703740.013	681022.636	686824.812	712456.958
Northing (1927 Datum)	836051.941	838231.116	841741.747	854628.588	821426.200	852148.139	741014.310
Ground surface elevation (feet)**	16.10	15.61	17.20	12.46	15.90	12.20	22.41
Well screen(s) in layer(s):	3, 4	3, 4	3, 4, 5	4	3, 4	4	3, 4
Layer 1 - Wetland peat/levee fill							
Bottom elevation (feet)**	8.0	does not exist	10.0	6.4	11.0	12.0	8.41
# sieve samples	3	0	1	1	2	0.0	9
Average K_{HST} of layer (ft/day)	20		45	17			120
Average K_{VST} of layer (ft/day)	20		4.5	1.7			72
D10 (mm)	0.16		0.19	0.13	0.2		0.27
D60 (mm)	0.32		3.7	0.38	8.7		5.4
Uniformity coefficient (Cu)	1.9		21.0	2.7	44.65		19.8
Layer 2 - Unconsolidated sand							
Bottom elevation (feet)**	4.5	does not exist	2.2	-1.0	2.0	9.0	-8.4
# sieve samples	1	0	0	3	3	0	5
Average K_{HS} of layer (ft/day)				62	61.0		53
Average K_{VS} of layer (ft/day)				52	18.0		39
D10 (mm)	0.08			0.22	0.19		0.24
D60 (mm)	0.83			4.3	3.6		4.1
Uniformity coefficient (Cu)	10.0000			20.40	16.35		2.5
Wells in layer (top of screen)**							S10CC (-7.63)
Layer 3 - Limestone with sand layers							
Bottom elevation (feet)**	-22.0	-16.0	-17.8	-21.0	-28.0	-46.0	-23.4
# sieve samples	3	0	6	3	8	0	0
Average K_{HS} of layer (ft/day)	21		26.0	21	11.0		
Average K_{VS} of layer (ft/day)	13		17.0	13	11.0		
K_{HD} (ft/day)	41.7	11.0	73.0		11.0		47.0
D10 (mm)	0.14		0.17	0.18	0.11		
D60 (mm)	2.6		2.6	1.2	0.46		
Uniformity coefficient (Cu)	13.2		12.5	7.8	3.99		
Wells in layer (top of screen)**	MP1C (-2.56)	MP2C (-8.43)	MP3D (-7.85)		MOP2C (-13.37)		
Wells in layer (top of screen)**	MP1D (-3.80)						

Table 19. Hydrogeologic Data by Borehole at ENR and WCA2-A Page 2 of 2

Site ID	MP1	MP2	MP3	MOP1	MOP2	MOP3*	S10C
Layer 4 - Coarse to fine sand							
Bottom elevation (feet)**	>84	>-84	>-121	>-88	>-84	>-82	>-77
# sieve samples	13	25	7	12	28	0	23
Average K_{HS} of layer (ft/day)	11	16.0	16.6	21	10.6		21.2
Average K_{VS} of layer (ft/day)	11	12.0	14.1	14	9.0		16.8
K_{HD} (ft/day)	51	58.3	66.0	34.2	47.9	31.0	164.4
D10 (mm)	0.12	0.14	0.15	0.15	0.11		0.14
D60 (mm)	0.25	0.85	0.53	0.38	0.33		1.46
Uniformity coefficient (Cu)	2.04	5.46	3.53	3.35	2.59		12.00
Wells in layer (top of screen)**	MP1B (-41.98)	MP2B (-45.57)	MP3C (-44.28)	MOP1B (-50.65)	MOP2B (-41.58)	MOP3A (-81.40)	S10CB (-39.48)
Wells in layer (top of screen)**	MP1A (-83.45)	MP2A (-83.29)	MP3B (-77.39)	MOP1A (-87.84)	MOP2A (-83.52)		S10CA (-76.98)
Layer 5 - Fine sand to clay							
Bottom elevation (feet)**			>-214				
K_{HD} (ft/day)			1.0				
Wells in layer (top of screen)**			MP3A (-158.95)				

* Sieve samples were not collected for MOP3-A

** 1929 NGVD

K_{HD} = Horizontal K of the well(s) from drawdown tests. If 2 wells at a site are in the same layer, the geometric mean is used.

K_{HST} = Horizontal K of layer based on sieve analysis, following Todd, 1980.

K_{VST} = Vertical K of layer based on sieve analysis, following Todd, 1980.

Borehole Information for Wetland-Interior Wells

Table 20. Hydrogeologic Data by Borehole at ENR Interior Wells

Site ID	**M102**	**M103**	**M203**	**M204**	**M303**	**M401**
Latitude	263848.307	263811.610	263835.054	263902.993	263638.348	263746.312
Longitude	802451.467	802522.596	802601.548	802524.223	802622.330	802624.110
Easting (1927 Datum)	691315.771	688508.012	684962.848	688336.938	683128.764	682937.224
Northing (1927 Datum)	841170.438	837452.400	839803.665	842639.741	828011.781	834873.266
Ground surface elevation (feet)**	7.51	9.54	8.63	8.44	8.04	8.29
Well screen is in layer:	2, 3	2, 3	2, 3	2, 3	3	2, 3
Layer 1 - Wetland peat						
Bottom elevation (feet)**	3.91	5.64	5.63	4.94	5.04	5.49
Layer 2 - Unconsolidated sand *						
Bottom elevation (feet)**	2.33	0.38	3.50	3.38	2.74	0.56
Wells in layer (top of screen)**					M303-PZ (3.65)	
Layer 3 - Limestone						
Bottom elevation (feet)**	> -21.16	> -19.29	> -19.51	> -19.14	> -18.22	> - 18.82
K_{HD} (ft/day)	10	48	32	5	174	45
Wells in layer (top of screen)**	M103-PZ (-2.89)	M103-PZ (-1.19)	M203-PZ (-2.7)	M204-PZ (-1.71)		M401-PZ (-4.21)
Wells in layer (top of screen)**	M103-P (-21.16)	M103-P (-19.29)	M203-P (-19.51)	M204-P (-19.14)	M303-P (-18.22)	M401-P (-18.82)

* Depth of layer 2 is estimated

** All elevations are measured according to 1929 NGVD

K_{HD} = Horizontal K of the well(s) from drawdown tests

Table 21. Hydrogeologic Data by Borehole at WCA-2A Wells **Page 1 of 2**

Site ID	WC2E1	WC2E4	WC2U1	WC2F1	WC2F4	WC2U3	S10C
Latitude	262104.431	261831.114	261426.021	262138.075	261859.788	261713.664	262215.350
Longitude	802115.104	802126.072	802121.284	802210.652	802307.310	802441.991	802104.055
Easting (1927 Datum)	711487.876	710567.094	711126.010	706418.181	701340.568	692773.768	712456.958
Northing (1927 Datum)	737218.199	718364.458	693621.154	737220.900	721214.663	710459.902	741014.310
Ground surface elevation (feet)**	12.50	11.97	10.87	11.92	11.53	11.16	22.41
Well screen(s) in layer(s):	2,3	2,3	2,3	2,3	2,3	2,3	3, 4
Layer 1 - Wetland peat							
Bottom elevation (feet)**	9.1	8.7	5.9	6.7	7.5	6.3	8.41
# sieve samples	0	0	0	0	0	0	9
Average K_{HST} of layer (ft/day)							120
Average K_{VST} of layer (ft/day)							72
D10 (mm)							0.27
D60 (mm)							5.4
Uniformity coefficient (Cu)							19.8
Layer 2 - Unconsolidated sand *							
Bottom elevation (feet)**	2.3	0.4	3.5	3.4	2.7	0.6	-8.4
# sieve samples							5
Average K_{HS} of layer (ft/day)							53
Average K_{VS} of layer (ft/day)							39
D10 (mm)							0.24
D60 (mm)							4.1
D60/D10							2.5
K_{HD} (ft/day)	134	80	32	58	116	65	
Wells in layer (top of screen**)	E1GW4 (2.74)	E4GW4 (4.16)	U1GW4 (-3.80)	F1GW4 (3.83)	F4GW4 (5.00)	U3GW4 (4.43)	

Table 13. Hydrogeologic Data by Borehole at WCA2-A Wells Page 2 of 2

Site ID	WC2E1	WC2E4	WC2U1	WC2F1	WC2F4	WC2U3	S10C
Layer 3 - Limestone							
Bottom elevation (feet)**	>-8.78	>-5.82	>-11.38	>-15.64	>-11.46	>-16.45	-23.4
# sieve samples							0
K_{HD} (ft/day)	211	93	1261	166	58	205	47
Wells in layer (top of screen**)	E1GW3 (-8.78)	E4GW3 (-5.82)	U1GW3 (-11.38)	F1GW3 (-15.64)	F4GW3 (-11.46)	U3GW3 (-16.45)	S10CC (-7.63)
Layer 4 - Coarse to fine sand							
Bottom **							>-77
# sieve samples							23
Average K_{HS} of layer (ft/day)							21.2
Average K_{VS} of layer (ft/day)							16.8
K_{HD} (ft/day)							164.4
D10 (mm)							0.14
D60 (mm)							1.46
D60/D10							12.00
Wells in layer (top of screen**)							S10CB (-39.48)
Wells in layer (top of screen**)							S10CA (-76.98)

* Depth of layer 2 is estimated

** All elevations are measured according to 1929 NGVD

K_{HD} = Horizontal K of the well(s) from drawdown tests. If 2 wells at a site are in the same layer, the geometric mean is used.

K_{HST} = Horizontal K of layer based on sieve analysis following Todd, 1980.

K_{VST} = Vertical K of layer based on sieve analysis following Todd, 1980.

Well Drawdown Test Summary Table

Table 22. Results of Drawdown Tests in ENR and WCA2-A

Site ID	Test Date	Total Depth - feet	Elevation at Top of Well Screen - feet (1929 NGVD)	Hydraulic Conductivity (K) (feet/day)
MOP1-A	01/09/98	102.10	-87.73	73
MOP1-B	01/09/98	64.97	-50.52	16
MOP2-A	11/05/97	101.65	-83.52	74
MOP2-B	11/05/97	59.26	-41.58	31
MOP2-C	11/05/97	31.50	-13.37	11
MOP3-A	01/09/98	95.41	-81.40	31
MP1-A	11/05/97	101.48	-83.45	65
MP1-B	11/05/97	60.03	-41.98	40
MP1-C	11/05/97	20.61	-2.56	29
MP1-D	11/05/97	27.97	-3.80	60
MP2-A	10/29/97	100.90	-83.29	50
MP2-B	10/29/97	62.80	-45.57	68
MP2-C	10/29/97	25.80	-8.43	11
MP3-A	11/06/97	190.90	-158.95	1.0
MP3-B	11/06/97	96.36	-77.39	18
MP3-C	11/06/97	62.81	-44.28	242
MP3-D	11/06/97	26.85	-7.85	73
M102-P	01/21/98	40.28	-19.16	10
M103-P	01/21/98	37.51	-17.29	48
M203-P	01/21/98	37.87	-17.51	32
M204-P	01/21/98	37.44	-17.14	5.0
M303-P	01/26/98	36.37	-16.22	174
M401-P	01/26/98	37.61	-16.82	45
WC2E1GW3	12/17/96	27.20	-7.17	211
WC2E1GW4	12/17/96	15.68	4.36	134
WC2E4GW3	12/17/96	23.70	-4.41	93
WC2E4GW4	12/17/96	13.70	5.58	80
WC2U1GW3	04/07/98	28.90	-10.11	1261
WC2U1GW4	12/17/96	21.38	-2.58	32
WC2F1GW3	02/25/98	33.95	-13.99	166
WC2F1GW4	12/17/96	14.55	5.47	58
WC2F4GW3	04/07/98	29.30	-9.92	58
WC2F4GW4	12/17/96	13.05	6.52	116
WC2U3GW3	02/25/98	34.20	-14.97	205
WC2U3GW4	12/17/96	13.30	5.89	65
S10C-WA	04/07/98	101.39	-77.18	130
S10C-WB	01/07/98	64.59	-39.67	208
S10C-WC	04/07/98	31.47	-7.83	47

Table 23. Mean Hydraulic Conductivity for Different Layers in ENR and WCA2-A

Site ID	Total depth (ft.)	Screen is in layer	Elevation at bottom of well screen (1929 NGVD)	K_{HD} * (feet/day)	K_{HDA} ** (feet/day)
MP1-C	20.61	3	-4.56	29	
MP1-D	27.97	3	-5.80	60	
MP3-D	26.85	3	-9.85	73	
MP2-C	25.80	3	-10.43	11	
MOP2-C	31.50	3	-15.37	11	
M303-P	36.37	3	-18.22	174	
M401-P	37.61	3	-18.82	45	
M204-P	37.44	3	-19.14	5	
M103-P	37.51	3	-19.29	48	
M203-P	37.87	3	-19.51	32	
M102-P	40.28	3	-21.16	10	
Mean K_{HD} for ENR layer 3				**28**	**45**
MOP2-B	59.26	4	-43.58	31	
MP1-B	60.03	4	-43.98	40	
MP3-C	62.81	4	-46.28	242	
MP2-B	62.80	4	-47.57	68	
MOP1-B	64.97	4	-52.52	16	
MP3-B	96.36	4	-79.39	18	
MOP3-A	95.41	4	-83.40	31	
MP2-A	100.90	4	-85.29	50	
MP1-A	101.48	4	-85.45	65	
MOP2-A	101.65	4	-85.52	74	
MOP1-A	102.10	4	-89.73	73	
Mean K_{HD} for ENR layer 4				**48**	**64**
MP3-A	190.90	5	-173.95	1	
Mean K_{HD} for ENR layer 5				**1**	
WC2F4GW4	13.05	2	3.00	116	
WC2U3GW4	13.30	2	2.43	65	
WC2E4GW4	13.70	2	2.16	80	
WC2F1GW4	14.55	2	1.83	58	
WC2E1GW4	15.68	2	0.74	134	
WC2U1GW4	21.38	2	-5.80	32	
Mean K_{HD} for WCA2-A layer 2				**73**	**81**
WC2E4GW3	23.70	3	-7.82	93	
S10C-WC	31.47	3	-9.63	47	
WC2E1GW3	27.20	3	-10.78	211	
WC2U1GW3	28.90	3	-13.38	1261	
WC2F4GW3	29.30	3	-13.46	58	
WC2F1GW3	33.95	3	-17.64	166	
WC2U3GW3	34.20	3	-18.45	205	
Mean K_{HD} for WCA2-A layer 3				**156**	**292**
S10C-WB	64.59	4	-41.48	208	
S10C-WA	101.39	4	-78.98	130	
Mean K_{HD} for WCA2-A layer 4				**164**	**169**

* The mean horizontal K value for each layer was calculated using the geometric mean.
** The mean horizontal K value for each layer was calculated using the arithmetic mean.

APPENDIX IV

Water Levels and Hydraulic Gradients

Water Levels in ENR and WCA-2A 1997-1998

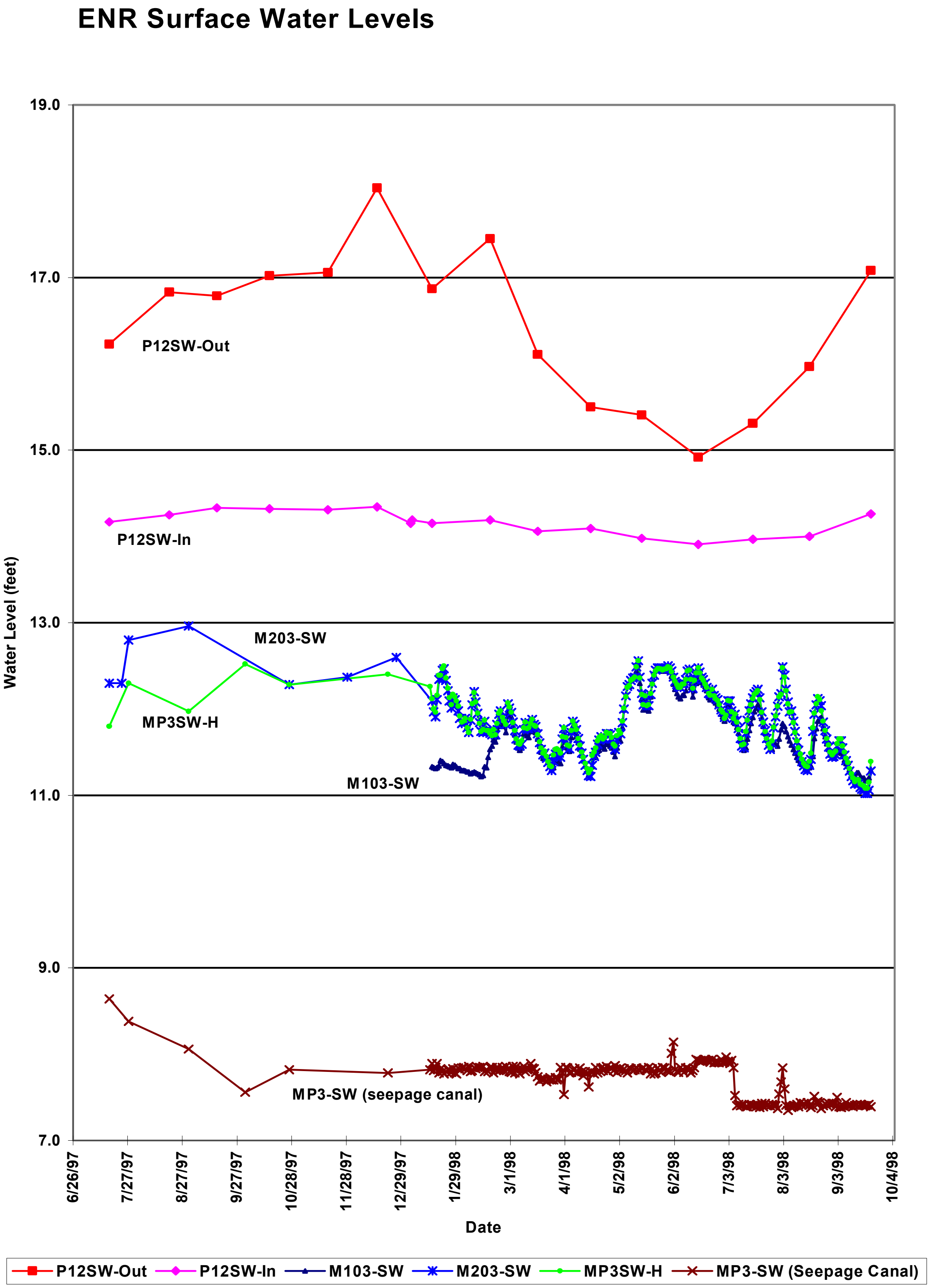


Figure 42. ENR surface water levels: June 1997 to October 1998.

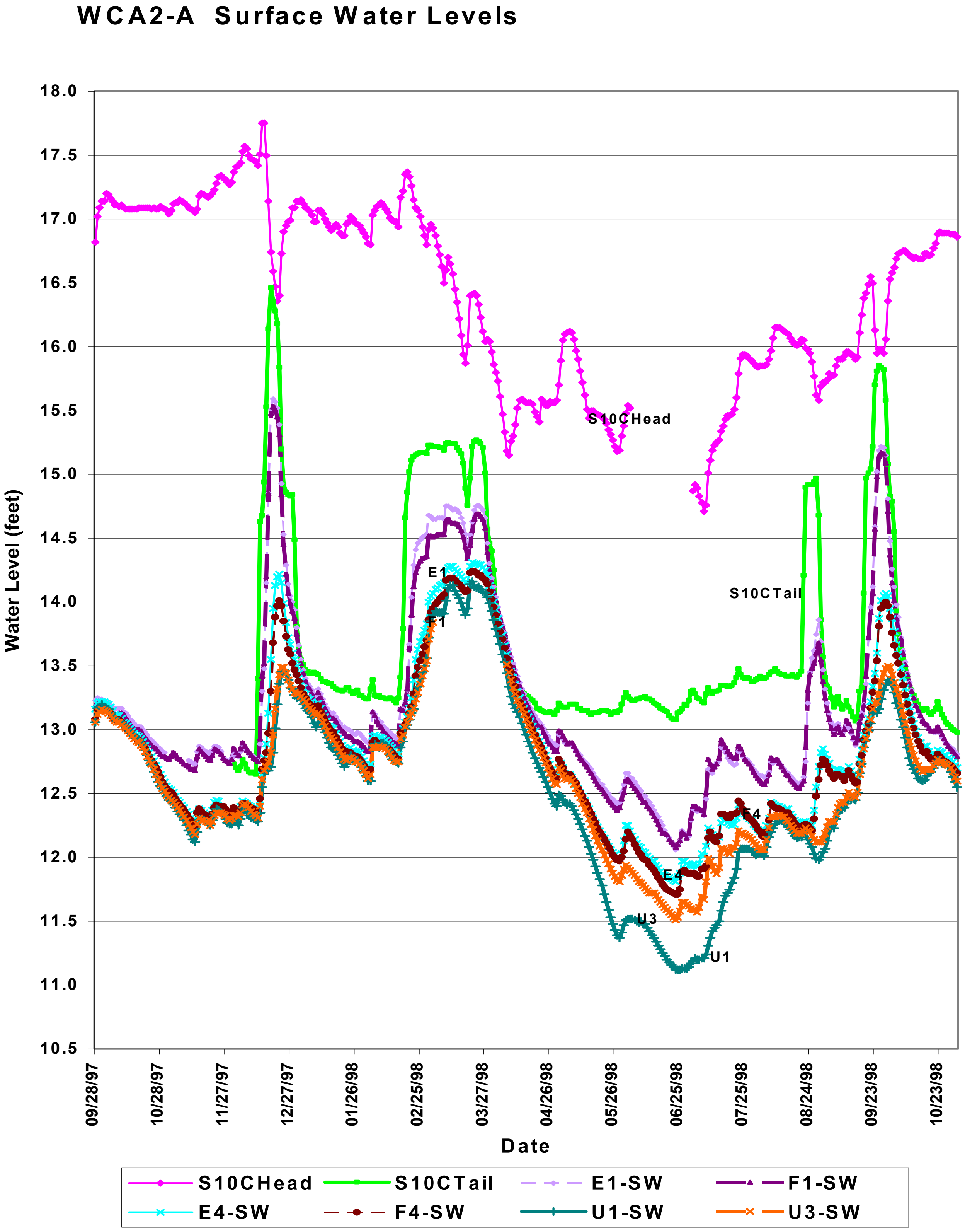


Figure 43. WCA2-A surface water levels: September 1997 to October 1998.

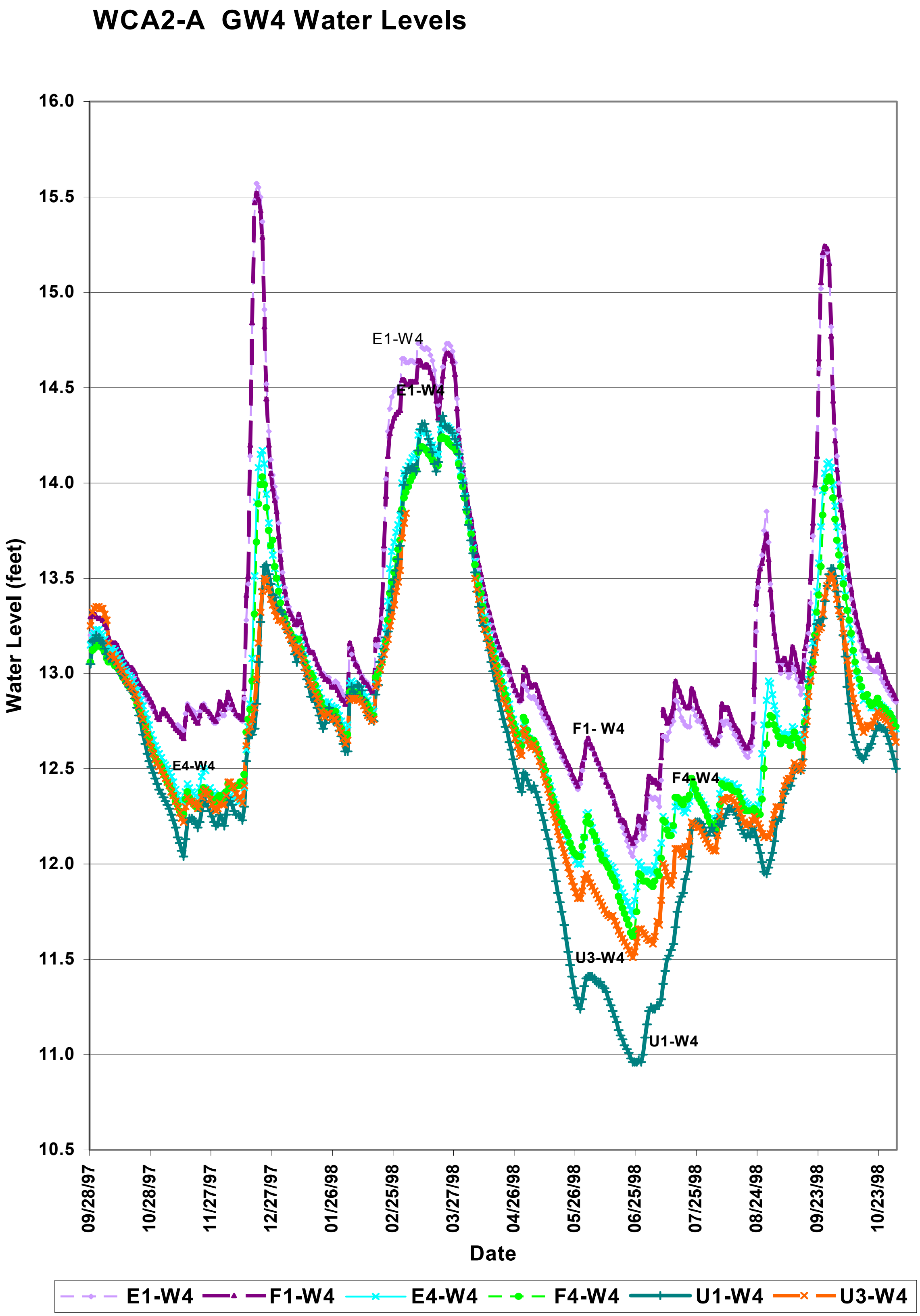


Figure 44. WCA2-A ground water levels at shallow depth in surficial aquifer: September 1997 to October 1998.

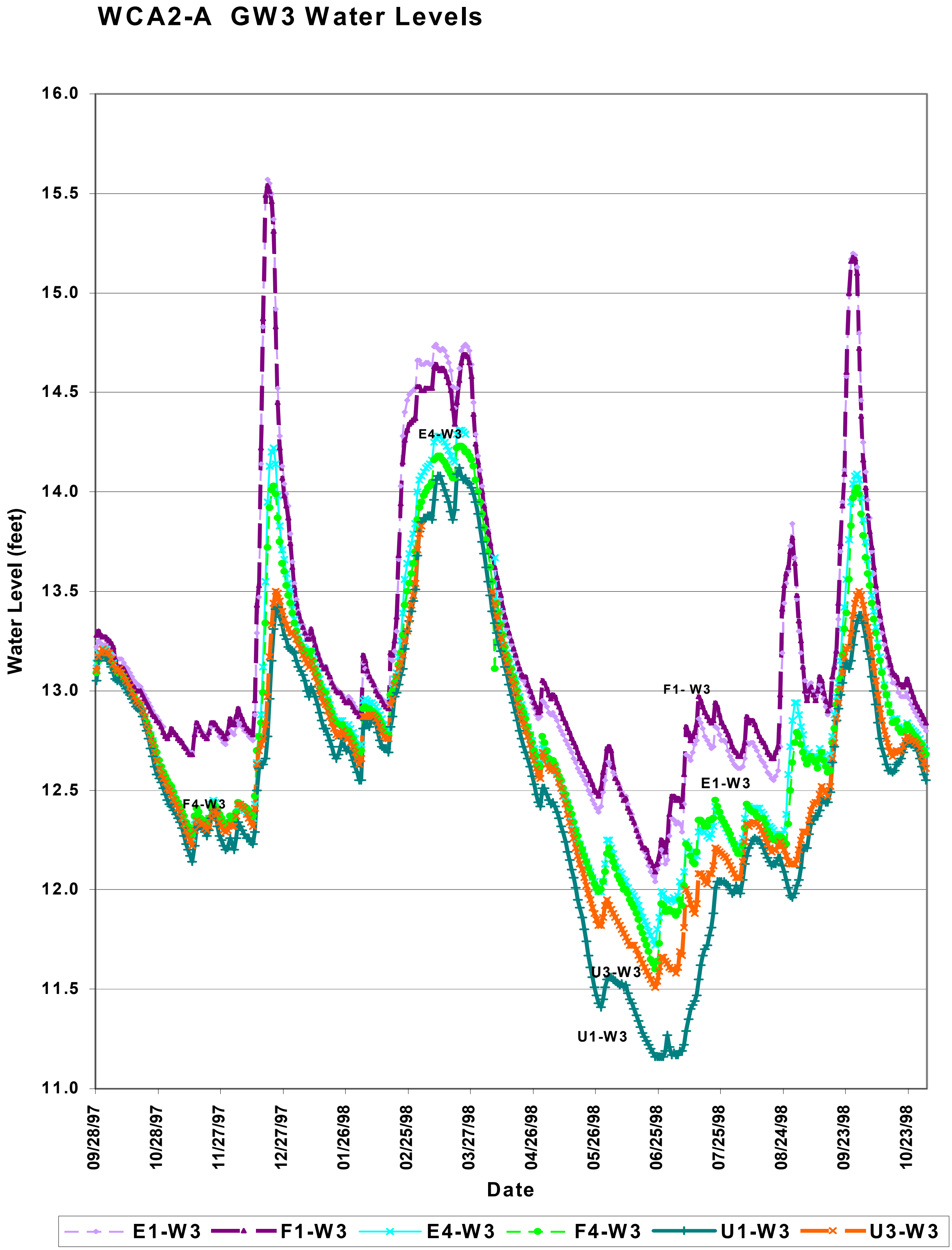


Figure 45. WCA2-A ground water levels at intermediate depth in surficial aquifer: September 1997 to October 1998.

Spatial Distribution of Vertical Hydraulic Gradients

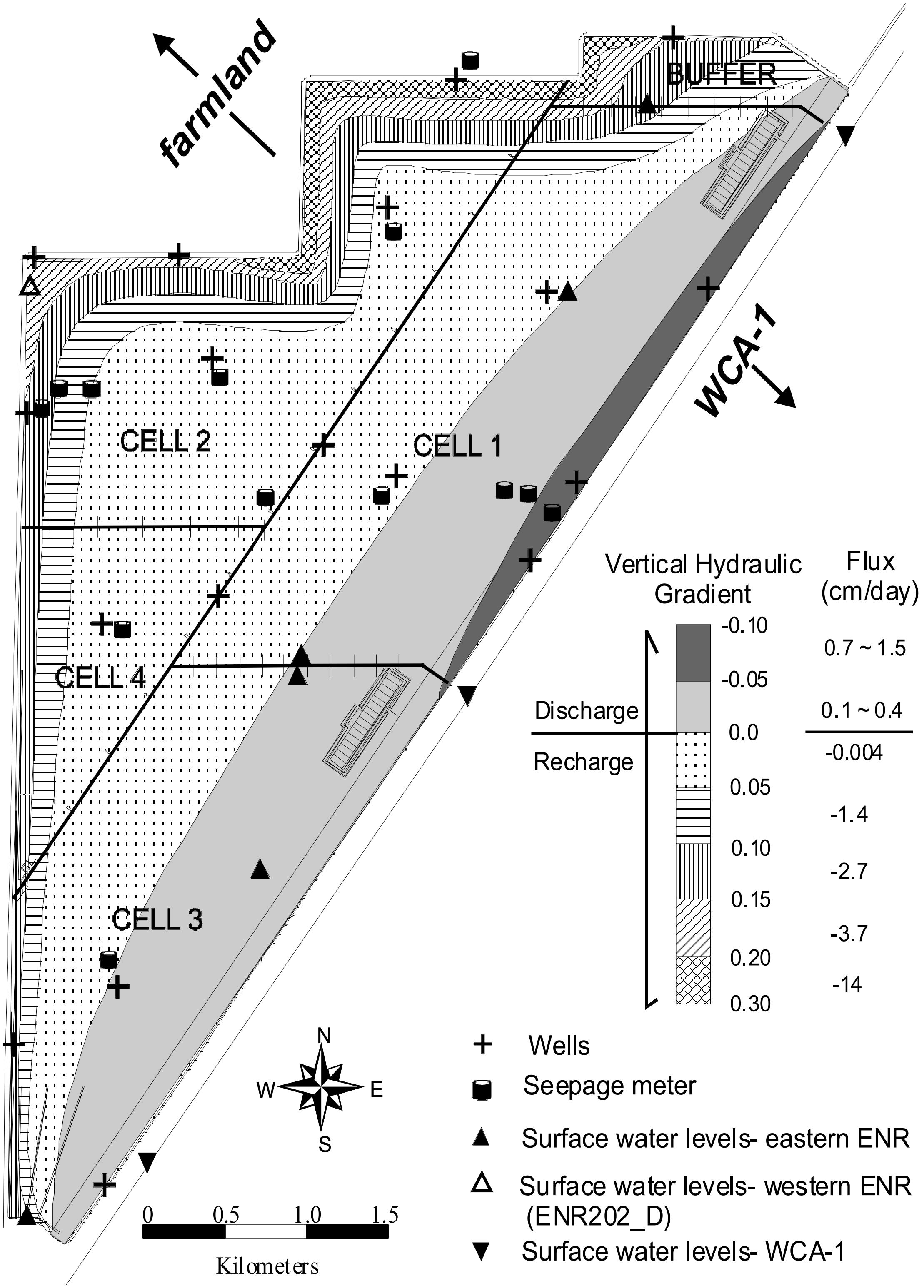


Figure 46. Vertical hydraulic gradients in ENR: 8/19/97. Hydraulic gradients were computed using measured surface water levels and shallow ground water levels.

Vertical Hydraulic Gradients in WCA-2A

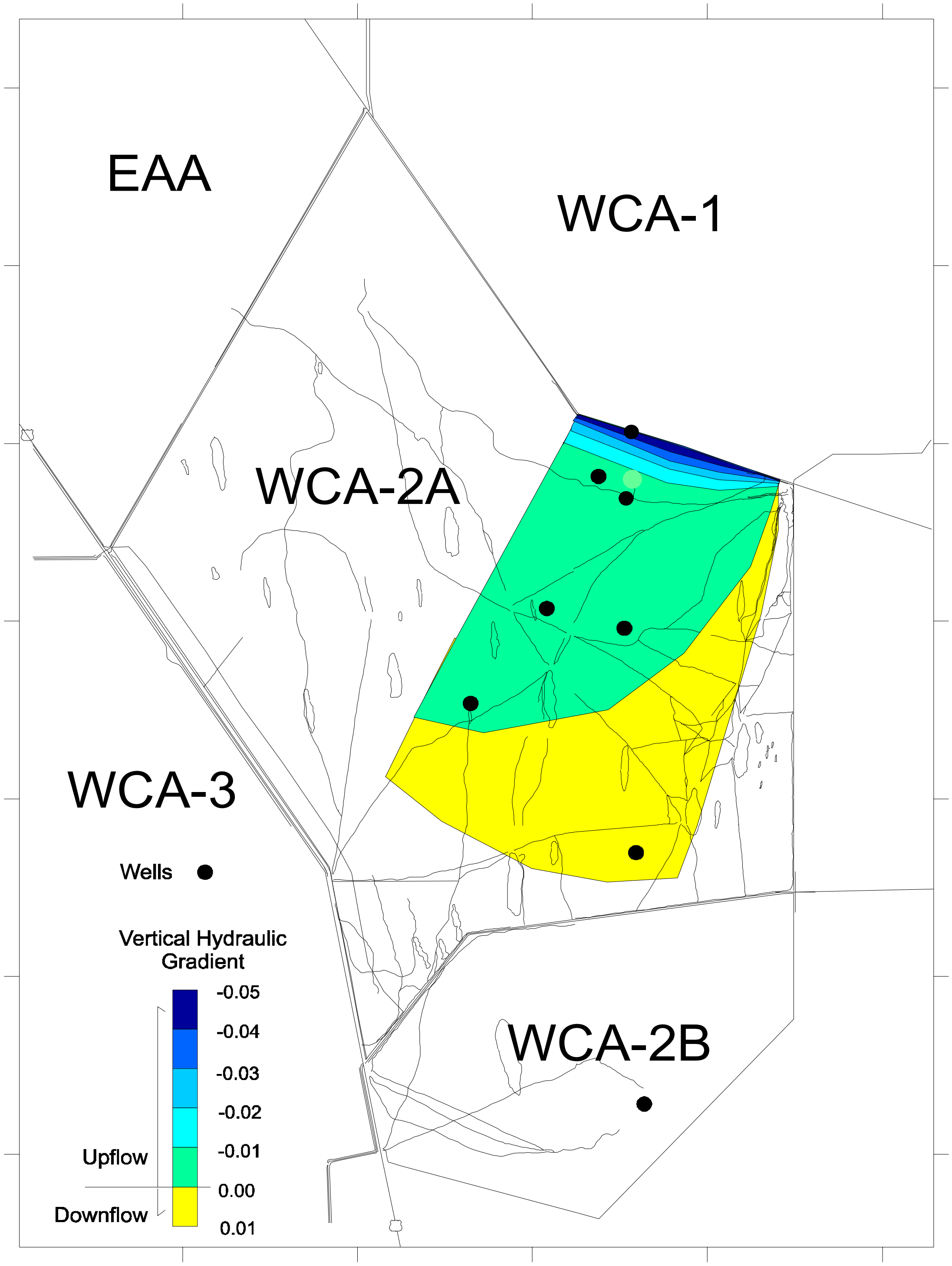


Figure 47. Vertical hydraulic gradients in WCA2-A: 8/31/98. Vertical gradients were computed using measured surface water levels and ground water levels.

ENR and WCA-2A Contoured Hydraulic Heads

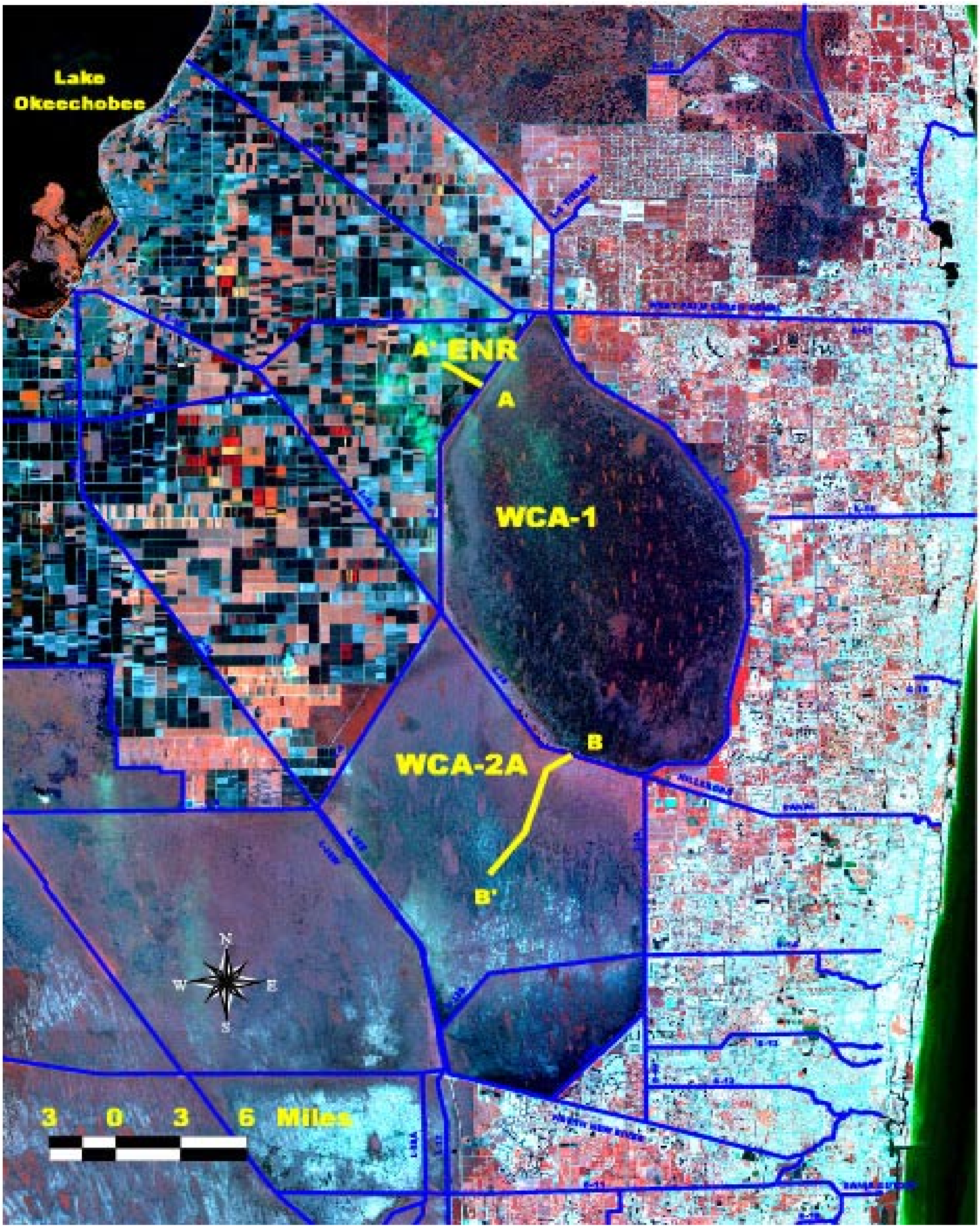
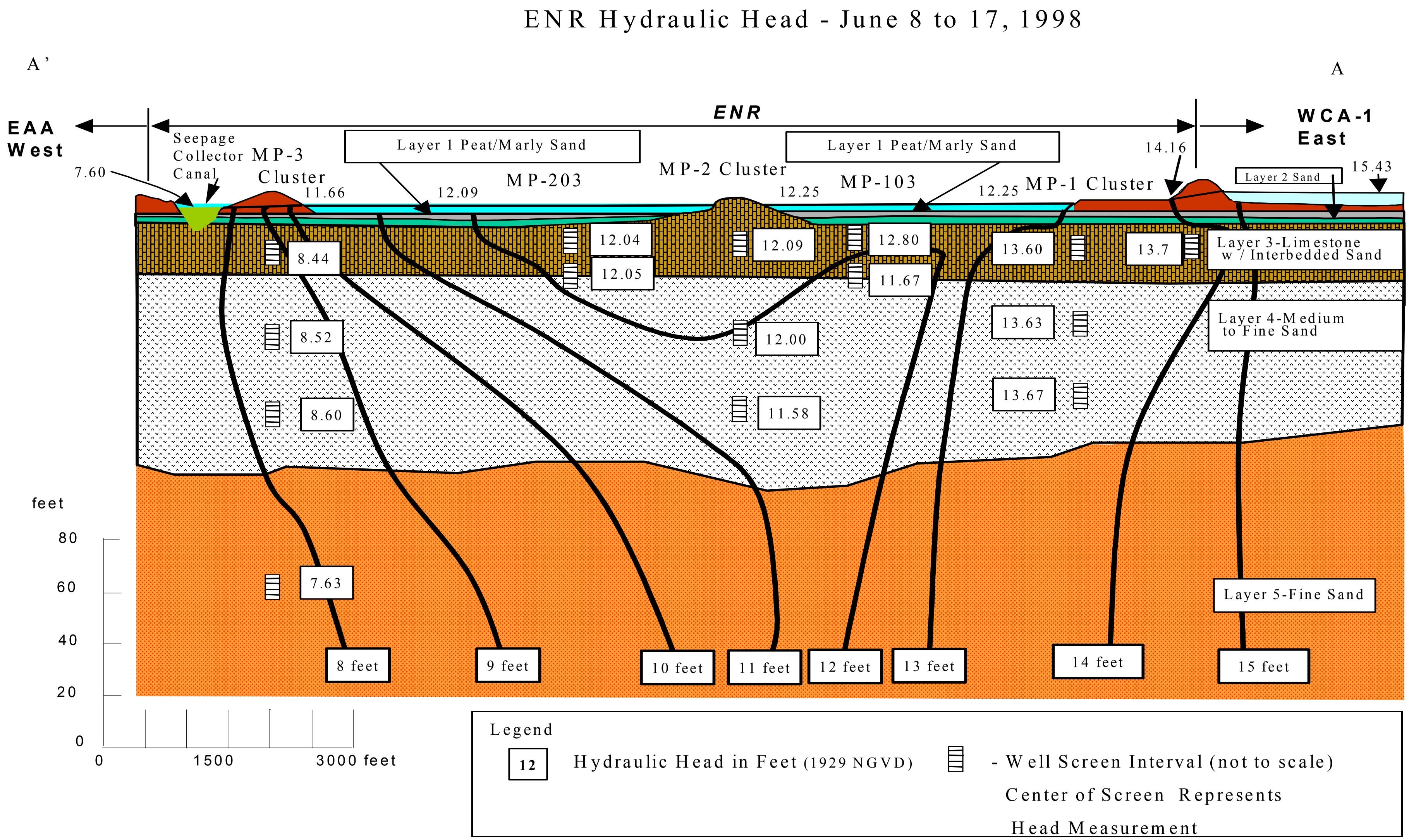


Figure 48. Location map of lithostratigraphic cross-sections.



ENR Hydraulic Head - June 8 to 17, 1998

Figure 49. ENR West-East lithostratigraphic cross-section with dry season hydraulic heads.

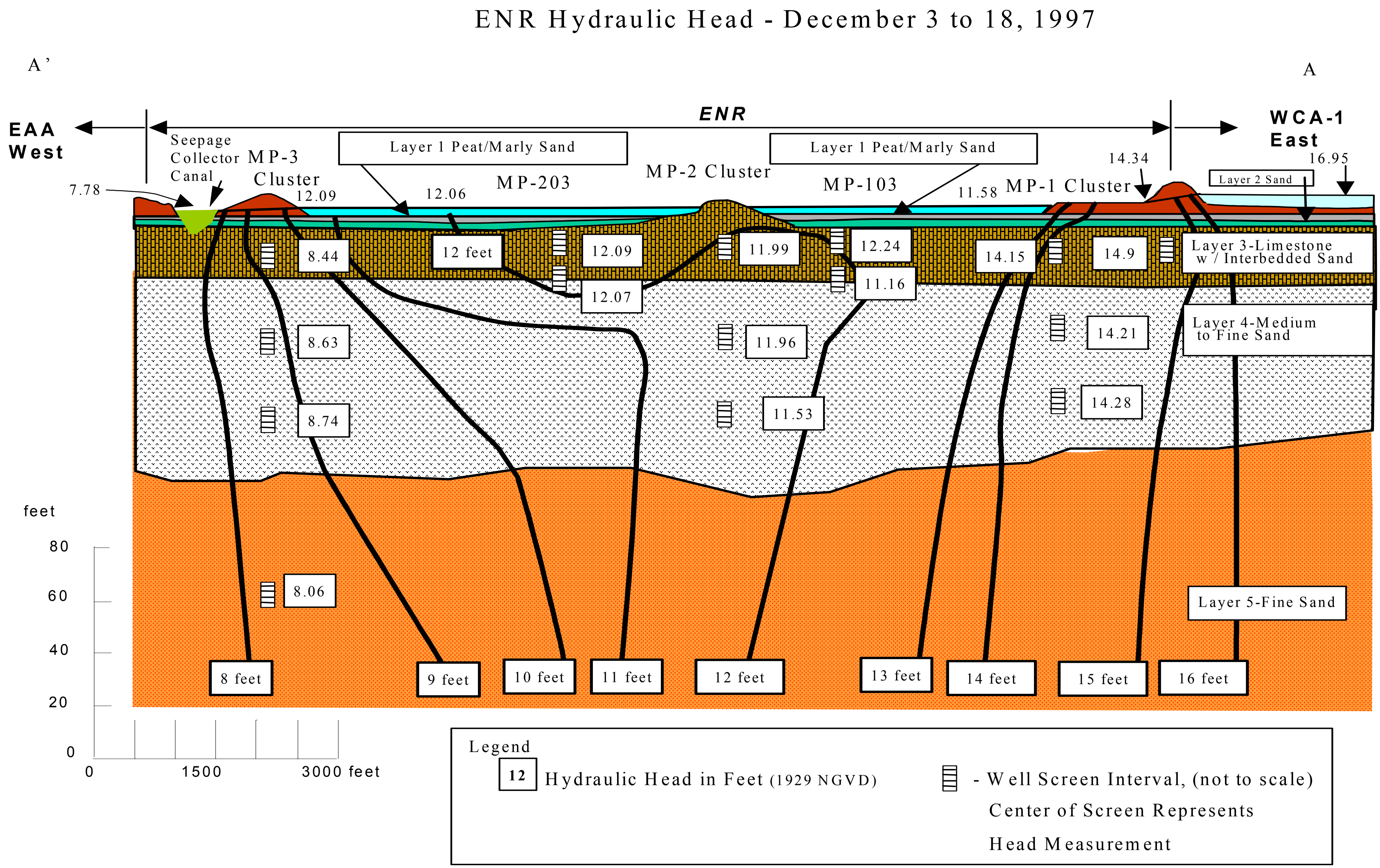


Figure 50. ENR West-East lithostratigraphic cross section with wet season hydraulic heads.

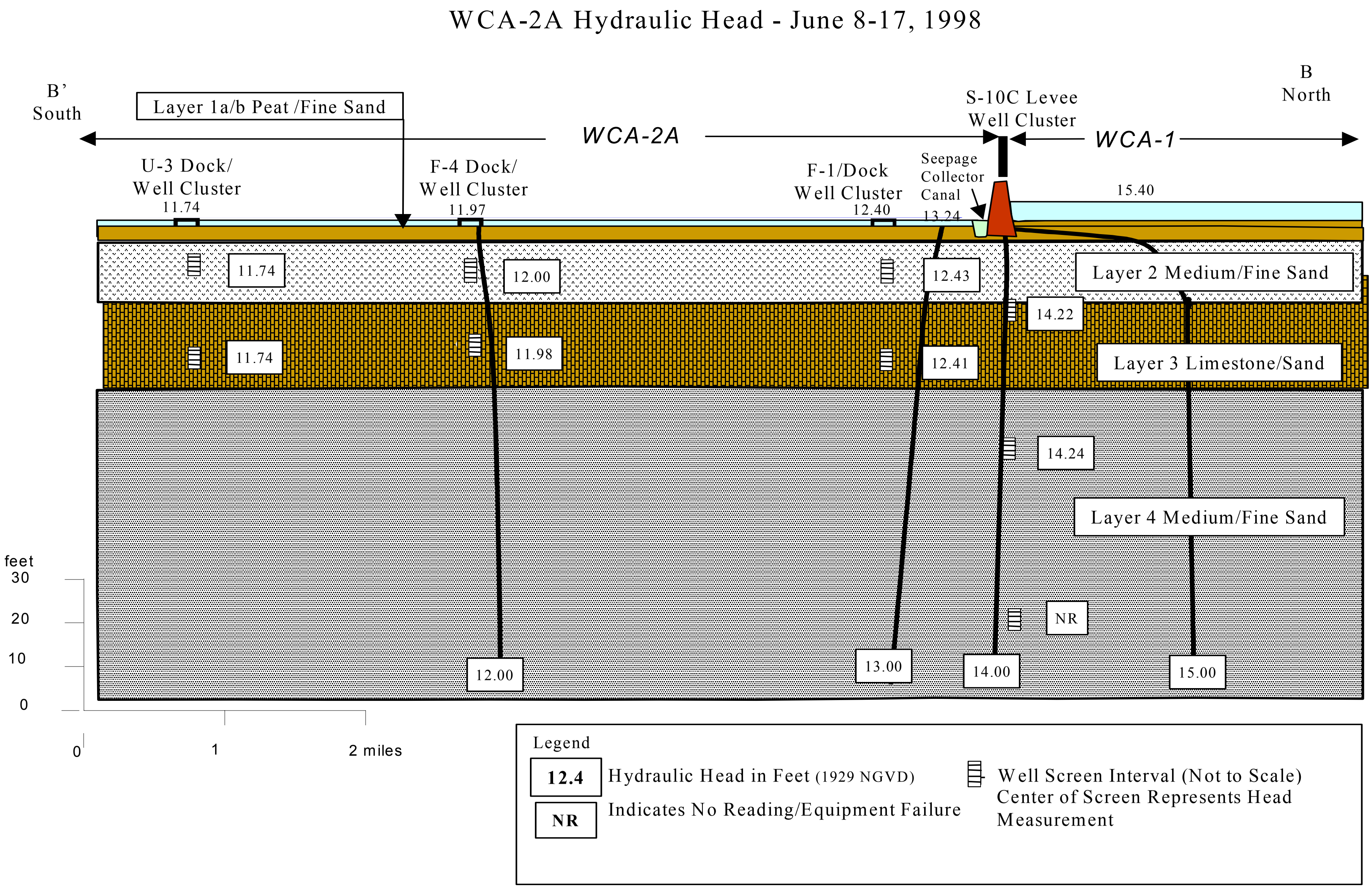


Figure 51. WCA2-A North-South lithostratigraphic cross-section with dry season hydraulic heads.

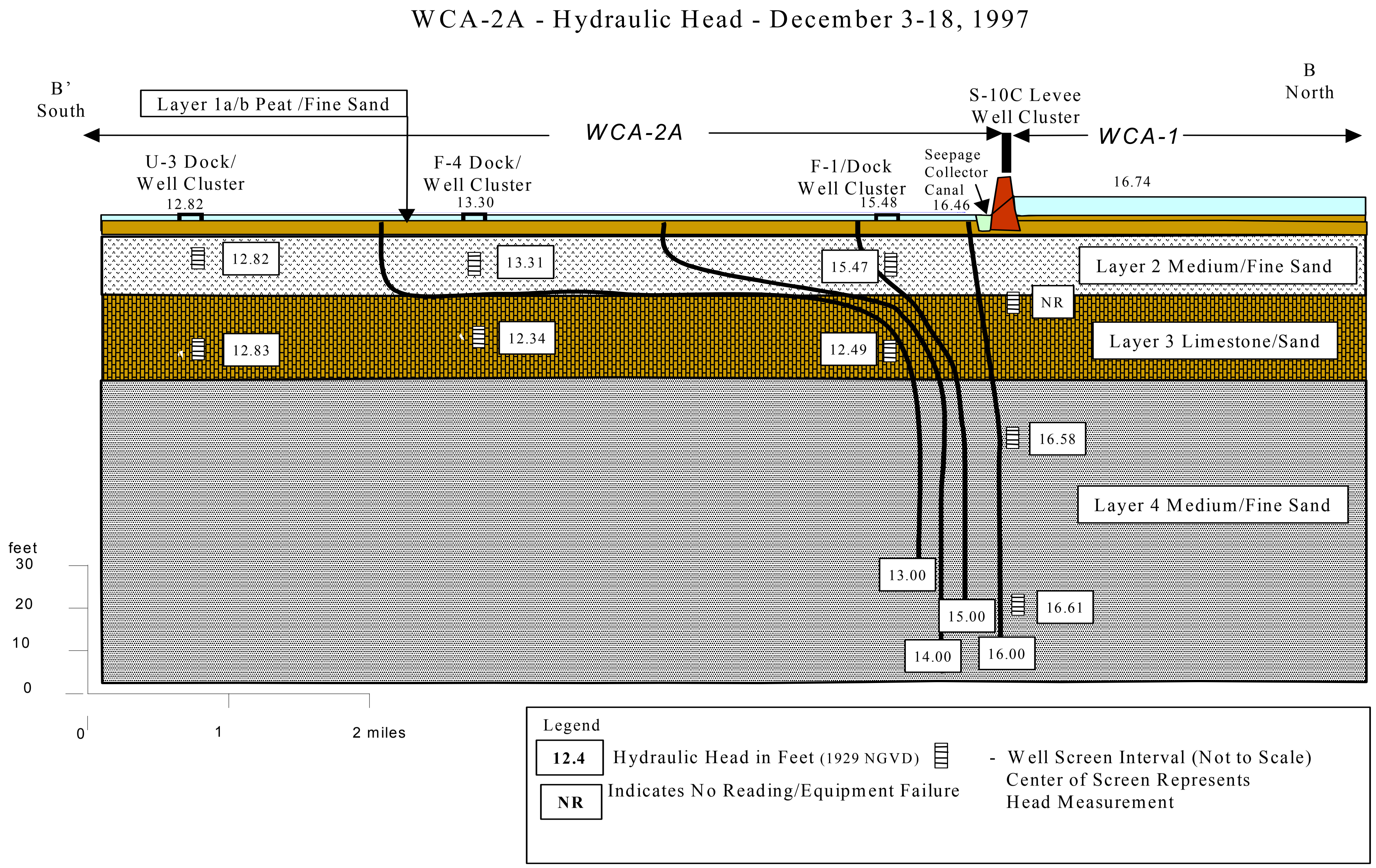
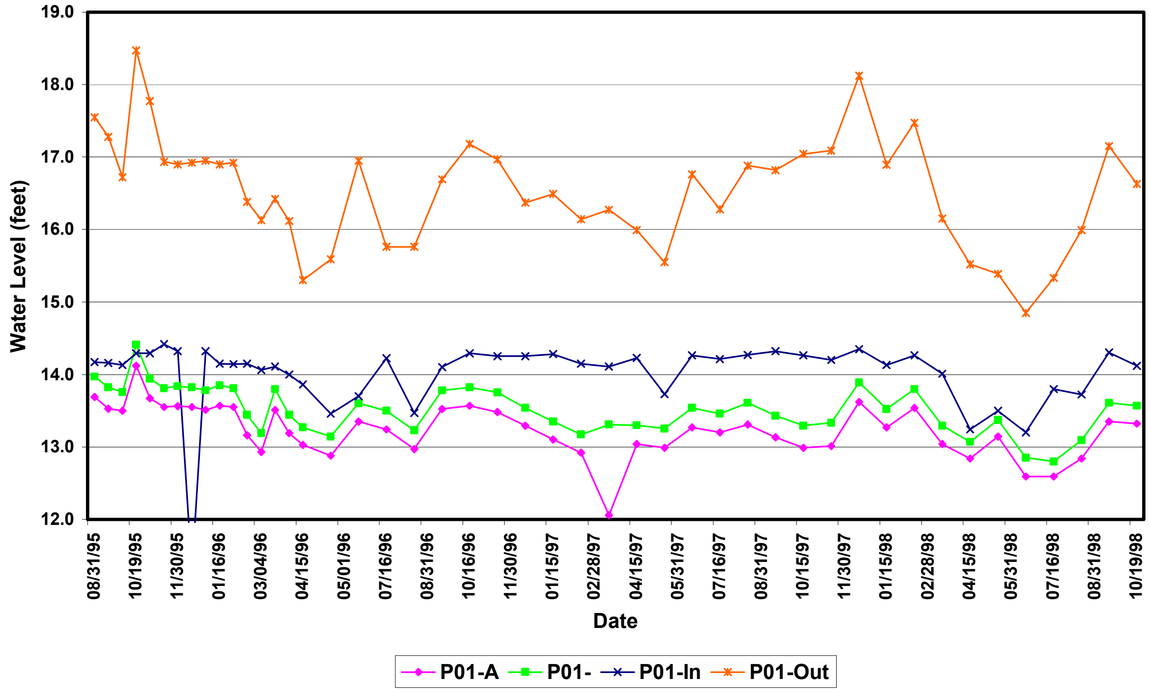


Figure 52. WCA2-A North-South lithostratigraphic cross section with wet season hydraulic heads.

Temporal Variation of Vertical Hydraulic Gradients in ENR

a. ENR Water Levels -- P01 Wells A and B and Surface Water



b. ENR Vertical Hydraulic Gradients -- P01 Wells to Surface Water

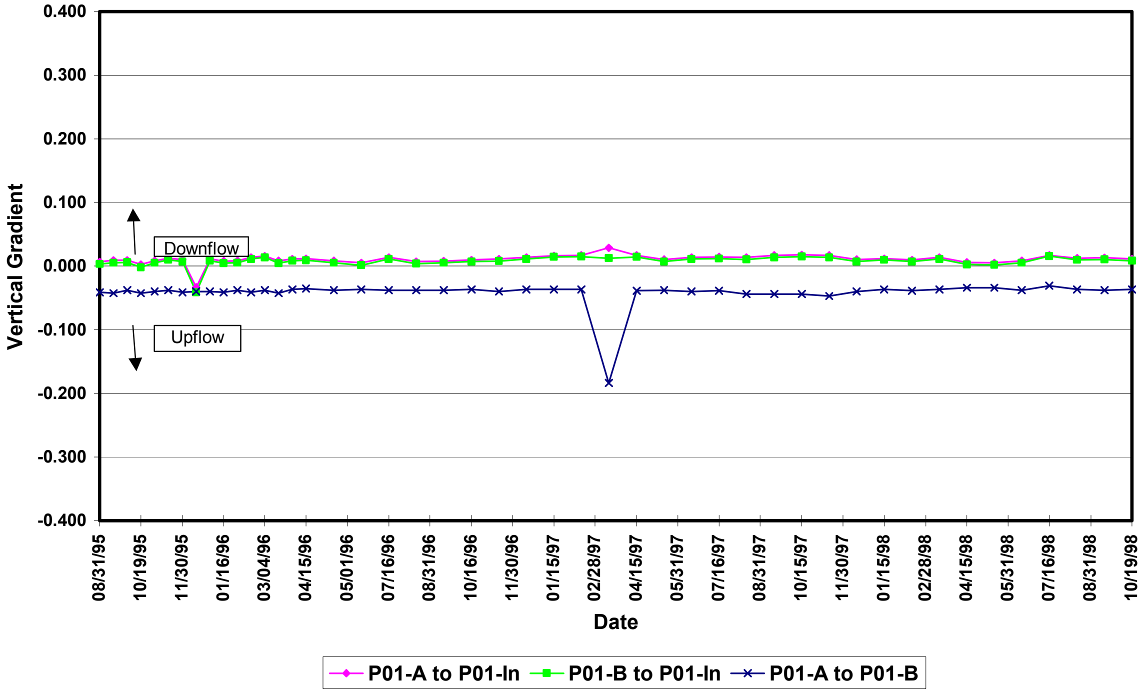
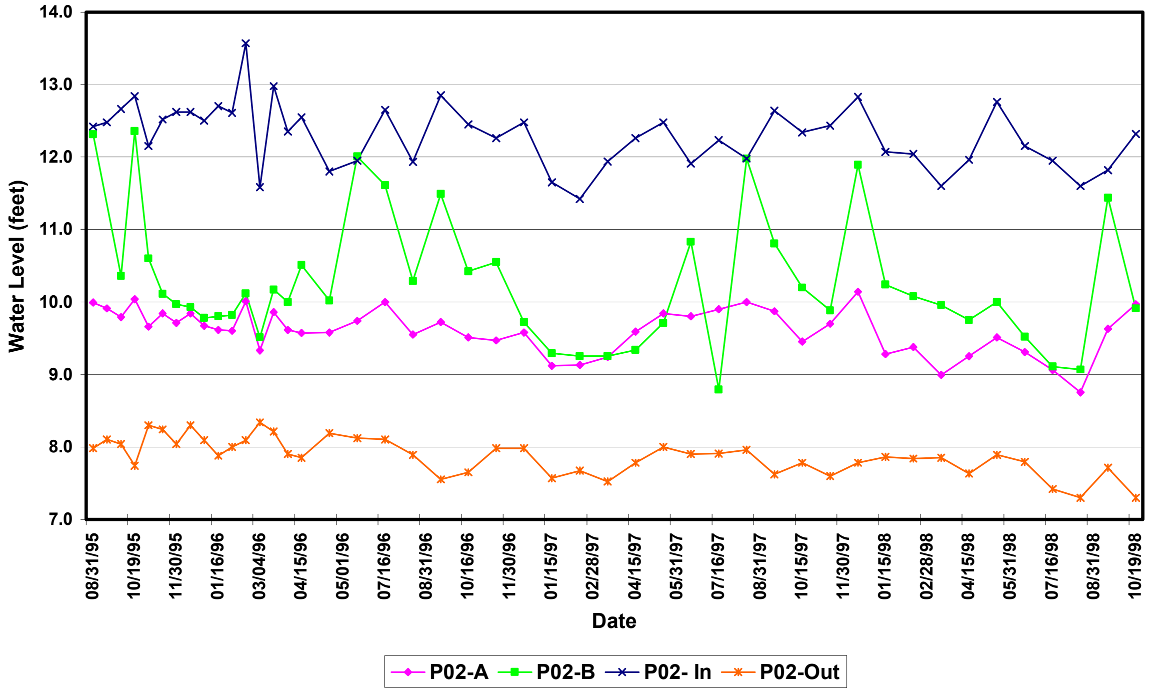


Figure 53. ENR site P01. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- P02 Wells A and B and Surface Water



b. ENR Vertical Hydraulic Gradients -- P02 Wells to Surface Water

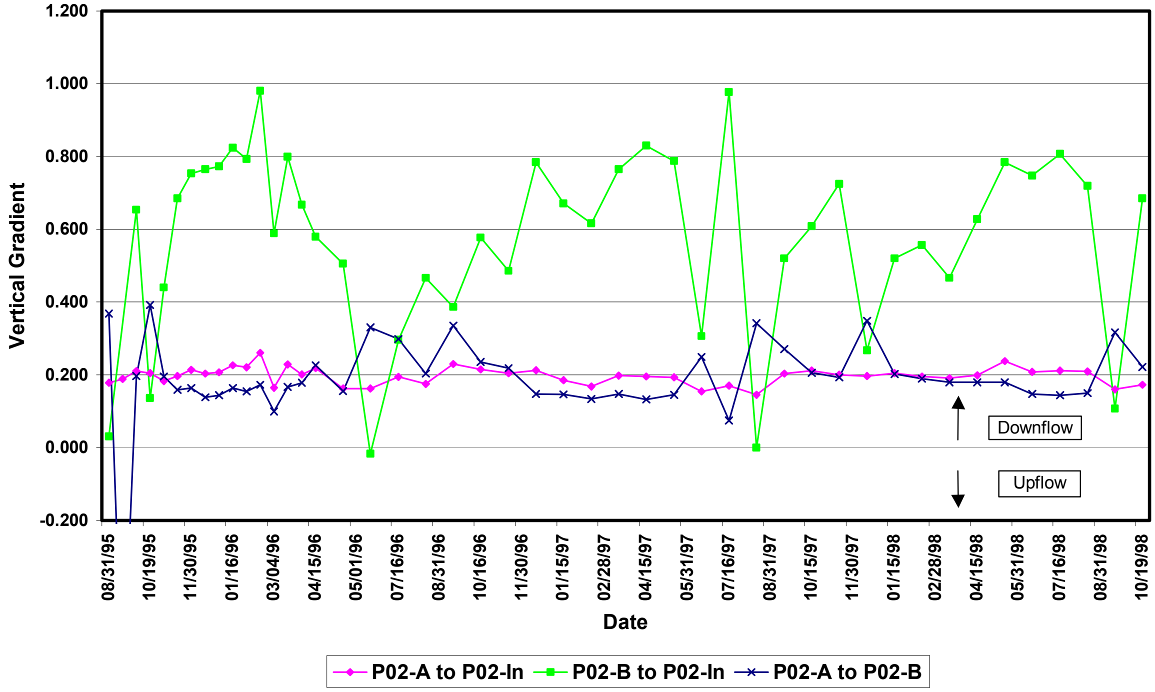
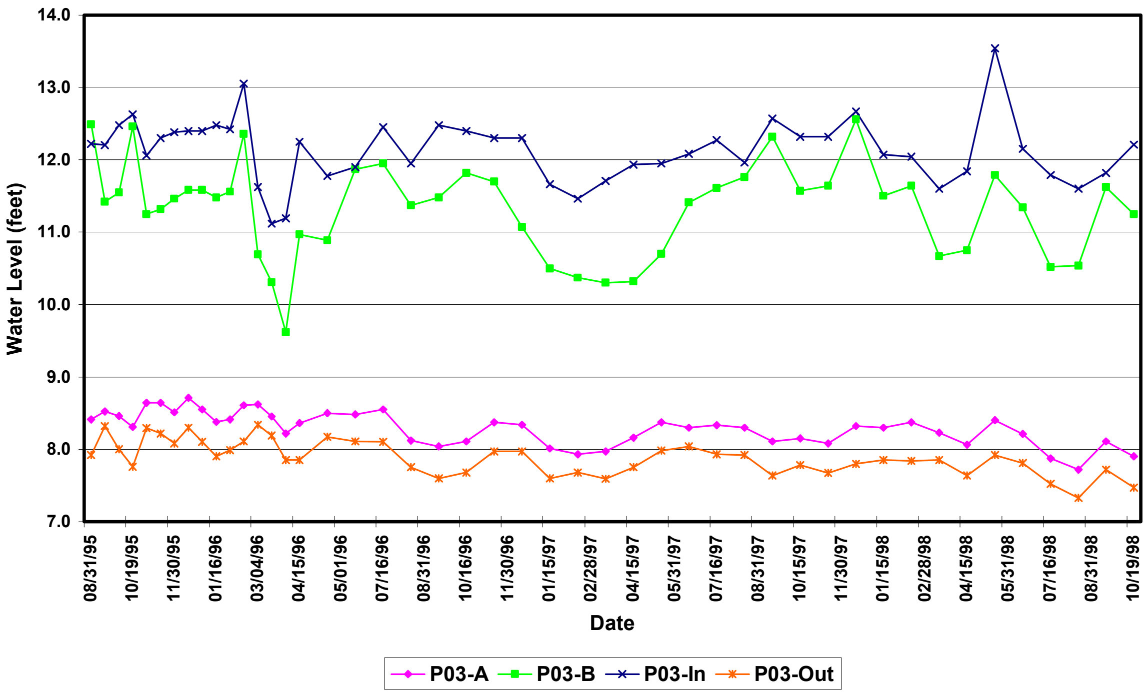


Figure 54. ENR site P02. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- P03 Wells A and B and Surface Water



b. ENR Vertical Hydraulic Gradients -- P03 Wells to Surface Water

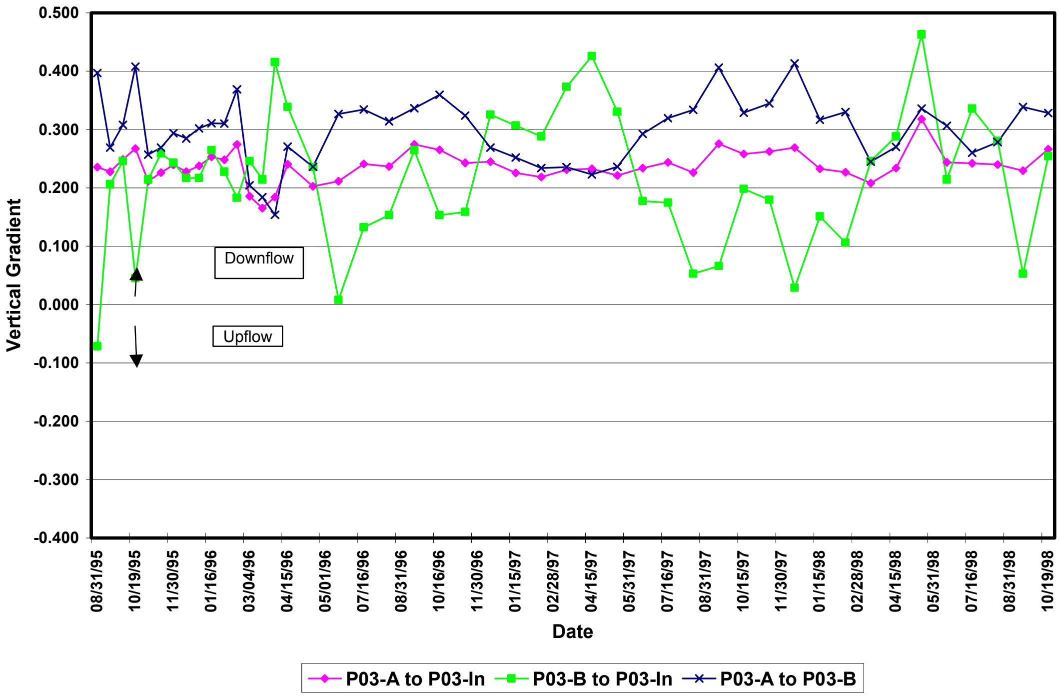
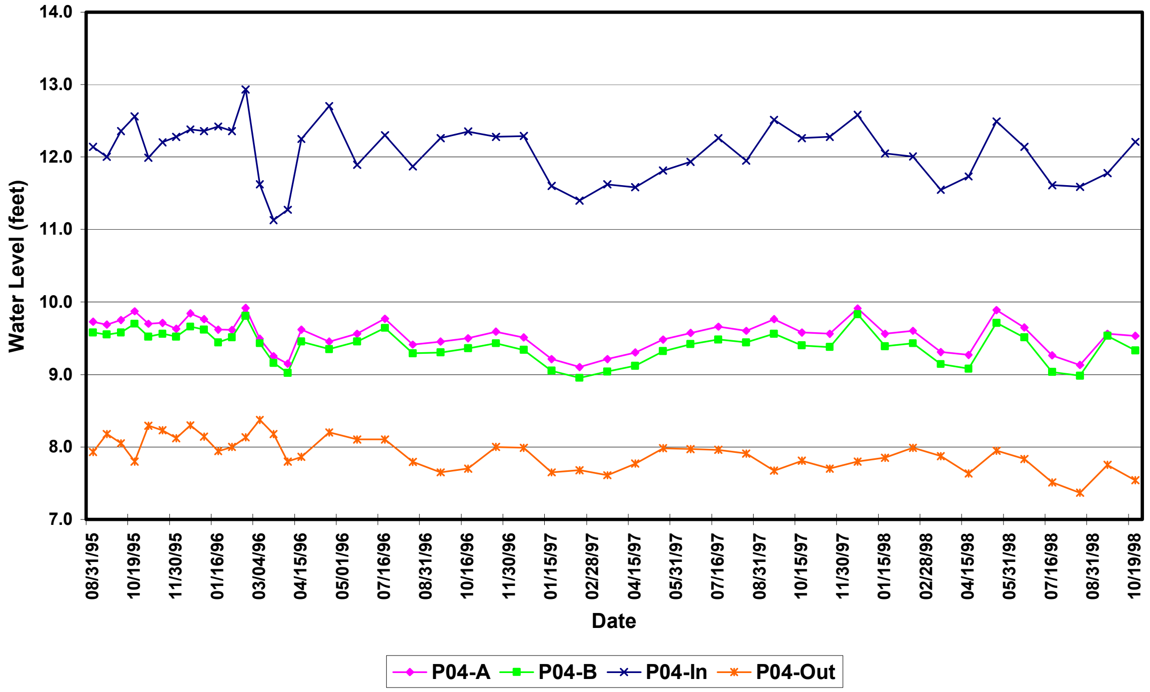


Figure 55. ENR site P03. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.


a. ENR Water Levels -- P04 Wells A and B and Surface Water

b. ENR Vertical Hydraulic Gradients -- P04 Wells to Surface Water

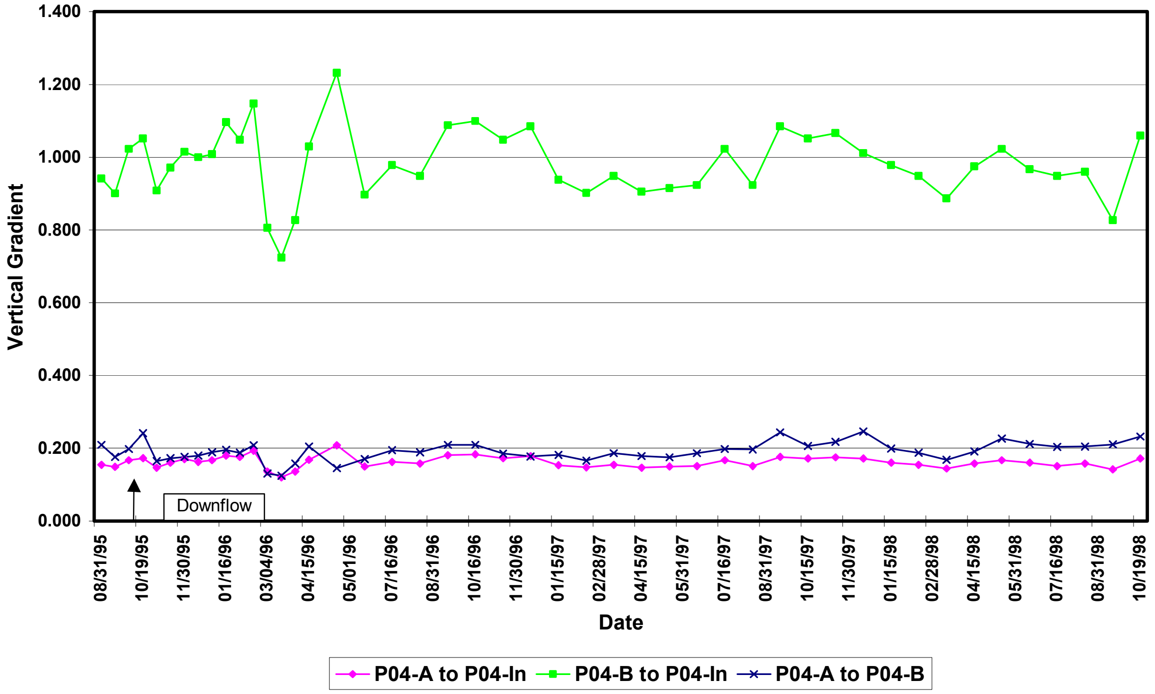
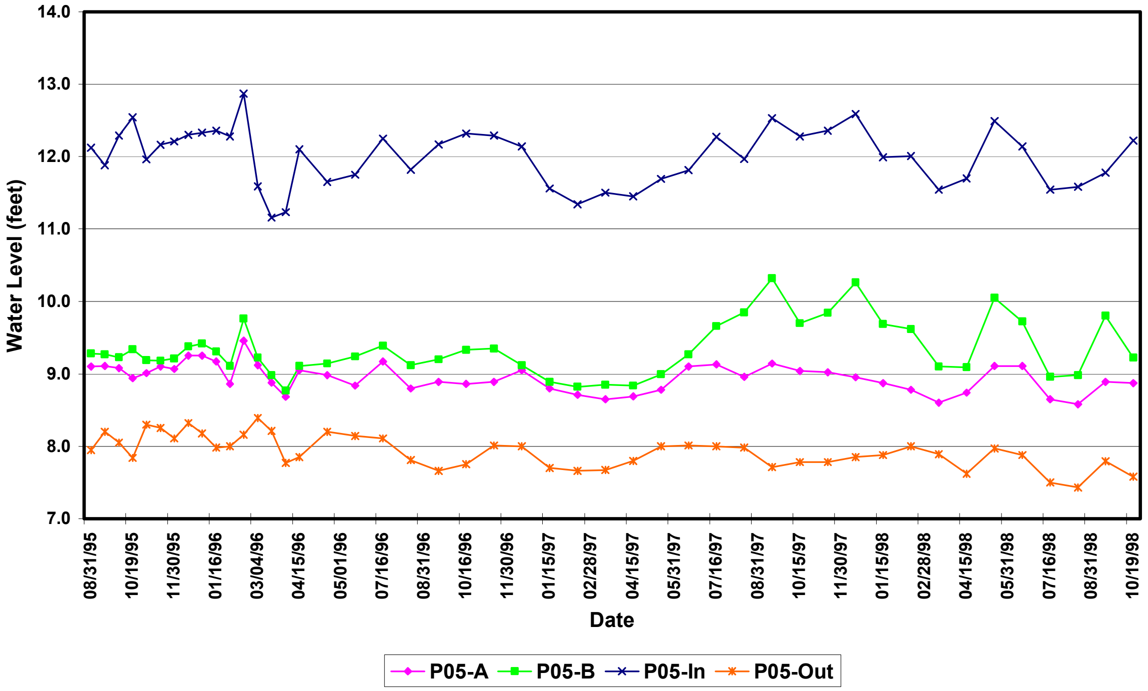


Figure 56. ENR site P04. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- P05 Wells A and B and Surface Water



b. ENR Vertical Hydraulic Gradients -- P05 Wells to Surface Water

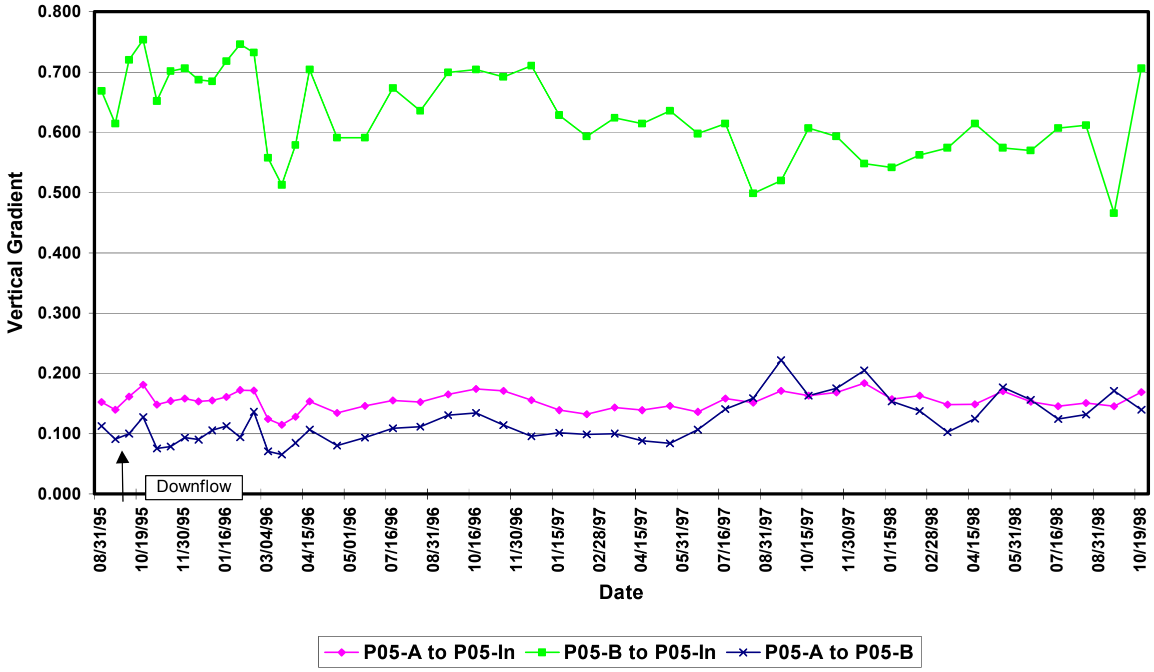
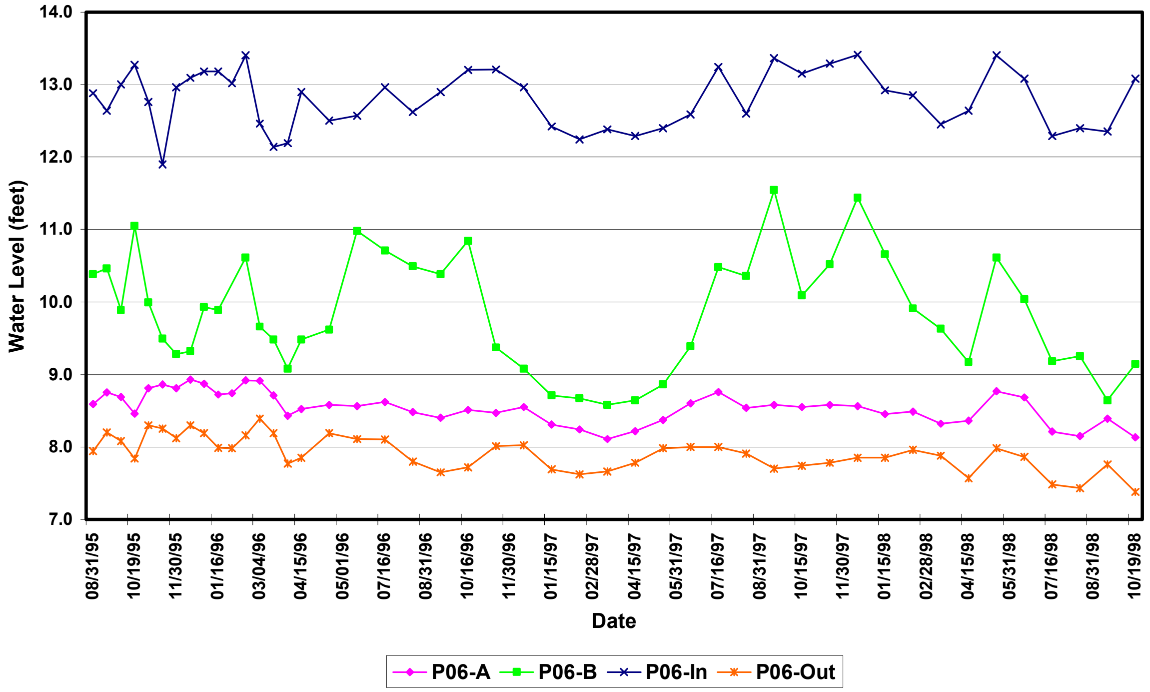


Figure 57. ENR site P05. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- P06 Wells A and B and Surface Water



b. ENR Vertical Hydraulic Gradients -- P06 Wells to Surface Water

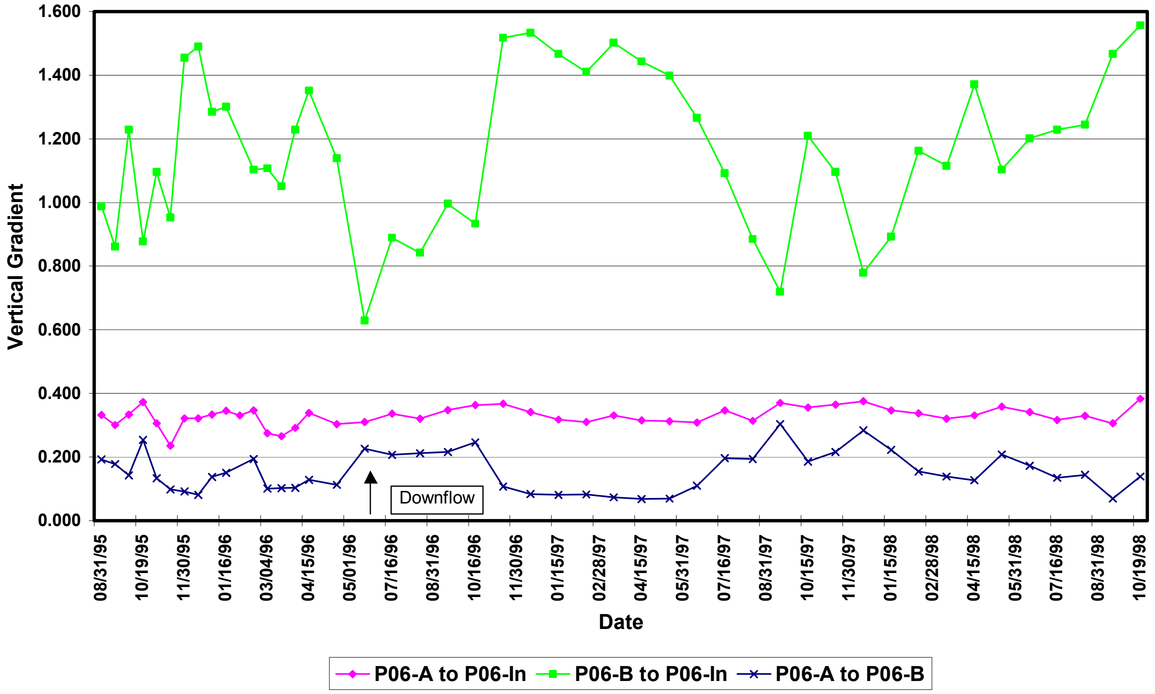
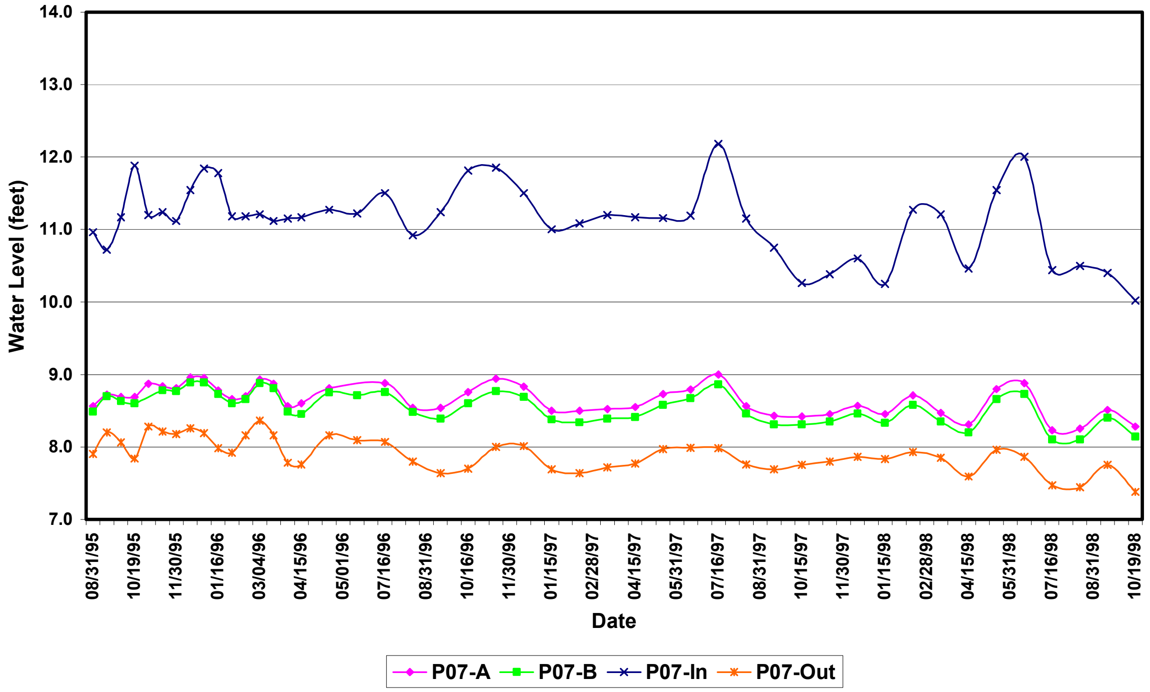


Figure 58. ENR site P06. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- P07 Wells A and B and Surface Water



b. ENR Vertical Hydraulic Gradients -- P07 Wells to Surface Water

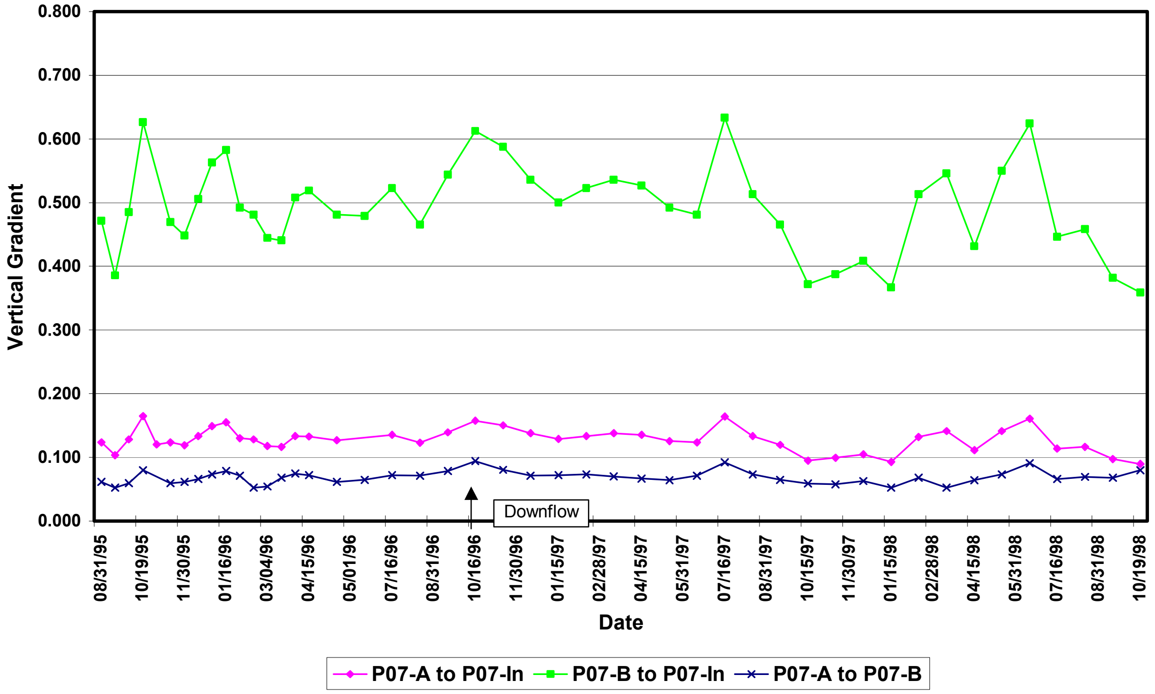
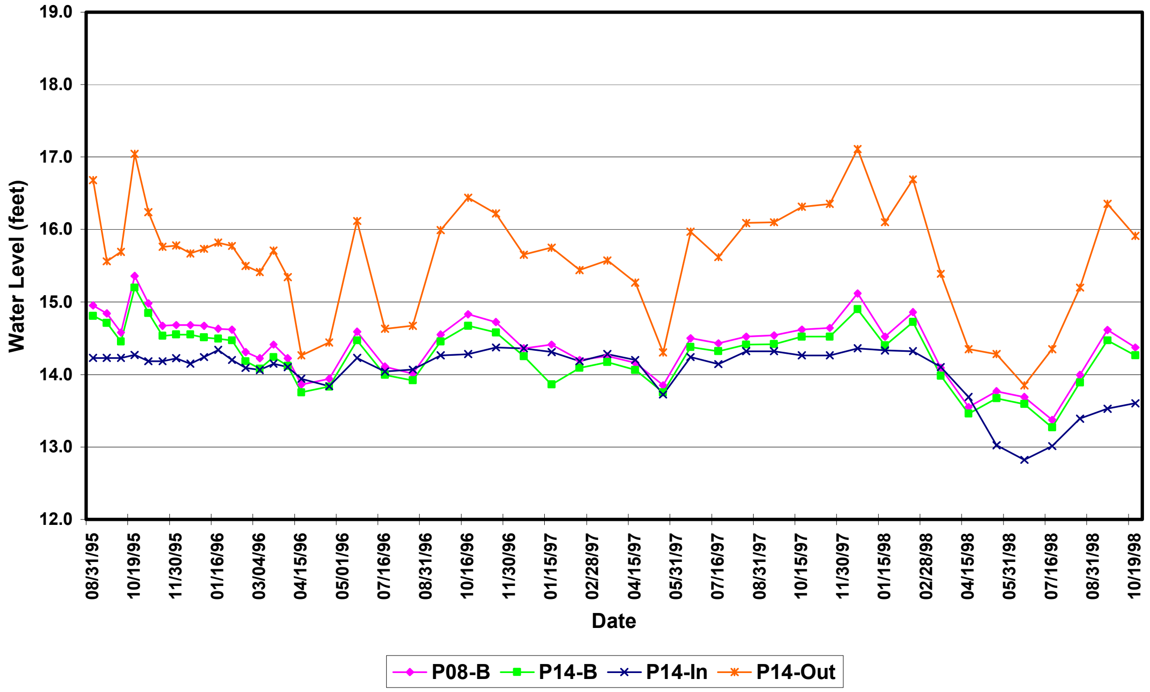


Figure 59. ENR site P07. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- P08 and P14 Wells and P14 Surface Water



b. ENR Vertical Hydraulic Gradients -- P08 and P14 Wells to Surface Water

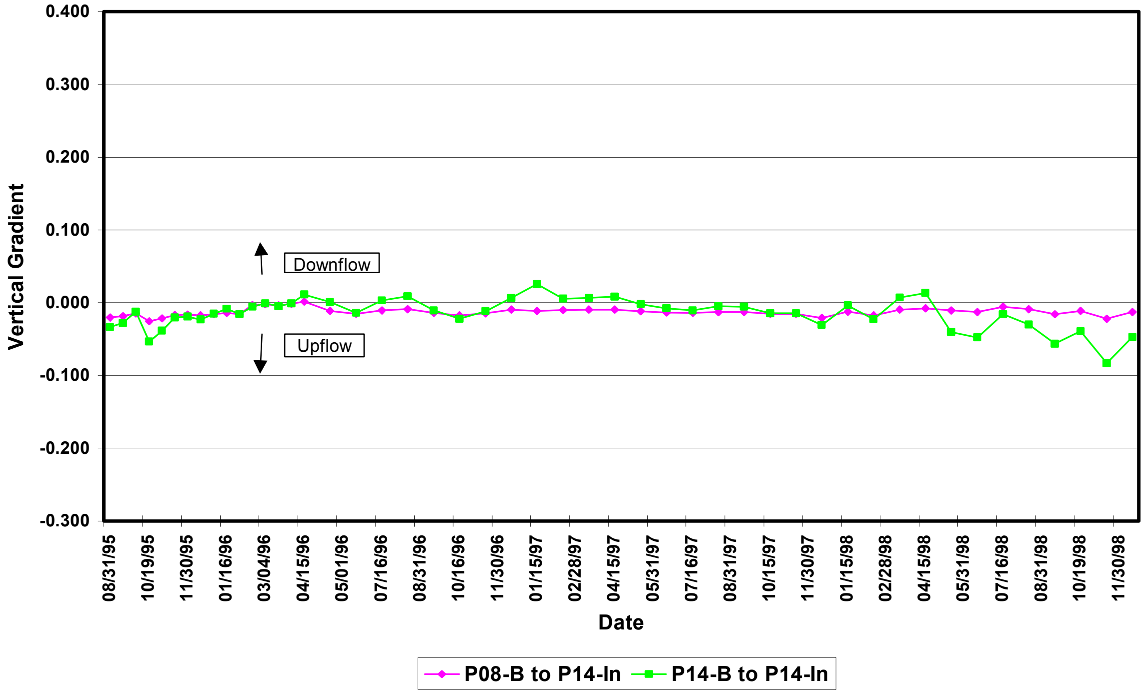
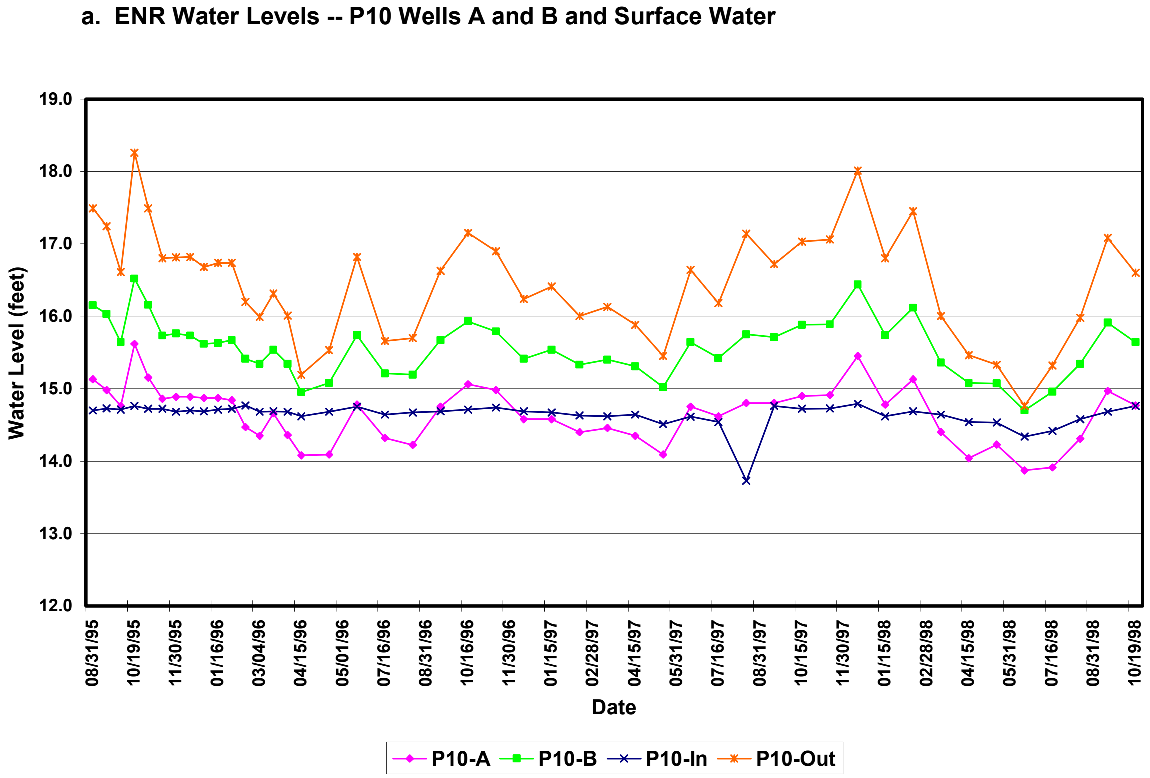


Figure 60. ENR sites P08 and P14. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



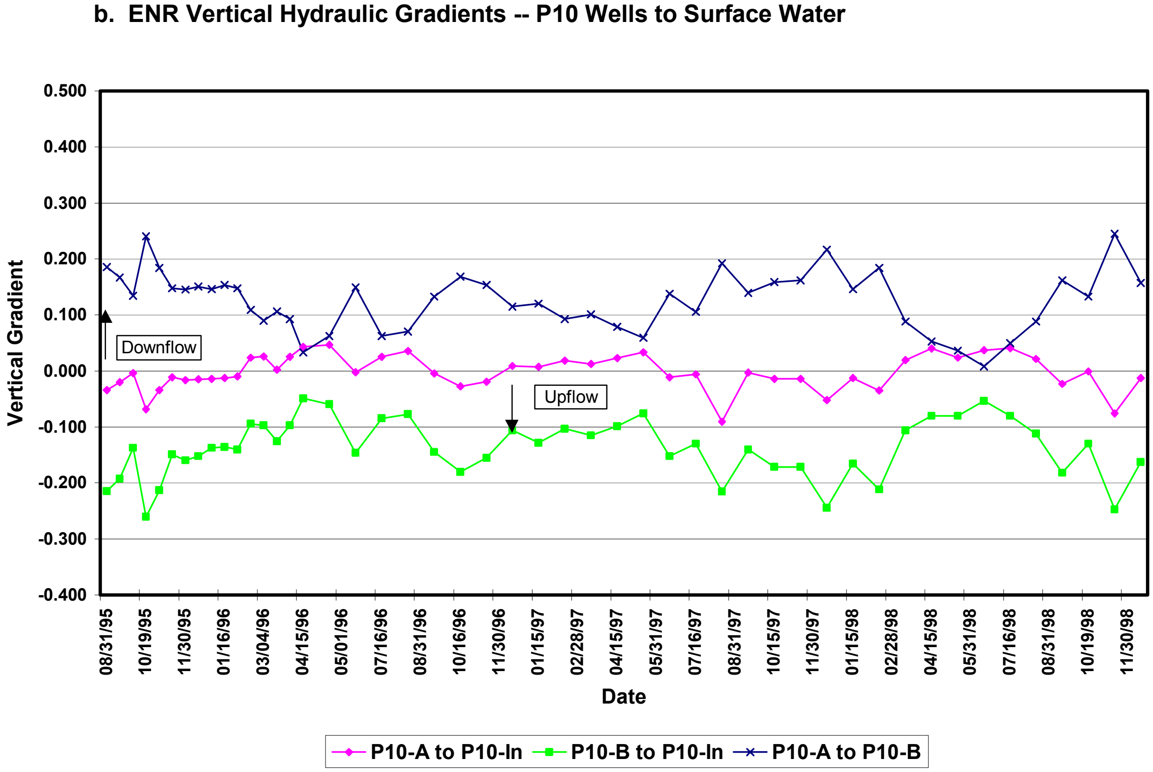
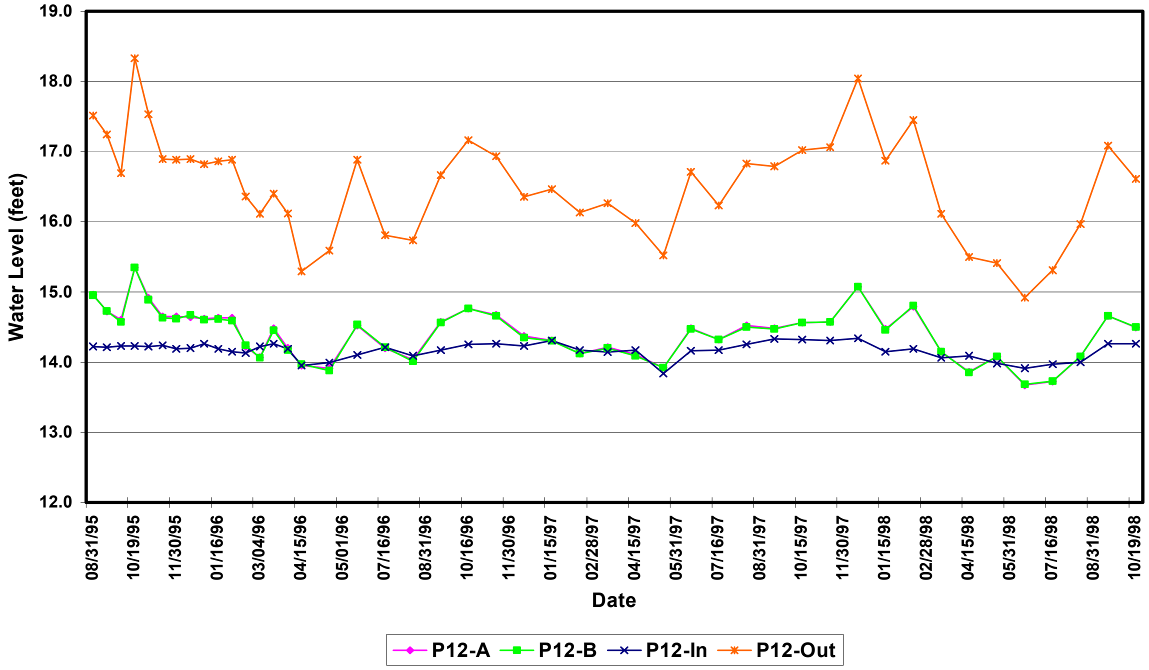


Figure 61. ENR site P10. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- P12 Wells A and B and Surface Water



b. ENR Vertical Hydraulic Gradients -- P12 Wells to Surface Water

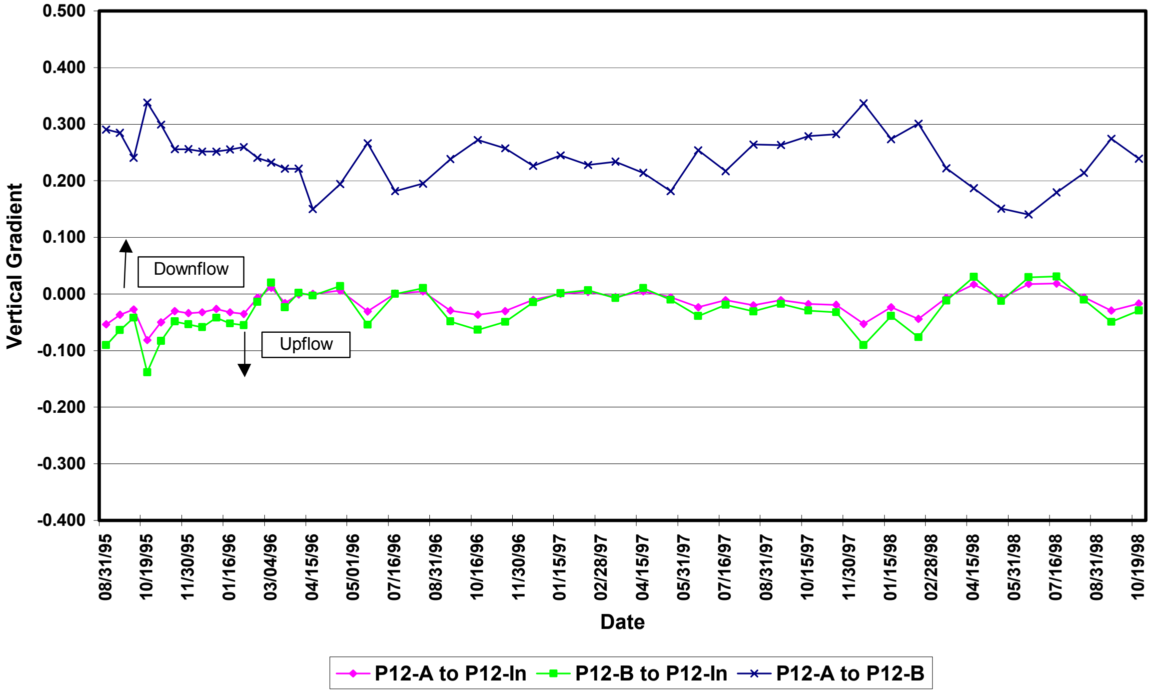
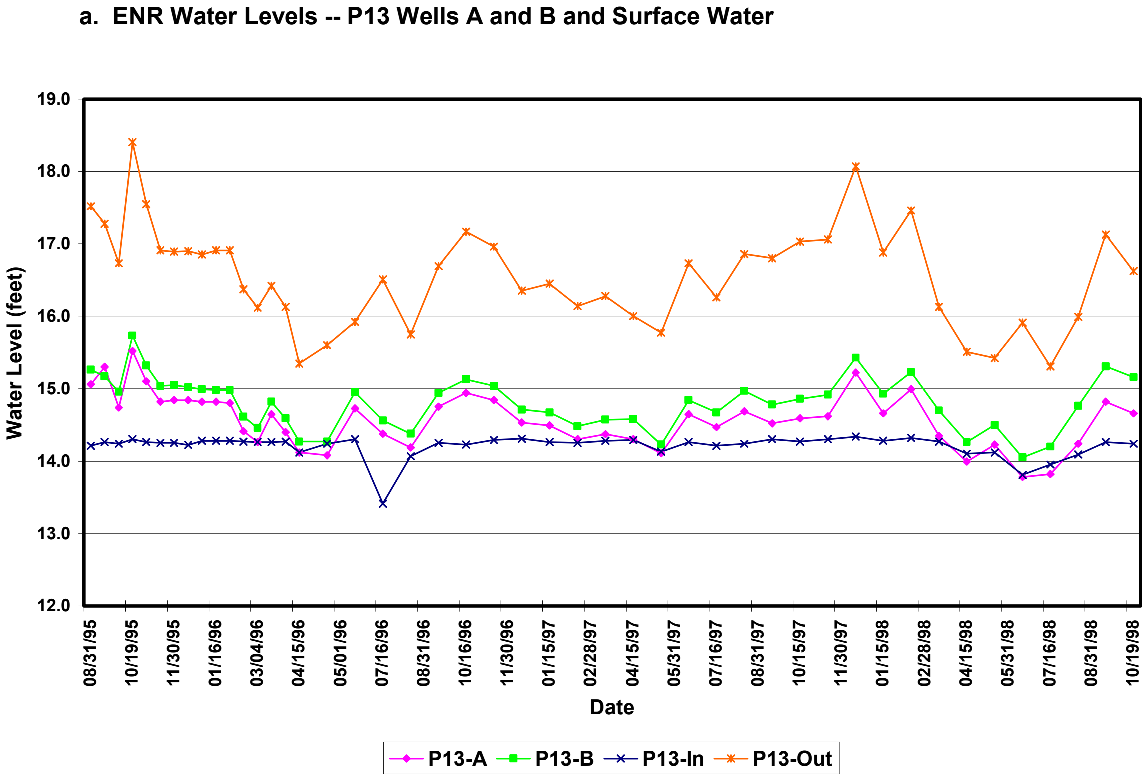


Figure 62. ENR site P12. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



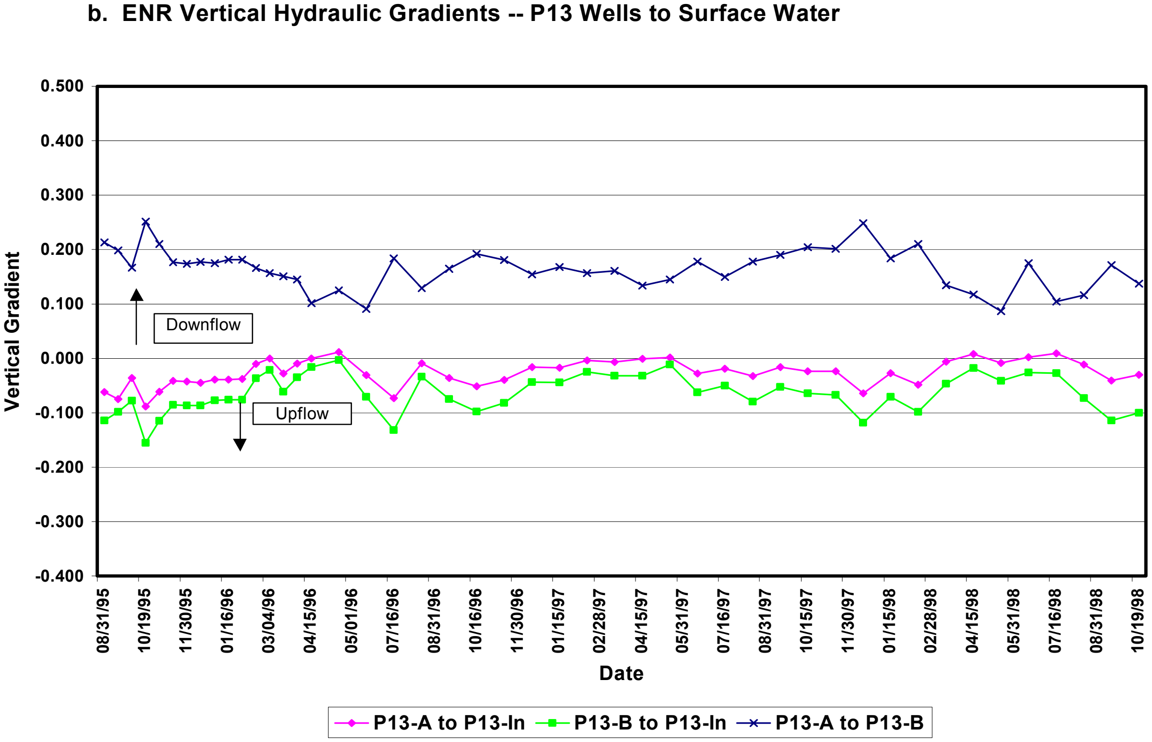
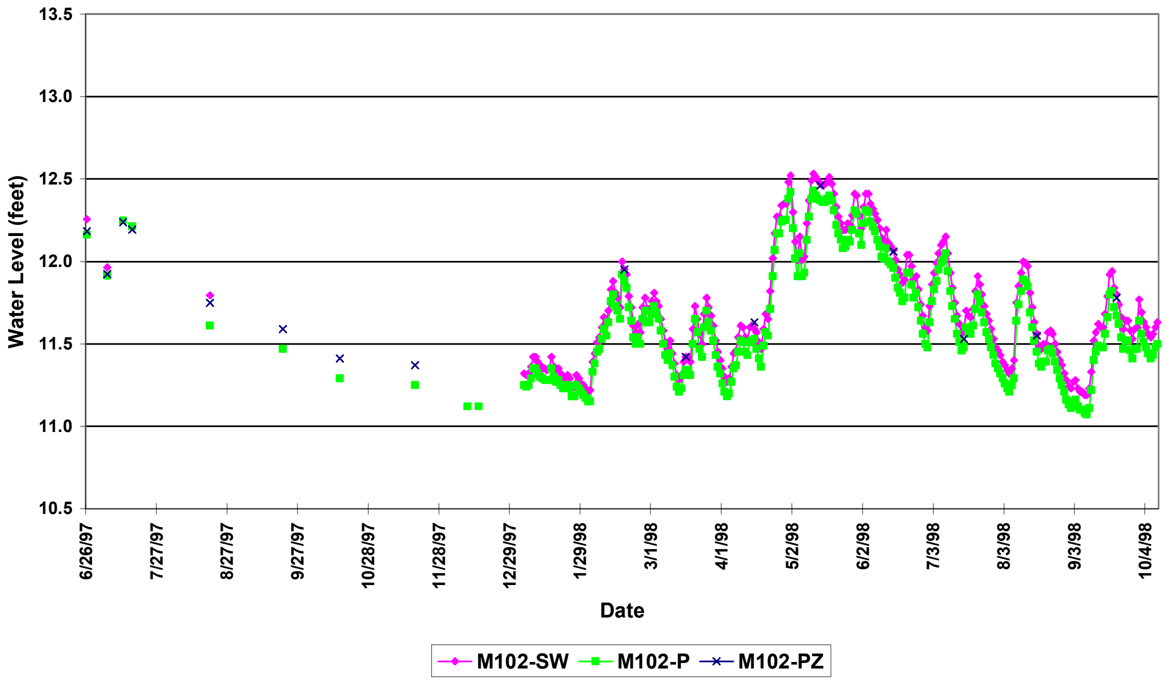


Figure 63. ENR site P13. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.


a. ENR Water Levels -- M102 Wells P and PZ and Surface Water

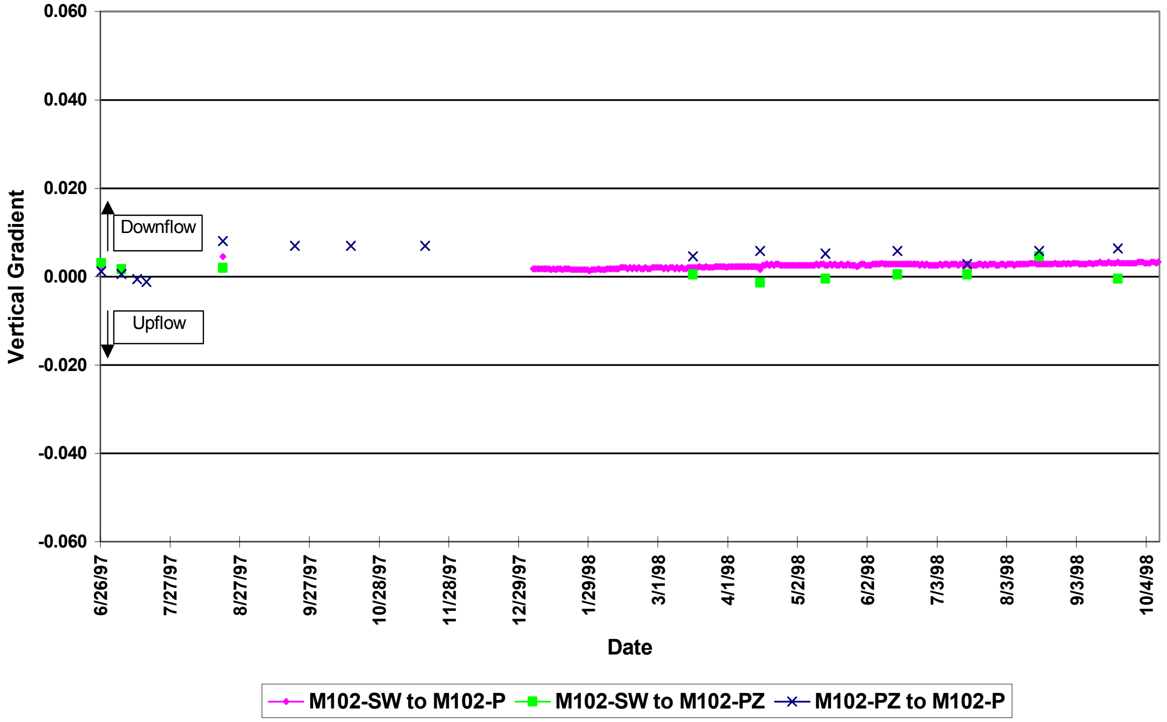
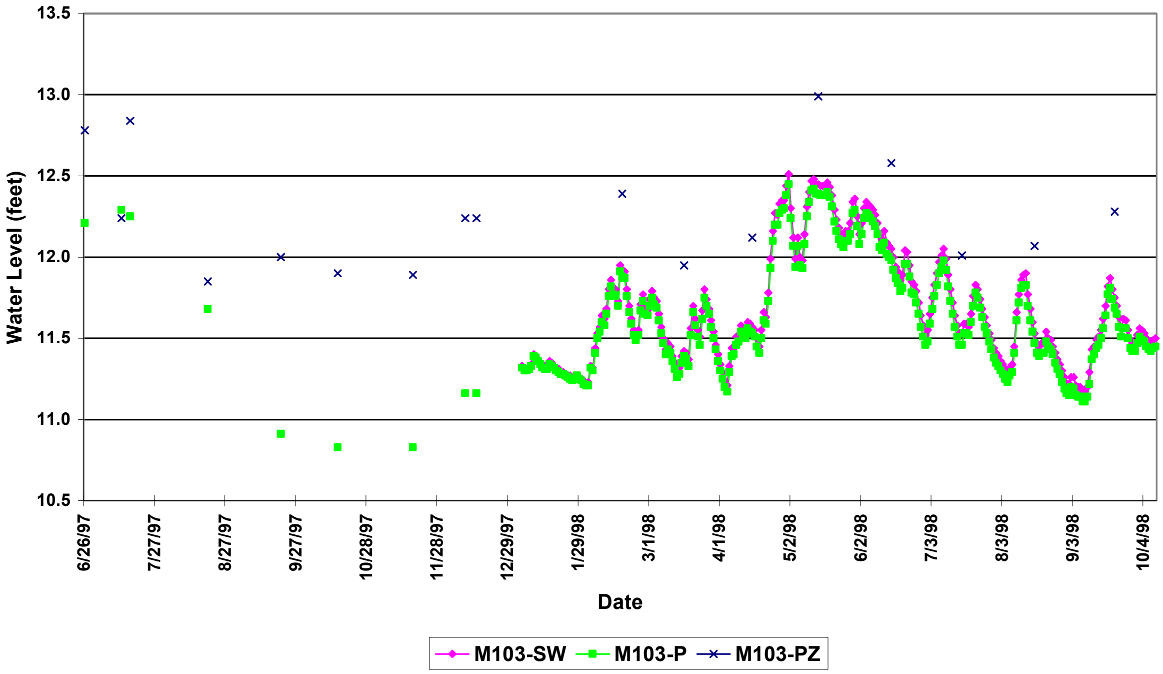

b. ENR Vertical Hydraulic Gradients -- M102 Wells to Surface Water

Figure 64. ENR site M102. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- M103 Wells P and PZ and Surface Water



b. ENR Vertical Hydraulic Gradients -- M103 Wells to Surface Water

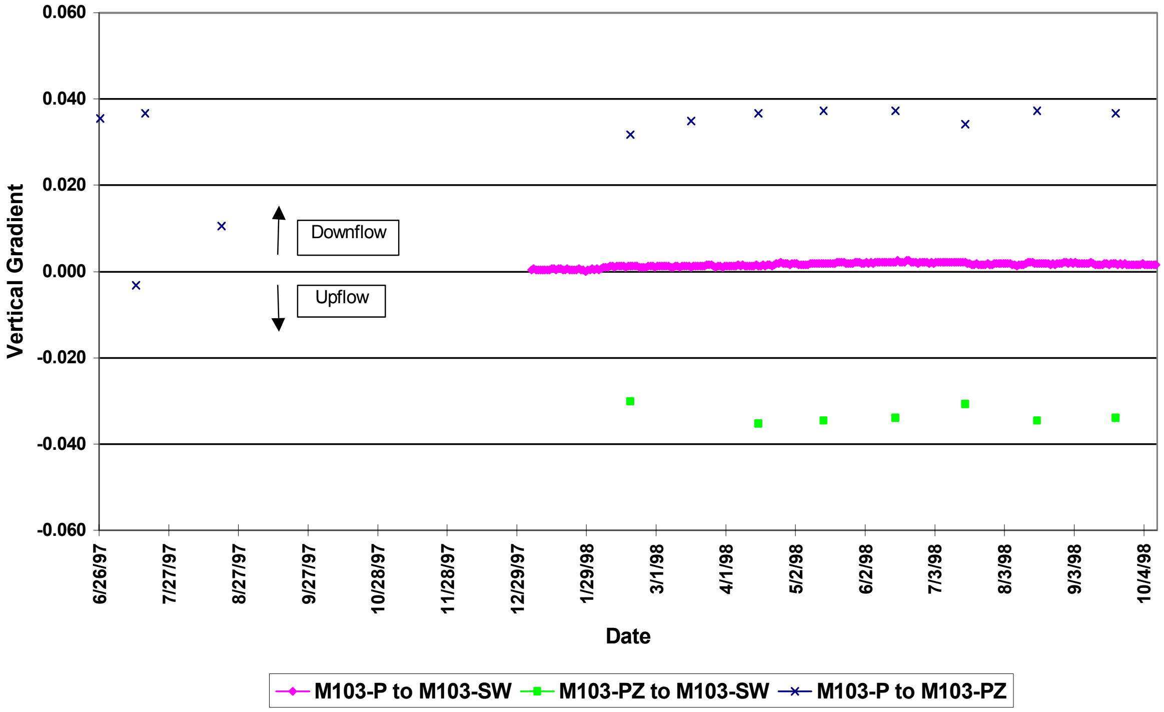
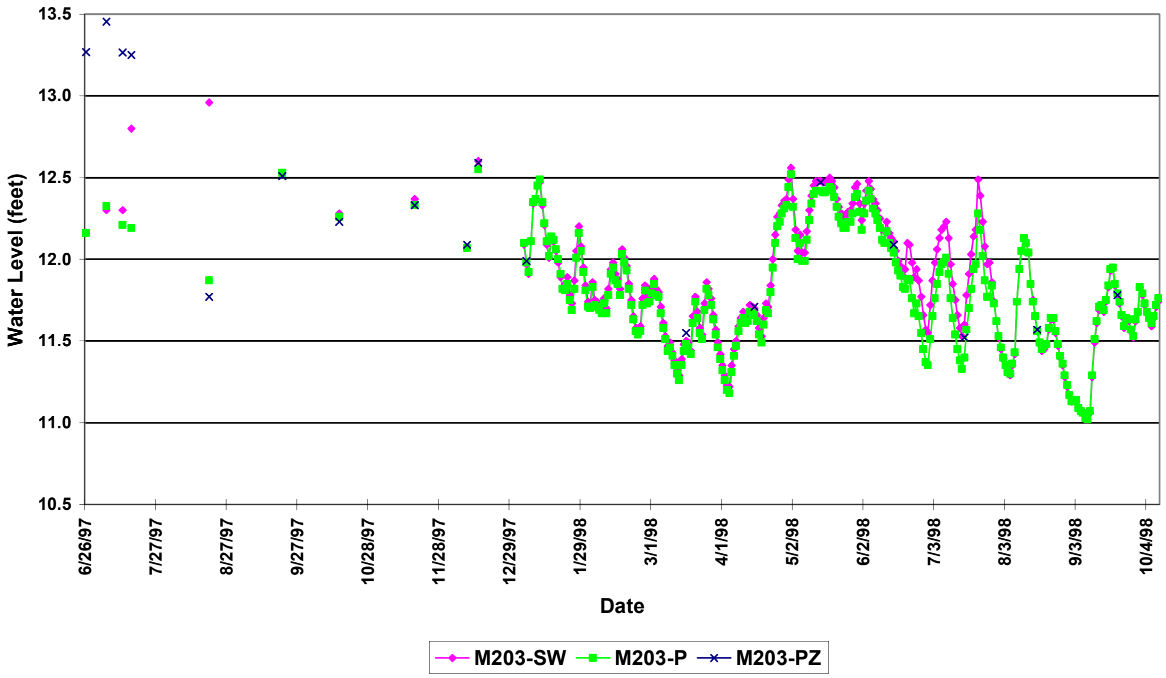


Figure 65. ENR site M103. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- M203 Wells P and PZ and Surface Water



b. ENR Vertical Hydraulic Gradients -- M203 Wells to Surface Water

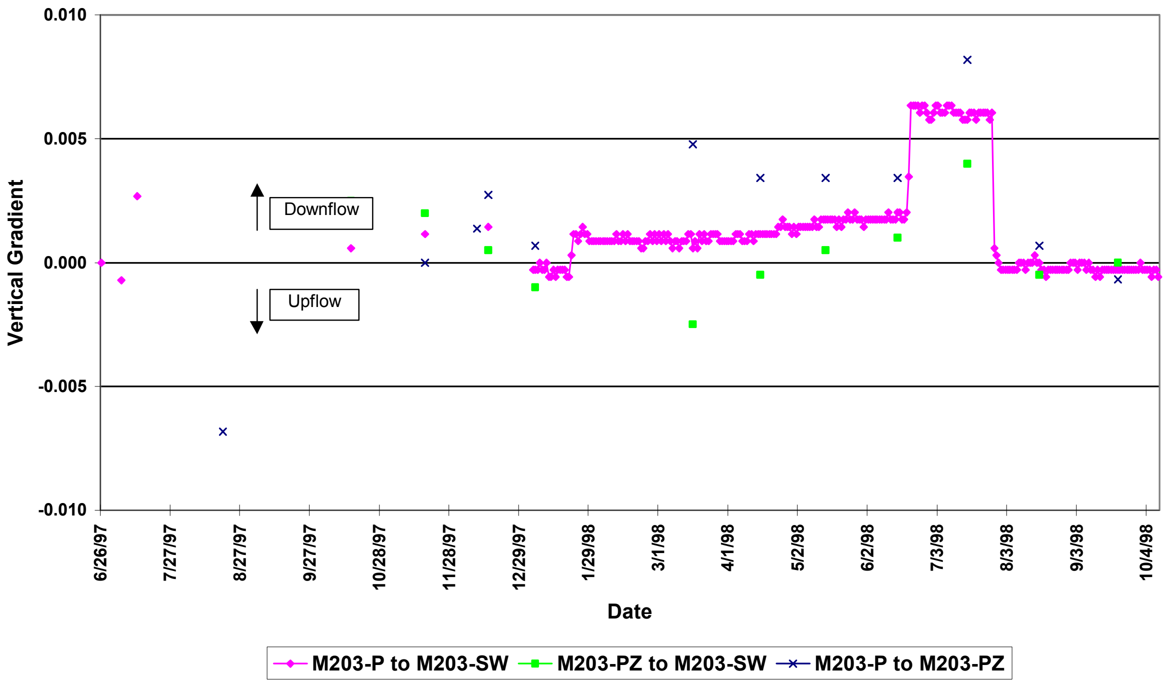
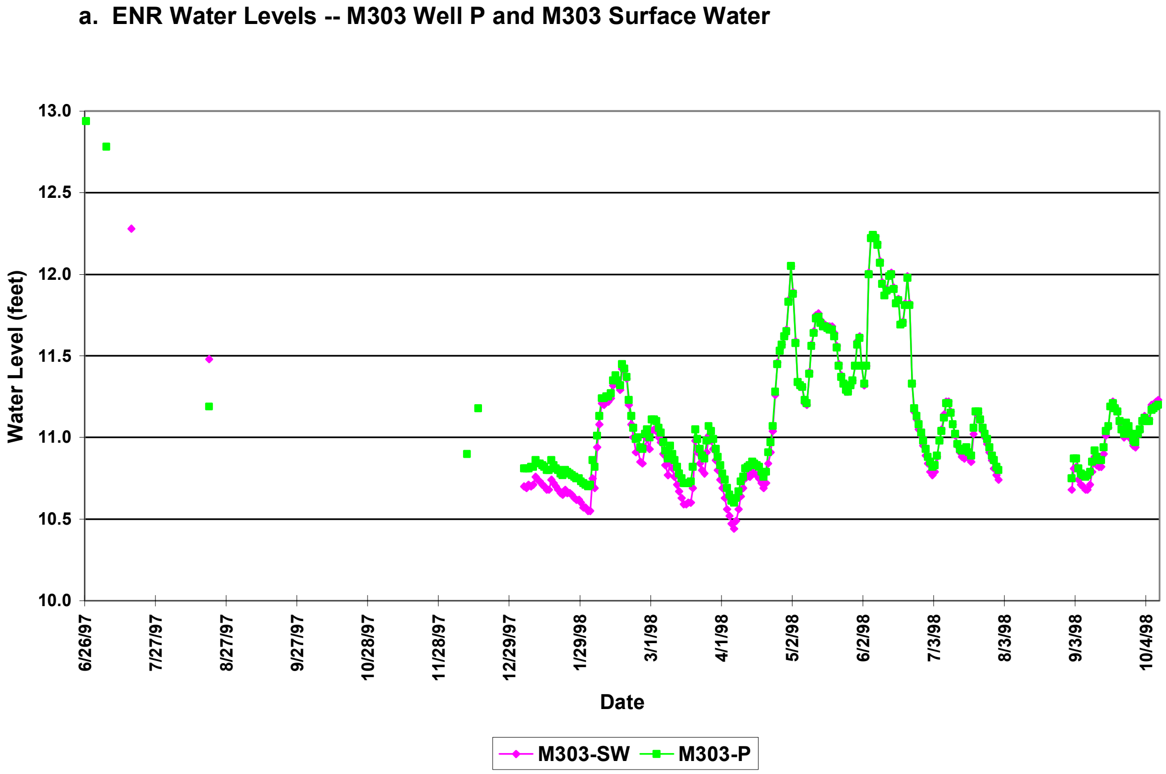


Figure 66. ENR site M203. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



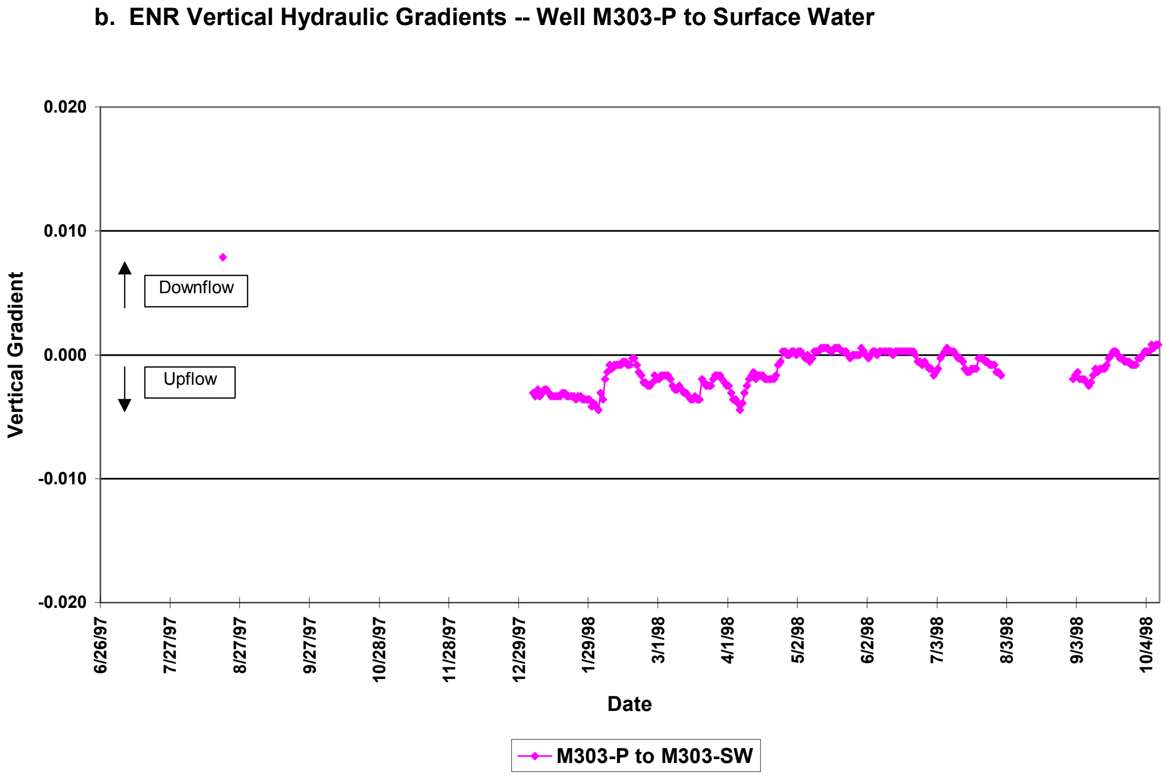
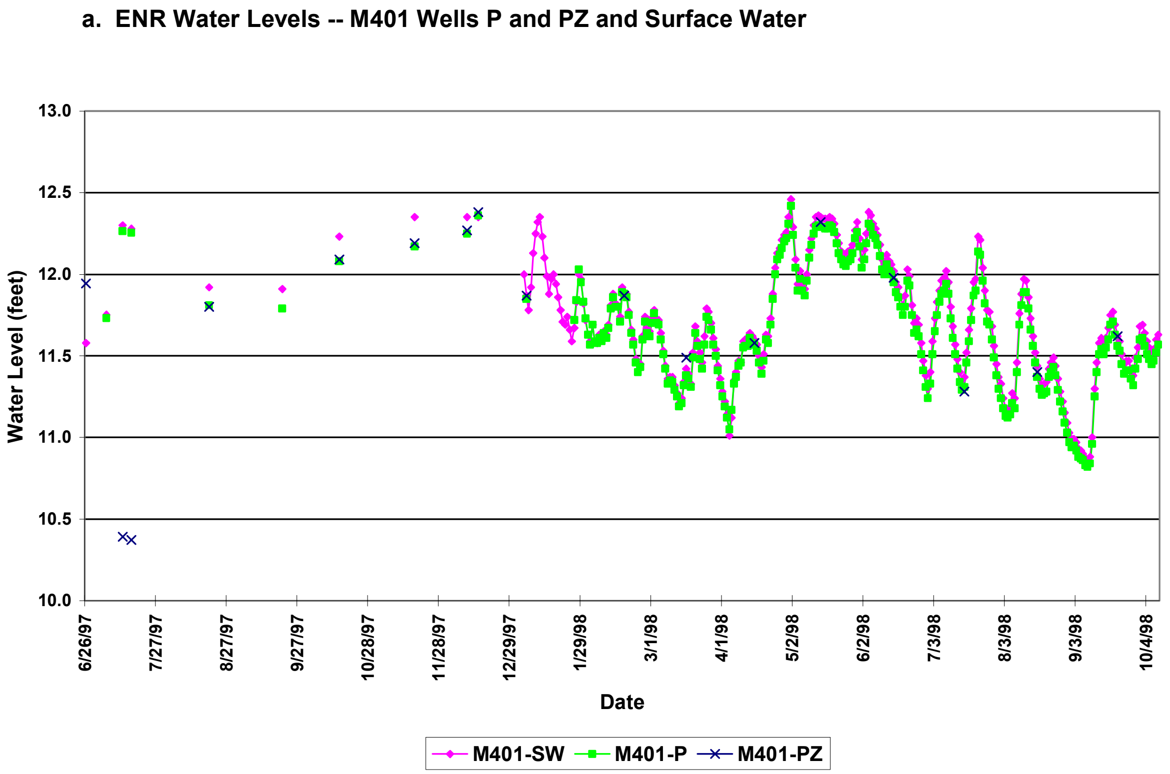


Figure 67. ENR site M303. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



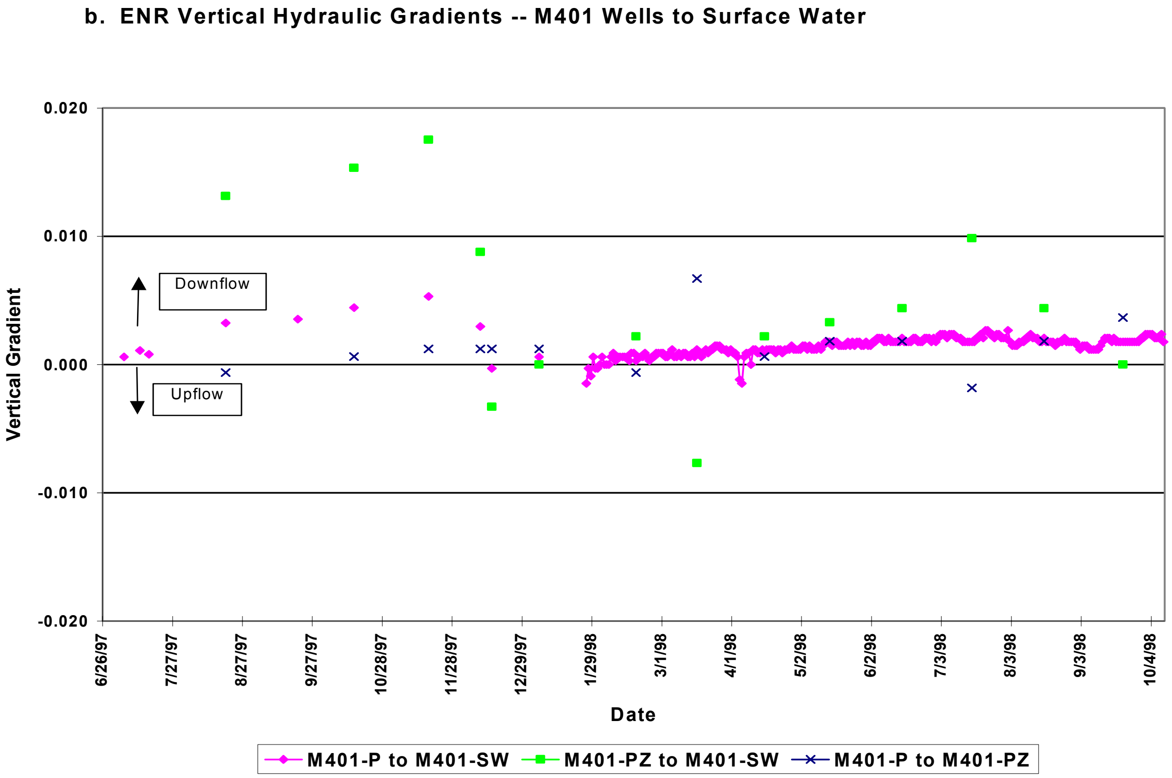
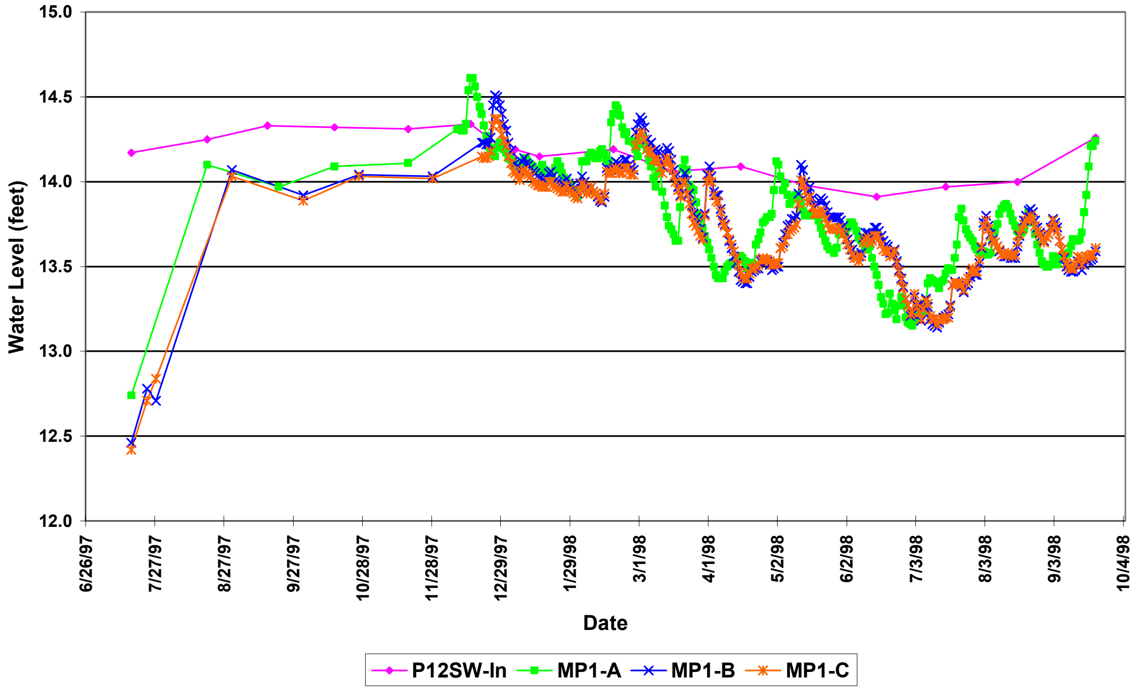


Figure 68. ENR site M401. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- MP1 Wells A, B, and C, and Surface Water



b. ENR Vertical Hydraulic Gradients -- MP1 Wells to P12-In Surface Water

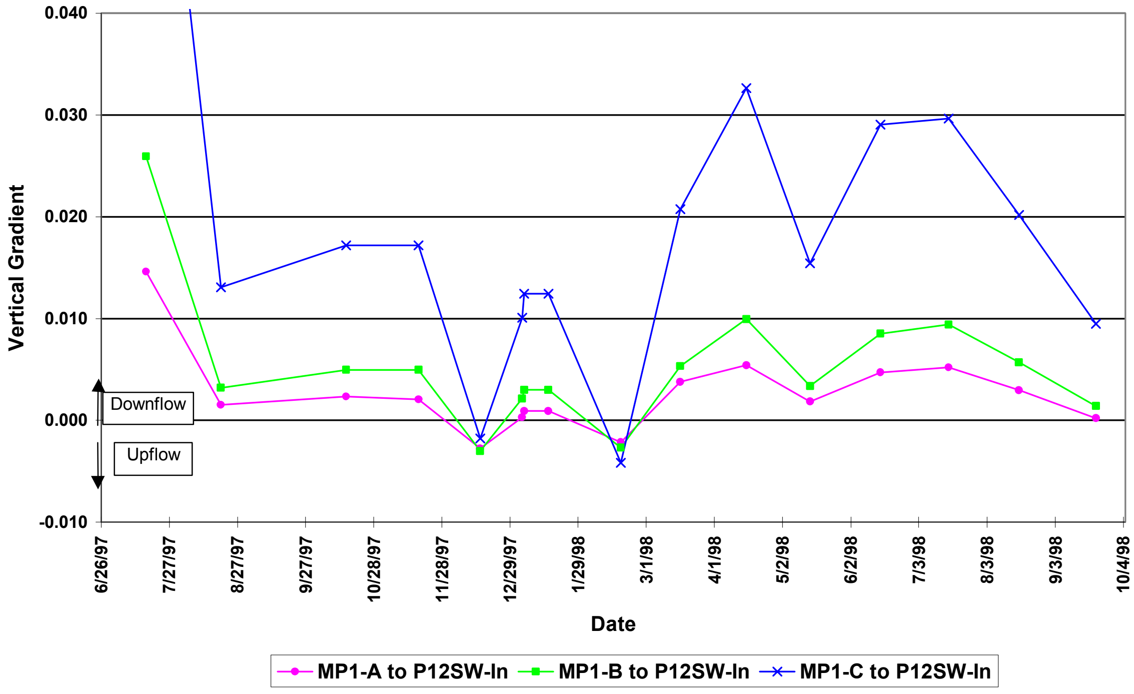
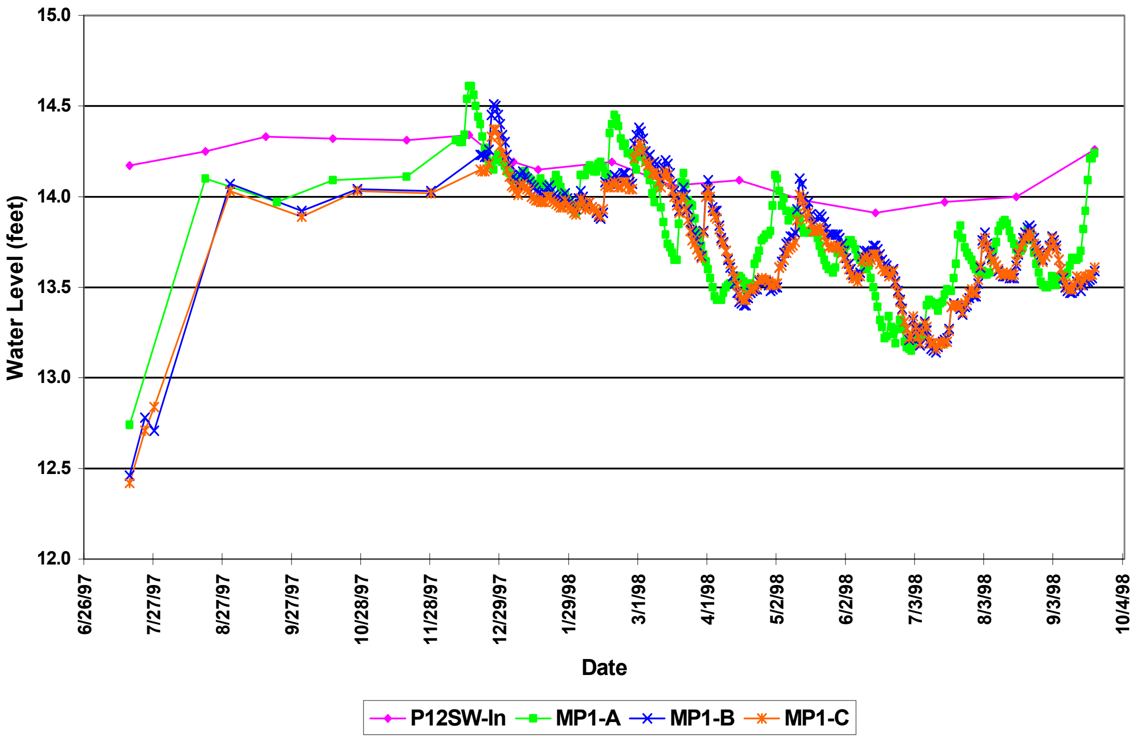


Figure 69. ENR site MP1. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- MP1 Wells A, B, and C, and Surface Water



b. ENR Vertical Hydraulic Gradients -- Between MP1 Wells A, B, and C

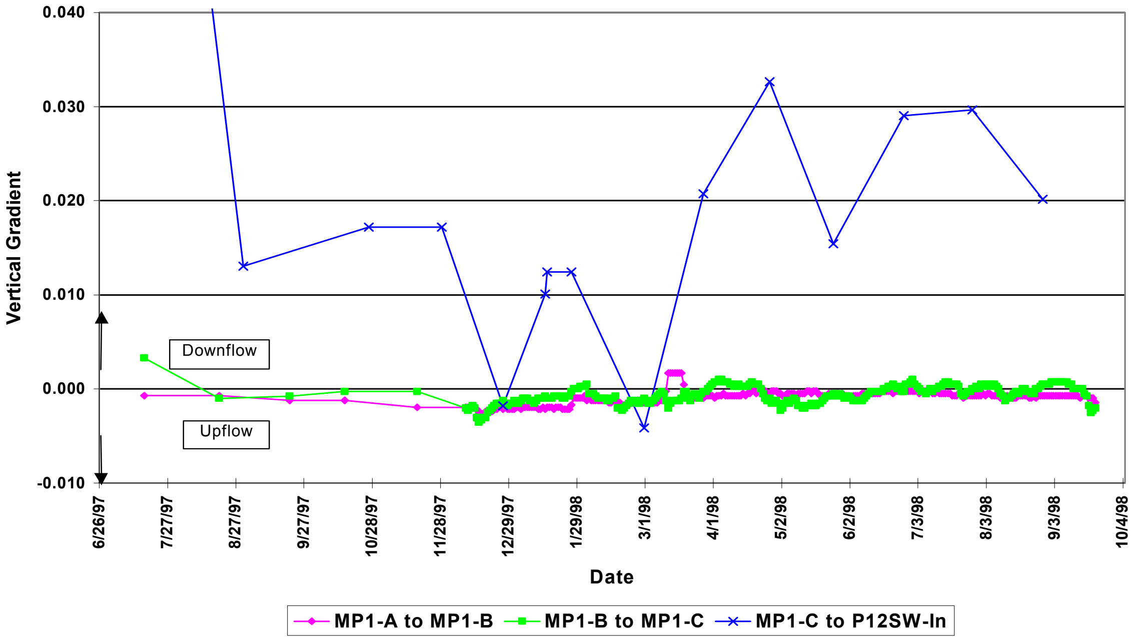
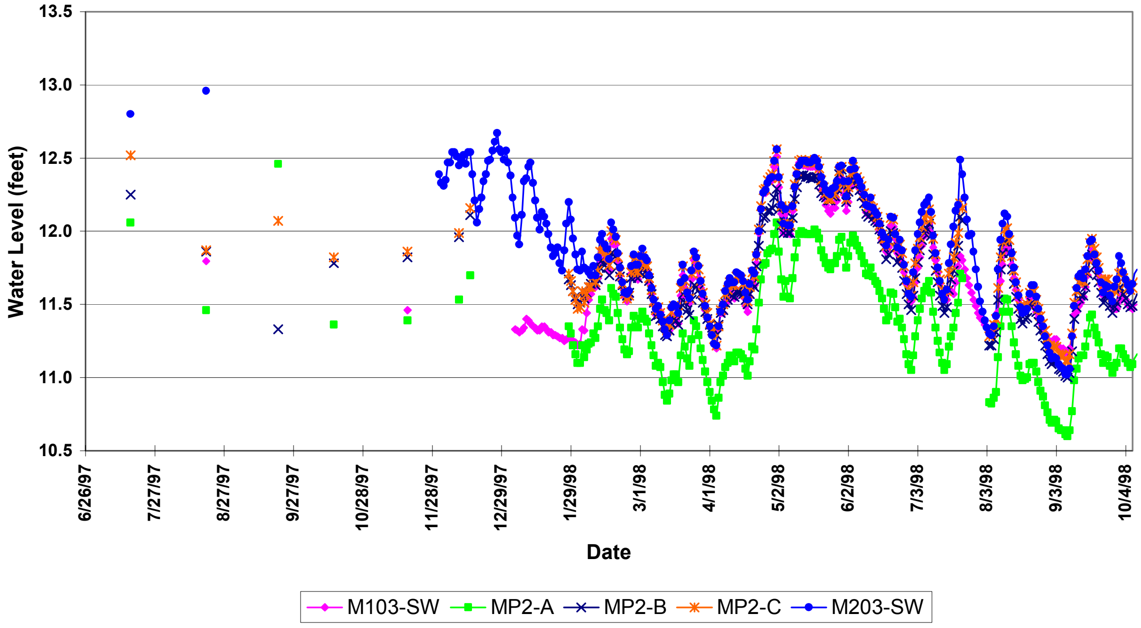


Figure 70. ENR site MP1. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- MP2 Wells A, B, and C and Surface Water M103-SW and M203-SW



b. ENR Vertical Hydraulic Gradients - MP2 Wells and M103-SW Surface Water

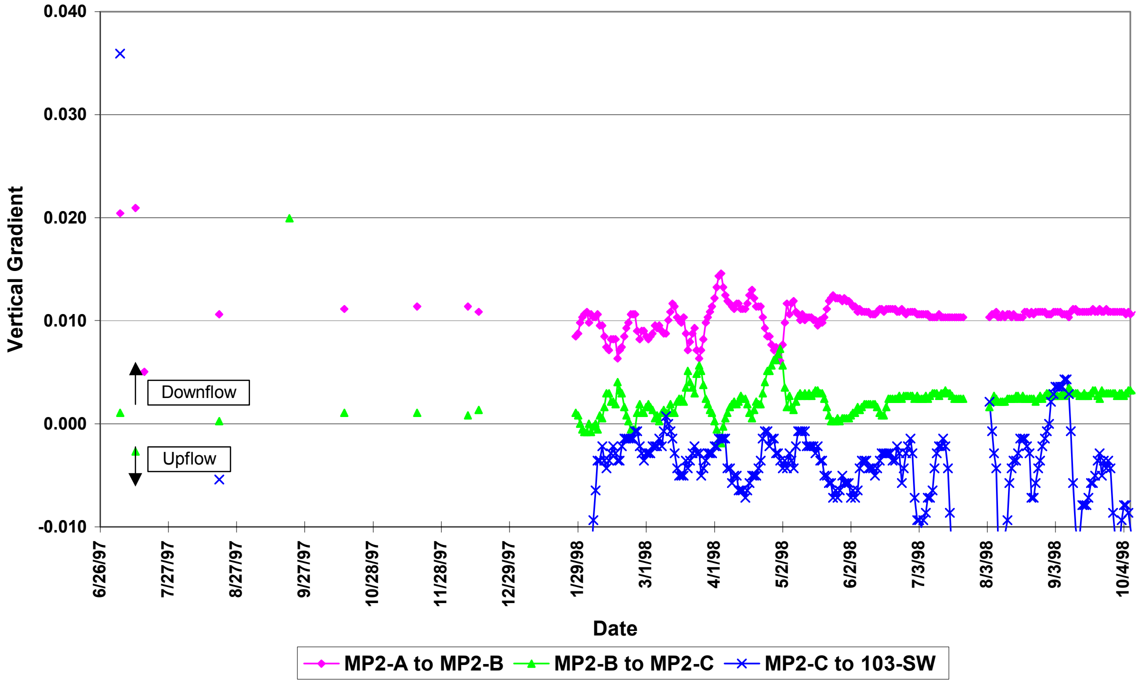
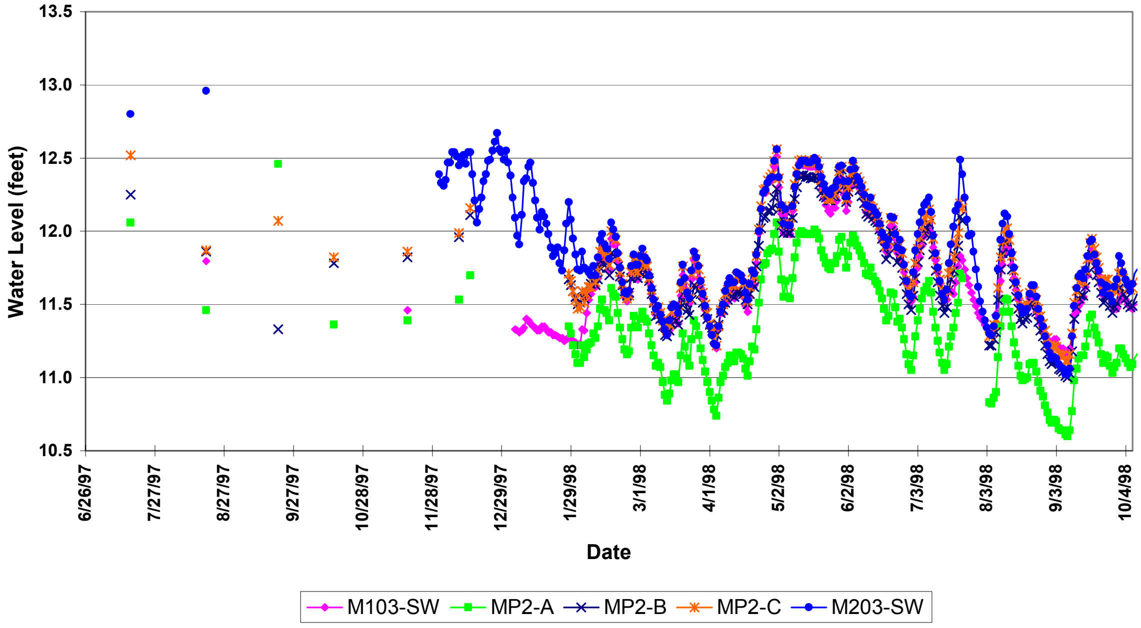


Figure 71. ENR site MP2. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- MP2 Wells A, B, and C and Surface Water M103-SW and M203-SW



b. ENR Vertical Hydraulic Gradients -- MP2-C Wells and M203-SW Surface Water

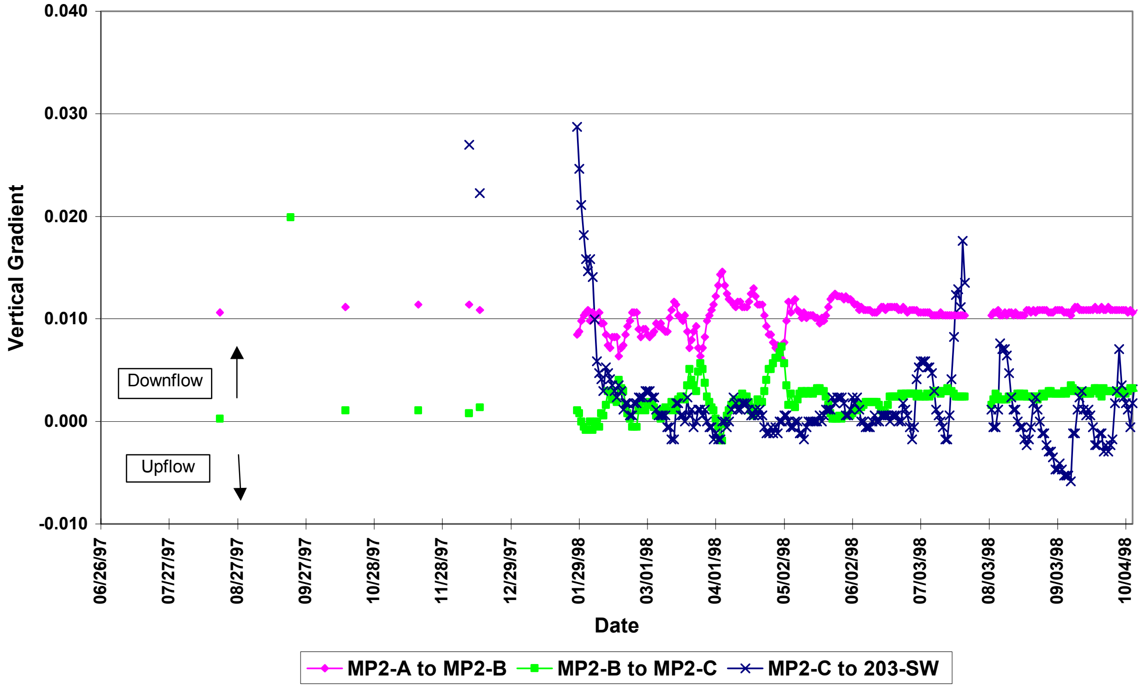
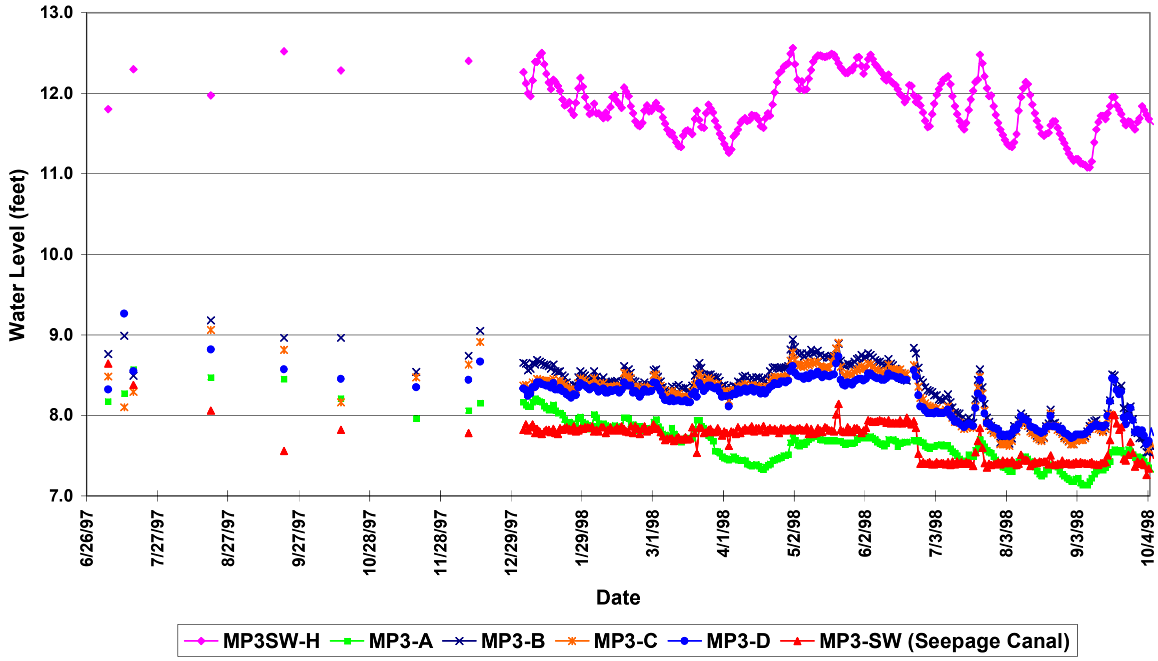


Figure 72. ENR site MP2. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- MP3 Wells A, B, C, D, and Surface Water



b. ENR Vertical Hydraulic Gradients -- MP3 Wells to Cell 2 Surface Water (MP3-HW)

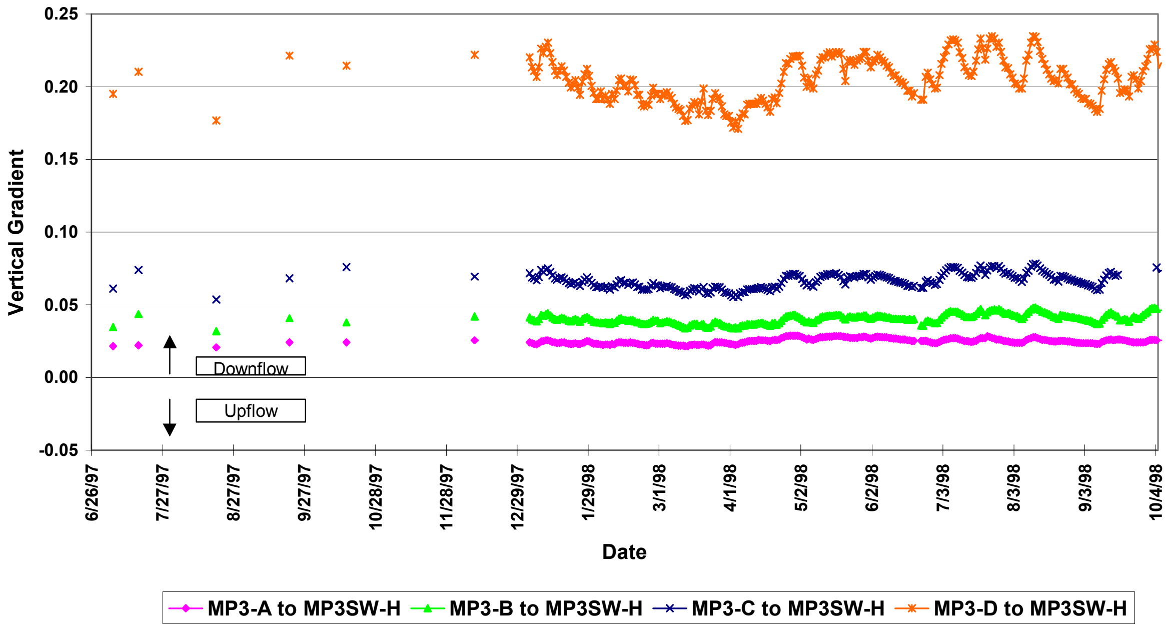
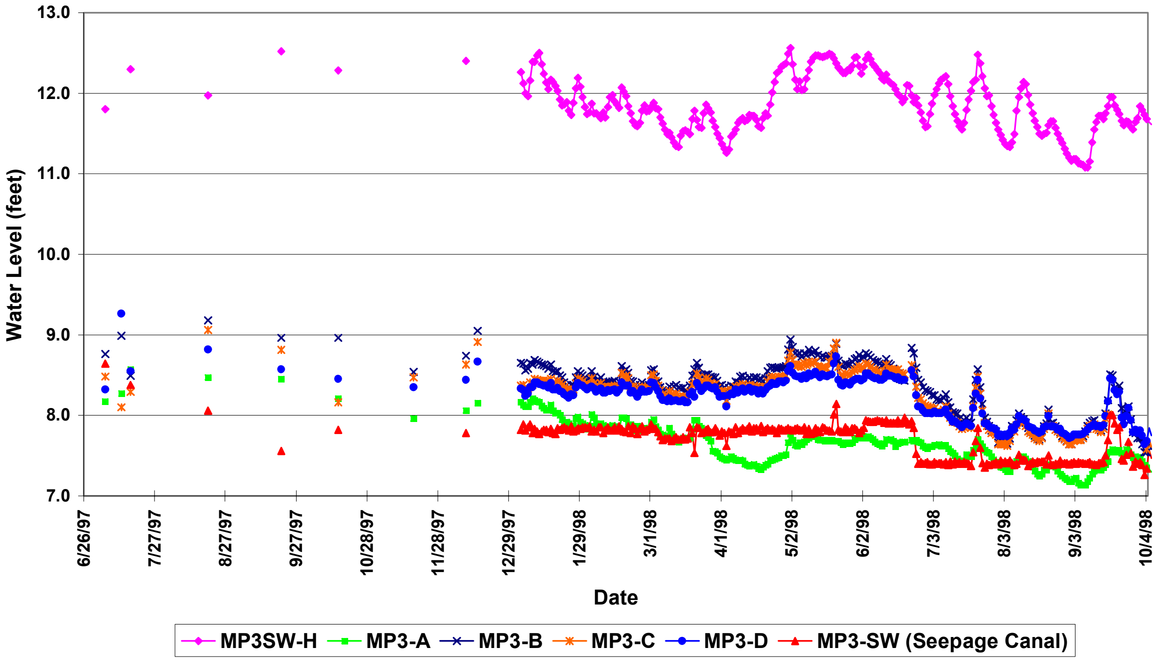


Figure 73. ENR site MP3. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. ENR Water Levels -- MP3 Wells A, B, C, D, and Surface Water



b. Vertical Hydraulic Gradients -- Between MP3 Wells

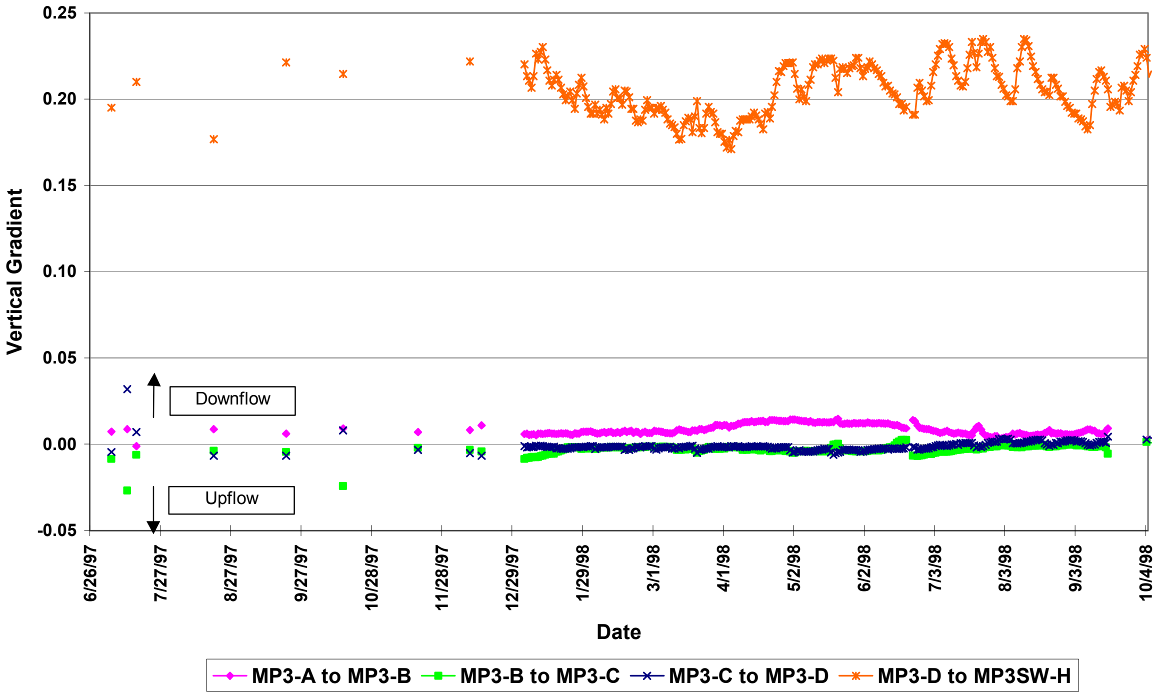
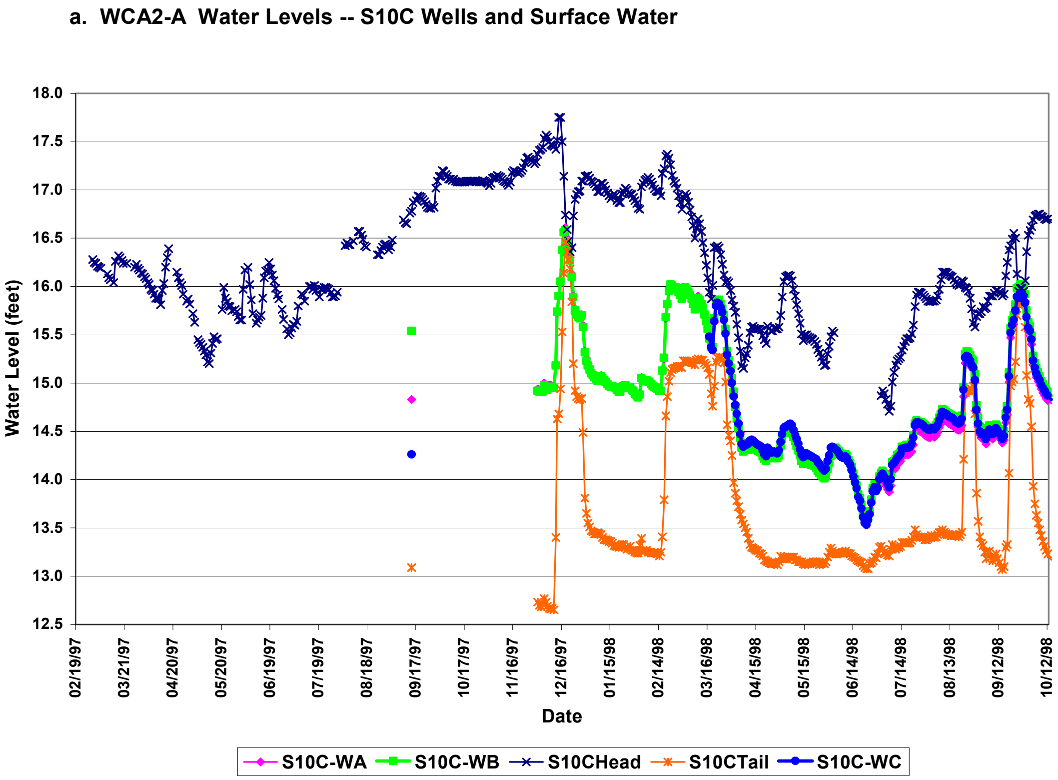


Figure 74. ENR site MP3. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

Temporal Variation of Vertical Hydraulic Gradients in WCA-2A



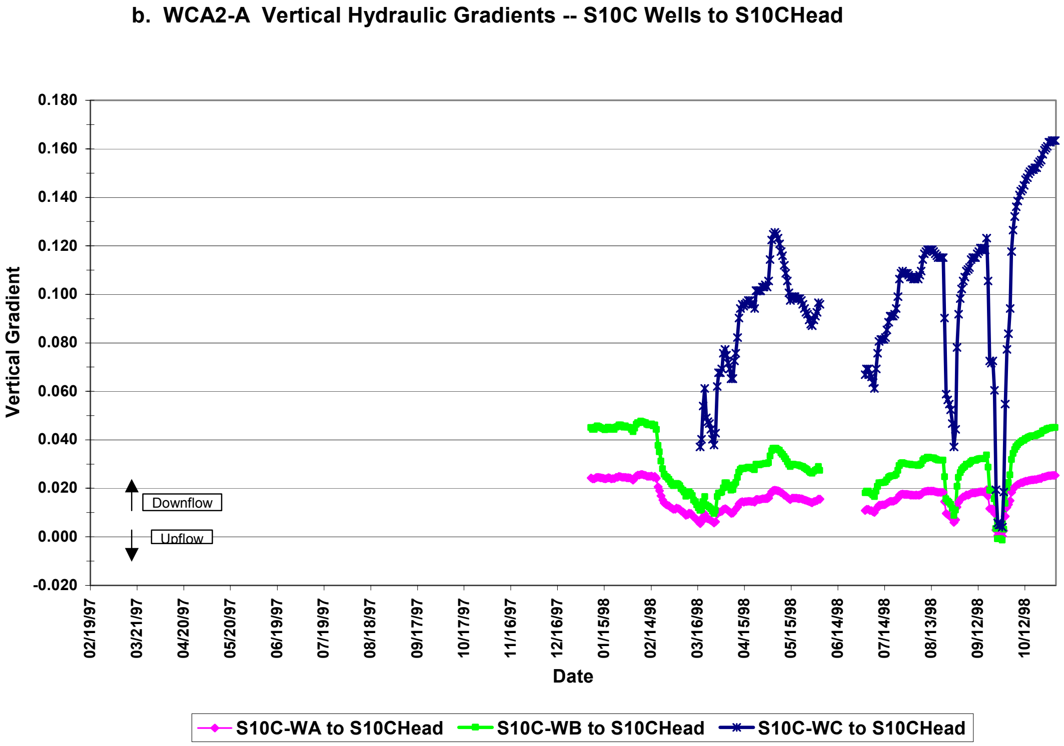
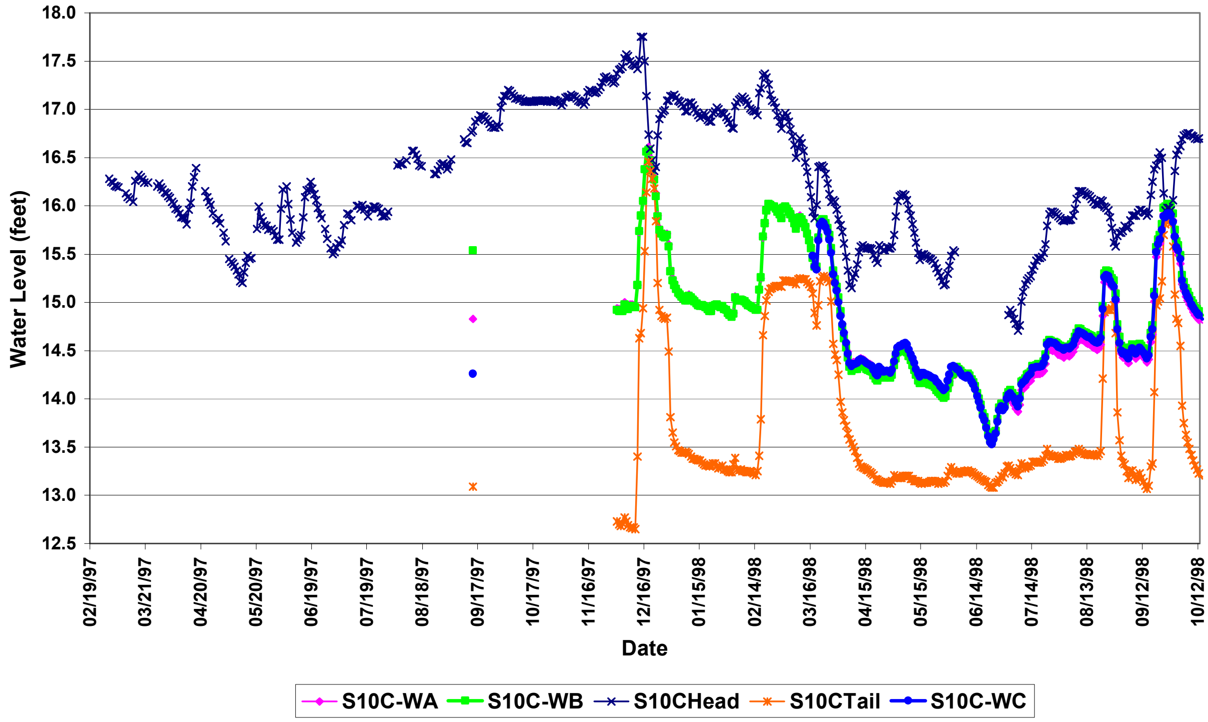


Figure 75. WCA2-A site S10C. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. WCA2-A Water Levels -- S10C Wells and Surface Water



b. WCA2-A Vertical Hydraulic Gradients -- Between S10C Wells

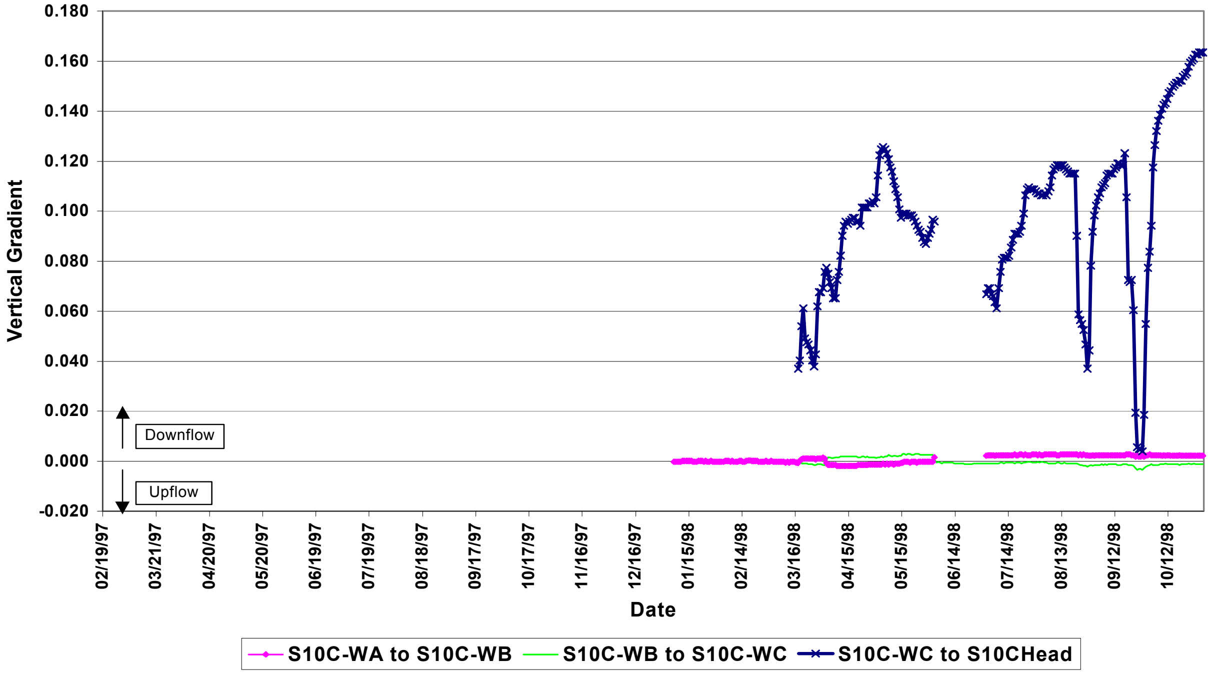
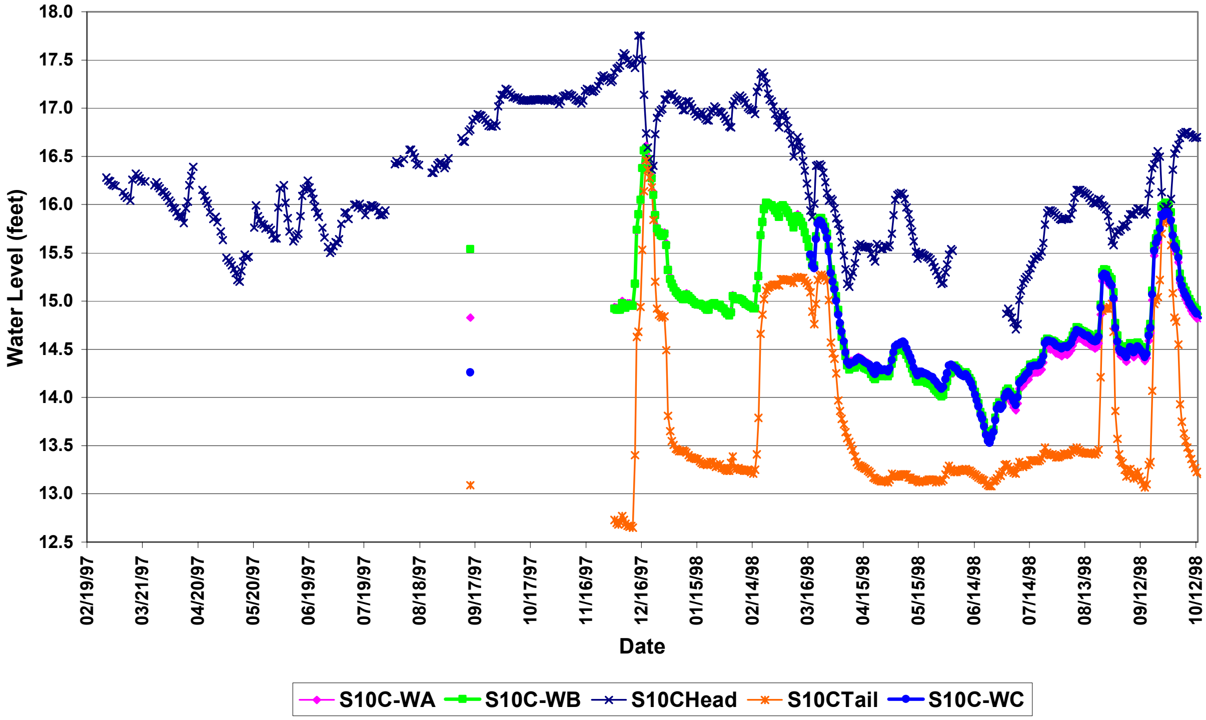


Figure 76. WCA2-A site S10C. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. WCA2-A Water Levels -- S10C Wells and Surface Water



b. WCA2-A Vertical Hydraulic Gradients -- S10C Wells to Surface Water S10CTail

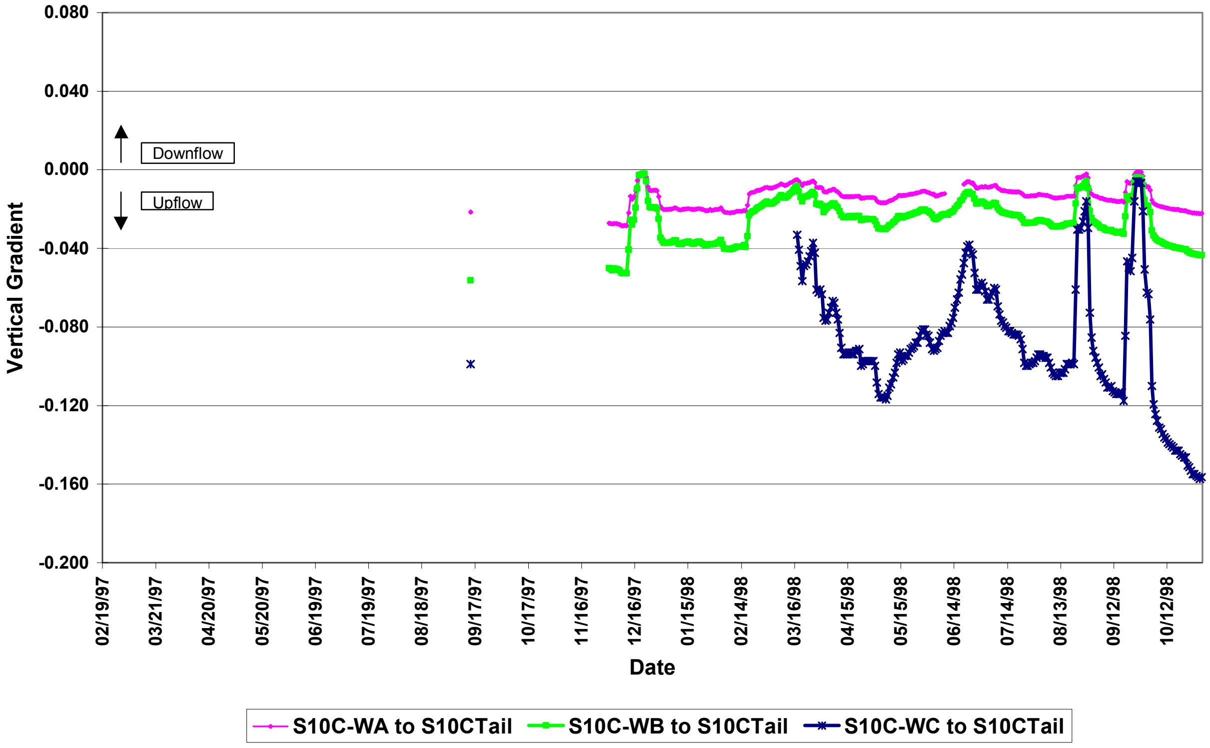
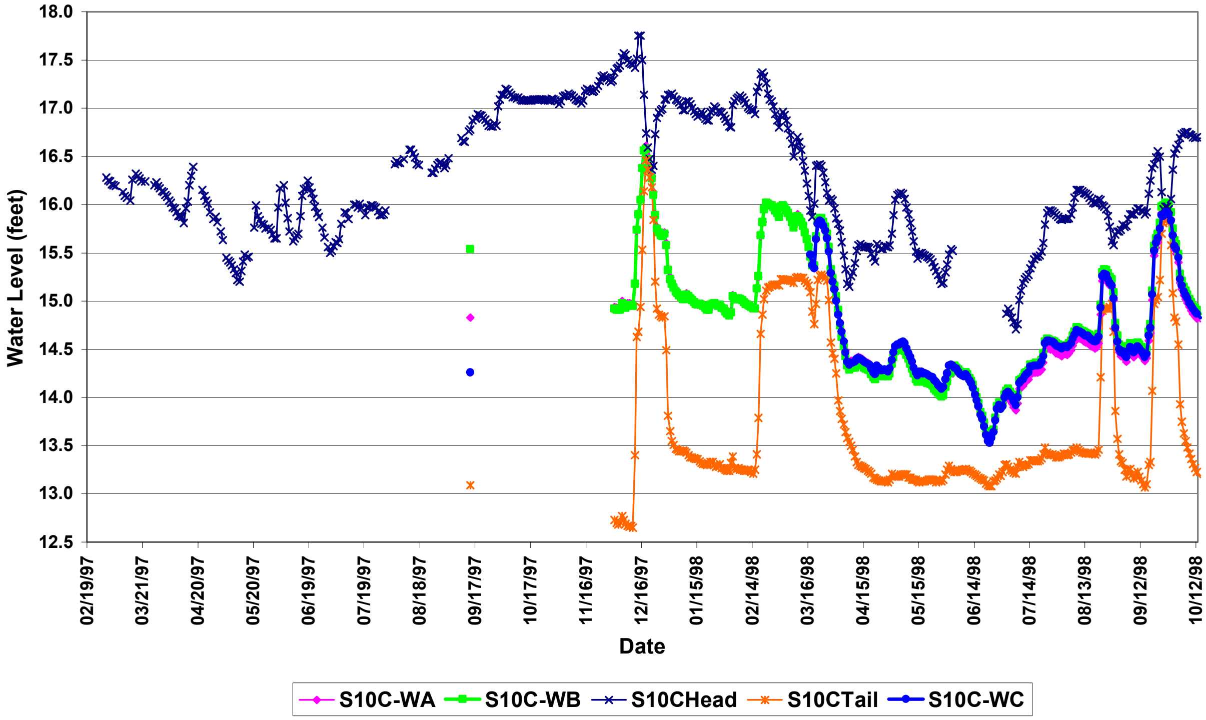


Figure 77. WCA2-A site S10C. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. WCA2-A Water Levels -- S10C Wells and Surface Water



b. WCA2-A Vertical Hydraulic Gradients -- S10C Wells to Surface Water S10CTail

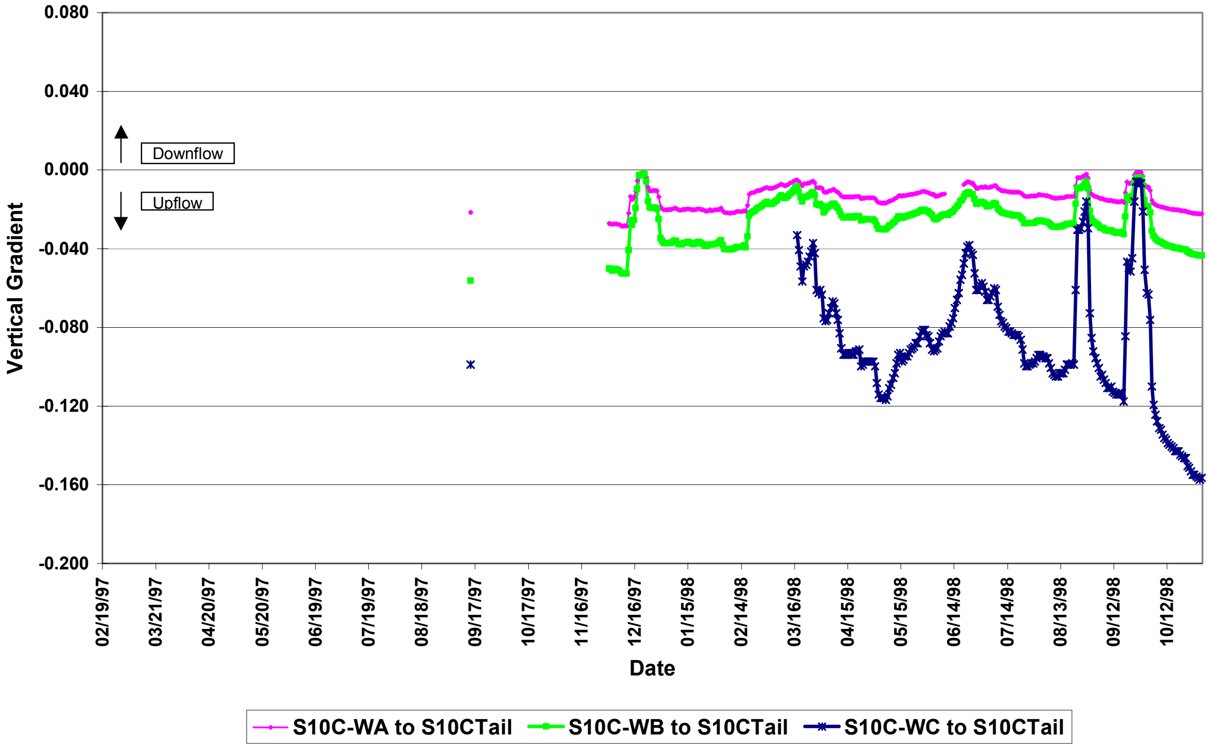
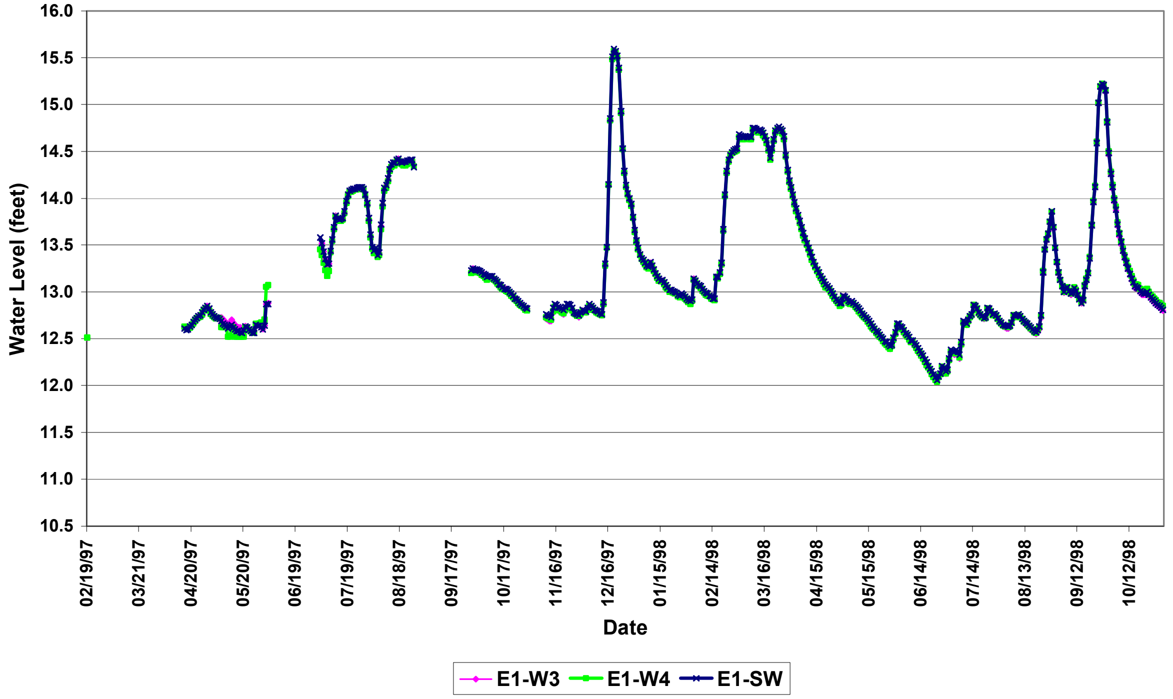


Figure 78. WCA2-A site S10C. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. WCA2-A Water Levels -- E1 Wells and Surface Water



b. WCA2-A Vertical Hydraulic Gradients -- E1 Wells to Surface Water

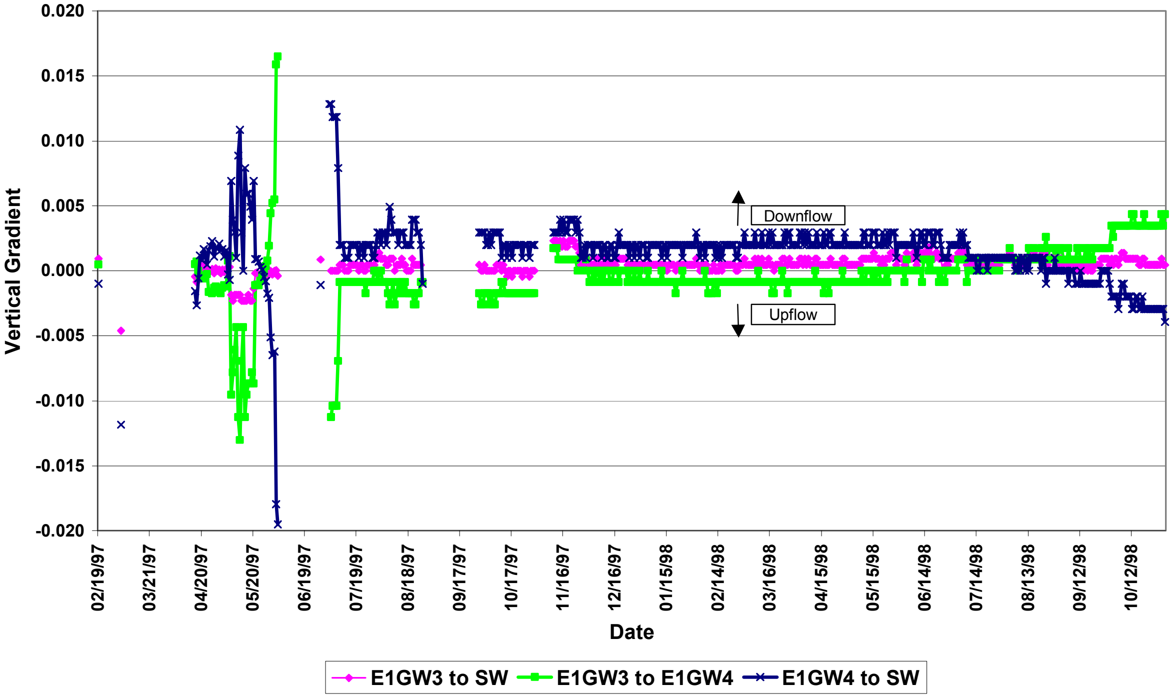
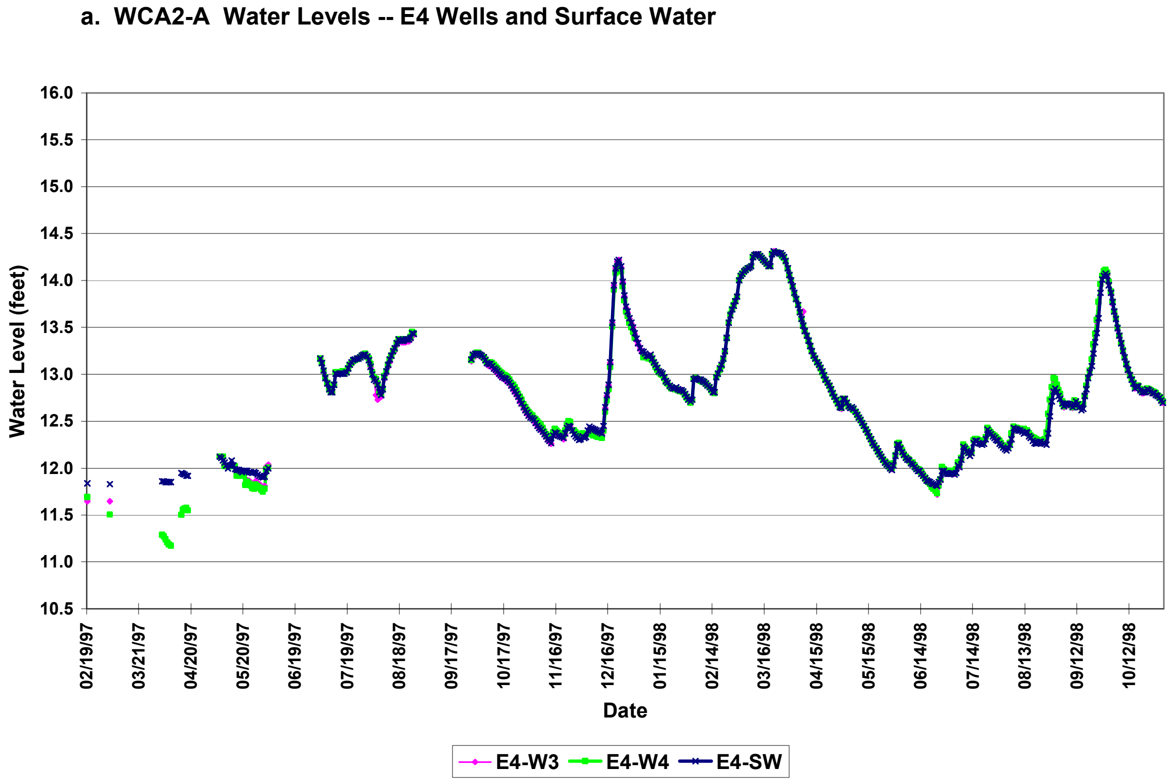


Figure 79. WCA2-A site E1. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



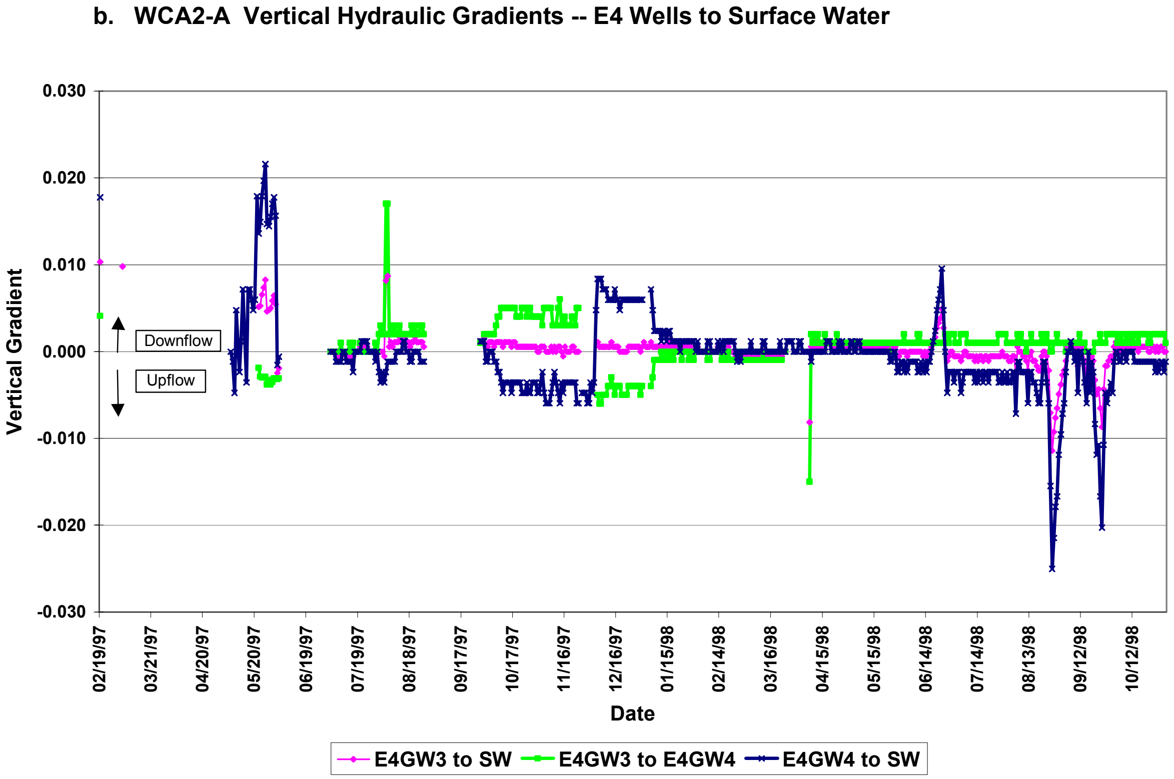
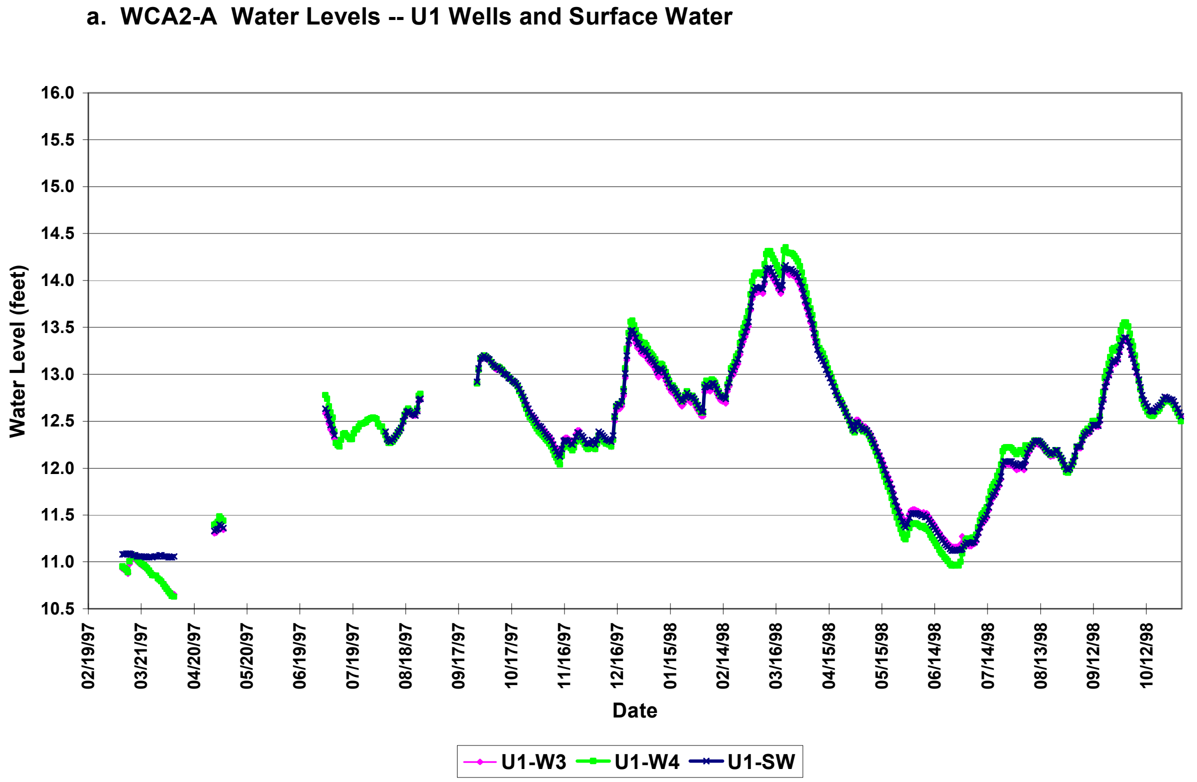


Figure 80. WCA2-A site E4. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



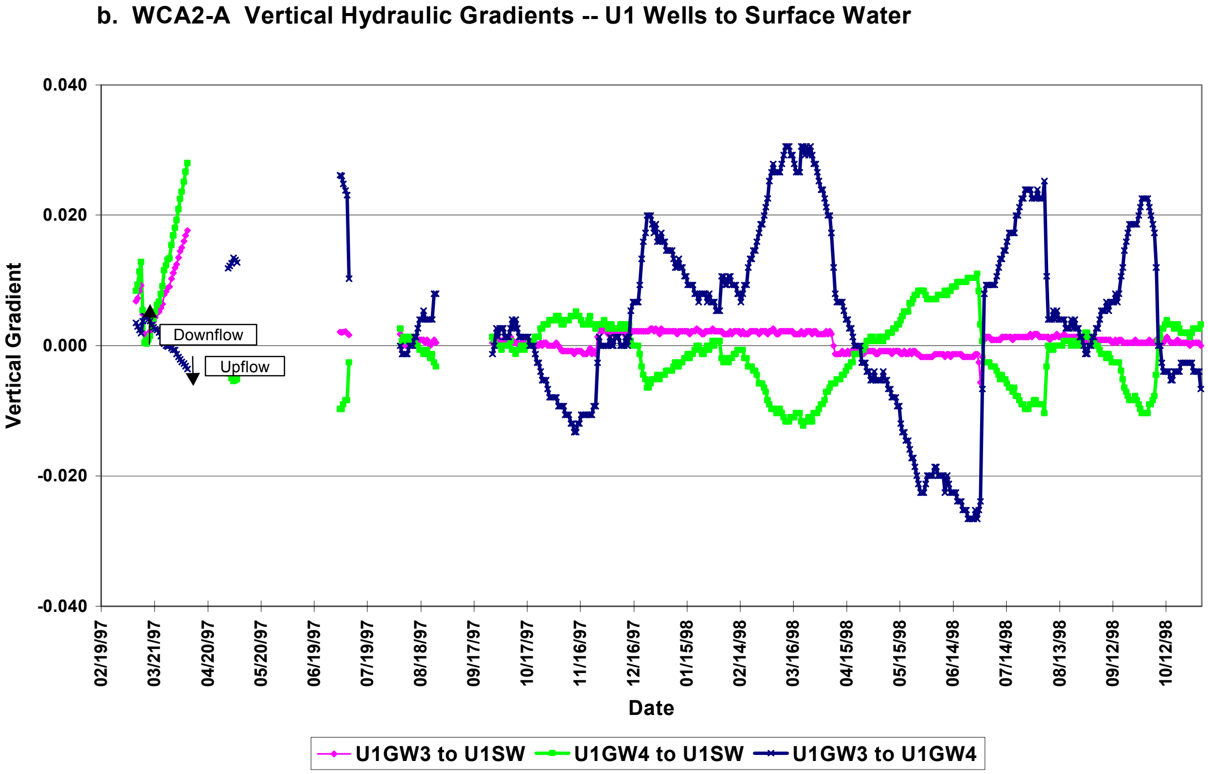
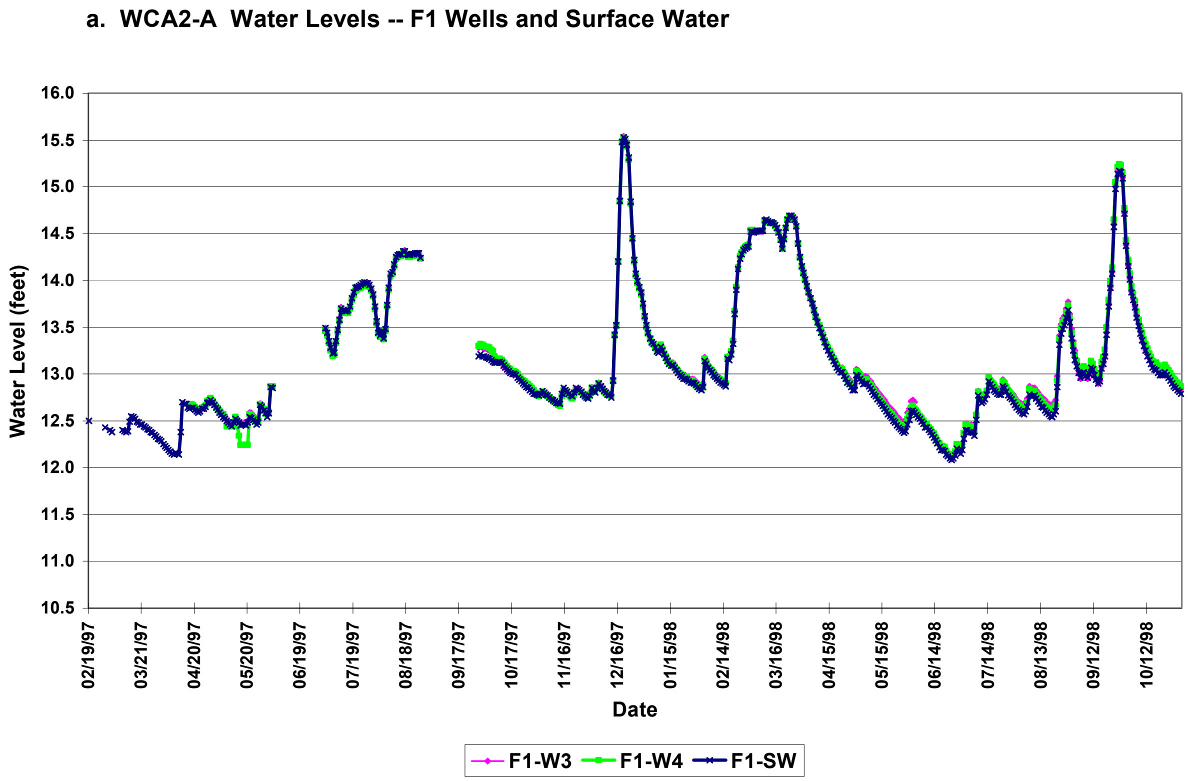


Figure 81. WCA2-A site U1. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



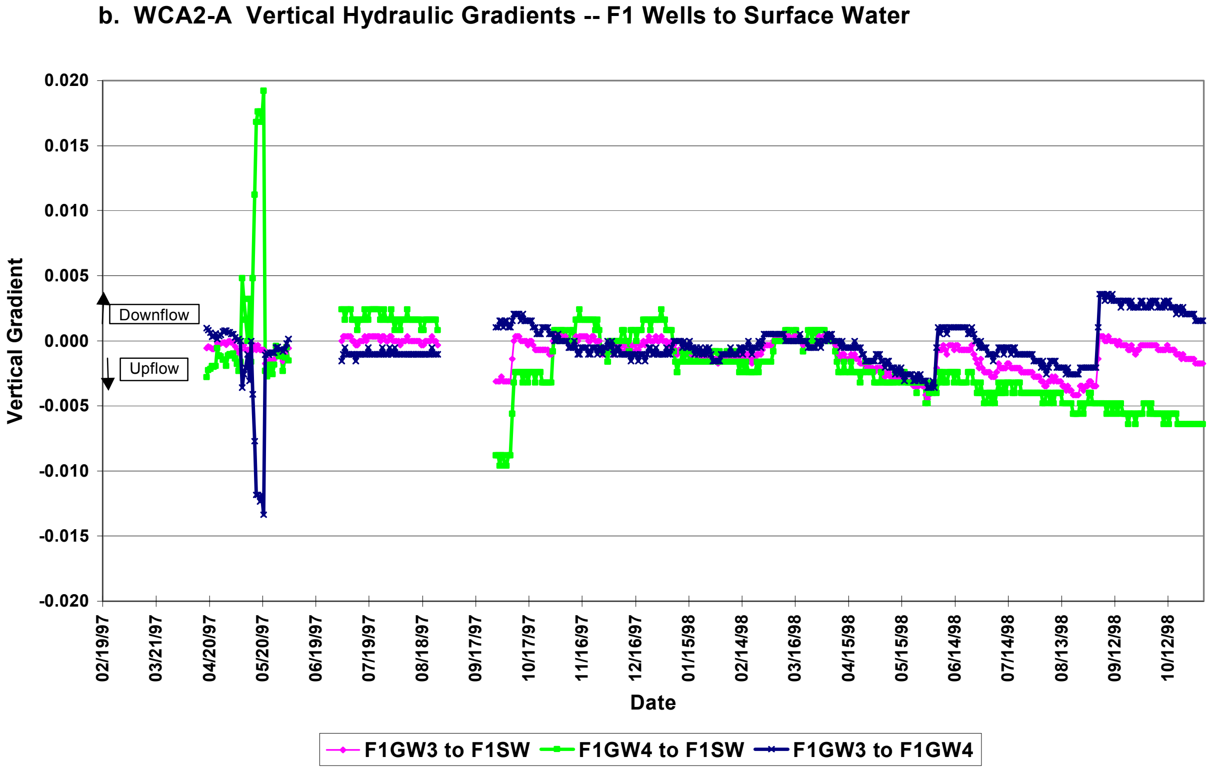
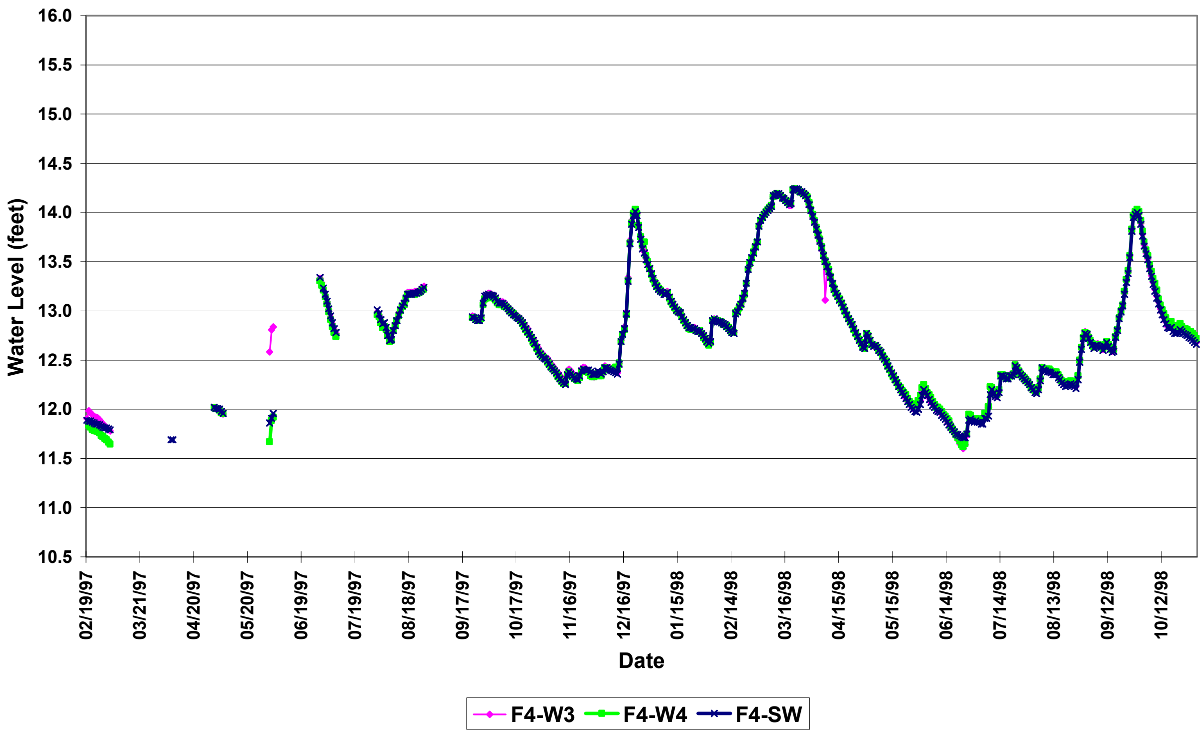


Figure 82. WCA2-A site F1. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

a. WCA2-A Water Levels -- F4 Wells and Surface Water



b. WCA2-A Vertical Hydraulic Gradients -- F4 Wells to Surface Water

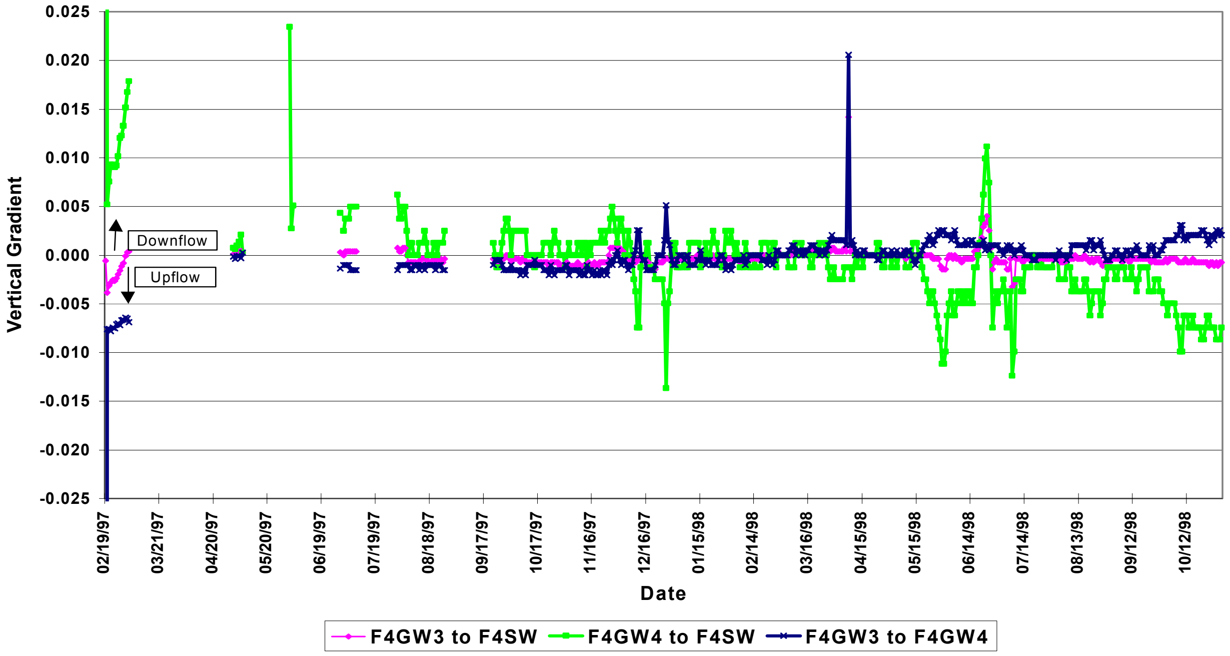
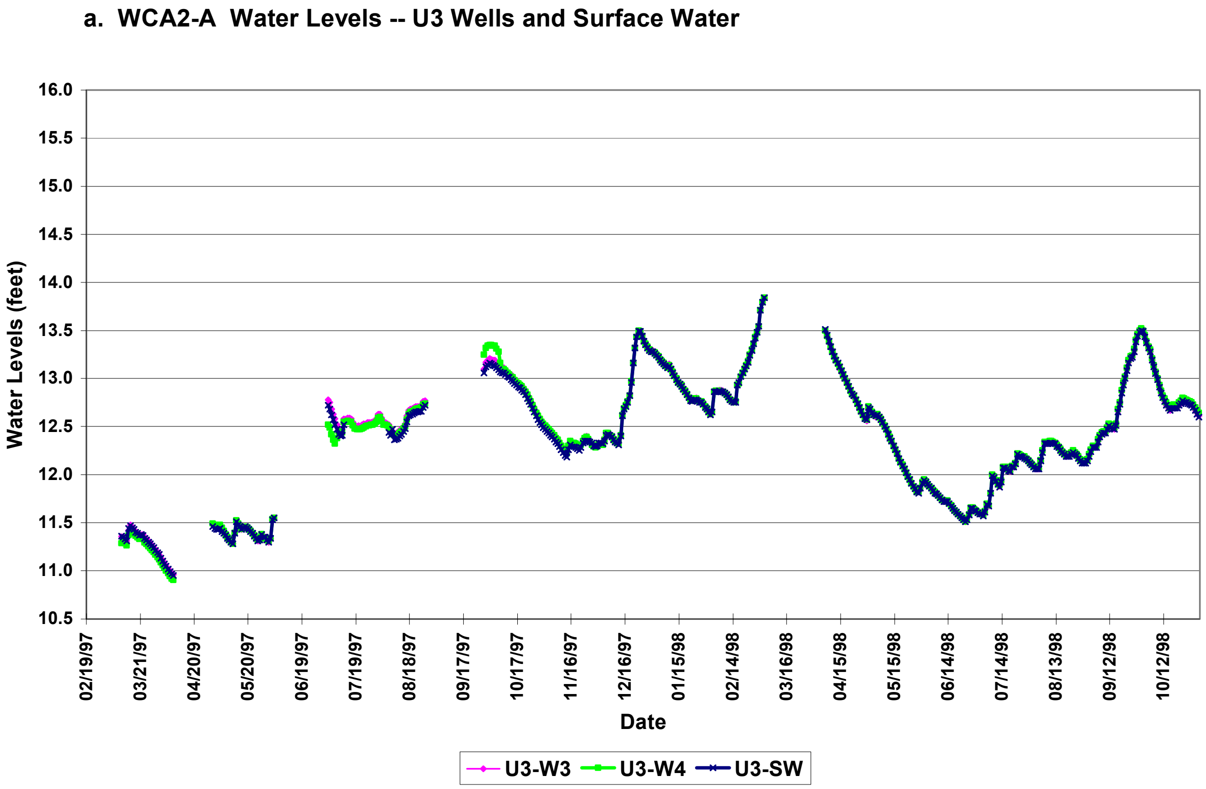


Figure 83. WCA2-A site F4. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.



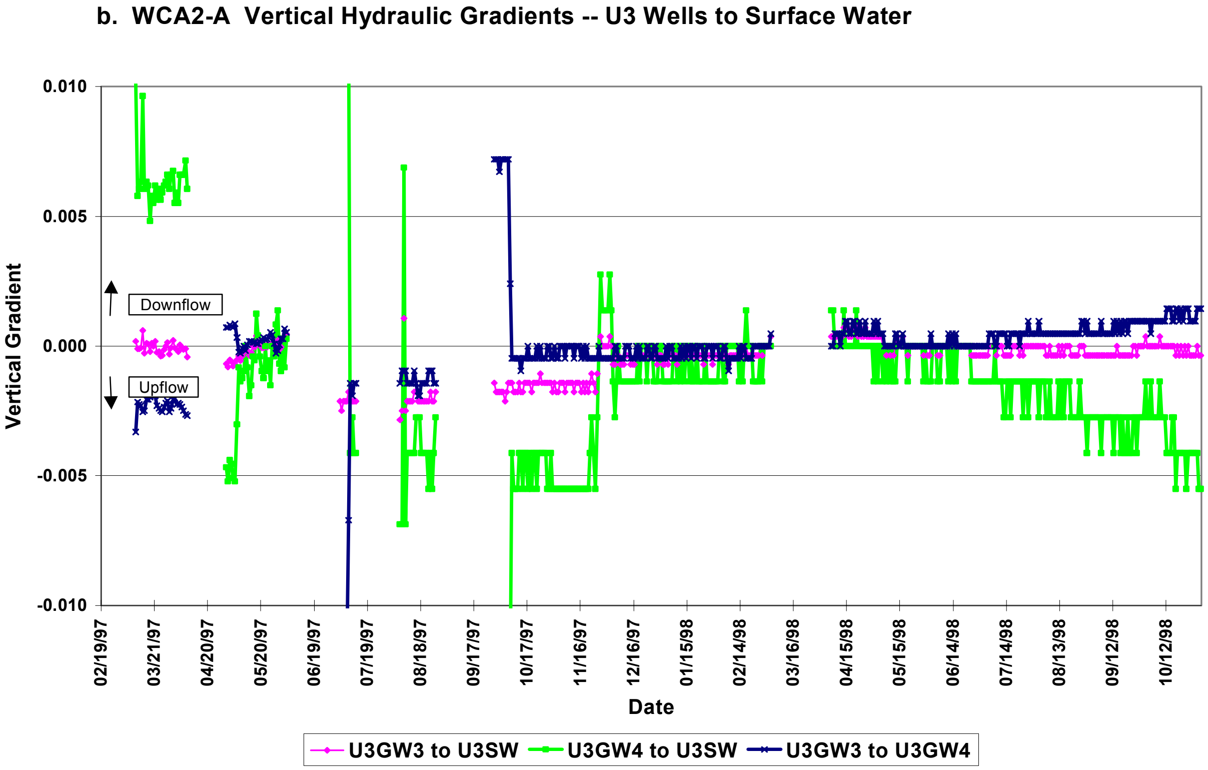
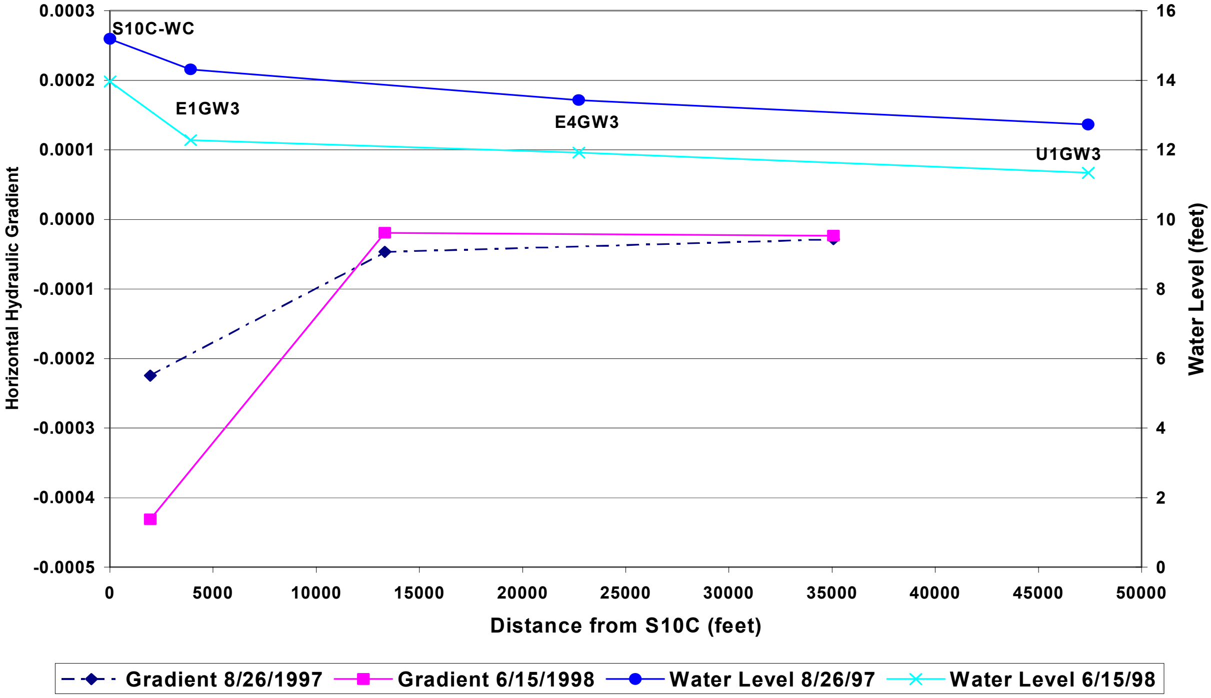


Figure 84. WCA2-A site U3. Water levels and vertical hydraulic gradients. Vertical gradients are calculated relative to each well and to surface water. A positive gradient indicates the potential for downward flow.

WCA-2A Horizontal Hydraulic Gradients

b. WCA2-A Horizontal Hydraulic Gradients -- S10C-WC to U1GW3



a. WCA2-A Horizontal Hydraulic Gradients -- E1GW4 to U1GW4

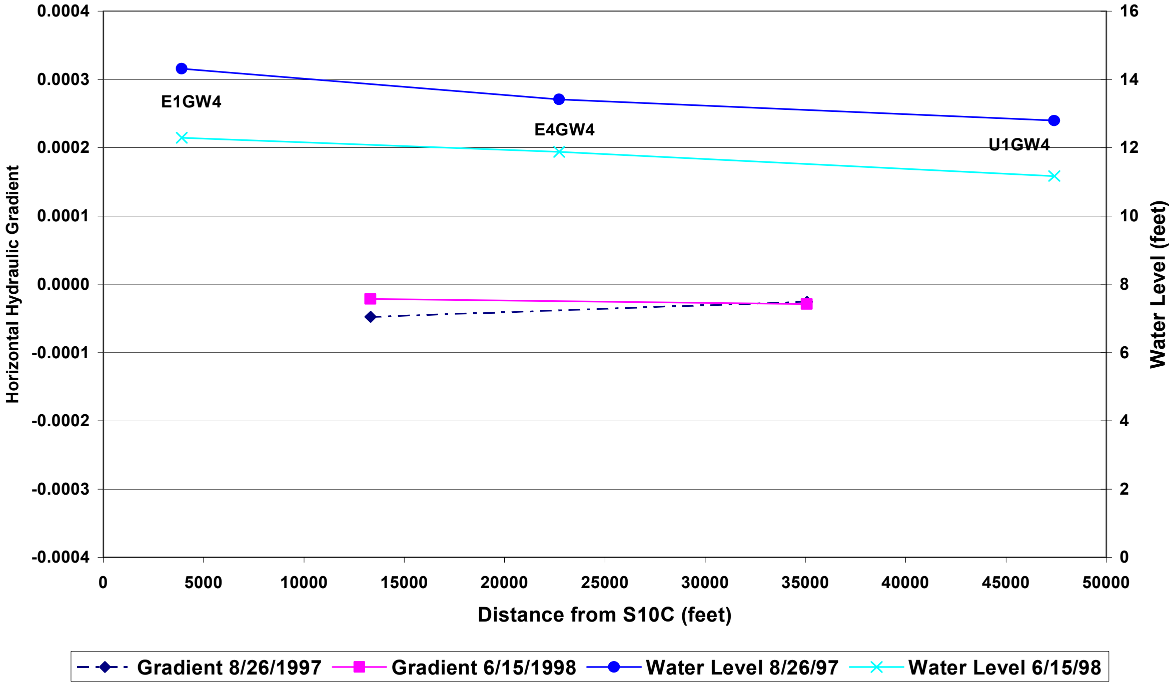


Figure 85. WCA2-A Water levels and horizontal hydraulic gradients: comparison between wet conditions (August 1997) and dry conditions (June 1998). A positive gradient indicates flow toward the north (S10C) and a negative gradient indicates flow towards the south (U1).

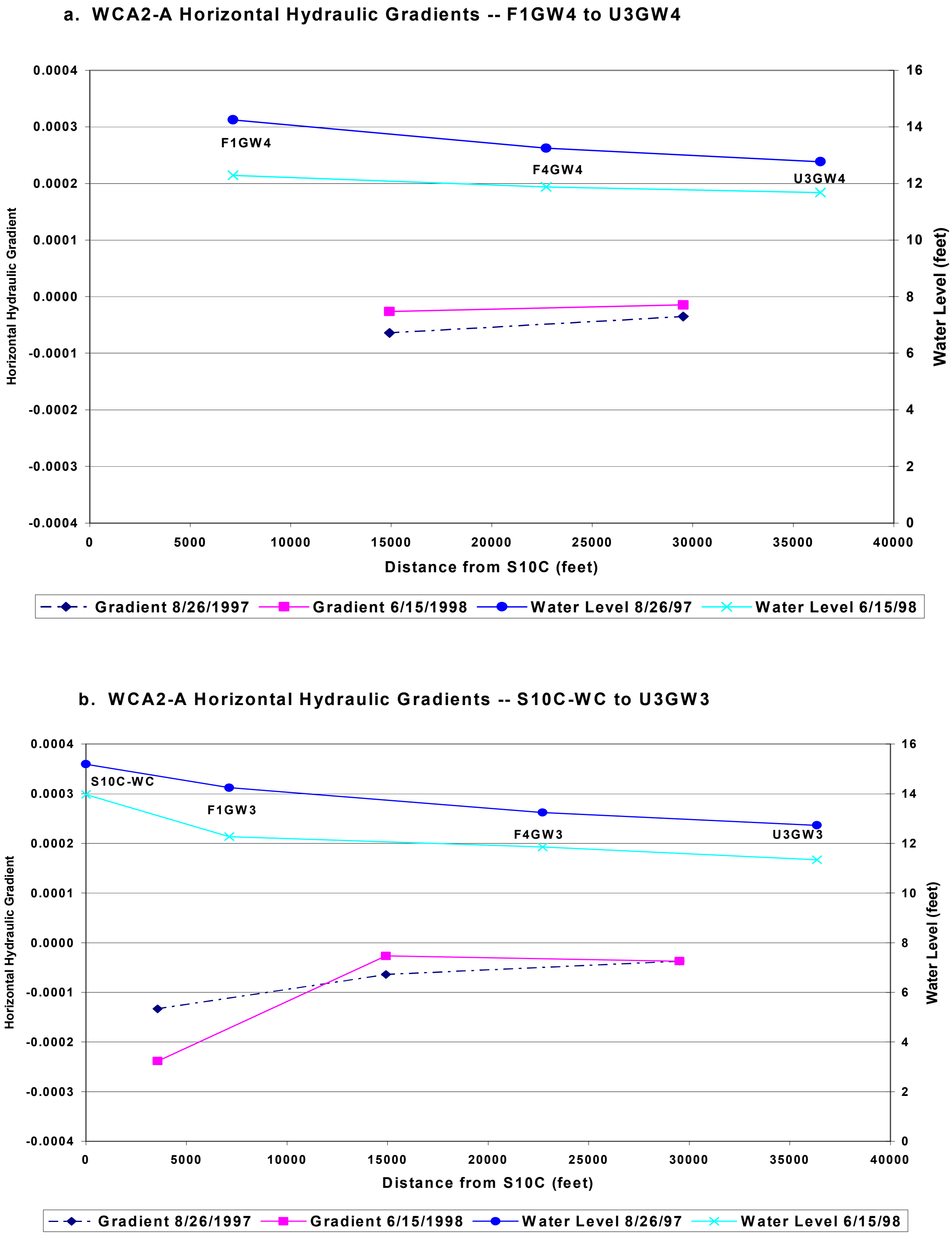
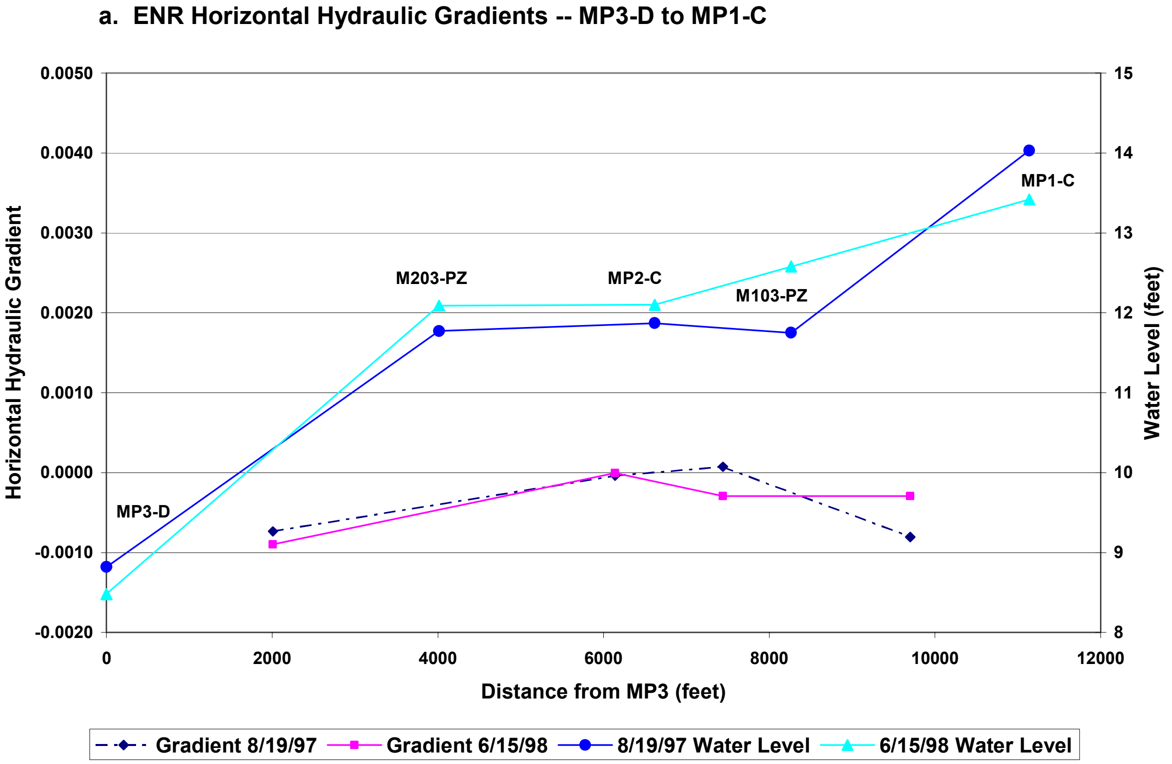


Figure 86. WCA2-A water levels and horizontal hydraulic gradients: comparison between wet conditions (August 1997) and dry conditions (June 1998). A positive gradient indicates flow towards the north (S10C) and a negative gradient indicates flow toward the south (U3)



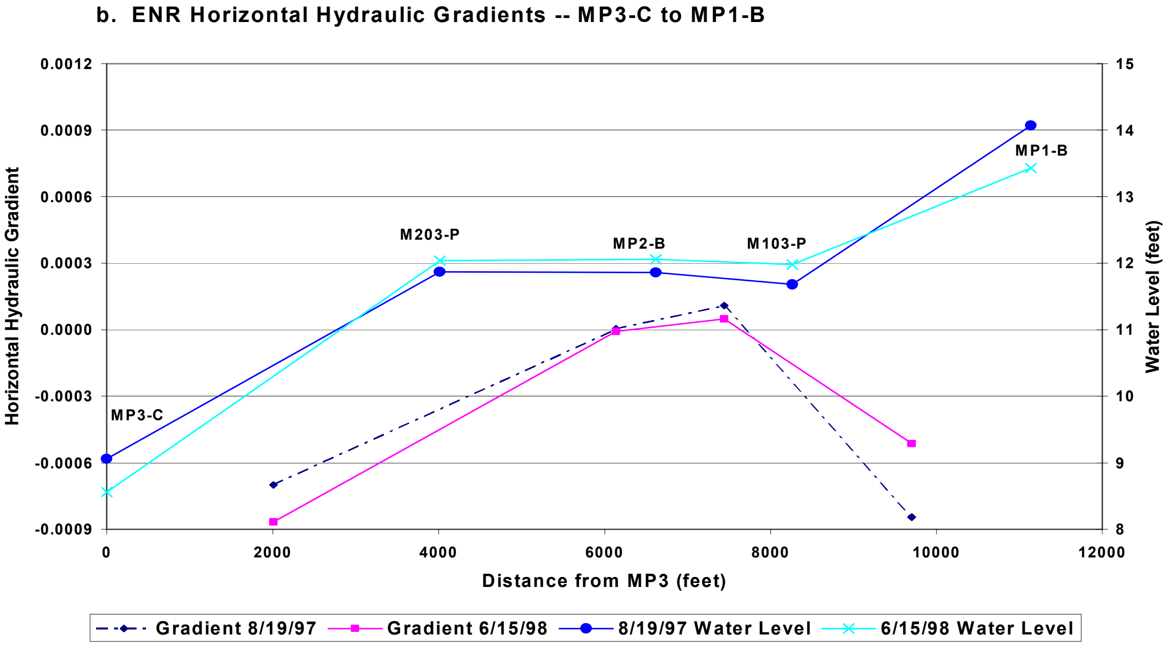


Figure 87. ENR water levels and horizontal hydraulic gradients: comparison between wet conditions (August 1997) and dry conditions (June 1998). A positive gradient indicates flow toward the east (MP1) and a negative gradient indicates flow toward the west (MP3).

Table 24. Velocity of Horizontal Ground water Flow in the Study Areas

a. Velocity of Horizontal Groundwater Flow in ENR

ENR - Intermediate Layer (K=28 ft/day; depth = +5.76' to -22.0' NGVD)

	8/19/97	**6/15/98**
Flow Direction (degrees)	296	297
Solute Velocity (feet/day)	0.0737	0.0609
Gradient	-0.00164	-0.00135

ENR - Deep Layer (K=48 ft/day; depth = -40.0' to -90.0' NGVD)

	8/19/97	**6/15/98**
Flow Direction (degrees)	310	311
Solute Velocity (feet/day)	0.0960	0.0857
Gradient	-0.00150	-0.00134

b. Velocity of Horizontal Groundwater Flow in WCA2-A

WCA-2A - Shallow Layer (K=73 ft/day; depth = +5.0' to -5.8' NGVD)

	8/26/97	**6/15/98**
Flow Direction (degrees)	224	173
Solute Velocity (feet/day)	0.01220	0.00612
Gradient	-0.00025	-0.00011

WCA-2A - Intermediate Layer (K=156 ft/day; depth = -6.0' to -19.0' NGVD)

	8/26/97	**6/15/98**
Flow Direction (degrees)	219	190
Solute Velocity (feet/day)	0.02530	0.01120
Gradient	-0.00021	-0.00012

Porosity used in all of these calculations was 30%.
K values used in all of these calculations was the geometric mean computed from the drawdown test values.

Water Levels from Wells Installed in Previous Investigations

Table 25. Water Levels at Selected Wells, Piezometers, and Staff Gages in the ENR Seepage Study (Rohrer, 1999 and this study) Page 1 of 6

Site ID	PO1A	PO1 In	PO1 Out	PO1B	PO2A	PO2 In	PO2 Out	PO2B	PO3A	PO3 In	PO3 Out	PO3B	PO4A	PO4 In	PO4 Out	PO4B	PO5A
06/01/95	12.28	13.22	15.14	12.55	9.08			9.19	8.50			9.49	9.29			9.18	8.74
06/15/95	12.67	13.95	15.54	12.93	9.28			9.94	8.21			10.01	9.25			9.10	8.65
07/31/95	13.44	14.14	16.66	13.72	9.95			11.77	8.66			11.62	9.86			9.67	9.15
08/16/95	13.13	14.12	16.02	13.40	9.65			11.26	8.58			11.59	9.73			9.43	9.12
08/31/95	13.69	14.17	17.55	13.97	9.99	12.42	7.98	12.31	8.41	12.22	7.92	12.49	9.73	12.14	7.93	9.58	9.10
09/15/95	13.53	14.16	17.28	13.82	9.91	12.48	8.10	8.92	8.52	12.20	8.32	11.42	9.69	12.00	8.18	9.55	9.11
09/29/95	13.50	14.13	16.72	13.76	9.79	12.66	8.04	10.36	8.46	12.48	8.00	11.55	9.75	12.36	8.05	9.58	9.08
10/19/95	14.12	14.29	18.47	14.41	10.04	12.84	7.74	12.36	8.31	12.63	7.76	12.46	9.87	12.56	7.80	9.70	8.94
10/31/95	13.67	14.29	17.77	13.94	9.66	12.15	8.30	10.60	8.64	12.06	8.29	11.25	9.70	11.99	8.29	9.52	9.01
11/15/95	13.55	14.42	16.93	13.81	9.84	12.52	8.24	10.11	8.64	12.30	8.22	11.32	9.71	12.20	8.23	9.56	9.10
11/30/95	13.56	14.32	16.90	13.84	9.71	12.62	8.04	9.97	8.51	12.38	8.08	11.46	9.63	12.28	8.12	9.52	9.07
12/15/95	13.55	11.27	16.92	13.82	9.84	12.62	8.30	9.93	8.71	12.40	8.30	11.58	9.84	12.38	8.30	9.66	9.25
12/29/95	13.51	14.32	16.95	13.78	9.67	12.50	8.09	9.78	8.55	12.40	8.10	11.58	9.76	12.36	8.14	9.62	9.25
01/16/96	13.57	14.15	16.90	13.85	9.61	12.70	7.88	9.80	8.38	12.48	7.90	11.48	9.62	12.42	7.94	9.44	9.17
01/31/96	13.55	14.14	16.92	13.81	9.60	12.61	8.00	9.82	8.41	12.42	7.99	11.56	9.61	12.36	8.00	9.51	8.86
02/15/96	13.16	14.15	16.38	13.44	10.01	13.57	8.09	10.12	8.61	13.05	8.11	12.36	9.92	12.93	8.13	9.81	9.46
03/04/96	12.93	14.06	16.13	13.19	9.33	11.58	8.34	9.51	8.62	11.62	8.34	10.69	9.49	11.62	8.37	9.43	9.12
03/16/96	13.51	14.11	16.42	13.80	9.86	12.98	8.21	10.17	8.45	11.12	8.19	10.31	9.25	11.13	8.18	9.16	8.88
03/29/96	13.19	14.00	16.12	13.44	9.61	12.35	7.90	10.00	8.22	11.19	7.85	9.62	9.15	11.27	7.80	9.02	8.68
04/15/96	13.03	13.86	15.30	13.27	9.57	12.55	7.85	10.51	8.36	12.25	7.85	10.97	9.62	12.25	7.86	9.45	9.05
05/15/96	12.88	13.46	15.59	13.14	9.58	11.80	8.19	10.02	8.50	11.78	8.17	10.89	9.45	12.70	8.20	9.35	8.98
06/14/96	13.35	13.70	16.95	13.60	9.74	11.95	8.12	12.01	8.48	11.90	8.11	11.87	9.56	11.89	8.10	9.45	8.84
07/16/96	13.24	14.22	15.76	13.50	10.00	12.65	8.10	11.61	8.55	12.45	8.10	11.95	9.77	12.30	8.10	9.64	9.17
08/15/96	12.97	13.47	15.76	13.23	9.55	11.93	7.89	10.29	8.12	11.95	7.75	11.37	9.41	11.87	7.79	9.29	8.80
09/16/96	13.52	14.10	16.69	13.78	9.72	12.85	7.55	11.49	8.04	12.48	7.60	11.48	9.45	12.26	7.65	9.30	8.89
10/16/96	13.57	14.29	17.18	13.82	9.51	12.45	7.65	10.42	8.11	12.40	7.68	11.82	9.50	12.35	7.70	9.36	8.86
11/15/96	13.48	14.25	16.97	13.75	9.47	12.26	7.98	10.55	8.37	12.30	7.97	11.70	9.59	12.28	8.00	9.43	8.89
12/16/96	13.29	14.25	16.37	13.54	9.58	12.48	7.98	9.72	8.34	12.30	7.97	11.07	9.51	12.29	7.99	9.34	9.05
01/15/97	13.10	14.28	16.49	13.35	9.12	11.65	7.57	9.29	8.01	11.66	7.60	10.50	9.21	11.60	7.65	9.05	8.80
02/13/97	12.92	14.15	16.14	13.17	9.13	11.42	7.67	9.25	7.93	11.46	7.68	10.37	9.10	11.40	7.68	8.95	8.71
03/17/97	12.06	14.11	16.27	13.31	9.24	11.94	7.52	9.25	7.97	11.71	7.59	10.30	9.21	11.62	7.61	9.04	8.65
04/15/97	13.04	14.23	15.99	13.30	9.59	12.26	7.78	9.34	8.16	11.93	7.75	10.32	9.30	11.58	7.77	9.12	8.69
05/14/97	12.99	13.73	15.55	13.25	9.84	12.48	8.00	9.71	8.37	11.95	7.98	10.70	9.48	11.81	7.98	9.32	8.78
06/14/97	13.27	14.26	16.76	13.54	9.80	11.91	7.90	10.83	8.30	12.08	8.04	11.41	9.57	11.93	7.97	9.42	9.10
07/16/97	13.20	14.21	16.28	13.46	9.90	12.23	7.91	8.79	8.33	12.27	7.93	11.61	9.66	12.26	7.96	9.48	9.13
08/19/97	13.31	14.27	16.88	13.61	10.00	11.98	7.96	11.98	8.30	11.96	7.92	11.76	9.60	11.95	7.91	9.44	8.96
09/15/97	13.13	14.32	16.82	13.43	9.87	12.64	7.62	10.81	8.11	12.57	7.64	12.32	9.76	12.51	7.67	9.56	9.14
10/15/97	12.99	14.26	17.04	13.29	9.45	12.34	7.78	10.20	8.15	12.32	7.78	11.57	9.58	12.26	7.81	9.40	9.04

Table 25. Water Levels at Selected Wells, Piezometers, and Staff Gages in the ENR Seepage Study (Rohrer, 1999 and this study) Page 2 of 6

Site ID	PO5 In	PO5 Out	PO5B	PO6A	PO6 In	PO6 Out	PO6B	PO7A	PO7 In	PO7 Out	PO7B	PO8B	PO9A	P10A	P10 In	P10 Out
06/01/95			8.83	8.59			8.57	8.73			8.68	13.39	11.77	13.74	14.58	15.07
06/15/95			8.72	8.34			8.51	8.41			8.36	13.79	11.99	14.05	14.65	15.55
07/31/95			9.37	8.69			9.71	8.87			8.82	14.54	12.12	14.69	14.72	16.58
08/16/95			9.39	8.72			10.57	8.74			8.67	14.22	12.10	14.37	14.70	15.92
08/31/95	12.12	7.95	9.28	8.59	12.88	7.94	10.38	8.56	10.96	7.90	8.49	14.95	12.17	15.13	14.70	17.49
09/15/95	11.88	8.20	9.27	8.75	12.64	8.20	10.46	8.72	10.72	8.20	8.70	14.84	12.11	14.98	14.73	17.24
09/29/95	12.29	8.05	9.23	8.69	13.00	8.08	9.89	8.69	11.17	8.06	8.63	14.58	12.24	14.76	14.71	16.61
10/19/95	12.54	7.84	9.34	8.46	13.27	7.84	11.05	8.69	11.88	7.84	8.60	15.36	12.27	15.62	14.76	18.26
10/31/95	11.96	8.30	9.19	8.81	12.76	8.30	9.99	8.87	11.20	8.28		14.98	12.17	15.15	14.72	17.49
11/15/95	12.16	8.25	9.18	8.86	11.90	8.25	9.49	8.84	11.24	8.21	8.78	14.67	12.17	14.86	14.72	16.80
11/30/95	12.21	8.11	9.21	8.81	12.96	8.12	9.28	8.81	11.12	8.18	8.77	14.68	12.11	14.89	14.68	16.81
12/15/95	12.30	8.32	9.38	8.93	13.09	8.30	9.32	8.96	11.54	8.26	8.89	14.68	12.09	14.89	14.70	16.82
12/29/95	12.33	8.18	9.42	8.87	13.18	8.19	9.93	8.95	11.84	8.19	8.89	14.67	12.27	14.87	14.69	16.68
01/16/96	12.36	7.98	9.31	8.72	13.18	7.99	9.89	8.78	11.78	7.98	8.73	14.63	12.21	14.87	14.71	16.74
01/31/96	12.28	8.00	9.11	8.74	13.02	7.98		8.66	11.18	7.92	8.60	14.62	12.14	14.84	14.72	16.74
02/15/96	12.87	8.16	9.76	8.92	13.40	8.16	10.61	8.70	11.18	8.16	8.66	14.31	12.10	14.47	14.77	16.20
03/04/96	11.59	8.39	9.22	8.91	12.46	8.39	9.66	8.93	11.21	8.36	8.88	14.22	11.98	14.35	14.68	15.99
03/16/96	11.16	8.21	8.98	8.71	12.14	8.19	9.48	8.87	11.12	8.16	8.81	14.41	12.00	14.66	14.69	16.31
03/29/96	11.23	7.77	8.77	8.43	12.19	7.77	9.08	8.56	11.15	7.78	8.49	14.22	12.00	14.36	14.68	16.01
04/15/96	12.10	7.85	9.11	8.52	12.90	7.85	9.48	8.60	11.17	7.76	8.45	13.86	12.00	14.08	14.62	15.19
05/15/96	11.65	8.20	9.14	8.58	12.50	8.19	9.62	8.81	11.27	8.16	8.75	13.94	11.98	14.09	14.68	15.53
06/14/96	11.75	8.14	9.24	8.56	12.57	8.11	10.98		11.22	8.09	8.71	14.59	12.19	14.78	14.75	16.82
07/16/96	12.25	8.11	9.39	8.62	12.96	8.10	10.71	8.88	11.50	8.07	8.76	14.11	12.14	14.32	14.64	15.66
08/15/96	11.82	7.81	9.12	8.48	12.62	7.80	10.49	8.54	10.92	7.80	8.48	14.01	12.14	14.22	14.67	15.70
09/16/96	12.17	7.66	9.20	8.40	12.90	7.65	10.38	8.54	11.24	7.64	8.39	14.55	12.13	14.75	14.69	16.63
10/16/96	12.32	7.75	9.33	8.51	13.20	7.72	10.84	8.76	11.81	7.70	8.60	14.83	12.38	15.06	14.71	17.15
11/15/96	12.29	8.01	9.35	8.47	13.21	8.01	9.37	8.94	11.85	8.00	8.77	14.72	12.29	14.98	14.74	16.90
12/16/96	12.14	8.00	9.12	8.55	12.96	8.02	9.08	8.83	11.50	8.01	8.69	14.36	12.11	14.58	14.69	16.24
01/15/97	11.56	7.70	8.89	8.31	12.42	7.69	8.71	8.50	11.00	7.69	8.38	14.41	12.22	14.58	14.67	16.41
02/13/97	11.34	7.66	8.82	8.24	12.24	7.62	8.67	8.50	11.08	7.64	8.34	14.20	12.06	14.40	14.63	16.00
03/17/97	11.50	7.67	8.85	8.11	12.38	7.66	8.58	8.52	11.20	7.72	8.39	14.25	12.09	14.46	14.62	16.13
04/15/97	11.45	7.80	8.84	8.22	12.29	7.78	8.64	8.55	11.17	7.77	8.41	14.16	12.14	14.35	14.64	15.88
05/14/97	11.69	8.00	8.99	8.37	12.40	7.98	8.86	8.73	11.16	7.97	8.58	13.85	12.10	14.09	14.51	15.45
06/14/97	11.81	8.01	9.27	8.60	12.59	8.00	9.39	8.79	11.19	7.99	8.67	14.50	12.14	14.75	14.61	16.64
07/16/97	12.27	8.00	9.66	8.76	13.24	8.00	10.48	9.00	12.18	7.98	8.86	14.43	12.34	14.62	14.54	16.18
08/19/97	11.97	7.98	9.85	8.54	12.60	7.91	10.36	8.56	11.15	7.76	8.46	14.52	12.19	14.80	13.73	17.14
09/15/97	12.53	7.71	10.32	8.58	13.36	7.70	11.54	8.43	10.75	7.69	8.31	14.54	12.24	14.80	14.76	16.72
10/15/97	12.28	7.78	9.70	8.55	13.15	7.74	10.09	8.42	10.26	7.75	8.31	14.62	12.11	14.90	14.72	17.03

Table 25. Water Levels at Selected Wells, Piezometers, and Staff Gages in the ENR Seepage Study (Rohrer, 1999 and this study) Page 3 of 6

Site ID	P10B	P11A	P11 In	P11 Out	P11B	PO12A	PO12 In	PO12 Out	PO12B	PO13A	PO13 In	PO13 Out	PO13B	PO14B	PO14 In	PO14 Out
06/01/95	14.84	10.93	11.89	12.16	10.62	13.48	13.96	15.14	13.48	13.57	13.86	15.14	13.76	13.41	13.58	14.15
06/15/95	15.08	11.13	11.89	12.16	10.72	13.81	14.12	15.57	13.81	13.96	14.13	15.55	14.14	13.82	14.00	14.57
07/31/95	15.60	12.04	11.89	12.16	13.28	14.55	14.14	16.63	14.54	14.68	14.24	16.65	14.88	14.40	14.23	15.93
08/16/95	15.32	11.94	11.89	12.16	11.69	14.23	14.10	15.98	14.21	14.36	14.18	16.01	14.54	14.10	14.17	15.23
08/31/95	16.15	12.05	11.89	12.16	11.58	14.96	14.22	17.51	14.95	15.06	14.21	17.52	15.26	14.81	14.23	16.68
09/15/95	16.03	11.62	11.89	11.66	11.34	14.72	14.21	17.24	14.73	15.30	14.26	17.28	15.17	14.71	14.23	15.56
09/29/95	15.64	12.09	11.89	12.22	11.66	14.60	14.23	16.69	14.57	14.74	14.24	16.73	14.96	14.45	14.23	15.69
10/19/95	16.52	12.36	11.89	12.50	11.88	15.35	14.23	18.33	15.35	15.52	14.30	18.40	15.73	15.20	14.27	17.04
10/31/95	16.16	11.81	11.74	11.98	11.77	14.91	14.22	17.53	14.89	15.10	14.26	17.55	15.32	14.85	14.18	16.24
11/15/95	15.73	12.01	11.92	12.17	11.78	14.65	14.24	16.89	14.63	14.82	14.25	16.91	15.04	14.53	14.18	15.76
11/30/95	15.76	12.08	11.96	12.22	11.71	14.65	14.19	16.88	14.62	14.84	14.25	16.89	15.05	14.55	14.22	15.78
12/15/95	15.73	12.15	12.05	12.30	11.77	14.64	14.20	16.89	14.67	14.84	14.22	16.90	15.02	14.55	14.15	15.67
12/29/95	15.62	12.24	12.16	12.32	11.83	14.62	14.26	16.82	14.60	14.82	14.28	16.85	14.99	14.51	14.24	15.73
01/16/96	15.63	12.27	12.15	12.38	11.93	14.63	14.19	16.86	14.61	14.82	14.28	16.91	14.98	14.49	14.34	15.82
01/31/96	15.67	12.15	12.02	12.32	11.83	14.63	14.15	16.88	14.59	14.80	14.28	16.91	14.98	14.47	14.20	15.77
02/15/96	15.41	11.95	12.44	11.39	11.62	14.22	14.13	16.36	14.24	14.41	14.27	16.37	14.61	14.18	14.09	15.50
03/04/96	15.34	11.34	11.32	11.28	11.16	14.07	14.22	16.11	14.06	14.26	14.26	16.12	14.46	14.08	14.06	15.41
03/16/96	15.54	11.75	11.12	12.60	11.14	14.48	14.26	16.40	14.45	14.65	14.26	16.42	14.82	14.24	14.15	15.71
03/29/96	15.34	11.49	11.20	11.90	12.81	14.20	14.19	16.12	14.17	14.40	14.27	16.13	14.59	14.12	14.10	15.34
04/15/96	14.95	12.08	11.90	12.16	11.48	13.95	13.95	15.29	13.97	14.12	14.12	15.35	14.27	13.75	13.94	14.26
05/15/96	15.08	11.56	11.45	11.65	11.19	13.91	13.99	15.59	13.88	14.08	14.24	15.60	14.27	13.83	13.84	14.44
06/14/96	15.74	11.69	11.57	11.87	11.45	14.52	14.10	16.88	14.53	14.73	14.30	15.92	14.95	14.47	14.23	16.12
07/16/96	15.21	12.16	12.00	12.32	11.86	14.20	14.21	15.81	14.21	14.38	13.41	16.51	14.56	13.99	14.04	14.63
08/15/96	15.19	11.74	12.65	11.90	11.55	14.03	14.09	15.73	14.01	14.19	14.07	15.75	14.38	13.92	14.07	14.67
09/16/96	15.67	12.03	11.92	11.15	11.12	14.57	14.17	16.66	14.56	14.75	14.25	16.69	14.94	14.45	14.26	15.99
10/16/96	15.93	12.25	12.30	12.31	11.69	14.76	14.25	17.16	14.76	14.94	14.23	17.17	15.13	14.67	14.28	16.44
11/15/96	15.79	12.28	12.17	12.38	11.90	14.67	14.26	16.93	14.66	14.84	14.29	16.96	15.04	14.58	14.37	16.22
12/16/96	15.41	12.03	11.96	12.18	11.44	14.37	14.23	16.35	14.35	14.53	14.31	16.35	14.71	14.25	14.36	15.65
01/15/97	15.54		11.40	11.60		14.31	14.31	16.46	14.30	14.49	14.26	16.45	14.67	13.86	14.31	15.75
02/13/97	15.33	11.33	11.20	11.45	11.04	14.12	14.17	16.13	14.12	14.30	14.25	16.14	14.48	14.09	14.18	15.44
03/17/97	15.40	11.48	11.35	11.61	11.08	14.21	14.14	16.26	14.20	14.37	14.28	16.28	14.57	14.17	14.28	15.57
04/15/97	15.31		11.31	11.57	11.01	14.11	14.17	15.98	14.09	14.30	14.29	16.00	14.58	14.06	14.20	15.27
05/14/97	15.02	11.68	11.47	11.90	11.07	13.92	13.84	15.52	13.92	14.11	14.13	15.77	14.23	13.75	13.72	14.30
06/14/97	15.64	11.81	11.71	11.94	11.32	14.48	14.16	16.71	14.47	14.65	14.26	16.73	14.84	14.38	14.24	15.97
07/16/97	15.42	12.26	12.21	12.24	11.89	14.32	14.17	16.23	14.32	14.47	14.21	16.26	14.67	14.32	14.14	15.62
08/19/97	15.75	11.85	11.90	11.74	11.52	14.52	14.25	16.83	14.50	14.69	14.24	16.86	14.97	14.41	14.32	16.09
09/15/97	15.71	12.08	12.41	11.64	11.72	14.48	14.33	16.79	14.47	14.52	14.30	16.80	14.78	14.42	14.32	16.10
10/15/97	15.88	11.84	12.18	11.40	11.46	14.56	14.32	17.02	14.56	14.59	14.27	17.03	14.86	14.52	14.26	16.31

Table 25. Water Levels at Selected Wells, Piezometers, and Staff Gages in the ENR Seepage Study (Rohrer, 1999 and this study) Page 4 of 6

Site ID	PO1A	PO1 In	PO1 Out	PO1B	PO2A	PO2 In	PO2 Out	PO2B	PO3A	PO3 In	PO3 Out	PO3B	PO4A	PO4 In	PO4 Out	PO4B	PO5A
11/17/97	13.01	14.20	17.09	13.33	9.70	12.43	7.60	9.88	8.08	12.32	7.67	11.64	9.56	12.28	7.70	9.38	9.02
12/15/97	13.62	14.35	18.12	13.89	10.14	12.83	7.78	11.89	8.32	12.67	7.80	12.56	9.91	12.58	7.80	9.83	8.95
01/15/98	13.27	14.13	16.89	13.52	9.28	12.07	7.86	10.24	8.30	12.07	7.85	11.50	9.56	12.05	7.85	9.39	8.87
02/17/98	13.54	14.26	17.47	13.80	9.38	12.04	7.84	10.08	8.37	12.04	7.84	11.64	9.60	12.01	7.99	9.43	8.78
03/16/98	13.04	14.01	16.15	13.29	8.99	11.60	7.85	9.96	8.23	11.60	7.85	10.67	9.31	11.55	7.87	9.14	8.60
04/15/98	12.84	13.24	15.52	13.07	9.25	11.96	7.63	9.75	8.06	11.84	7.64	10.75	9.27	11.73	7.63	9.08	8.74
05/14/98	13.14	13.50	15.39	13.37	9.51	12.76	7.89	10.00	8.40	13.54	7.92	11.79	9.89	12.49	7.95	9.71	9.11
06/15/98	12.59	13.20	14.85	12.85	9.31	12.15	7.79	9.52	8.21	12.15	7.81	11.34	9.65	12.14	7.83	9.51	9.11
07/16/98	12.59	13.80	15.33	12.80	9.06	11.95	7.42	9.11	7.87	11.79	7.52	10.52	9.26	11.61	7.51	9.03	8.65
08/17/98	12.84	13.72	15.99	13.09	8.75	11.60	7.30	9.07	7.72	11.60	7.33	10.54	9.13	11.59	7.37	8.98	8.58
09/21/98	13.35	14.30	17.15	13.61	9.63	11.82	7.71	11.44	8.11	11.82	7.72	11.62	9.56	11.78	7.75	9.53	8.89
10/19/98	13.32	14.12	16.63	13.57	9.97	12.32	7.30	9.91	7.90	12.21	7.47	11.25	9.53	12.21	7.54	9.33	8.87
11/09/98	13.93	14.05		14.19	9.95	12.63	7.94	11.51	8.40	12.66	7.96	12.19	10.02	12.65	7.99	10.02	9.28
12/21/98	13.25	13.97	16.92	13.49	9.05	11.76	7.18	9.47	7.98	11.77	7.19	10.96	9.20	11.77	7.23	9.02	8.53

Table 25. Water Levels at Selected Wells, Piezometers, and Staff Gages in the ENR Seepage Study (Rohrer, 1999 and this study) Page 5 of 6

Site ID	PO5 In	PO5 Out	PO5B	PO6A	PO6 In	PO6 Out	PO6B	PO7A	PO7 In	PO7 Out	PO7B	PO8B	PO9A	P10A	P10 In	P10 Out
11/17/97	12.36	7.78	9.84	8.58	13.29	7.78	10.52	8.45	10.38	7.80	8.35	14.64	12.19	14.91	14.73	17.06
12/15/97	12.59	7.85	10.26	8.56	13.41	7.85	11.44	8.57	10.60	7.86	8.46	15.12	12.31	15.45	14.79	18.01
01/15/98	11.99	7.88	9.69	8.45	12.92	7.85	10.66	8.45	10.25	7.83	8.33	14.52	12.16	14.78	14.62	16.80
02/17/98	12.01	8.00	9.62	8.49	12.85	7.96	9.91	8.71	11.27	7.93	8.58	14.86	12.25	15.13	14.69	17.45
03/16/98	11.54	7.89	9.10	8.32	12.45	7.88	9.63	8.47	11.21	7.85	8.35	14.09	12.08	14.40	14.64	16.00
04/15/98	11.70	7.62	9.09	8.36	12.64	7.57	9.17	8.31	10.46	7.59	8.20	13.55	11.88	14.04	14.54	15.46
05/14/98	12.49	7.97	10.05	8.77	13.40	7.98	10.61	8.80	11.54	7.96	8.66	13.77	12.09	14.23	14.53	15.33
06/15/98	12.14	7.88	9.72	8.68	13.08	7.86	10.04	8.88	12.00	7.86	8.73	13.69	12.21	13.87	14.34	14.76
07/16/98	11.54	7.50	8.96	8.21	12.29	7.48	9.18	8.23	10.44	7.47	8.10	13.37	11.92	13.91	14.42	15.32
08/17/98	11.58	7.43	8.98	8.15	12.40	7.43	9.25	8.25	10.50	7.44	8.10	13.99	11.97	14.31	14.58	15.98
09/21/98	11.78	7.79	9.80	8.39	12.35	7.76	8.64	8.51	10.40	7.75	8.40	14.61	12.20	14.97	14.68	17.08
10/19/98	12.22	7.58	9.22	8.13	13.08	7.38	9.14	8.28	10.02	7.38	8.14	14.37	12.20	14.77	14.76	16.60
11/09/98	12.61	8.02	10.31	8.47	13.58	8.01	11.24	8.89	12.06	8.00	8.76	15.13	12.24	15.62	14.66	18.10
12/21/98	11.78	7.28	9.04	7.84	12.68	7.27	8.60	7.32	11.12	6.26	7.21	14.45	12.20	14.85	14.69	16.93

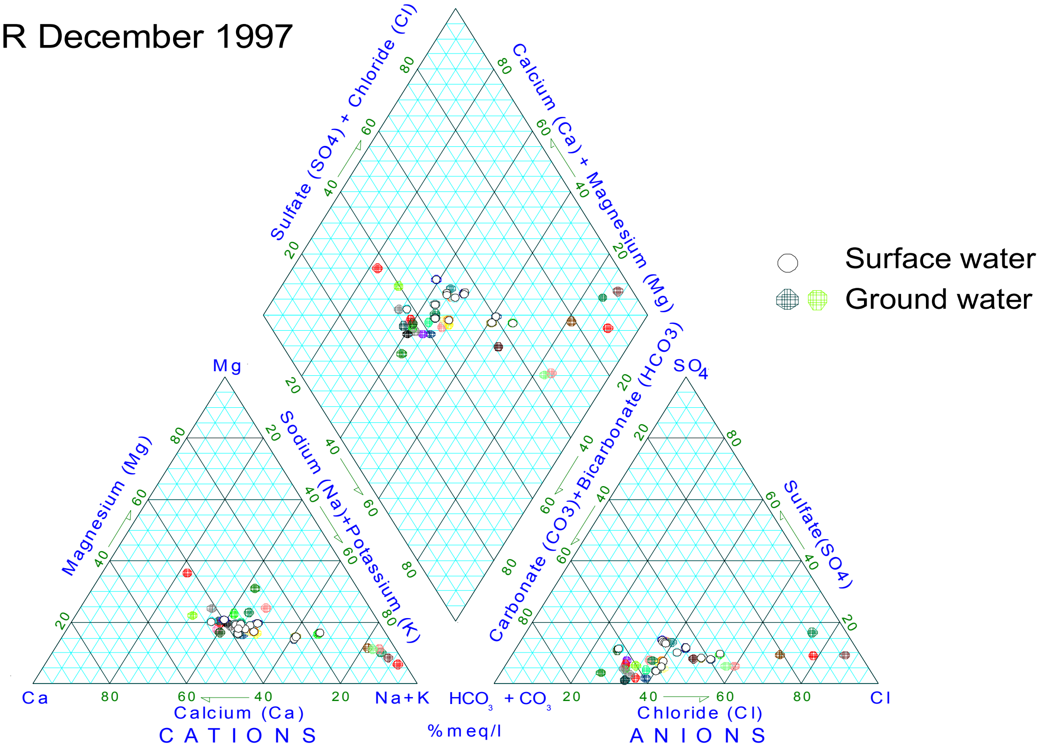
Table 25. Water Levels at Selected Wells, Piezometers, and Staff Gages in the ENR Seepage Study (Rohrer, 1999 and this study) Page 6 of 6

Site ID	P10B	P11A	P11 In	P11 Out	P11B	PO12A	PO12 In	PO12 Out	PO12B	PO13A	PO13 In	PO13 Out	PO13B	PO14B	PO14 In	PO14 Out
11/17/97	15.89	11.89	12.29	12.35	11.47	14.57	14.31	17.06	14.57	14.62	14.30	17.06	14.92	14.52	14.26	16.35
12/15/97	16.44	12.15	12.48	11.72	12.84	15.07	14.34	18.04	15.07	15.22	14.34	18.07	15.43	14.90	14.36	17.11
01/15/98	15.74	11.69	11.86	11.34	11.47	14.47	14.15	16.87	14.46	14.66	14.28	16.88	14.93	14.40	14.33	16.10
02/17/98	16.12	11.89	11.91	11.83	11.11	14.79	14.19	17.45	14.80	14.99	14.32	17.46	15.23	14.72	14.32	16.69
03/16/98	15.36	11.49	11.42	11.46	11.22	14.15	14.06	16.11	14.15	14.35	14.27	16.13	14.70	13.98	14.10	15.39
04/15/98	15.08	11.64	11.63	11.58	11.27	13.86	14.09	15.50	13.85	13.99	14.10	15.51	14.26	13.46	13.69	14.35
05/14/98	15.07	12.49	12.38	12.46	12.04	14.08	13.98	15.41	14.08	14.23	14.12	15.42	14.50	13.67	13.02	14.28
06/15/98	14.70	12.13	12.08	11.00	11.77	13.67	13.91	14.92	13.68	13.78	13.81	15.91	14.05	13.59	12.82	13.85
07/16/98	14.96	11.73	11.41	11.53	11.25	13.72	13.97	15.31	13.73	13.82	13.95	15.31	14.20	13.27	13.01	14.35
08/17/98	15.34	12.00	11.47	11.56	11.29	14.08	14.00	15.97	14.08	14.24	14.09	15.99	14.76	13.89	13.39	15.20
09/21/98	15.91	11.86	11.66	11.75	11.42	14.66	14.26	17.08	14.66	14.82	14.26	17.13	15.31	14.47	13.53	16.35
10/19/98	15.64	12.25	12.12	12.06	11.37	14.49	14.26	16.61	14.50	14.66	14.24	16.62	15.16	14.26	13.60	15.91
11/09/98	16.33	12.81	12.57	12.60	12.14	15.23	14.11	18.14	15.23	15.39	14.25	18.18	15.72	14.99	13.59	17.37
12/21/98	15.79	11.88	11.69	11.75	11.46	14.51	14.15	16.90	14.52	14.72	14.28	16.93	15.22	14.35	13.56	16.20

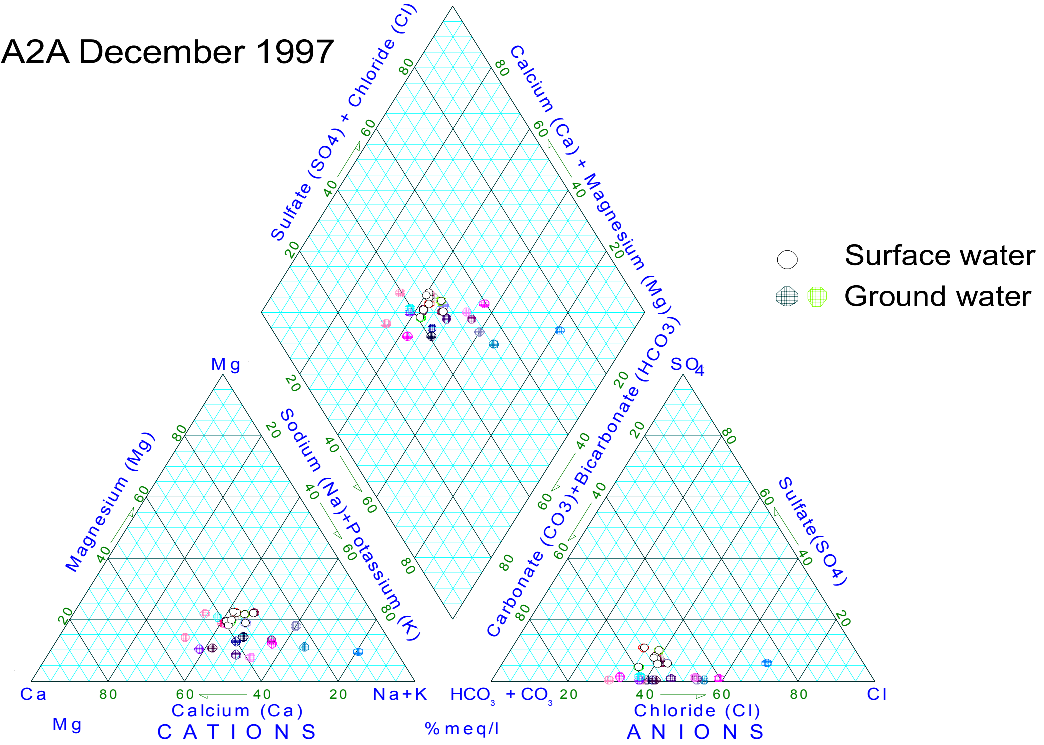
APPENDIX V

Surface Water and Ground Water Chemistry

Geochemical Water Types Delineated by Major-Ion Chemistry

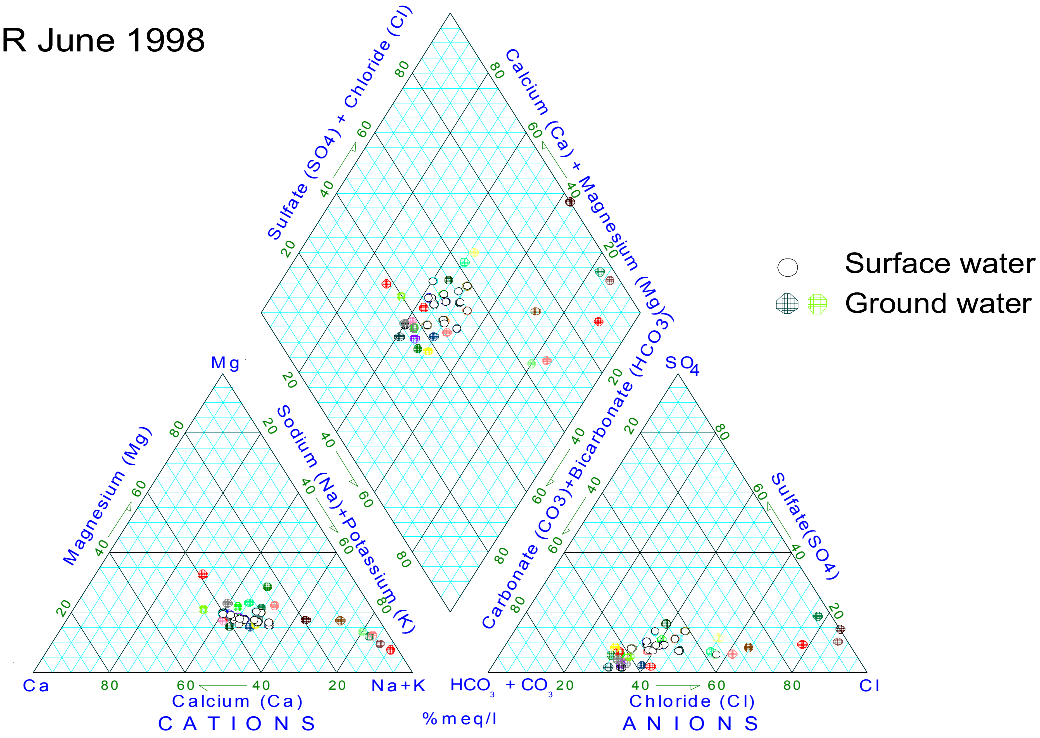


a. ENR December 1997



b. WCA2A December 1997

Figure 125. Major ion water chemistry at a time of high water levels and wet conditions in the northern Everglades.


a. ENR June 1998

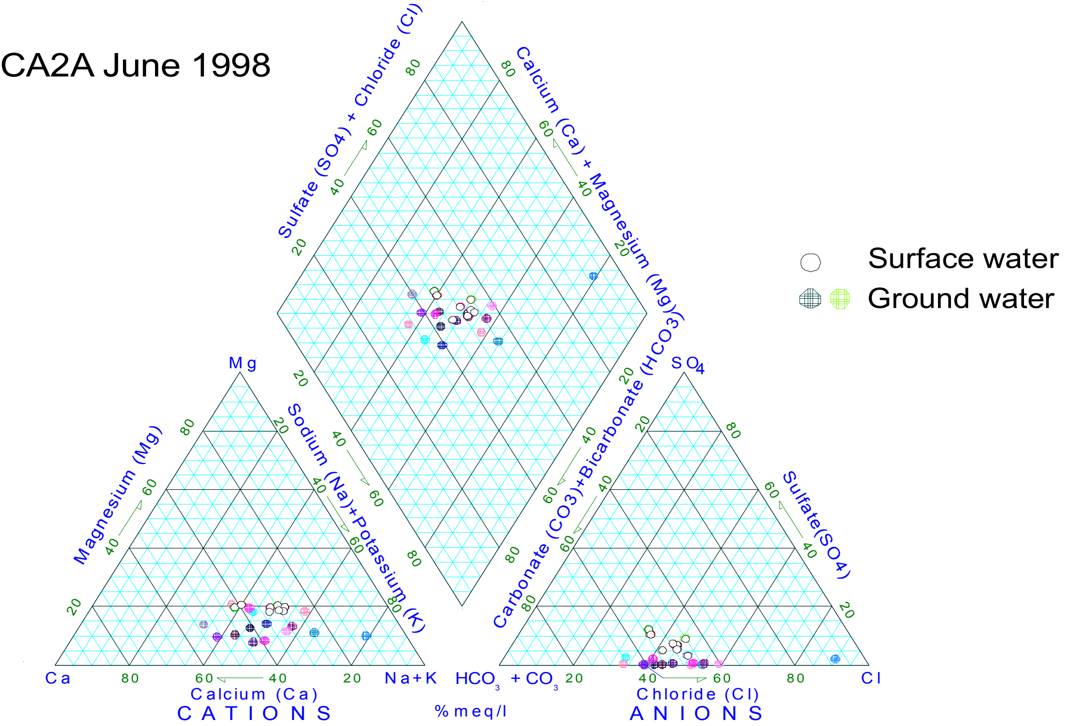

b. WCA2A June 1998

Figure 126. Major ion water chemistry at a time of low water levels and dry conditions in the northern Everglades.

Aquifer Cross Sections Showing Geochemical Water Types

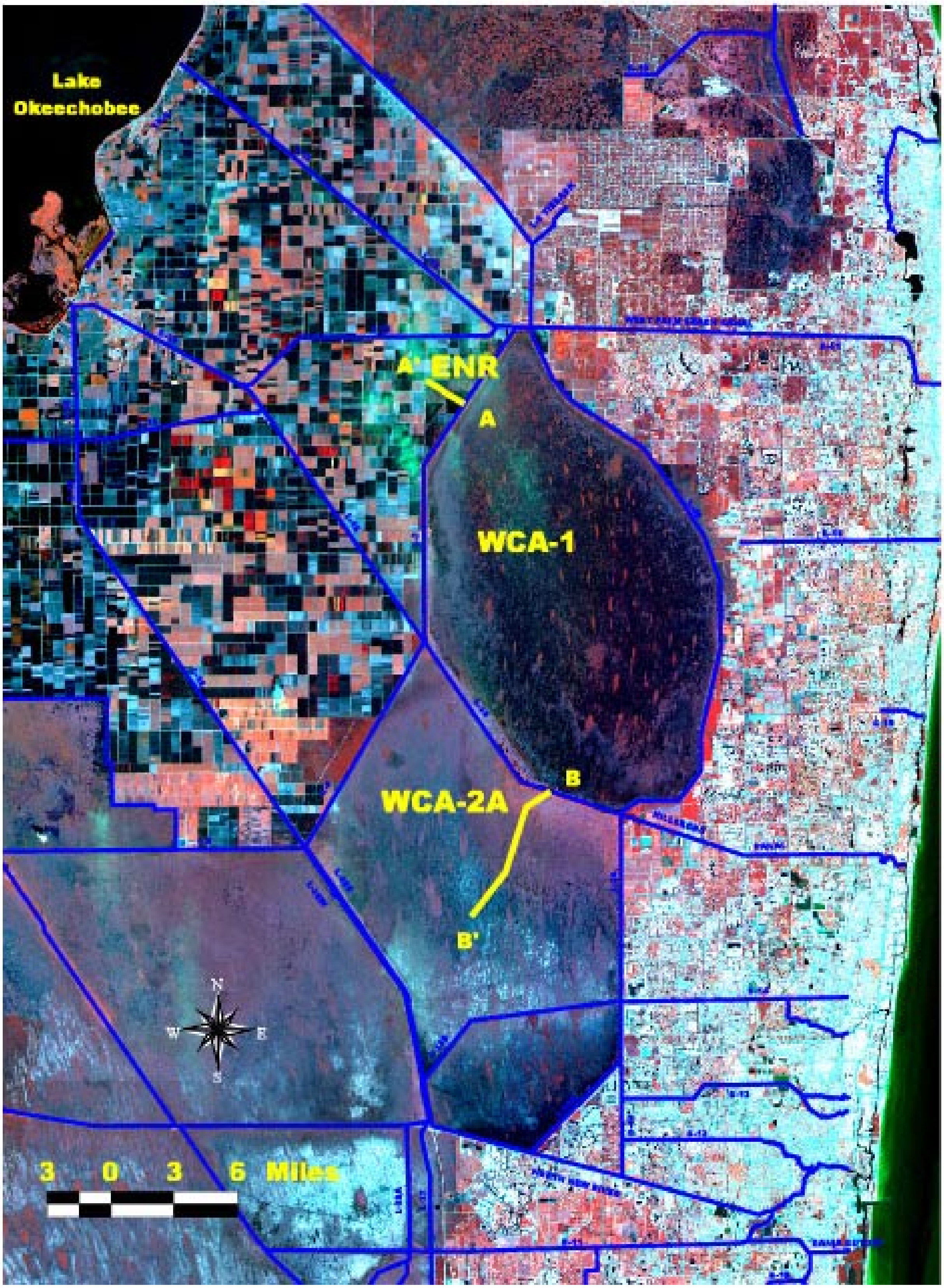


Figure 127. Location map of cross sections showing geochemical water types in the Surficial aquifer.

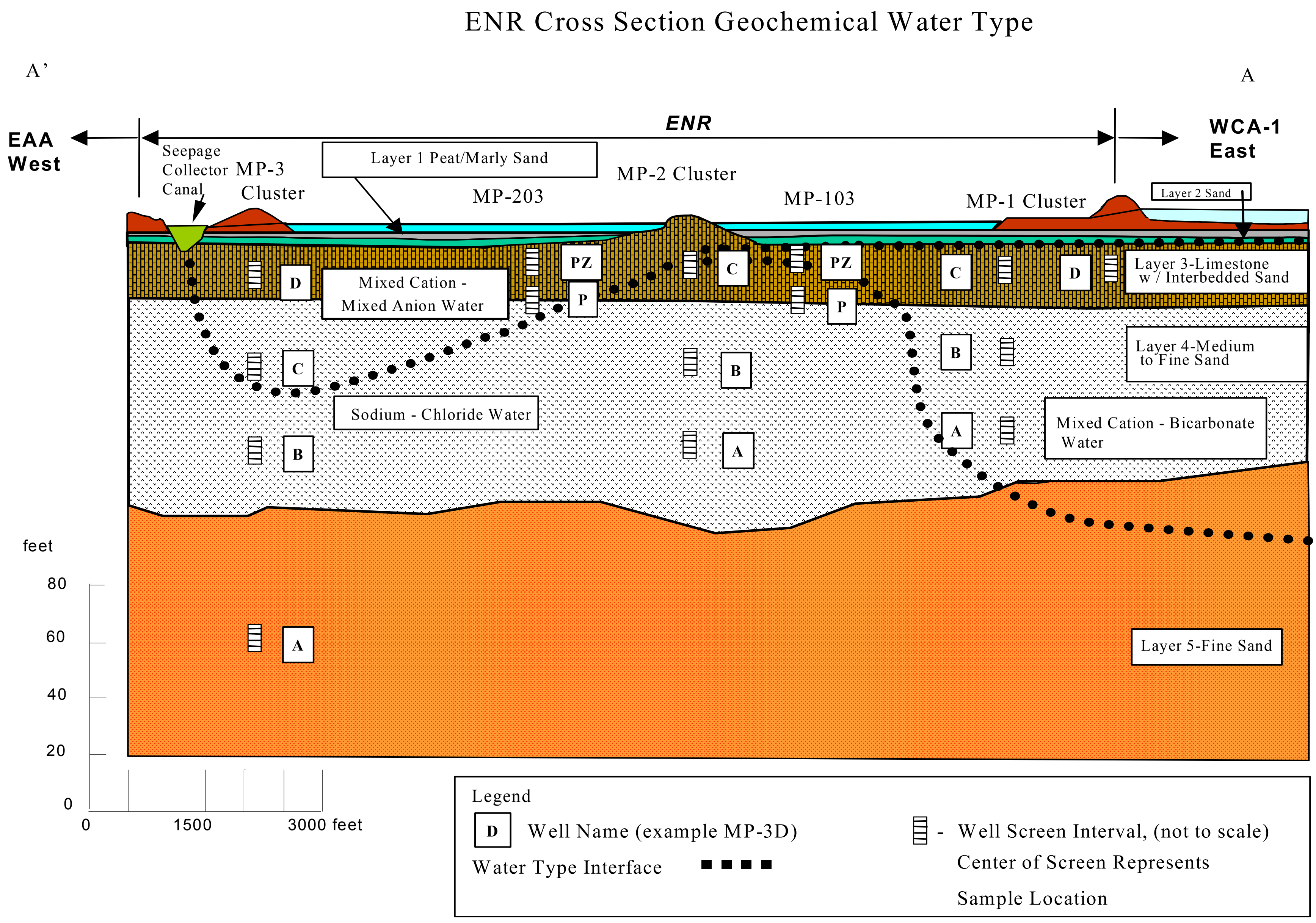


Figure 128. ENR hydrologic cross section showing geochemical water types.

WCA-2A Cross Section - Geochemical Water Type

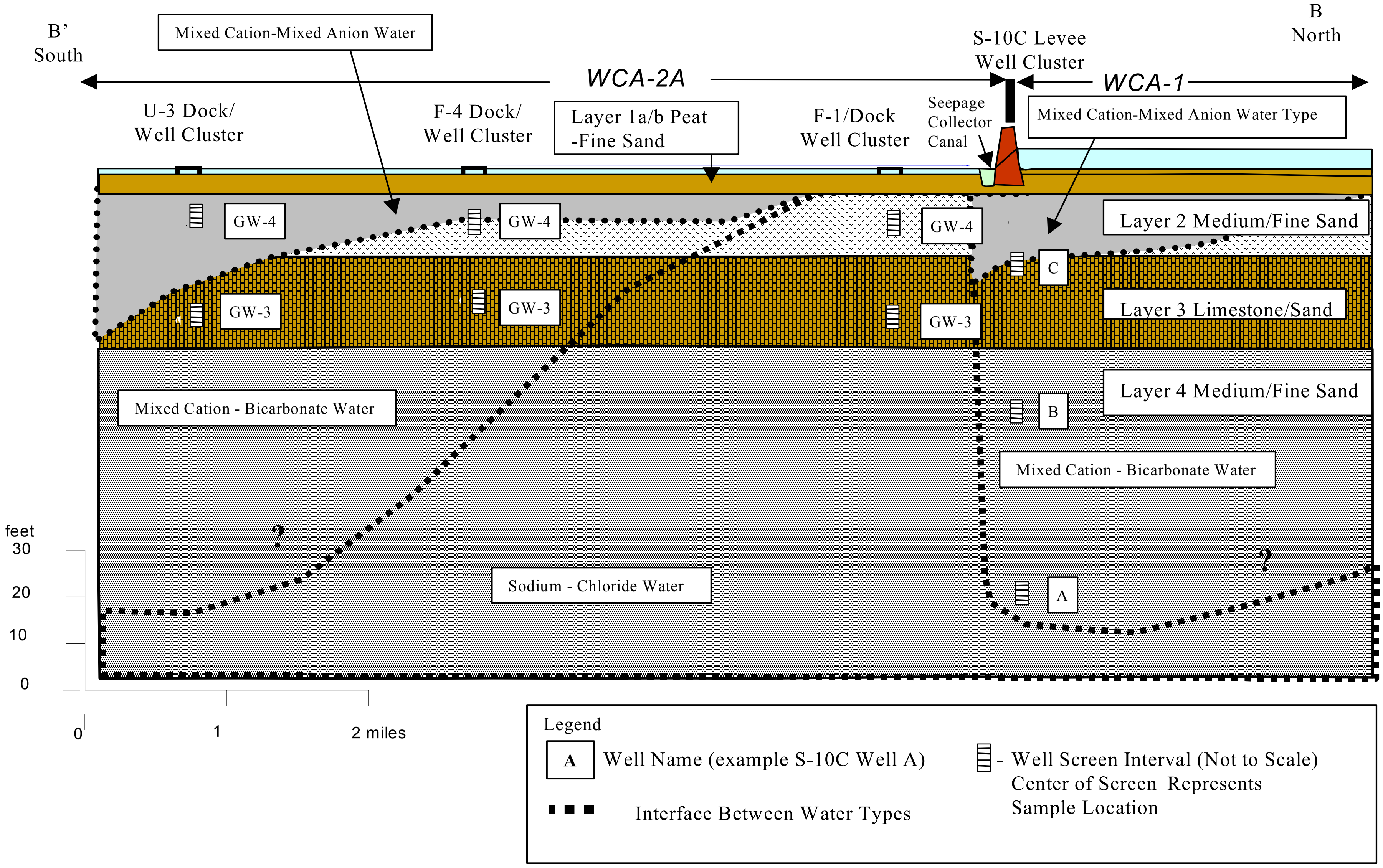


Figure 129. WCA-2A hydrologic cross section showing geochemical water types.

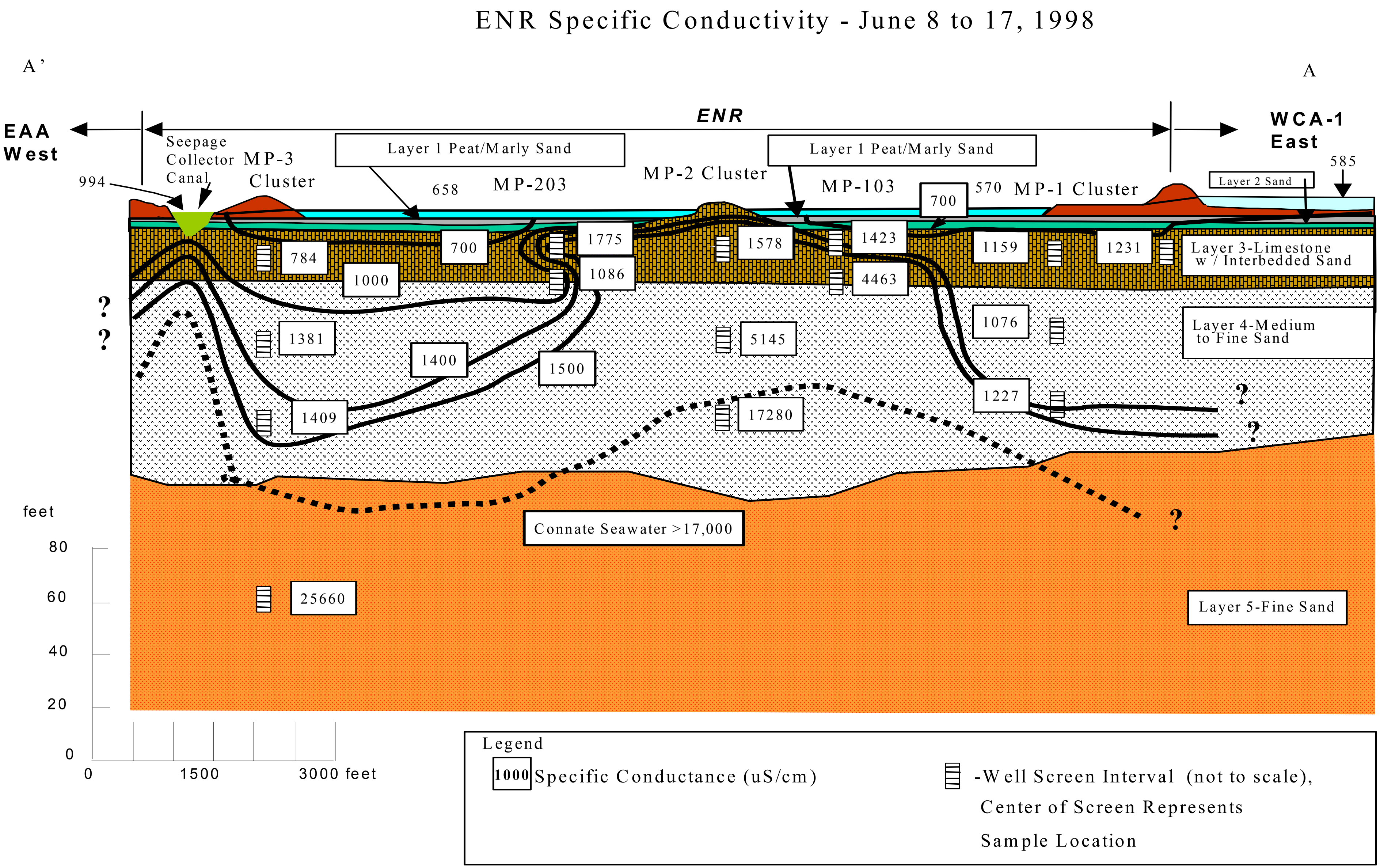


Figure 130. ENR lithostratigraphic cross-section showing dry season specific conductivity contours.

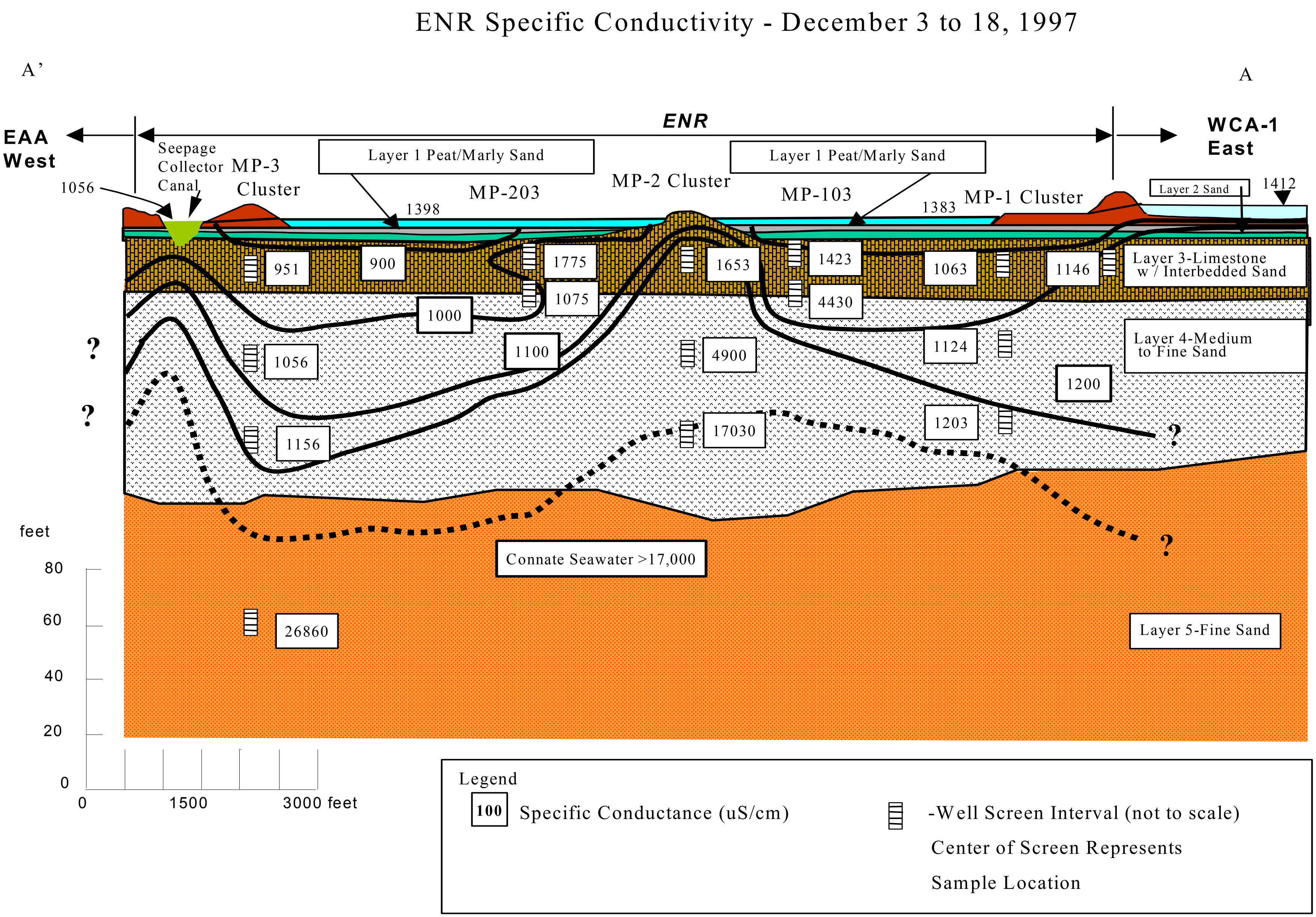


Figure 131. ENR lithostratigraphic cross-section showing wet season specific conductivity contours.

WCA-2A Specific Conductivity - December 3-18, 1997

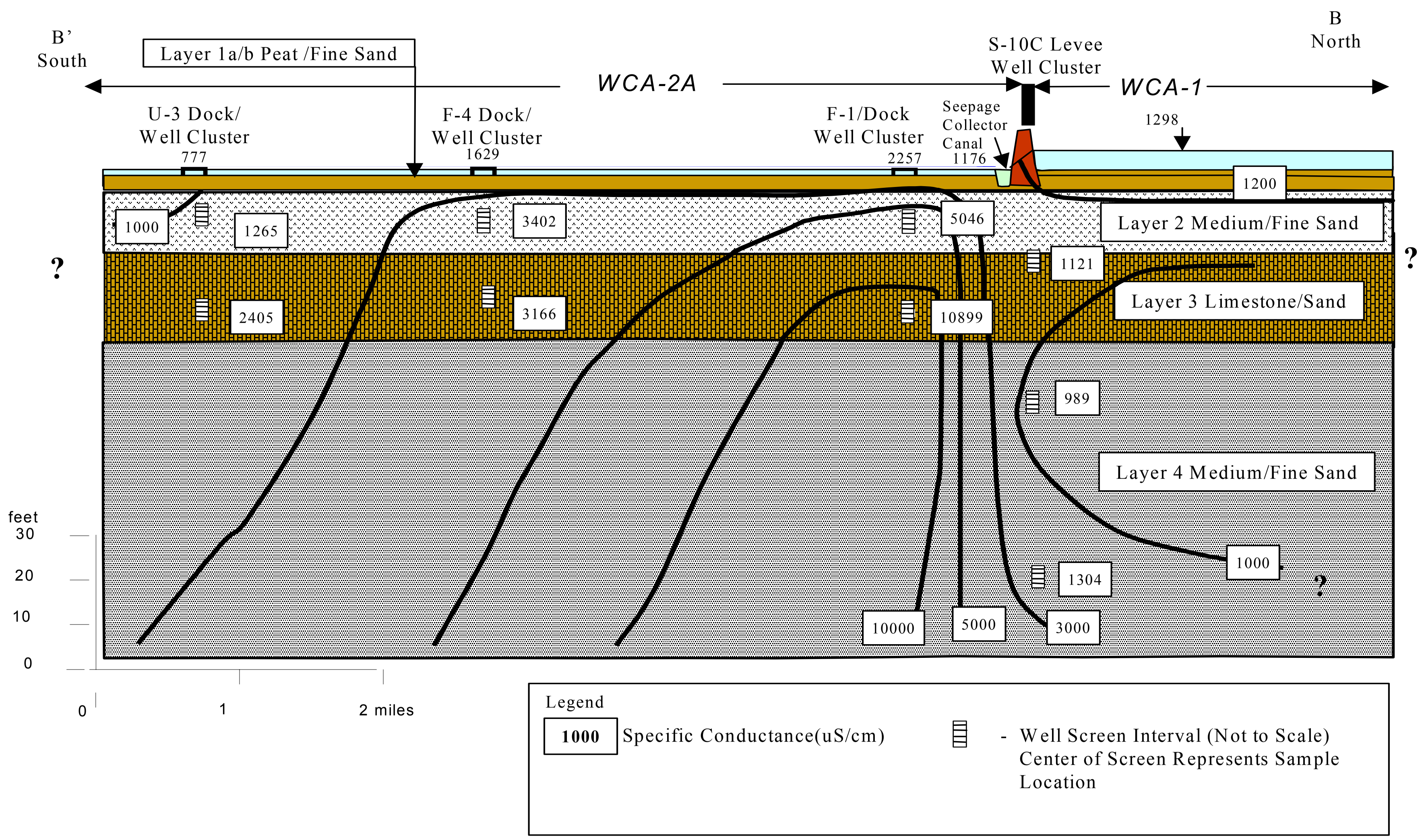


Figure 132. WCA-2A lithostratigraphic cross-section showing dry season specific conductivity contours.

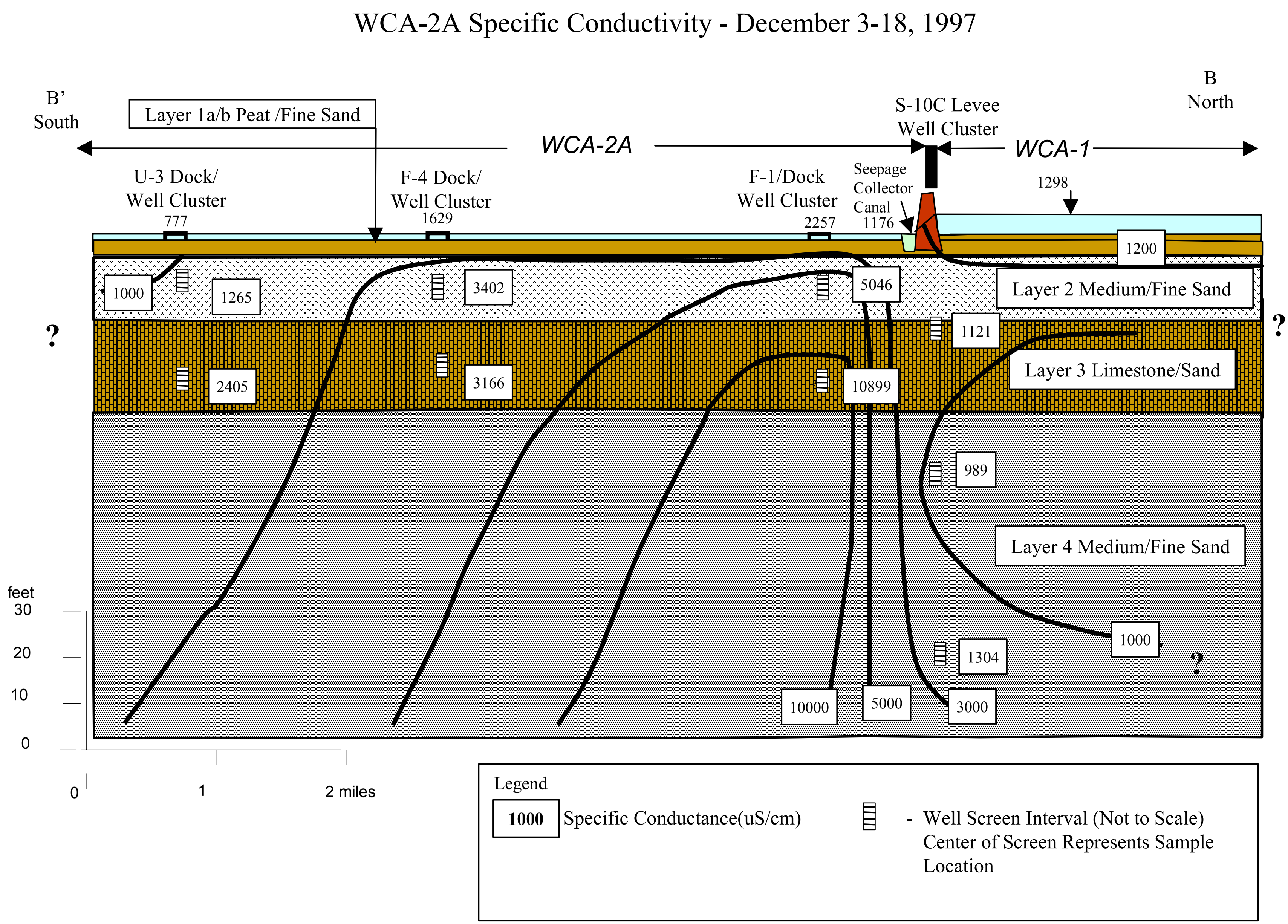
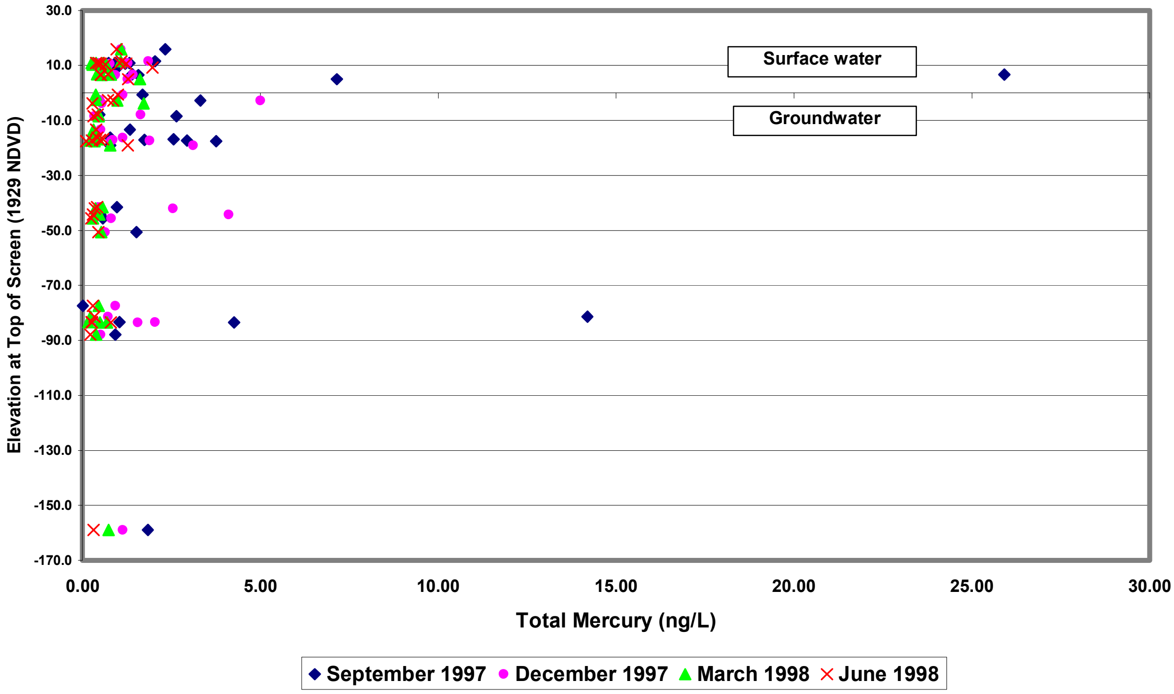


Figure 133. WCA-2A lithostratigraphic cross-section showing wet season specific conductivity contours.

Total and Methyl Mercury in Surface Water and Ground Water

a. Dissolved Total Mercury in the ENR



b. Dissolved Methyl Mercury in the ENR

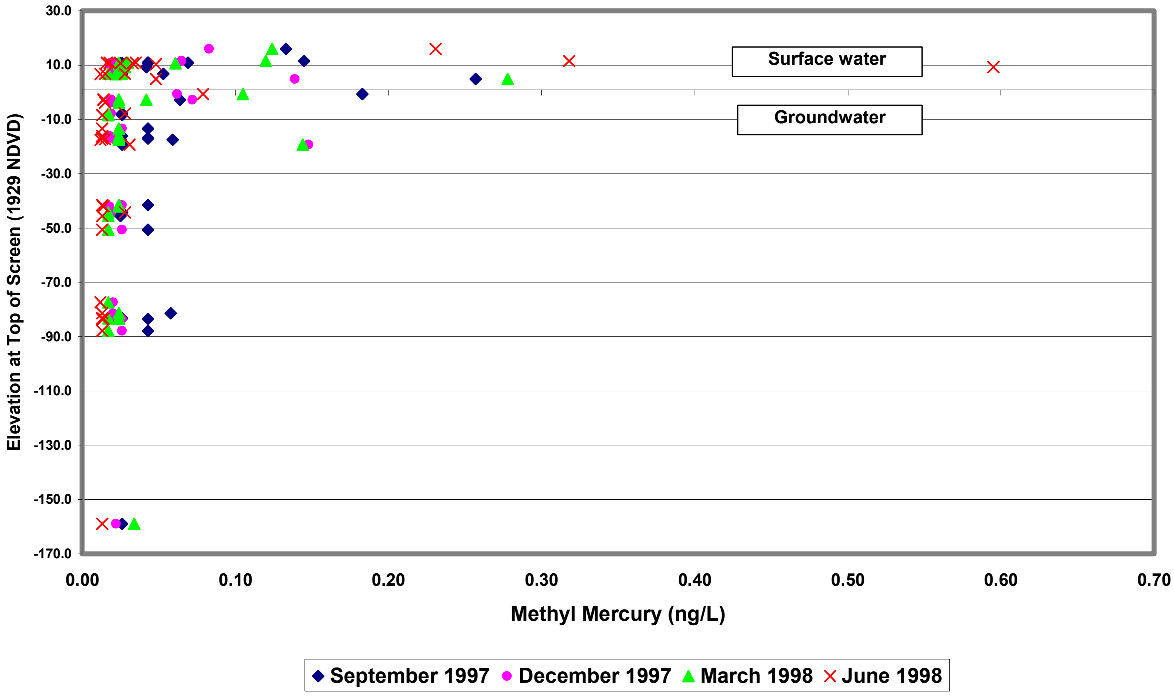
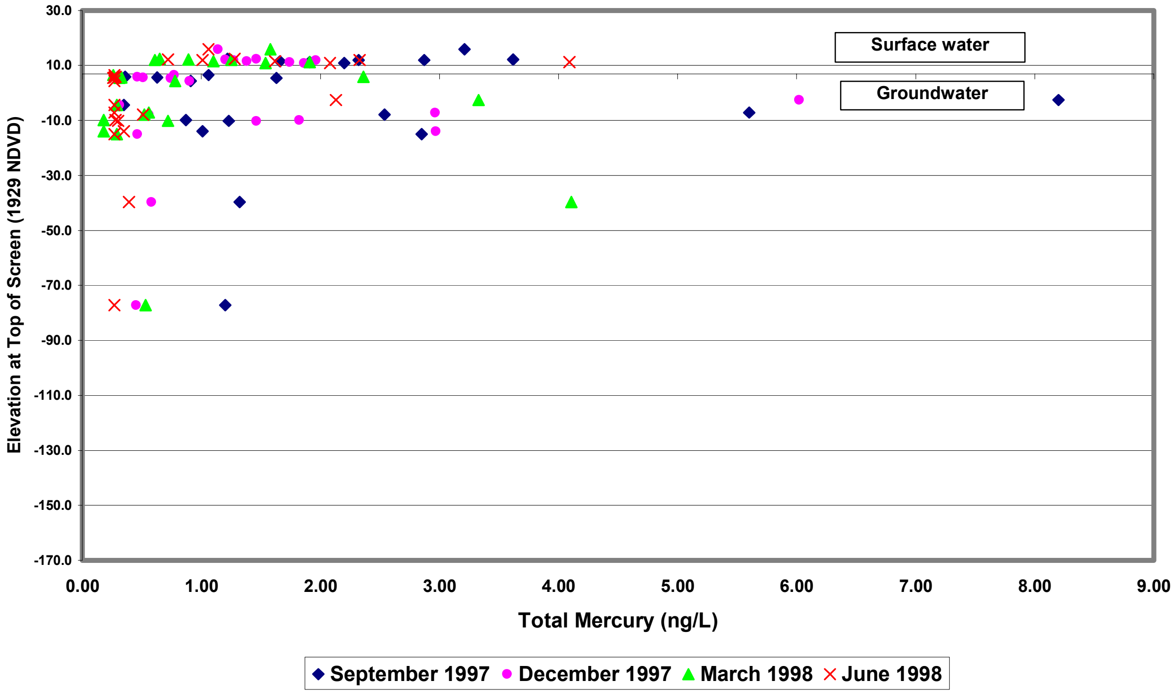


Figure 134. ENR dissolved total mercury and dissolved methyl mercury: comparison of concentrations between sampling events and with depth in surficial aquifer.

a. Dissolved Total Mercury in WCA2-A



b. Dissolved Methyl Mercury in WCA2-A

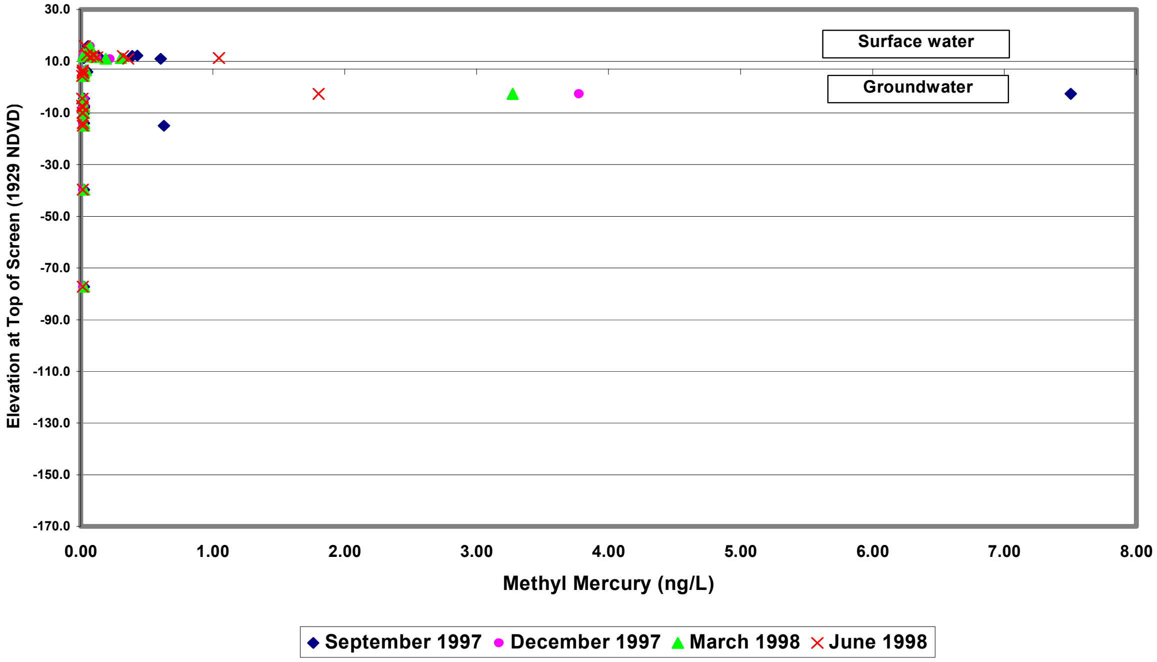
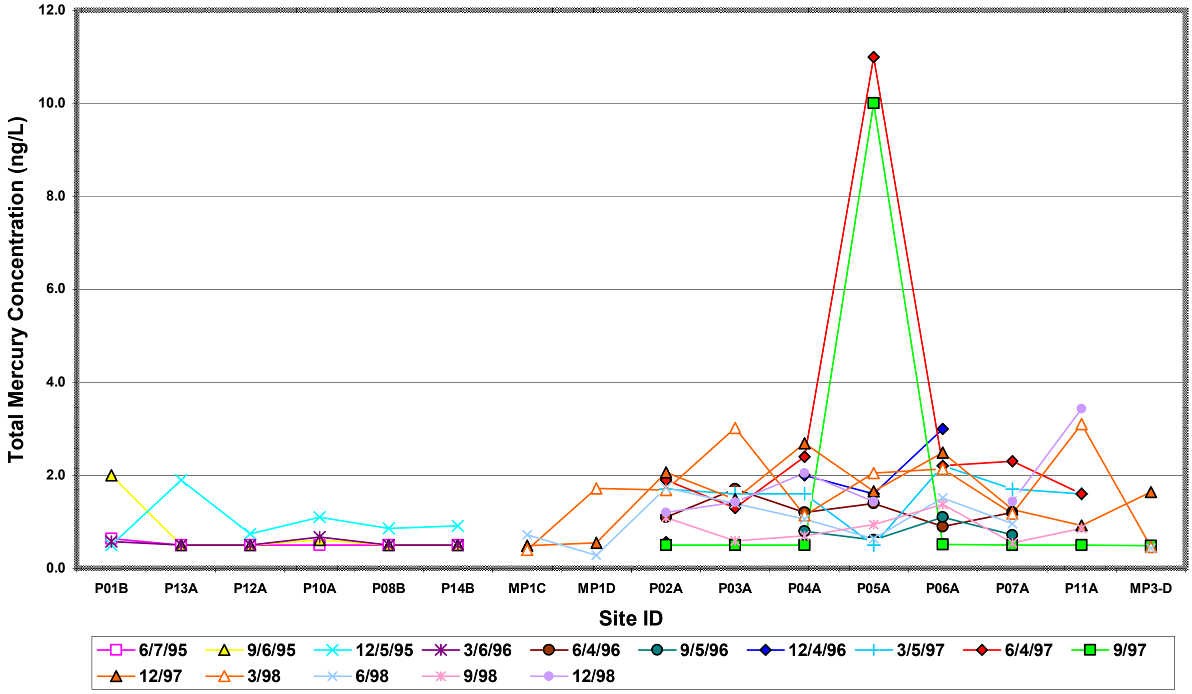


Figure 135. WCA2-A dissolved total mercury and dissolved methyl mercury: comparison of concentrations between sampling events and with depth in surficial aquifer.

a. Dissolved Total Mercury in ENR Shallow Groundwater



b. Dissolved Methyl Mercury in ENR Shallow Groundwater

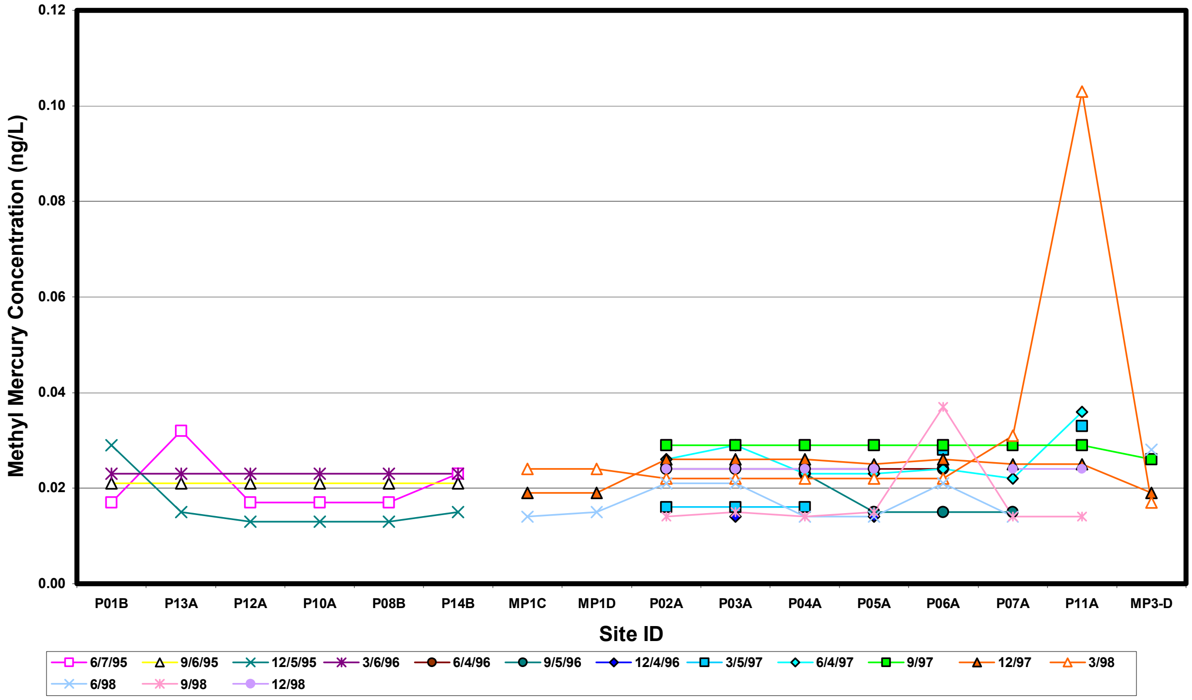
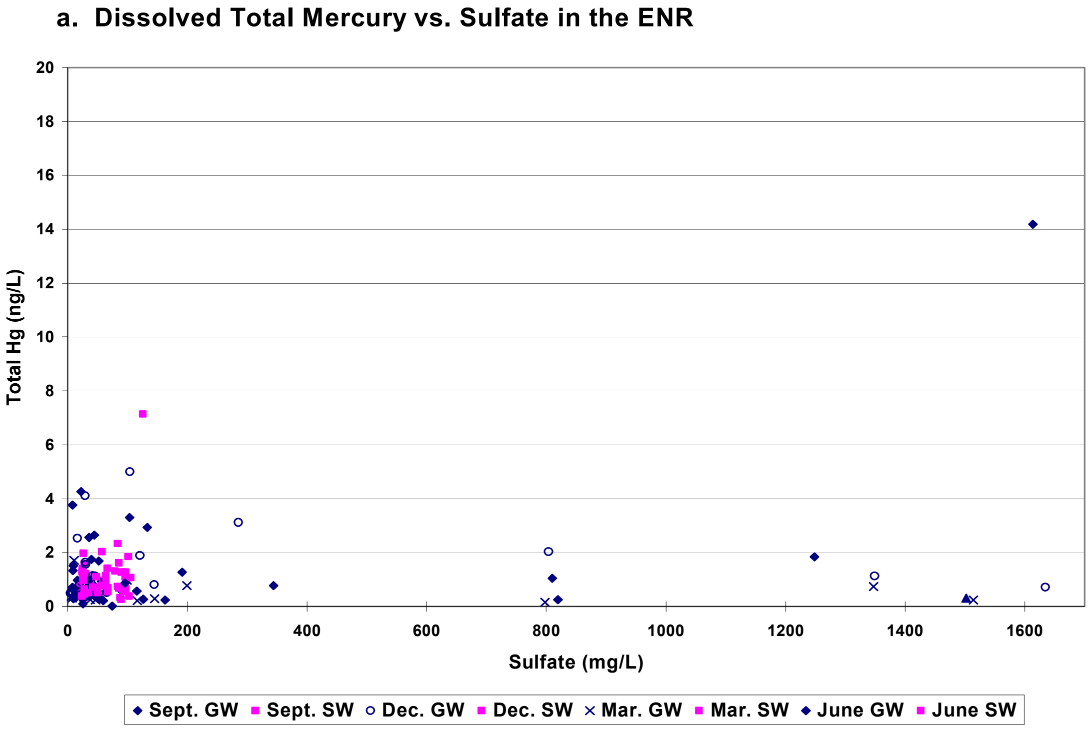


Figure 136. ENR dissolved total mercury and dissolved methyl mercury concentrations: temporal variation in shallow ground water between June 1995 and December 1998.



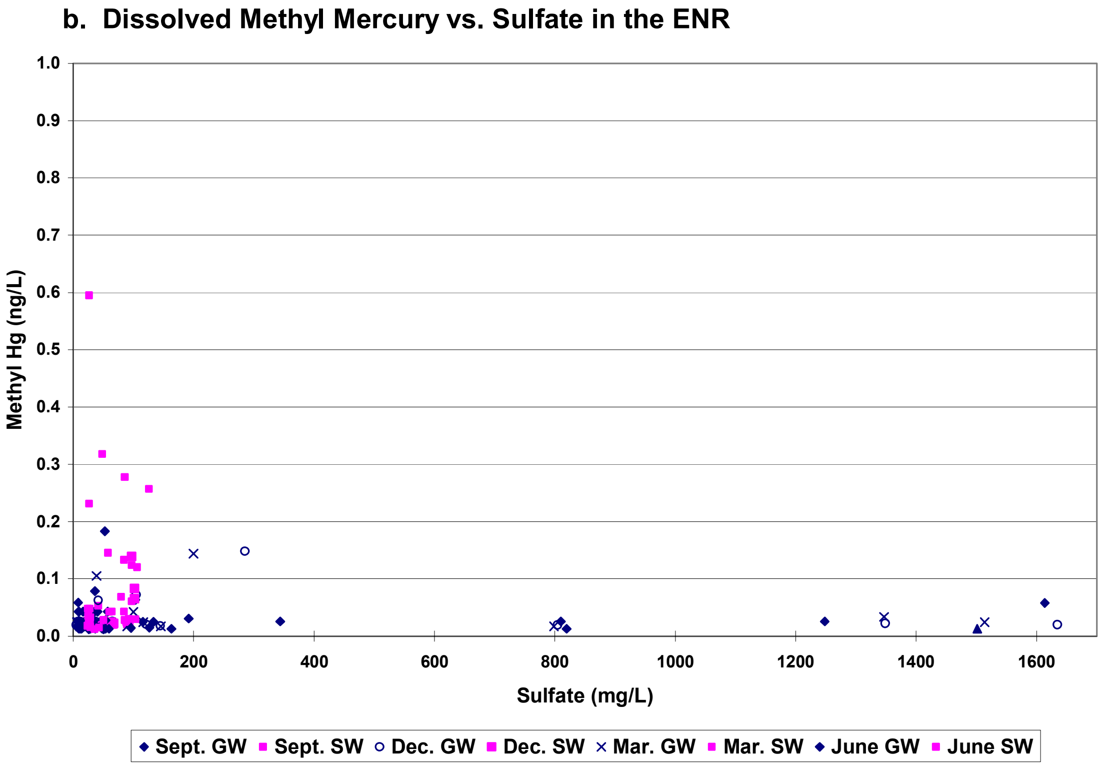
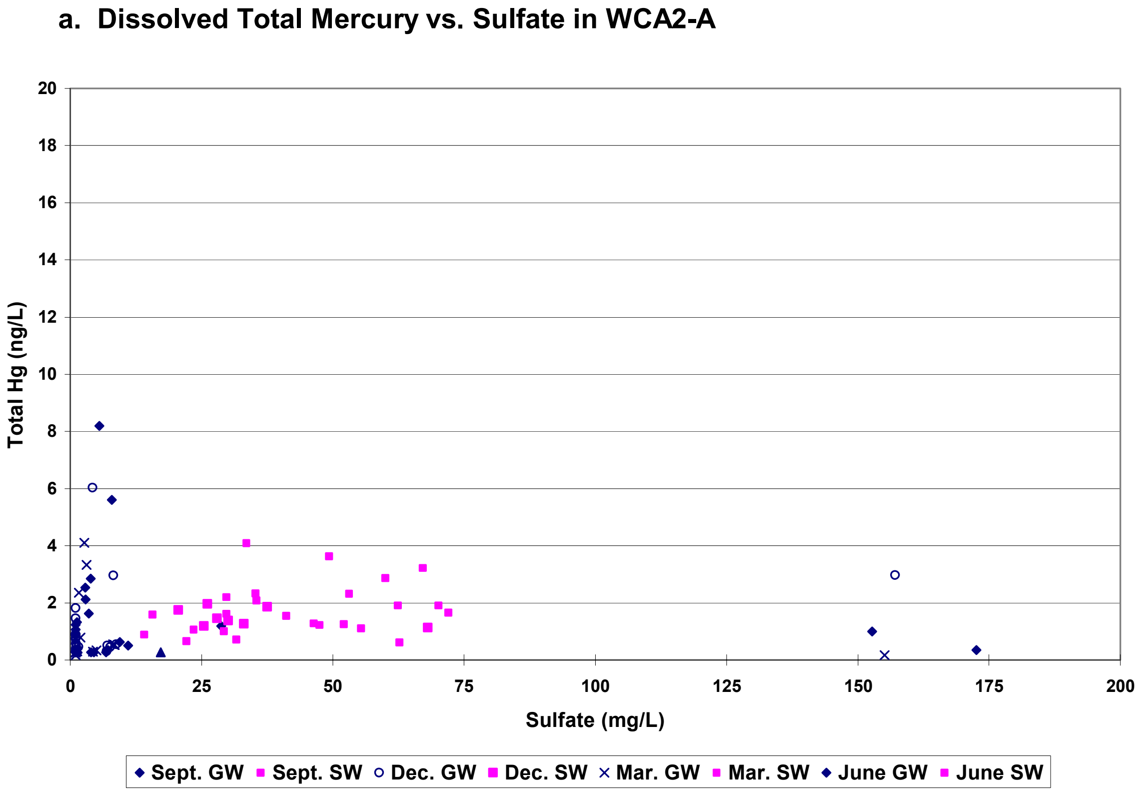


Figure 137. ENR dissolved total mercury and dissolved methyl mercury concentrations: comparison with sulfate concentrations in ground water (GW) and surface water (SW).



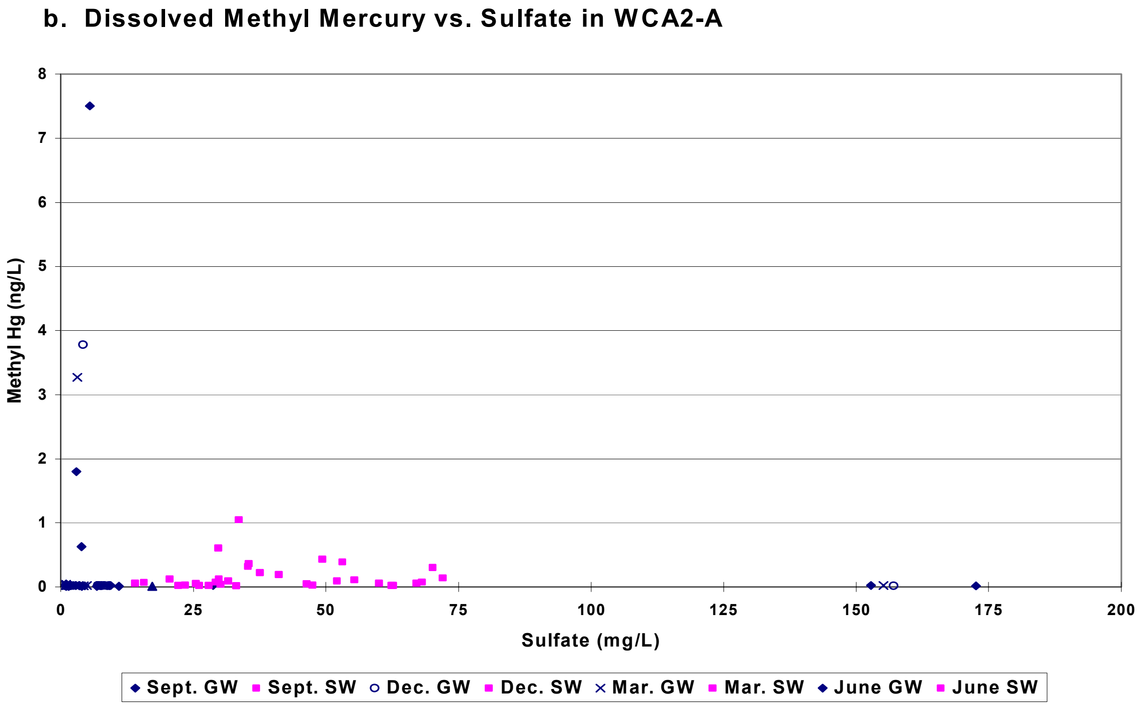


Figure 138. WCA2-A dissolved total mercury and dissolved methyl mercury concentrations: comparison with sulfate concentrations in ground water (GW) and surface water (SW).

Summary of Water Chemistry Data

Table 26. May - August 1997 Chemical Analyses from Research Site Locations in WCA2-A

Page 1 of 2

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)
Analyst			**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**Savana/HBEL/ SFWMD**	**Savana/HBEL/ SFWMD**	**Savana/HBEL/ SFWMD**	**Savana/HBEL/ SFWMD**	
M.D.L.			**0.5 mg/L**	**1.0 mg/L**	**1.0 mg/L**	**1.0 mg/L**	**0.01 mg/L**	**0.01 mg/L**	**0.01 mg/L**	**0.01 mg/L**	
WC2F1GW3	-15.99	5/15/97	1.4E+03	1.5E+02	7.7E+02	3.2E+01	8.9E+02	1.5E+02	7.8E+00	8.0E+01	-4.07
WC2F1GW4	3.47	5/15/97	4.9E+02	1.1E+01	6.3E+02	4.1E+01	3.2E+02	1.4E+02	3.0E+00	3.9E+01	-4.35
WC2F1SW	n/a	5/15/97	3.0E+02	2.6E+01	4.5E+02	7.6E+01	1.9E+02	1.3E+02	6.2E+00	4.7E+01	2.09
WC2F4GW3	-11.92	5/28/97	2.3E+02	1.0	5.0E+02	2.8E+01	1.8E+02	1.4E+02	4.1E+00	3.2E+01	2.92
WC2F4GW4	4.52	5/20/97	2.5E+02	5.0E+00	5.2E+02	3.5E+01	1.6E+02	1.8E+02	2.4E+00	3.2E+01	3.37
WC2F4SW	n/a	5/20/97	2.2E+02	5.1E+01	3.2E+02		1.5E+02	1.0E+02	1.1E+01	3.4E+01	4.47
WC2U3GW3	-16.97	6/24/97	4.4E+02	1.0	5.5E+02	1.9E+01	2.9E+02	1.2E+02	1.2E+01	5.3E+01	-0.42
WC2U3GW4	3.89	6/10/97	1.6E+02	6.2E+00	3.8E+02	2.4E+01	7.2E+01	1.5E+02	4.5E+00	2.2E+01	1.98
WC2U3SW	n/a	6/24/97	1.0E+02	3.9E+01	1.9E+02		6.7E+01	6.1E+01	1.3E+01	2.1E+01	3.93
WC2E1GW3	-9.17	7/29/97	3.6E+02	9.8E+00	4.0E+02		2.4E+02	1.2E+02	6.9E+00	3.3E+01	2.67
WC2E1GW4	2.36	7/30/97	2.8E+02	1.0	4.7E+02	4.1E+01	2.9E+02	2.9E+02	1.3E+01	5.8E+01	30.57
WC2E1SW	n/a	7/30/97	1.4E+02	7.5E+01	2.8E+02	5.3E+01					
WC2E4GW3	-6.41	8/4/97	3.8E+02	1.3E+01	3.8E+02	2.5E+01	2.7E+02	1.2E+02	8.8E+00	3.6E+01	6.03
WC2E4GW4	3.58	7/30/97	2.5E+02	2.4E+01	2.4E+02	2.4E+01	1.7E+02	9.6E+01	1.1E+01	1.1E+01	4.63
WC2E4SW	n/a	7/30/97	1.5E+02	6.5E+01	3.1E+02	4.7E+01	1.1E+02	9.9E+01	8.6E+00	3.2E+01	4.11
WC2U1GW3	-12.11	8/4/97	1.7E+02	1.0	4.1E+02	2.6E+01	2.6E+02	2.5E+02	8.3E+00	2.9E+01	33.35
WC2U1GW4	-4.58	8/4/97	1.7E+02	1.2E+01	2.8E+02	2.7E+01					
WC2U1SW	n/a	8/4/97	8.4E+01	3.2E+01	1.7E+02	3.0E+01	6.2E+01	6.0E+01	5.2E+00	1.9E+01	6.68
S10C-WA	-79.18	5/15/97	1.3E+02	1.8E+01	4.8E+02	2.4E+01	1.1E+02	1.3E+02	4.9E+00	3.5E+01	2.03
S10C-WB	-41.67	5/15/97	8.5E+01	1.0	4.0E+02	3.1E+01	7.6E+01	1.0E+02	6.9E+00	3.0E+01	3.22
S10C-WC	-9.83	5/13/97	1.3E+02	8.3E+00	3.0E+02		7.8E+01	8.2E+01	8.5E+00	2.4E+01	-0.26
S10CHead	n/a	5/13/97	6.4E+01	9.9E+00	1.4E+02	2.5E+01	4.0E+01	4.3E+01	3.5E+00	1.3E+01	2.13
S10CTail	n/a	5/13/97	8.8E+01	1.6E+01	1.9E+02	2.7E+01	5.3E+01	5.7E+01	5.1E+00	1.7E+01	0.66

Table 26. May - August 1997 Chemical Analyses from Research Site Locations in WCA2-A Page 2 of 2

Site	Orthophosphate⁺ (mg/L)	Phosphorus⁺ (mg/L)	NH4⁺ (mg/L)	TDS (mg/L)	SiO_2 (mg/L)	Total Dis. Iron (ug/L)	Barium (ug/L)	Aluminum (ug/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	DO (mg/L)	Temp. (ºC)
Analyst	**SFWMD**	**SFWMD**	**PPB**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**					
M.D.L.	**0.004 mg/L**	**0.01 mg/L**	**0.009 mg/L**		**1 mg/L**	**3.0 ug/L**	**0.2 ug/L**	**5.2 ug/L**					
WC2F1GW3	2.8E-02			3.2E+03	1.8E+01	1.6E+01	2.8E+01	2.5E+01	5816	6.83	-201.7	1.61	25.16
WC2F1GW4	0.004			1.4E+03	1.5E+01	2.2E+03	7.6E+01	4.7E+03	2659	6.81	-85.8		27.08
WC2F1SW	2.2E-01	3.1E-01		1.2E+03	3.0E+01	5.5E+00	8.7E+01	1.7E+01					
WC2F4GW3			1.3E+00	9.5E+02	2.4E+01	4.9E+01	3.5E+01	5.0E+01	1671	6.74	-139.7	2.59	30.48
WC2F4GW4	0.004			9.9E+02	2.6E+01	1.1E+03	5.4E+01		1838	6.99	-67	3.73	35.32
WC2F4SW	0.004			8.7E+02	8.0E+00	1.8E+01	7.6E+01	1.2E+01					
WC2U3GW3	9.0E-03	3.1E-02		1.3E+03	2.0E+01		4.9E+01	4.0E+01	2195	6.72	-160.1	1.65	27.68
WC2U3GW4	0.004	1.3E-01	1.4E+00	7.1E+02	2.3E+01	1.7E+03	1.0E+02	4.5E+03	1211	6.75	-97.9	0.64	28.95
WC2U3SW	5.0E-03	1.1E-02		4.9E+02	1.6E+01	8.2E+00	4.5E+01	9.5E+00					
WC2E1GW3	7.0E-03	4.6E-02		9.8E+02	1.9E+01	3.3E+01	4.9E+01	2.0E+02	2104	6.83	-194	4.16	27.25
WC2E1GW4	0.004	2.1E-02		1.0E+03	2.0E+01	6.9E+03	8.3E+01	1.4E+02	1718	6.61	-86.2	4	33.65
WC2E1SW	1.3E-02	3.2E-02		8.3E+02	2.9E+01	7.7E+00	7.3E+01	5.2	1097	7.2	-180.5	0.34	28.11
WC2E4GW3	5.0E-03	5.4E-02		1.1E+03	1.4E+01	2.3E+03	5.1E+01	7.1E+02	2547	6.97	-121.9	5.03	
WC2E4GW4	0.004	2.2E-02		7.2E+02	1.4E+01	3.1E+02	8.5E+01	1.2E+03	1303	7.65	-91.5	7.47	33.13
WC2E4SW	6.0E-03	1.2E-02		7.7E+02	2.4E+01	5.4E+00	6.8E+01	9.2E+00	1082	7.4	-36.6	4.52	29.81
WC2U1GW3	4.0E-03	2.7E-02		7.9E+02	1.7E+01	1.8E+03	3.8E+01	3.6E+02	1232	6.62	-79.2	2.46	30.19
WC2U1GW4	4.0E-03	4.5E-02		7.0E+02	1.4E+01	5.0E+02	3.0E+01	6.4E+02	1239	6.93	-115.2	3.23	36.3
WC2U1SW	0.004	8.0E-03		4.5E+02	1.5E+01	4.0E+00	4.0E+01	7.4E+00	711	7.65	-2.2	4.37	31.34
S10C-WA	5.0E-03	3.1E-02		7.9E+02	2.0E+01	3.8E+00	1.8E+01	1.1E+02	1362	6.85	-247.6	0.65	25.51
S10C-WB	6.0E-03	2.5E-02		6.8E+02	3.7E+01	2.4E+01	1.5E+01	1.1E+02	1022	6.95	-172.8	1.96	25.69
S10C-WC	1.5E-02	4.1E-02		5.8E+02	2.8E+01	4.9E+00	3.6E+01	1.2E+02	950	7.16	-244.8		23.76
S10CHead	0.004	2.5E-02		3.2E+02	8.6E+00	3.4E+00	3.0E+01	3.9E+01					
S10CTail	0.004	5.8E-02		4.2E+02	1.4E+01	7.7E+00	3.3E+01	4.8E+01					

Blank cells indicate no sample, no measurement, no analysis, or that the measurement was not applicable at that site.

* Cation anion balance = (cations-anions)/(cations + anions)*100.

Shaded cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

+ Results are reported in terms of elemental concentrations.

Table 27. September 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 1 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^2H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	Savana	Savana	Savana	Savana		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L			
MOP1-A	-89.73	09/23/97	2.4E+02	5.7E+01	5.0E+02	3.4E+01	2.1E+02	1.0E+02	6.9E+00	5.6E+01	3.32		
MOP1-B	-52.52	09/23/97	1.8E+02	9.2E+00	4.1E+02	3.8E+01	5.2E+01	9.8E+01	9.3E+00	2.6E+01	-16.65		
MOP2-A	-85.52	09/25/97	1.0E+02	2.2E+01	7.0E+02	3.2E+01	1.3E+02	7.5E+01	4.0E+01	2.4E+01	-16.58		
MOP2-B	-43.58	09/25/97	1.3E+02	1.6E+01	3.4E+02	3.7E+01	1.2E+02	8.2E+01	1.7E+01	2.6E+01	4.81		
MOP2-C	-15.37	09/25/97	1.3E+02	8.9E+00	3.1E+02	3.3E+01	9.8E+01	8.5E+01	8.3E+00	2.5E+01	3.55		
MOP3-A	-83.40	09/23/97	5.3E+03	1.6E+03	6.2E+02	5.5E+01	3.6E+03	2.0E+02	9.9E+01	2.8E+02	-0.55		
MP1-A	-85.45	09/09/97	1.3E+02	3.2E+01	4.1E+02	3.1E+01	1.2E+02	9.8E+01	5.3E+00	3.8E+01	3.32	2.8	-0.44
MP1-B	-43.98	09/09/97	1.4E+02	1.8E+01	3.7E+02	3.7E+01	1.2E+02	1.0E+02	9.9E+00	3.0E+01	4.91		
MP1-C	-4.56	09/09/97	1.2E+02	8.2E+00	3.7E+02	3.2E+01	1.0E+02	9.6E+01	9.7E+00	2.9E+01	3.67	3.4	-0.24
MP1-D	-5.80	09/09/97	1.3E+02	6.8E+00	3.3E+02	3.2E+01	1.0E+02	1.0E+02	9.9E+00	3.1E+01	7.88	7.6	0.21
MP2-A	-85.29	09/16/97	5.2E+03	8.1E+02	1.2E+03	3.3E+01	3.7E+03	8.2E+01	7.3E+01	1.6E+02	-1.55	12.2	1.66
MP2-B	-47.57	09/16/97	0.5	1.2E+02	8.2E+02	3.1E+01	8.2E+02	4.8E+01	2.6E+01	7.6E+01	40.87	7.6	0.85
MP2-C	-10.43	09/15/97	2.2E+02	4.5E+01	5.4E+02	6.3E+01	1.1E+02	1.6E+02	1.0E+01	7.8E+01	4.25	-5.3	-1.64
MP3-A	-173.95	09/15/97	8.0E+03	1.2E+03	6.1E+02	5.3E+01	5.3E+03	1.9E+02	1.7E+02	3.1E+01	-3.22	13.4	1.38
MP3-B	-79.39	09/15/97	2.3E+02	7.5E+01	1.7E+02	2.3E+01	2.3E+02	2.8E+01	1.5E+01	1.6E+01	6.70	5.4	0.36
MP3-C	-46.28	09/15/97	1.5E+02	2.9E+01	2.7E+02	3.0E+01	1.0E+02	8.6E+01	7.2E+00	2.6E+01	2.79	13.3	1.28
MP3-D	-9.85	09/15/97	1.9E+02	3.5E+01	3.3E+02	4.6E+01	1.4E+02	9.9E+01	9.5E+00	2.9E+01	3.80	5.0	-0.22
MP3-HW	n/a	09/15/97	1.6E+02	5.7E+01	2.8E+02	4.1E+01	1.3E+02	9.7E+01	8.3E+00	2.6E+01	6.21		
MP3-TW	n/a	09/15/97	1.6E+02	2.8E+01	3.0E+02	4.0E+01	1.4E+02	8.6E+01	9.3E+00	2.7E+01	7.00		
M102-P	-21.16	09/18/97	1.7E+03	3.4E+02	7.0E+02	3.3E+01	1.3E+03	1.0E+02	2.8E+01	1.1E+02	0.91		
M102-SW	n/a	09/18/97	2.1E+02	6.5E+01	2.4E+02		1.8E+02	6.0E+01	1.1E+01	2.9E+01	4.95		

Table 27. September 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 2 of 6

Site	Orthophosphate$^+$ (mg/L)	Phosphate$^+$ (mg/L)	Ammonium$^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh	DO (mg/L)	Temp. (ºC)	Hydraulic Head - 9/97 (feet - 1929 NGVD)
Analyst	SFWMD	W. Orem, USGS		Frontier	Frontier							
M.D.L.	0.004 mg/L	0.0016 mg/L	0.0007 mg/L	variable	variable							
MOP1-A	6.0E-03	5.0E-03	1.5E+00	0.93	0.043	1797.0	6.93	-268.0	-40	1.40	25.11	11.33
MOP1-B	1.4E-02	1.5E-02	2.4E+00	1.52	0.043	1339.0	6.93	-208.7	20.3	2.26	24.50	11.31
MOP2-A	4.0E-03	1.6E-03	9.6E-01	4.26	0.043	1214.0	6.67	-228.2	-0.2	5.19	24.99	13.45
MOP2-B	2.2E-02	1.2E-02	7.4E-01	0.97	0.043	1089.0	6.94	-260.3	-34.3	4.46	25.90	13.48
MOP2-C	1.2E-02	0.0016	7.7E-01	1.33	0.043	1014.0	6.95	-293.5	-61.5	0.30	23.16	13.72
MOP3-A	7.1E-02	3.7E-02	6.5E-01	14.19	0.058	18397.0	6.80	-276.0	-51	1.61	26.67	7.34
MP1-A	8.0E-03	5.4E-03	1.3E+00			1234.0	6.60	-246.4	-18.4	0.59	25.00	13.97
MP1-B	7.0E-03	0.0016	8.6E-01			1168.0	6.80	-288.8	-59.8	1.70	24.72	13.92
MP1-C	6.0E-03	1.3E-02	7.4E-01			1070.0	6.87	-283.8	-54.8	1.69	24.33	13.89
MP1-D	6.0E-03	1.2E-02	7.8E-01			1143.0	6.79	-261.7	-36.7	4.09	26.75	14.56
MP2-A	8.8E-02			1.04	0.026	17258.0	6.87	-287.7	-62.7	5.60	26.62	12.46
MP2-B	4.3E-02	5.6E-02	6.9E-01	0.57	0.025	4255.0	7.13	-257.3	-32.3	4.26	26.46	11.33
MP2-C	3.3E-02			2.65	0.026	1785.0	6.69	-254.8	-25.8	0.27	24.39	12.07
MP3-A	6.5E-02	2.4E-02	8.1E-01	1.84	0.026	25932.0	6.83	-223.9	-1.9	5.04	28.13	8.45
MP3-B	1.0E-02	5.0E-03	4.7E-01	0.01		1480.0	8.37	-270.6	-43.6	2.97	25.63	8.96
MP3-C	4.0E-03	0.0016	3.5E-01	0.50	0.026	1087.0	7.17	-304.1	-75.1	n/a	24.49	8.81
MP3-D	6.0E-03	1.3E-02	6.1E-01	0.48	0.026	1382.0	6.97	-316.5	-91.5	0.72	26.77	8.57
MP3-HW	1.6E-02			2.04	0.145	1225.0	6.94	-267.3	-42.3	0.57	26.54	7.56
MP3-TW	4.0E-03			1.57	0.026	1214.0	7.17	-145.1	75.9	1.70	28.45	12.52
M102-P	6.5E-02			0.78	0.026	6913.0	6.80	-279.9	-50.9	1.38	24.57	11.47
M102-SW	6.0E-03			0.55	0.026	1358.0	8.20	-82.0	138	18.67	28.97	11.64

Table 27. September 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 3 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^2H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	Savana	Savana	Savana	Savana		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L			
M103-P	-19.29	09/10/97	8.2E+02	1.3E+02	7.6E+02	2.9E+01	8.0E+02	6.2E+01	1.9E+01	6.0E+01	2.49	9.5	1.06
M103-PZ	-1.19	09/10/97	1.5E+02	5.2E+01	4.3E+02	3.9E+01	1.2E+02	1.3E+02	4.9E+00	3.8E+01	3.57	-4.4	-1.52
M103-SW	n/a	09/10/97	1.4E+02	2.9E+01	2.3E+02	3.6E+01	1.2E+02	5.8E+01	7.3E+00	2.5E+01	5.67		
M203-P	-19.51	09/10/97	4.2E+00	8.4E+00	2.9E+02	2.0E+00	1.5E+01	4.1E+00	3.3E+01			-4.2	-1.37
M203-PZ	-2.70	09/10/97	1.8E+02	1.0E+02	5.9E+02	7.7E+01	1.9E+02	1.7E+02	6.1E+00	4.2E+01	3.78	-8.2	-2.14
M203-SW	n/a	09/10/97	1.8E+02	7.9E+01	2.9E+02	4.9E+01	1.5E+02	1.1E+02	9.8E+00	3.4E+01	9.20		
M204-P	-19.14	09/24/97	2.5E+02	4.0E+01	5.7E+02	6.7E+01	1.9E+02	1.3E+02	1.2E+01	7.0E+01	4.54		
M204-SW	n/a	09/24/97	2.1E+02	8.4E+01	3.4E+02		1.7E+02	1.1E+02	9.9E+00	3.5E+01	4.90		
M303-P	-18.22	09/18/97	1.6E+02	4.5E+01	3.6E+02	3.3E+01	1.4E+02	9.1E+01	8.2E+00	4.1E+01	6.12		
M303-SW	n/a	09/18/97	1.6E+02	2.0E+01	2.9E+02		1.3E+02	8.4E+01	7.5E+00	2.6E+01	6.45		
M401-P	-18.82	09/24/97	1.4E+02	3.6E+01	4.5E+02	4.0E+01	1.2E+02	1.1E+02	8.4E+00	4.5E+01	3.23		
M401-SW	n/a	09/24/97	1.6E+02	6.4E+01	1.9E+02		1.3E+02	5.8E+01	7.9E+00	2.8E+01	7.17		
ENR002	n/a	09/16/97	2.2E+02	1.3E+02	3.8E+02	7.9E+01	1.8E+02	1.3E+02	9.7E+00	4.4E+01	5.52		
ENR011	n/a	09/16/97	2.2E+02	4.1E+01	3.4E+02	4.0E+01	1.9E+02	9.4E+01	9.9E+00	3.1E+01	6.65		
ENR004	n/a	09/16/97	1.7E+02	8.4E+01	3.3E+02	5.3E+01	1.4E+02	1.2E+02	8.8E+00	3.4E+01	7.15		
ENR012	n/a	09/16/97	1.6E+02	6.0E+01	2.6E+02	4.5E+01	1.3E+02	8.2E+01	8.9E+00	3.0E+01	5.77		
ENRG259	n/a	09/16/97	1.6E+02	2.5E+01	3.0E+02	3.7E+01	1.3E+02	8.4E+01	9.1E+00	2.8E+01	5.72		
WC2F1GW3	-15.99	09/14/98	1.4E+03	1.5E+02	7.3E+02	3.8E+01	1.0E+03	1.3E+02	6.5E+00	7.6E+01	-0.70	9.7	1.43
WC2F1GW4	3.47	09/14/97	4.9E+02	3.5E+00	5.7E+02	4.6E+01						7.1	0.60
WC2F1SW	n/a	09/14/97	1.4E+02	6.0E+01	2.6E+02	5.2E+01	1.0E+02	8.1E+01	9.2E+00	2.9E+01	3.74		
WC2F4GW3	-11.92	09/11/97	2.3E+02	1.000	5.0E+02	4.8E+01	1.9E+02	1.3E+02	2.6E+00	3.2E+01	2.70	10.5	1.49
WC2F4GW4	4.52	09/11/97	2.6E+02	1.000	5.2E+02	4.7E+01	2.0E+02	1.5E+02	2.6E+00	3.1E+01	2.67	7.4	0.68
WC2F4SW	n/a	09/11/97	1.6E+02	7.2E+01	2.9E+02	5.2E+01	1.2E+02	8.7E+01	8.7E+00	3.4E+01	4.17		

Table 27. September 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 4 of 6

Site	Orthophosphate^{+} (mg/L)	Phosphate^{+} (mg/L)	Ammonium^{+} (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh	DO (mg/L)	Temp. (ºC)	Hydraulic Head - 9/97 (feet 1929 NGVD)
Analyst	SFWMD	W. Orem, USGS		Frontier	Frontier							
M.D.L.	0.004 mg/L	0.0019 mg/L	0.0007 mg/L	variable	variable							
M103-P	7.7E-02	6.7E-02	1.1E+00	2.94	0.025	4091.0	6.83	-263.7	-34.7	0.75	24.66	10.91
M103-PZ	5.1E-02			1.69	0.183	1406.0	6.79	-167.9	60.1	0.49	24.81	12.00
M103-SW	1.7E-02	2.0E-03	6.9E-02	1.21	0.025	1751.0	7.31	-209.1	8.9	2.73	30.26	11.64
M203-P	1.5E-02	2.0E-03	1.8E+00	3.76	0.059	1685.0	7.13	-259.3	-29.3	0.08	24.01	12.53
M203-PZ	3.0E-02	3.2E-02	2.0E+00	3.31	0.064	2786.0	6.56	-143.2	85.8	1.00	24.35	12.51
M203-SW	6.0E-03	0.0016	6.3E-02	1.32	0.069	2273.0	7.30	-253.0	-29	1.22	27.23	11.27
M204-P	3.6E-02	2.2E-02	1.6E+00	1.75	0.043	1888.0	6.53	-238.4	-9.4	4.62	24.53	11.62
M204-SW	8.0E-03	0.0016	2.4E-02	0.74	0.043	1458.0	7.76	-115.3	102.7	11.01	29.92	11.27
M303-P	6.0E-03			0.78	0.026	1319.0	7.01	-258.6	-28.6	0.09	24.24	11.02
M303-SW	4.9E-02			0.77	0.026	1179.0	7.27	-145.5	76.5	2.62	28.01	11.13
M401-P	1.1E-02	2.0E-03	2.3E+00	2.56	0.043	1397.0	6.67	-212.1	16.9	4.32	24.35	11.79
M401-SW	4.0E-03	0.0016	1.6E-02	0.92	0.043	1102.0	7.99	-8.1	212.9	14.04	28.78	11.91
ENR002	7.5E-02	7.3E-02	3.5E-01	7.15	0.257	1693.0	7.38	-45.0	175	3.47	28.96	10.87
ENR011	4.0E-03	2.0E-03	6.2E-01	25.91	0.053	1509.0	7.19	-205.5	18.5	1.02	27.12	7.62
ENR004	6.0E-02			2.33	0.133	1362.0	7.24	-31.3	192.7	1.48	27.02	16.76
ENR012	8.0E-03			0.98	0.042	1226.0	7.28	-61.5	161.5	4.00	27.79	10.75
ENRG259	4.0E-03			1.41	0.026	1162.0	6.63	-219.9	2.5	2.36	28.28	10.75
WC2F1GW3	3.0E-02	5.0E-03	6.8E-01	1.01	0.025	5109.0	6.72	-272.6	234.6	0.44	23.34	11.52
WC2F1GW4	2.8E-02	1.2E-02	9.8E-01	1.63	0.025	2331.0	6.57	-114.9	115.1	1.21	23.87	11.54
WC2F1SW	1.7E-02	0.0016	2.1E-02	2.87	0.057	931.0	7.41	6.6	-41.6	1.54	24.92	--
WC2F4GW3	9.0E-03	1.5E-02	5.5E-01	0.87	0.025	1425.0	6.66	-175.5	149	0.56	23.67	11.24
WC2F4GW4	5.0E-03	2.0E-03	9.0E-01	1.06	0.039	1564.0	6.52	-76.6	152.4	0.83	24.72	11.25
WC2F4SW	8.0E-03			1.66	0.139	1022.0	7.36	-74.0	55.5	2.06	27.50	11.30

Table 27. September 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 5 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^2H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	Savana	Savana	Savana	Savana		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L			
WC2U3GW3	-16.97	09/11/97	4.4E+02	3.9E+00	5.6E+02	1.7E+01	3.2E+02	1.2E+02	4.0E+00	5.8E+01	2.01	11.9	1.86
WC2U3GW4	3.89	09/11/97	1.6E+02	1.000	3.7E+02	2.0E+01	9.2E+01	1.4E+02	2.2E+00	2.3E+01	4.34	9.5	1.27
WC2U3SW	n/a	09/11/97	1.6E+02	6.2E+01	2.7E+02	5.4E+01	1.2E+02	7.7E+01	8.5E+00	3.3E+01	4.57		
WC2E1GW3	-9.17	09/17/97	4.3E+02	7.9E+00	5.0E+02	2.1E+01	2.9E+02	1.3E+02	4.3E+00	3.8E+01	0.20		
WC2E1GW4	2.36	09/17/97	2.8E+02	1.000	5.0E+02	3.9E+01	1.8E+02	1.7E+02	2.3E+00	2.4E+01	1.29		
WC2E1SW	n/a	09/17/97	1.1E+02	4.7E+01	2.9E+02	3.7E+01	8.4E+01	7.1E+01	7.3E+00	2.4E+01	-2.68		
WC2E4GW3	-6.41	09/17/97	4.3E+02	7.2E+00	4.4E+02	1.9E+01	2.9E+02	1.3E+02	4.9E+00	3.5E+01	2.62		
WC2E4GW4	3.58	09/17/97	2.5E+02	9.4E+00	2.3E+02	1.6E+01	1.8E+02	1.1E+02	5.7E+00	1.4E+01	10.87		
WC2E4SW	n/a	09/17/97	1.2E+02	5.3E+01	2.6E+02	4.0E+01	1.0E+02	7.5E+01	7.8E+00	2.8E+01	4.75		
WC2U1GW3	-12.11	09/17/97	1.8E+02	1.000	4.4E+02	2.5E+01	1.2E+02	1.5E+02	2.4E+00	1.8E+01	1.17		
WC2U1GW4	-4.58	09/17/97	1.9E+02	5.5E+00	3.1E+02	2.6E+01	1.4E+02	1.1E+02	4.3E+00	1.3E+01	5.07		
WC2U1SW	n/a	09/17/97	8.6E+01	3.0E+01	1.9E+02	3.2E+01	6.8E+01	6.0E+01	5.2E+00	2.0E+01	6.49		
S10C-WA	-79.18	09/14/97	1.4E+02	2.9E+01	4.4E+02	2.8E+01	1.3E+02	1.1E+02	5.5E+00	3.2E+01	1.79	7.9	0.92
S10C-WB	-41.67	09/14/97	1.0E+02	1.2E+00	3.5E+02	2.9E+01	7.9E+01	8.8E+01	8.1E+00	2.7E+01	1.57	4.8	0.38
S10C-WC	-9.83	09/14/97	1.2E+02	2.9E+00	2.9E+02	3.5E+01	9.2E+01	7.3E+01	7.0E+00	2.3E+01	2.58	13.7	1.79
S10CHead	n/a	09/14/97	1.6E+02	6.7E+01	3.2E+02	5.0E+01	1.2E+02	1.0E+02	8.2E+00	3.5E+01	4.44		
S10CTail	n/a	09/14/97	1.4E+02	4.9E+01	2.8E+02	4.3E+01	1.0E+02	9.0E+01	7.9E+00	2.9E+01	4.57		

Blank cells indicate no sample, no measurement, no analysis, or that the measurement was not applicable at that site.

Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Shaded cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

* Cation anion balance = (cations-anions)/(cations + anions)*100.

\+ Results are reported in terms of elemental concentrations.

** The precision of stable isotope analysis is 1 ($^o/_{oo}$) for ^2H and 0.1 ($^o/_{oo}$) for ^{18}O

Table 27. September 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 6 of 6

Site	Orthophosphate$^+$ (mg/L)	Phosphate$^+$ (mg/L)	Ammonium$^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh	DO (mg/L)	Temp. (ºC)	Hydraulic Head - 9/97 (feet - 1929 NGVD)
Analyst	SFWMD	W. Orem, USGS		Frontier	Frontier							
M.D.L.	0.004 mg/L	0.0019 mg/L	0.0007 mg/L	variable	variable							
WC2U3GW3	1.6E-02	8.1E-03	6.6E-01	2.85	0.630	2223.0	6.70	-198.7	183.2	0.70	24.49	11.21
WC2U3GW4	7.0E-03	2.0E-03	8.3E-01	0.36	0.049	1180.0	6.69	-106.4	122.4	0.96	25.32	11.22
WC2U3SW	8.0E-03	0.0016	1.9E-02	1.91	0.025	1050.0	7.56	-37.8	30.3	4.83	28.60	11.24
WC2E1GW3	6.0E-03			5.60	0.026	2263.0	6.63	-237.2	170.1	0.41	23.78	11.54
WC2E1GW4	4.0E-03			0.91	0.026	1831.0	6.46	-106.8	123.2	0.92	24.15	11.53
WC2E1SW	4.0E-03			1.22	0.032	916.0	7.25	-53.9	-7.2	4.29	26.84	11.51
WC2E4GW3	4.0E-03			0.35	0.026	1033.0	7.21	-65.5	97.1	3.62	26.66	11.57
WC2E4GW4	4.0E-03			0.63	0.026	1418.0	6.78	-127.0	102	0.74	24.66	11.58
WC2E4SW	4.0E-03			2.32	0.392	2257.0	6.73	-132.9	159.5	0.77	23.99	11.43
WC2U1GW3	4.0E-03			1.23	0.026	1411.0	6.57	-83.7	198.6	0.92	24.64	11.65
WC2U1GW4	4.0E-03			8.20	7.503	1181.0	6.73	-115.2	112.8	0.84	25.05	11.72
WC2U1SW	4.0E-03			2.20	0.605	736.0	7.18	-23.4	145.3	3.87	28.08	11.51
S10C-WA	1.3E-02	2.3E-03	1.0E+00	1.20	0.026	1166.0	6.88	-257.4	-34.4	1.96	27.66	15.03
S10C-WB	4.0E-03	0.0016	2.5E+00	1.32	0.025	855.0	7.04	-236.2	-15.2	1.90	28.77	15.74
S10C-WC	2.2E-02	1.2E-02	1.2E+00	2.54	0.025	837.0	7.24	-268.1	-39.1	0.25	24.36	14.46
S10CHead	1.5E-02	5.4E-03	1.3E-02	3.21	0.056	1076.0	7.62	-54.6	166.4	2.56	28.43	16.89
S10CTail	▨ 1.6E-01	5.1E-02	1.5E-01	3.62	0.428	957.0	7.52	-69.1	148.9	4.73	30.32	13.09

Blank cells indicate no sample, no measurement, no analysis, or that the measurement was not applicable at that site.

Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Shaded cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

* Cation anion balance = (cations-anions)/(cations + anions)*100.

\+ Results are reported in terms of elemental concentrations.

** The precision of stable isotope analysis is 1 ($^o/_{oo}$) for ^{2}H and 0.1 ($^o/_{oo}$) for ^{18}O

Table 28. December 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^2H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L			
MOP1-A	-89.73	12/03/97	2.3E+02	6.5E+01	4.9E+02	3.4E+01	2.0E+02	1.0E+02	8.7E+00	5.5E+01	2.65		
MOP1-B	-52.52	12/03/97	1.8E+02	1.1E+01	4.0E+02	3.6E+01	1.4E+02	1.0E+02	5.0E+00	2.6E+01	1.38		
MOP2-A	-85.52	12/03/97	1.3E+02	3.0E+01	3.7E+02	3.8E+01	1.1E+02	1.1E+02	7.4E+00	2.7E+01	4.36		
MOP2-B	-43.58	12/03/97	1.1E+02	3.6E+01	3.1E+02	3.4E+01	1.1E+02	8.5E+01	1.1E+01	2.5E+01	4.81		
MOP2-C	-15.37	12/02/97	1.3E+02	8.8E+00	3.2E+02	3.5E+01	9.3E+01	9.0E+01	7.6E+00	2.6E+01	3.34		
MOP3-A	-83.40	12/11/97	5.3E+03	1.6E+03	8.7E+02	3.7E+01	4.4E+03	2.0E+02	1.2E+02	2.8E+02	6.12		
MP1-A	-85.45	12/09/97	1.4E+02	2.9E+01	4.0E+02	3.2E+01	1.2E+02	9.5E+01	5.7E+00	3.6E+01	2.32		
MP1-B	-43.98	12/09/97	1.4E+02	1.6E+01	3.7E+02	3.8E+01	1.1E+02	9.4E+01	1.0E+01	2.7E+01	1.87		
MP1-C	-4.56	12/11/97	1.3E+02	4.9E+00	3.6E+02	3.2E+01	9.9E+01	9.0E+01	1.1E+01	2.7E+01	1.72	3.5	0.04
MP1-D	-5.80	12/11/97	1.4E+02	5.9E+00	3.9E+02	3.5E+01	1.0E+02	1.0E+02	1.1E+01	3.0E+01	1.41	5.9	0.25
MP2-A	-85.29	12/09/97	5.1E+03	8.0E+02	1.2E+03	4.7E+01	4.4E+03	8.2E+01	9.0E+01	1.6E+02	7.26		
MP2-B	-47.57	12/09/97	1.1E+03	1.4E+02	8.6E+02	4.0E+01	1.1E+03	4.9E+01	3.5E+01	7.9E+01	6.42		
MP2-C	-10.43	12/09/97	1.9E+02	5.1E+01	5.4E+02	6.1E+01	8.4E+01	1.5E+02	1.2E+01	7.8E+01	1.89	-7.8	-2.05
MP3-A	-173.95	12/10/97	9.0E+03	1.3E+03	5.9E+02	3.6E+01	6.5E+03	2.2E+02	2.0E+02	3.3E+02	5.23		
MP3-B	-79.39	12/10/97	2.2E+02	5.0E+01	2.9E+02	2.5E+01	2.2E+02	5.2E+01	1.6E+01	3.0E+01	6.66		
MP3-C	-46.28	12/10/97	1.8E+02	2.9E+01	3.2E+02	3.5E+01	1.4E+02	9.2E+01	9.2E+00	2.7E+01	3.61		
MP3-D	-9.85	12/10/97	1.3E+02	3.0E+01	2.5E+02	3.1E+01	1.1E+02	6.8E+01	9.2E+00	2.0E+01	4.90	12.4	1.51
MP3-HW	n/a	12/10/97	2.0E+02	1.0E+02	3.6E+02	5.0E+01	1.7E+02	1.2E+02	1.4E+01	3.7E+01	5.50		
MP3-TW	n/a	12/10/97	1.5E+02	3.8E+01	2.8E+02	3.3E+01	1.2E+02	7.6E+01	9.5E+00	2.3E+01	2.61		
M102-P	-21.16	12/15/97	1.6E+03	2.9E+02	6.8E+02	3.4E+01	1.3E+03	1.0E+02	3.4E+01	1.0E+02	5.13		
M102-SW	n/a	12/15/97	2.9E+02	6.4E+01	3.4E+02	4.1E+01	2.4E+02	8.5E+01	1.2E+01	3.3E+01	3.93		

Table 28. December 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 2 of 6

Site	Orthophosphate$^+$ (mg/L)	Phosphate$^+$ (mg/L)	Ammonium $^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 12/97 (feet - 1929 NGVD)
Analyst	SFWMD	W. Orem, USGS		Frontier	Frontier								
M.D.L.	0.004 mg/L	0.0016 mg/L	0.0007 mg/L	variable	variable								
MOP1-A	7.0E-02	1.88E-02	7.69E-02	0.52	0.026	3270	6.87	-230.9	-8.3	2.78	32.9	24.89	11.38
MOP1-B	7.9E-02	4.05E-02	1.89E+00	0.63	0.026	2431	6.96	-196.5	28.1	2.77	32.1	23.79	11.515
MOP2-A	5.3E-02	2.68E-02	6.05E-01	1.56	0.026	2242	6.94	-257.4	-31.8	2.83	32.6	23.44	13.82
MOP2-B	6.1E-02	1.88E-02	1.81E-01	0.44	0.026	2015	7.07	-257.9	-33.3	2.54	29.4	23.71	13.84
MOP2-C	5.5E-02	2.76E-02	6.71E-01	0.52	0.026	1038	7.09	-280.3	-53.7			22.79	14.09
MOP3-A	1.0E-01	4.55E-02	5.94E-01	0.71	0.02	18010	6.7	-326.1	-102.6			24.92	6.06
MP1-A	1.4E-02	1.92E-02	5.78E-01	0.44	0.018	1203	6.88	-264.3	-37.8	1.94	22.5	23.64	14.28
MP1-B	1.4E-02	5.73E-03	7.67E-01	2.54	0.018	1124	6.9	-308.7	-82.2	2.33	26.9	23.58	14.21
MP1-C	2.0E-02	1.30E-02	6.83E-01	0.48	0.019	1063	6.95	-318.6	-92.1	1.49	17.2	23.50	14.15
MP1-D	1.7E-02	0.0016	5.32E-01	0.55	0.019	1146	6.86	-305.6	-78.1			23.05	14.99
MP2-A	9.2E-02	9.91E-02	3.43E-01	2.04	0.019	17030	6.81	-310.9	-85.4	1.82	21.3	24.38	11.53
MP2-B	4.7E-02	7.29E-02	3.22E-01	0.81	0.018	4900	6.97	-313.3	-87.8	1.26	14.8	24.44	11.96
MP2-C	2.9E-02	3.90E-02	2.31E+00	0.33	0.018	1653	6.52	-245.5	-18	0.72	8.54	25.08	11.99
MP3-A	6.6E-02	7.51E-02	1.28E+00	1.13	0.022	26860	6.67	-288.1	-60.6			24.80	8.06
MP3-B	1.9E-02	9.94E-03	4.54E-01	0.93	0.02	1156	7.62	-323.5	-89	0.85	9.93	24.21	8.74
MP3-C	1.4E-02	2.80E-02	4.98E-01	4.11	0.019	1056	7.02	-311.8	-85.3	1.1	11	23.02	8.63
MP3-D	1.6E-02	0.0016	4.45E-01	1.64	0.019	951	7.15	-294.9	-68.4	0.91	11	23.12	8.44
MP3-HW	4.6E-02	3.43E-02	2.28E-01	1.85	0.065	1520	7.21	-13.0	226.5	1.79	19.3	19.73	12.4
MP3-TW	9.0E-03	1.09E-03	3.98E-01	0.92	0.019	1056	7.26	-38.9	187.6	1.53	17.7	23.72	7.781
M102-P	6.4E-02	7.51E-02	9.27E-01	3.12	0.148	6338	6.99	-287.6	201.4	1.1	12.7	23.36	11.12
M102-SW	9.0E-03	5.30E-03	3.56E-01	1.14	0.021	1654	7.98	-126.8	113.2			17.23	n/a

Table 28. December 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 3 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^2H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L			
M103-P	-19.29	12/15/97	9.1E+02	1.2E+02	8.2E+02	3.2E+01	9.5E+02	6.0E+01	2.8E+01	6.9E+01	6.55	8.5	1.20
M103-PZ	-1.19	12/15/97	1.8E+02	4.2E+01	4.5E+02	4.1E+01	1.0E+02	1.4E+02	6.1E+00	4.0E+01	0.11	-3.6	-1.57
M103-SW	n/a	12/15/97	2.4E+02	5.7E+01	2.3E+02	3.2E+01	2.1E+02	5.1E+01	1.4E+01	2.8E+01	6.41		
M203-P	-19.51	12/18/97	1.1E+02	2.0E+01	4.2E+02	3.0E+01	1.1E+02	6.4E+01	1.1E+01	4.5E+01	0.86	-5.0	-1.31
M203-PZ	-2.70	12/18/97	1.8E+02	1.0E+02	6.0E+02	9.5E+01	1.8E+02	1.7E+02	5.6E+00	4.0E+01	1.68	-8.8	-2.10
M203-SW	n/a	12/18/97	1.9E+02	9.0E+01	3.4E+02	4.5E+01	1.5E+02	1.1E+02	1.0E+01	3.7E+01	4.23		
M204-P	-19.14	12/18/97	2.5E+02	3.9E+01	5.5E+02	4.9E+01	1.5E+02	1.1E+02	9.7E+00	3.7E+01	-10.23		
M204-SW	n/a	12/18/97	2.0E+02	9.2E+01	3.4E+02	4.8E+01	1.5E+02	1.1E+02	9.7E+00	3.6E+01	3.56		
M303-P	-18.22	12/09/97	1.7E+02	4.6E+01	3.5E+02	3.3E+01	1.3E+02	8.5E+01	8.6E+00	3.7E+01	1.15		
M303-SW	n/a	12/09/97	1.5E+02	2.1E+01	3.0E+02	4.3E+01	1.1E+02	8.5E+01	8.7E+00	2.2E+01	2.24		
M401-P	-18.82	12/09/97	1.6E+02	3.3E+01	4.6E+02	4.2E+01	1.1E+02	1.2E+02	8.3E+00	4.3E+01	0.72		
M401-SW	n/a	12/09/97	1.4E+02	4.5E+01	2.2E+02	7.7E+01	9.8E+01	6.5E+01	9.1E+00	2.2E+01	2.30		
ENR002	n/a	12/19/97	1.7E+02	9.7E+01	5.5E+02	5.7E+01	1.2E+02	1.3E+02	9.5E+00	3.7E+01	-8.23		
ENR011	n/a	12/19/97	3.3E+02	6.6E+01	3.6E+02	3.6E+01	2.5E+02	9.1E+01	9.7E+00	3.2E+01	1.33		
ENR004	n/a	12/19/97	1.9E+02	1.0E+02	3.6E+02	5.2E+01	1.3E+02	1.2E+02	1.0E+01	3.8E+01	2.24		
ENR012	n/a	12/19/97	1.9E+02	6.7E+01	2.7E+02	3.8E+01	1.3E+02	7.7E+01	9.5E+00	2.9E+01	0.69		
ENRG259	n/a	12/19/97	1.5E+02	2.8E+01	2.8E+02	3.4E+01	1.0E+02	7.9E+01	7.0E+00	2.5E+01	1.73		
WC2F1GW3	-15.99	12/08/97	1.4E+03	1.6E+02	7.2E+02	2.9E+01	1.2E+03	1.3E+02	9.0E+00	7.4E+01	7.54	11.9	1.52
WC2F1GW4	3.47	12/08/97	5.0E+02	1	5.7E+02	3.8E+01	4.2E+02	1.3E+02	3.8E+00	3.7E+01	4.44	7.4	0.85
WC2F1SW	n/a	12/08/97	1.8E+02	3.3E+01	3.0E+02	5.0E+01	1.3E+02	8.8E+01	9.0E+00	2.9E+01	3.63		
WC2F4GW3	-11.92	12/08/97	2.6E+02	1	5.1E+02	3.3E+01	2.0E+02	1.5E+02	3.2E+00	2.9E+01	3.10		
WC2F4GW4	4.52	12/08/97	2.4E+02	1.1E+00	5.0E+02	2.6E+01	1.9E+02	1.3E+02	3.0E+00	3.0E+01	1.40		
WC2F4SW	n/a	12/08/97	1.2E+02	3.0E+01	2.2E+02	3.0E+01	8.1E+01	6.5E+01	9.4E+00	2.2E+01	2.51		

Table 28. December 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 4 of 6

Site	Orthophosphate$^+$ (mg/L)	Phosphate$^+$ (mg/L)	Ammonium$^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 12/97 (feet - 1929 NGVD)
Analyst	SFWMD	W. Orem, USGS		Frontier	Frontier								
M.D.L.	0.004 mg/L	0.0019 mg/L	0.0007 mg/L	variable	variable								
M103-P	7.5E-02	6.26E-02	8.27E-01	1.89	0.021	4430	7.07	-301.8	-70.8			23.66	11.16
M103-PZ	4.5E-02	3.99E-02	2.16E+00	1.14	0.062	1423	6.83	-22.5	209.5	1.42	16.5	23.97	12.24
M103-SW	2.5E-02	1.92E-02	1.01E-01	0.77	0.021	1383	7.58	-222.1	22.9	6.14	65.2	18.76	n/a
M203-P	2.7E-02	0.0016	1.54E+00	0.8	0.022	1075	7.53	-278.1	-47.1	1.03	11.9	23.29	12.07
M203-PZ	4.1E-02	1.81E-02	1.74E+00	5	0.072	1775	6.77	-14.2	230.8	1.37	15.7	22.92	12.09
M203-SW	1.3E-02	0.0016	4.27E-02	1.28	0.022	1398	7.81	-2.5	227.5	8.01	81	16.25	n/a
M204-P	3.5E-02	0.0016	1.36E+00	0.85	0.021	1785	6.8	-282.3	-59.3	1.52	17.5	23.33	11.8
M204-SW	1.2E-02	0.0016	1.38E-01	0.55	0.022	1410	7.54	-161.4	168.6	6.68	67.9	16.47	n/a
M303-P	1.1E-02	1.09E-03	7.85E-01	1.13	0.018	1319	7.01	-240.7	-3.2	0.89	10.4	23.94	10.9
M303-SW	3.9E-02	1.92E-02	2.28E-01	0.48	0.018	1078	7.26	-157.7	79.8	5.49	67.9	27.62	n/a
M401-P	1.3E-02	9.94E-03	2.00E+00	0.39	0.019	1429	6.81	-190.0	42.5	0.82	9.54	23.91	12.25
M401-SW	6.0E-03	5.30E-03	1.12E-02	0.46	0.019	988	7.73	-70.5	169	9.81	103	18.24	n/a
ENR002	9.4E-02	7.32E-02	5.04E-01	1.27	0.139	1396	7.28	-88.8	160.2	3.75	39.4	18.16	n/a
ENR011	8.0E-03	0.0016	5.52E-01	1.42	0.021	1836	7.24	-111.5	122.5	1.16	12.8	20.75	n/a
ENR004	6.9E-02	5.14E-02	2.41E-01	1.08	0.083	1412	7.28			2.46	25.2	16.83	n/a
ENR012	1.1E-02	0.0016	2.04E-02	0.7	0.022	1207	7.67	28.4	259.4	7.64	74.2	14.21	n/a
ENRG259	8.0E-03	0.0016	2.23E-01	0.49	0.022	1051	7.22	-200.1	44.9	1.24	13.9	21.91	n/a
WC2F1GW3	3.7E-02	2.93E-02	4.72E-01	2.97	0.018	10899	6.76	-209.7	17.8	1.21	13.9	23.19	11.17
WC2F1GW4	1.1E-02	1.46E-02	8.53E-01	0.74	0.019	5046	6.67	-65.6	161.9	1.09	12.6	23.51	11.18
WC2F1SW	2.3E-02	9.94E-03	4.37E-02	1.27	0.019	2257	7.49			7.32	74	16.18	11.25
WC2F4GW3	7.0E-03	9.94E-03	5.68E-01	1.82	0.018	3402	6.70	-141.6	81.9	1.31	10.9	23.33	10.86
WC2F4GW4	1.3E-02	9.94E-03	6.61E-01	0.77	0.028	3166	6.74	-93.7	131.8	0.95	15.1	23.21	10.88
WC2F4SW	5.0E-03	5.30E-03	9.31E-03	1.38	0.039	1629	7.49	-80.3	141.2	8.10	82.3	16.45	n/a

Table 28. December 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A **Page 5 of 6**

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^{2}H ($^{o}/_{oo}$)	delta ^{18}O ($^{o}/_{oo}$)
Analyst			**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**		**USGS****	**USGS****
M.D.L.			**0.5 mg/L**	**1.0 mg/L**	**1.0 mg/L**	**1.0 mg/L**	**0.01 mg/L**	**0.01 mg/L**	**0.01 mg/L**	**0.01 mg/L**			
WC2U3GW3	-16.97	12/11/97	1.7E+02	1.6E+00	3.7E+02	4.3E+01	9.2E+01	1.3E+02	2.7E+00	2.1E+01	-0.17	13.5	1.90
WC2U3GW4	3.89	12/11/97	4.5E+02	1.2E+00	5.5E+02	2.8E+01	3.4E+02	1.1E+02	5.1E+00	5.4E+01	2.37	11.2	1.32
WC2U3SW	n/a	12/11/97	1.1E+02	2.1E+01	2.0E+02	3.7E+01	8.0E+01	4.8E+01	7.0E+00	2.1E+01	2.76		
WC2E1GW3	-9.17	12/04/97	4.0E+02	8.2E+00	5.0E+02	2.4E+01	2.9E+02	1.4E+02	5.2E+00	3.7E+01	3.19		
WC2E1GW4	2.36	12/04/97	2.6E+02	1	4.9E+02	5.1E+01	1.7E+02	1.7E+02	2.7E+00	2.3E+01	1.60		
WC2E1SW	n/a	12/04/97	1.4E+02	2.8E+01	2.6E+02	4.5E+01	9.2E+01	8.0E+01	6.3E+00	2.4E+01	1.90		
WC2E4GW3	-6.41	12/04/97	2.5E+02	7.0E+00	3.2E+02	2.6E+01	1.7E+02	1.1E+02	5.8E+00	1.3E+01	2.07		
WC2E4GW4	3.58	12/04/97	4.5E+02	7.1E+00	4.3E+02	1.8E+01	2.9E+02	1.4E+02	5.5E+00	3.3E+01	2.52		
WC2E4SW	n/a	12/04/97	9.3E+01	2.6E+01	1.8E+02	2.6E+01	6.1E+01	5.7E+01	7.9E+00	1.6E+01	2.05		
WC2U1GW3	-12.11	12/11/97	1.9E+02	1.1E+00	4.3E+02	3.5E+01	1.2E+02	1.4E+02	3.0E+00	1.7E+01	-0.74		
WC2U1GW4	-4.58	12/11/97	1.9E+02	4.3E+00	3.0E+02	2.8E+01	1.3E+02	1.0E+02	5.5E+00	1.2E+01	0.93		
WC2U1SW	n/a	12/11/97	1.1E+02	3.8E+01	2.0E+02	3.7E+01	8.2E+01	5.6E+01	7.1E+00	2.2E+01	2.02		
S10C-WA	-79.18	12/08/97	1.5E+02	7.6E+00	3.3E+02	3.3E+01	9.5E+01	9.4E+01	9.3E+00	2.9E+01	1.52		
S10C-WB	-41.67	12/08/97	1.1E+02	1.1E+00	3.5E+02	2.8E+01	7.5E+01	8.9E+01	9.2E+00	2.7E+01	0.52	4.2	0.45
S10C-WC	-9.83	12/08/97	1.6E+02	8.8E+00	4.5E+02	2.3E+01	1.3E+02	1.1E+02	6.3E+00	3.1E+01	0.78	2.0	0.07
S10CHead	n/a	12/08/97	1.6E+02	6.8E+01	3.6E+02	4.4E+01	1.3E+02	1.0E+02	1.1E+01	3.8E+01	3.84		
S10CTail	n/a	12/08/97	1.6E+02	2.6E+01	3.7E+02	3.3E+01	1.2E+02	9.8E+01	8.5E+00	3.0E+01	1.97		

Table 28. December 1997 Chemical Analyses from Research Site Locations in ENR and WCA2-A

Site	Orthophosphate$^+$ (mg/L)	Phosphate$^+$ (mg/L)	Ammonium$^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (°C)	Hydraulic Head - 12/97 (feet - 1929 NGVD)
Analyst	**SFWMD**	**W. Orem, USGS**		**Frontier**	**Frontier**								
M.D.L.	**0.004 mg/L**	**0.0019 mg/L**	**0.0007 mg/L**	**variable**	**variable**								
WC2U3GW3	1.1E-02	0.0016	3.54E-01	0.46	0.019	1265	6.70	-166.8	60.7	0.73	8.64	24.99	10.87
WC2U3GW4	2.2E-02	0.0016	6.82E-01	0.46	0.023	2405	6.74	-100.6	125.9	0.70	8.2	24.34	10.89
WC2U3SW	6.0E-03	0.0016	9.46E-03	1.74	0.121	777	7.83	-99.9	133.6	8.20	99.2	26.26	n/a
WC2E1GW3	5.4E-02	2.80E-02	7.32E-01	2.96	0.026	4540	6.8	-166.3	59.3			23.29	11.16
WC2E1GW4	4.7E-02	9.94E-03	9.88E-01	0.9	0.025	3602	6.60	-132.9	91.7	1.62	18.7	23.50	11.17
WC2E1SW	2.6E-02	2.22E-02	1.71E-02	1.46	0.026	2060	7.36	-84.7	147.9	3.71	40.4	20.13	n/a
WC2E4GW3	3.9E-02	2.68E-02	3.85E-01	0.31	0.026	2877	6.98	-110.7	112.9	1.46	17.6	23.09	10.95
WC2E4GW4	3.0E-02	9.94E-03	6.16E-01	0.51	0.025	4556	6.88	-89.3	134.3	1.52	16.7	23.68	10.95
WC2E4SW	2.2E-02	9.94E-03	8.99E-02	1.96	0.026	1476	7.34	-47.1	183.5	3.33	36.1	19.85	n/a
WC2U1GW3	1.5E-02	0.0016	4.62E-01	1.46	0.02	1382	6.71	-112.9	139.2	0.63	7.39	24.41	10.94
WC2U1GW4	1.4E-02	0.0016	4.30E-01	6.02	3.776	1171	6.91	-82.3	111.6	0.64	7.53	24.59	11.02
WC2U1SW	7.0E-03	0.0016	2.46E-03	1.86	0.222	834	7.26	-47.7	176.8	4.76	52.3	20.69	n/a
S10C-WA	4.6E-02	7.95E-03	7.08E-01	0.45	0.019	1121	7.10	-320.8	-80.8	0.98	11.9	26.26	15.00
S10C-WB	1.1E-02	2.87E-03	1.65E+00	0.58	0.019	989	6.98	-268.9	-34.9	0.75	8.86	24.88	14.98
S10C-WC	1.4E-02	4.42E-02	1.15E+00	0.56	0.019	1304	6.85	-313.9	-52.9	1.74	20.5	24.70	15.11
S10CHead	4.1E-02	2.28E-02	7.77E-02	1.14	0.073	1298	7.55	-17.5	246.5	5.61	59.9	19.07	17.51
S10CTail	1.1E-02	0.0016	9.46E-01	1.2	0.055	1176	7.47	-171.9	90.1	2.75	31	22.04	12.76

Blank cells indicate no sample, no measurement, no analysis, or that the measurement was not applicable at that site.

Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Shaded cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

* Cation anion balance = (cations-anions)/(cations + anions)*100.

\+ Results are reported in terms of elemental concentrations.

Table 29. March 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 1 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^2H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/	0.01 mg/	0.01 mg/	0.01 mg/			
MOP1-A	-89.73	3/25/98	2.3E+02	5.5E+01	5.0E+02	3.6E+01	2.0E+02	9.7E+01	1.0E+01	5.3E+01	0.86		
MOP1-B	-52.52	3/25/98	1.8E+02	1.2E+01	4.0E+02	3.5E+01	1.4E+02	9.9E+01	4.8E+00	2.6E+01	0.16		
MOP2-A	-85.52	3/23/98	1.4E+02	2.5E+01	3.8E+02	4.1E+01	1.1E+02	1.1E+02	6.4E+00	2.9E+01	3.11		
MOP2-B	-43.58	3/23/98	1.2E+02	1.1E+01	3.2E+02	4.2E+01	1.0E+02	8.1E+01	9.8E+00	2.4E+01	4.15		
MOP2-C	-15.37	3/23/98	1.4E+02	7.2E+00	2.8E+02	3.7E+01	9.9E+01	8.9E+01	7.7E+00	2.5E+01	6.43		
MOP3-A	-83.40	3/23/98	4.9E+03	1.5E+03	8.3E+02	6.8E+01	3.6E+03	2.0E+02	1.2E+02	2.9E+02	1.16		
MP1-A	-85.45	3/17/98	1.3E+02	3.1E+01	4.0E+02	3.1E+01	1.1E+02	9.6E+01	5.0E+00	3.7E+01	2.76		
MP1-B	-43.98	3/17/98	1.3E+02	1.5E+01	3.5E+02	3.3E+01	9.9E+01	8.9E+01	8.2E+00	2.6E+01	0.49		
MP1-C	-4.56	3/17/98	1.4E+02	5.9E+00	3.7E+02	3.2E+01	9.3E+01	9.9E+01	9.2E+00	3.0E+01	1.42	5.7	0.26
MP1-D	-5.80	3/17/98	1.5E+02	1.1E+01	4.1E+02	3.6E+01	1.0E+02	1.1E+02	9.4E+00	3.4E+01	2.29	4.9	0.27
MP2-A	-85.29	3/25/98	5.1E+03	8.0E+02	1.2E+03	3.3E+01	3.7E+03	7.6E+01	9.2E+01	1.7E+02	-0.38		
MP2-B	-47.57	3/25/98	1.1E+03	1.5E+02	9.0E+02	3.5E+01	9.8E+02	4.2E+01	3.1E+01	7.9E+01	-1.01		
MP2-C	-10.43	3/25/98	1.6E+02	5.2E+01	5.5E+02	5.9E+01	7.1E+01	1.4E+02	1.0E+01	7.4E+01	-0.70	-8.4	-2.15
MP3-A	-173.95	3/24/98	9.1E+03	1.3E+03	6.0E+02	3.6E+01	5.2E+03	2.2E+02	1.7E+02	3.2E+02	-4.78		
MP3-B	-79.39	3/24/98	2.2E+02	5.3E+01	3.1E+02	2.8E+01	1.9E+02	5.5E+01	1.2E+01	3.1E+01	2.24		
MP3-C	-46.28	3/24/98	1.5E+02	3.9E+01	3.2E+02	3.9E+01	1.3E+02	9.1E+01	8.9E+00	2.8E+01	4.99		
MP3-D	-9.85	3/24/98	2.3E+02	8.9E+01	3.2E+02	4.6E+01	1.7E+02	1.2E+02	8.7E+00	3.6E+01	4.99	2.5	-0.04
MP3-HW	n/a	3/24/98	2.0E+02	1.1E+02	3.9E+02	5.6E+01	1.6E+02	1.3E+02	1.1E+01	4.3E+01	4.36		
MP3-TW	n/a	3/24/98	2.1E+02	6.8E+01	3.3E+02	4.1E+01	1.6E+02	1.0E+02	8.7E+00	3.2E+01	3.95		
M102-P	-21.16	3/17/98	1.2E+03	2.0E+02	6.7E+02	4.8E+01	8.2E+02	1.0E+02	2.6E+01	1.2E+02	-0.87		
M102-SW	n/a	3/17/98	2.3E+02	9.7E+01	3.3E+02	5.0E+01	1.8E+02	1.0E+02	1.0E+01	3.9E+01	4.08		

Table 29. March 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 2 of 6

Site	Orthophosphate$^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 3/98 (feet - 1929 NGVD)
Analyst	**SFWMD**	**Frontier**	**Frontier**								
M.D.L.	**0.004 mg/L**	**variable**	**variable**								
MOP1-A	2.0E-02	3.90E-01	1.70E-02	1710	6.84	-182.3	49.7	1	11.5	23.49	10.71
MOP1-B	2.4E-02	5.30E-01	1.70E-02	1264	6.94	-157.7	74.3	0.64	7.36	23.28	10.84
MOP2-A	2.2E-02	6.90E-01	2.40E-02	1188	5.85	-105.4	127.7	0.56	6.45	23.31	13.31
MOP2-B	3.2E-02	5.60E-01	2.40E-02	985	5.97	-119.6	112.5	0.53	6.15	23.76	13.27
MOP2-C	2.7E-02	3.20E-01	2.40E-02	1055	6.58	-156.8	75.3	0.29	3.37	23.86	13.53
MOP3-A	6.6E-02	2.40E-01	2.40E-02	17944	6.45	-157.7	73.4	0.79	9.31	24.72	5.63
MP1-A	1.5E-02	4.90E-01	2.40E-02	1163	6.25	-57.7	175.4	0.28	3.24	23.61	13.71
MP1-B	1.6E-02	3.60E-01	2.40E-02	1036	6.43	-129.2	103.9	0.0	0	23.35	13.67
MP1-C	1.5E-02	3.90E-01	2.40E-02	1072	6.38	-167.2	65.9	0.17	1.96	23.27	13.68
MP1-D	1.6E-02	1.72E+00	2.40E-02	1167	5.5	-77.1	157	0.0	0	22.86	14.25
MP2-A	9.8E-02	1.60E-01	1.70E-02	16472	6.9	-161.6	68.4	1.12	13.1	24.41	11.36
MP2-B	6.1E-02	2.90E-01	1.70E-02	5141	7.13	-192.1	37.9	0.4	4.69	24.40	11.77
MP2-C	4.2E-02	4.60E-01	1.70E-02	1592	6.7	-125.1	103.9	0.42	4.97	24.92	11.85
MP3-A	8.3E-02	7.40E-01	3.40E-02	27643	6.68	-146.5	80.5	0.76	9.1	25.68	7.46
MP3-B	2.0E-02	4.60E-01	1.70E-02	1373	7.56	-183.3	46.7	0.38	4.43	24.03	8.36
MP3-C	2.2E-02	4.80E-01	1.70E-02	1217	7.04	-180.3	48.7	0.54	6.39	24.97	8.32
MP3-D	2.0E-02	4.60E-01	1.70E-02	1582	7.01	-104.5	130.5	0.35	3.92	21.74	8.19
MP3-HW	5.5E-02	1.08E+00	1.20E-01	1556	7.3	-187.1	49.9	2.34	25.7	20.67	11.54
MP3-TW	1.2E-02	5.50E-01	2.20E-02	1408	7.35	-169.9	65.1	2.35	26.2	21.49	7.85
M102-P	7.3E-02	7.80E-01	1.44E-01	5119	6.94	-145.9	85.1			23.80	11.33
M102-SW	8.0E-03	6.60E-01	6.10E-02	1560	8.14	-65.0	165			24.39	11.43

Table 29. March 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 3 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^{2}H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/	0.01 mg/	0.01 mg/	0.01 mg/			
M103-P	-19.29	3/17/98	9.1E+02	1.2E+02	8.5E+02	4.3E+01	7.6E+02	5.9E+01	2.4E+01	7.8E+01	-1.91	9.4	1.26
M103-PZ	-1.19	3/17/98	1.6E+02	3.9E+01	4.5E+02	5.0E+01	1.1E+02	1.4E+02	5.0E+00	4.2E+01	3.41	-5.9	-1.58
M103-SW	n/a	3/17/98	2.3E+02	8.8E+01	3.1E+02	5.1E+01	1.8E+02	9.0E+01	1.1E+01	3.9E+01	4.62		
M203-P	-19.51	3/22/98	1.1E+02	1.6E+01	4.2E+02	3.7E+01	1.1E+02	6.4E+01	1.2E+01	4.7E+01	2.64	-3.3	-1.39
M203-PZ	-2.70	3/22/98	1.7E+02	1.0E+02	6.1E+02	8.4E+01	1.9E+02	1.8E+02	6.2E+00	4.2E+01	3.99	-9.2	-2.07
M203-SW	n/a	3/22/98	2.3E+02	1.0E+02	3.3E+02	5.1E+01	1.7E+02	1.1E+02	9.9E+00	3.8E+01	3.88		
M204-P	-19.14	3/22/98	2.3E+02	3.8E+01		7.6E+01	1.7E+02	1.3E+02	1.1E+01	6.2E+01	45.19		
M204-SW	n/a	3/22/98	2.1E+02	9.3E+01	2.8E+02	4.9E+01	1.6E+02	9.4E+01	9.4E+00	3.5E+01	4.36		
M303-P	-18.22	3/17/98	1.7E+02	4.7E+01	3.5E+02	3.6E+01	1.3E+02	8.2E+01	7.2E+00	3.8E+01	1.44		
M303-SW	n/a	3/17/98	1.7E+02	2.6E+01	3.4E+02	5.0E+01	1.3E+02	9.8E+01	7.4E+00	2.8E+01	4.24		
M401-P	-18.82	3/22/98	1.4E+02	2.9E+01	4.5E+02	6.7E+01	1.1E+02	1.1E+02	7.0E+00	4.3E+01	2.29		
M401-SW	n/a	3/22/98	2.2E+02	8.9E+01	2.6E+02	5.1E+01	1.7E+02	7.4E+01	1.1E+01	3.6E+01	3.37		
ENR002	n/a	3/24/98	2.3E+02	8.6E+01	2.8E+02	4.5E+01	1.7E+02	8.2E+01	1.1E+01	3.6E+01	3.46		
ENR011	n/a	3/24/98	2.3E+02	6.4E+01	3.6E+02	4.2E+01	1.7E+02	1.1E+02	9.5E+00	3.4E+01	2.59		
ENR004	n/a	3/24/98	1.8E+02	9.7E+01	3.1E+02	4.7E+01	1.4E+02	1.1E+02	9.5E+00	3.7E+01	5.20		
ENR012	n/a	3/24/98	2.3E+02	8.6E+01	2.8E+02	4.5E+01	1.7E+02	8.2E+01	1.1E+01	3.6E+01	3.46		
ENRG259	n/a	3/24/98	1.8E+02	5.1E+01	3.1E+02	3.7E+01	1.3E+02	9.0E+01	8.1E+00	3.1E+01	2.96		
WC2F1GW3	-15.99	3/23/98	1.4E+03	1.6E+02	7.2E+02	5.7E+01	9.7E+02	1.4E+02	8.4E+00	7.1E+01	-1.83	12.0	1.44
WC2F1GW4	3.47	3/23/98	5.1E+02	1.4E+00	5.9E+02	6.8E+01	3.6E+02	1.3E+02	3.7E+00	3.8E+01	-1.09	5.5	0.71
WC2F1SW	n/a	3/23/98	1.5E+02	6.3E+01	3.2E+02	4.5E+01	1.1E+02	9.7E+01	8.0E+00	3.4E+01	3.22		
WC2F4GW3	-11.92	3/25/98	2.4E+02	1.0E+00	5.0E+02	2.8E+01	1.8E+02	1.3E+02	2.9E+00	3.2E+01	1.79		
WC2F4GW4	4.52	3/25/98	2.6E+02	1	5.3E+02	3.3E+01	1.8E+02	1.5E+02	3.1E+00	2.9E+01	-0.26		
WC2F4SW	n/a	3/25/98	1.6E+02	5.5E+01	2.9E+02	3.7E+01	1.1E+02	8.5E+01	6.5E+00	2.9E+01	1.80		

Table 29. March 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 4 of 6

Site	Orthophosphate^{+} (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 3/98 (feet - 1929 NGVD)
Analyst	SFWMD	Frontier	Frontier								
M.D.L.	0.004 mg/L	variable	variable								
M103-P	5.1E-02	2.10E-01	2.40E-02	4495	7.04	-191.5	38.5			24.16	10.85
M103-PZ	5.0E-02	3.70E-01	1.05E-01	1432	6.79	-135.0	96			23.98	11.95
M103-SW	1.1E-02	3.30E-01	2.40E-02	1543	8.05	-190.6	39.4			24.01	11.42
M203-P	3.6E-02	3.40E-01	2.40E-02	1185	7.11	-198.4	32			23.49	11.55
M203-PZ	3.5E-02	9.80E-01	4.20E-02	1935	6.69	-93.3	139.1	0.9	10.3	22.76	11.55
M203-SW	3.5E-02	3.90E-01	2.90E-02	1652	7.81	-130.7	105.7	5.37	58.9	20.56	n/a
M204-P	3.7E-02	2.60E-01	2.40E-02	1837	6.78	-185.0	45.4	0.96	11.1	23.43	11.36
M204-SW	6.7E-02	5.90E-01	3.00E-02	1489	7.81	-107.1	131.3	3.25	34.9	19.37	n/a
M303-P	1.5E-02	2.50E-01	2.40E-02	1283	7.07	-97.6	133.4	0.59	6.86	23.89	10.74
M303-SW	3.7E-02	2.80E-01	2.40E-02	1268	7.99	-100.2	123.8	7.78	95.5	27.19	10.61
M401-P	1.8E-02	4.50E-01	2.40E-02	1400	6.91	-146.7	83.7	0.53	6.11	23.44	11.48
M401-SW	7.0E-03	2.60E-01	2.40E-02	1416	7.8	78.6	162.8	2.63	27.5	18.03	11.62
ENR002	1.6E-02	1.62E+00	2.78E-01	1412	5.96	-27.0	213	6.85	73	18.96	n/a
ENR011	1.9E-02	8.00E-01	2.60E-02	1540	6.8	-35.6	217.7	1.75	19.8	22.28	n/a
ENR004	6.3E-02	1.09E+00	1.24E-01	1343	7.05	-20.3	198.4	5.34	58.2	20.19	n/a
ENR012	1.6E-02	6.70E-01	2.80E-02	1412	5.96	79.7	319.7	6.85	73	18.96	n/a
ENRG259	1.4E-02	4.10E-01	1.70E-02	1266	6.54	-21.0	215	3.06	34	21.3	n/a
WC2F1GW3	3.9E-02	1.80E-01	2.40E-02	5700	6.77	-119.2	112.2	0.54	6.19	23.07	13.01
WC2F1GW4	1.6E-02	3.10E-01	2.40E-02	2634	6.74	-13.7	219.7			22.37	13.05
WC2F1SW	2.1E-02	6.10E-01	2.40E-02	1218	7.4	72.8	312.2	1.56	16.6	18.97	13.20
WC2F4GW3	1.5E-02	1.80E-01	2.20E-02	1648	6.03	8.7	240.7	0.62	7.13	23.23	12.47
WC2F4GW4	1.1E-02	2.60E-01	4.10E-02	1764	5.78	3.0	237	0.66	7.48	22.44	12.69
WC2F4SW	9.0E-03	1.10E+00	1.10E-01	1144	6.55	20.1	257.1	2.58	28.5	20.87	12.64

Table 29. March 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 5 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^2H ($^o/_{oo}$)	delta ^{18}O ($^o/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/	0.01 mg/	0.01 mg/	0.01 mg/			
WC2U3GW3	-16.97	3/18/98	4.4E+02	1.1E+00	5.6E+02	3.1E+01	2.9E+02	1.2E+02	4.6E+00	5.7E+01	-0.12	11.5	1.83
WC2U3GW4	3.89	3/18/98	1.7E+02	1.7E+00	3.8E+02	3.7E+01	9.1E+01	1.4E+02	2.4E+00	2.3E+01	2.03	9.8	1.26
WC2U3SW	n/a	3/18/98	1.6E+02	7.0E+01	2.4E+02	5.2E+01	1.3E+02	9.7E+01	8.3E+00	3.5E+01	11.41		
WC2E1GW3	-9.17	3/23/98	4.2E+02	8.1E+00	5.0E+02	2.7E+01	2.7E+02	1.4E+02	4.5E+00	3.8E+01	-0.45		
WC2E1GW4	2.36	3/23/98	2.6E+02	2.0E+00	4.9E+02	4.8E+01	1.7E+02	1.7E+02	3.2E+00	2.4E+01	1.94		
WC2E1SW	n/a	3/23/98	8.3E+01	2.2E+01	1.7E+02	2.8E+01	6.3E+01	5.5E+01	3.4E+00	1.6E+01	5.72		
WC2E4GW3	-6.41	3/25/98	4.6E+02	4.4E+00	4.5E+02	2.5E+01	2.9E+02	1.4E+02	4.4E+00	3.2E+01	-0.38		
WC2E4GW4	3.58	3/25/98	2.5E+02	5.0E+00	3.3E+02	1.6E+01	1.6E+02	1.1E+02	4.6E+00	1.4E+01	0.83		
WC2E4SW	n/a	3/25/98	1.4E+02	5.2E+01	2.5E+02	3.4E+01	1.1E+02	7.6E+01	6.2E+00	2.6E+01	2.20		
WC2U1GW3	-12.11	3/18/98	1.8E+02	1	4.4E+02	2.6E+01	1.2E+02	1.5E+02	2.9E+00	1.8E+01	1.91		
WC2U1GW4	-4.58	3/18/98	1.9E+02	3.1E+00	3.2E+02	2.8E+01	1.3E+02	1.1E+02	5.2E+00	1.3E+01	1.32		
WC2U1SW	n/a	3/18/98	1.0E+02	4.1E+01	2.0E+02	2.9E+01	7.7E+01	6.3E+01	5.6E+00	2.1E+01	3.14		
S10C-WA	-79.18	3/18/98	1.5E+02	8.5E+00	4.6E+02	2.4E+01	1.2E+02	1.1E+02	5.5E+00	3.2E+01	-0.19		
S10C-WB	-41.67	3/18/98	1.1E+02	2.7E+00	3.6E+02	3.0E+01	7.2E+01	8.7E+01	7.7E+00	2.7E+01	-1.81	4.3	0.41
S10C-WC	-9.83	3/18/98	1.4E+02	8.4E+00	3.1E+02	3.2E+01	9.3E+01	8.4E+01	7.1E+00	2.7E+01	0.91	4.9	0.39
S10CHead	n/a	3/18/98	5.7E+01	1.6E+01	1.1E+02	2.0E+01	4.1E+01	3.4E+01	2.4E+00	1.0E+01	2.35		
S10CTail	n/a	3/18/98	5.1E+01	1.4E+01	1.1E+02	1.9E+01	3.8E+01	3.1E+01	2.1E+00	9.5E+00	2.43		

Table 29. March 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A **Page 6 of 6**

Site	Orthophosphate$^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 3/98 (feet - 1929 NGVD)
Analyst	**SFWMD**	**Frontier**	**Frontier**								
M.D.L.	**0.004 mg/L**	**variable**	**variable**								
WC2U3GW3	2.1E-02	2.90E-01	2.40E-02	2408	6.81	-100.3	129.1	0.15	1.75	24.18	12.52
WC2U3GW4	8.0E-03	2.36E+00	2.40E-02	1250	6.78	-88.2	142.2	0.42	4.86	23.62	12.53
WC2U3SW	7.0E-03	1.91E+00	3.04E-01	1247	7.98	-53.4	179	7.4	83.8	22.4	12.53
WC2E1GW3	2.2E-02	5.60E-01	2.40E-02	2245	6.8	-167.9	63.5			23.08	13.13
WC2E1GW4	1.9E-02	7.80E-01	2.40E-02	1758	6.65	-69.4	163			22.38	13.13
WC2E1SW	7.0E-03	6.50E-01	2.20E-02	645	7.31	-167.5	69.9	4.29	46.5	19.91	13.18
WC2E4GW3	1.1E-02	2.90E-01	1.70E-02	2246	6.03	-65.2	166.8	0.73	8.4	23.31	12.84
WC2E4GW4	9.0E-03	3.30E-01	2.20E-02	1421	6.28	-28.4	204.6	0.66	7.49	22.52	12.86
WC2E4SW	8.0E-03	1.25E+00	9.50E-02	7022	6.2	56.6	293.6	3.53	39	20.92	12.70
WC2U1GW3	1.6E-02	7.20E-01	2.50E-02	1375	6.76	-33.9	196.5	0.22	2.55	23.61	12.58
WC2U1GW4	1.0E-02	3.33E+00	3.27E+00	1162	6.99	-55.1	174.3	0.31	3.6	23.89	12.65
WC2U1SW	5.0E-03	1.54E+00	1.91E-01	880	6.95	-52.4	184	1.34	14.7	20.57	12.42
S10C-WA	1.9E-02	5.30E-01	2.40E-02	1280	6.79	-186.1	45			24.72	15.35
S10C-WB	1.3E-02	4.11E+00	2.40E-02	968	6.92	-138.2	40.9	0.36	4.25	24.77	15.31
S10C-WC	4.8E-02	5.20E-01	2.40E-02	1035	7.11	-178.9	50.2	0.17	2.03	25.38	15.39
S10CHead	9.0E-03	1.58E+00	6.90E-02	438	7.14	-62.8	177.3	6.69	72.8	20.13	15.89
S10CTail	8.0E-03	8.90E-01	5.80E-02	402	7.28	-30.2	208.9	6.83	74.4	20.21	14.84

Blank cells indicate no sample, no measurement, no analysis, or that the measurement was not applicable at that site.

Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Shaded cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

* Cation anion balance = (cations-anions)/(cations + anions)*100.

\+ Results are reported in terms of elemental concentrations.

Table 30. June 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 1 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^{2}H $(^{o}/_{oo})$	delta ^{18}O $(^{o}/_{oo})$
Analyst			**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**	**SFWMD**		**USGS****	**USGS****
M.D.L.			**0.5 mg/L**	**1.0 mg/L**	**1.0 mg/L**	**1.0 mg/L**	**0.01 mg/**	**0.01 mg/**	**0.01 mg/**	**0.01 mg/**			
MOP1-A	-89.73	6/15/98	2.4E+02	5.9E+01	4.8E+02	3.5E+01	2.0E+02	9.7E+01	8.4E+00	5.2E+01	1.63		
MOP1-B	-52.52	6/15/98	1.8E+02	1.4E+01	3.8E+02	3.7E+01	1.4E+02	9.6E+01	4.5E+00	2.5E+01	-0.05		
MOP2-A	-85.52	6/11/98	1.4E+02	2.6E+01	3.6E+02	3.8E+01	1.1E+02	1.1E+02	6.1E+00	2.8E+01	4.27		
MOP2-B	-43.58	6/11/98	1.2E+02	1.2E+01	3.2E+02	3.5E+01	9.6E+01	7.8E+01	8.6E+00	2.4E+01	0.72		
MOP2-C	-15.37	6/11/98	1.6E+02	9.5E+00	3.0E+02	4.2E+01	1.0E+02	9.4E+01	7.6E+00	2.7E+01	3.96		
MOP3-A	-83.40	6/11/98	5.2E+03	1.7E+03	3.5E+02	6.9E+01	3.5E+03	2.1E+02	9.9E+01	2.8E+02	-0.41		
MP1-A	-85.45	6/8/98	1.4E+02	3.6E+01	3.8E+02	3.6E+01	1.1E+02	9.3E+01	4.7E+00	3.5E+01	0.11	0.8	-0.58
MP1-B	-43.98	6/8/98	1.3E+02	1.4E+01	3.3E+02	3.5E+01	9.9E+01	9.0E+01	8.2E+00	2.6E+01	3.31	0.0	-0.43
MP1-C	-4.56	6/8/98	1.4E+02	8.3E+00	3.7E+02	3.5E+01	9.7E+01	1.0E+02	9.2E+00	3.0E+01	1.84	5.4	0.35
MP1-D	-5.80	6/8/98	1.3E+02	9.6E+00	4.0E+02	3.7E+01	1.1E+02	1.1E+02	9.1E+00	3.3E+01	4.89	5.2	0.20
MP2-A	-85.29	6/15/98	5.1E+03	8.2E+02	1.1E+03	3.2E+01	3.6E+03	7.4E+01	7.5E+01	1.6E+02	-2.26	10.4	1.60
MP2-B	-47.57	6/15/98	1.2E+03	1.6E+02	8.8E+02	3.3E+01	9.7E+02	4.6E+01	2.9E+01	7.9E+01	-1.87	8.2	1.08
MP2-C	-10.43	6/15/98	1.8E+02	5.4E+01	5.1E+02	5.6E+01	7.5E+01	1.4E+02	9.5E+00	7.1E+01	-0.06	-8.4	-2.18
MP3-A	-173.95	6/16/98	9.5E+03	1.5E+03	4.1E+02	4.6E+01	6.5E+03	2.6E+02	2.0E+02	3.9E+02	3.94	13.5	1.76
MP3-B	-79.39	6/16/98	2.2E+02	5.0E+01		2.7E+01	2.0E+02	5.9E+01	1.2E+01	3.2E+01	34.64	6.4	0.72
MP3-C	-46.28	6/16/98	1.9E+02	5.3E+01	1.7E+02	4.0E+01	1.4E+02	1.1E+02	9.1E+00	3.0E+01	17.59	4.7	0.25
MP3-D	-9.85	6/16/98	8.5E+01	3.2E+01	2.5E+02	3.1E+01	9.1E+01	5.8E+01	6.3E+00	1.7E+01	1.92	6.7	0.55
MP3-HW	n/a	6/16/98	1.4E+02	4.8E+01	2.1E+02	3.3E+01	1.2E+02	6.3E+01	9.3E+00	2.1E+01	6.44		
MP3-TW	n/a	6/16/98	1.3E+02	3.5E+01	2.5E+02	3.3E+01	1.1E+02	7.0E+01	7.8E+00	2.3E+01	5.42		
M102-P	-21.16	6/8/98	1.1E+03	1.9E+02	6.5E+02	5.6E+01	8.1E+02	1.1E+02	2.5E+01	1.1E+02	2.83	2.6	0.02
M102-SW	n/a	6/8/98	7.0E+01	2.9E+01	8.7E+01	1.9E+01	5.0E+01	3.0E+01	3.8E+00	1.2E+01	4.48		

Table 30. June 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A   Page 2 of 6

Site	Orthophosphate^{+} (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 6/98 (feet - 1929 NGVD)
Analyst	SFWMD	Frontier	Frontier								
M.D.L.	0.004 mg/L	variable	variable								
MOP1-A	1.3E-02	2.20E-01	1.30E-02	1712	6.49	-159.4	72.6	0.73	8.46	23.70	10.99
MOP1-B	1.5E-02	4.40E-01	1.30E-02	1295	6.63	-154.1	77.9	0.61	7.02	23.31	10.88
MOP2-A	1.8E-02	2.70E-01	1.30E-02	1150	6.57	-160.2	71.6	4.92	57.3	23.96	14.75
MOP2-B	2.5E-02	4.10E-01	1.30E-02	997	6.74	-178.4	54.4	0.85	9.82	23.50	14.30
MOP2-C	2.7E-02	3.90E-01	1.30E-02	1137	6.82	-185.9	45.9	2.74	31.8	23.87	14.76
MOP3-A	6.1E-02	3.40E-01	1.30E-02	16840	6.59	-161.6	68.2	5.31	62.9	25.05	10.63
MP1-A	1.5E-02	8.00E-01	1.40E-02	1227	6.77	-135.3	97.8	0.46	5.33	23.71	13.67
MP1-B	1.5E-02	3.50E-01	1.40E-02	1076	6.68	-157.7	75.4			23.53	13.63
MP1-C	1.8E-02	7.20E-01	1.40E-02	1159	6.50	-151.3	82.8			23.31	13.60
MP1-D	2.0E-02	2.80E-01	1.50E-02	1231	6.62	-179.0	56.1	1.55	17.6	22.48	20.76
MP2-A	8.7E-02	2.60E-01	1.30E-02	17280	6.71	-185.4	44.6	0.87	10.2	24.50	11.58
MP2-B	4.3E-02	2.50E-01	1.30E-02	5145	6.92	-172.0	58	1.28	15	24.45	12.00
MP2-C	3.1E-02	3.20E-01	1.30E-02	1578	6.61	-106.6	122.4	0.68	8.02	24.77	12.09
MP3-A	6.6E-02	3.20E-01	1.30E-02	25660	6.57	-136.7	91.3	0.35	4.18	25.51	7.63
MP3-B	1.6E-02	2.90E-01	1.20E-02	1409	7.34	-165.1	64.9	0.29	3.41	24.55	8.60
MP3-C	1.3E-02	2.90E-01	2.80E-02	1381	6.89	-157.9	70.1	0.44	5.27	25.63	8.52
MP3-D	1.5E-02	4.30E-01	2.80E-02	784	7.21	-140.1	92.9	0.49	5.6	22.91	8.44
MP3-HW	3.9E-02	1.10E+00	3.18E-01	1041	6.90	-70.1	151.9	0.46	5.78	28.68	
MP3-TW	9.0E-03	5.10E-01	1.20E-02	994	7.45	-28.9	183.1	2.00	26.7	33.42	7.60
M102-P	7.5E-02	1.28E+00	3.10E-02	4908	5.31	17.3	249.4	0.36	4.22	24.40	12.14
M102-SW	1.0E-02	1.23E+00	3.30E-02	480	8.83	234.3	447.2	1.73	22.6	31.82	12.24

Table 30. June 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 3 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^{2}H ($^{o}/_{oo}$)	delta ^{18}O ($^{o}/_{oo}$)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/	0.01 mg/	0.01 mg/	0.01 mg/			
M103-P	-19.29	6/8/98	8.9E+02	1.3E+02	8.4E+02	4.3E+01	9.5E+02	7.2E+01	2.7E+01	8.9E+01	8.74	9.1	1.28
M103-PZ	-1.19	6/8/98	1.8E+02	3.6E+01	4.4E+02	4.4E+01	1.0E+02	1.4E+02	4.7E+00	4.0E+01	0.98	-4.8	-1.55
M103-SW	n/a	6/8/98	7.7E+01	2.8E+01	1.3E+02	2.5E+01	5.4E+01	4.4E+01	3.7E+00	1.3E+01	3.31		
M203-P	-19.51	6/16/98	9.8E+01	2.6E+01	3.1E+02	3.1E+01	1.2E+02	6.5E+01	1.2E+01	4.7E+01	13.89	-5.3	-1.33
M203-PZ	-2.70	6/16/98	1.7E+02	9.6E+01	2.8E+02	8.5E+01	2.0E+02	1.8E+02	6.0E+00	4.1E+01	25.26	-6.3	-2.06
M203-SW	n/a	6/16/98	9.1E+01	2.9E+01	2.2E+02	2.4E+01	6.8E+01	5.4E+01	5.0E+00	1.5E+01	-3.81		
M204-P	-19.14	6/17/98	2.2E+02	3.7E+01	2.1E+02	7.6E+01	1.8E+02	1.3E+02	1.0E+01	5.8E+01	26.82	8.4	0.77
M204-SW	n/a	6/17/98	8.5E+01	2.5E+01	1.6E+02	2.3E+01	6.4E+01	5.5E+01	3.7E+00	1.5E+01	4.65		
M303-P	-18.22	6/15/98	1.8E+02	4.8E+01	3.4E+02	3.4E+01	1.4E+02	8.3E+01	7.0E+00	3.7E+01	1.23	4.4	0.32
M303-SW	n/a	6/15/98	1.3E+02	2.7E+01	1.8E+02	2.8E+01	8.7E+01	5.4E+01	4.5E+00	1.7E+01	0.66		
M401-P	-18.82	6/15/98	1.6E+02	2.8E+01	4.5E+02	4.0E+01	1.1E+02	1.1E+02	6.7E+00	4.1E+01	-0.17	-7.2	-1.78
M401-SW	n/a	6/15/98	7.0E+01	2.4E+01	9.9E+01	2.2E+01	4.8E+01	3.1E+01	3.4E+00	1.2E+01	3.43		
ENR002	n/a	6/10/98	4.8E+01	2.4E+01	9.2E+01	1.6E+01	3.3E+01	3.4E+01	4.1E+00	1.0E+01	4.55		
ENR011	n/a	6/10/98	1.7E+02	5.0E+01	3.0E+02	3.9E+01	1.5E+02	7.9E+01	8.1E+00	2.5E+01	4.60		
ENR004	n/a	6/10/98	7.2E+01	2.7E+01	1.5E+02	2.3E+01	5.2E+01	4.9E+01	4.5E+00	1.5E+01	4.12		
ENR012	n/a	6/10/98	8.8E+01	2.6E+01	1.5E+02	2.4E+01	6.7E+01	5.0E+01	4.5E+00	1.5E+01	5.56		
ENRG259	n/a	6/10/98	1.3E+02	4.3E+01	2.6E+02	3.2E+01	1.2E+02	7.5E+01	7.6E+00	2.6E+01	5.97		
WC2F1GW3	-15.99	6/10/98	5.5E+03	1.7E+02	7.0E+02	4.0E+01	1.1E+03	1.4E+02	7.3E+00	7.6E+01	-48.74	10.0	1.51
WC2F1GW4	3.47	6/10/98	4.9E+02	1.4E+00	5.7E+02	5.2E+01	4.0E+02	1.4E+02	3.3E+00	3.8E+01	4.65	6.4	0.69
WC2F1SW	n/a	6/10/98	3.2E+02	2.9E+01	4.3E+02	3.8E+01	2.2E+02	1.2E+02	5.4E+00	4.6E+01	2.39		
WC2F4GW3	-11.92	6/10/98	2.2E+02	1	4.9E+02	9.4E+01	1.9E+02	1.3E+02	2.7E+00	3.1E+01	4.67	10.4	1.45
WC2F4GW4	4.52	6/10/98	2.6E+02	1	5.1E+02	4.4E+01	1.9E+02	1.6E+02	2.7E+00	3.0E+01	2.90	8.3	0.80
WC2F4SW	n/a	6/10/98	1.9E+02	3.0E+01	3.4E+02	8.3E+01	1.5E+02	1.0E+02	7.2E+00	3.4E+01	5.77		

Table 30. June 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 4 of 6

Site	Orthophosphate^{+} (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 6/98 (feet - 1929 NGVD)
Analyst	**SFWMD**	**Frontier**	**Frontier**								
M.D.L.	**0.004 mg/L**	**variable**	**variable**								
M103-P	4.5E-02	2.70E-01	1.50E-02	4463	6.07	-116.8	111.1	0.01	0.117	24.36	11.67
M103-PZ	5.1E-02	9.90E-01	7.90E-02	1423	5.50	174.9	402.8	1.32	15.5	24.36	12.80
M103-SW	9.0E-03	5.20E-01	2.50E-02	570	8.15	165.9	378.8	9.37	122	31.71	12.25
M203-P	3.6E-02	1.00E-01	1.20E-02	1086	3.71	-93.8	137.2	0.31	3.63	24.34	12.05
M203-PZ	2.5E-02	8.70E-01	1.40E-02	1775	4.04	109.1	341.1	0.89	10.4	24.08	12.04
M203-SW	8.0E-03	4.60E-01	1.60E-02	658	5.48	249.1	467.1	3.99	51.7	31.00	12.09
M204-P	7.4E-02	4.90E-01	1.30E-02	1776	6.51	-173.5	56.5	0.68	7.99	24.53	11.81
M204-SW	7.0E-03	1.05E+00	3.50E-02	664	7.36	-166.1	49.9	4.02	52.3	31.42	12.00
M303-P	1.3E-02	4.20E-01	1.30E-02	1235	5.39	-341.5	-109.5	0.32	3.74	24.20	11.99
M303-SW	1.0E-02	6.40E-01	4.80E-02	793	7.06	274.1	494.1	2.62	33.6	29.91	11.99
M401-P	1.2E-02	5.90E-01	1.30E-02	1297	4.51	-57.0	174	0.35	4.1	24.35	11.99
M401-SW	9.0E-03	3.90E-01	1.80E-02	448	8.46	66.4	285.4			30.76	12.14
ENR002	1.1E-02	1.29E+00	4.80E-02	407	8.22	-69.3	145.5	8.46	112	32.60	n/a
ENR011	1.8E-02	5.20E-01	2.80E-02	1213	7.27	-73.9	150.9	1.51	18.6	27.49	n/a
ENR004	1.0E-02	9.60E-01	2.31E-01	585	7.42	16.6	235.4	3.04	39.1	30.57	n/a
ENR012	1.9E-02	1.97E+00	5.95E-01	633	7.27	59.8	280.6	1.96	25	29.64	n/a
ENRG259	9.0E-03	7.10E-01	1.50E-02	1033	7.49	41.4	267.2	2.33	28.5	26.96	n/a
WC2F1GW3	3.4E-02	3.50E-01	1.50E-02	5620	3.52	21.2	250.1	2.32	26.8	23.62	10.73
WC2F1GW4	1.5E-02	2.60E-01	1.50E-02	2629	2.88	426.2	655.1	0.64	7.4	23.59	10.77
WC2F1SW	7.2E-02	1.01E+00	7.50E-02	1948	7.51	235.5	443.4	4.10	55.5	34.63	10.76
WC2F4GW3	1.5E-02	2.80E-01	1.50E-02	1644	2.62	329.8	558.7	0.48	5.56	23.69	10.43
WC2F4GW4	9.0E-03	2.70E-01	1.50E-02	1756	2.99	340.7	570.6	0.76	8.72	23.10	10.45
WC2F4SW	1.0E-02	1.62E+00	1.24E-01	1406	6.48	-10.7	209.2	1.64	20.4	28.17	10.42

Table 30. June 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A Page 5 of 6

Site	Elevation at Bottom of Screen (feet - 1929 NGVD)	Date of Sample	Chloride (mg/L)	Sulfate (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	DOC (mg/L)	Sodium (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Cation/ Anion Balance* (%)	delta ^{2}H (°/oo)	delta ^{18}O (°/oo)
Analyst			SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD	SFWMD		USGS**	USGS**
M.D.L.			0.5 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L	0.01 mg/	0.01 mg/	0.01 mg/	0.01 mg/			
WC2U3GW3	-16.97	6/9/98	4.2E+02	1.1E+00	5.5E+02	2.2E+01	3.1E+02	1.2E+02	4.5E+00	5.7E+01	2.82	12.2	1.88
WC2U3GW4	3.89	6/9/98	1.8E+02	1.3E+00	3.8E+02	2.4E+01	8.8E+01	1.4E+02	2.4E+00	2.2E+01	0.66	9.0	1.38
WC2U3SW	n/a	6/9/98	2.0E+02	3.4E+01	3.0E+02	6.1E+01	1.5E+02	8.0E+01	8.7E+00	3.4E+01	4.02		
WC2E1GW3	-9.17	6/11/98	4.2E+02	6.8E+00	4.7E+02	2.1E+01	2.7E+02	1.3E+02	4.2E+00	3.5E+01	-0.66	10.0	1.37
WC2E1GW4	2.36	6/11/98	2.7E+02	1	4.8E+02	4.6E+01	1.7E+02	1.7E+02	2.4E+00	2.3E+01	1.99	4.6	0.33
WC2E1SW	n/a	6/11/98	2.2E+02	4.6E+01	3.3E+02	7.0E+01	1.6E+02	9.0E+01	8.7E+00	3.6E+01	3.08		
WC2E4GW3	-6.41	6/11/98	4.5E+02	4.0E+00	4.3E+02	1.7E+01	2.7E+02	1.4E+02	4.0E+00	3.1E+01	-0.92	10.4	1.48
WC2E4GW4	3.58	6/11/98	2.5E+02	4.5E+00	3.2E+02	1.6E+01	1.6E+02	1.1E+02	4.1E+00	1.4E+01	0.94	10.9	1.56
WC2E4SW	n/a	6/11/98	1.6E+02	3.5E+01	2.6E+02	4.6E+01	1.1E+02	7.3E+01	7.2E+00	2.7E+01	1.88		
WC2U1GW3	-12.11	6/9/98	1.9E+02	1	4.2E+02	2.8E+01	1.2E+02	1.5E+02	2.6E+00	1.7E+01	2.14	10.7	1.34
WC2U1GW4	-4.58	6/9/98	1.9E+02	3.0E+00	3.0E+02	2.8E+01	1.4E+02	1.1E+02	5.4E+00	1.2E+01	4.23	9.3	1.09
WC2U1SW	n/a	6/9/98	1.3E+02	3.5E+01	1.8E+02	3.9E+01	8.9E+01	5.3E+01	5.3E+00	2.2E+01	2.90		
S10C-WA	-79.18	6/9/98	1.6E+02	1.7E+01	4.4E+02	3.3E+01	1.3E+02	1.1E+02	5.5E+00	3.2E+01	0.91	7.5	0.85
S10C-WB	-41.67	6/9/98	1.2E+02	1.5E+00	3.4E+02	3.7E+01	7.6E+01	9.0E+01	7.7E+00	2.7E+01	1.01	6.4	0.44
S10C-WC	-9.83	6/9/98	1.6E+02	1.1E+01	3.2E+02	3.4E+01	1.0E+02	9.0E+01	7.4E+00	2.8E+01	1.01	4.7	0.26
S10CHead	n/a	6/9/98	5.8E+01	2.3E+01	1.2E+02	2.0E+01	4.0E+01	4.1E+01	3.9E+00	1.3E+01	4.30		
S10CTail	n/a	6/9/98	6.7E+01	3.2E+01	1.5E+02	2.3E+01	4.4E+01	4.9E+01	4.4E+00	1.4E+01	1.25		

Table 30. June 1998 Chemical Analyses from Research Site Locations in ENR and WCA2-A   Page 6 of 6

Site	Orthophosphate$^+$ (mg/L)	Total Hg (ng/L)	MM Hg (ng/L)	Field Conductivity (uS/cm)	pH	Uncorrected ORP (mv)	Eh (mv)	DO (mg/L)	% SAT. D.O.	Temp. (ºC)	Hydraulic Head - 6/98 (feet - 1929 NGVD)
Analyst	**SFWMD**	**Frontier**	**Frontier**								
M.D.L.	**0.004 mg/L**	**variable**	**variable**								
WC2U3GW3	2.1E-02	2.70E-01	1.50E-02	2405	4.86	72.1	299	0.40	4.7	24.55	10.32
WC2U3GW4	1.1E-02	2.80E-01	1.50E-02	1265	4.21	199.2	426.1	0.56	6.6	24.74	10.30
WC2U3SW	1.6E-02	4.09E+00	1.05E+00	25660	6.57	213.1	439	0.35	72.5	25.51	10.32
WC2E1GW3	2.3E-02	2.70E-01	1.30E-02	2221	3.64	432.5	663.5	0.49	5.77	24.62	10.79
WC2E1GW4	1.6E-02	2.70E-01	1.30E-02	1772	3.39	133.3	366.3	0.49	5.65	23.37	10.79
WC2E1SW	3.9E-02	1.28E+00	4.80E-02	1425	6.50	269.2	495.2	3.10	38.1	27.20	10.79
WC2E4GW3	1.4E-02	2.70E-01	1.30E-02	2299	3.71	419.6	651.6	0.46	5.34	23.84	10.53
WC2E4GW4	1.0E-02	2.70E-01	1.50E-02	1471	2.50	509.1	742.1	0.89	10.3	23.70	10.53
WC2E4SW	9.0E-03	2.33E+00	3.21E-01	1087	5.85	390.6	614.6	5.15	64.3	28.23	10.38
WC2U1GW3	1.4E-02	3.00E-01	1.50E-02	1379	3.83	328.0	554.9	0.41	4.85	24.96	10.18
WC2U1GW4	1.0E-02	2.13E+00	1.80E+00	1209	3.51	284.5	512.4	0.54	6.34	24.46	10.24
WC2U1SW	1.0E-02	2.08E+00	3.60E-01	843	5.83	272.2	491.1	1.44	18.1	28.65	10.10
S10C-WA	2.7E-02	2.70E-01	1.40E-02	1301	6.80	-191.4	153.6	0.78	9.27	25.23	14.16
S10C-WB	1.5E-02	3.90E-01	1.40E-02	985	6.77	-126.1	219.9	0.54	6.39	24.91	14.15
S10C-WC	5.4E-02	5.10E-01	1.40E-02	1123	7.01	-155.5	190.5	0.68	8.02	24.76	14.22
S10CHead	1.5E-02	1.06E+00	3.20E-02	490	7.66	-43.7	291.3	5.53	71.2	30.60	15.40
S10CTail	7.0E-03	7.20E-01	9.60E-02	566	7.34	-60.2	273.8	4.63	60	31.09	13.28

Blank cells indicate no sample, no measurement, no analysis, or that the measurement was not applicable at that site.

Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Shaded cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

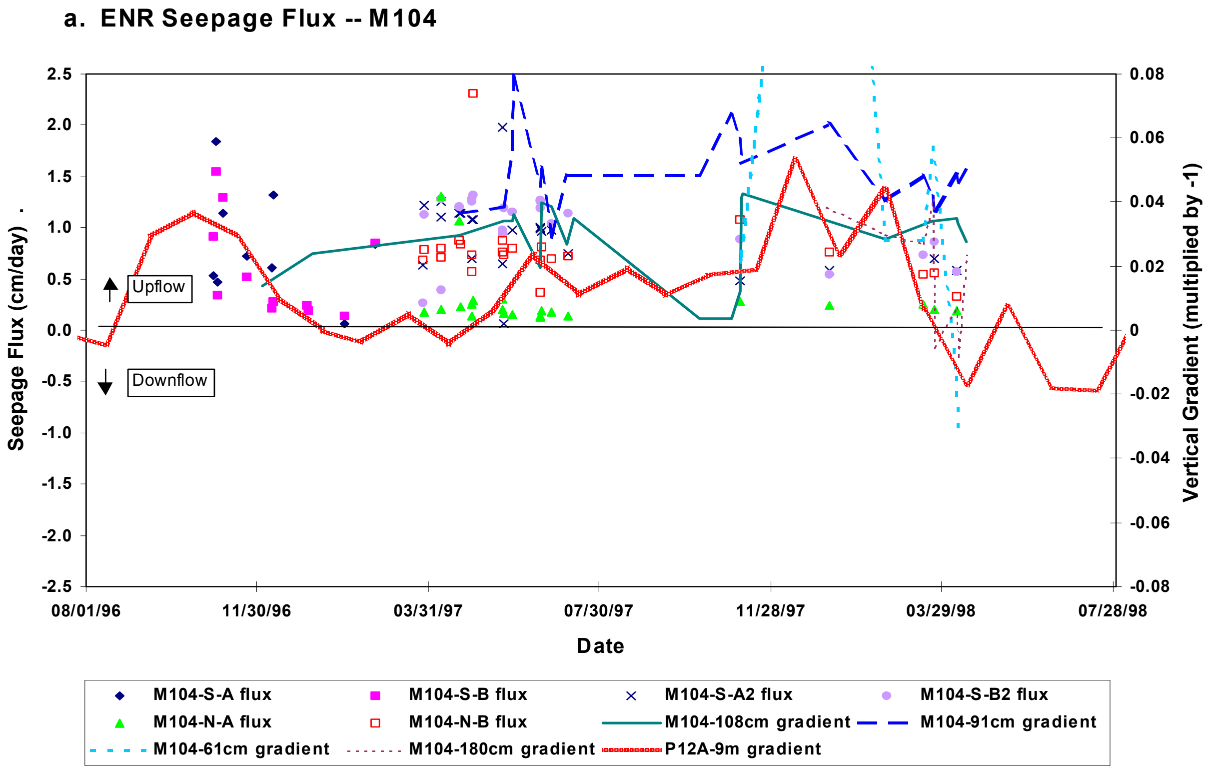
* Cation anion balance = (cations-anions)/(cations + anions)*100.

+ Results are reported in terms of elemental concentrations.

APPENDIX VI

Vertical Fluxes of Water through Wetland Peat

Seepage Meter Fluxes and Hydraulic Gradients in ENR



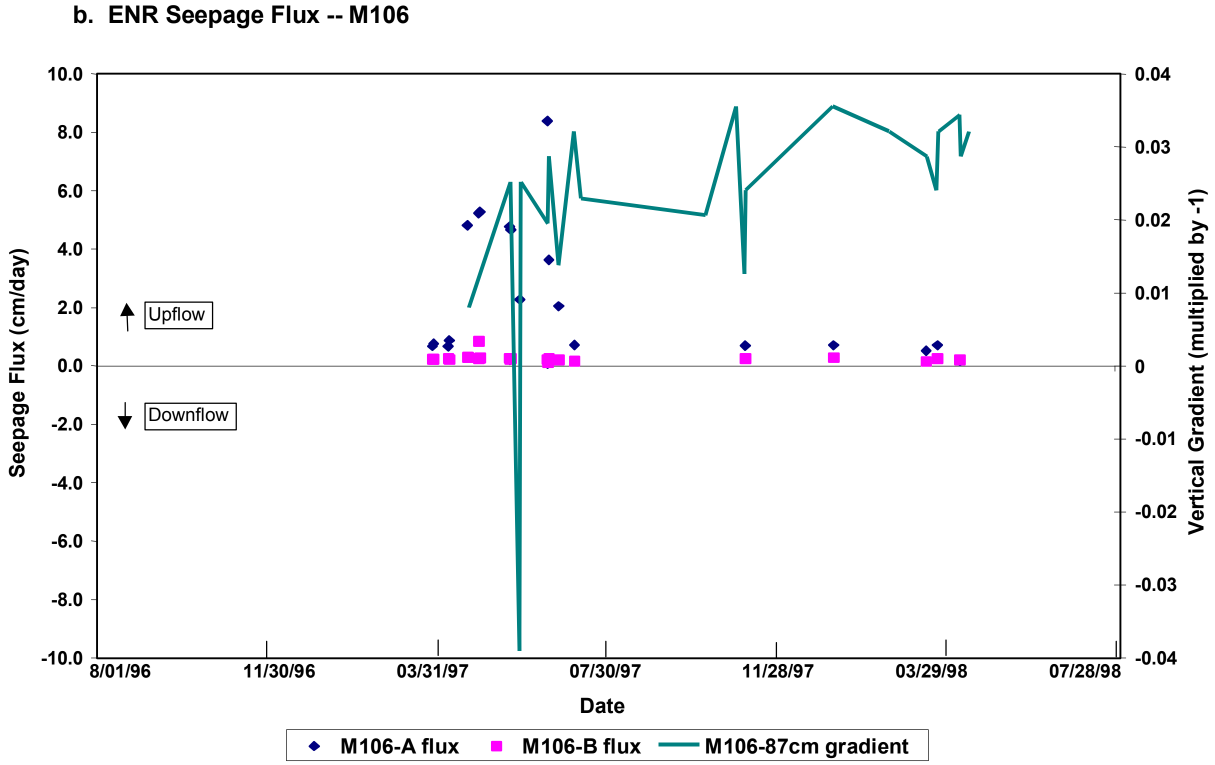
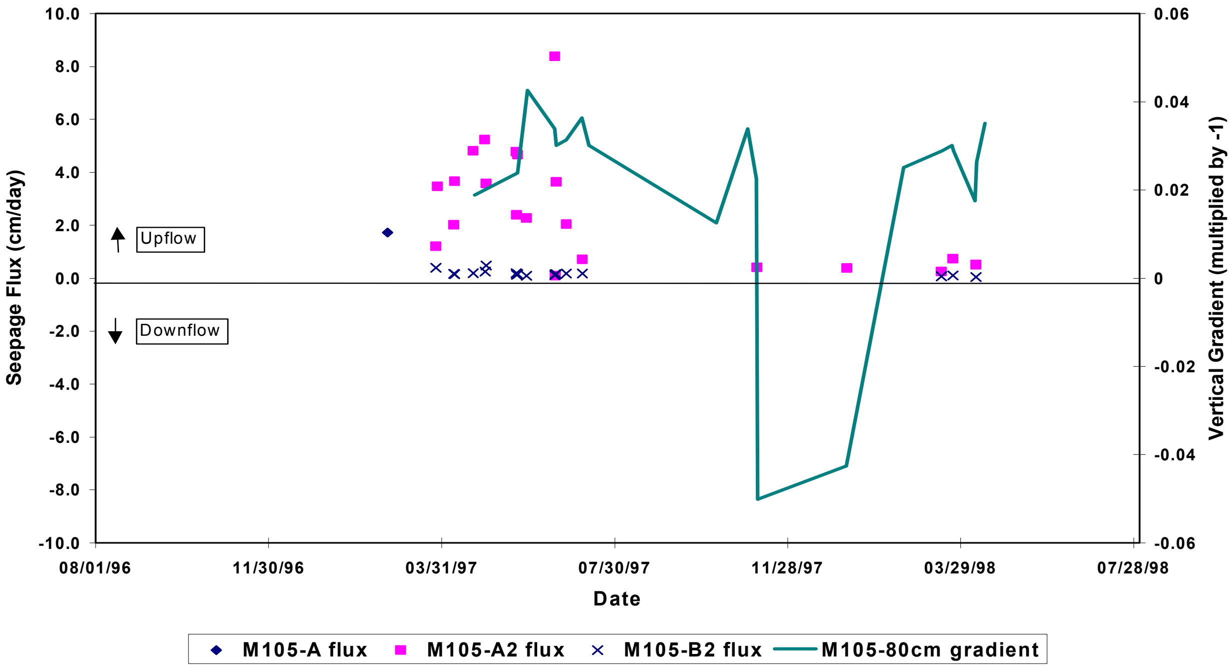


Figure 139. ENR sites M104 and M106. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates upward flow.

a. ENR Seepage Flux -- M105



b. ENR Seepage Flux -- M103

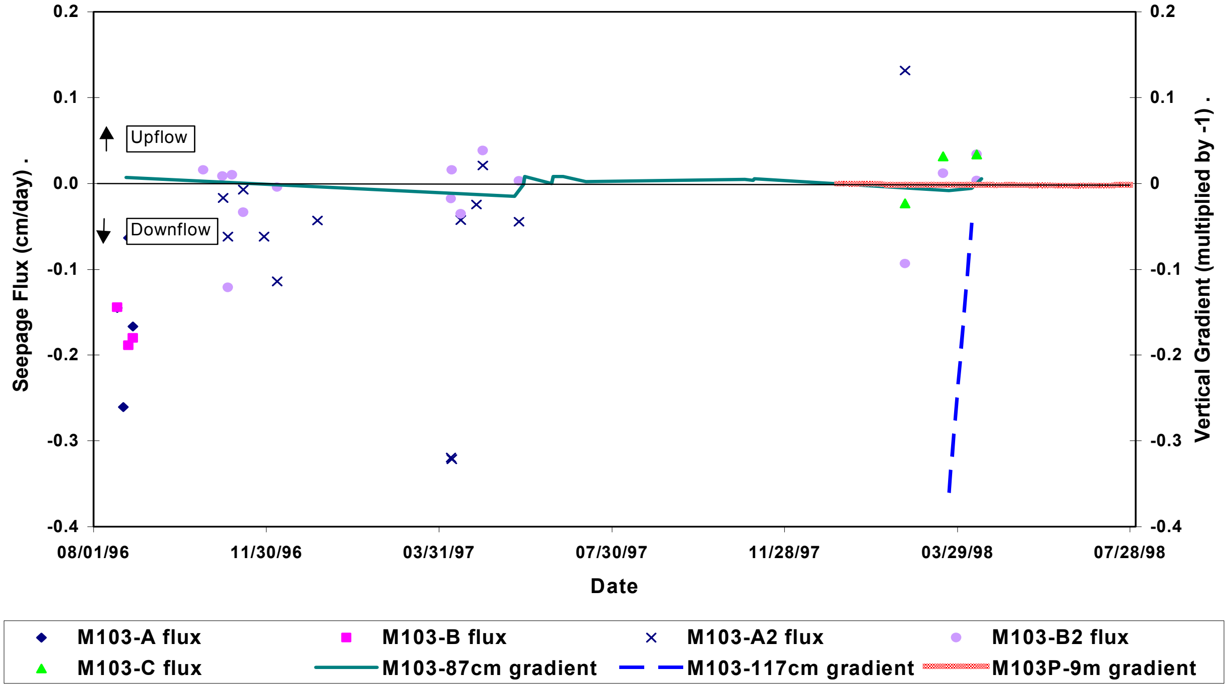
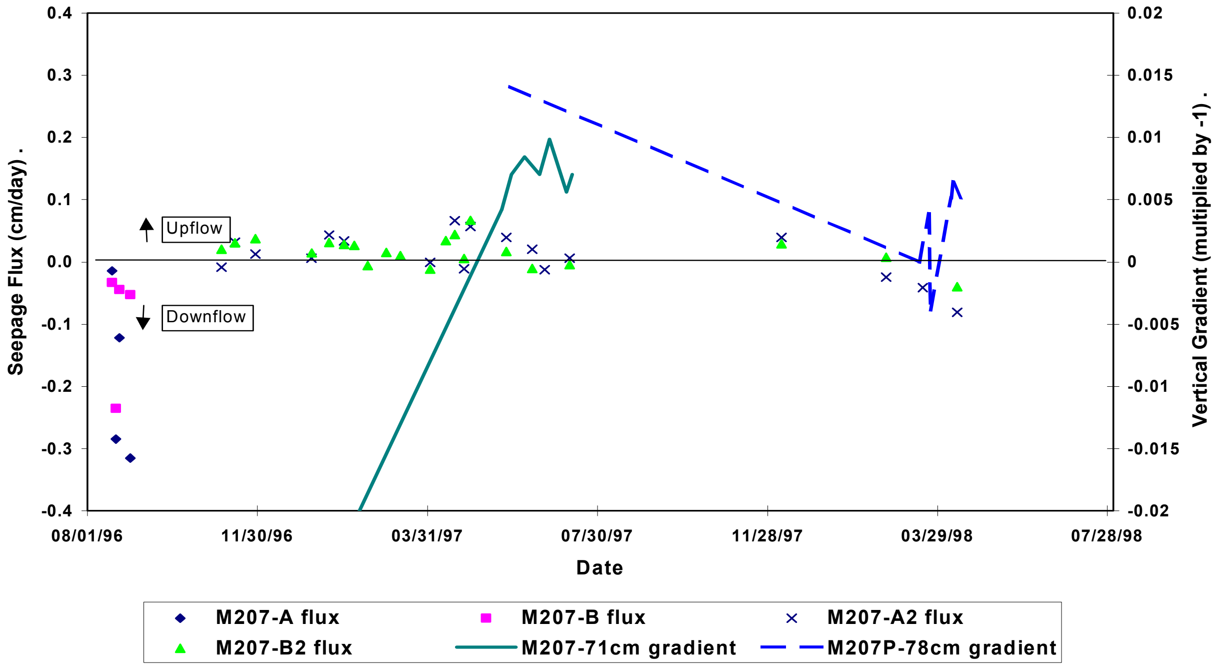


Figure 140. ENR sites M105 and M03. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates upward flow.

a. ENR Seepage Flux --M207



b. ENR Seepage Flux -- M203

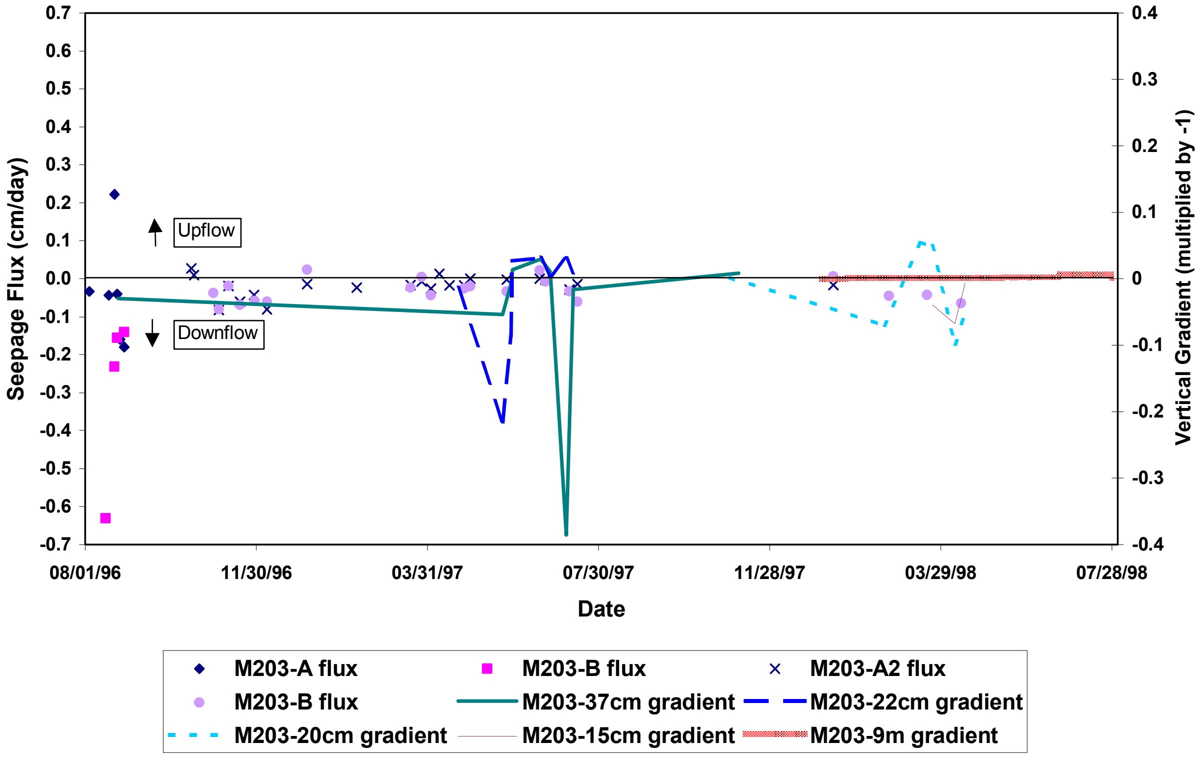
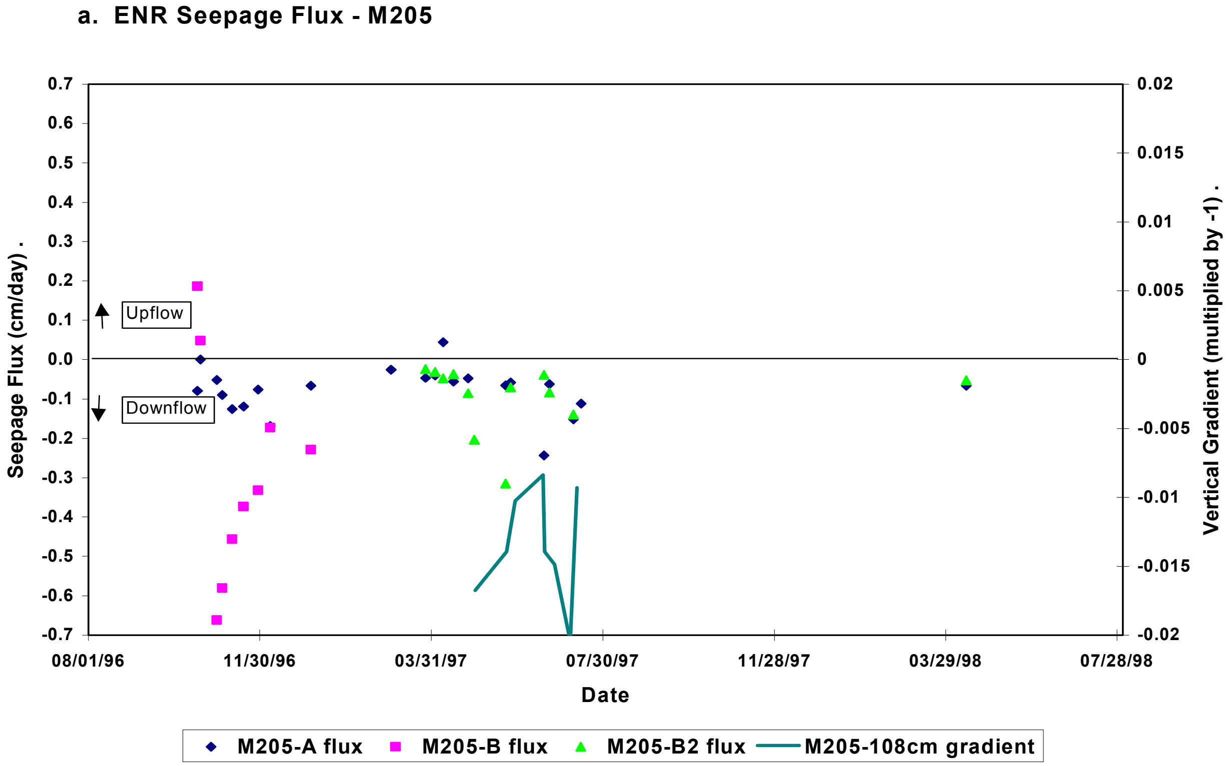


Figure 141. ENR sites M207 and M203. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates upward flow.



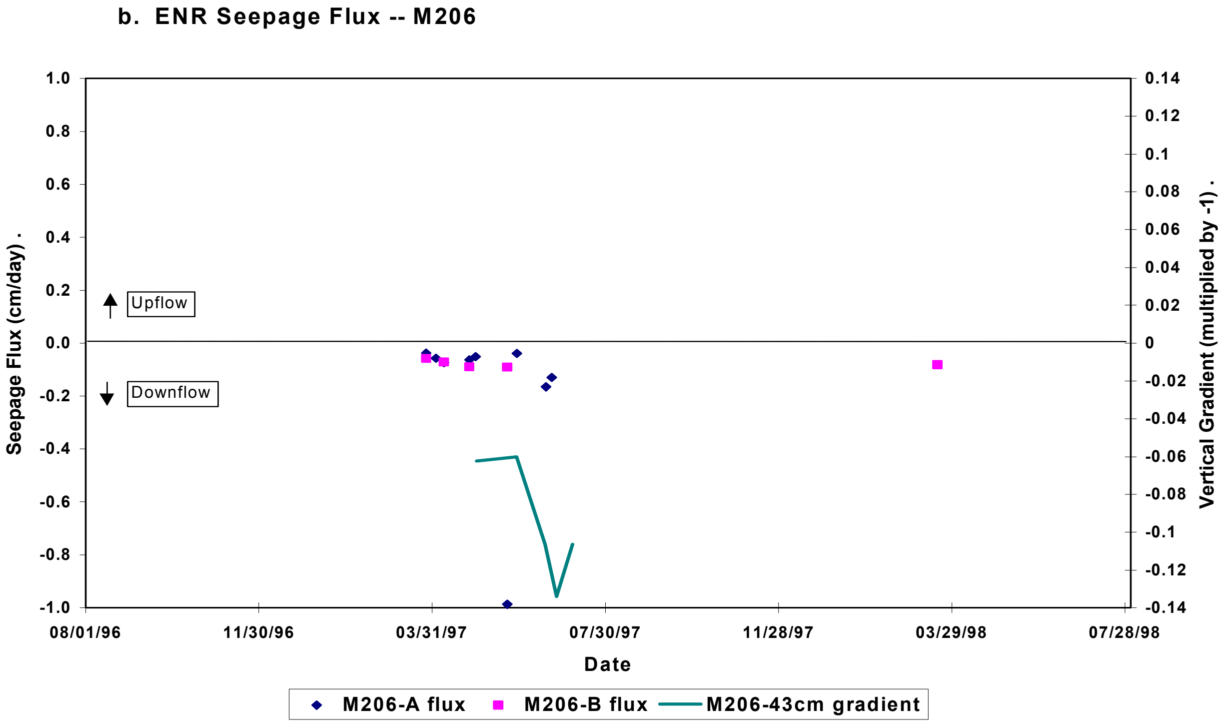
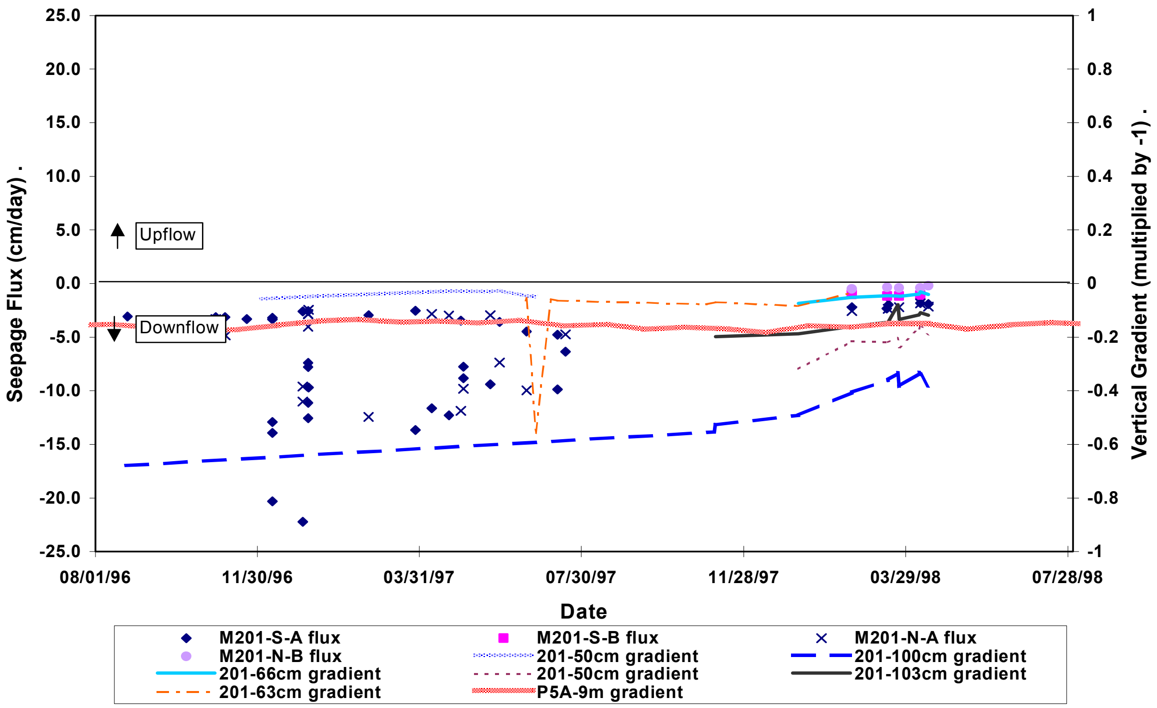


Figure 142. ENR sites M205 and M 206. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates upward flow.

a. ENR Seepage Flux -- M201



b. ENR Seepage Flux -- M401

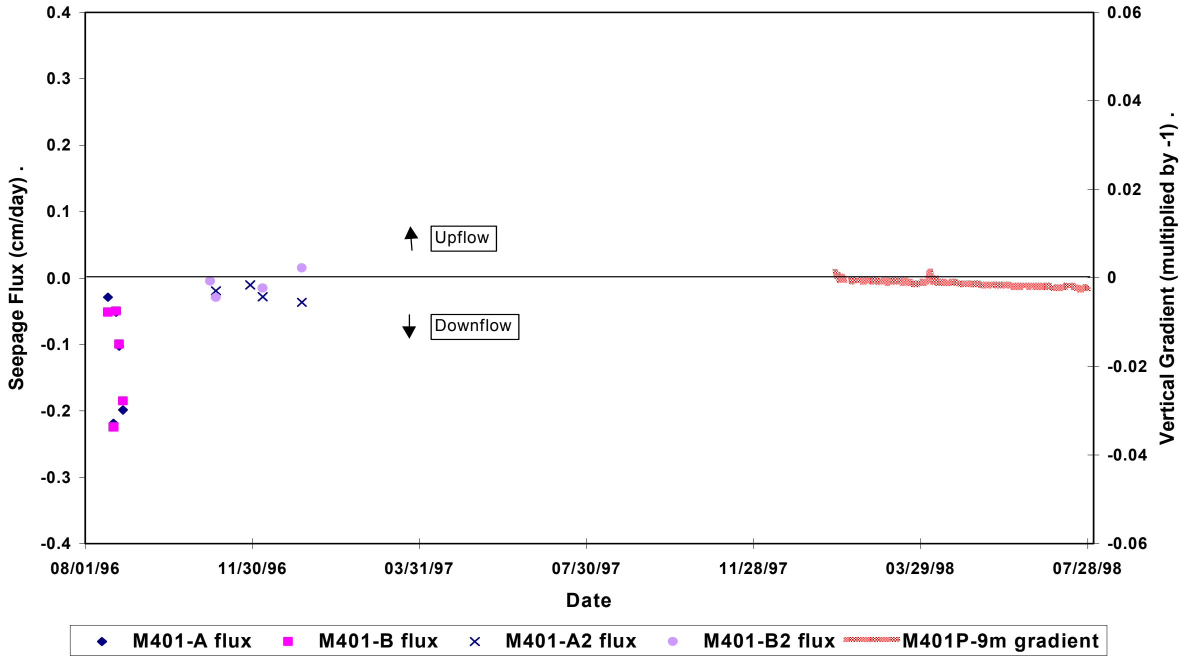
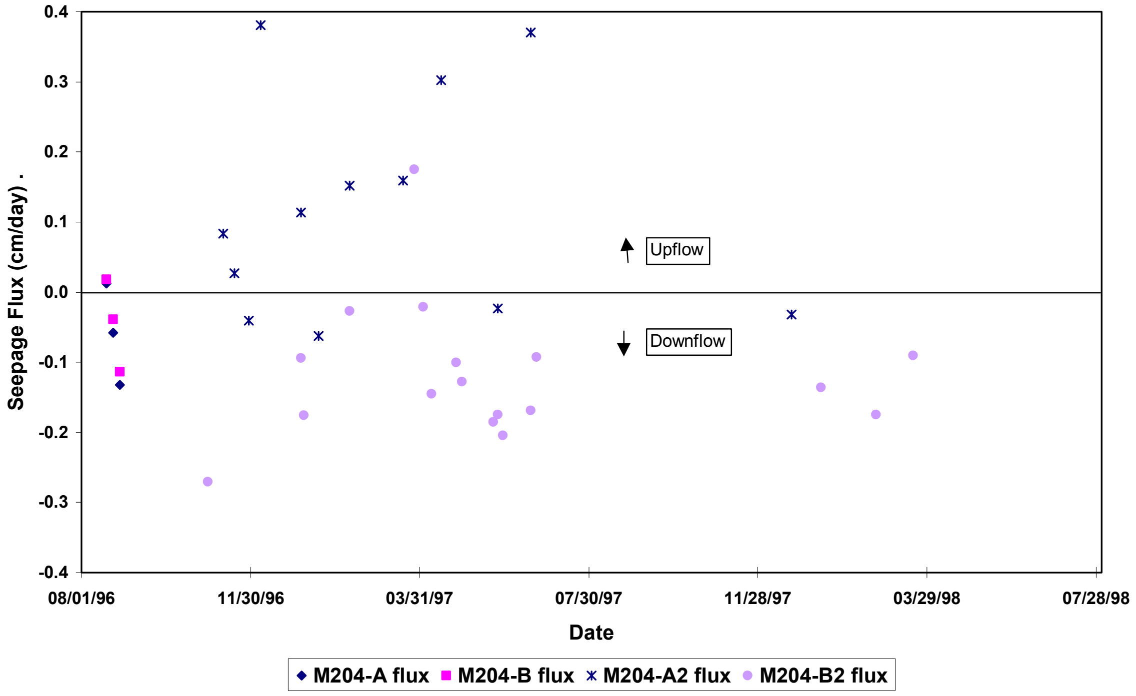


Figure 143. ENR sites M201 and M 401. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates upward flow.

a. ENR Seepage Flux -- M204



b. ENR Seepage Flux - M303

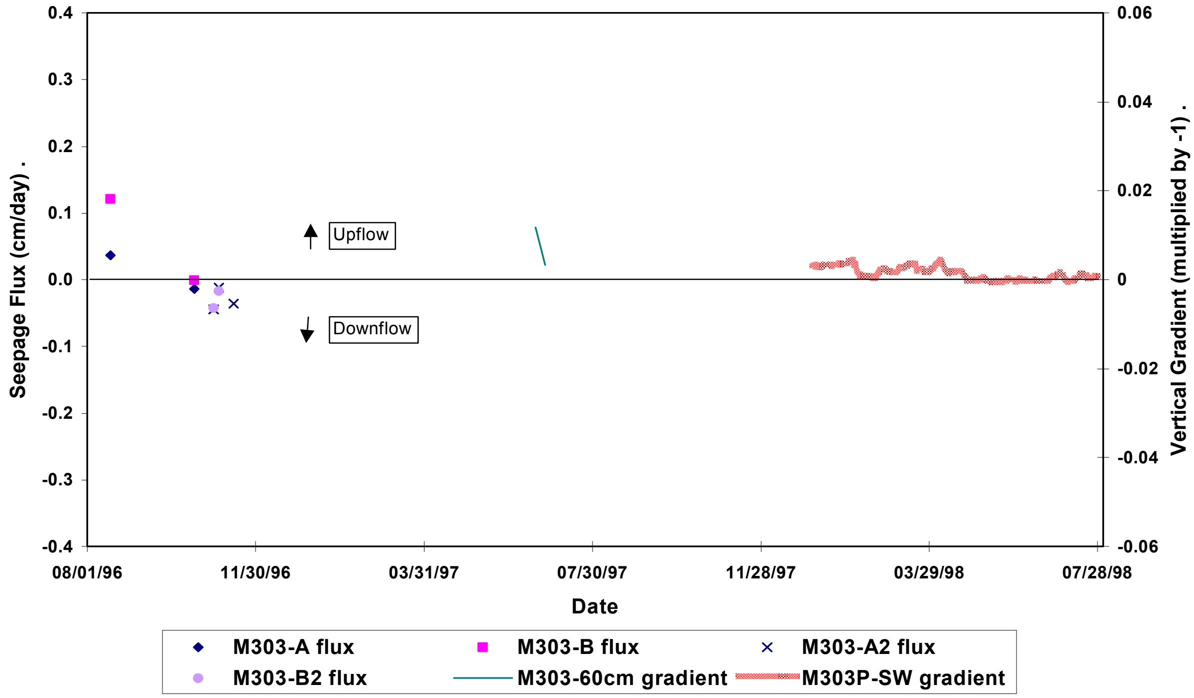


Figure 144. ENR sites M204 and M303. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates upward flow.

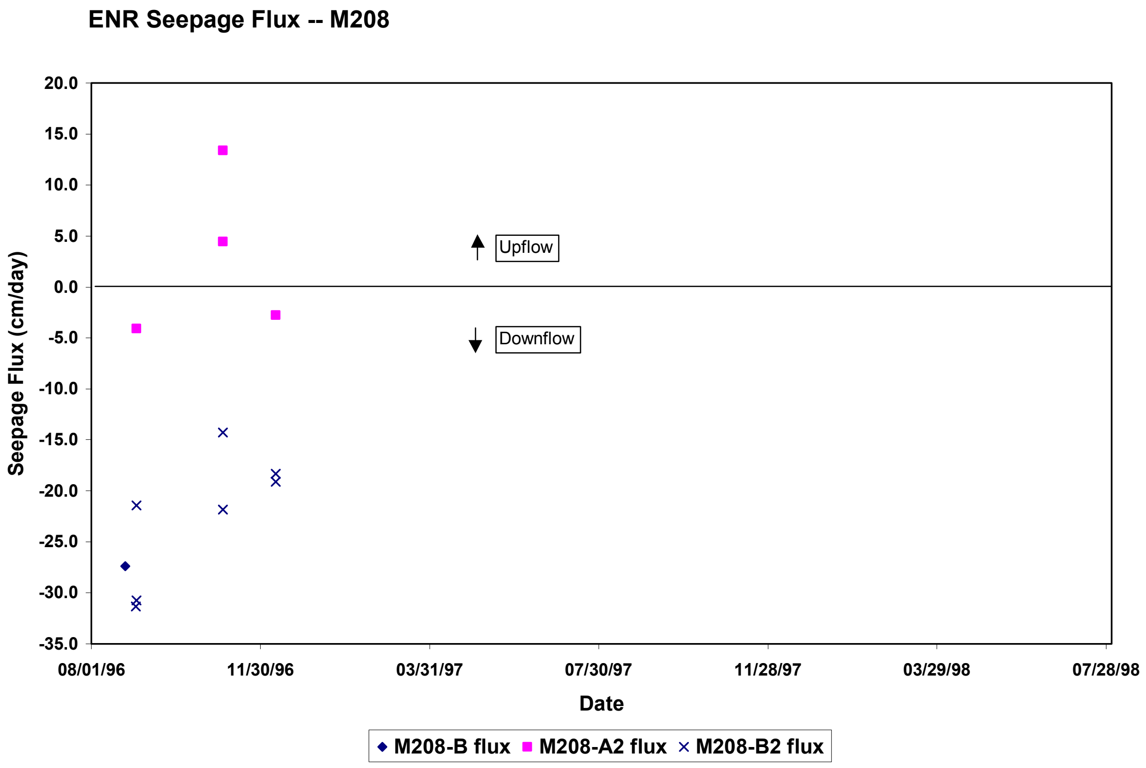


Figure 145. ENR site M208. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface.

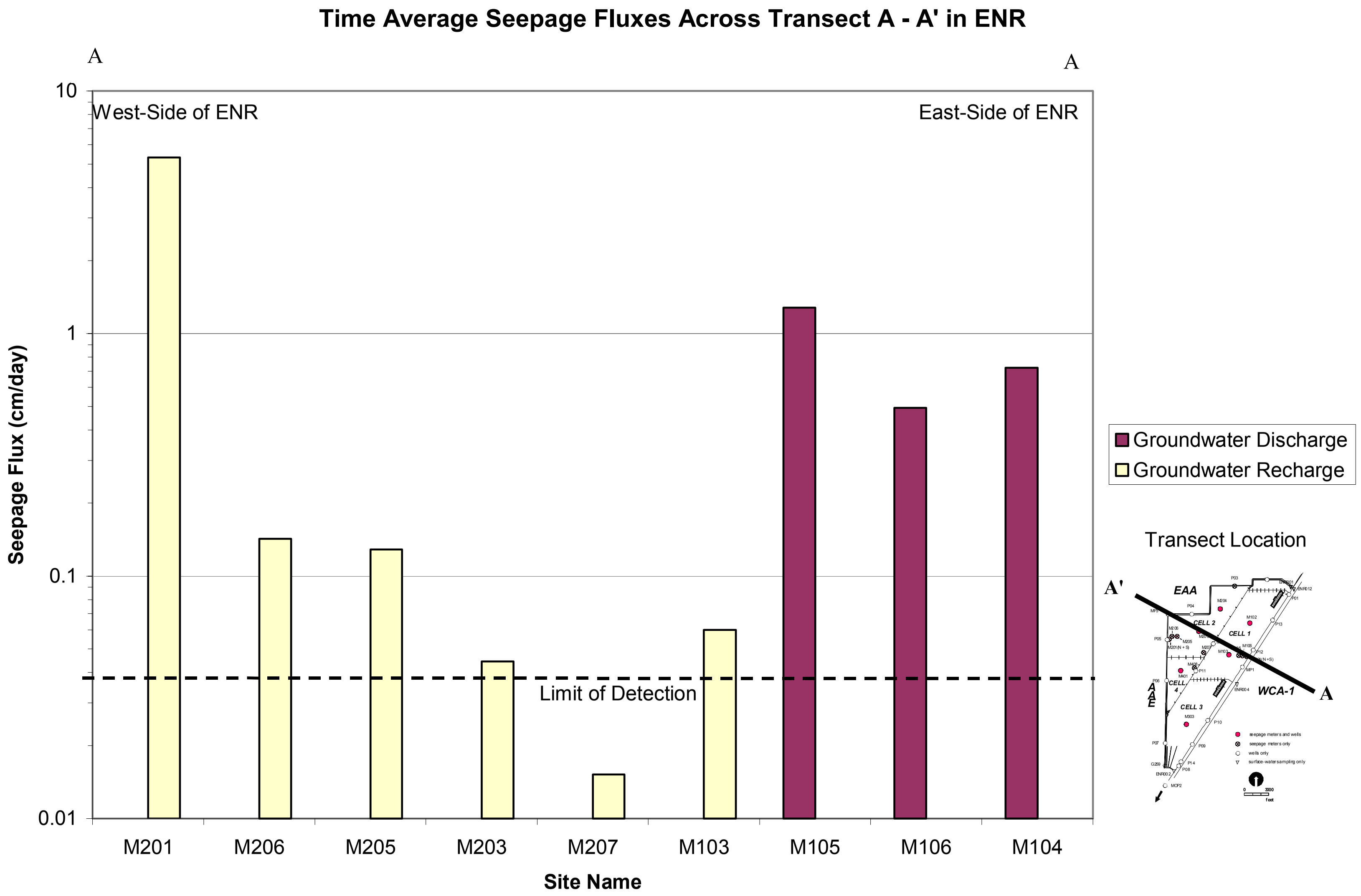
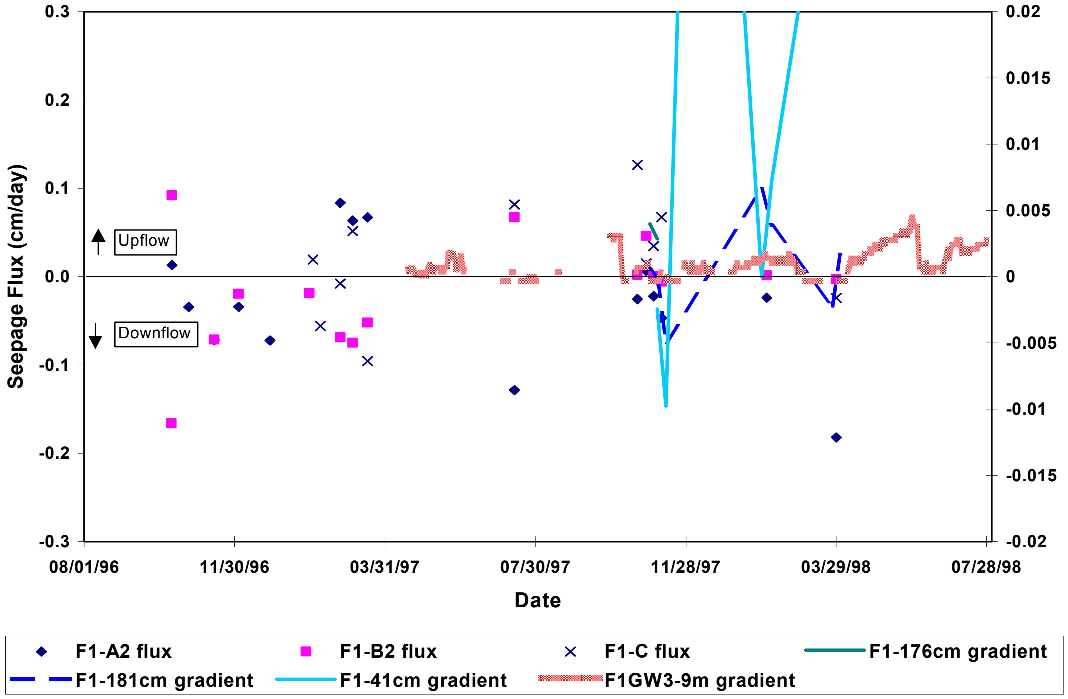


Figure 146. Time averaged seepage fluxes across transect A - A' in ENR.

Seepage Meter Fluxes and Hydraulic Gradients in WCA2 and WCA3-A

a. WCA2-A Seepage Flux -- F1



b. E1 Seepage Flux

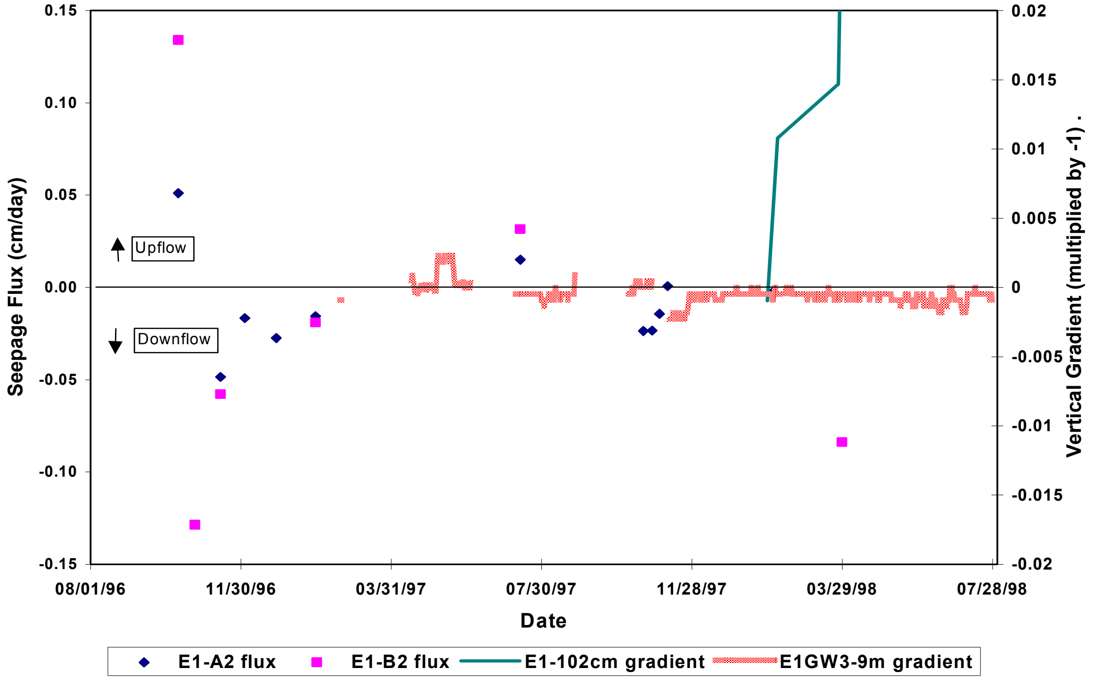
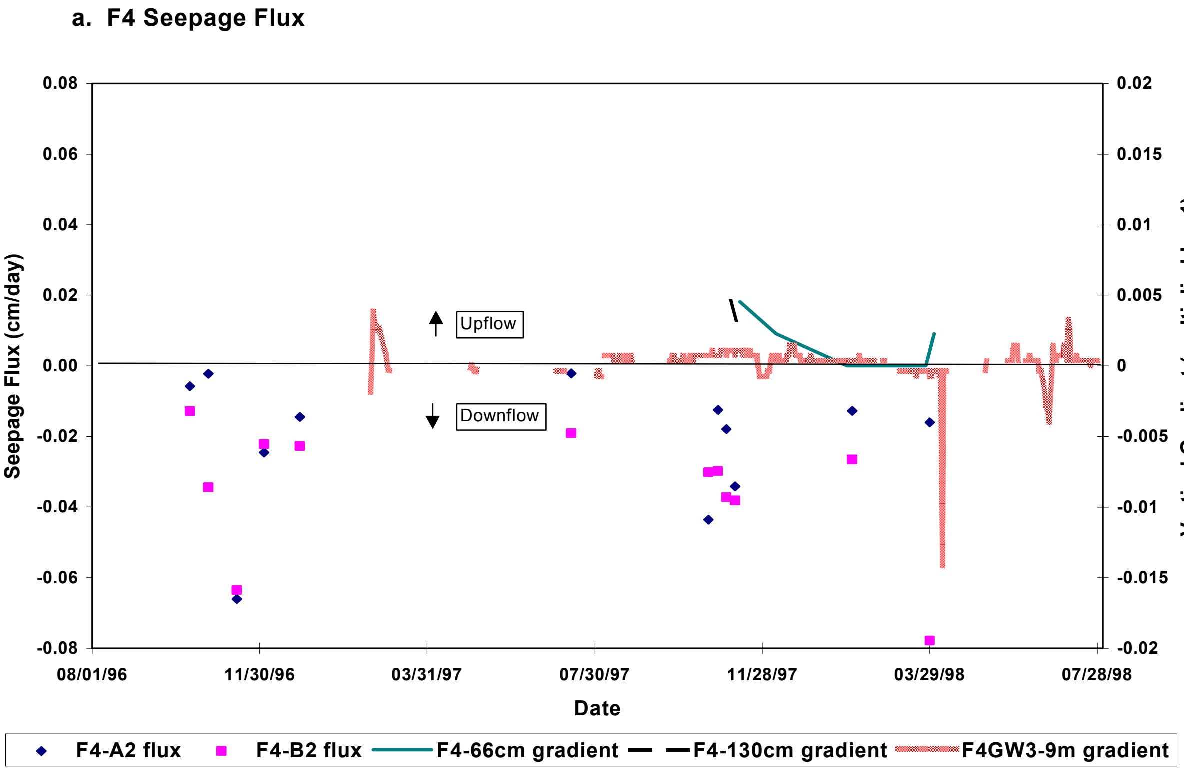


Figure 146. WCA2-A sites F1 and E1. Seepage meter flux and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates positive upward flow.



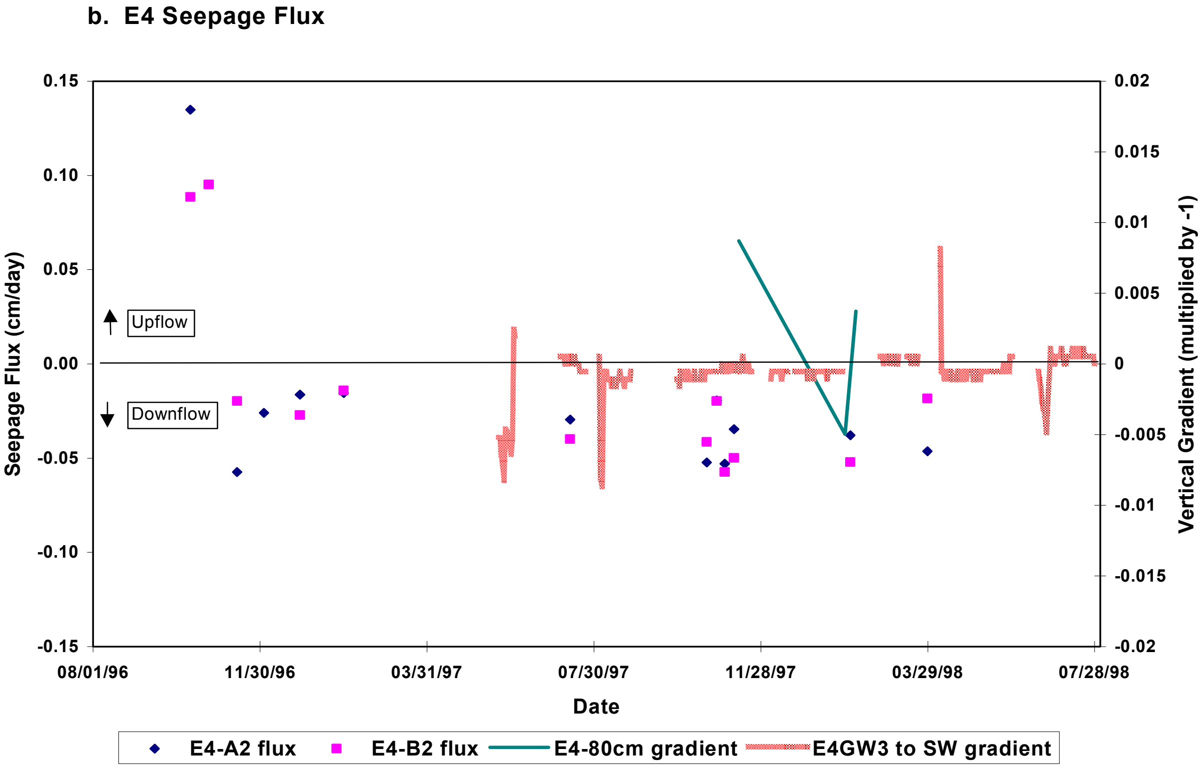


Figure 147. WCA2-A sites F4 and E4. Seepage meter flux and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates positive upward flow.

a. U3 Seepage Flux

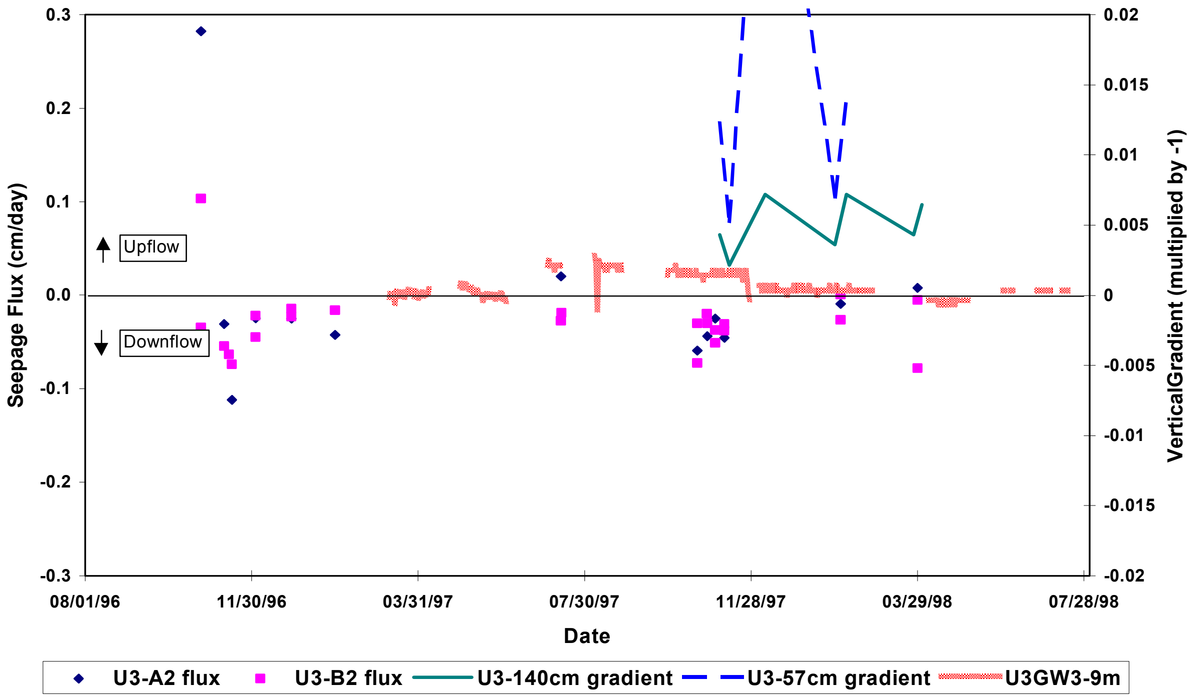
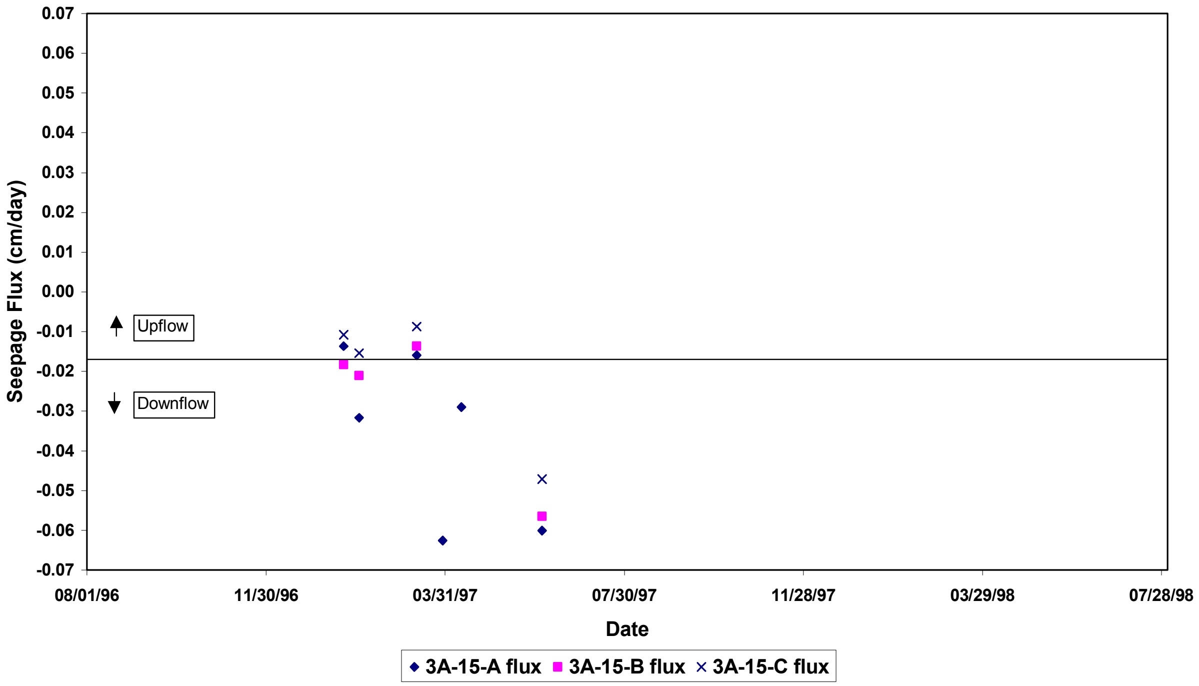


Figure 148. WCA2-A site U3 and U1. Seepage meter flux and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface. A positive gradient (after multiplying by -1) also indicates positive upward flow.

a. 3A-15 Seepage Flux



b. 2B-S Seepage Flux

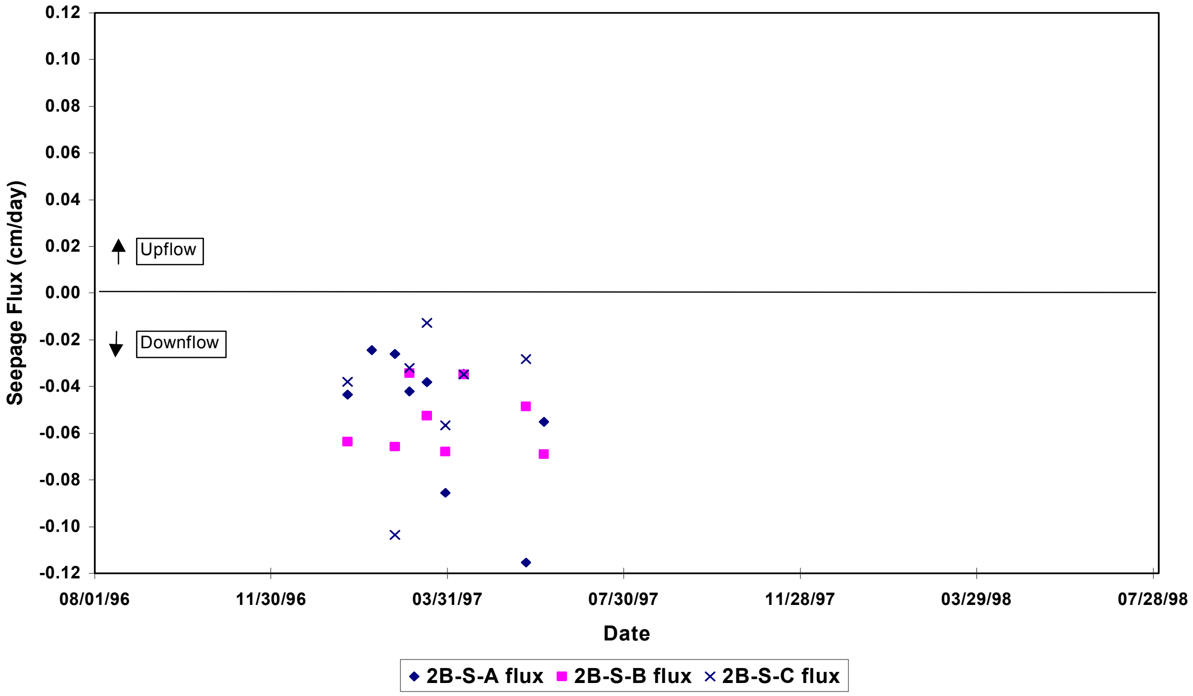
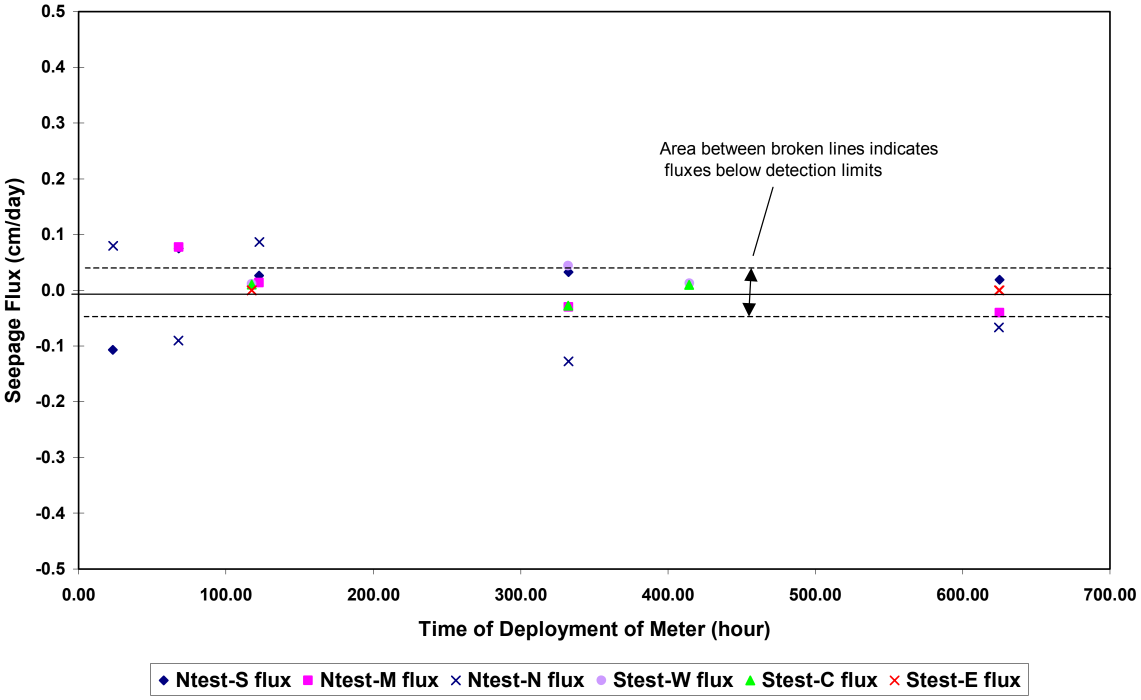


Figure 149. WCA3-A site 3A-15 and WCA2-B site 2B-S. Seepage meter flux measurements and vertical hydraulic gradients. A positive flux indicates upward flow across wetland sediment surface.

b. Seepage Meter Flux Errors Plotted Versus Elapsed Time of Deployment



a. Seepage Meter Flux Errors Plotted Versus Date of Measurement

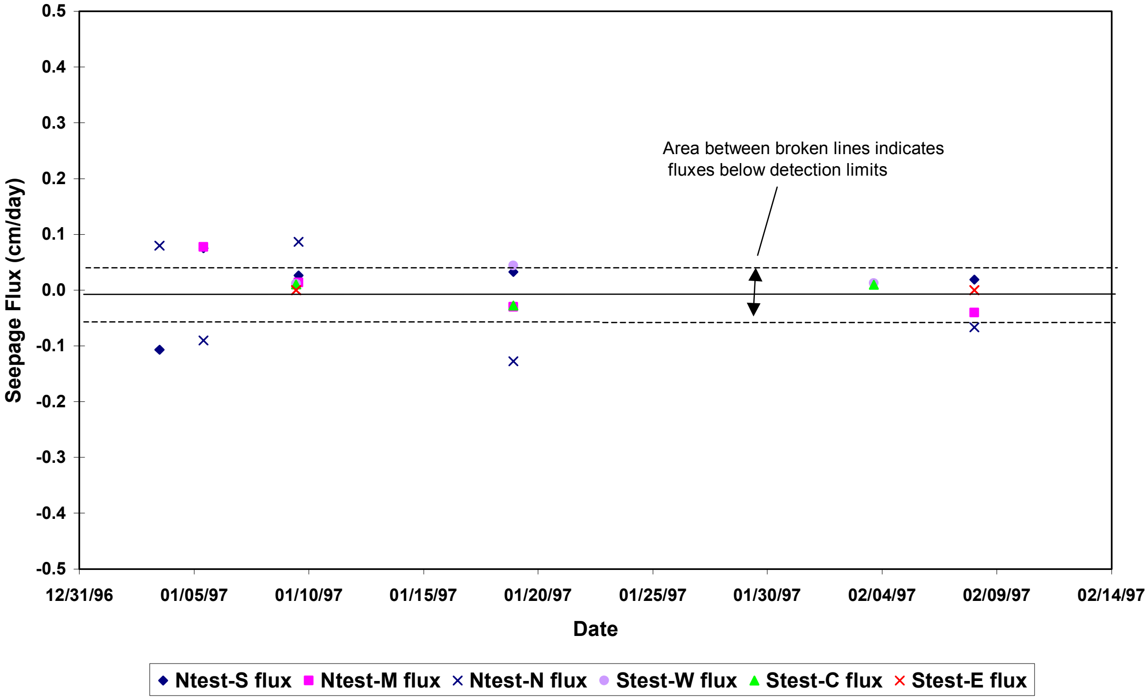
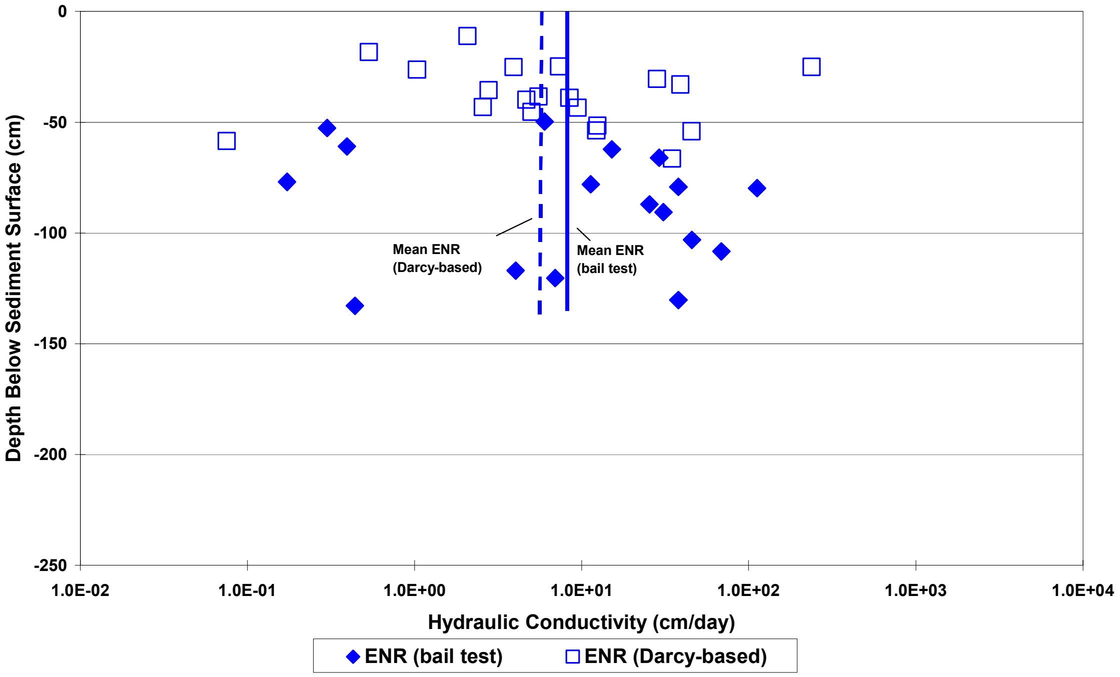


Figure 150. Seepage meter error estimates. The detection limit of seepage meters used to estimate vertical water fluxes was determined to be zero plus or minus 0.38 cm/day (between broken lines). Operation of test meters and estimation of detection limit is explained in text.

Hydraulic Conductivity of Peat

a. Hydraulic Conductivity of Wetland Peat in ENR



b. Hydraulic Conductivity of Wetland Peat and Underlaying Sand Layer in WCA2A

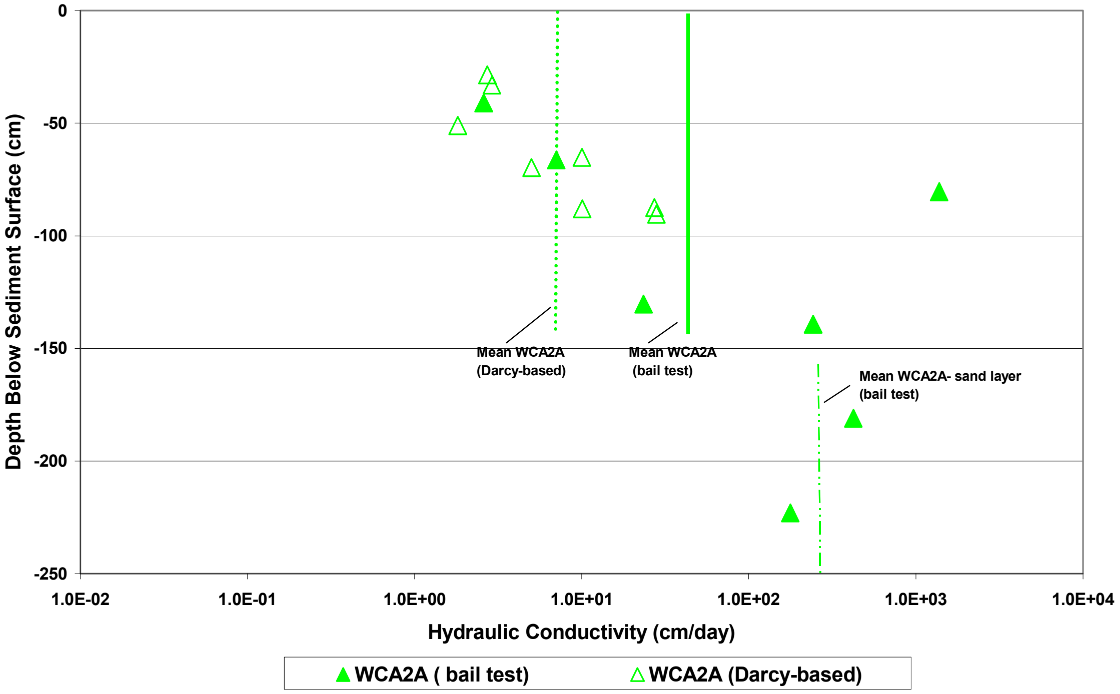


Figure 151. Hydraulic conductivity of wetland peat in ENR (a) and in WCA-2A (b).

Table 31. Hydraulic Conductivity of Peat and Sediment Immediately Underlying Peat

General Location	Drive Point ID	Drive Point Type*	Screen Length (cm)	Approx. Sediment Depth (cm)	Approx. Sediment Depth (feet)	Depth of Center of Screen Below Sediment Surface (cm)	K Method = bail test# (cm/day)	K Method = bail test# (feet/day)	Bail Test Method Reliable? n = no	K method = flux-grad+ (cm/day)	K method = flux-grad+ (feet/day)	Flux-grad Method Reliable? n = no	Average K best estimate** (cm/day)	Average K best estimate** (feet/day)
ENR, cell 1	M104-SU-SS1,108cm	3/8" ss, 6'	1	152	5.0	108	69	2.2		46	1.5			
ENR, cell 1	M104-NV-SS2,91cm	3/8" ss, 6'	1	152	5.0	91	31	1.0		5.0	0.16			
ENR, cell 1	M104-P1,61cm	1.25" pvc	12.5	152	5.0	61	0.4	0.013		28	0.93			
ENR, cell 1	M104-P2,133cm	1.5" pvc	6.5	152	5.0	133	0.4	0.014		35	1.1			
ENR, cell 1	M106-SS1,87cm	3/8" ss, 6'	1	94	3.1	87	25	0.84		9.5	0.31			
ENR, cell 1	M105-SS1,80cm	3/8" ss, 6'	1	134	4.4	80	110	3.6		4.7	0.15			
ENR, cell 1	M103-SS1,87cm	3/8" ss, 6'	1	119	3.9	87				2.6	0.08			
ENR, cell 1	M103-P1,118cm	3/4" pvc	14.5	119	3.9	117	4.0	0.13		0.08	0.0025			
ENR, cell 2	M207-SS1,138cm	3/8" ss, 7'	1	107	3.5	71				2.8	0.091			
ENR, cell 2	M207-P1,78cm	3/4" pvc	14.5	107	3.5	78	11	0.37		8.5	0.28			
ENR, cell 2	M203-SSE-SS1,37cm	3/8" ss, 6'	1	91	3.0	37				0.53	0.018			
ENR, cell 2	M203-SSW-SS2,22cm	3/8" ss, 7'	1	91	3.0	22				2.1	0.068			
ENR, cell 2	M203-P1,53cm	1.5" pvc	19.8	91	3.0	53	0.30	0.010		1.0	0.034			
ENR, cell 2	M203-P2,77cm	3/4" pvc	14.5	91	3.0	77	0.17	0.0057		5.5	0.18			
ENR, cell 2	M205-SS1,108cm	3/8" ss, 7'	1	79	2.6	108				12	0.40			
ENR, cell 2	M206-SS1,43cm	3/8" ss, 6'	1	79	2.6	43								
ENR, cell 2	M206-P1	3/4" pvc	14.5	88	2.9	79	38	1.2						
ENR, cell 2	M201-S-SS	3/8" ss, 6'	1	85	2.8	50				240	7.9			
ENR, cell 2	M201-S-P1,66cm	1.5" pvc	13.5	85	2.8	66	29	1.0		39	1.3			
ENR, cell 2	M201-N-SS	3/8" ss, 7'	1	85	2.8	50				3.9	0.13			
ENR, cell 2	M201-NW-P1,50cm	1" pvc	14.5	85	2.8	50	6.0	0.20		7.3	0.24			
ENR, cell 2	M201-NW-P2,103cm	1.5"pvc	4.8	85	2.8	103	46	1.5		12	0.41			
ENR, cell 2	M201-NE-P3,62cm	1.25" pvc	12.5	85	2.8	62	15	0.50						
ENR, cell 2	M204-P1	3/4" pvc	14.5	107	3.5	130	38	1.2						
ENR, cell 3	M303-SS1,59cm	3/8" SS	1	91	3.0	59								
ENR, cell 1	M102-P1	3/4" pvc	14.5	110	3.6	120	6.9	0.23						
WCA2A	F1-SS1,176cm	3/8" ss, 7'	1	158	5.2	176				10	0.33	n		
WCA2A	F1-P1,181cm	3/4" pvc	14.5	158	5.2	181	420	13.8		28	0.92	n		
WCA2A	F1-P2,41cm	3/4" pvc	14.5	158	5.2	41	2.6	0.09						
WCA2A	F1-P3,223cm	1.25" pvc	12.4	158	5.2	223	180	5.9						
WCA2A	E1-P1,102cm	1.25" pvc	12.4	104	3.4	102				1.8	0.06	n		
WCA2A	E4-P1,80cm	1.25" pvc	11.4	101	3.3	80	1400	45.9						
WCA2A	F4-SS1,130cm	3/8" ss, 7'	1	122	4.0	130	24	0.77		10	0.33	n		
WCA2A	F4-P1,66cm	3/4" pvc	14.5	122	4.0	66	7.1	0.23		2.9	0.10	n		
WCA2A	U3-P1,139cm	1.25" pvc	11.3	149	4.9	139	240	7.9		5.0	0.16	n		
WCA2A	U3-P2,57cm	3/4" pvc	14.5	149	4.9	57				2.7	0.09	n		
WCA2A	U1-P1,174cm	1.25" pvc	11.4	152	5.0	175				27	0.90	n		
Mean$^{\&}$	ENR, all	average		105	3.4		8.1	0.27				n	8.1	0.27
	ENR, above transition	average					5.9	0.19		7.6	0.25		6.7	0.22
	ENR, transition layer	average					18	0.59				n	18	0.59
Mean$^{\&}$	WCA2A, all except sand	average		131	4.3		43	1.4				n	43	1.4
	WCA2A, above transition	average					30	1.0				n	30	1.0
	WCA2A, transition layer	average					76	2.5				n	76	2.5
	WCA2A sand layer only	average					270	8.9				n.a.	270	8.9

* - ss - stainless steel tube capped with conical point with four 1-cm vertical slots (0.014") behind point
pvc - polyvinyl chloride pipe capped at end with horizontally slotted screen (0.01") of variable length behind cap
\# - bail test conducted by pumping water out of drive point and recording time course of head recovery. K calculated according to Luthin and Kirkham (1949)
+ - flux-gradient method uses seepage meter data and head data from drive point and surface water to compute K using Darcy's law
& - all means are geometric means
** - best estimates are depth-averaged means. If one method was suspected to be invalid then only the valid estimates were depth averaged

Summary of Vertical Fluxes Determined by Seepage Meters

Table 32. Time-Averaged Seepage Fluxes and Average Uncertainties of Measurements

Site Name	Number of Observations	Time-Averaged Seepage Flux (cm/day)	Average Coeff. of Variation# (1)	Estimate Above Detection Level and Reliable? n = no
ENR Sites				
M207	41	-0.02	0.76	n
M401	18	-0.07	0.52	
M204	41	0.07	1.23	
M103	37	-0.06	0.66	
M303	9	-0.001	0.45	n
M203	56	-0.04	1.00	
M205	42	-0.13	0.50	
M206	14	-0.14	0.31	
M408	5	0.02	n.a.	n
M104-S	66	0.90	0.23	
M104-N	45	0.54	0.53	
M106	43	1.2	0.62	
M105	40	1.5	0.91	
M208	12	-14	1.94	
M201-S	42	-6.2	0.24	
M201-N	27	-4.4	0.70	
WCA2A Sites				
WCA-F1	41	-0.01	1.19	n
WCA-E1	17	-0.01	0.28	n
WCA-E4	23	-0.01	0.25	n
WCA-F4	24	-0.03	0.36	n
WCA-U3	26	-0.02	1.23	n
WCA-U1	9	-0.01	0.13	n
WCA2-B and WCA3-A Sites				
WCA-2B	24	-0.05	0.27	
WCA-3A	14	-0.03	0.21	n
Test Meters to Estimate Detection Level of Seepage Meters				
Test Meters	24	0.04	1.70	
Average Uncertainties of Replicate Measurements*				
Mean CV at ENR			0.60	
Mean CV at WCA2-A			0.41	
Mean CV in WCA2-B and WCA3-A			0.24	

\# - Coefficient of variation (CV) computed as standard deviation divided by the mean for replicate or triplicate measurements at one site on one day

* - Geometric mean of coefficients of variation

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
Page 1 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measurement?* n = no	Flux Above Minimum Detection?# n = no
				Start Date	End Date	Mid Date					
ENR, cell 2	M207-A		1000	06/14/96	06/14/96	06/14/96	7.56	0.193	1.3E-01	n-b	
ENR, cell 2	M207-B		1000	06/14/96	06/14/96	06/14/96	7.50	0.116	7.9E-02	n-b	
ENR, cell 2	M207-A		1000	06/14/96	06/14/96	06/14/96	15.28	0.346	1.2E-01	n-b	
ENR, cell 2	M207-B		1000	06/14/96	06/14/96	06/14/96	15.12	0.051	1.7E-02	n-b	
ENR, cell 2	M207-A		1000	06/14/96	06/14/96	06/14/96	21.67	0.153	3.6E-02	n-b	
ENR, cell 2	M207-B		1000	06/14/96	06/14/96	06/14/96	21.68	0.361	8.5E-02	n-b	
ENR, cell 2	M207-A		1000	06/14/96	06/14/96	06/14/96	11.92	0.365	1.6E-01	n-b	
ENR, cell 2	M207-B		1000	06/14/96	06/14/96	06/14/96	11.89	0.874	3.8E-01	n-b	
ENR, cell 2	M207-A		1000	06/16/96	06/17/96	06/16/96	46.00	0.541	6.0E-02	n-b	
ENR, cell 2	M207-B		1000	06/16/96	06/17/96	06/16/96	45.95	1.587	1.8E-01	n-b	
ENR, cell 2	M207-A		1000	06/18/96	06/21/96	06/19/96	91.03	1.247	7.0E-02	n-b	
ENR, cell 2	M207-B		1000	06/18/96	06/21/96	06/19/96	90.45	2.117	1.2E-01	n-b	
ENR, cell 2	M207-A		1000	07/05/96	07/05/96	07/05/96	0.87	0.235	1.4E+00	n-s	
ENR, cell 2	M207-B		3000	07/05/96	07/05/96	07/05/96	1.18	0.010	4.3E-02	n-s	
ENR, cell 2	M207-A		3000	07/05/96	07/07/96	07/06/96	70.20	0.537	3.9E-02		
ENR, cell 2	M207-B		3000	07/05/96	07/07/96	07/06/96	70.48	1.410	1.0E-01		
ENR, cell 2	M207-A		1000	07/05/96	07/06/96	07/05/96	47.20	0.839	9.1E-02		
ENR, cell 2	M207-B		1000	07/05/96	07/06/96	07/05/96	47.87	0.192	2.0E-02		n
ENR, cell 2	M207-A		1000	07/10/96	07/10/96	07/10/96	1.27	0.140	5.7E-01	n-s	
ENR, cell 2	M207-B		1000	07/10/96	07/10/96	07/10/96	1.30	0.084	3.3E-01	n-s	
ENR, cell 2	M207-A		1000	07/10/96	07/10/96	07/10/96	0.50	0.024	2.4E-01	n-s	
ENR, cell 2	M207-B		1000	07/10/96	07/10/96	07/10/96	0.10	0.039	2.0E+00	n-s	
ENR, cell 2	M207-A		1000	07/10/96	07/10/96	07/10/96	0.08	0.011	6.5E-01	n-s	
ENR, cell 2	M207-B		1000	07/10/96	07/10/96	07/10/96	0.03	0.005	7.2E-01	n-s	
ENR, cell 2	M207-B		1000	07/05/96	07/05/96	07/05/96	0.03	0.011	1.7E+00	n-s	
ENR, cell 2	M207-A		2000	07/20/96	07/24/96	07/22/96	103.05	0.829	4.1E-02	n-lv	
ENR, cell 2	M207-A		2000	07/24/96	07/24/96	07/24/96	16.83	0.200	6.1E-02	n-lv	
ENR, cell 2	M207-B		2000	07/24/96	07/24/96	07/24/96	16.90	-0.021	-6.3E-03	n-lv	
ENR, cell 2	M207-A		4000	07/25/96	08/13/96	08/03/96	456.32	-3.205	-3.6E-02	n-lv	
ENR, cell 2	M207-B		4000	07/25/96	08/13/96	08/03/96	456.40	-0.058	-6.5E-04	n-lv	
ENR, cell 2	M207-A		2000	08/17/96	08/19/96	08/18/96	70.95	-0.200	-1.4E-02		n
ENR, cell 2	M207-B		2500	08/17/96	08/19/96	08/18/96	71.09	-0.460	-3.3E-02		n
ENR, cell 2	M207-A		4000	08/20/96	08/22/96	08/21/96	63.53	-3.525	-2.8E-01		n
ENR, cell 2	M207-B		4000	08/20/96	08/22/96	08/21/96	63.20	-2.910	-2.4E-01		n
ENR, cell 2	M207-A		2000	08/23/96	08/24/96	08/23/96	45.88	-1.091	-1.2E-01		n
ENR, cell 2	M207-B		2000	08/23/96	08/24/96	08/23/96	45.79	-0.400	-4.5E-02		
ENR, cell 2	M207-A		4000	08/25/96	08/30/96	08/27/96	124.79	-3.352	-1.4E-01	n-o	
ENR, cell 2	M207-B		4000	08/25/96	08/30/96	08/27/96	124.85	-0.053	-2.2E-03	n-b	
ENR, cell 2	M207-A		6000	08/30/96	09/02/96	08/31/96	76.70	-4.716	-3.2E-01		
ENR, cell 2	M207-B		6000	08/30/96	09/02/96	08/31/96	76.42	-0.788	-5.3E-02		
ENR, cell 2	M207-A2		2000	11/03/96	11/03/96	11/03/96	2.78	-0.070	-1.3E-01	n-s	
ENR, cell 2	M207-B2		2000	11/03/96	11/03/96	11/03/96	2.72	-0.070	-1.3E-01	n-s	
ENR, cell 2	M207-A2		2000	11/03/96	11/05/96	11/04/96	71.50	-0.118	-8.5E-03		
ENR, cell 2	M207-B2		1000	11/03/96	11/05/96	11/04/96	71.63	0.280	2.0E-02		n
ENR, cell 2	M207-A2		4000	11/06/96	11/21/96	11/13/96	376.90	2.350	3.2E-02		n
ENR, cell 2	M207-B2		4000	11/06/96	11/21/96	11/13/96	376.80	2.250	3.0E-02		n
ENR, cell 2	M207-A2		2000	11/22/96	12/04/96	11/28/96	311.82	0.764	1.3E-02		n
ENR, cell 2	M207-B2		2000	11/22/96	12/05/96	11/28/96	312.10	2.305	3.8E-02		
ENR, cell 2	M207-A2		3000	12/05/97	12/11/97	12/08/97	148.45	1.130	3.9E-02		
ENR, cell 2	M207-B2		3000	12/05/97	12/11/97	12/08/97	148.52	0.850	2.9E-02		n
ENR, cell 2	M207-A2		3000	12/05/97	12/27/97	12/16/97	551.50	0.000	0.0E+00		
ENR, cell 2	M207-B2		3000	12/05/97	12/27/97	12/16/97	551.60	0.000	0.0E+00		
ENR, cell 2	M207-A2		2000	01/03/97	01/12/97	01/07/97	216.85	0.245	5.8E-03		n
ENR, cell 2	M207-B2		2000	01/03/97	01/12/97	01/07/97	217.03	0.605	1.4E-02		n
ENR, cell 2	M207-A2		4000	01/12/97	01/28/97	01/20/97	385.17	3.240	4.3E-02		
ENR, cell 2	M207-B2		4000	01/12/97	01/28/97	01/20/97	385.34	2.340	3.1E-02		n
ENR, cell 2	M207-A2		4000	01/28/97	02/02/97	01/30/97	121.68	0.790	3.3E-02		n
ENR, cell 2	M207-B2		4000	01/28/97	02/02/97	01/30/97	121.78	0.660	2.8E-02		n
ENR, cell 2	M207-A2		2000	02/02/97	02/11/97	02/06/97	239.95	1.919	4.1E-02	n-g	
ENR, cell 2	M207-B2		2000	02/02/97	02/11/97	02/06/97	239.82	1.250	2.7E-02		n
ENR, cell 2	M207-A2		4000	02/12/97	02/20/97	02/16/97	214.42	-1.485	-3.6E-02	n-g	
ENR, cell 2	M207-B2		4000	02/12/97	02/20/97	02/16/97	214.52	-0.260	-6.2E-03		n

Table 33. Vertical Fluxes Measured by Measured by Seepage Meters at Research Sites in ENR and WCA2-A Page 2 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
ENR, cell 2	M207-A2		4000	02/21/97	03/10/97	03/01/97	424.63	1.800	2.2E-02	n-g	
ENR, cell 2	M207-B2		4000	02/21/97	03/10/97	03/01/97	424.47	1.265	1.5E-02		n
ENR, cell 2	M207-A2		4000	03/11/97	03/12/97	03/11/97	32.55	0.150	2.4E-02	n-g	
ENR, cell 2	M207-B2		4000	03/11/97	03/12/97	03/11/97	32.58	0.065	1.0E-02		n
ENR, cell 2	M207-A2		4000	03/26/97	04/09/97	04/02/97	336.24	-0.050	-7.6E-04	n-g	n
ENR, cell 2	M207-B2		4000	03/26/97	04/09/97	04/02/97	336.65	-0.800	-1.2E-02		n
ENR, cell 2	M207-A2		2000	04/09/97	04/17/97	04/13/97	192.05	1.935	5.2E-02	n-g	
ENR, cell 2	M207-B2		2000	04/09/97	04/17/97	04/13/97	192.15	1.300	3.5E-02		n
ENR, cell 2	M207-A2		2000	04/17/97	04/21/97	04/19/97	112.38	1.445	6.6E-02		n
ENR, cell 2	M207-B2		2000	04/17/97	04/21/97	04/19/97	112.47	0.960	4.4E-02		
ENR, cell 2	M207-A2		2000	04/22/97	04/30/97	04/26/97	196.90	-0.440	-1.1E-02		n
ENR, cell 2	M207-B2		2000	04/22/97	04/30/97	04/26/97	197.00	0.200	5.2E-03		n
ENR, cell 2	M207-A2		4000	04/30/97	05/01/97	04/30/97	25.37	0.280	5.7E-02		
ENR, cell 2	M207-B2		4000	04/30/97	05/01/97	04/30/97	25.55	0.335	6.7E-02		
ENR, cell 2	M207-A2		4000	05/23/97	05/29/97	05/26/97	144.87	1.120	4.0E-02		
ENR, cell 2	M207-B2		4000	05/23/97	05/29/97	05/26/97	145.05	0.480	1.7E-02		n
ENR, cell 2	M207-A2		2000	05/29/97	06/07/97	06/02/97	235.48	1.400	3.1E-02	n-g	
ENR, cell 2	M207-B2		2000	05/29/97	06/07/97	06/02/97	235.65	0.575	1.2E-02	n-g	
ENR, cell 2	M207-A2		4000	06/08/97	06/19/97	06/13/97	268.50	1.060	2.0E-02		n
ENR, cell 2	M207-B2		4000	06/08/97	06/19/97	06/13/97	268.72	-0.550	-1.0E-02		n
ENR, cell 2	M207-A2		4000	06/19/97	06/25/97	06/22/97	166.42	-0.400	-1.2E-02		n
ENR, cell 2	M207-B2		4000	06/19/97	06/25/97	06/22/97	166.48	-0.505	-1.5E-02	n-g	
ENR, cell 2	M207-A2		4000	07/08/97	07/12/97	07/10/97	99.65	0.120	6.2E-03		
ENR, cell 2	M207-B2		4000	07/08/97	07/12/97	07/10/97	99.73	-0.080	-4.1E-03		
ENR, cell 2	M207-A2		4000	07/12/97	07/17/97	07/14/97	141.42	-0.600	-2.2E-02	n-g	
ENR, cell 2	M207-B2		4000	07/12/97	07/17/97	07/14/97	141.37	-0.480	-1.7E-02	n-g	
ENR, cell 2	M207-A2		4000	02/17/98	02/23/98	02/20/98	164.37	-0.780	-2.4E-02		n
ENR, cell 2	M207-B2		4000	02/17/98	02/23/98	02/20/98	164.35	0.230	7.1E-03		n
ENR, cell 2	M207-A2		4000	03/15/98	03/22/98	03/18/98	170.42	-1.365	-4.1E-02		
ENR, cell 2	M207-A2		4000	04/09/98	04/14/98	04/11/98	139.65	-2.200	-8.1E-02		
ENR, cell 2	M207-B2		4000	04/09/98	04/14/98	04/11/98	139.55	-1.090	-4.0E-02		
ENR, cell 2	M401-A		1000	06/18/96	06/21/96	06/19/96	88.56	0.048	2.8E-03	n-b	
ENR, cell 2	M401-B		1000	06/18/96	06/21/96	06/19/96	89.23	0.067	3.9E-03	n-b	
ENR, cell 2	M401-A		2000	08/15/96	08/20/96	08/17/96	124.70	-0.707	-2.9E-02		n
ENR, cell 2	M401-B		2000	08/15/96	08/20/96	08/17/96	124.70	-1.229	-5.1E-02		
ENR, cell 2	M401-A		4000	08/20/96	08/22/96	08/21/96	70.85	-3.024	-2.2E-01		
ENR, cell 2	M401-B		4000	08/20/96	08/22/96	08/21/96	71.05	-3.060	-2.2E-01		
ENR, cell 2	M401-A		2000	08/23/96	08/23/96	08/23/96	22.09	-0.221	-5.1E-02		
ENR, cell 2	M401-B		2000	08/23/96	08/23/96	08/23/96	21.89	-0.208	-4.9E-02		
ENR, cell 2	M401-A		4000	08/24/96	08/27/96	08/25/96	72.42	-1.446	-1.0E-01		
ENR, cell 2	M401-B		4000	08/24/96	08/27/96	08/25/96	72.30	-1.380	-9.9E-02		
ENR, cell 2	M401-A		4000	08/27/96	08/29/96	08/28/96	69.09	-2.680	-2.0E-01		
ENR, cell 2	M401-B		4000	08/27/96	08/29/96	08/28/96	68.99	-2.450	-1.8E-01		
ENR, cell 2	M401-A2		4000	10/29/96	11/01/96	10/30/96	73.37	2.133	1.5E-01	n-g	
ENR, cell 2	M401-B2		4000	10/29/96	11/01/96	10/30/96	73.32	-0.066	-4.7E-03		n
ENR, cell 2	M401-A2		4000	11/01/96	11/06/96	11/03/96	120.24	-0.450	-1.9E-02		n
ENR, cell 2	M401-B2		4000	11/01/96	11/06/96	11/03/96	120.40	-0.685	-3.0E-02		n
ENR, cell 2	M401-A2		4000	11/22/96	12/05/96	11/28/96	315.73	-0.650	-1.1E-02		n
ENR, cell 2	M401-A2		4000	12/05/96	12/09/96	12/07/96	118.75	-0.660	-2.8E-02		n
ENR, cell 2	M401-B2		4000	12/05/96	12/09/96	12/07/96	118.77	-0.350	-1.5E-02		n
ENR, cell 2	M401-A2		4000	01/03/97	01/06/97	01/04/97	94.58	-0.670	-3.6E-02		n
ENR, cell 2	M401-B2		4000	01/03/97	01/06/97	01/04/97	94.55	0.270	1.5E-02		n
ENR, cell 2	M204-A		1000	06/18/96	06/20/96	06/19/96	69.10	0.598	4.4E-02	n-b	
ENR, cell 2	M204-B		1000	06/18/96	06/20/96	06/19/96	69.50	0.332	2.4E-02	n-b	
ENR, cell 2	M204-A		2000	08/15/96	08/22/96	08/18/96	189.47	0.439	1.2E-02		n
ENR, cell 2	M204-B		2000	08/15/96	08/22/96	08/18/96	189.35	0.676	1.8E-02		n
ENR, cell 2	M204-A		2000	08/23/96	08/24/96	08/23/96	24.37	-0.274	-5.8E-02		
ENR, cell 2	M204-B		2000	08/23/96	08/24/96	08/23/96	24.20	-0.183	-3.9E-02		
ENR, cell 2	M204-A		4000	08/27/96	08/29/96	08/28/96	68.77	-1.775	-1.3E-01		
ENR, cell 2	M204-B		4000	08/27/96	08/29/96	08/28/96	68.27	-1.510	-1.1E-01		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
Page 3 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
ENR, cell 2	M204-B2		4000	10/15/96	10/15/96	10/15/96	5.07	-0.367	-3.7E-01	n-s	
ENR, cell 2	M204-B2		6000	10/15/96	10/18/96	10/16/96	91.17	-5.480	-3.1E-01	n-g	
ENR, cell 2	M204-B2		6000	10/19/96	10/19/96	10/19/96	5.95	-0.302	-2.6E-01	n-s	
ENR, cell 2	M204-B2		4000	10/29/96	10/31/96	10/30/96	67.58	-3.570	-2.7E-01		
ENR, cell 2	M204-B2		6000	11/01/96	11/01/96	11/01/96	6.98	-0.463	-3.4E-01	n-s	
ENR, cell 2	M204-A2		4000	11/06/96	11/06/96	11/06/96	4.22	-0.017	-1.3E-01	n-s	
ENR, cell 2	M204-B2		6000	11/06/96	11/06/96	11/06/96	4.35	-0.463	-5.5E-01	n-s	
ENR, cell 2	M204-A2		6000	11/06/96	11/14/96	11/10/96	209.77	0.543	8.4E-02		
ENR, cell 2	M204-A2		1000	11/15/96	11/22/96	11/18/96	169.29	0.140	2.7E-02		n
ENR, cell 2	M204-A2		4000	11/22/96	12/05/96	11/28/96	316.98	-0.400	-4.1E-02		
ENR, cell 2	M204-A2		4000	12/05/96	12/09/96	12/07/96	115.32	1.360	3.8E-01		
ENR, cell 2	M204-A2		2000	12/10/97	01/02/98	12/21/97	574.30	-0.560	-3.1E-02		n
ENR, cell 2	M204-A2		2000	01/03/97	01/06/97	01/04/97	95.53	0.335	1.1E-01		
ENR, cell 2	M204-B2		2000	01/03/97	01/06/97	01/04/97	95.31	-1.745	-9.4E-02		
ENR, cell 2	M204-A2		4000	01/07/97	01/28/97	01/17/97	505.92	-0.980	-6.3E-02		
ENR, cell 2	M204-B2		4000	01/07/97	01/07/97	01/07/97	7.30	-0.250	-1.8E-01		
ENR, cell 2	M204-A2		4000	01/28/97	02/21/97	02/09/97	576.73	2.715	1.5E-01		
ENR, cell 2	M204-B2		4000	01/28/97	02/21/97	02/09/97	577.26	-3.045	-2.7E-02		n
ENR, cell 2	M204-A2		4000	02/21/97	02/21/97	02/21/97	2.40	0.066	8.9E-01	n-s	
ENR, cell 2	M204-B2		4000	02/21/97	02/21/97	02/21/97	2.42	-0.030	-6.4E-02	n-s	
ENR, cell 2	M204-A2		4000	03/12/97	03/25/97	03/18/97	332.58	1.640	1.6E-01		
ENR, cell 2	M204-A2		4000	03/26/97	03/27/97	03/26/97	45.27	1.800	1.3E+00	n	
ENR, cell 2	M204-B2		4000	03/26/97	03/27/97	03/26/97	45.10	1.540	1.8E-01		
ENR, cell 2	M204-B2		4000	03/28/97	04/08/97	04/02/97	266.72	-1.080	-2.1E-02		n
ENR, cell 2	M204-A2		2000	04/08/97	04/09/97	04/08/97	25.28	0.335	4.3E-01		
ENR, cell 2	M204-B2		2000	04/08/97	04/09/97	04/08/97	24.90	-0.705	-1.5E-01		
ENR, cell 2	M204-A2		2000	04/09/97	04/22/97	04/15/97	312.02	2.925	3.0E-01		
ENR, cell 2	M204-A2		2000	04/22/97	04/30/97	04/26/97	192.75	2.840	4.8E-01		
ENR, cell 2	M204-B2		4000	04/22/97	04/30/97	04/26/97	192.73	-3.780	-1.0E-01		
ENR, cell 2	M204-A2		4000	04/30/97	04/30/97	04/30/97	20.82	0.280	4.3E-01		
ENR, cell 2	M204-B2		4000	04/30/97	04/30/97	04/30/97	20.82	-0.520	-1.3E-01		
ENR, cell 2	M204-A2		4000	05/22/97	05/22/97	05/22/97	23.63	0.675	9.2E-01		
ENR, cell 2	M204-B2		4000	05/22/97	05/23/97	05/22/97	26.30	-0.950	-1.9E-01		
ENR, cell 2	M204-A2		1000	05/23/97	05/29/97	05/26/97	144.12	-0.105	-2.4E-02		n
ENR, cell 2	M204-B2		6000	05/23/97	05/29/97	05/26/97	144.07	-4.905	-1.7E-01		
ENR, cell 2	M204-A2		4000	05/29/97	05/29/97	05/29/97	19.23	0.960	1.6E+00		
ENR, cell 2	M204-B2		4000	05/29/97	05/29/97	05/29/97	19.22	-0.765	-2.0E-01		
ENR, cell 2	M204-A2		4000	06/18/97	06/19/97	06/18/97	24.43	0.280	3.7E-01		
ENR, cell 2	M204-B2		4000	06/18/97	06/19/97	06/18/97	24.47	-0.806	-1.7E-01		
ENR, cell 2	M204-A2		2000	06/19/97	06/25/97	06/22/97	167.60	3.485	6.7E-01	n-g	
ENR, cell 2	M204-B2		2000	06/19/97	06/25/97	06/22/97	167.43	-3.040	-9.3E-02		
ENR, cell 2	M204-B2		4000	01/09/98	01/15/98	01/12/98	146.17	-3.880	-1.4E-01		
ENR, cell 2	M204-B2		4000	02/17/98	02/23/98	02/20/98	165.65	-5.640	-1.7E-01		
ENR, cell 2	M204-B2		4000	03/15/98	03/23/98	03/19/98	196.65	-3.460	-9.0E-02		
ENR, cell 1	M103-A		1000	06/18/96	06/20/96	06/19/96	67.93	0.108	8.2E-03	n-b	
ENR, cell 1	M103-B		1000	06/18/96	06/20/96	06/19/96	68.20	0.025	1.9E-03	n-b	
ENR, cell 1	M103-B		2000	07/24/96	08/14/96	08/03/96	526.50	-1.223	-1.2E-02	n-long	
ENR, cell 1	M103-A		4000	08/15/96	08/20/96	08/17/96	120.50	-3.418	-1.5E-01		
ENR, cell 1	M103-B		4000	08/15/96	08/20/96	08/17/96	120.73	-3.422	-1.4E-01		
ENR, cell 1	M103-A		6000	08/20/96	08/23/96	08/21/96	95.35	-4.849	-2.6E-01		
ENR, cell 1	M103-A		2000	08/24/96	08/27/96	08/25/96	73.50	-0.906	-6.3E-02		
ENR, cell 1	M103-B		4000	08/24/96	08/27/96	08/25/96	73.35	-2.723	-1.9E-01		
ENR, cell 1	M103-A		4000	08/27/96	08/29/96	08/28/96	70.11	-2.280	-1.7E-01		
ENR, cell 1	M103-B		4000	08/27/96	08/29/96	08/28/96	70.03	-2.480	-1.8E-01		
ENR, cell 1	M103-A2		4000	10/15/96	10/18/96	10/16/96	95.60	0.224	1.2E-02	n-g	
ENR, cell 1	M103-B2		4000	10/15/96	10/18/96	10/16/96	95.78	0.297	1.6E-02		n
ENR, cell 1	M103-A2		4000	10/19/96	10/19/96	10/19/96	5.52	-0.019	-1.8E-02	n-s	
ENR, cell 1	M103-B2		4000	10/19/96	10/19/96	10/19/96	5.43	0.055	5.2E-02	n-sg	
ENR, cell 1	M103-A2		4000	10/29/96	11/01/96	10/30/96	78.30	-0.261	-1.7E-02		n
ENR, cell 1	M103-B2		4000	10/29/96	11/01/96	10/30/96	77.93	0.130	8.5E-03		
ENR, cell 1	M103-A2		4000	11/01/96	11/05/96	11/03/96	113.47	-1.370	-6.2E-02		
ENR, cell 1	M103-B2		4000	11/01/96	11/05/96	11/03/96	113.50	-2.710	-1.2E-01		
ENR, cell 1	M103-B2		2000	11/06/96	11/06/96	11/06/96	5.19	0.010	9.8E-03		n
ENR, cell 1	M103-A2		4000	11/06/96	11/21/96	11/13/96	383.70	-0.552	-7.4E-03		n
ENR, cell 1	M103-B2		4000	11/06/96	11/21/96	11/13/96	383.69	-2.540	-3.4E-02		n

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA-2A Page 4 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?# n = no
				Start Date	End Date	Mid Date					
ENR, cell 1	M103-A2		4000	11/22/96	12/04/96	11/28/96	310.43	-3.742	-6.2E-02		
ENR, cell 1	M103-B2		4000	11/22/96	11/22/96	11/22/96	0.00	0.000	0.0E+00		
ENR, cell 1	M103-A2		4000	12/05/96	12/10/96	12/07/96	120.23	-2.676	-1.1E-01		
ENR, cell 1	M103-B2		4000	12/05/96	12/10/96	12/07/96	120.52	-0.110	-4.6E-03		n
ENR, cell 1	M103-A2		4000	12/10/96	01/02/97	12/21/96	575.02	-4.000	-3.6E-02	n-long	
ENR, cell 1	M103-B2		4000	12/10/96	01/02/97	12/21/96	575.12	-0.200	-1.8E-03	n-long	
ENR, cell 1	M103-A2		4000	01/03/97	01/06/97	01/04/97	94.50	-0.800	-4.3E-02		
ENR, cell 1	M103-A2		4000	04/08/97	04/09/97	04/08/97	24.08	-1.500	-3.2E-01		
ENR, cell 1	M103-B2		4000	04/08/97	04/09/97	04/08/97	24.07	-0.085	-1.8E-02		n
ENR, cell 1	M103-A2		4000	04/09/97	04/09/97	04/09/97	6.38	-0.400	-3.2E-01		
ENR, cell 1	M103-B2		4000	04/09/97	04/09/97	04/09/97	6.55	0.020	1.6E-02		n
ENR, cell 1	M103-A2		4000	04/09/97	04/21/97	04/15/97	306.03	-2.540	-4.3E-02		
ENR, cell 1	M103-B2		4000	04/09/97	04/21/97	04/15/97	306.12	-2.145	-3.6E-02		n
ENR, cell 1	M103-A2		4000	04/22/97	04/30/97	04/26/97	197.57	-0.945	-2.5E-02		n
ENR, cell 1	M103-A2		4000	04/30/97	05/01/97	04/30/97	26.87	0.110	2.1E-02		n
ENR, cell 1	M103-B2		4000	04/30/97	05/01/97	04/30/97	26.72	0.200	3.8E-02		
ENR, cell 1	M103-A2		4000	05/23/97	05/29/97	05/26/97	147.05	-1.285	-4.5E-02		
ENR, cell 1	M103-B2		4000	05/23/97	05/29/97	05/26/97	147.08	0.072	2.5E-03		n
ENR, cell 1	M103-A2		4000	06/18/97	06/26/97	06/22/97	198.67	-3.300	-8.5E-02	n-g	
ENR, cell 1	M103-B2		4000	06/18/97	06/26/97	06/22/97	198.60	-2.555	-6.5E-02	n-g	
ENR, cell 1	M103-A2		4000	07/12/98	07/17/98	07/14/98	141.03	-0.825	-3.0E-02	n-g	
ENR, cell 1	M103-B2		4000	07/12/98	07/17/98	07/14/98	140.83	-1.145	-4.1E-02	n-g	
ENR, cell 1	M103-A2		4000	02/17/98	02/23/98	02/20/98	167.08	4.320	1.3E-01		
ENR, cell 1	M103-B2		4000	02/17/98	02/23/98	02/20/98	167.12	-3.080	-9.4E-02		
ENR, cell 1	M103-C		0	02/17/98	02/23/98	02/20/98	167.05	-0.750	-2.3E-02		n
ENR, cell 1	M103-B2		4000	03/15/98	03/22/98	03/18/98	190.68	0.440	1.2E-02		n
ENR, cell 1	M103-C		0	03/15/98	03/22/98	03/18/98	190.57	1.175	3.2E-02		n
ENR, cell 1	M103-B2		4000	04/08/98	04/15/98	04/11/98	170.73	0.100	3.0E-03		n
ENR, cell 1	M103-C		4000	04/08/98	04/15/98	04/11/98	170.73	1.120	3.4E-02		n
ENR, cell 1	M102		0	12/12/95	01/01/00	01/00/00	30.38	0.470	1.4E-01		
ENR, cell 1	M102		0	12/12/95	01/01/00	01/00/00	30.22	2.140	1.5E+00		
ENR, cell3	M303-A		1000	06/18/96	06/20/96	06/19/96	67.00	0.142	1.1E-02	n-b	
ENR, cell3	M303-B		1000	06/18/96	06/20/96	06/19/96	67.40	0.026	2.0E-03	n-b	
ENR, cell3	M303-A		2000	08/15/96	08/20/96	08/17/96	122.22	0.875	3.7E-02		
ENR, cell3	M303-B		4000	08/15/96	08/20/96	08/17/96	122.45	2.890	1.2E-01		
ENR, cell3	M303-A		4000	10/15/96	10/18/96	10/16/96	92.98	-0.253	-1.4E-02		n
ENR, cell3	M303-B		4000	10/15/96	10/18/96	10/16/96	92.83	-0.013	-7.2E-04		n
ENR, cell3	M303-A2		4000	10/19/96	10/19/96	10/19/96	5.85	-0.046	-4.0E-02	n-s	
ENR, cell3	M303-B2		4000	10/19/96	10/19/96	10/19/96	5.83	-0.018	-1.6E-02	n-s	
ENR, cell3	M303-A2		4000	10/29/96	11/01/96	10/30/96	76.22	-0.656	-4.4E-02		
ENR, cell3	M303-B2		4000	10/29/96	11/01/96	10/30/96	76.18	-0.626	-4.2E-02		
ENR, cell3	M303-A2		4000	11/01/96	11/05/96	11/03/96	115.33	-0.269	-1.2E-02		n
ENR, cell3	M303-B2		4000	11/01/96	11/05/96	11/03/96	115.08	-0.380	-1.7E-02		n
ENR, cell3	M303-A2		4000	11/06/96	11/22/96	11/14/96	386.75	-2.673	-3.5E-02		n
ENR, cell3	M303-A2		4000	11/22/96	12/04/96	11/28/96	309.18	3.900	6.5E-02	n-g	
ENR, cell3	M303-B2		4000	11/22/96	12/04/96	11/28/96	308.98	-3.440	-5.7E-02	n-sg	
ENR, cell 2	M203-A	E	1000	06/18/96	06/20/96	06/19/96	68.65		1.0E-03	n-b	
ENR, cell 2	M203-B	W	1000	06/18/96	06/20/96	06/19/96	69.40	0.048	3.5E-03	n-b	
ENR, cell 2	M203-A	E	4000	07/24/96	08/14/96	08/03/96	525.80	-3.367	-3.3E-02		n
ENR, cell 2	M203-B	W	4000	07/24/96	08/14/96	08/03/96	525.59	-3.331	-3.2E-02	n-long	
ENR, cell 2	M203-A	E	2000	08/15/96	08/20/96	08/17/96	121.13	-1.023	-4.3E-02		
ENR, cell 2	M203-B	W	2000	08/15/96	08/16/96	08/15/96	25.15	-3.100	-6.3E-01		
ENR, cell 2	M203-A	E	4000	08/20/96	08/22/96	08/21/96	71.35	3.100	2.2E-01		
ENR, cell 2	M203-B	W	4000	08/20/96	08/22/96	08/21/96	71.63	-3.235	-2.3E-01		
ENR, cell 2	M203-A	E	2000	08/23/96	08/23/96	08/23/96	20.88	-0.166	-4.1E-02		
ENR, cell 2	M203-B	W	2000	08/23/96	08/23/96	08/23/96	21.08	-0.644	-1.6E-01		
ENR, cell 2	M203-A	E	4000	08/24/96	08/27/96	08/25/96	75.02	-2.337	-1.6E-01		
ENR, cell 2	M203-A	E	4000	08/27/96	08/29/96	08/28/96	68.43	-2.400	-1.8E-01		
ENR, cell 2	M203-B	W	4000	08/27/96	08/29/96	08/28/96	68.32	-1.880	-1.4E-01		
ENR, cell 2	M203-A2	E	4000	10/15/96	10/15/96	10/15/96	6.93	0.037	2.7E-02		n
ENR, cell 2	M203-B2	W	4000	10/15/96	10/15/96	10/15/96	6.70	0.062	4.7E-02	n-g	
ENR, cell 2	M203-A2	E	2000	10/15/96	10/18/96	10/16/96	89.65	0.165	9.4E-03		n
ENR, cell 2	M203-A2	E	2000	10/19/96	10/19/96	10/19/96	6.25	0.056	4.6E-02	n-s	
ENR, cell 2	M203-B2	W	2000	10/19/96	10/19/96	10/19/96	6.07	0.086	7.3E-02	n-s	

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
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General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
ENR, cell 2	M203-A2	E	4000	10/29/96	11/01/96	10/30/96	76.50	-0.564	-3.8E-02	n-g	
ENR, cell 2	M203-B2	W	4000	10/29/96	11/01/96	10/30/96	76.32	-0.558	-3.7E-02		
ENR, cell 2	M203-A2	E	4000	11/01/96	11/05/96	11/03/96	115.57	-1.875	-8.3E-02		
ENR, cell 2	M203-B2	W	4000	11/01/96	11/05/96	11/03/96	115.30	-1.820	-8.1E-02		
ENR, cell 2	M203-A2	E	6000	11/06/96	11/14/96	11/10/96	212.85	-0.800	-1.9E-02		n
ENR, cell 2	M203-B2	W	6000	11/06/96	11/14/96	11/10/96	213.10	-0.780	-1.9E-02		n
ENR, cell 2	M203-A2	E	2000	11/15/96	11/22/96	11/18/96	170.53	-2.018	-6.1E-02		
ENR, cell 2	M203-B2	W	2000	11/15/96	11/22/96	11/18/96	170.53	-2.265	-6.8E-02		
ENR, cell 2	M203-A2	E	4000	11/22/96	12/05/96	11/28/96	315.95	-2.605	-4.2E-02		
ENR, cell 2	M203-B2	W	4000	11/22/96	12/05/96	11/28/96	315.98	-3.664	-5.9E-02		
ENR, cell 2	M203-A2	E	4000	12/05/96	12/09/96	12/07/96	115.08	-1.810	-8.1E-02		
ENR, cell 2	M203-B2	W	4000	12/05/96	12/09/96	12/07/96	114.98	-1.340	-6.0E-02		
ENR, cell 2	M203-A2	E	4000	12/10/96	01/02/97	12/21/96	574.45	-3.045	-2.7E-02	n-long	
ENR, cell 2	M203-B2	W	4000	12/10/96	01/02/97	12/21/96	574.52	-3.325	-3.0E-02	n-long	
ENR, cell 2	M203-A2	E	4000	01/03/97	01/06/97	01/04/97	95.57	-0.270	-1.4E-02		n
ENR, cell 2	M203-B2	W	4000	01/03/97	01/06/97	01/04/97	95.41	0.433	2.3E-02		n
ENR, cell 2	M203-A2	E	4000	01/07/97	01/28/97	01/17/97	506.70	-2.170	-2.2E-02	n-long	
ENR, cell 2	M203-B2	W	4000	01/07/97	01/07/97	01/07/97					
ENR, cell 2	M203-A2	E	4000	01/28/97	02/21/97	02/09/97	577.47	-2.615	-2.3E-02		n
ENR, cell 2	M203-B2	W	4000	01/28/97	01/28/97	01/28/97	0.00				
ENR, cell 2	M203-A2	E	4000	02/21/97	03/12/97	03/02/97	458.40	-1.140	-1.3E-02	n-long	
ENR, cell 2	M203-B2	W	4000	02/21/97	03/12/97	03/02/97	458.66	-1.085	-1.2E-02	n-long	
ENR, cell 2	M203-A2	E	4000	03/12/97	03/25/97	03/18/97	334.63	-1.090	-1.7E-02		n
ENR, cell 2	M203-B2	W	4000	03/12/97	03/25/97	03/18/97	334.63	-1.555	-2.4E-02		n
ENR, cell 2	M203-A2	E	4000	03/26/97	03/27/97	03/26/97	43.90	-0.060	-7.0E-03		n
ENR, cell 2	M203-B2	W	4000	03/26/97	03/27/97	03/26/97	43.88	0.040	4.7E-03		n
ENR, cell 2	M203-A2	E	4000	03/28/97	04/08/97	04/02/97	266.93	-1.370	-2.6E-02		n
ENR, cell 2	M203-B2	W	4000	03/28/97	04/08/97	04/02/97	267.18	-2.300	-4.4E-02		
ENR, cell 2	M203-A2	E	4000	04/08/97	04/09/97	04/08/97	24.47	0.060	1.3E-02	n-s	n
ENR, cell 2	M203-A2	E	4000	04/09/97	04/21/97	04/15/97	311.30	-1.075	-1.8E-02		n
ENR, cell 2	M203-A2	E	4000	04/22/97	04/30/97	04/26/97	193.57	-0.670	-1.8E-02		n
ENR, cell 2	M203-B2	W	4000	04/22/97	04/30/97	04/26/97	193.70	-1.002	-2.7E-02		n
ENR, cell 2	M203-A2	E	4000	04/30/97	04/30/97	04/30/97	20.72	-0.002	-4.9E-04		n
ENR, cell 2	M203-B2	W	2000	04/30/97	04/30/97	04/30/97	20.62	-0.080	-2.0E-02		n
ENR, cell 2	M203-A2	E	4000	05/23/97	05/29/97	05/26/97	147.03	-0.065	-2.3E-03		n
ENR, cell 2	M203-B2	W	4000	05/23/97	05/29/97	05/26/97	147.13	-0.965	-3.4E-02		n
ENR, cell 2	M203-A2	E	4000	06/18/97	06/19/97	06/18/97	24.05	-0.002	-4.3E-04	n-s	n
ENR, cell 2	M203-B2	W	4000	06/18/97	06/19/97	06/18/97	24.57	0.108	2.3E-02	n-s	n
ENR, cell 2	M203-A2	E	4000	06/19/97	06/25/97	06/22/97	167.48	-0.085	-2.6E-03		n
ENR, cell 2	M203-B2	W	4000	06/19/97	06/25/97	06/22/97	167.43	-0.250	-7.7E-03		n
ENR, cell 2	M203-A2	E	4000	07/07/97	07/11/97	07/09/97	117.73	-0.660	-2.9E-02		n
ENR, cell 2	M203-B2	W	4000	07/07/97	07/11/97	07/09/97	117.98	-0.750	-3.3E-02		n
ENR, cell 2	M203-A2	E	4000	07/12/97	07/17/97	07/14/97	137.18	-0.380	-1.4E-02		n
ENR, cell 2	M203-B2	W	4000	07/12/97	07/17/97	07/14/97	137.28	-1.620	-6.1E-02		
ENR, cell 2	M203-A2	E	4000	01/09/98	01/15/98	01/12/98	146.25	-0.480	-1.7E-02		n
ENR, cell 2	M203-B2	W	4000	01/09/98	01/15/98	01/12/98	146.32	0.160	5.6E-03		n
ENR, cell 2	M203-B2	W	4000	02/17/98	02/23/98	02/20/98	165.95	-1.465	-4.5E-02		
ENR, cell 2	M203-B2	W	4000	03/15/98	03/23/98	03/19/98	196.85	-1.620	-4.2E-02		
ENR, cell 2	M203-B2	W	4000	04/09/98	04/15/98	04/12/98	163.83	-2.070	-6.5E-02		
ENR, cell 2	M205-A		4000	10/15/96	10/15/96	10/15/96	4.59	0.131	1.5E-01	n-s	
ENR, cell 2	M205-B		4000	10/15/96	10/15/96	10/15/96	4.87	-0.076	-5.0E-01	n-s	
ENR, cell 2	M205-A		4000	10/15/96	10/18/96	10/16/96	90.48	-1.393	-7.9E-02		
ENR, cell 2	M205-B		4000	10/15/96	10/18/96	10/16/96	90.69	0.525	1.9E-01		
ENR, cell 2	M205-A		2000	10/19/96	10/19/96	10/19/96	6.00	0.763	6.5E-01	n-s	
ENR, cell 2	M205-B		2000	10/19/96	10/19/96	10/19/96	6.00	0.009	4.8E-02	n-s	
ENR, cell 2	M205-A		4000	10/29/96	11/01/96	10/30/96	75.57	-0.759	-5.1E-02		
ENR, cell 2	M205-B		4000	10/29/96	11/01/96	10/30/96	75.58	-1.548	-6.6E-01		
ENR, cell 2	M205-A		4000	11/01/96	11/05/96	11/03/96	115.27	-2.010	-8.9E-02		
ENR, cell 2	M205-B		4000	11/01/96	11/05/96	11/03/96	115.64	-2.080	-5.8E-01		
ENR, cell 2	M205-A		6000	11/06/96	11/14/96	11/10/96	214.18	-5.230	-1.3E-01		
ENR, cell 2	M205-B		6000	11/06/96	11/14/96	11/10/96	213.78	-3.020	-4.6E-01		
ENR, cell 2	M205-A		4000	11/15/96	11/22/96	11/18/96	168.97	-3.914	-1.2E-01		
ENR, cell 2	M205-B		4000	11/15/96	11/22/96	11/18/96	169.20	-1.953	-3.7E-01		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A Page 6 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
ENR, cell 2	M205-A		4000	11/22/96	12/05/96	11/28/96	316.85	-4.680	-7.6E-02		
ENR, cell 2	M205-B		4000	11/22/96	12/05/96	11/28/96	316.68	-3.260	-3.3E-01		
ENR, cell 2	M205-A		4000	12/05/96	12/09/96	12/07/96	115.65	-3.800	-1.7E-01		
ENR, cell 2	M205-B		4000	12/05/96	12/09/96	12/07/96	115.63	-0.620	-1.7E-01		
ENR, cell 2	M205-A		4000	12/10/96	01/02/97	12/21/96	574.73	-3.470	-3.1E-02	n-long	
ENR, cell 2	M205-B		4000	12/10/96	01/02/97	12/21/96	575.00	-3.282	-1.8E-01	n-long	
ENR, cell 2	M205-A		4000	01/03/97	01/06/97	01/04/97	94.51	-1.230	-6.7E-02		
ENR, cell 2	M205-B		4000	01/03/97	01/06/97	01/04/97	94.45	-0.668	-2.3E-01		
ENR, cell 2	M205-A		4000	01/07/97	01/07/97	01/07/97	5.68	-0.138	-1.2E-01	n-s	
ENR, cell 2	M205-B		4000	01/07/97	01/28/97	01/17/97	506.38	-2.010	-1.3E-01	n-long	
ENR, cell 2	M205-A		4000	01/07/97	01/27/97	01/17/97	499.56	-2.730	-2.8E-02	n-long	
ENR, cell 2	M205-B		4000	01/07/97	01/31/97	01/19/97	577.38	-3.090	-1.7E-01	n-long	
ENR, cell 2	M205-A		4000	01/28/97	02/21/97	02/09/97	577.48	0.280	2.5E-03	n-long	
ENR, cell 2	M205-B		4000	01/28/97	02/21/97	02/09/97	577.38	-3.090	-1.7E-01	n-long	
ENR, cell 2	M205-A		4000	02/21/97	03/12/97	03/02/97	457.93	-2.295	-2.6E-02		n
ENR, cell 2	M205-A		4000	03/26/97	03/27/97	03/26/97	45.28	-0.405	-4.6E-02		
ENR, cell 2	M205-B2		4000	03/26/97	03/27/97	03/26/97	45.35	-0.120	-2.5E-02		n
ENR, cell 2	M205-A		4000	03/28/97	04/08/97	04/02/97	267.48	-2.080	-4.0E-02		
ENR, cell 2	M205-B2		4000	03/28/97	04/08/97	04/02/97	267.43	-0.910	-3.2E-02		n
ENR, cell 2	M205-A		4000	04/08/97	04/08/97	04/08/97	18.72	0.160	4.4E-02	n-s	
ENR, cell 2	M205-B2		4000	04/08/97	04/08/97	04/08/97	18.75	-0.095	-4.7E-02	n-s	
ENR, cell 2	M205-A		4000	04/09/97	04/22/97	04/15/97	317.83	-3.480	-5.6E-02		
ENR, cell 2	M205-B2		4000	04/09/97	04/22/97	04/15/97	318.05	-1.260	-3.7E-02		
ENR, cell 2	M205-A		4000	04/22/97	04/30/97	04/26/97	193.33	-1.770	-4.7E-02		
ENR, cell 2	M205-B2		4000	04/22/97	04/30/97	04/26/97	193.20	-1.770	-8.5E-02		
ENR, cell 2	M205-B2		4000	04/30/97	04/30/97	04/30/97	21.08	-0.460	-2.0E-01		
ENR, cell 2	M205-A		4000	05/22/97	05/22/97	05/22/97	23.48	-0.300	-6.6E-02		
ENR, cell 2	M205-B2		4000	05/22/97	05/22/97	05/22/97	23.67	-0.800	-3.2E-01		
ENR, cell 2	M205-A		4000	05/23/97	05/29/97	05/26/97	145.57	-1.655	-5.8E-02		
ENR, cell 2	M205-B2		4000	05/23/97	05/29/97	05/26/97	145.47	-1.095	-7.0E-02		
ENR, cell 2	M205-A		4000	06/18/97	06/19/97	06/18/97	25.67	-1.220	-2.4E-01		
ENR, cell 2	M205-B2		4000	06/18/97	06/19/97	06/18/97	25.47	-0.107	-3.9E-02		
ENR, cell 2	M205-A		4000	06/19/97	06/25/97	06/22/97	164.45	-2.000	-6.2E-02		
ENR, cell 2	M205-B2		4000	06/19/97	06/25/97	06/22/97	164.57	-1.460	-8.3E-02		
ENR, cell 2	M205-A		4000	07/07/97	07/11/97	07/09/97	116.18	-3.430	-1.5E-01		
ENR, cell 2	M205-B2		4000	07/07/97	07/11/97	07/09/97	116.23	-1.740	-1.4E-01		
ENR, cell 2	M205-A		4000	07/12/97	07/17/97	07/14/97	139.07	-3.020	-1.1E-01		
ENR, cell 2	M205-A		4000	04/09/98	04/15/98	04/12/98	163.68	-2.120	-6.6E-02		
ENR, cell 2	M205-B2		4000	04/09/98	04/15/98	04/12/98	163.68	-0.920	-5.2E-02		
ENR, cell 2	M206-A	NE	4000	03/26/97	03/27/97	03/26/97	45.08	-0.180	-3.7E-02		
ENR, cell 2	M206-B	SW	4000	03/26/97	03/27/97	03/26/97	44.70	-0.280	-5.8E-02		
ENR, cell 2	M206-A	NE	4000	03/28/97	04/08/97	04/02/97	267.38	-1.645	-5.7E-02		
ENR, cell 2	M206-A	NE	4000	04/08/97	04/08/97	04/08/97	18.33	-0.143	-7.3E-02		
ENR, cell 2	M206-B	SW	4000	04/08/97	04/08/97	04/08/97	18.33	-0.140	-7.1E-02		
ENR, cell 2	M206-A	NE	4000	04/22/97	04/30/97	04/26/97	193.33	-1.300	-6.3E-02		
ENR, cell 2	M206-B	SW	4000	04/22/97	04/30/97	04/26/97	193.18	-1.845	-8.9E-02		
ENR, cell 2	M206-A	NE	4000	04/30/97	04/30/97	04/30/97	21.75	-0.120	-5.1E-02		
ENR, cell 2	M206-A	NE	4000	05/22/97	05/22/97	05/22/97	23.18	-2.450	-9.9E-01		
ENR, cell 2	M206-B	SW	4000	05/22/97	05/22/97	05/22/97	23.17	-0.225	-9.1E-02		
ENR, cell 2	M206-A	NE	4000	05/29/97	05/29/97	05/29/97	19.10	-0.080	-3.9E-02		
ENR, cell 2	M206-A	NE	4000	06/18/97	06/19/97	06/18/97	24.88	-0.440	-1.6E-01		
ENR, cell 2	M206-A	NE	4000	06/19/97	06/25/97	06/22/97	166.65	-2.305	-1.3E-01		
ENR, cell 2	M206-B	SW	4000	03/15/98	03/23/98	03/19/98	195.82	-1.720	-8.2E-02		
ENR, cell 4	M408-A	0	3000	07/08/96	07/08/96	07/08/96	1.70	0.058	1.7E-01	n-s	
ENR, cell 4	M408-B	0	3000	07/08/96	07/08/96	07/08/96	1.37	0.062	2.3E-01	n-s	
ENR, cell 4	M408-A	0	3000	07/08/96	07/10/96	07/09/96	49.02	0.468	4.9E-02		
ENR, cell 4	M408-A	0	2000	07/20/96	07/24/96	07/22/96	117.07	-1.490	-6.5E-02		
ENR, cell 4	M408-A	0	4000	07/24/96	08/13/96	08/03/96	483.40	-2.976	-3.2E-02		n
ENR, cell 4	M408-A	0	4000	08/17/96	08/19/96	08/18/96	65.58	-3.510	-2.7E-01	n-l	
ENR, cell 4	M408-B	0	4000	08/17/96	08/19/96	08/18/96	65.13	-2.800	-2.2E-01	n-o	
ENR, cell 4	M408-A	0	2000	08/20/96	08/20/96	08/20/96	20.55	0.480	1.2E-01		
ENR, cell 4	M408-B	0	2000	08/20/96	08/20/96	08/20/96	20.72	-2.365	-5.9E-01		
ENR, cell 1	M104-S-A	SE	2000	10/30/96	10/30/96	10/30/96	1.45	0.150	5.3E-01		
ENR, cell 1	M104-S-B	SW	2000	10/30/96	10/30/96	10/30/96	1.40	0.250	9.2E-01		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A

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General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
ENR, cell 1	M104-S-A	SE	1400	11/01/96	11/01/96	11/01/96	7.58	2.714	1.8E+00		
ENR, cell 1	M104-S-B	SW	1400	11/01/96	11/01/96	11/01/96	7.48	2.250	1.5E+00		
ENR, cell 1	M104-S-A	SE	1000	11/01/96	11/02/96	11/01/96	46.00	4.210	4.7E-01		
ENR, cell 1	M104-S-B	SW	1000	11/01/96	11/02/96	11/01/96	46.18	3.100	3.4E-01		
ENR, cell 1	M104-S-B	SW	2000	11/03/97	11/05/97	11/04/97	67.40	6.140	4.7E-01	n-f	
ENR, cell 1	M104-S-A	SE	500	11/06/96	11/06/96	11/06/96	5.07	1.130	1.1E+00		
ENR, cell 1	M104-S-B	SW	500	11/06/96	11/06/96	11/06/96	5.17	1.300	1.3E+00		
ENR, cell 1	M104-S-A	SE	2000	11/22/96	11/22/96	11/22/96	8.25	1.159	7.2E-01		
ENR, cell 1	M104-S-B	SW	2000	11/22/96	11/22/96	11/22/96	8.27	0.848	5.3E-01		
ENR, cell 1	M104-S-A	SE	1000	12/10/96	12/10/96	12/10/96	19.90	2.375	6.1E-01		
ENR, cell 1	M104-S-B	SW	1000	12/10/96	12/10/96	12/10/96	19.98	0.832	2.1E-01		
ENR, cell 1	M104-S-A	SE	1000	12/11/96	12/11/96	12/11/96	5.60	1.440	1.3E+00		
ENR, cell 1	M104-S-B	SW	1000	12/11/96	12/11/96	12/11/96	5.70	0.315	2.8E-01		
ENR, cell 1	M104-S-B	SW	2000	01/03/97	01/04/97	01/03/97	32.40	1.490	2.4E-01		
ENR, cell 1	M104-S-B	SW	700	01/04/97	01/06/97	01/05/97	64.00	2.350	1.9E-01		
ENR, cell 1	M104-S-A	SE	2000	01/28/97	02/02/97	01/30/97	122.85	1.570	6.6E-02		
ENR, cell 1	M104-S-B	SW	2000	01/28/97	02/02/97	01/30/97	122.80	3.320	1.4E-01		
ENR, cell 1	M104-S-A	SE	4000	02/21/97	02/21/97	02/21/97	7.00	1.150	8.4E-01		
ENR, cell 1	M104-S-B	SW	4000	02/21/97	02/21/97	02/21/97	7.03	1.165	8.5E-01		
ENR, cell 1	M104-S-A2	SE	4000	03/26/97	03/27/97	03/26/97	46.46	5.750	6.3E-01		
ENR, cell 1	M104-S-B2	SW	4000	03/26/97	03/27/97	03/26/97	46.78	2.460	2.7E-01		
ENR, cell 1	M104-S-A2	SE	2000	03/28/97	03/28/97	03/28/97	4.63	1.100	1.2E+00		
ENR, cell 1	M104-S-B2	SW	2000	03/28/97	03/28/97	03/28/97	4.50	0.990	1.1E+00		
ENR, cell 1	M104-S-A2	SE	1800	04/08/97	04/09/97	04/08/97	24.42	5.250	1.1E+00		
ENR, cell 1	M104-S-B2	SW	1800	04/08/97	04/09/97	04/08/97	24.48	1.850	3.9E-01		
ENR, cell 1	M104-S-A2	SE	2000	04/09/97	04/09/97	04/09/97	6.00	1.470	1.3E+00		
ENR, cell 1	M104-S-B2	SW	2000	04/09/97	04/09/97	04/09/97	6.03	1.500	1.3E+00		
ENR, cell 1	M104-S-A2	SE	2000	04/22/97	04/22/97	04/22/97	6.82	1.520	1.1E+00		
ENR, cell 1	M104-S-B2	SW	2000	04/22/97	04/22/97	04/22/97	6.92	1.620	1.2E+00		
ENR, cell 1	M104-S-A2	SE	1000	04/22/97	04/22/97	04/22/97	18.98	4.235	1.1E+00		
ENR, cell 1	M104-S-B2	SW	2000	04/23/97	04/23/97	04/23/97	0.75	0.460	3.1E+00		
ENR, cell 1	M104-S-A2	SE	1000	04/30/97	04/30/97	04/30/97	6.72	1.420	1.1E+00		
ENR, cell 1	M104-S-B2	SW	1000	04/30/97	04/30/97	04/30/97	6.63	1.620	1.3E+00		
ENR, cell 1	M104-S-A2	SE	1000	04/30/97	04/30/97	04/30/97	22.37	3.035	7.0E-01		
ENR, cell 1	M104-S-B2	SW	1000	04/30/97	04/30/97	04/30/97	16.15	4.055	1.3E+00		
ENR, cell 1	M104-S-A2	SE	2000	05/01/97	05/01/97	05/01/97	6.25	1.310	1.1E+00		
ENR, cell 1	M104-S-B2	SW	2000	05/01/97	05/01/97	05/01/97	6.23	1.600	1.3E+00		
ENR, cell 1	M104-S-A2	SE	4000	05/22/97	05/22/97	05/22/97	4.55	1.760	2.0E+00		
ENR, cell 1	M104-S-B2	SW	4000	05/22/97	05/22/97	05/22/97	4.58	0.835	9.3E-01		
ENR, cell 1	M104-S-A2	SE	1000	05/22/97	05/22/97	05/22/97	18.28	2.300	6.5E-01		
ENR, cell 1	M104-S-B2	SW	1000	05/22/97	05/22/97	05/22/97	18.27	3.470	9.7E-01		
ENR, cell 1	M104-S-A2	SE	1000	05/23/97	05/23/97	05/23/97	7.13	0.090	6.5E-02		
ENR, cell 1	M104-S-B2	SW	1000	05/23/97	05/23/97	05/23/97	7.08	1.650	1.2E+00		
ENR, cell 1	M104-S-A2	SE	1000	05/29/97	05/29/97	05/29/97	20.08	3.835	9.8E-01		
ENR, cell 1	M104-S-B2	SW	1000	05/29/97	05/29/97	05/29/97	20.08	4.500	1.1E+00		
ENR, cell 1	M104-S-A2	SE	4000	06/18/97	06/18/97	06/18/97	5.42	1.060	1.0E+00		
ENR, cell 1	M104-S-B2	SW	4000	06/18/97	06/18/97	06/18/97	5.45	1.350	1.3E+00		
ENR, cell 1	M104-S-A2	SE	1000	06/18/97	06/18/97	06/18/97	19.10	3.700	9.9E-01		
ENR, cell 1	M104-S-B2	SW	1000	06/18/97	06/18/97	06/18/97	19.08	4.450	1.2E+00		
ENR, cell 1	M104-S-A2	SE	1000	06/19/97	06/19/97	06/19/97	7.15	1.345	9.6E-01		
ENR, cell 1	M104-S-B2	SW	1000	06/18/97	06/18/97	06/18/97	7.10	1.740	1.3E+00		
ENR, cell 1	M104-S-A2	SE	4000	06/26/97	06/26/97	06/26/97	7.70	1.460	9.7E-01		
ENR, cell 1	M104-S-B2	SW	4000	06/26/97	06/26/97	06/26/97	7.68	1.560	1.0E+00		
ENR, cell 1	M104-S-A2	SE	2000	07/07/97	07/07/97	07/07/97	18.62	2.700	7.4E-01		
ENR, cell 1	M104-S-B2	SW	2000	07/07/97	07/07/97	07/07/97	17.53	3.895	1.1E+00		
ENR, cell 1	M104-S-A2	SE	2000	11/06/97	11/06/97	11/06/97	23.13	2.200	4.9E-01		
ENR, cell 1	M104-S-B2	SW	2000	11/06/97	11/06/97	11/06/97	23.17	4.010	8.9E-01		
ENR, cell 1	M104-S-A2	SE	2000	01/08/98	01/08/98	01/08/98	22.78	2.600	5.9E-01		
ENR, cell 1	M104-S-B2	SW	2000	01/08/98	01/08/98	01/08/98	22.78	2.420	5.4E-01		
ENR, cell 1	M104-S-B2	SW	2000	03/15/98	03/16/98	03/15/98	24.92	3.600	7.4E-01		
ENR, cell 1	M104-S-A2	SE	2000	03/23/98	03/24/98	03/23/98	24.37	3.320	7.0E-01		
ENR, cell 1	M104-S-B2	SW	2000	03/23/98	03/24/98	03/23/98	24.47	4.094	8.6E-01		
ENR, cell 1	M104-S-A2	SE	2000	04/08/98	04/09/98	04/08/98	27.42	3.140	5.9E-01		
ENR, cell 1	M104-S-B2	SW	2000	04/08/98	04/09/98	04/08/98	27.48	3.080	5.7E-01		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A Page 8 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?# n = no
				Start Date	End Date	Mid Date					
ENR, cell 1	M104-N-B	NE	4000	03/26/97	03/27/97	03/26/97	46.08	3.400	6.9E-01		
ENR, cell 1	M104-N-B	NE	2000	03/28/97	03/28/97	03/28/97	4.35	0.370	7.9E-01		
ENR, cell 1	M104-N-A	NW	2000	03/28/97	03/28/97	03/28/97	4.18	0.080	1.8E-01		
ENR, cell 1	M104-N-B	NE	1800	04/08/97	04/09/97	04/08/97	24.48	1.850	7.0E-01		
ENR, cell 1	M104-N-A	NW	1800	04/08/97	04/09/97	04/08/97	24.52	0.530	2.0E-01		
ENR, cell 1	M104-N-B	NE	2000	04/09/97	04/09/97	04/09/97	5.80	0.500	8.0E-01		
ENR, cell 1	M104-N-A	NW	2000	04/09/97	04/09/97	04/09/97	5.73	0.800	1.3E+00		
ENR, cell 1	M104-N-B	NE	2000	04/22/97	04/22/97	04/22/97	6.82	0.640	8.7E-01		
ENR, cell 1	M104-N-A	NW	2000	04/22/97	04/22/97	04/22/97	6.82	0.780	1.1E+00		
ENR, cell 1	M104-N-B	NE	2000	04/22/97	04/22/97	04/22/97	18.33	1.640	8.3E-01		
ENR, cell 1	M104-N-A	NW	2000	04/22/97	04/22/97	04/22/97	18.38	0.460	2.3E-01		
ENR, cell 1	M104-N-B	NE	1000	04/30/97	04/30/97	04/30/97	6.60	0.520	7.3E-01		
ENR, cell 1	M104-N-A	NW	1000	04/30/97	04/30/97	04/30/97	6.62	0.180	2.5E-01		
ENR, cell 1	M104-N-B	NE	1000	04/30/97	04/30/97	04/30/97	22.77	1.380	5.7E-01		
ENR, cell 1	M104-N-A	NW	1000	04/30/97	04/30/97	04/30/97	22.33	0.340	1.4E-01		
ENR, cell 1	M104-N-B	NE	2000	05/01/97	05/01/97	05/01/97	6.20	1.540	2.3E+00		
ENR, cell 1	M104-N-A	NW	2000	05/01/97	05/01/97	05/01/97	6.17	0.195	2.9E-01		
ENR, cell 1	M104-N-B	NE	4000	05/22/97	05/22/97	05/22/97	4.55	0.425	8.7E-01		
ENR, cell 1	M104-N-A	NW	4000	05/22/97	05/22/97	05/22/97	4.55	0.150	3.1E-01		
ENR, cell 1	M104-N-B	NE	1000	05/22/97	05/22/97	05/22/97	18.27	1.498	7.6E-01		
ENR, cell 1	M104-N-A	NW	1000	05/22/97	05/22/97	05/22/97	18.27	0.395	2.0E-01		
ENR, cell 1	M104-N-B	NE	1000	05/23/97	05/23/97	05/23/97	7.07	0.560	7.4E-01		
ENR, cell 1	M104-N-A	NW	1000	05/23/97	05/23/97	05/23/97	7.02	0.120	1.6E-01		
ENR, cell 1	M104-N-B	NE	1000	05/29/97	05/29/97	05/29/97	20.10	1.710	7.9E-01		
ENR, cell 1	M104-N-A	NW	1000	05/29/97	05/29/97	05/29/97	20.08	0.320	1.5E-01		
ENR, cell 1	M104-N-B	NE	4000	06/18/97	06/18/97	06/18/97	5.45	0.400	6.8E-01		
ENR, cell 1	M104-N-A	NW	4000	06/18/97	06/18/97	06/18/97	5.55	0.075	1.3E-01		
ENR, cell 1	M104-N-B	NE	1000	06/18/97	06/18/97	06/18/97	19.10	0.750	3.7E-01		
ENR, cell 1	M104-N-A	NW	1000	06/18/97	06/18/97	06/18/97	19.12	0.280	1.4E-01		
ENR, cell 1	M104-N-B	NE	1000	06/19/97	06/19/97	06/19/97	7.03	0.610	8.1E-01		
ENR, cell 1	M104-N-A	NW	1000	06/19/97	06/19/97	06/19/97	6.95	0.140	1.9E-01		
ENR, cell 1	M104-N-B	NE	4000	06/26/97	06/26/97	06/26/97	7.60	0.570	7.0E-01		
ENR, cell 1	M104-N-A	NW	4000	06/26/97	06/26/97	06/26/97	7.57	0.140	1.7E-01		
ENR, cell 1	M104-N-B	NE	2000	07/07/97	07/07/97	07/07/97	17.52	1.360	7.2E-01		
ENR, cell 1	M104-N-A	NW	2000	07/07/97	07/07/97	07/07/97	17.55	0.255	1.4E-01		
ENR, cell 1	M104-N-B	NE	2000	11/06/97	11/06/97	11/06/97	23.48	2.720	1.1E+00		
ENR, cell 1	M104-N-A	NW	2000	11/06/97	11/06/97	11/06/97	23.42	0.700	2.8E-01		
ENR, cell 1	M104-N-B	NE	2000	01/08/98	01/08/98	01/08/98	22.68	1.860	7.6E-01		
ENR, cell 1	M104-N-A	NW	2000	01/08/98	01/08/98	01/08/98	22.65	0.590	2.4E-01		
ENR, cell 1	M104-N-B	NE	2000	03/15/98	03/16/98	03/15/98	24.92	1.460	5.5E-01		
ENR, cell 1	M104-N-A	NW	2000	03/15/98	03/16/98	03/15/98	24.93	0.670	2.5E-01		
ENR, cell 1	M104-N-B	NE	2000	03/23/98	03/24/98	03/23/98	26.65	1.600	5.6E-01		
ENR, cell 1	M104-N-A	NW	2000	03/23/98	03/24/98	03/23/98	26.77	0.600	2.1E-01		
ENR, cell 1	M104-N-B	NE	2000	04/08/98	04/09/98	04/08/98	27.73	0.980	3.3E-01		
ENR, cell 1	M104-N-A	NW	2000	04/08/98	04/09/98	04/08/98	27.67	0.560	1.9E-01		
ENR, cell 1	M106-A	E	4000	03/28/97	03/29/97	03/28/97	46.02	3.740	7.6E-01		
ENR, cell 1	M106-B	W	4000	03/28/97	03/29/97	03/28/97	45.98	1.190	2.4E-01		
ENR, cell 1	M106-A	E	2000	03/28/97	03/28/97	03/28/97	4.08	0.300	6.9E-01		
ENR, cell 1	M106-B	W	2000	03/28/97	03/28/97	03/28/97	4.05	0.100	2.3E-01		
ENR, cell 1	M106-A	E	1800	04/08/97	04/08/97	04/08/97	23.47	1.700	6.8E-01		
ENR, cell 1	M106-B	W	1800	04/08/97	04/08/97	04/08/97	23.67	0.650	2.6E-01		
ENR, cell 1	M106-A	E	2000	04/09/97	04/09/97	04/09/97	6.20	0.580	8.7E-01		
ENR, cell 1	M106-B	W	2000	04/09/97	04/09/97	04/09/97	6.17	0.150	2.3E-01		
ENR, cell 1	M106-A	E	2000	04/22/97	04/22/97	04/22/97	5.85	3.020	4.8E+00		
ENR, cell 1	M106-B	W	2000	04/22/97	04/22/97	04/22/97	6.23	0.200	3.0E-01		
ENR, cell 1	M106-B	W	2000	04/22/97	04/22/97	04/22/97	18.10	0.570	2.9E-01		
ENR, cell 1	M106-A	E	1000	04/30/97	04/30/97	04/30/97	5.88	3.300	5.2E+00		
ENR, cell 1	M106-B	W	1000	04/30/97	04/30/97	04/30/97	6.45	0.180	2.6E-01		
ENR, cell 1	M106-A	E	2000	04/30/97	04/30/97	04/30/97	0.00				
ENR, cell 1	M106-B	W	2000	04/30/97	04/30/97	04/30/97	16.00	1.435	8.4E-01		
ENR, cell 1	M106-A	E	2000	05/01/97	05/01/97	05/01/97	5.47	3.100	5.3E+00		
ENR, cell 1	M106-B	W	2000	05/01/97	05/01/97	05/01/97	6.27	0.190	2.8E-01		
ENR, cell 1	M106-A	E	2000	05/22/97	05/22/97	05/22/97	4.32	2.210	4.8E+00		
ENR, cell 1	M106-B	W	4000	05/22/97	05/22/97	05/22/97	4.18	0.120	2.7E-01		
ENR, cell 1	M106-A	E	1000	05/22/97	05/22/97	05/22/97	18.27	0.395	2.0E-01		
ENR, cell 1	M106-B	W	1000	05/22/97	05/22/97	05/22/97	18.53	0.440	2.2E-01		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A Page 9 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
ENR, cell 1	M106-A	E	1000	05/23/97	05/23/97	05/23/97	6.37	3.185	4.7E+00		
ENR, cell 1	M106-B	W	1000	05/23/97	05/23/97	05/23/97	6.52	0.180	2.6E-01		
ENR, cell 1	M106-A	E	1000	05/29/97	05/29/97	05/29/97	19.08	4.640	2.3E+00		
ENR, cell 1	M106-A	E	4000	06/18/97	06/18/97	06/18/97	2.85	2.560	8.4E+00		
ENR, cell 1	M106-B	W	4000	06/18/97	06/18/97	06/18/97	5.12	0.120	2.2E-01		
ENR, cell 1	M106-A	E	1000	06/18/97	06/18/97	06/18/97	19.67	0.180	8.5E-02		
ENR, cell 1	M106-B	W	1000	06/18/97	06/19/97	06/18/97	24.65	0.335	1.3E-01		
ENR, cell 1	M106-A	E	1000	06/19/97	06/19/97	06/19/97	6.27	2.440	3.6E+00		
ENR, cell 1	M106-B	W	1000	06/19/97	06/19/97	06/19/97	6.45	0.175	2.5E-01		
ENR, cell 1	M106-A	E	4000	06/26/97	06/26/97	06/26/97	6.77	1.480	2.0E+00		
ENR, cell 1	M106-B	W	4000	06/26/97	06/26/97	06/26/97	7.18	0.160	2.1E-01		
ENR, cell 1	M106-A	E	2000	07/07/97	07/07/97	07/07/97	18.28	1.400	7.1E-01		
ENR, cell 1	M106-B	W	2000	07/07/97	07/07/97	07/07/97	17.33	0.310	1.7E-01		
ENR, cell 1	M106-A	E	2000	11/06/97	11/06/97	11/06/97	22.78	1.700	7.0E-01		
ENR, cell 1	M106-B	W	2000	11/06/97	11/06/97	11/06/97	22.78	0.600	2.5E-01		
ENR, cell 1	M106-A	E	2000	01/08/98	01/08/98	01/08/98	22.53	1.700	7.0E-01		
ENR, cell 1	M106-B	W	2000	01/08/98	01/08/98	01/08/98	22.62	0.700	2.9E-01		
ENR, cell 1	M106-A	E	2000	03/15/98	03/16/98	03/15/98	24.98	1.370	5.1E-01		
ENR, cell 1	M106-B	W	2000	03/15/98	03/16/98	03/15/98	24.85	0.400	1.5E-01		
ENR, cell 1	M106-A	E	2000	03/23/98	03/24/98	03/23/98	25.65	1.935	7.0E-01		
ENR, cell 1	M106-B	W	2000	03/23/98	03/24/98	03/23/98	25.65	0.675	2.5E-01		
ENR, cell 1	M106-A	E	2000	04/08/98	04/09/98	04/08/98	29.00	0.480	1.5E-01		
ENR, cell 1	M106-B	W	2000	04/08/98	04/09/98	04/08/98	29.00	0.650	2.1E-01		
ENR, cell 1	M105-A	E	2000	12/10/96	01/02/97	12/21/96	575.30	-0.600	-9.7E-03	n-long	
ENR, cell 1	M105-B	W	2000	12/10/96	01/02/97	12/21/96	575.18	0.280	4.5E-03	n-long	
ENR, cell 1	M105-A	E	2000	01/03/97	01/06/97	01/04/97	94.35	-0.625	-6.2E-02	n-long	
ENR, cell 1	M105-B	W	2000	01/03/97	01/06/97	01/04/97	94.63	-1.000	-9.8E-02	n-long	
ENR, cell 1	M105-A	E	4000	01/07/97	01/28/97	01/17/97	507.50	-0.100	-1.8E-03	n-long	
ENR, cell 1	M105-B	W	2000	01/07/97	01/28/97	01/17/97	507.58	6.160	1.1E-01	n-long	
ENR, cell 1	M105-A	E	4000	02/21/97	02/21/97	02/21/97	4.13	0.760	1.7E+00		
ENR, cell 1	M105-B	W	4000	02/21/97	02/21/97	02/21/97	4.12	-0.050	-1.1E-01	n-s	
ENR, cell 1	M105-A2	E	4000	03/26/97	03/27/97	03/26/97	45.83	5.950	1.2E+00		
ENR, cell 1	M105-B2	W	4000	03/26/97	03/27/97	03/26/97	46.02	1.915	3.9E-01		
ENR, cell 1	M105-A2	E	2000	03/28/97	03/28/97	03/28/97	3.63	1.350	3.5E+00		
ENR, cell 1	M105-B2	W	2000	03/28/97	03/28/97	03/28/97	3.60	0.050	1.3E-01	n-s	
ENR, cell 1	M105-A2	E	1800	04/08/97	04/08/97	04/08/97	23.85	5.140	2.0E+00		
ENR, cell 1	M105-B2	W	1800	04/08/97	04/08/97	04/08/97	23.05	0.395	1.6E-01		
ENR, cell 1	M105-A2	E	2000	04/09/97	04/09/97	04/09/97	6.25	2.455	3.7E+00		
ENR, cell 1	M105-B2	W	2000	04/09/97	04/09/97	04/09/97	6.23	0.100	1.5E-01		
ENR, cell 1	M105-A2	E	2000	04/22/97	04/22/97	04/22/97	5.85	3.020	4.8E+00		
ENR, cell 1	M105-B2	W	2000	04/22/97	04/22/97	04/22/97	5.73	0.120	2.0E-01		
ENR, cell 1	M105-A2	E	1000	04/30/97	04/30/97	04/30/97	5.88	3.300	5.2E+00		
ENR, cell 1	M105-B2	W	1000	04/30/97	04/30/97	04/30/97	16.83	0.460	2.5E-01		
ENR, cell 1	M105-A2	E	2000	05/01/97	05/01/97	05/01/97	5.47	2.100	3.6E+00		
ENR, cell 1	M105-B2	W	2000	05/01/97	05/01/97	05/01/97	5.45	0.280	4.8E-01		
ENR, cell 1	M105-A2	E	2000	05/22/97	05/22/97	05/22/97	4.32	2.210	4.8E+00		
ENR, cell 1	M105-B2	W	2000	05/22/97	05/22/97	05/22/97	4.17	0.087	1.9E-01		
ENR, cell 1	M105-A2	E	1000	05/22/97	05/22/97	05/22/97	17.93	4.600	2.4E+00		
ENR, cell 1	M105-B2	W	1000	05/22/97	05/22/97	05/22/97	18.15	0.240	1.2E-01		
ENR, cell 1	M105-A2	E	1000	05/23/97	05/23/97	05/23/97	6.37	3.185	4.7E+00		
ENR, cell 1	M105-B2	W	1000	05/23/97	05/23/97	05/23/97	6.25	0.100	1.5E-01		
ENR, cell 1	M105-A2	E	1000	05/29/97	05/29/97	05/29/97	19.08	4.640	2.3E+00		
ENR, cell 1	M105-B2	W	1000	05/29/97	05/29/97	05/29/97	19.02	0.180	8.8E-02		
ENR, cell 1	M105-A2	E	2000	06/18/97	06/18/97	06/18/97	2.85	2.560	8.4E+00		
ENR, cell 1	M105-B2	W	2000	06/18/97	06/18/97	06/18/97	4.97	0.060	1.1E-01		
ENR, cell 1	M105-A2	E	1000	06/18/97	06/18/97	06/18/97	19.67	0.180	8.5E-02		
ENR, cell 1	M105-B2	W	1000	06/18/97	06/18/97	06/18/97	19.73	0.330	1.6E-01		
ENR, cell 1	M105-A2	E	1000	06/19/97	06/19/97	06/19/97	6.27	2.440	3.6E+00		
ENR, cell 1	M105-B2	W	1000	06/19/97	06/19/97	06/19/97	6.13	0.100	1.5E-01		
ENR, cell 1	M105-A2	E	4000	06/26/97	06/26/97	06/26/97	6.77	1.480	2.0E+00		
ENR, cell 1	M105-B2	W	4000	06/26/97	06/26/97	06/26/97	6.60	0.120	1.7E-01		
ENR, cell 1	M105-A2	E	2000	07/07/97	07/07/97	07/07/97	18.28	1.400	7.1E-01		
ENR, cell 1	M105-B2	W	2000	07/07/97	07/07/97	07/07/97	18.27	0.350	1.8E-01		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
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General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
ENR, cell 1	M105-A2	E	2000	11/06/97	11/06/97	11/06/97	22.63	0.980	4.0E-01		
ENR, cell 1	M105-A2	E	2000	01/08/98	01/08/98	01/08/98	22.45	0.920	3.8E-01		
ENR, cell 1	M105-A2	E	2000	03/15/98	03/16/98	03/15/98	24.83	0.670	2.5E-01		
ENR, cell 1	M105-B2	W	2000	03/15/98	03/16/98	03/15/98	24.83	0.184	6.9E-02		
ENR, cell 1	M105-A2	E	2000	03/23/98	03/24/98	03/23/98	25.37	2.000	7.3E-01		
ENR, cell 1	M105-B2	W	2000	03/23/98	03/24/98	03/23/98	25.48	0.275	1.0E-01		
ENR, cell 1	M105-A2	E	2000	04/08/98	04/09/98	04/08/98	29.63	1.610	5.1E-01		
ENR, cell 1	M105-B2	W	2000	04/08/98	04/09/98	04/08/98	29.65	0.120	3.8E-02		
ENR, cell 2	M208-A		4000	08/21/96	08/22/96	08/21/96	45.40	0.950	1.1E-01	n-long	
ENR, cell 2	M208-B		4000	08/21/96	08/22/96	08/21/96	45.36	-3.890	-4.4E-01	n-e	
ENR, cell 2	M208-A		4000	08/23/96	08/24/96	08/23/96	25.42	-0.950	-1.9E-01	n-long	
ENR, cell 2	M208-B		4000	08/23/96	08/24/96	08/23/96	25.35	-3.870	-7.8E-01	n-e	
ENR, cell 2	M208-A		4000	08/24/96	08/24/96	08/24/96	19.67	-2.116	-5.5E-01	n-long	
ENR, cell 2	M208-B		4000	08/24/96	08/24/96	08/24/96	19.52	-3.824	-1.0E+00	n-e	
ENR, cell 2	M208-B		4000	08/25/96	08/25/96	08/25/96	3.85	-3.640	-4.8E+00	n-e	
ENR, cell 2	M208-B		4000	08/25/96	08/25/96	08/25/96	0.70	-3.740	-2.7E+01		
ENR, cell 2	M208-A2		6000	08/27/96	08/27/96	08/27/96	5.01	-2.000	-2.0E+00	n-long	
ENR, cell 2	M208-B2		4000	08/27/96	08/27/96	08/27/96	4.60	-1.500	-1.7E+00	n-long	
ENR, cell 2	M208-A2		4000	08/30/96	08/30/96	08/30/96	4.23	-1.156	-1.4E+00	n-long	
ENR, cell 2	M208-B2		4000	08/30/96	08/30/96	08/30/96	2.33	-2.949	-6.5E+00	n-long	
ENR, cell 2	M208-A2		4000	09/02/96	09/02/96	09/02/96	0.85	-0.676	-4.1E+00		
ENR, cell 2	M208-B2		4000	09/02/96	09/02/96	09/02/96	0.76	-3.177	-2.1E+01		
ENR, cell 2	M208-B2		4000	09/02/96	09/02/96	09/02/96	0.25	-1.500	-3.1E+01		
ENR, cell 2	M208-B2		8000	09/02/96	09/02/96	09/02/96	0.17	-1.039	-3.1E+01		
ENR, cell 2	M208-A2		2000	11/03/96	11/03/96	11/03/96	0.32	0.280	4.5E+00		
ENR, cell 2	M208-B2		2000	11/03/96	11/03/96	11/03/96	0.28	-0.780	-1.4E+01		
ENR, cell 2	M208-A2		2000	11/03/96	11/03/96	11/03/96	0.22	0.574	1.3E+01		
ENR, cell 2	M208-B2		3000	11/03/96	11/03/96	11/03/96	0.33	-1.405	-2.2E+01		
ENR, cell 2	M208-A2		2000	12/11/96	12/11/96	12/11/96	1.68	-0.900	-2.7E+00		
ENR, cell 2	M208-A2		2000	12/11/96	12/11/96	12/11/96	2.35	1.480	3.2E+00	n-long	
ENR, cell 2	M208-B2		3000	12/11/96	12/11/96	12/11/96	0.54	-1.930	-1.8E+01		
ENR, cell 2	M208-B2		3000	12/11/96	12/11/96	12/11/96	0.47	-1.750	-1.9E+01		
ENR, cell 2	M201-S-A	S	2000	08/13/96	08/17/96	08/15/96	100.36	-1.862	-9.5E-02	n-o	
ENR, cell 2	M201-S-A	S	4000	08/17/96	08/19/96	08/18/96	69.67	-3.918	-2.9E-01	n-e	
ENR, cell 2	M201-S-A	S	5600	08/20/96	08/23/96	08/21/96	87.75	-5.543	-3.2E-01	n-e	
ENR, cell 2	M201-S-A	S	4000	08/24/96	08/25/96	08/24/96	25.70	-3.876	-7.7E-01	n-e	
ENR, cell 2	M201-S-A	S	4000	08/25/96	08/25/96	08/25/96	3.63	-2.165	-3.1E+00		
ENR, cell 2	M201-S-A	S	4000	08/25/96	08/25/96	08/25/96	18.62	-2.165	-6.0E-01	n-e	
ENR, cell 2	M201-S-A	S	4000	08/27/96	08/27/96	08/27/96	7.43	-3.830	-2.6E+00	n-e	
ENR, cell 2	M201-S-A	S	6000	08/30/96	08/30/96	08/30/96	4.00	-3.000	-3.8E+00	n-a	
ENR, cell 2	M201-S-A	S	4000	08/30/96	08/30/96	08/30/96	0.25	-0.102	-2.1E+00	n-s	
ENR, cell 2	M201-S-A	S	4000	10/30/96	10/30/96	10/30/96	1.90	-1.162	-3.1E+00		
ENR, cell 2	M201-S-A	S	6000	11/06/96	11/06/96	11/06/96	1.90	-1.162	-3.1E+00		
ENR, cell 2	M201-S-A	S	4000	11/22/96	11/22/96	11/22/96	4.40	-2.825	-3.3E+00		
ENR, cell 2	M201-S-A	S	4000	12/11/96	12/11/96	12/11/96	2.22	-1.440	-3.3E+00		
ENR, cell 2	M201-S-A	S	4000	12/11/96	12/11/96	12/11/96	2.32	-1.440	-3.2E+00		
ENR, cell 2	M201-S-A	S	4000	12/11/96	12/11/96	12/11/96	1.32	-3.320	-1.3E+01		
ENR, cell 2	M201-S-A	S	4000	12/11/96	12/11/96	12/11/96	0.46	-1.250	-1.4E+01		
ENR, cell 2	M201-S-A	S	4000	12/11/96	12/11/96	12/11/96	0.66	-2.615	-2.0E+01		
ENR, cell 2	M201-S-A	S	4000	01/03/97	01/03/97	01/03/97	0.60	-2.600	-2.2E+01		
ENR, cell 2	M201-S-A	S	4000	01/03/97	01/03/97	01/03/97	1.33	-0.670	-2.6E+00		
ENR, cell 2	M201-S-A	S	4000	01/07/97	01/07/97	01/07/97	0.38	-0.190	-2.6E+00		
ENR, cell 2	M201-S-A	S	4000	01/07/97	01/07/97	01/07/97	0.50	-0.760	-7.8E+00		
ENR, cell 2	M201-S-A	S	2000	01/07/97	01/07/97	01/07/97	0.35	-0.760	-1.1E+01		
ENR, cell 2	M201-S-A	S	6000	01/07/97	01/07/97	01/07/97	0.40	-0.980	-1.3E+01		
ENR, cell 2	M201-S-A	S	1000	01/07/97	01/07/97	01/07/97	0.38	-0.550	-7.4E+00		
ENR, cell 2	M201-S-A	S	4000	01/07/97	01/07/97	01/07/97	1.78	-3.360	-9.7E+00		
ENR, cell 2	M201-S-A	S	4000	02/21/97	02/21/97	02/21/97	0.97	-0.560	-3.0E+00		
ENR, cell 2	M201-S-A	S	4000	03/12/97	03/12/97	03/12/97	0.88	-0.425			
ENR, cell 2	M201-S-A	S	4000	03/28/97	03/28/97	03/28/97	0.43	-0.210	-2.5E+00		
ENR, cell 2	M201-S-A	S	4000	03/28/97	03/28/97	03/28/97	0.52	-1.385	-1.4E+01		
ENR, cell 2	M201-S-A	S	4000	04/09/97	04/09/97	04/09/97	0.70	-1.585	-1.2E+01		
ENR, cell 2	M201-S-A	S	4000	04/22/97	04/22/97	04/22/97	0.75	-1.800	-1.2E+01		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
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General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?[#] n = no
				Start Date	End Date	Mid Date					
ENR, cell 2	M201-S-A	S	4000	05/01/97	05/01/97	05/01/97	0.85	-0.570	-3.4E+00		
ENR, cell 2	M201-S-A	S	4000	05/03/97	05/03/97	05/03/97	0.40	-0.690	-8.8E+00		
ENR, cell 2	M201-S-A	S	4000	05/03/97	05/03/97	05/03/97	0.45	-0.680	-7.7E+00		
ENR, cell 2	M201-S-A	S	4000	05/23/97	05/23/97	05/23/97	0.87	-1.590	-9.4E+00		
ENR, cell 2	M201-S-A	S	4000	05/30/97	05/30/97	05/30/97	0.52	-0.360	-3.5E+00		
ENR, cell 2	M201-S-A	S	4000	06/19/97	06/19/97	06/19/97	0.98	-0.855	-4.5E+00		
ENR, cell 2	M201-S-A	S	4000	07/12/97	07/12/97	07/12/97	0.58	-0.540	-4.8E+00		
ENR, cell 2	M201-S-A	S	4000	07/12/97	07/12/97	07/12/97	0.67	-1.290	-9.9E+00		
ENR, cell 2	M201-S-A	S	4000	07/18/97	07/18/97	07/18/97	0.92	-1.140	-6.4E+00		
ENR, cell 2	M201-S-A	S	4000	01/09/98	01/15/98	01/12/98	146.12	-4.000	-1.4E-01	n-long	
ENR, cell 2	M201-S-A	S	4000	02/17/98	02/17/98	02/17/98	2.35	-1.020	-2.2E+00		
ENR, cell 2	M201-S-B	SW	4000	02/17/98	02/17/98	02/17/98	2.25	-0.440	-1.0E+00		
ENR, cell 2	M201-S-A	S	4000	03/15/98	03/15/98	03/15/98	2.45	-0.580	-1.2E+00		
ENR, cell 2	M201-S-B	SW	4000	03/15/98	03/15/98	03/15/98	5.33	-1.190	-1.1E+00		
ENR, cell 2	M201-S-A	S	4000	03/15/98	03/15/98	03/15/98	1.13	-0.510	-2.3E+00		
ENR, cell 2	M201-S-A	S	4000	03/16/98	03/16/98	03/16/98	4.47	-1.725	-2.0E+00		
ENR, cell 2	M201-S-B	SW	4000	03/24/98	03/24/98	03/24/98	3.82	-0.865	-1.2E+00		
ENR, cell 2	M201-S-A	S	4000	04/09/98	04/09/98	04/09/98	2.45	-0.870	-1.8E+00		
ENR, cell 2	M201-S-B	SW	4000	04/09/98	04/09/98	04/09/98	2.40	-0.500	-1.1E+00		
ENR, cell 2	M201-S-A	S	4000	04/15/98	04/15/98	04/15/98	1.33	-0.490	-1.9E+00		
ENR, cell 2	M201-N-A	N	4000	08/17/96	08/18/96	08/17/96	24.85	-2.600	-5.4E-01	n-long	
ENR, cell 2	M201-N-A	N	4000	08/24/96	08/25/96	08/24/96	25.62	-2.514	-5.0E-01	n-long	
ENR, cell 2	M201-N-A	N	4000	08/25/96	08/26/96	08/25/96	45.88	-2.875	-3.2E-01	n-long	
ENR, cell 2	M201-N-A	N	4000	08/27/96	08/30/96	08/28/96	75.23	-2.864	-2.0E-01	n-long	
ENR, cell 2	M201-N-A	N	4000	08/30/96	08/30/96	08/30/96	4.80	-0.520	-5.6E-01	n-out	
ENR, cell 2	M201-N-A	N	4000	10/30/96	10/30/96	10/30/96	1.75	-1.131	-3.3E+00		
ENR, cell 2	M201-N-A	N	6000	11/06/96	11/06/96	11/06/96	3.60	-3.415	-4.9E+00		
ENR, cell 2	M201-N-A	N	4000	11/22/96	11/22/96	11/22/96	4.67	-3.004	-3.3E+00	n-e	
ENR, cell 2	M201-N-A	N	4000	12/11/96	12/11/96	12/11/96	2.05	-3.814	-9.5E+00	n-e	
ENR, cell 2	M201-N-A	N	4000	01/03/97	01/03/97	01/03/97	0.65	-1.220	-9.6E+00		
ENR, cell 2	M201-N-A	N	4000	01/03/97	01/03/97	01/03/97	1.13	-2.424	-1.1E+01		
ENR, cell 2	M201-N-A	N	2000	01/07/97	01/07/97	01/07/97	0.35	-0.195	-2.9E+00		
ENR, cell 2	M201-N-A	N	6000	01/07/97	01/07/97	01/07/97	0.33	-0.260	-4.0E+00		
ENR, cell 2	M201-N-A	N	1000	01/07/97	01/07/97	01/07/97	0.40	-0.220	-2.8E+00		
ENR, cell 2	M201-N-A	N	4000	01/07/97	01/07/97	01/07/97	1.68	-0.800	-2.4E+00		
ENR, cell 2	M201-N-A	N	4000	02/21/97	02/21/97	02/21/97	1.13	-2.740	-1.2E+01		
ENR, cell 2	M201-N-A	N	4000	03/12/97	03/12/97	03/12/97	0.67	-1.560			
ENR, cell 2	M201-N-A	N	4000	04/09/97	04/09/97	04/09/97	0.68	-0.375	-2.8E+00		
ENR, cell 2	M201-N-A	N	4000	04/22/97	04/22/97	04/22/97	0.72	-0.420	-3.0E+00		
ENR, cell 2	M201-N-A	N	4000	05/01/97	05/01/97	05/01/97	0.90	-2.080	-1.2E+01		
ENR, cell 2	M201-N-A	N	4000	05/03/97	05/03/97	05/03/97	0.47	-0.900	-9.8E+00		
ENR, cell 2	M201-N-A	N	4000	05/23/97	05/23/97	05/23/97	0.80	-0.460	-2.9E+00		
ENR, cell 2	M201-N-A	N	4000	05/30/97	05/30/97	05/30/97	0.55	-0.790	-7.4E+00		
ENR, cell 2	M201-N-A	N	4000	06/19/97	06/19/97	06/19/97	1.10	-2.140	-1.0E+01		
ENR, cell 2	M201-N-A	N	4000	07/18/97	07/18/97	07/18/97	0.88	-0.810	-4.7E+00		
ENR, cell 2	M201-N-B	NW	6000	01/09/98	01/15/98	01/12/98	146.05	-4.400	-1.5E-01	n-long	
ENR, cell 2	M201-N-A	N	4000	02/17/98	02/17/98	02/17/98	1.87	-0.940	-2.6E+00		
ENR, cell 2	M201-N-B	NW	4000	02/17/98	02/17/98	02/17/98	1.45	-0.140	-5.0E-01		
ENR, cell 2	M201-N-C	NE	4000	02/17/98	02/23/98	02/20/98	164.97	-0.980	-3.0E-02	n-long	
ENR, cell 2	M201-N-B	NW	6000	02/17/98	02/23/98	02/20/98	163.35	-2.980	-9.4E-02	n-long	
ENR, cell 2	M201-N-B	NW	4000	03/15/98	03/15/98	03/15/98	5.60	-0.380	-3.5E-01		
ENR, cell 2	M201-N-A	N	4000	03/16/98	03/16/98	03/16/98	2.83	-1.300	-2.4E+00		
ENR, cell 2	M201-N-A	N	4000	03/24/98	03/24/98	03/24/98	4.12	-1.770	-2.2E+00		
ENR, cell 2	M201-N-B	NW	4000	03/24/98	03/24/98	03/24/98	3.90	-0.330	-4.3E-01		
ENR, cell 2	M201-N-A	N	4000	04/09/98	04/09/98	04/09/98	2.85	-1.040	-1.9E+00		
ENR, cell 2	M201-N-B	NW	4000	04/09/98	04/09/98	04/09/98	2.80	-0.230	-4.2E-01		
ENR, cell 2	M201-N-A	N	4000	04/15/98	04/15/98	04/15/98	1.15	-0.475	-2.1E+00		
ENR, cell 2	M201-N-B	NW	4000	04/15/98	04/15/98	04/15/98	1.02	-0.040	-2.0E-01		
WCA2A	F1		0	12/15/95	12/15/95	12/15/95	3.40	0.160	4.2E-01	n	
WCA2A	F1		0	12/15/95	12/15/95	12/15/95	0.03	0.060	1.6E+01	n-s	
WCA2A	F1		0	12/15/95	12/15/95	12/15/95	0.03	0.040	1.1E+01	n-s	
WCA2A	F1		0	12/15/95	12/15/95	12/15/95	0.03	0.045	1.2E+01	n-s	
WCA2A	F1		0	12/13/95	12/14/95	12/13/95	47.00	0.360	6.9E-02	n-s	
WCA2A	F1-A2	N	4000	10/10/96	10/10/96	10/10/96	1.87	-0.049	-3.8E-01	n-s	
WCA2A	F1-B2	S	4000	10/10/96	10/10/96	10/10/96	2.10	-0.068	-1.7E-01		
WCA2A	F1-A2	N	4000	10/10/96	10/11/96	10/10/96	26.35	0.024	1.3E-02		n
WCA2A	F1-B2	S	4000	10/10/96	10/11/96	10/10/96	26.15	0.469	9.2E-02		
WCA2A	F1-A2	N	4000	10/23/96	10/25/96	10/24/96	48.82	-0.117	-3.4E-02		n
WCA2A	F1-A2	N	4000	10/25/96	10/25/96	10/25/96	5.27	-0.131	-3.6E-01	n-s	

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
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General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?# n = no
				Start Date	End Date	Mid Date					
WCA2A	F1-B2	S	3000	10/25/96	10/25/96	10/25/96	4.95	-0.008	-8.3E-03	n-s	
WCA2A	F1-A2	N	4000	11/08/96	11/18/96	11/13/96	263.13	-1.312	-7.2E-02		
WCA2A	F1-B2	S	4000	11/08/96	11/18/96	11/13/96	263.17	-3.645	-7.1E-02		
WCA2A	F1-A2	N	4000	11/19/96	12/17/96	12/03/96	675.12	-1.600	-3.4E-02		n
WCA2A	F1-B2	S	4000	11/19/96	12/17/96	12/03/96	675.04	-2.550	-1.9E-02		n
WCA2A	F1-A2	N	4000	12/17/96	01/08/97	12/28/96	545.17	-2.740	-7.2E-02		
WCA2A	F1-B2	S	4000	01/09/97	02/18/97	01/29/97	962.68	-3.510	-1.9E-02		n
WCA2A	F1-C	W	4000	01/27/97	01/27/97	01/27/97	2.02	0.090	4.2E-01	n-s	
WCA2A	F1-C	W	4000	01/27/97	02/18/97	02/07/97	528.30	-3.160	-5.6E-02		
WCA2A	F1-A2	N	4000	02/18/97	02/27/97	02/22/97	236.77	1.375	8.4E-02		
WCA2A	F1-B2	S	4000	02/18/97	02/27/97	02/22/97	236.77	-3.175	-6.9E-02		
WCA2A	F1-C	W	4000	02/18/97	02/27/97	02/22/97	237.25	-0.200	-7.9E-03		n
WCA2A	F1-A2	N	4000	02/28/97	03/10/97	03/05/97	240.75	1.060	6.3E-02		
WCA2A	F1-B2	S	4000	02/28/97	03/10/97	03/05/97	241.03	-3.520	-7.5E-02		
WCA2A	F1-C	W	4000	02/28/97	03/10/97	03/05/97	240.35	1.330	5.2E-02		
WCA2A	F1-A2	N	4000	03/10/97	03/24/97	03/17/97	338.53	1.580	6.7E-02		
WCA2A	F1-B2	S	4000	03/10/97	03/24/97	03/17/97	338.35	-3.430	-5.2E-02		
WCA2A	F1-C	W	4000	03/10/97	03/24/97	03/17/97	338.80	-3.470	-9.6E-02		
WCA2A	F1-A2	N	4000	07/09/97	07/17/97	07/13/97	192.85	-1.720	-1.3E-01		
WCA2A	F1-B2	S	4000	07/09/97	07/17/97	07/13/97	192.93	2.530	6.7E-02		
WCA2A	F1-C	W	4000	07/09/97	07/17/97	07/13/97	193.23	1.690	8.2E-02		
WCA2A	F1-A2	N	4000	10/16/97	10/23/97	10/19/97	191.58	-0.340	-2.6E-02		n
WCA2A	F1-B2	S	4000	10/16/97	10/23/97	10/19/97	191.55	0.075	2.0E-03		n
WCA2A	F1-C	W	4000	10/16/97	10/23/97	10/19/97	191.38	2.600	1.3E-01		
WCA2A	F1-A2	N	4000	10/24/97	10/30/97	10/27/97	150.07	0.070	6.7E-03		n
WCA2A	F1-B2	S	4000	10/24/97	10/30/97	10/27/97	150.05	1.350	4.6E-02		
WCA2A	F1-C	W	4000	10/24/97	10/30/97	10/27/97	150.23	0.240	1.5E-02		n
WCA2A	F1-A2	N	4000	10/30/97	11/04/97	11/01/97	143.30	-0.220	-2.2E-02		n
WCA2A	F1-B2	S	4000	10/30/97	11/04/97	11/01/97	143.38	0.020	7.2E-04		n
WCA2A	F1-C	W	4000	10/30/97	11/04/97	11/01/97	143.18	0.530	3.5E-02		n
WCA2A	F1-A2	N	4000	11/05/97	11/11/97	11/08/97	163.00	-0.530	-4.7E-02		
WCA2A	F1-B2	S	4000	11/05/97	11/11/97	11/08/97	163.00	-0.180	-5.7E-03		n
WCA2A	F1-C	W	4000	11/05/97	11/11/97	11/08/97	163.57	1.180	6.7E-02		
WCA2A	F1-A2	N	4000	01/28/98	02/05/98	02/01/98	193.55	-0.320	-2.4E-02		n
WCA2A	F1-B2	S	4000	01/28/98	02/05/98	02/01/98	193.58	0.060	1.6E-03		n
WCA2A	F1-C	W	4000	01/28/97	02/05/97	02/01/97	193.50	0.400	1.9E-02		n
WCA2A	F1-A2	N	4000	03/26/98	03/31/98	03/28/98	142.33	-1.800	-1.8E-01		
WCA2A	F1-B2	S	4000	03/26/98	03/31/98	03/28/98	142.47	-0.080	-2.9E-03		n
WCA2A	F1-C	W	4000	03/26/98	03/31/98	03/28/98	142.08	-0.365	-2.4E-02		n
WCA2A	E1-A2	N	4000	10/10/96	10/11/96	10/10/96	26.85	0.267	5.1E-02		
WCA2A	E1-B2	S	4000	10/10/96	10/11/96	10/10/96	27.17	0.710	1.3E-01		
WCA2A	E1-A2	N	4000	10/23/96	10/25/96	10/24/96	48.62	-0.783	-8.3E-02	n-g	
WCA2A	E1-B2	S	4000	10/23/96	10/25/96	10/24/96	48.20	-1.209	-1.3E-01		
WCA2A	E1-A2	N	4000	10/25/96	10/25/96	10/25/96	4.95	-0.053	-5.5E-02	n-s	
WCA2A	E1-B2	S	4000	10/25/96	10/25/96	10/25/96	5.02	-0.369	-3.8E-01	n-s	
WCA2A	E1-A2	N	4000	11/08/96	11/18/96	11/13/96	262.87	-2.485	-4.8E-02		
WCA2A	E1-B2	S	4000	11/08/96	11/18/96	11/13/96	262.97	-2.968	-5.8E-02		
WCA2A	E1-A2	N	4000	11/19/96	12/17/96	12/03/96	673.52	-2.190	-1.7E-02		n
WCA2A	E1-A2	N	4000	12/17/96	01/08/97	12/28/96	549.37	-2.945	-2.7E-02		n
WCA2A	E1-A2	N	4000	01/09/97	02/18/97	01/29/97	963.25	-2.949	-1.6E-02		n
WCA2A	E1-B2	S	4000	01/09/97	02/18/97	01/29/97	963.17	-3.575	-1.9E-02		n
WCA2A	E1-A2	N	4000	07/09/97	07/16/97	07/12/97	191.90	0.560	1.5E-02		n
WCA2A	E1-B2	S	4000	07/09/97	07/17/97	07/13/97	192.00	1.180	3.2E-02		n
WCA2A	E1-A2	N	4000	10/16/97	10/23/97	10/19/97	190.80	-0.880	-2.4E-02		n
WCA2A	E1-A2	N	4000	10/24/97	10/30/97	10/27/97	149.08	-0.680	-2.3E-02		n
WCA2A	E1-A2	N	4000	10/30/97	11/04/97	11/01/97	142.65	-0.400	-1.4E-02		n
WCA2A	E1-A2	N	4000	11/05/97	11/11/97	11/08/97	164.70	0.020	6.2E-04		n
WCA2A	E1-A2	N	4000	01/28/98	02/05/98	02/01/98	193.40	-0.100	-2.7E-03		n
WCA2A	E1-B2	S	4000	03/26/98	03/31/98	03/28/98	142.20	-2.325	-8.4E-02		
WCA2A	E4-A2	W	4000	10/10/96	10/10/96	10/10/96	20.77	0.547	1.4E-01		
WCA2A	E4-B2	E	4000	10/10/96	10/10/96	10/10/96	21.69	0.375	8.9E-02		
WCA2A	E4-A2	W	4000	10/23/96	10/24/96	10/23/96	47.75				
WCA2A	E4-B2	E	4000	10/23/96	10/24/96	10/23/96	47.90	0.890	9.5E-02		

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
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General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
WCA2A	E4-A2	W	4000	10/25/96	10/25/96	10/25/96	3.67	0.120	1.7E-01	n-s	
WCA2A	E4-B2	E	4000	10/25/96	10/25/96	10/25/96	3.48	0.038	5.6E-02	n-s	
WCA2A	E4-A2	W	4000	11/08/96	11/19/96	11/13/96	265.63	-2.966	-5.7E-02		
WCA2A	E4-B2	E	4000	11/08/96	11/19/96	11/13/96	265.85	-1.022	-2.0E-02		n
WCA2A	E4-A2	W	4000	11/19/96	12/17/96	12/03/96	672.20	-3.420	-2.6E-02		n
WCA2A	E4-A2	W	4000	12/17/96	01/09/97	12/28/96	572.82	-1.830	-1.6E-02		n
WCA2A	E4-B2	E	4000	12/17/96	01/09/97	12/28/96	572.80	-3.040	-2.7E-02		n
WCA2A	E4-A2	W	4000	01/10/97	02/18/97	01/29/97	940.21	-2.830	-1.5E-02		n
WCA2A	E4-B2	E	4000	01/10/97	02/18/97	01/29/97	940.10	-2.570	-1.4E-02		n
WCA2A	E4-A2	W	4000	07/09/97	07/16/97	07/12/97	190.20	-1.100	-3.0E-02		n
WCA2A	E4-B2	E	4000	07/09/97	07/16/97	07/12/97	190.32	-1.480	-4.0E-02		
WCA2A	E4-A2	W	4000	10/16/97	10/23/97	10/19/97	190.25	-1.940	-5.2E-02		
WCA2A	E4-B2	E	4000	10/16/97	10/23/97	10/19/97	190.13	-1.540	-4.2E-02		
WCA2A	E4-A2	W	4000	10/24/97	10/30/97	10/27/97	146.73	-0.555	-1.9E-02		n
WCA2A	E4-B2	E	4000	10/24/97	10/30/97	10/27/97	146.92	-0.565	-2.0E-02		n
WCA2A	E4-A2	W	4000	10/30/97	11/04/97	11/01/97	142.20	-1.470	-5.3E-02		
WCA2A	E4-B2	E	4000	10/30/97	11/04/97	11/01/97	142.22	-1.590	-5.7E-02		
WCA2A	E4-A2	W	4000	11/05/97	11/12/97	11/08/97	168.50	-1.140	-3.5E-02		n
WCA2A	E4-B2	E	4000	11/05/97	11/11/97	11/08/97	166.80	-1.620	-5.0E-02		
WCA2A	E4-A2	W	4000	01/28/98	02/05/98	02/01/98	193.10	-1.430	-3.8E-02		
WCA2A	E4-B2	E	4000	01/28/98	02/05/98	02/01/98	193.10	-1.960	-5.2E-02		
WCA2A	E4-A2	W	4000	03/26/98	03/31/98	03/28/98	141.92	-1.280	-4.6E-02		
WCA2A	E4-B2	E	4000	03/26/98	03/31/98	03/28/98	142.03	-0.505	-1.8E-02		n
WCA2A	F4-A2	E	4000	10/10/96	10/11/96	10/10/96	25.79	-0.029	-5.8E-03		
WCA2A	F4-B2	W	4000	10/10/96	10/11/96	10/10/96	25.87	-0.065	-1.3E-02		n
WCA2A	F4-A2	E	4000	10/23/96	10/24/96	10/23/96	47.73	-0.021	-2.3E-03		n
WCA2A	F4-B2	W	4000	10/23/96	10/24/96	10/23/96	47.67	-0.320	-3.4E-02		n
WCA2A	F4-A2	E	4000	10/25/96	10/25/96	10/25/96	2.62	0.072	1.4E-01	n-s	
WCA2A	F4-B2	W	2000	10/25/96	10/25/96	10/25/96	2.63	0.042	8.2E-02	n-s	
WCA2A	F4-A2	E	4000	11/08/96	11/19/96	11/13/96	265.85	-3.430	-6.6E-02		
WCA2A	F4-B2	W	2000	11/08/96	11/19/96	11/13/96	265.80	-3.290	-6.3E-02		
WCA2A	F4-A2	E	4000	11/19/96	12/16/96	12/02/96	670.45	-3.204	-2.5E-02		n
WCA2A	F4-B2	W	2000	11/19/96	12/16/96	12/02/96	670.40	-2.890	-2.2E-02		n
WCA2A	F4-A2	E	4000	12/17/96	01/09/97	12/28/96	572.03	-1.620	-1.5E-02		n
WCA2A	F4-B2	W	4000	12/17/96	01/09/97	12/28/96	572.28	-2.540	-2.3E-02		n
WCA2A	F4-A2	E	4000	07/09/97	07/16/97	07/12/97	191.18	-0.080	-2.1E-03		n
WCA2A	F4-B2	W	4000	07/09/97	07/16/97	07/12/97	190.95	-0.710	-1.9E-02		n
WCA2A	F4-A2	E	4000	10/16/97	10/23/97	10/19/97	190.47	-1.620	-4.4E-02		
WCA2A	F4-B2	W	4000	10/16/97	10/23/97	10/19/97	190.33	-1.120	-3.0E-02		n
WCA2A	F4-A2	E	4000	10/24/97	10/30/97	10/27/97	147.68	-0.360	-1.2E-02		n
WCA2A	F4-B2	W	4000	10/24/97	10/30/97	10/27/97	147.67	-0.860	-3.0E-02		n
WCA2A	F4-A2	E	4000	10/30/97	11/04/97	11/01/97	143.03	-0.500	-1.8E-02		n
WCA2A	F4-B2	W	4000	10/30/97	11/04/97	11/01/97	143.10	-1.040	-3.7E-02		
WCA2A	F4-A2	E	4000	11/05/97	11/11/97	11/08/97	166.48	-1.110	-3.4E-02		n
WCA2A	F4-B2	W	4000	11/05/97	11/11/97	11/08/97	166.55	-1.240	-3.8E-02		
WCA2A	F4-A2	E	4000	01/28/98	02/05/98	02/01/98	193.25	-0.480	-1.3E-02		n
WCA2A	F4-B2	W	4000	01/28/98	02/05/98	02/01/98	193.30	-1.000	-2.7E-02		n
WCA2A	F4-B2	W	4000	03/26/98	03/31/98	03/28/98	142.15	-2.160	-7.8E-02		
WCA2A	F4-A2	E	4000	03/26/98	03/31/98	03/28/98	142.15	-0.445	-1.6E-02		n
WCA2A	U3-A2	N	4000	10/23/96	10/24/96	10/23/96	47.82	0.938	2.8E-01		
WCA2A	U3-B2	S	4000	10/23/96	10/24/96	10/23/96	47.55	0.960	1.0E-01		
WCA2A	U3-A2	N	4000	10/25/96	10/25/96	10/25/96	1.49	0.088	8.5E-01	n-s	
WCA2A	U3-B2	S	4000	10/25/96	10/25/96	10/25/96	1.55	0.198	6.5E-01	n-s	
WCA2A	U3-A2	N	4000	11/08/96	11/08/96	11/08/96	3.43	0.012	5.0E-02	n-s	
WCA2A	U3-B2	S	4000	11/08/96	11/08/96	11/08/96	3.45	0.015	2.2E-02	n-s	
WCA2A	U3-A2	N	4000	11/08/96	11/11/96	11/09/96	90.67	-0.195	-3.1E-02		n
WCA2A	U3-B2	S	4000	11/08/96	11/11/96	11/09/96	90.59	-0.962	-5.4E-02		
WCA2A	U3-A2	N	4000	11/12/96	11/19/96	11/15/96	173.78	-1.350	-1.1E-01		
WCA2A	U3-B2	S	4000	11/12/96	11/19/96	11/15/96	173.82	-2.505	-7.4E-02		
WCA2A	U3-A2	N	4000	11/19/96	12/16/96	12/02/96	668.28	-1.140	-2.5E-02		n
WCA2A	U3-B2	S	4000	11/19/96	12/16/96	12/02/96	668.28	-5.847	-4.5E-02		
WCA2A	U3-A2	N	4000	12/17/96	01/09/97	12/28/96	574.48	-1.005	-2.5E-02		n
WCA2A	U3-B2	S	4000	12/17/96	01/09/97	12/28/96	574.50	-1.625	-1.5E-02		n

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
Page 14 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?# n = no
				Start Date	End Date	Mid Date					
WCA2A	U3-A2	N	4000	01/10/97	02/18/97	01/29/97	940.48	-2.780	-4.3E-02		
WCA2A	U3-B2	S	4000	01/10/97	02/18/97	01/29/97	940.28	-2.960	-1.6E-02		n
WCA2A	U3-A2	N	4000	07/09/97	07/16/97	07/12/97	186.67	0.260	2.0E-02		n
WCA2A	U3-B2	S	4000	07/09/97	07/16/97	07/12/97	186.68	-1.000	-2.7E-02		n
WCA2A	U3-A2	N	4000	10/16/97	10/23/97	10/19/97	189.23	-0.780	-5.9E-02		
WCA2A	U3-B2	S	4000	10/16/97	10/23/97	10/19/97	190.02	-2.700	-7.3E-02		
WCA2A	U3-A2	N	4000	10/24/97	10/30/97	10/27/97	144.77	-0.440	-4.4E-02		
WCA2A	U3-B2	S	4000	10/24/97	10/29/97	10/26/97	143.78	-0.550	-2.0E-02		n
WCA2A	U3-A2	N	4000	10/30/97	11/04/97	11/01/97	143.82	-0.250	-2.5E-02		n
WCA2A	U3-B2	S	4000	10/30/97	11/04/97	11/01/97	143.73	-1.430	-5.1E-02		
WCA2A	U3-A2	N	4000	11/05/97	11/12/97	11/08/97	169.82	-0.540	-4.6E-02		
WCA2A	U3-B2	S	4000	11/05/97	11/12/97	11/08/97	169.70	-1.020	-3.1E-02		n
WCA2A	U3-A2	N	4000	01/28/98	02/05/98	02/01/98	192.17	-0.120	-9.0E-03		
WCA2A	U3-B2	S	4000	01/28/98	02/05/98	02/01/98	192.15	0.030	8.0E-04		n
WCA2A	U3-A2	N	4000	03/26/98	03/31/98	03/28/98	141.73	0.075	7.6E-03		n
WCA2A	U3-B2	S	4000	03/26/98	03/31/98	03/28/98	141.67	-0.145	-5.2E-03		n
WCA2A	U1-A2	N	4000	10/23/96	10/24/96	10/23/96	47.03	1.550	1.7E-01		
WCA2A	U1-B2	S	4000	10/23/96	10/24/96	10/23/96	47.30	0.838	9.1E-02		
WCA2A	U1-A2	N	4000	11/08/96	11/08/96	11/08/96	5.07	-0.037	-3.7E-02	n-s	
WCA2A	U1-B2	S	4000	11/08/96	11/08/96	11/08/96	5.07	-0.060	-6.1E-02	n-s	
WCA2A	U1-A2	N	4000	11/08/96	11/11/96	11/09/96	90.95	-1.249	-7.0E-02		
WCA2A	U1-B2	S	4000	11/08/96	11/11/96	11/09/96	90.95	-1.038	-5.9E-02		
WCA2A	U1-A2	N	4000	11/12/96	11/19/96	11/15/96	173.45	-2.540	-7.5E-02		
WCA2A	U1-B2	S	4000	11/12/96	11/19/96	11/15/96	173.45	-2.020	-6.0E-02		
WCA2A	U1-A2	N	6000	11/19/96	12/16/96	12/02/96	666.05	-3.350	-2.6E-02		n
WCA2A	U1-B2	S	6000	11/19/96	12/16/96	12/02/96	665.98	-3.220	-2.5E-02		n
WCA2A	U1-A2	N	6000	12/17/97	12/28/97	12/22/97	266.58	-1.900	-3.7E-02		
WCA2A	U1-A2	N	4000	07/09/97	07/16/97	07/12/97	189.65	-0.360	-9.7E-03		n
WCA2A	U1-B2	S	4000	07/09/97	07/16/97	07/12/97	189.78	0.420	1.1E-02		n
WCA2A	U1-A2	N	4000	10/16/97	10/23/97	10/19/97	190.28	-1.620	-4.4E-02		
WCA2A	U1-B2	S	4000	10/16/97	10/23/97	10/19/97	190.10	-1.320	-3.6E-02		n
WCA2A	U1-A2	N	4000	10/24/97	10/29/97	10/26/97	142.05	-1.080	-3.9E-02		
WCA2A	U1-B2	S	4000	10/24/97	10/29/97	10/26/97	142.22	-2.440	-8.8E-02		
WCA2A	U1-A2	N	4000	10/30/97	11/04/97	11/01/97	143.07	-0.990	-3.5E-02		n
WCA2A	U1-B2	S	4000	10/30/97	11/04/97	11/01/97	143.08	-0.520	-1.9E-02		n
WCA2A	U1-A2	N	4000	11/05/97	11/12/97	11/08/97	172.13	-0.460	-1.4E-02		n
WCA2A	U1-B2	S	4000	11/05/97	11/12/97	11/08/97	172.18	-1.465	-4.4E-02		
WCA2A	U1-A2	N	4000	01/28/98	02/04/98	01/31/98	190.80	-1.600	-4.3E-02		
WCA2A	U1-B2	S	4000	01/28/98	02/04/98	01/31/98	190.85	-0.500	-1.3E-02		n
WCA2A	U1-A2	N	4000	03/26/98	03/31/98	03/28/98	141.47	0.070	2.5E-03		n
WCA2A	U1-B2	S	4000	03/26/98	03/31/98	03/28/98	141.53	-0.380	-1.4E-02		n
WCA3A	WC3A-15-A	S	4000	01/16/97	01/26/97	01/21/97	259.60	-0.380	-1.4E-02		n
WCA3A	WC3A-15-B	M	4000	01/16/97	01/26/97	01/21/97	259.78	-0.510	-1.8E-02		n
WCA3A	WC3A-15-C	N	4000	01/16/97	01/26/97	01/21/97	259.97	-0.300	-1.1E-02		n
WCA3A	WC3A-15-A	S	4000	01/27/97	02/06/97	02/01/97	243.87	-0.829	-3.2E-02		n
WCA3A	WC3A-15-B	M	4000	01/27/97	02/06/97	02/01/97	243.83	-0.551	-2.1E-02		n
WCA3A	WC3A-15-C	N	4000	01/27/97	02/06/97	02/01/97	243.92	-0.405	-1.5E-02		n
WCA3A	WC3A-15-A	S	4000	02/28/97	03/23/97	03/11/97	573.72	-0.980	-1.6E-02		n
WCA3A	WC3A-15-B	M	4000	02/28/97	03/23/97	03/11/97	573.67	-0.843	-1.4E-02		n
WCA3A	WC3A-15-C	N	4000	02/28/97	03/23/97	03/11/97	573.62	-0.540	-8.8E-03		n
WCA3A	WC3A-15-A	S	4000	03/24/97	04/03/97	03/29/97	262.93	-1.765	-6.3E-02		
WCA3A	WC3A-15-A	S	4000	04/04/97	04/17/97	04/10/97	333.57	-1.040	-2.9E-02		n
WCA3A	WC3A-15-A	S	4000	05/27/97	06/13/97	06/04/97	412.35	-2.660	-6.0E-02		
WCA3A	WC3A-15-B	M	4000	05/27/97	06/13/97	06/04/97	412.45	-2.500	-5.7E-02		
WCA3A	WC3A-15-C	N	4000	05/27/97	06/13/97	06/04/97	412.50	-2.085	-4.7E-02		
WCA2B	2B-S-A	S	4000	01/16/97	01/26/97	01/21/97	259.60	-1.210	-4.3E-02		
WCA2B	2B-S-B	M	4000	01/16/97	01/26/97	01/21/97	259.60	-1.770	-6.4E-02		
WCA2B	2B-S-C	N	4000	01/16/97	01/26/97	01/21/97	259.77	-1.060	-3.8E-02		
WCA2B	2B-S-A	S	4000	01/27/97	02/18/97	02/07/97	531.65	-1.395	-2.4E-02		n
WCA2B	2B-S-A	S	4000	02/18/97	02/27/97	02/22/97	236.00	-0.660	-2.6E-02		n
WCA2B	2B-S-B	M	4000	02/18/97	02/27/97	02/22/97	236.33	-1.665	-6.6E-02		
WCA2B	2B-S-C	N	4000	02/18/97	02/27/97	02/22/97	236.63	-2.625	-1.0E-01		
WCA2B	2B-S-A	S	4000	02/28/97	03/10/97	03/05/97	240.60	-1.085	-4.2E-02		
WCA2B	2B-S-B	M	4000	02/28/97	03/10/97	03/05/97	240.40	-0.885	-3.4E-02		n
WCA2B	2B-S-C	N	4000	02/28/97	03/10/97	03/05/97	240.32	-0.830	-3.2E-02		n

Table 33. Vertical Fluxes Measured by Seepage Meters at Research Sites in ENR and WCA2-A
Page 15 of 15

General Location	Location and Meter ID (letter)	Meter Directional Identifier	Meter Prefill Volume (ml)	Seepage Meter Bag Deployment			Elapsed Time (hr)	Water Vol. Exchanged (liters)	Vertical Flux + =upward (cm/day)	Valid Measure-ment?* n = no	Flux Above Minimum Detection?$^{\#}$ n = no
				Start Date	End Date	Mid Date					
WCA2B	2B-S-A	S	4000	03/10/97	03/23/97	03/16/97	334.78	-1.370	-3.8E-02		
WCA2B	2B-S-B	M	4000	03/10/97	03/23/97	03/16/97	335.02	-1.890	-5.3E-02		
WCA2B	2B-S-C	N	4000	03/10/97	03/23/97	03/16/97	335.03	-0.460	-1.3E-02		n
WCA2B	2B-S-A	S	4000	03/24/97	04/03/97	03/29/97	263.70	-2.420	-8.6E-02		
WCA2B	2B-S-B	M	4000	03/24/97	04/03/97	03/29/97	262.98	-1.915	-6.8E-02		
WCA2B	2B-S-C	N	4000	03/24/97	04/03/97	03/29/97	263.20	-1.600	-5.7E-02		
WCA2B	2B-S-A	S	4000	04/04/97	04/18/97	04/11/97	336.67	-1.250	-3.5E-02		
WCA2B	2B-S-B	M	4000	04/04/97	04/18/97	04/11/97	336.90	-1.260	-3.5E-02		
WCA2B	2B-S-C	N	4000	04/04/97	04/18/97	04/11/97	337.02	-1.260	-3.5E-02		
WCA2B	2B-S-A	S	4000	05/20/97	05/27/97	05/23/97	188.43	-2.330	-1.2E-01		
WCA2B	2B-S-B	M	4000	05/20/97	05/27/97	05/23/97	188.43	-0.980	-4.8E-02		
WCA2B	2B-S-C	N	4000	05/20/97	05/27/97	05/23/97	188.40	-0.570	-2.8E-02		n
WCA2B	2B-S-A	S	4000	05/28/97	06/13/97	06/05/97	389.92	-2.305	-5.5E-02		
WCA2B	2B-S-C	N	4000	05/28/97	06/13/97	06/05/97	390.23	-2.885	-6.9E-02		
ENR, cell 2	N. Test S	S	2000	01/03/97	01/03/97	01/03/97	23.18	-0.265	-1.1E-01		
ENR, cell 2	N. Test M	M	4000	01/03/97	01/03/97	01/03/97	23.25	2.060	8.3E-01		
ENR, cell 2	N. Test N	N	6000	01/03/97	01/03/97	01/03/97	23.37	0.200	8.0E-02		
ENR, cell 2	N. Test S	S	2000	01/04/97	01/06/97	01/05/97	67.90	0.550	7.6E-02		
ENR, cell 2	N. Test M	M	4000	01/04/97	01/06/97	01/05/97	67.90	0.565	7.8E-02		
ENR, cell 2	N. Test N	N	6000	01/04/97	01/06/97	01/05/97	67.77	-0.655	-9.0E-02		
ENR, cell 2	N. Test S	S	2000	01/07/97	01/12/97	01/09/97	122.47	0.345	2.6E-02		
ENR, cell 2	N. Test M	M	4000	01/07/97	01/12/97	01/09/97	122.57	0.180	1.4E-02		
ENR, cell 2	N. Test N	N	6000	01/07/97	01/12/97	01/09/97	122.73	1.140	8.7E-02		
ENR, cell 2	N. Test S	S	2000	01/12/97	01/25/97	01/18/97	332.39	1.180	3.3E-02		
ENR, cell 2	N. Test M	M	4000	01/12/97	01/25/97	01/18/97	332.39	-1.060	-3.0E-02		
ENR, cell 2	N. Test N	N	6000	01/12/97	01/25/97	01/18/97	332.39	-4.550	-1.3E-01		
ENR, cell 2	N. Test S	S	2000	01/26/97	02/21/97	02/08/97	624.95	1.230	1.8E-02		
ENR, cell 2	N. Test M	M	4000	01/26/97	02/21/97	02/08/97	624.88	-2.680	-4.0E-02		
ENR, cell 2	N. Test N	N	6000	01/26/97	02/21/97	02/08/97	624.75	-4.440	-6.6E-02		
ENR, cell 2	S. Test W	W	2000	01/07/97	01/11/97	01/09/97	117.35	0.140	1.1E-02		
ENR, cell 2	S. Test C	C	4000	01/07/97	01/11/97	01/09/97	117.30	0.130	1.0E-02		
ENR, cell 2	S. Test E	E	6000	01/07/97	01/11/97	01/09/97	117.33	0.240	1.9E-02		
ENR, cell 2	S. Test W	W	2000	01/12/97	01/25/97	01/18/97	332.24	1.580	4.4E-02		
ENR, cell 2	S. Test C	C	4000	01/12/97	01/25/97	01/18/97	332.24	-0.990	-2.8E-02		
ENR, cell 2	S. Test E	E	6000	01/12/97	01/25/97	01/18/97	332.24	3.060	8.6E-02		
ENR, cell 2	S. Test W	W	2000	01/26/97	02/12/97	02/03/97	414.50	0.560	1.3E-02		
ENR, cell 2	S. Test C	C	4000	01/26/97	02/12/97	02/03/97	414.43	0.440	9.9E-03		
ENR, cell 2	S. Test E	E	6000	01/26/97	02/12/97	02/03/97	414.35	-2.220	-5.0E-02		

* - Key to Invalid Measurements
n-f = bag full
n-b = outlet blocked
n-o = riser out of water
n-l = bag leaked
n-g = too much gas in bag
n-s = anomolous short term data
n-e = bag emptied
n-a = accidental spillage or other problem
n-lv = vent tube used
n-long = anomolous long-term data
n-out = outlier
n-install = too soon after installation

APPENDIX VII

Budget for Water, Chloride, and Dissolved Mercury

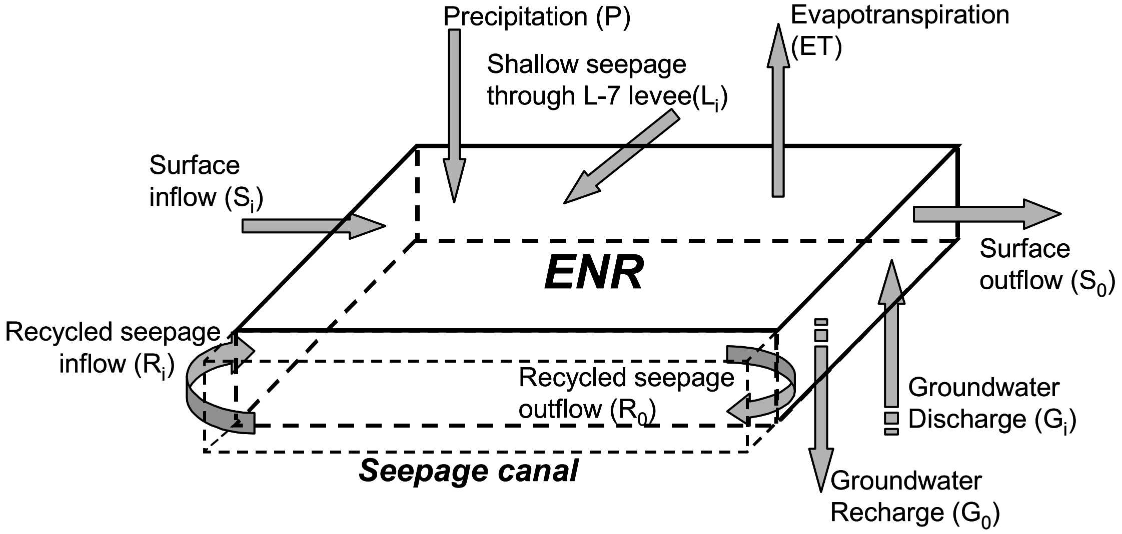


Figure 152. Conceptual model of water flows in the ENR Conceptual model of water flows in the ENR.

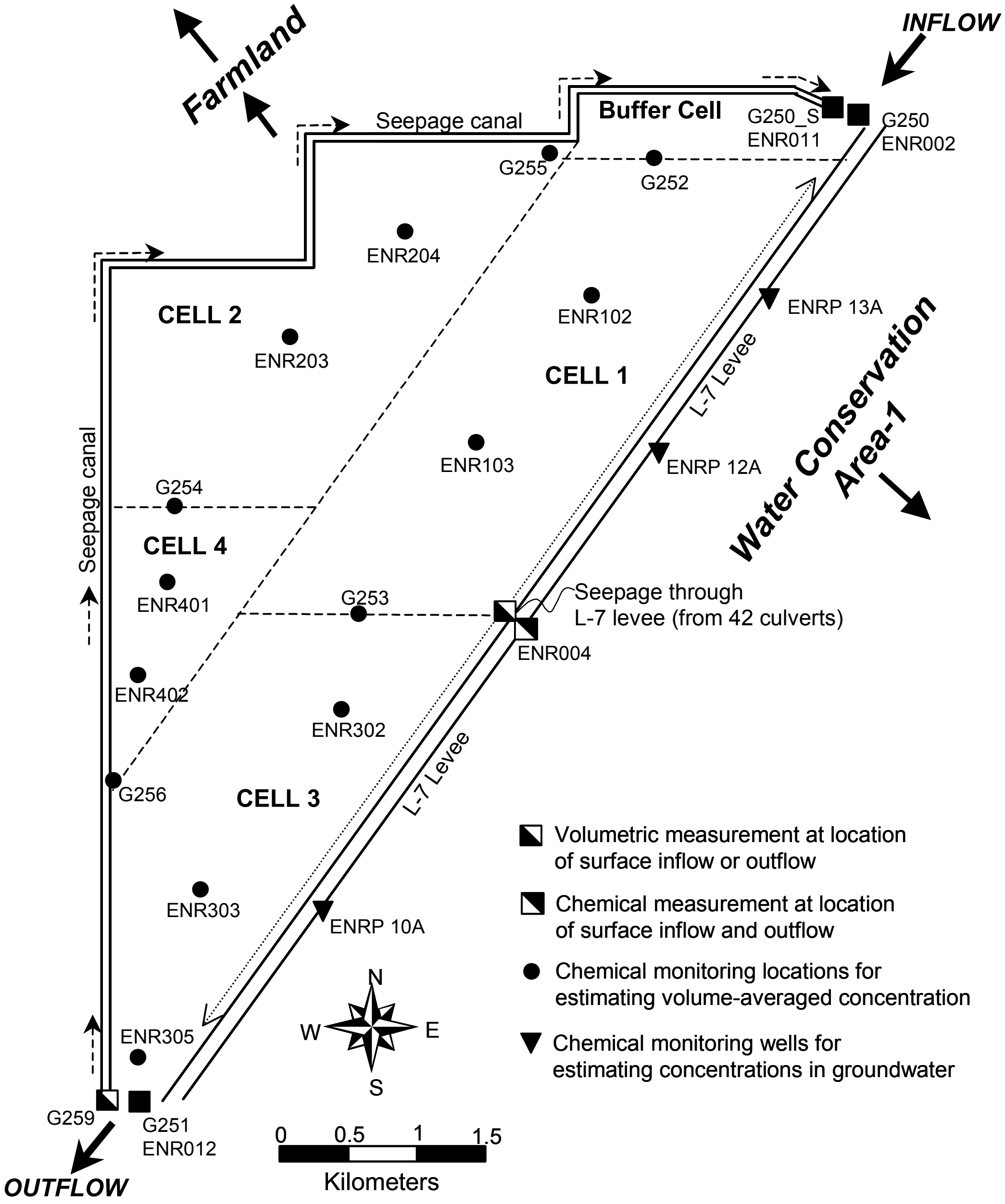
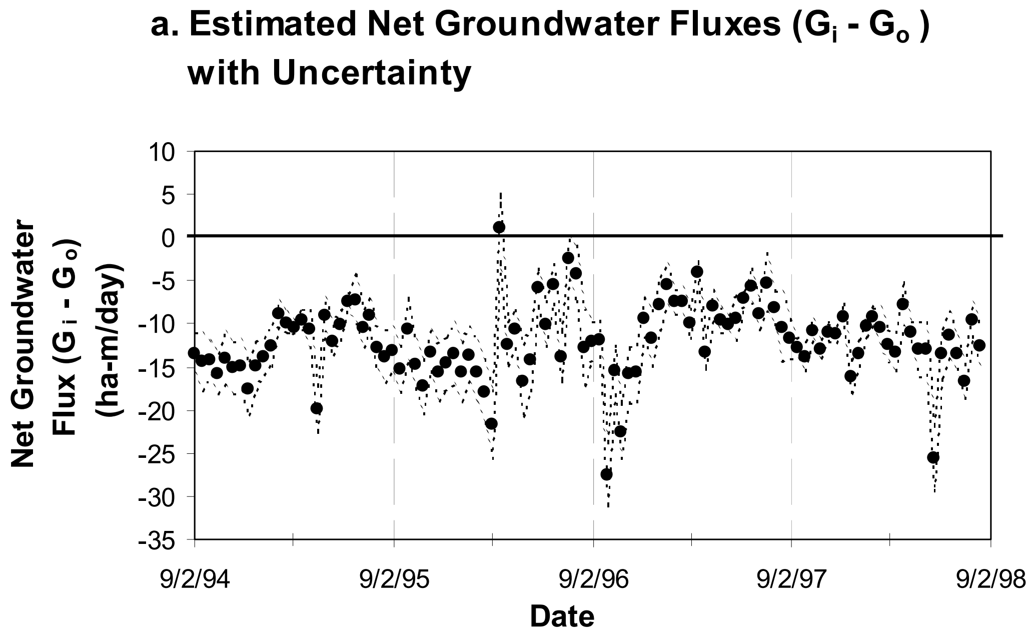
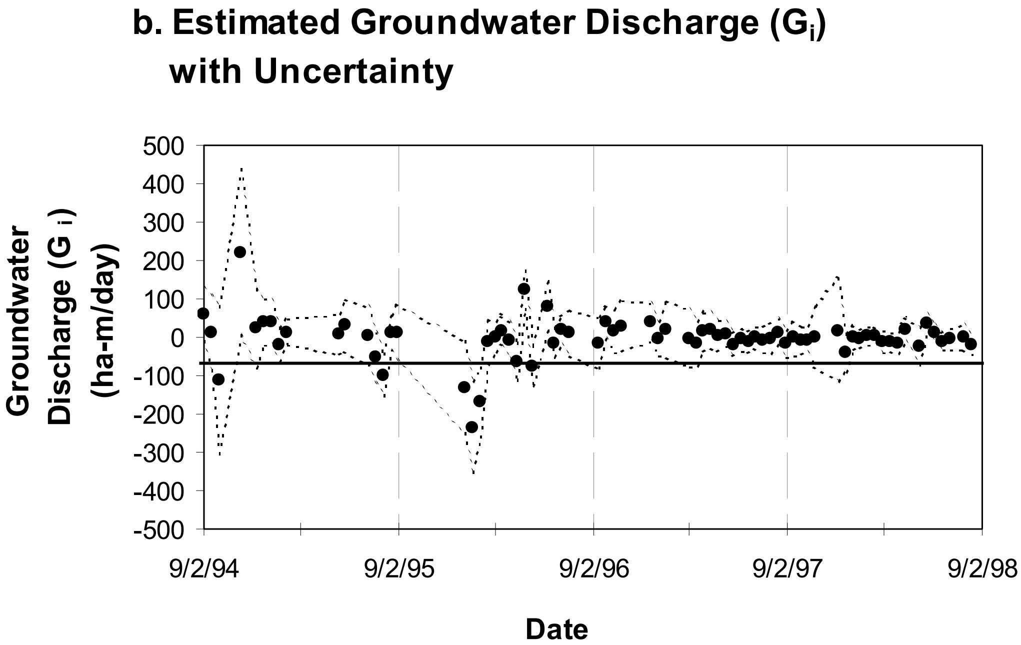


Figure 153. Location map illustrating hydrological and chemical monitoring sites in study area.



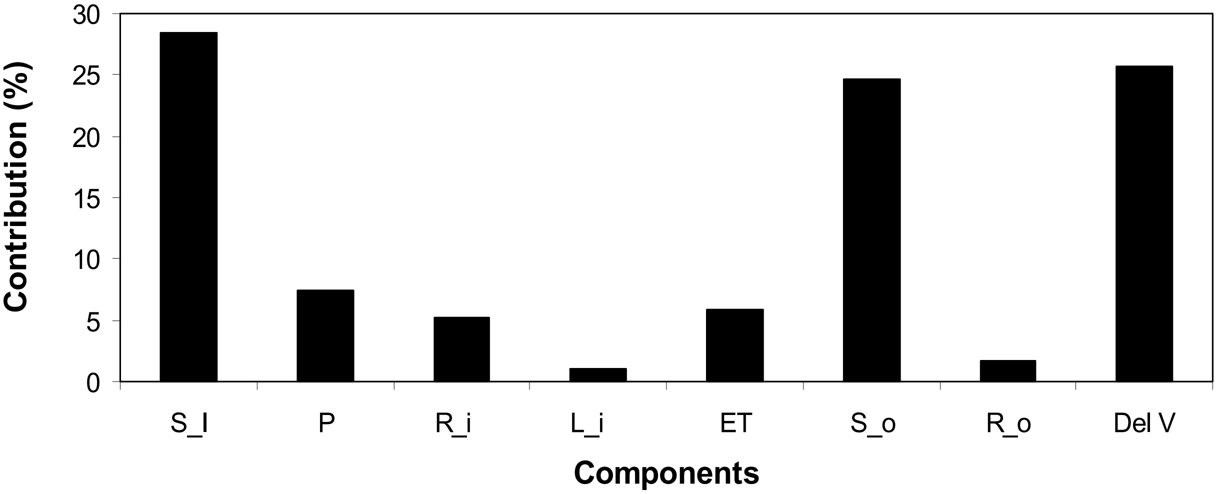
a. Estimated Net Groundwater Fluxes (G_i - G_o) with Uncertainty



b. Estimated Groundwater Discharge (G_i) with Uncertainty

Figure 1 NR. Upper and lower dashed lines represent the uncertainty. Positive values indicate discharge and negative values indicate recharge.

a. Contributions (%) to Uncertainty in Estimating Net Groundwater Flux (G_i - G_o)



b. Contributions (%) to Uncertainty in Estimating Groundwater Discharge (G_i)

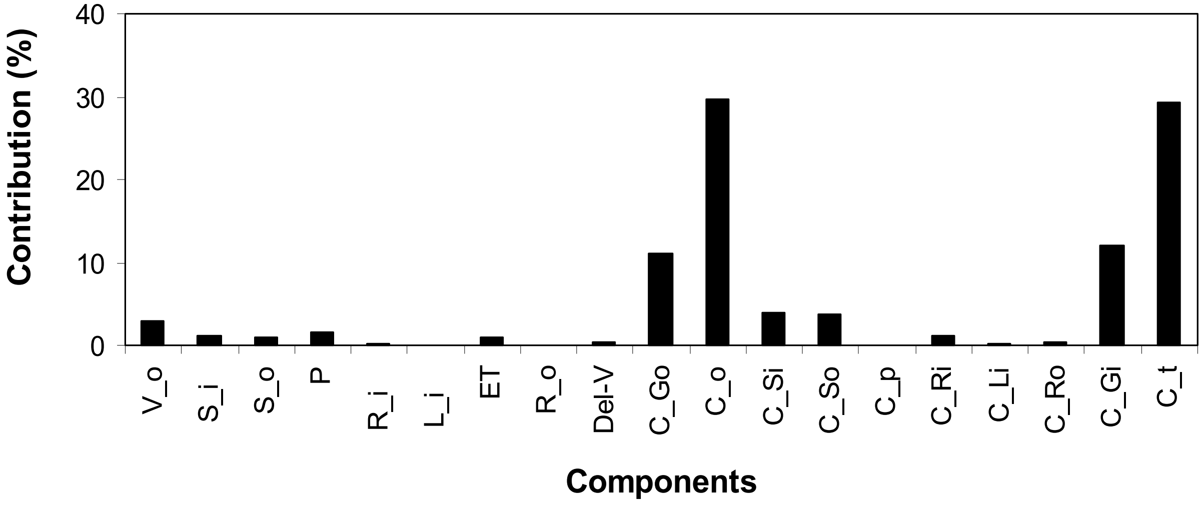
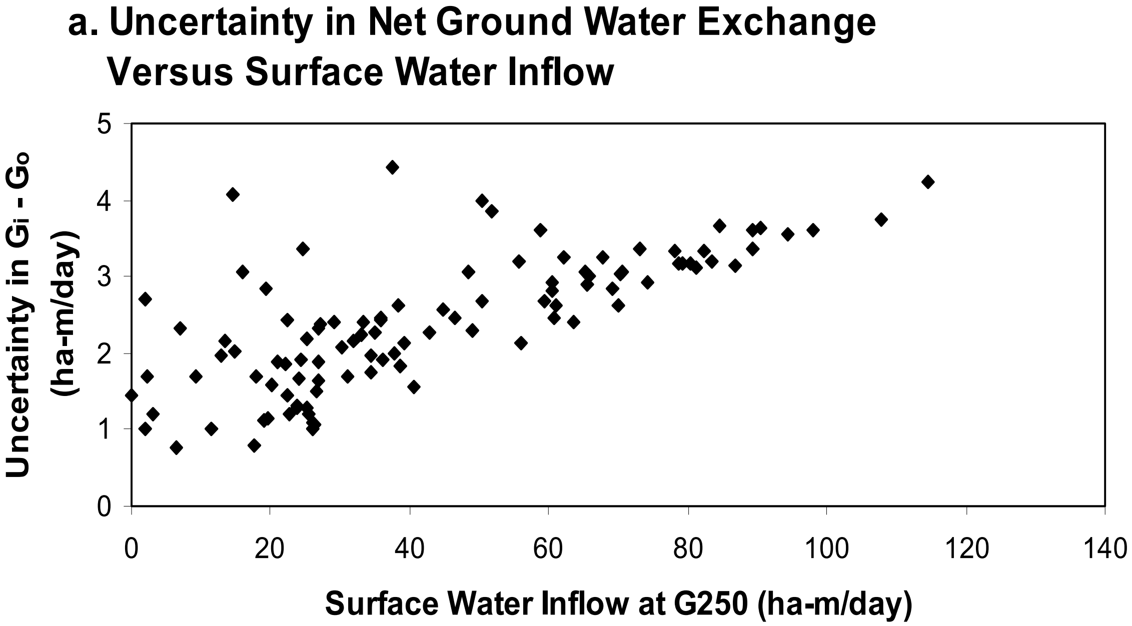
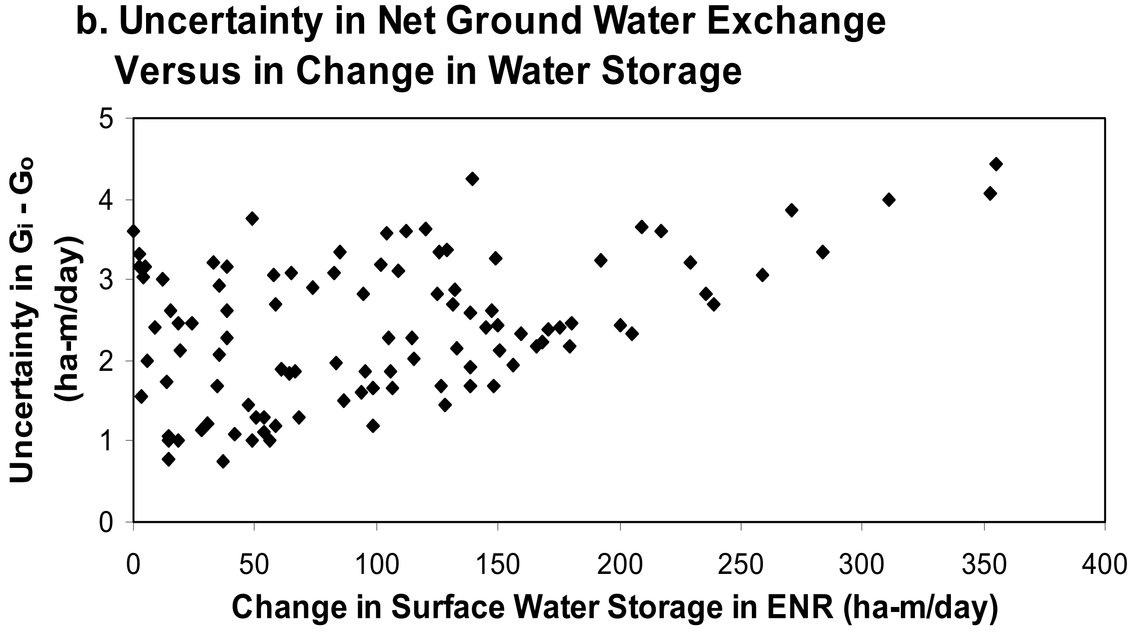


Figure 155.Contributions (%) of hydrologic and chemical measurements to the uncertainty in estimating (a) net ground water exchange and (b) ground water discharge rate into the ENR.

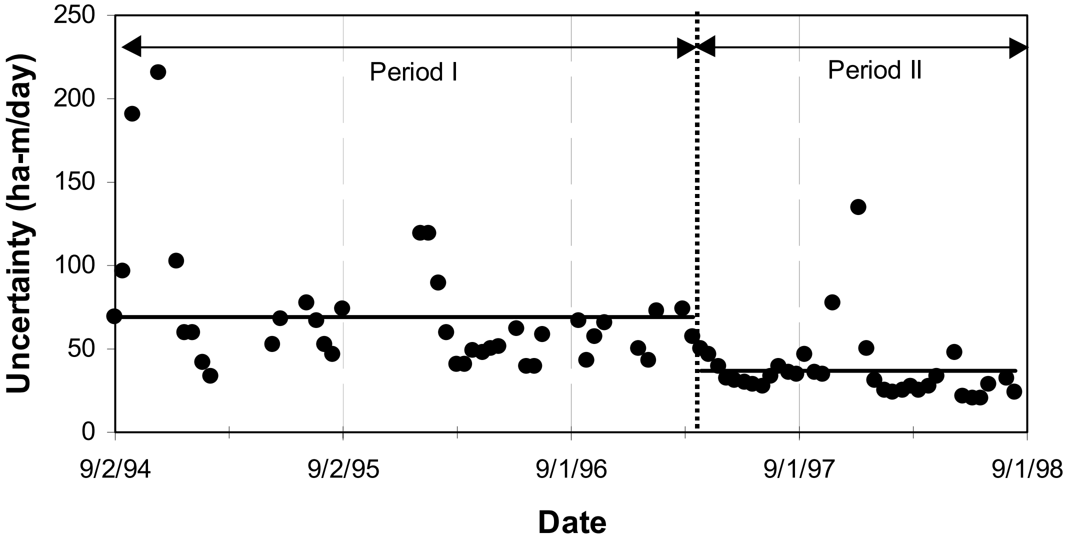


a. Uncertainty in Net Ground Water Exchange Versus Surface Water Inflow

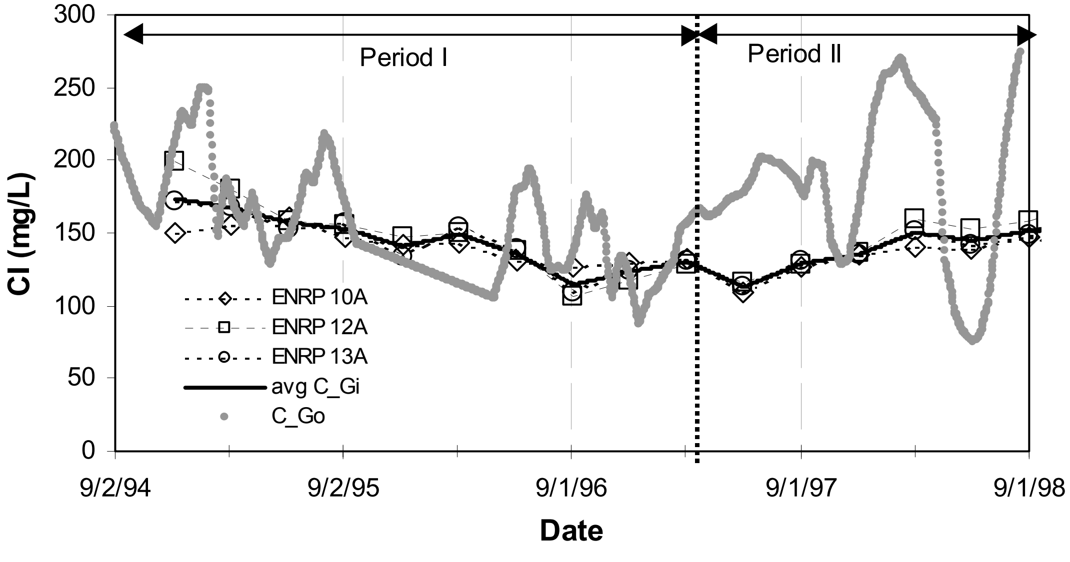


b. Uncertainty in Net Ground Water Exchange Versus in Change in Water Storage

Figure 156. Relationship between uncertainty in estimating net ground water exchange and hydrologic conditions, such as (a) surface-water pump rate and (b) change in surface-water storage in the ENR.



a. Uncertainty in Estimating Ground Water Discharge (G_i)



b. Comparison of Cl concentrations in ENR (C_{Gi}) and Ground Water Discharge (C_{Go})

Figure 157. Comparison of (a) uncertainty in estimated ground water discharge and (b) chemical difference between ground water recharge ($\overline{C}_{G_o}$) and discharge ($\overline{C}_{G_i}$). The greater the difference of Cl concentrations ($\overline{C}_{G_i}$ and $\overline{C}_{G_o}$), the lower the uncertainty in estimated ground water.

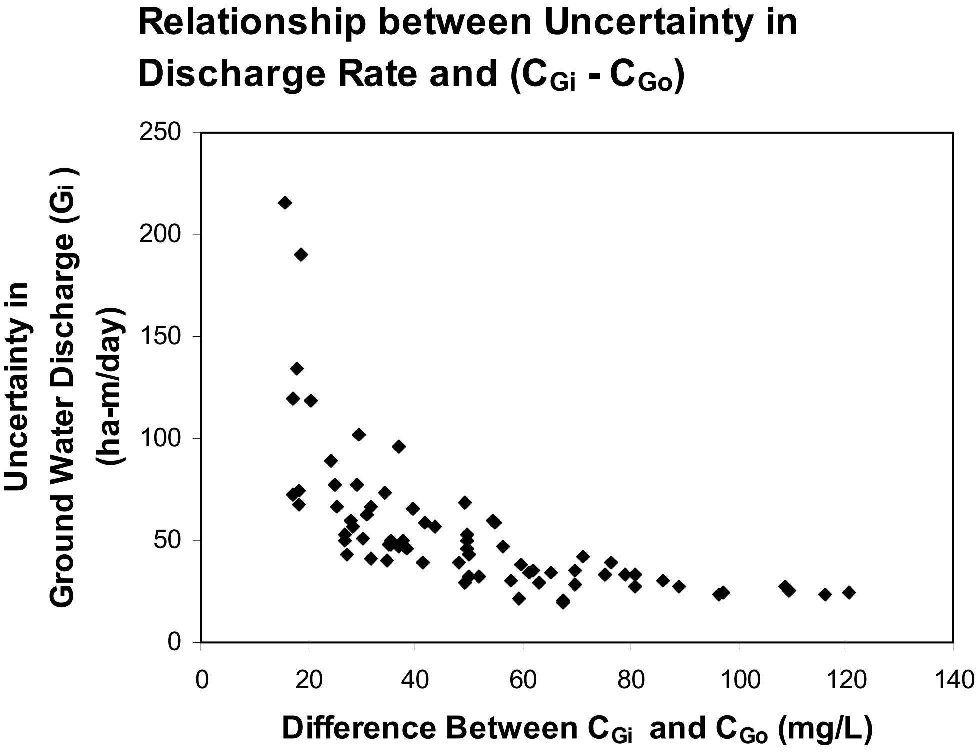


Figure 158. Relationship between uncertainty in ground water discharge rate and difference between Cl concentrations in ground water discharge ($\overline{C}_{G_i}$) and recharge ($\overline{C}_{G_O}$).

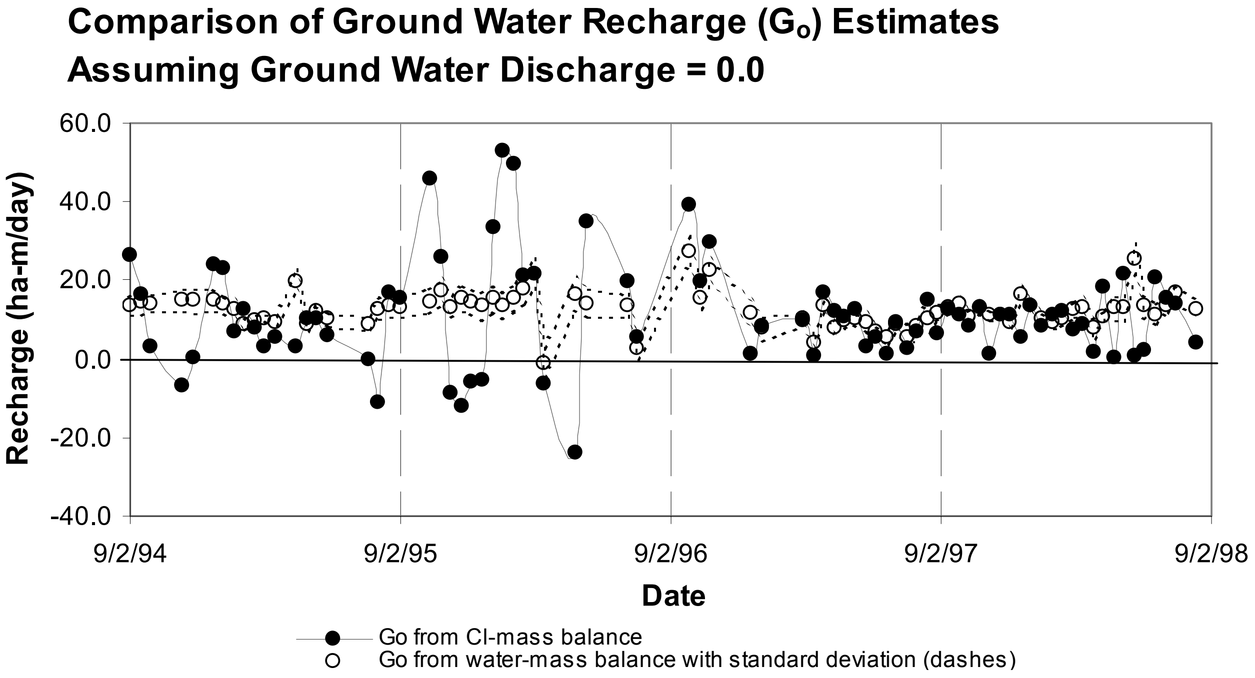


Figure 159. Comparison of the estimated ground water recharge from chloride mass balance and water balance by assuming that ground water discharge is negligible in water budget.

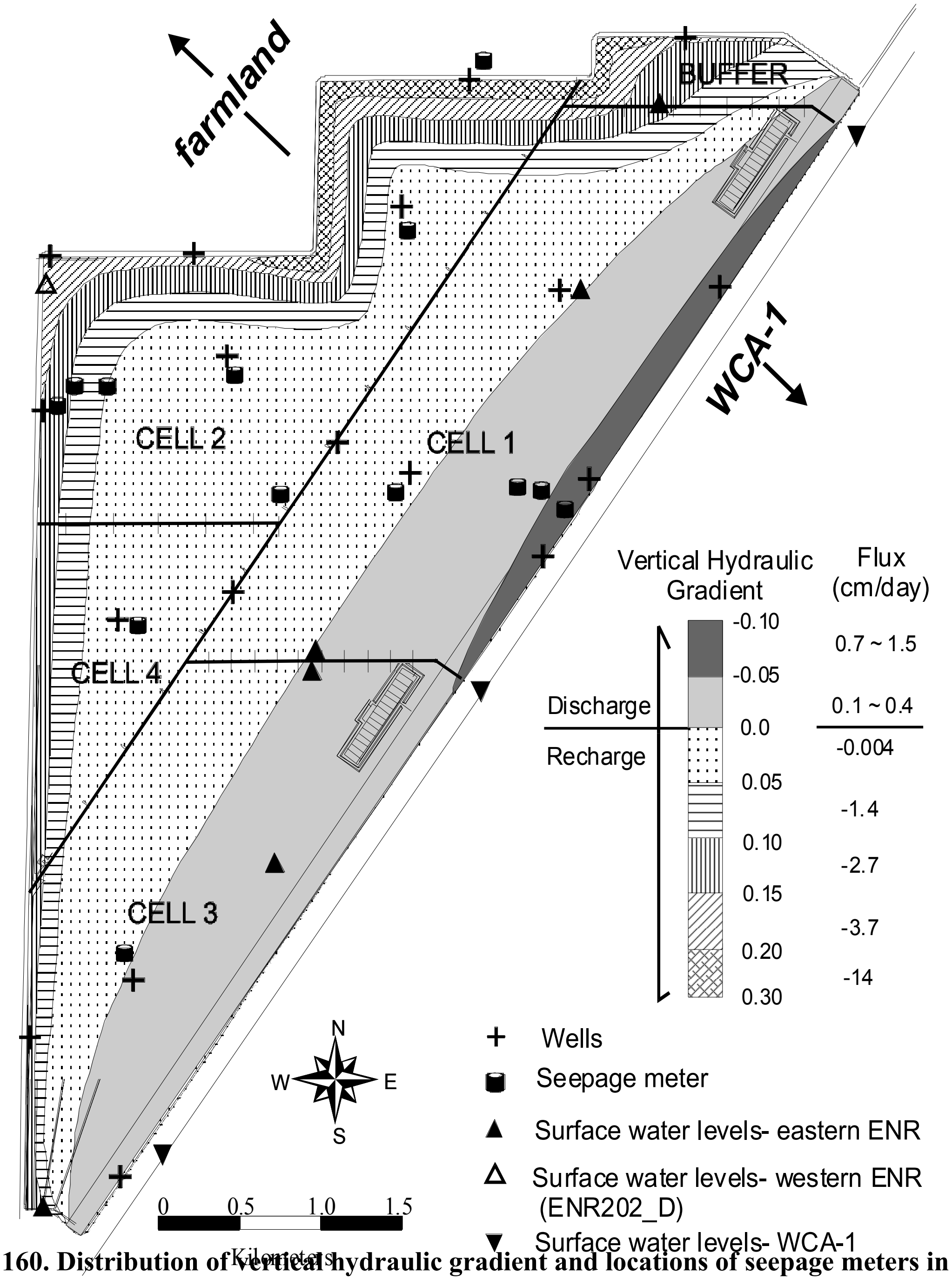
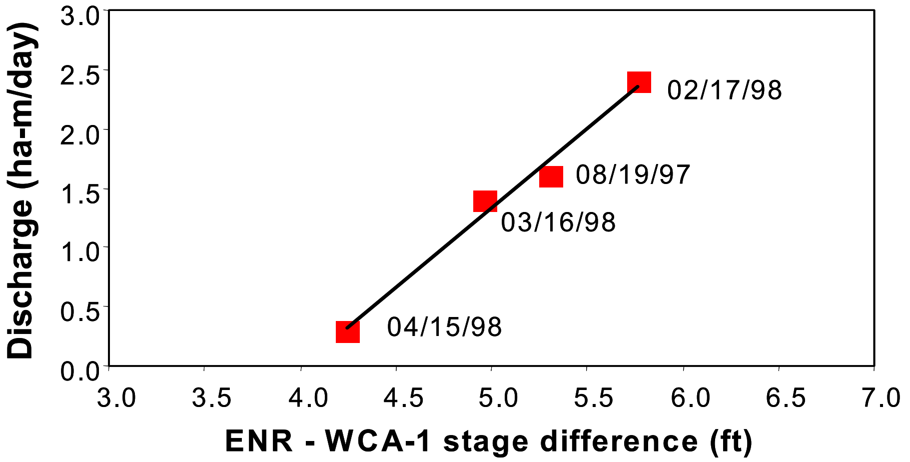


Figure 160. Distribution of vertical hydraulic gradient and locations of seepage meters in ENR.

a. Regression of Seepage meter Measurements of Ground water Discharge Against Water-level Differences of Eastern ENR and WCA-1



b. Ground water Discharge Estimated by Regression Equation

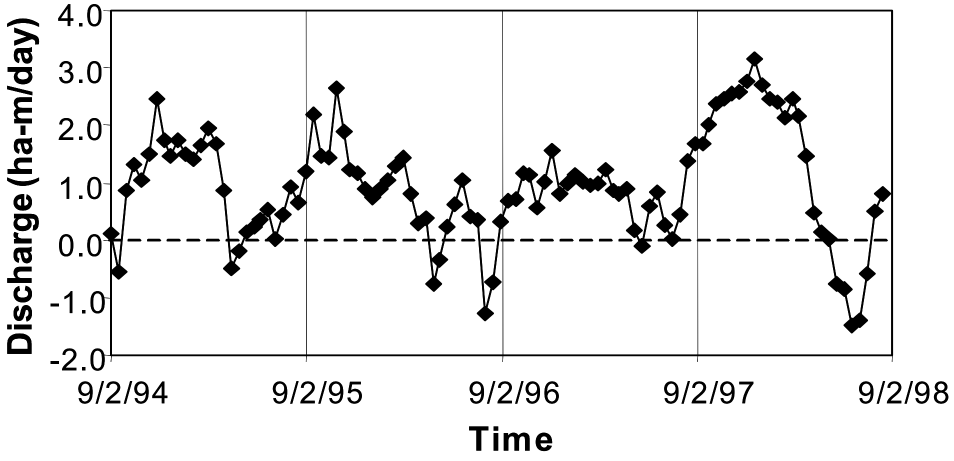
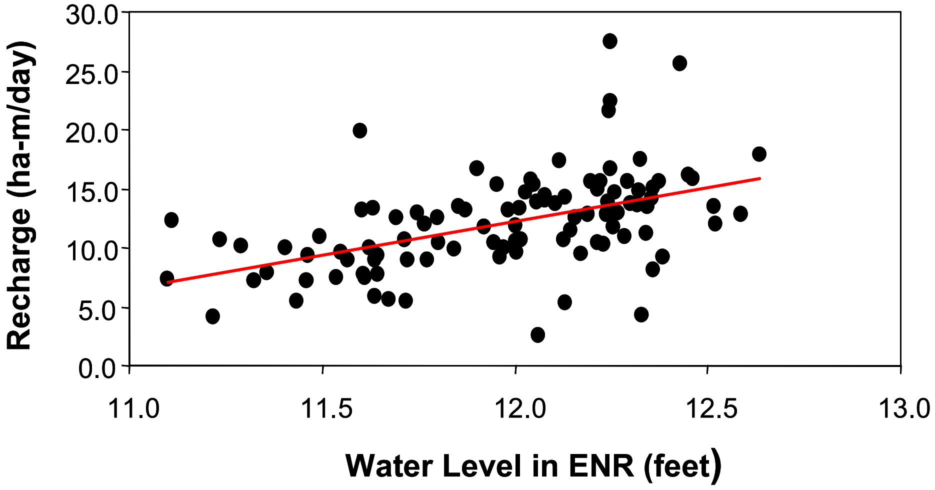


Figure 161. Independent estimate of ground water discharge using seepage meters.

a. Recharge Versus ENR Water Level



b. Recharge Versus Surface-Water Pump Rate

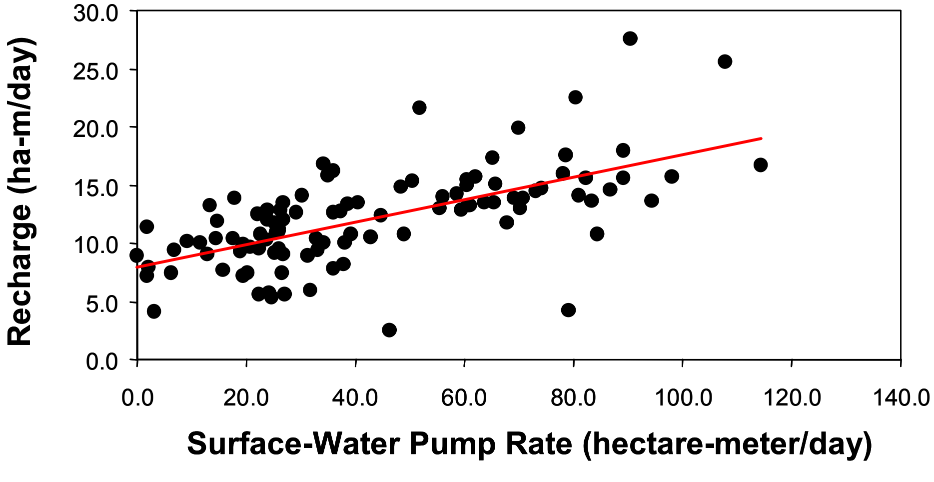
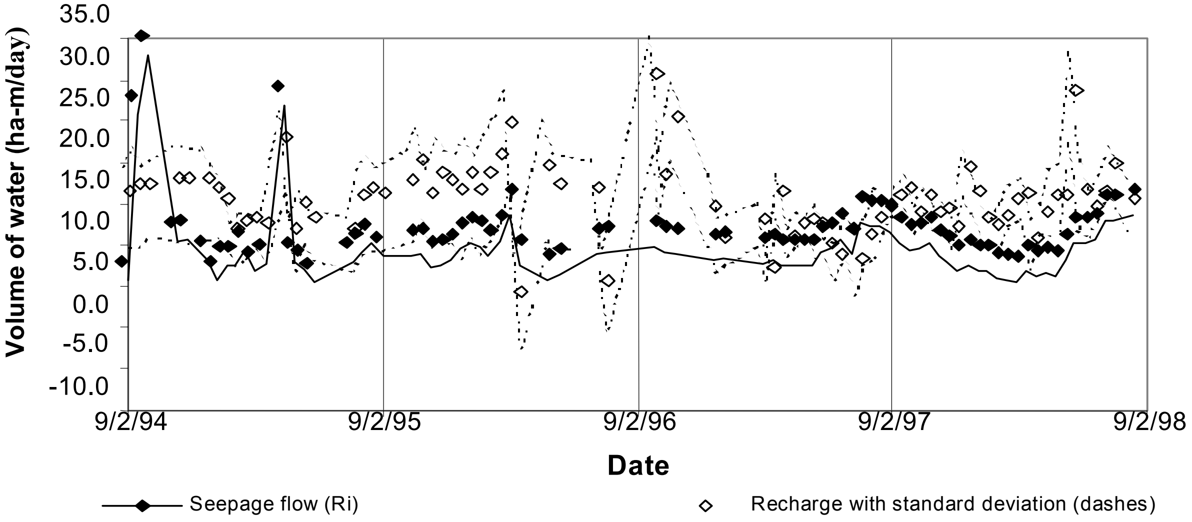
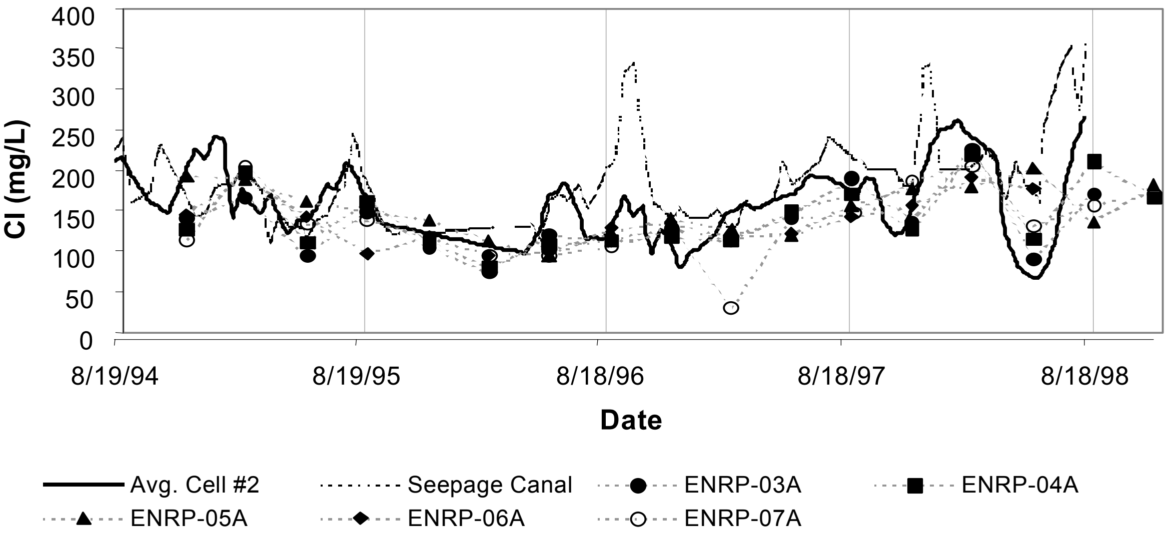


Figure 162. Comaprison of ground water recharge with (a) water level in ENR and (b) surface-water pump rate. Both water level and pump rate show positive correlation with ground water recharge.



a. Comparison of Water Fluxes



b. Comparison of Cl Concentrations

Figure 163. Comparison of (a) water fluxes and (b) chloride concentrations in ENR and seepage canal.

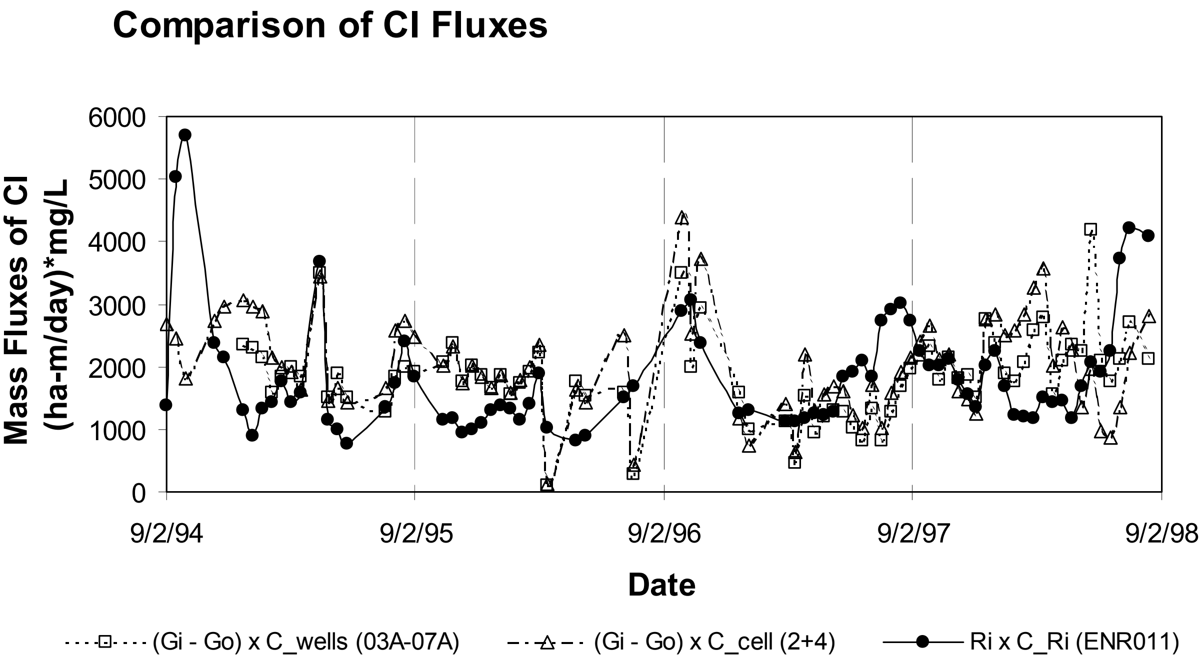


Figure 165. Comparision of Chloride Fluxes in the ENR.

Table 34. Monitoring Locations of Hydrologic and Chemical Components in the ENR.

Hydrologic Components		Chemical Components	
Variables	Location	Variables	Location
S_i	G-250	C_{Si}	ENR002
S_o	G-251	C_{So}	ENR012
R_i	G-250_S	C_{Ri}	ENR011
R_o	G-259	C_{Ro}	ENR012
L_i	L7a (culverts)	C_{Li}	ENR004
		C_{Gi}	ENRP10a, 12a, 13a
		C_{Go}	ENR(203, 204), G254(B & D),G255
		C_t	Buffer Cell: G252C, G252G Cell 1: ENR(102, 103), G252(C & G), G253(C & G) Cell 2: ENR(203, 204), G254(B & D), G255 Cell 3: ENR(302, 303, 305), G253(C & G) Cell 4: ENR(401, 402), G254(B & D), G256

Table 35. Estimation of Initial Volume of Surface Water within the Entire ENR.

Cell	Avg. surface water elevation* (ft)	Avg. ground elevation* (ft)	Water depth (ft)	Surface area (ha)	Water volume (ha-m)**	Volume fraction (unitless)
Buffer Cell	12.39	10.17	2.22	55	37.2	0.04
Cell #1	12.30	10.25	2.05	525	328	0.32
Cell #2	12.21	9.65	2.56	414	323	0.32
Cell #3	12.04	10.18	1.86	404	229	0.22
Cell #4	12.19	9.83	2.36	146	105	0.10
Total volume of surface water = 1022.4(ha-m)						

* field measurements from Abtew and Mullen (1997)

** ha-m=hectare x meter

Table 36. Uncertainties in Estimating and Measuring the Hydrologic and Chemical Components.

Hydrologic Components		Chemical Components	
components	uncertainty (%)	components	uncertainty (%)
S_i	10.0	C_t and C_o	15.0
S_o	10.0	C_{si}	10.0
R_i	10.0	C_{so}	10.0
R_o	10.0	C_{Ri}	10.0
L_i	10.0	C_{Ro}	10.0
P	8.5	C_p	15.0
ET	20.0	C_{Li}	10.0
ΔV	15.0	C_{Gi}	15.0
V_o	15.0	C_{Go}	20.0

Table 37. Description of Hydrologic and Chemical Variables

Hydrologic Components		Chemical (Cl) Components	
Variables	Description	Variables	Description
V_o	volume of surface water at t=0	C_0	Cl concentration at t=0
P	precipitation	C_t	Cl concentration at t=t
ET	evapotranspiration	C_p	Cl concentration of precipitation
ΔV	change in storage	C_{si}	Cl concen. of surface inflow
S_i	surface inflow at G-250	C_{so}	Cl concen. of surface outflow
S_o	surface outflow at G251	C_{Ri}	Cl concen. of surface seepage inflow
R_i	surface inflow from seepage canal	C_{Ro}	Cl concen. of surface outflow to seepage canal
R_o	surface outflow to seepage canal		
L_i	shallow seepage through L-7 levee	C_{Li}	Cl concen. of shallow seepage
G_i	groundwater discharge	C_{Gi}	Cl concen. of groundwater discharge
G_o	groundwater recharege	C_{Go}	Cl concen. of groundwater recharge

Table 38. Water Balance Fluxes in ENR: 8/19/94 – 8/19/98

Description		Fluxes(ha-m/day)	Percent (%) of Inflow pump
Inflow	Inflow pump (S_i)	43.1	100
	Inflow from seepage canal (R_i)	9.4	21.9
	Precipitation (P)	6.2	14.5
	Shallow seepage inflow (L_i)	1.6	3.8
	Groundwater discharge (G_i)	1.4	2.8
Outflow	Outflow pump (S_o)	42.5	98.6
	Outflow to seepage canal (R_o)	0.6	1.4
	Evapotranspiration (ET)	5.6	12.9
	Groundwater recharge (G_o)	13.4	31
	Change in storage (ΔV)	-0.3	0.7

Table 39. Comparison of Ground Water Fluxes Estimated From Coupled Water-Solute Mass Balance Approach, Seepage Meter Measurements, and Ground Water-Flow Modeling

	Mass balance approach (ha-m/day)	**Seepage meter measurement (ha-m/day)**	**Groundwater-flow model (ha-m/day)**
Groundwater Discharge (G_i)	1.4 (3)[1]	0.9 (2)	5.4[3] (13)
Groundwater Recharge (G_o)	13.4[2] (31)	13.0 (30)	13.9[4] (32)
Net Groundwater Flux (G_i - G_o)	-12.0	-12.1[2]	-8.5[2]

[1] numbers in parenthesis indicate percent of inflow pump rate.

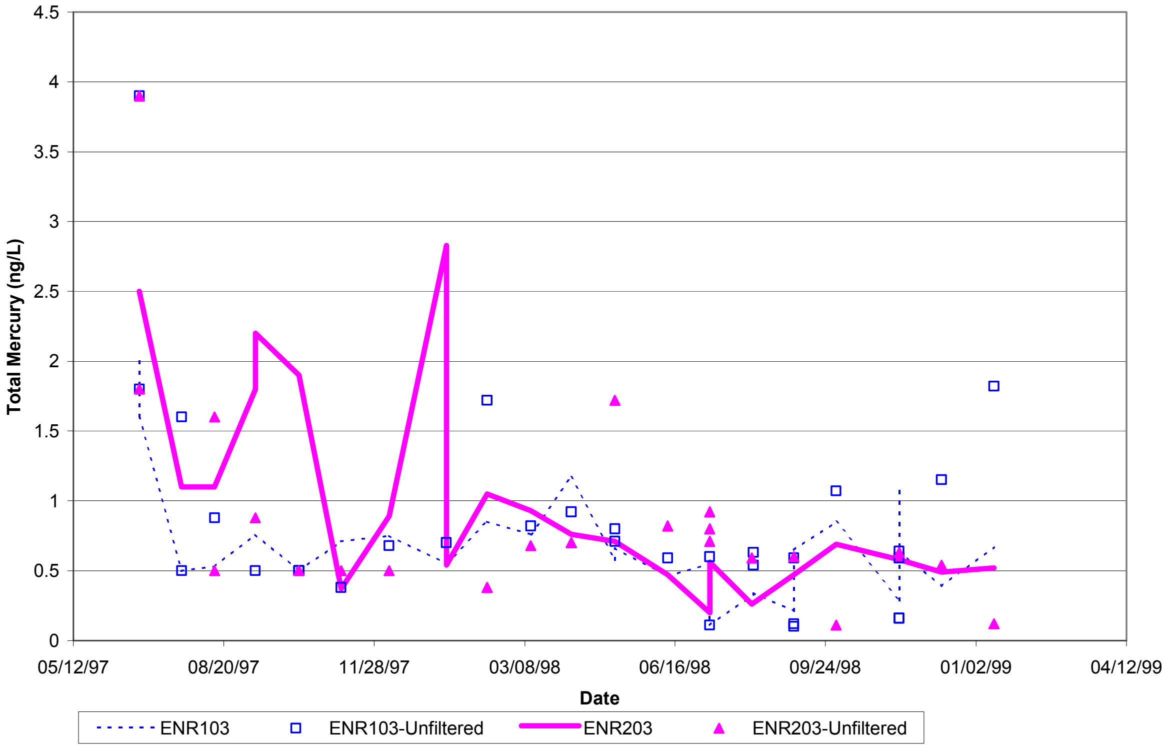
[2] estimated by difference between other two estimates.

[3] estimated using results from Guardo and Prymas (1998).

[4] estimated using results from Hutcheon Engineers (1996).

Calculation of Advective Fluxes of Mercury in ENR

a. ENR Total Mercury Concentrations in Surface Water - Eastern and Western Sides



b. ENR Total Mercury Concentrations in Surface and Groundwater - Western Side

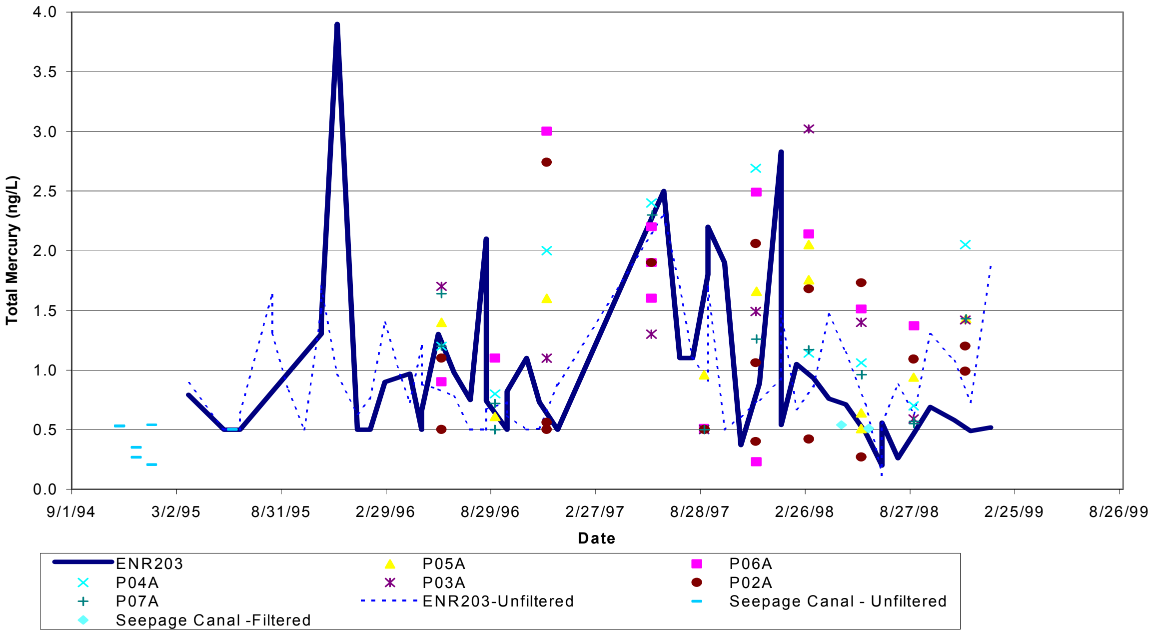
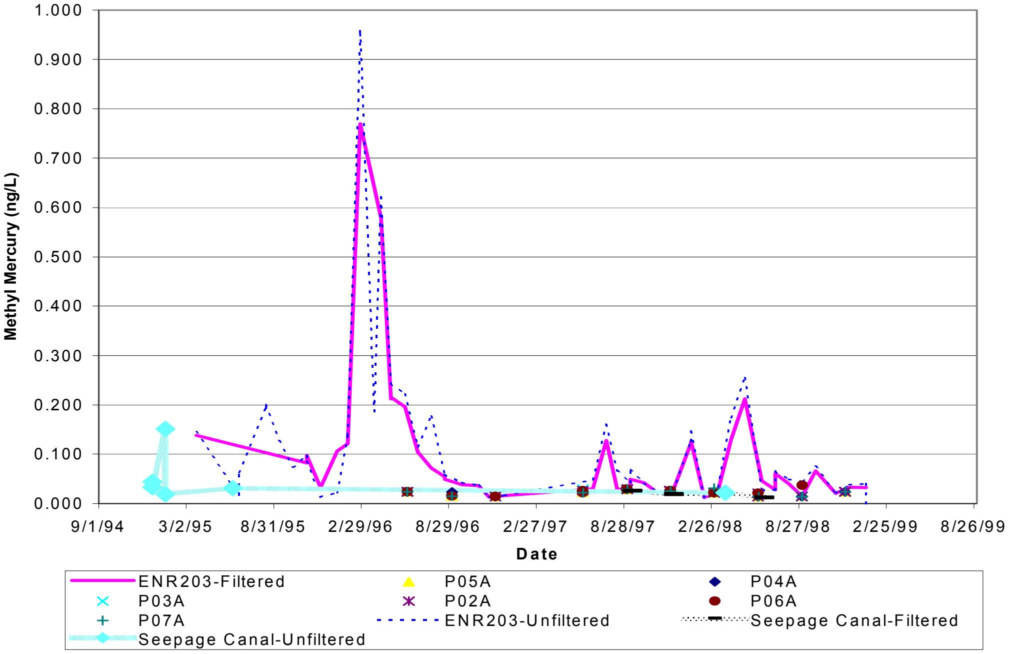


Figure 166. Total mercury concentrations in ENR versus time.

a. ENR Methyl Mercury Concentrations in Surface and Groundwater - Western Side



b. ENR Methyl Mercury Concentrations in Surface and Groundwater - Western Side

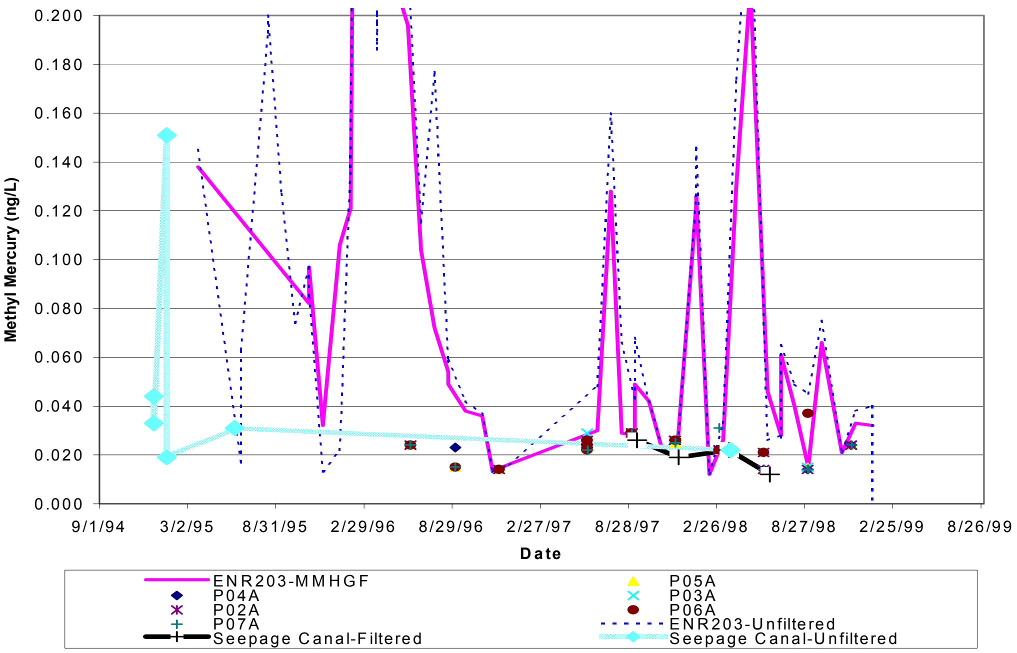


Figure 167. Methyl mercury concentrations in ENR versus time.

Table 40. Average Mercury Concentrations in Shallow Ground Water and Surface Water in ENR.

Sites	Years	Total	Mean Hg Concentrations[#]		Standard Deviation	
	Sampled	Obser	TOT-Hg	MM-Hg	TOT-Hg	MM-Hg
West-Side Wells			(ng/L)	(ng/L)	(ng/L)	(ng/L)
MP3-D	97-98	4	0.75	0.023	0.59	0.005
P02A	96-98	18	1.07	0.023	0.70	0.005
P03A	96-98	9	1.39	0.023	0.73	0.005
P04A	96-98	11	1.47	0.022	0.77	0.005
P05A	96-98	13	2.66	0.021	3.5	0.005
P06A	96-98	13	1.78	0.024	1.1	0.006
P07A	96-98	14	0.99	0.021	0.55	0.007
Average Between Sites			**1.44**	**0.022**	**0.64**	**0.001**
East-Side Wells						
MP1-C	97-98	4	0.53	0.019	0.17	0.005
MP1-D	97-98	4	0.85	0.019	0.77	0.005
P10A	95-96	4	0.72	0.019	0.26	0.004
P12A	95-96	4	0.56	0.019	0.12	0.004
P13A	95-96	10	0.97	0.022	0.89	0.010
Average Between Sites			**0.73**	**0.019**	**0.19**	**0.002**
Seepage Canal - Unfiltered	94-99	10	**0.44**	**0.046**	**0.12**	**0.047**
Seepage Canal - Filtered	97-98	5	**0.82**	**0.020**	**0.4500**	**0.006**
Seepage Canal - All Data	**94-99**	**15**	**0.57**	**0.036**	**0.3200**	**0.004**
Surface Water - ENR-203	95-99	155	**0.99**	**0.100**	**0.74**	**0.14**

* - total number of observations

\# - all reported concentrations are for filtered samples unless otherwise noted

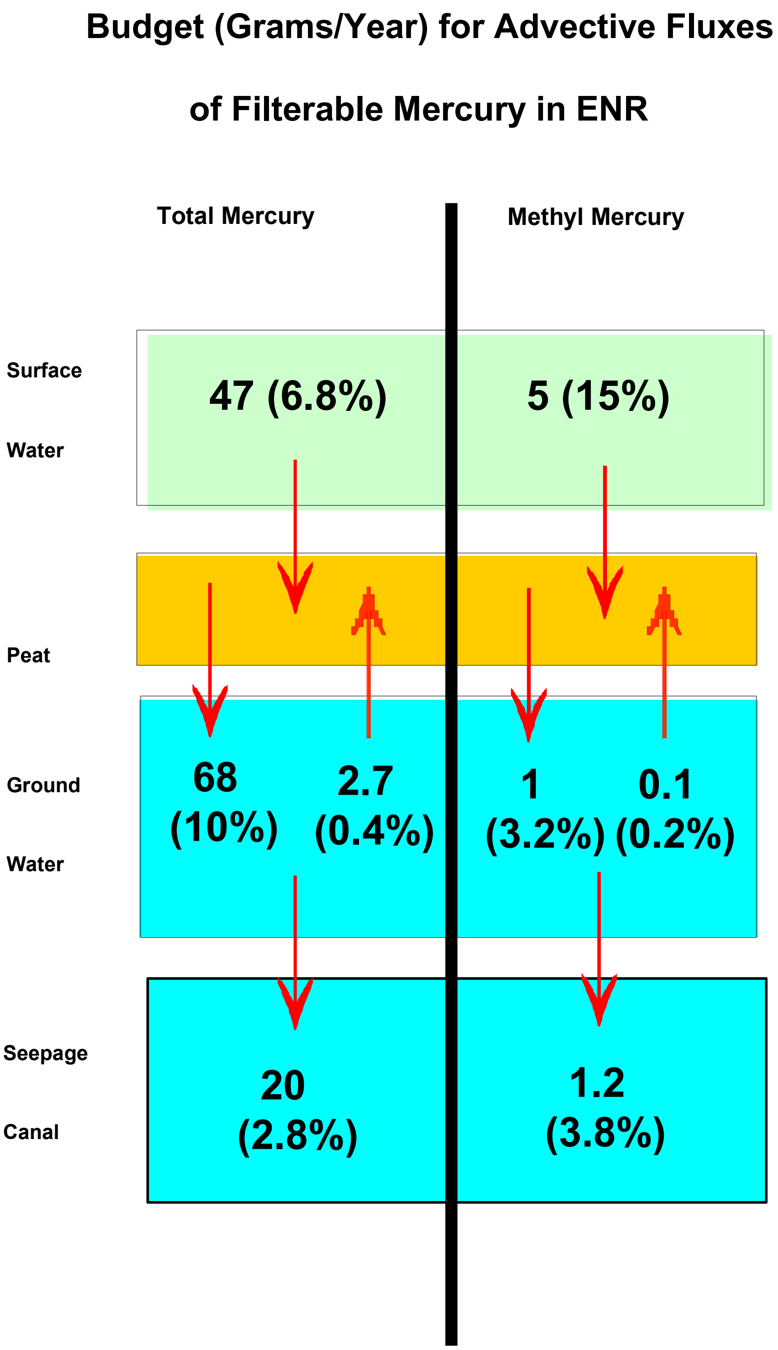


Figure 168. Budget for advective fluxes of filterable mercury in ENR.

Table 41. Annual Budget for Advective Fluxes of Dissolved Mercury in ENR, 1994 -1998

DESCRIPTION OF ADVECTIVE MERCURY FLUXES AND STORAGE CHANGES*#	FLUX* (grams/year)		FLUX (% of Inputs to ENR)	
	TOT-Hg	MM-Hg	TOT-Hg	MM-Hg
(1) Discharge to ENR, East-Side				
(1a) WCA1 Groundwater to Peat	2.7	0.1	0.4	0.2
(2) Recharge from ENR, West-Side				
(2a) ENR Surface Water to Peat	47	4.7	7.1	14
(2b) ENR Peat to Groundwater	68	1.0	10	3.2
(3) Apparent Storage Change in Peat	-19	4	2.8	11
(4) Seepage Canal Flux				
(4a) Surface Water Flux in Seepage Canal	20	1.2	2.8	3.8
(5) Apparent Storage Change in Surficial aquifer	46	-0.2	7.0	1

* - Positive and negative signs for storage terms indicate gains or losses of mercury, repectively

\# - Explanation of Calculations:

(1a) - average concentration in east-side wells x average groundwater discharge in ENR

(2a) - average concentration at ENR203 x average groundwater recharge in ENR

(2b) - average concentration in west-side wells x average groundwater recharge in ENR

(3) - difference between calculations: (2b) - (2a) + (1a)

(4a) - average concentration in west-side wells x average flow in seepage canal

(5) - difference between calculations: (2b) -(4a) - (1a)

Notes:

- all concentrations and fluxes are averaged over time for the entire period of record
- all concentrations are the average of filtered samples unless otherwise noted
- mercury input fluxes to the ENR project are from Fink (2000)
- both filtered and unfiltered data were used for seepage canal flux, due to the relatively small number of available measurements

APPENDIX VIII

Site Instrumentation Maps

Instrumentation Maps for Levee-Based Sites

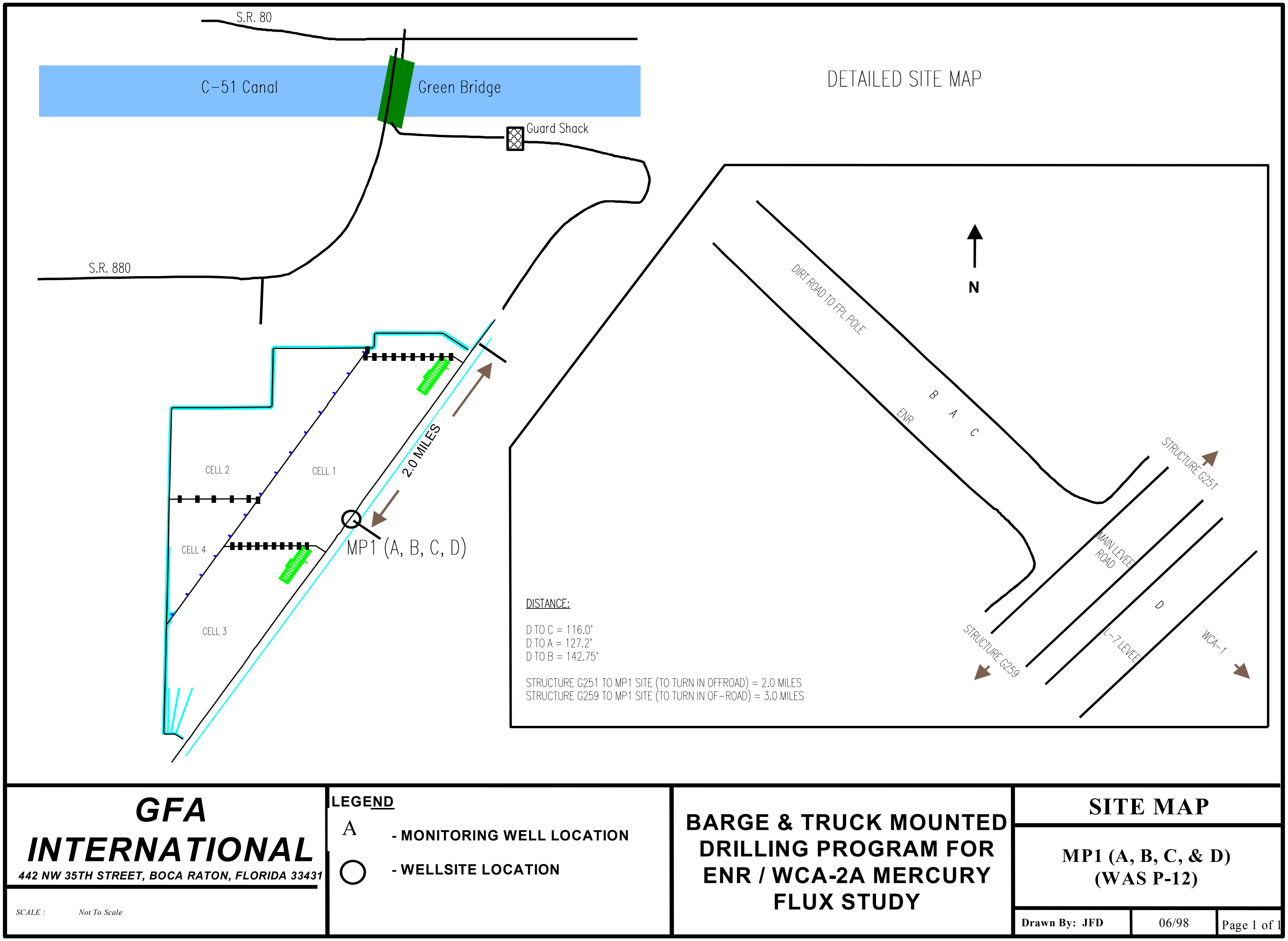


Figure 169. Site map for ENR ground water well cluster MP1.

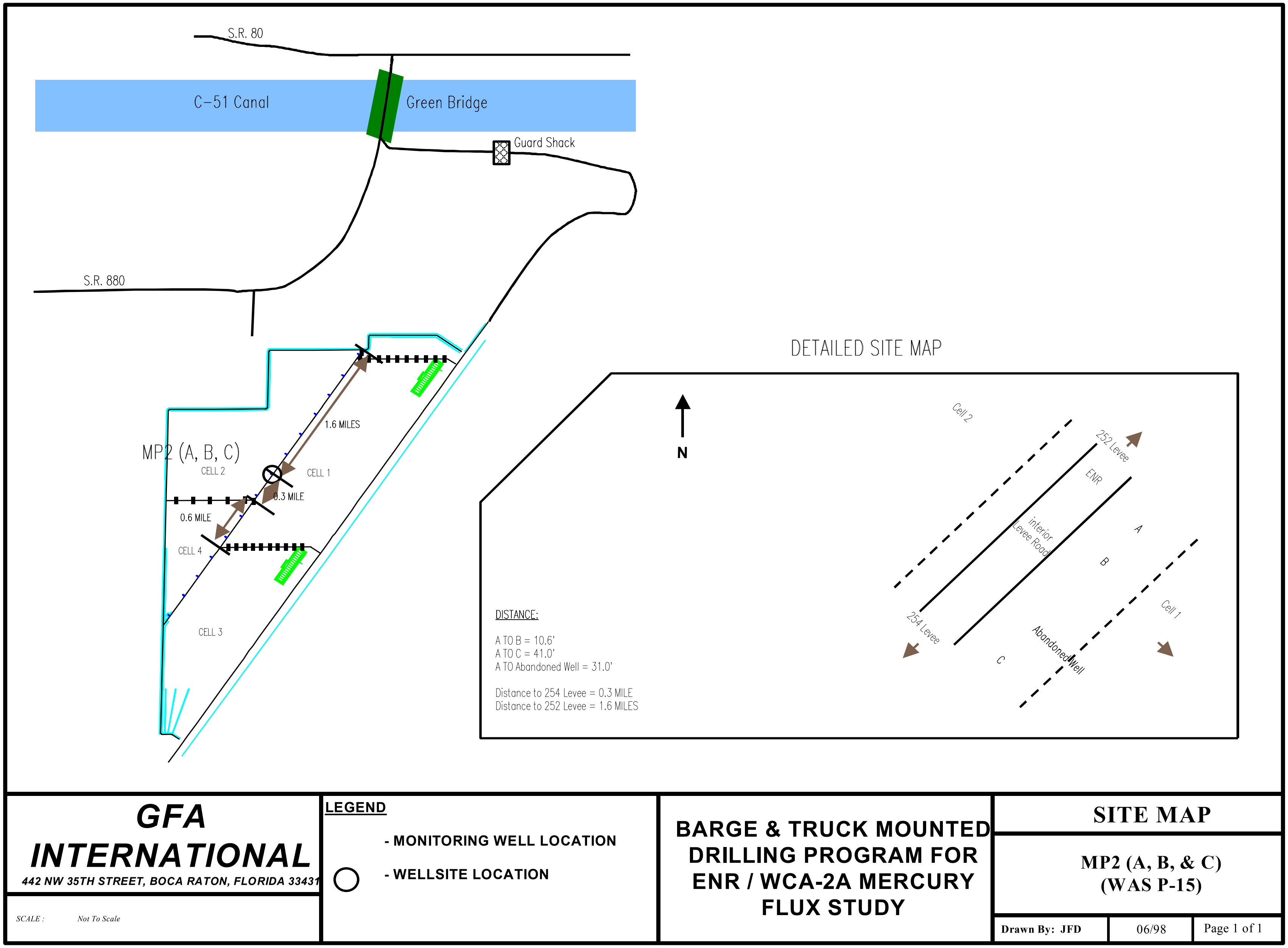


Figure 170. Site map for ENR ground water well cluster MP2.

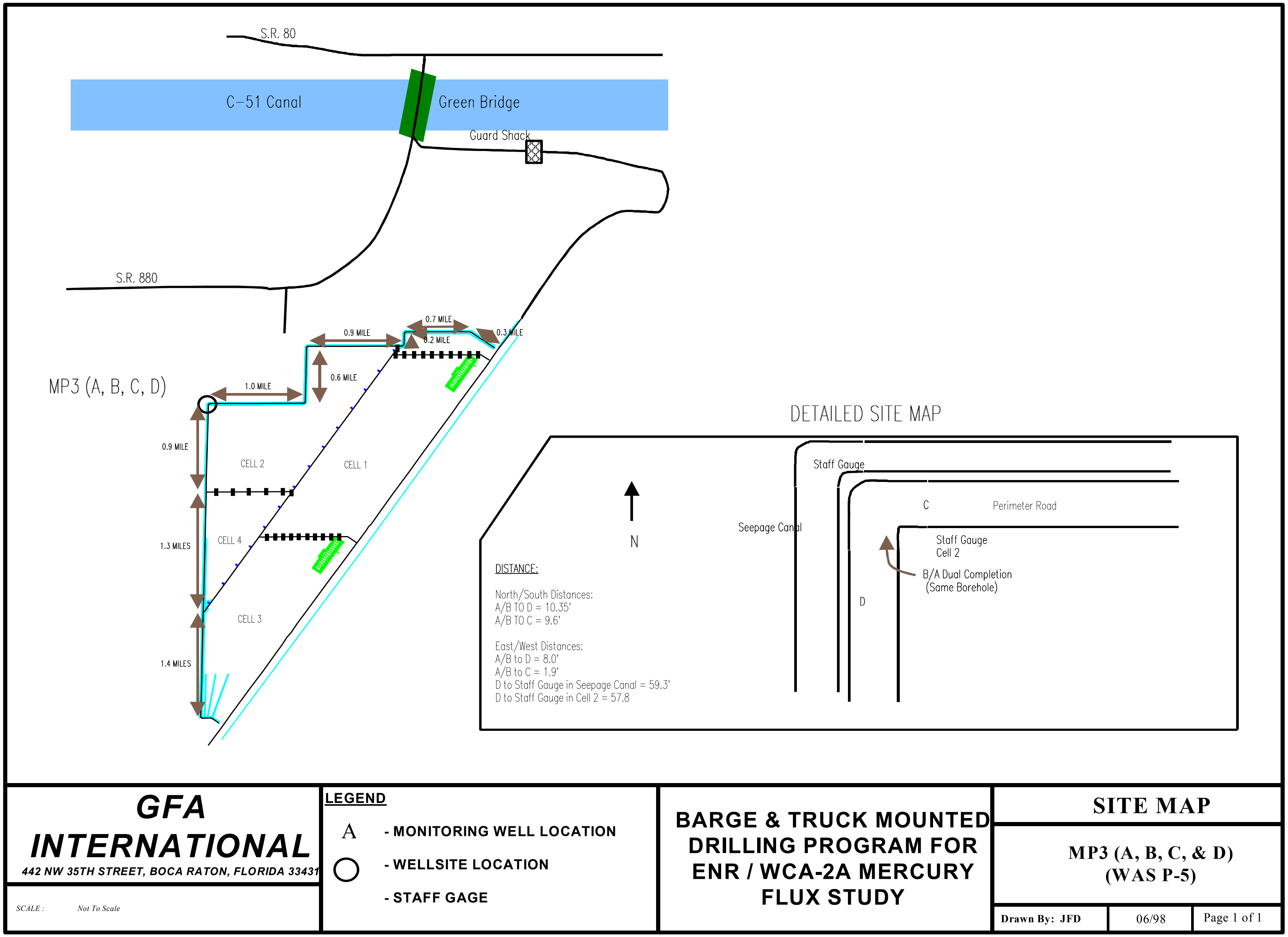
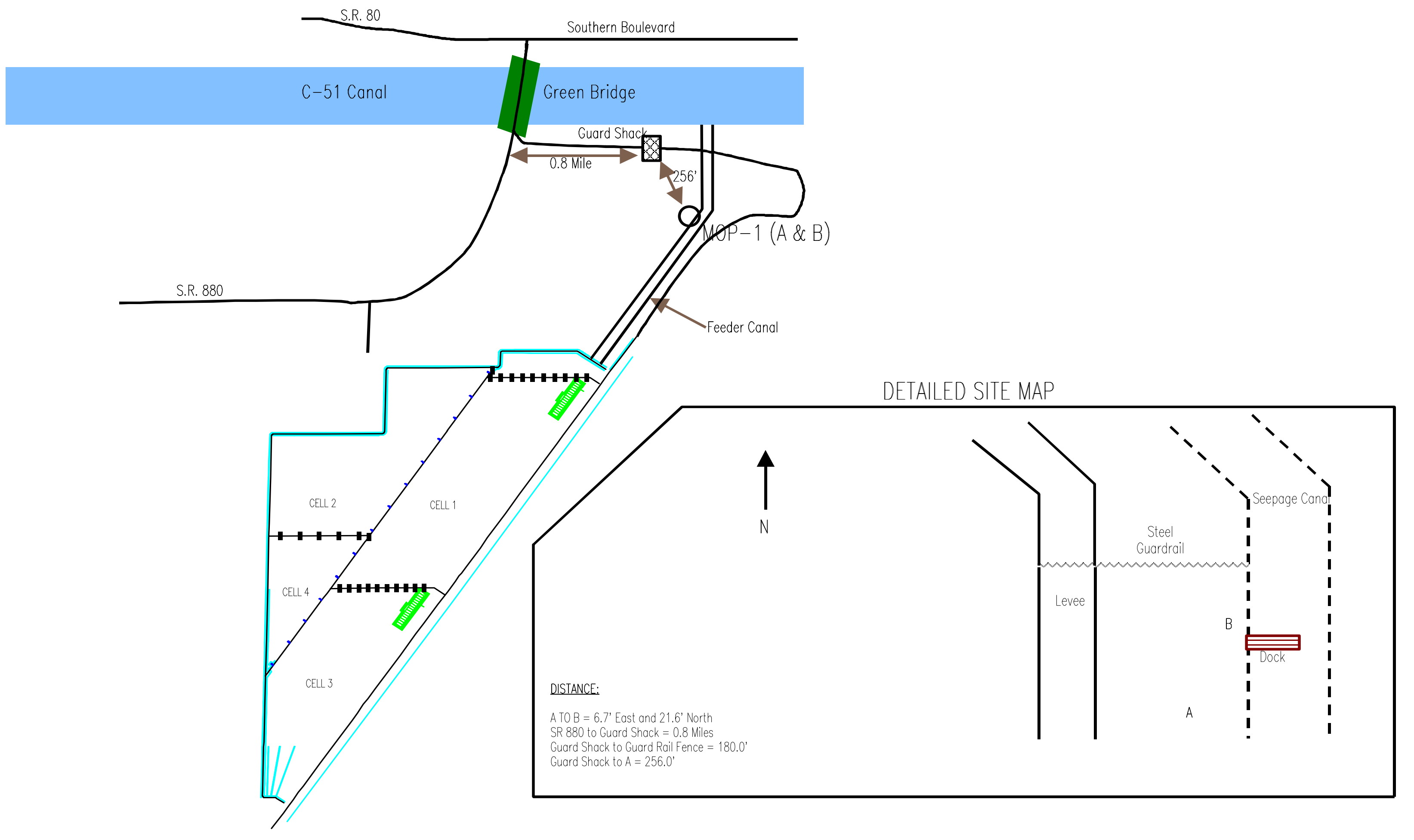


Figure 171. Site map for ENR ground water well cluster MP3.



DISTANCE:

A TO B = 6.7' East and 21.6' North
SR 880 to Guard Shack = 0.8 Miles
Guard Shack to Guard Rail Fence = 180.0'
Guard Shack to A = 256.0'

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SCALE : Not To Scale

LEGEND

- MONITORING WELL LOCATION

○ - WELLSITE LOCATION

BARGE & TRUCK MOUNTED DRILLING PROGRAM FOR ENR / WCA-2A MERCURY FLUX STUDY

SITE MAP

**MOP-1 (A & B)
(WAS OP-1 CLUSTER)**

Drawn By: JFD | 06/98 | Page 1 of 1

Figure 172. Site map for ENR ground water well cluster MOP1.

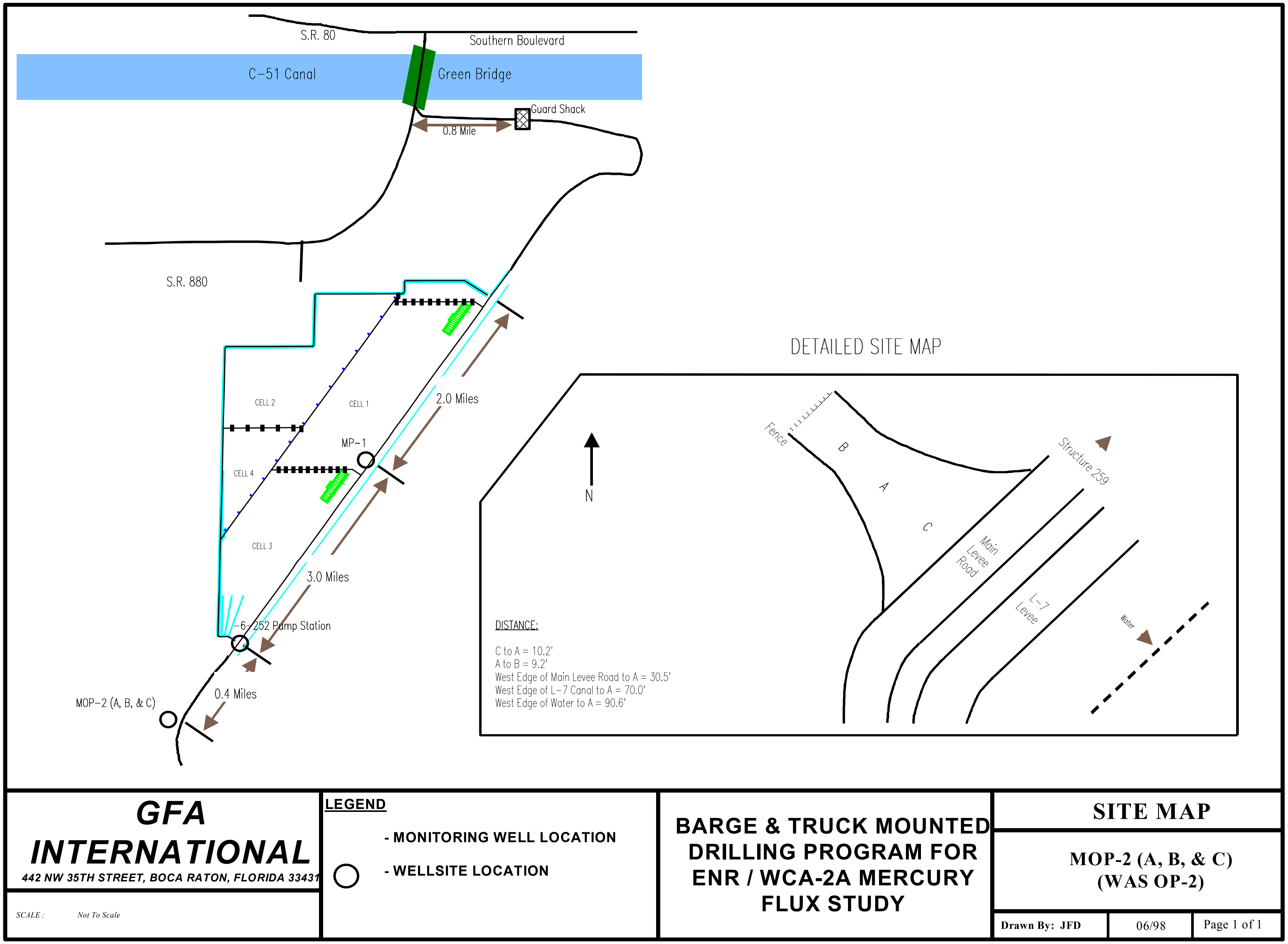
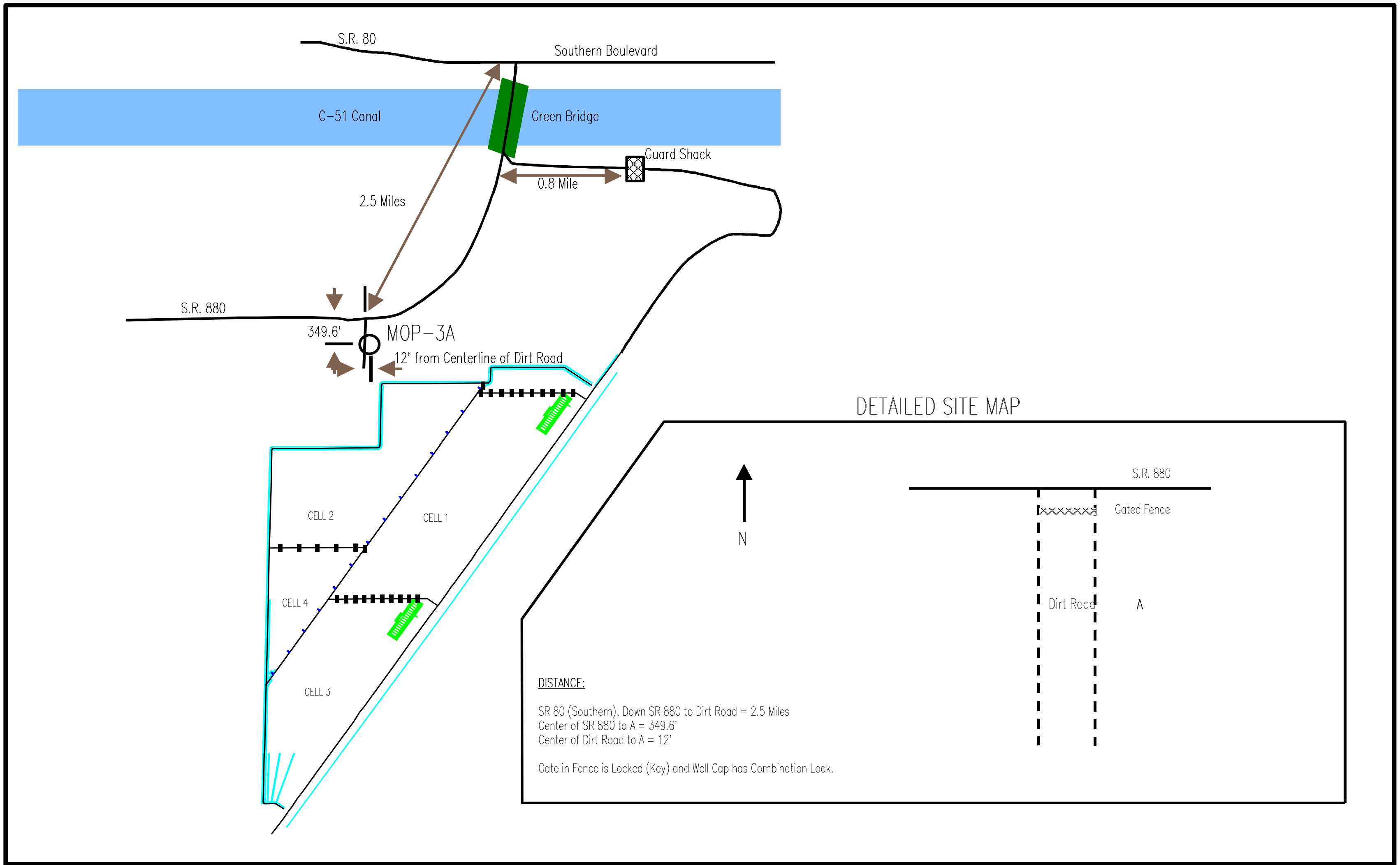


Figure 173. Site map for ENR ground water well cluster MOP2.



DISTANCE:

SR 80 (Southern), Down SR 880 to Dirt Road = 2.5 Miles
Center of SR 880 to A = 349.6'
Center of Dirt Road to A = 12'

Gate in Fence is Locked (Key) and Well Cap has Combination Lock.

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SCALE : Not To Scale

LEGEND

- - MONITORING WELL LOCATION
- ○ - WELLSITE LOCATION

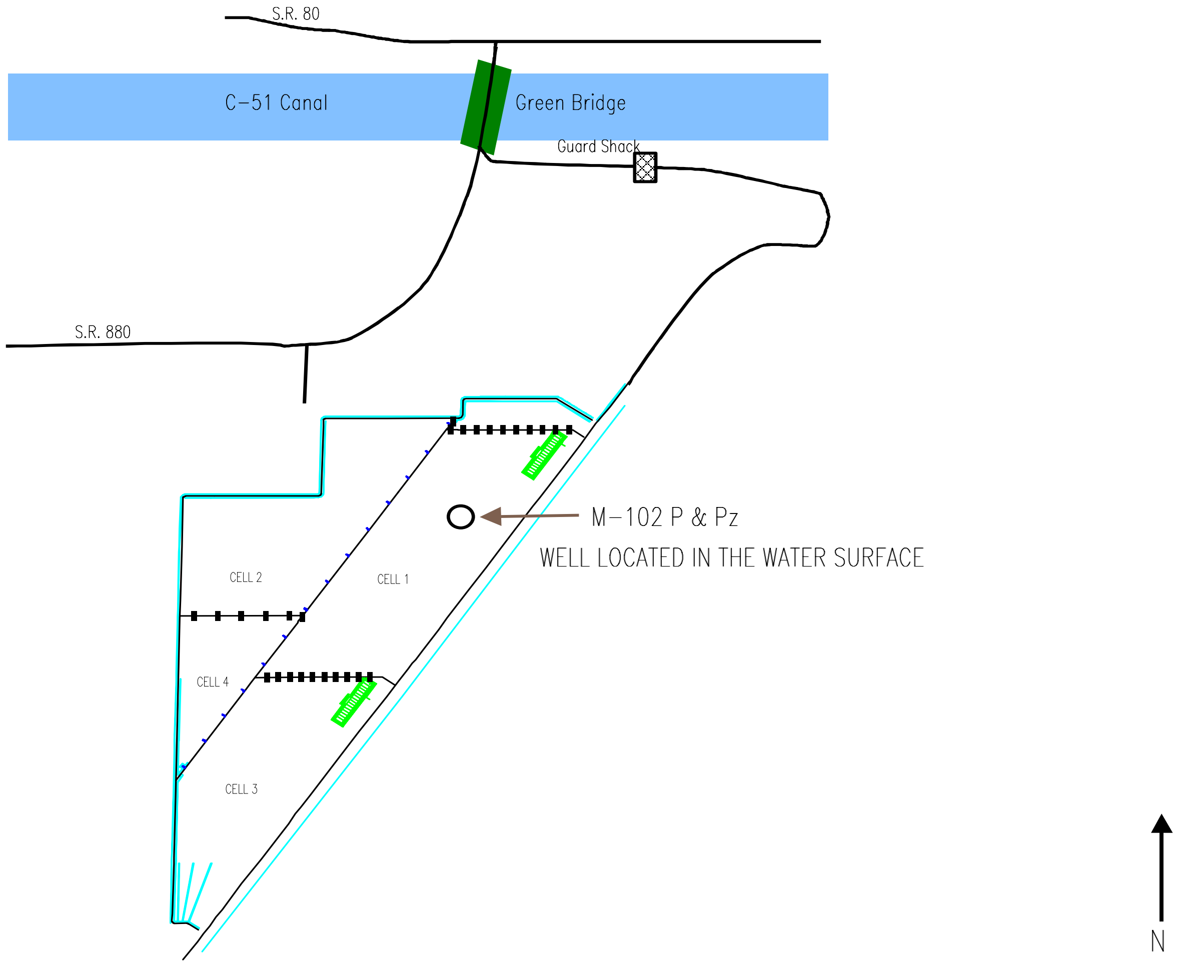
BARGE & TRUCK MOUNTED DRILLING PROGRAM FOR ENR / WCA-2A MERCURY FLUX STUDY

SITE MAP

MOP-3A

Drawn By: JFD	06/98	Page 1 of 1

Figure 174. Site map for ENR ground water well cluster MOP3.



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SCALE : Not To Scale

LEGEND

- MONITORING WELL LOCATION

○ - WELLSITE LOCATION

BARGE & TRUCK MOUNTED DRILLING PROGRAM FOR ENR / WCA-2A MERCURY FLUX STUDY

SITE MAP

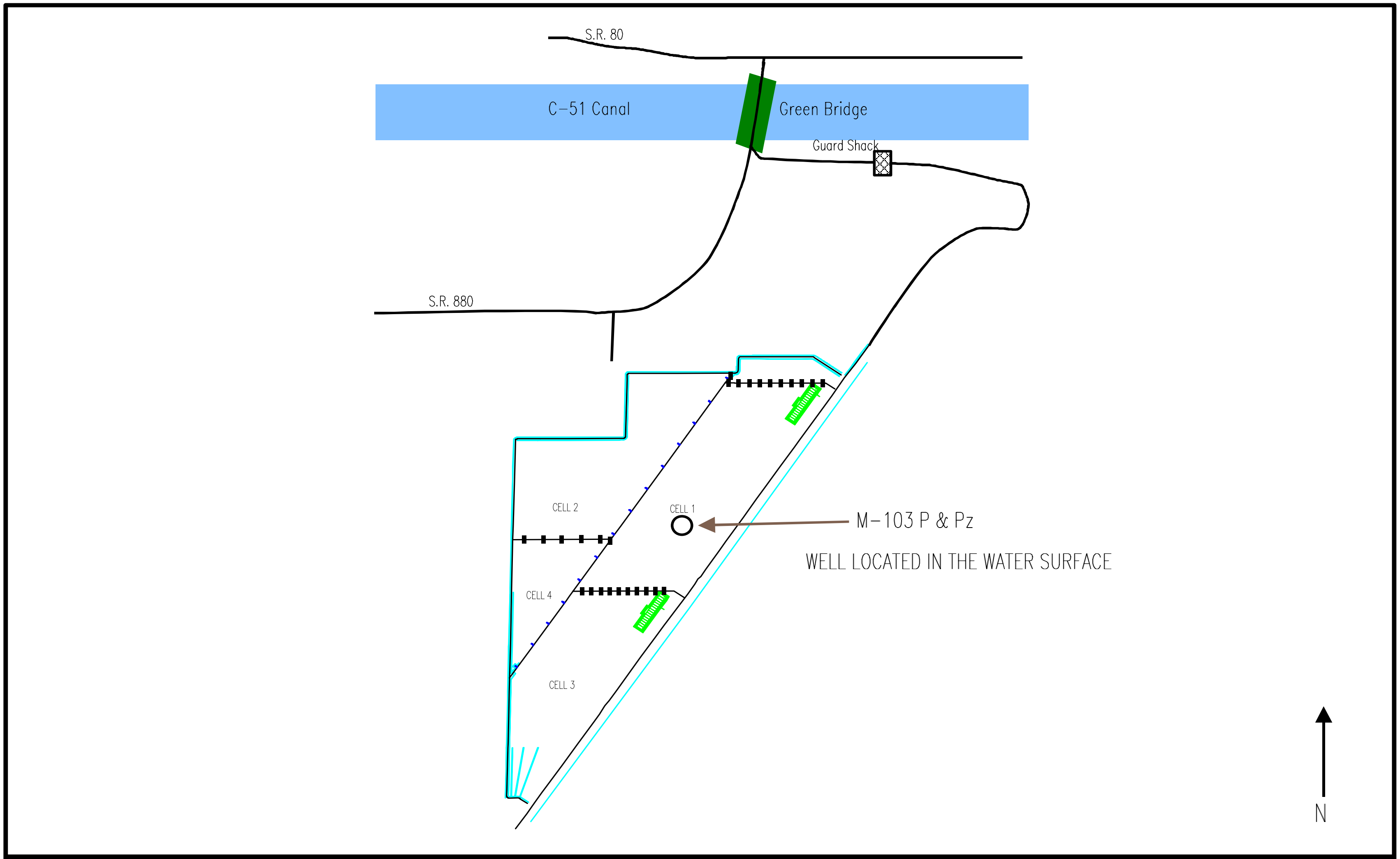
M-102 P & Pz
Water Site

Drawn By: JFD

06/98

Page 1 of 1

Figure 175. Site map for ENR ground water well cluster M102.



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SCALE : Not To Scale

LEGEND

- MONITORING WELL LOCATION

○ - WELLSITE LOCATION

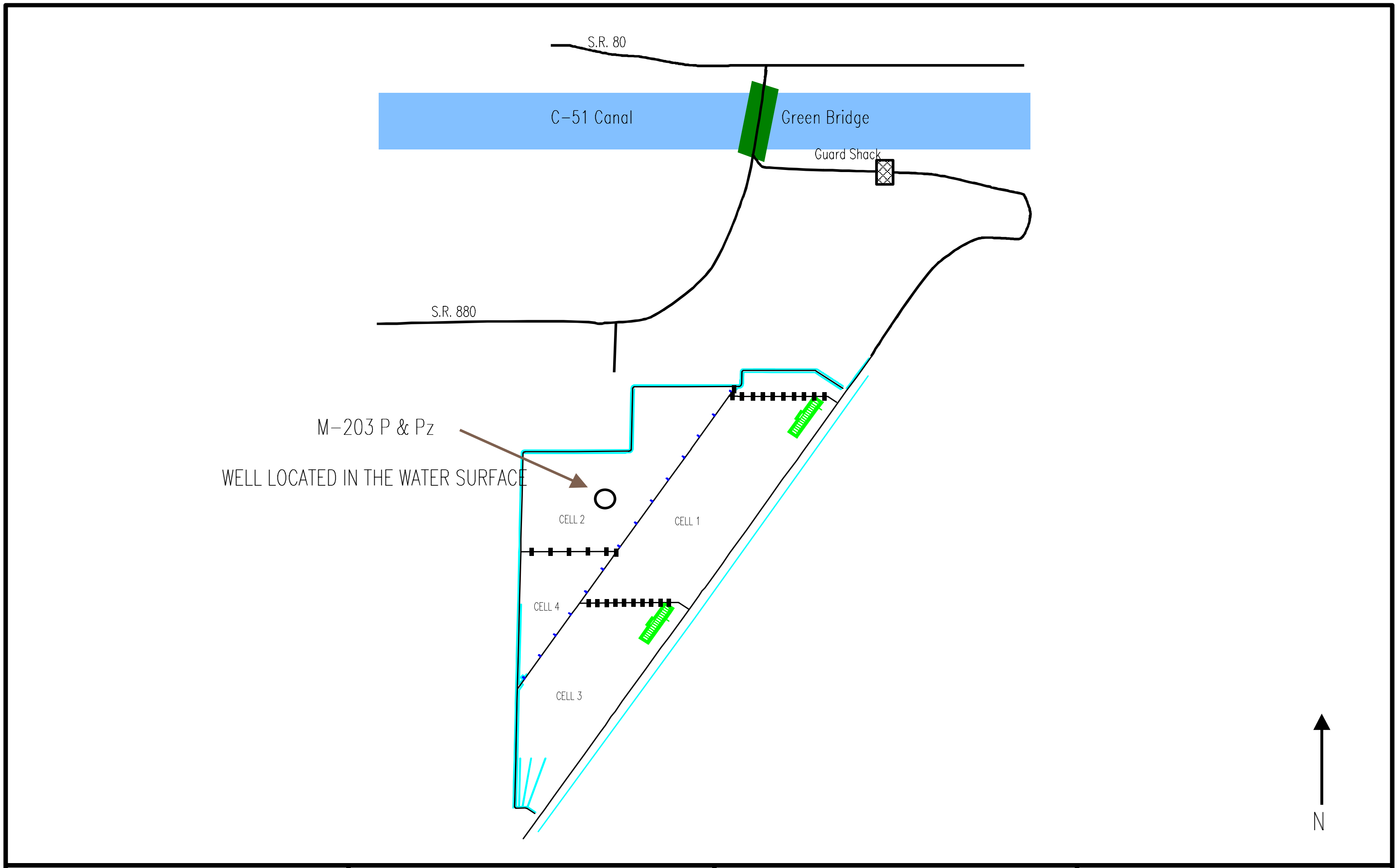
BARGE & TRUCK MOUNTED DRILLING PROGRAM FOR ENR / WCA-2A MERCURY FLUX STUDY

SITE MAP

M-103 P & Pz
Water Site

Drawn By: JFD
06/98
Page 1 of 1

Figure 176. Site map for ENR ground water well cluster M103.



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SCALE : *Not To Scale*

LEGEND

- MONITORING WELL LOCATION

○ - WELLSITE LOCATION

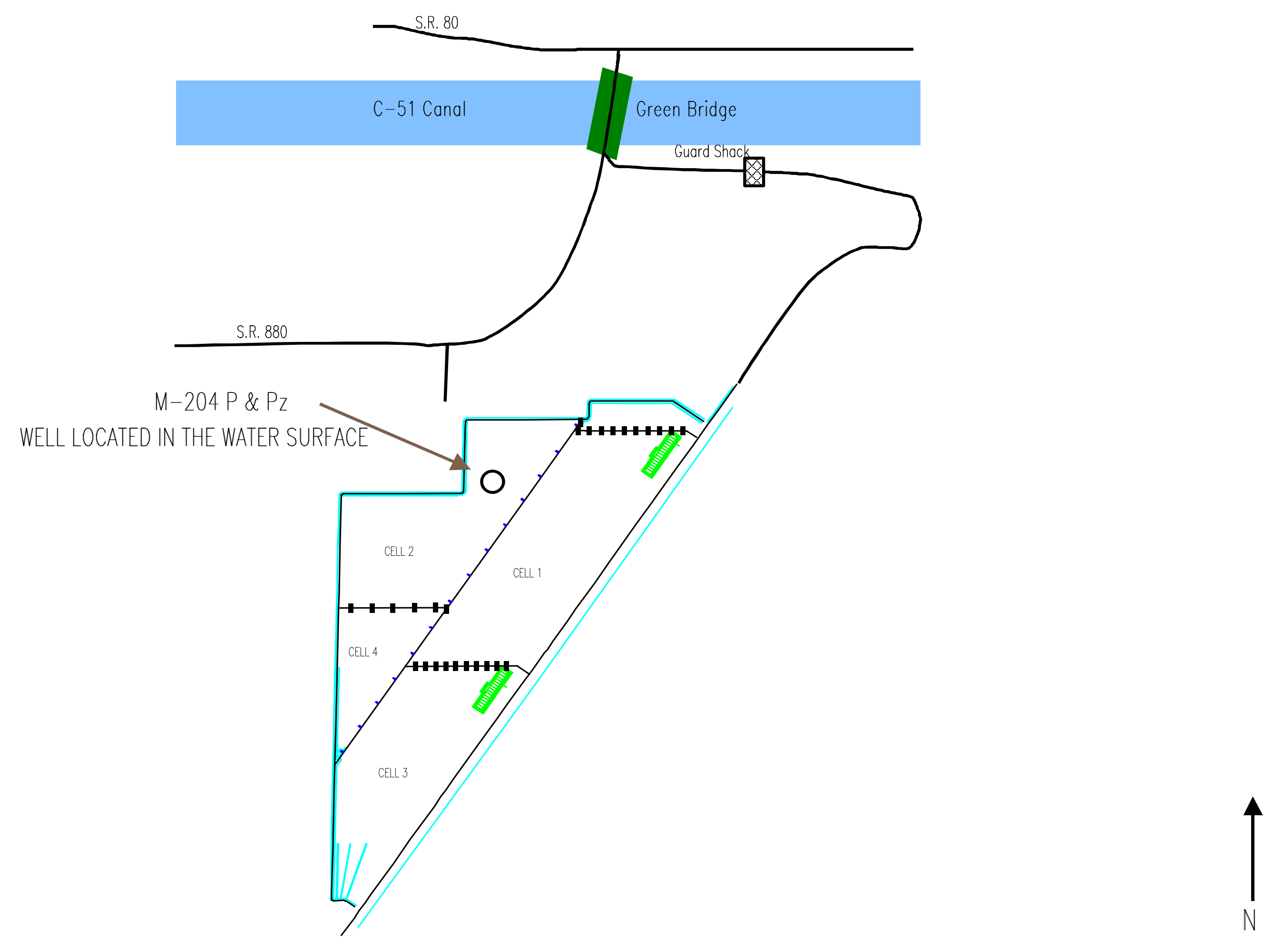
BARGE & TRUCK MOUNTED
DRILLING PROGRAM FOR
ENR / WCA-2A MERCURY
FLUX STUDY

SITE MAP

M-203 P & Pz
Water Site

Drawn By: JFD 06/98 Page 1 of 1

Figure 177. Site map for ENR ground water well cluster M203.



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SCALE : Not To Scale

LEGEND

- MONITORING WELL LOCATION

○ - WELLSITE LOCATION

BARGE & TRUCK MOUNTED DRILLING PROGRAM FOR ENR / WCA-2A MERCURY FLUX STUDY

SITE MAP

M-204 P & Pz
Water Site

Drawn By: JFD | 06/98 | Page 1 of 1

Figure 178. Site map for ENR ground water well cluster M204.

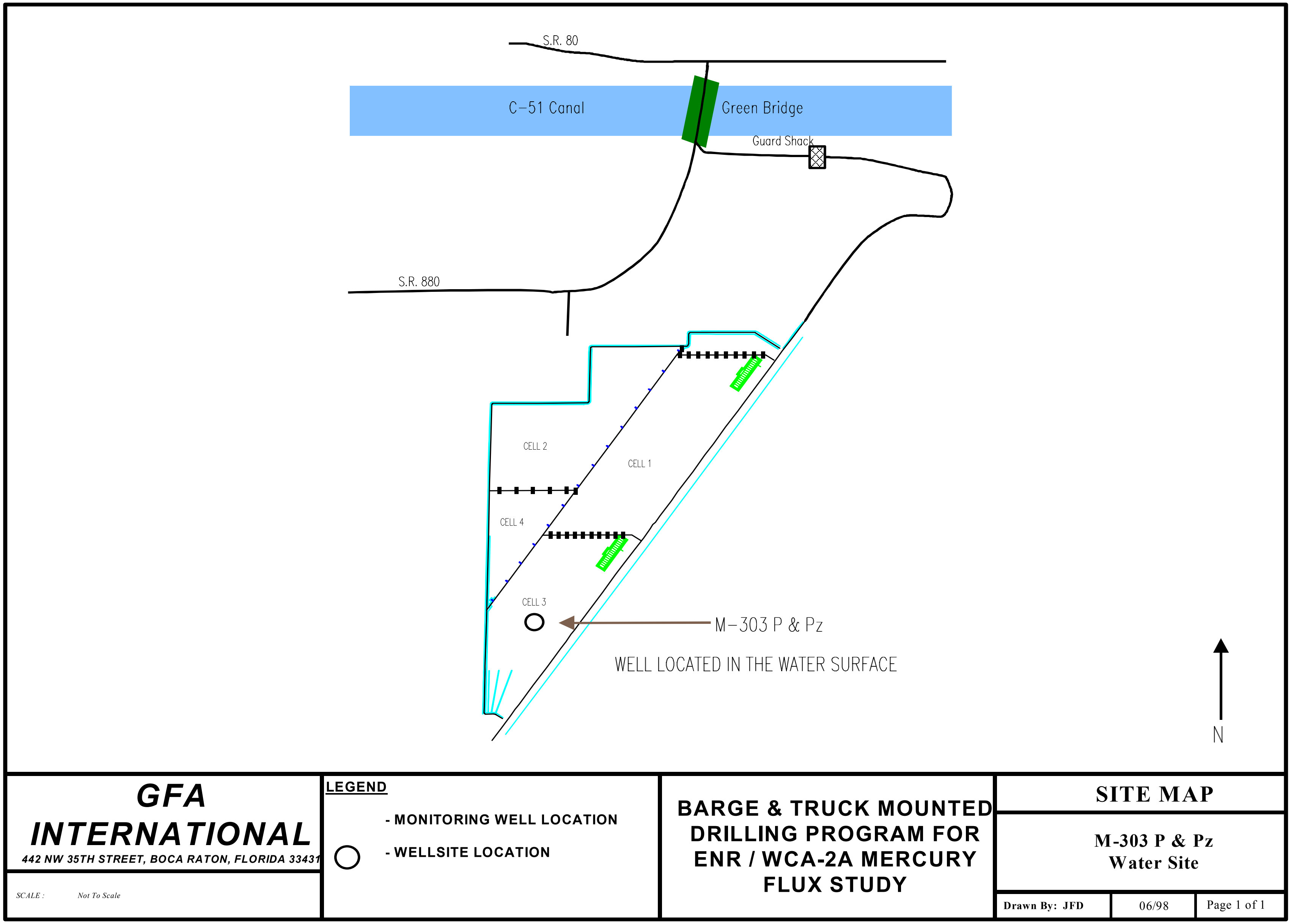
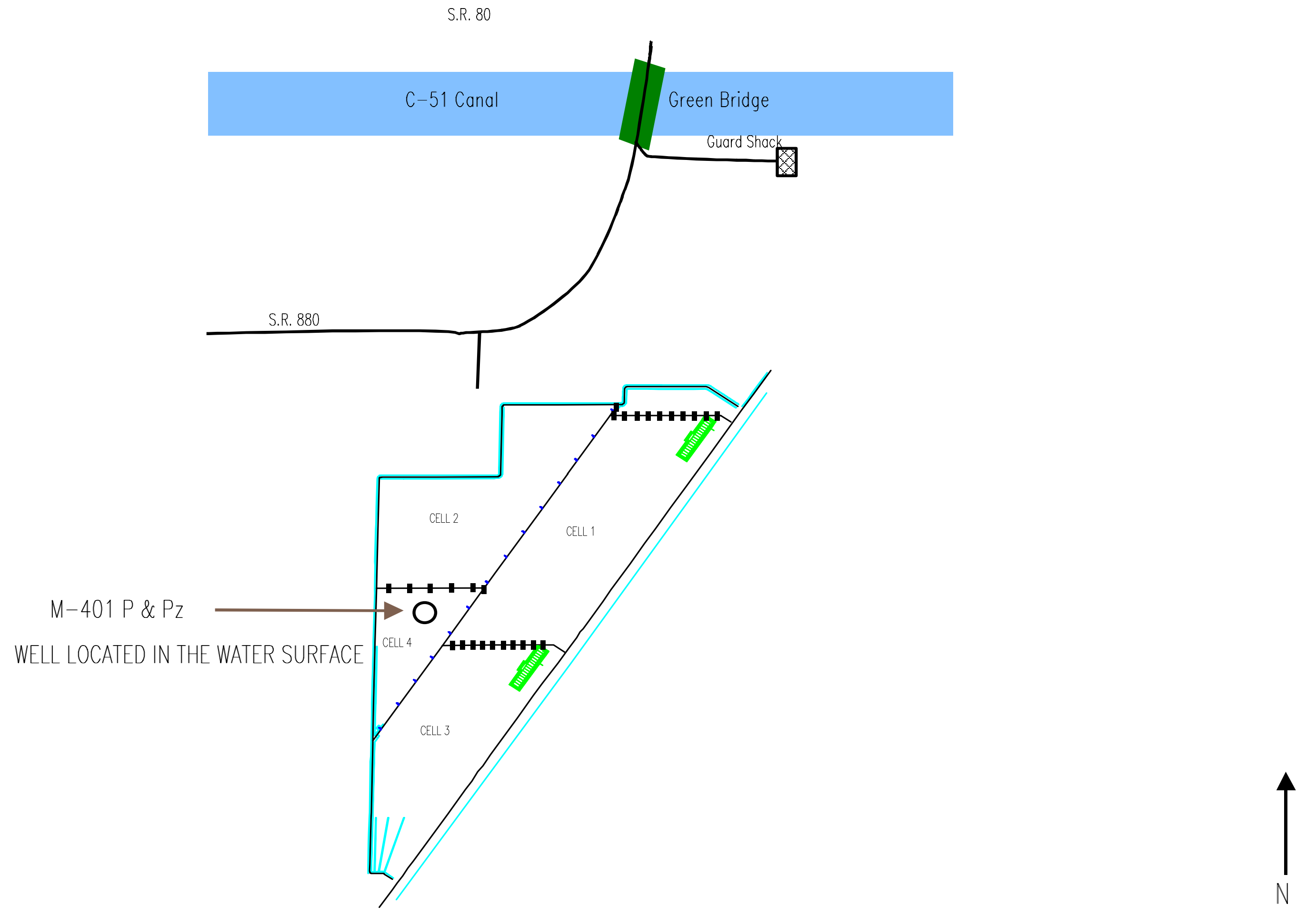


Figure 179. Site map for ENR ground water well cluster M303.



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SCALE : Not To Scale

LEGEND

- MONITORING WELL LOCATION

○ - WELLSITE LOCATION

BARGE & TRUCK MOUNTED DRILLING PROGRAM FOR ENR / WCA-2A MERCURY FLUX STUDY

SITE MAP

M-401 P & Pz
Water Site

Drawn By: JFD | 06/98 | Page 1 of 1

Figure 180. Site map for ENR ground water well cluster M401.

Instrumentation Maps for Wetland-Interior Sites

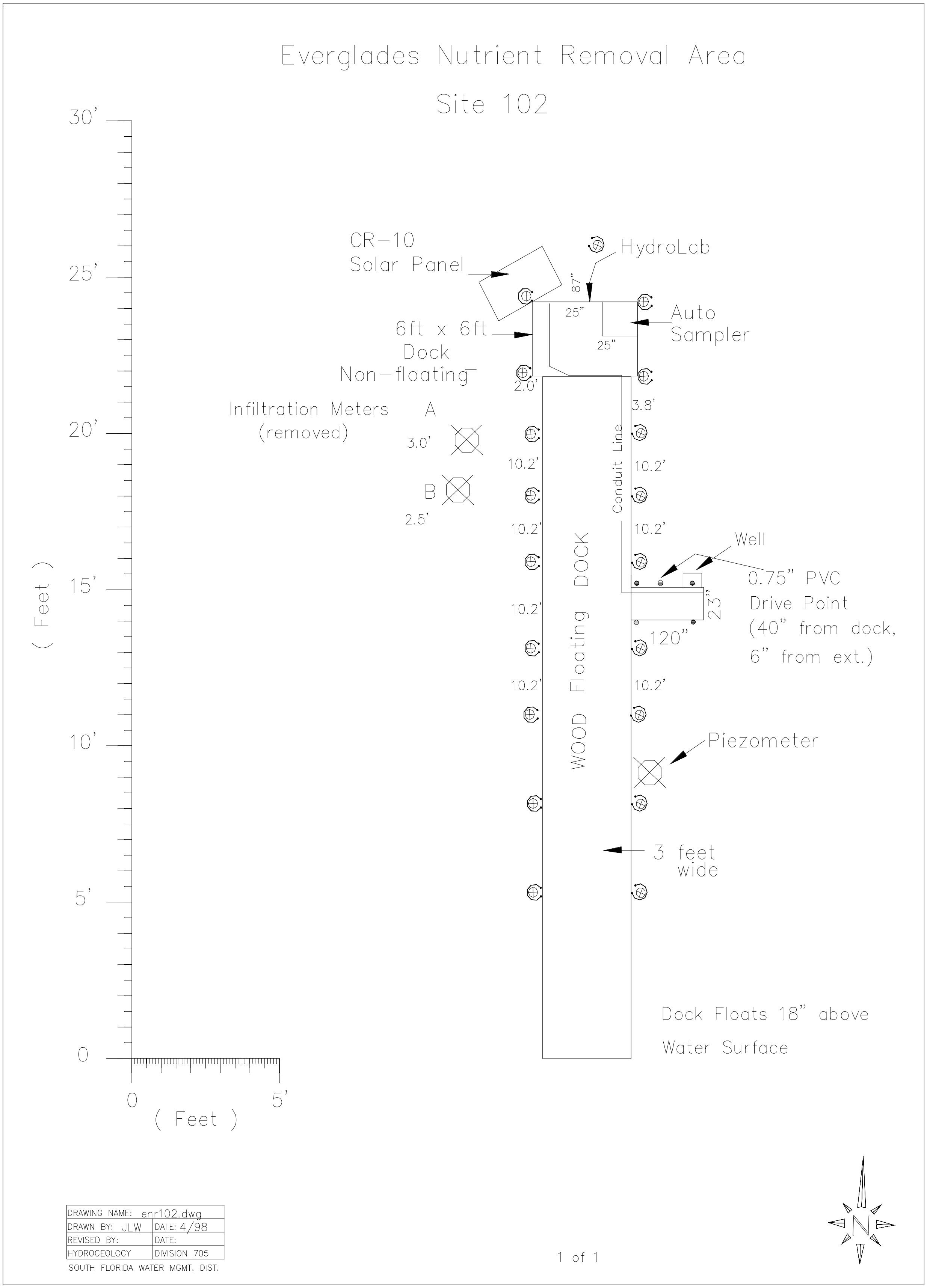


Figure 181. Site diagram for ENR dock 102.

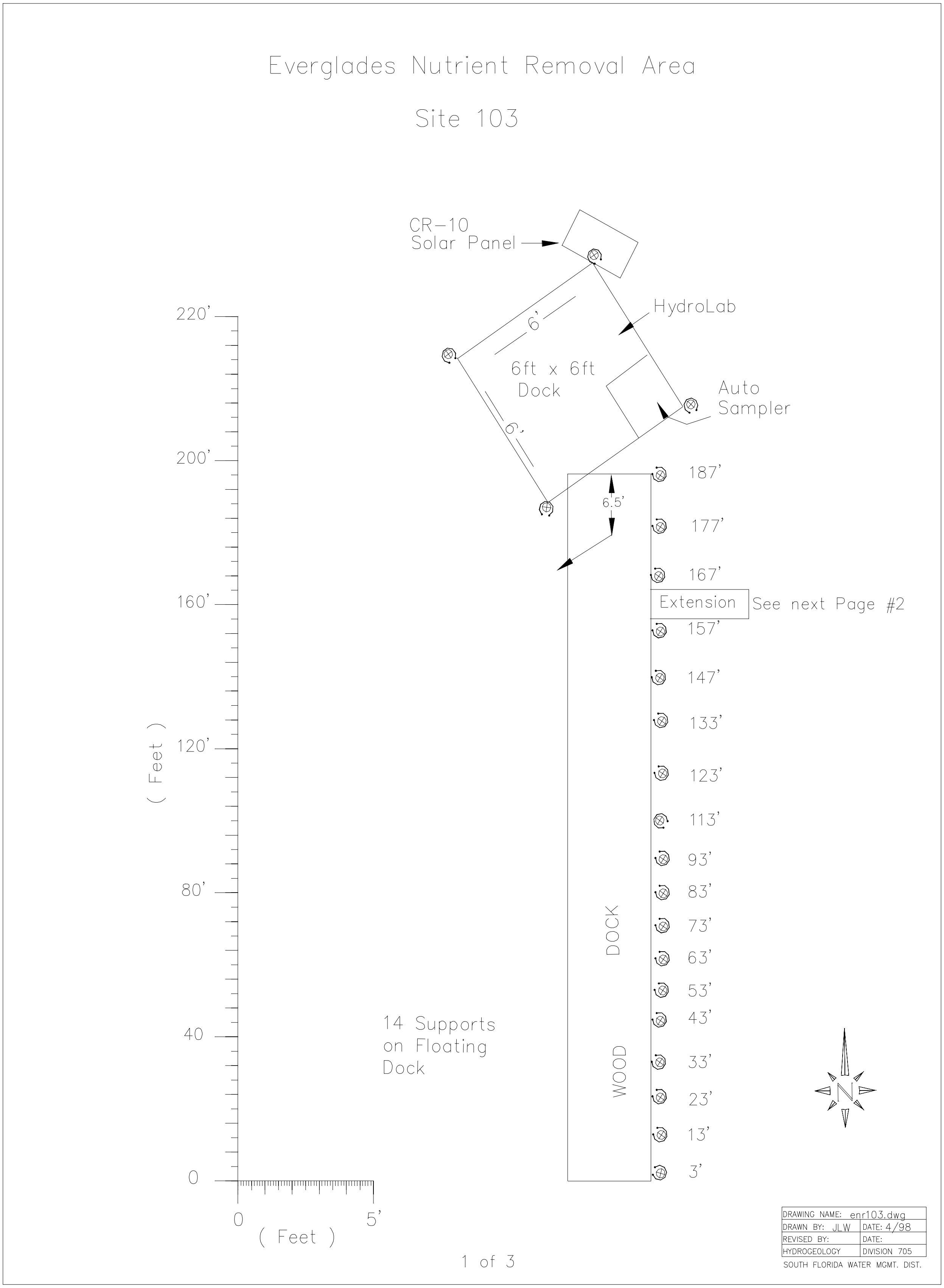


Figure 182. Site diagram for ENR dock 103. Page 1 of 3

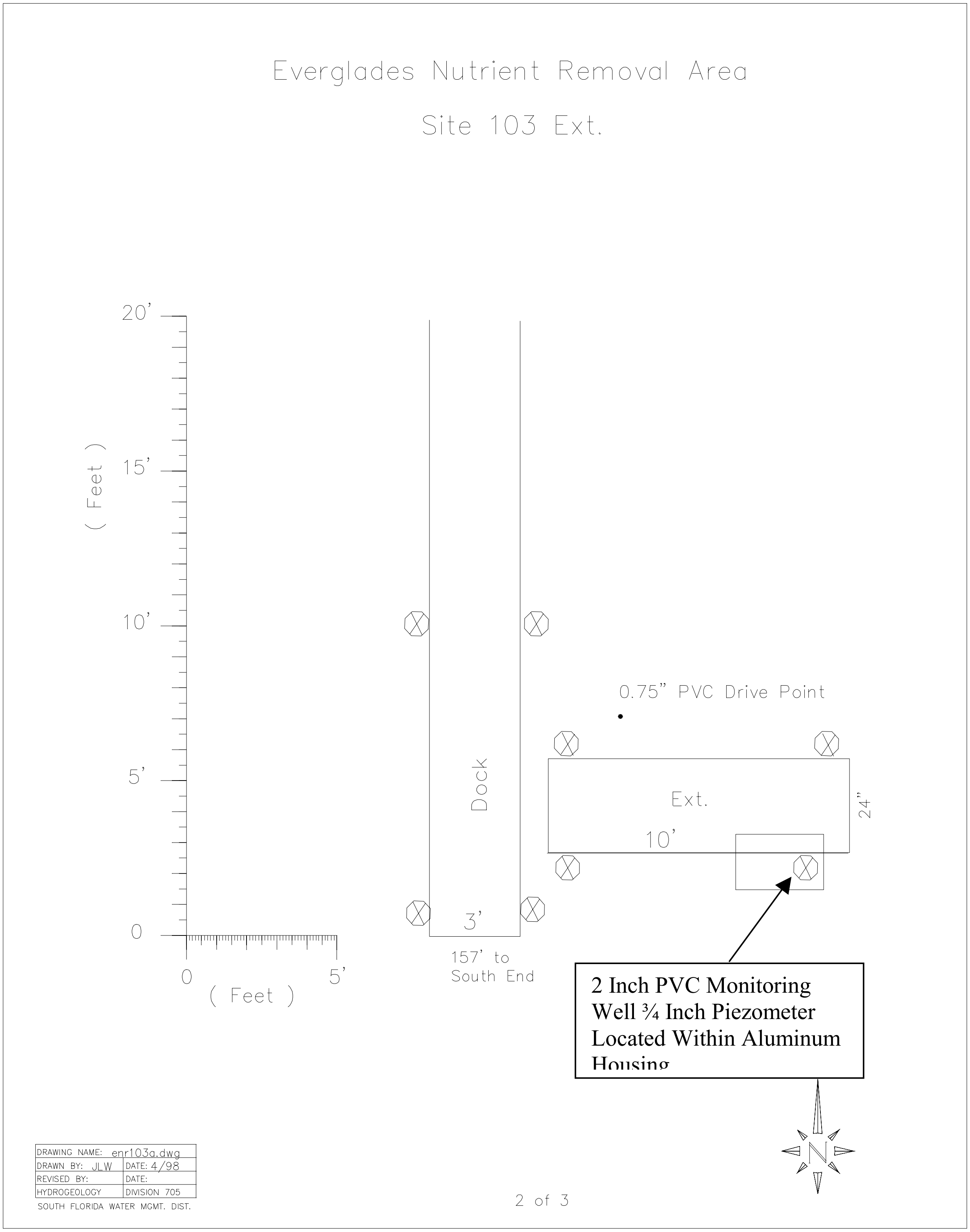


Figure 183. Site diagram for ENR dock 103 extension. Page 2 of 3

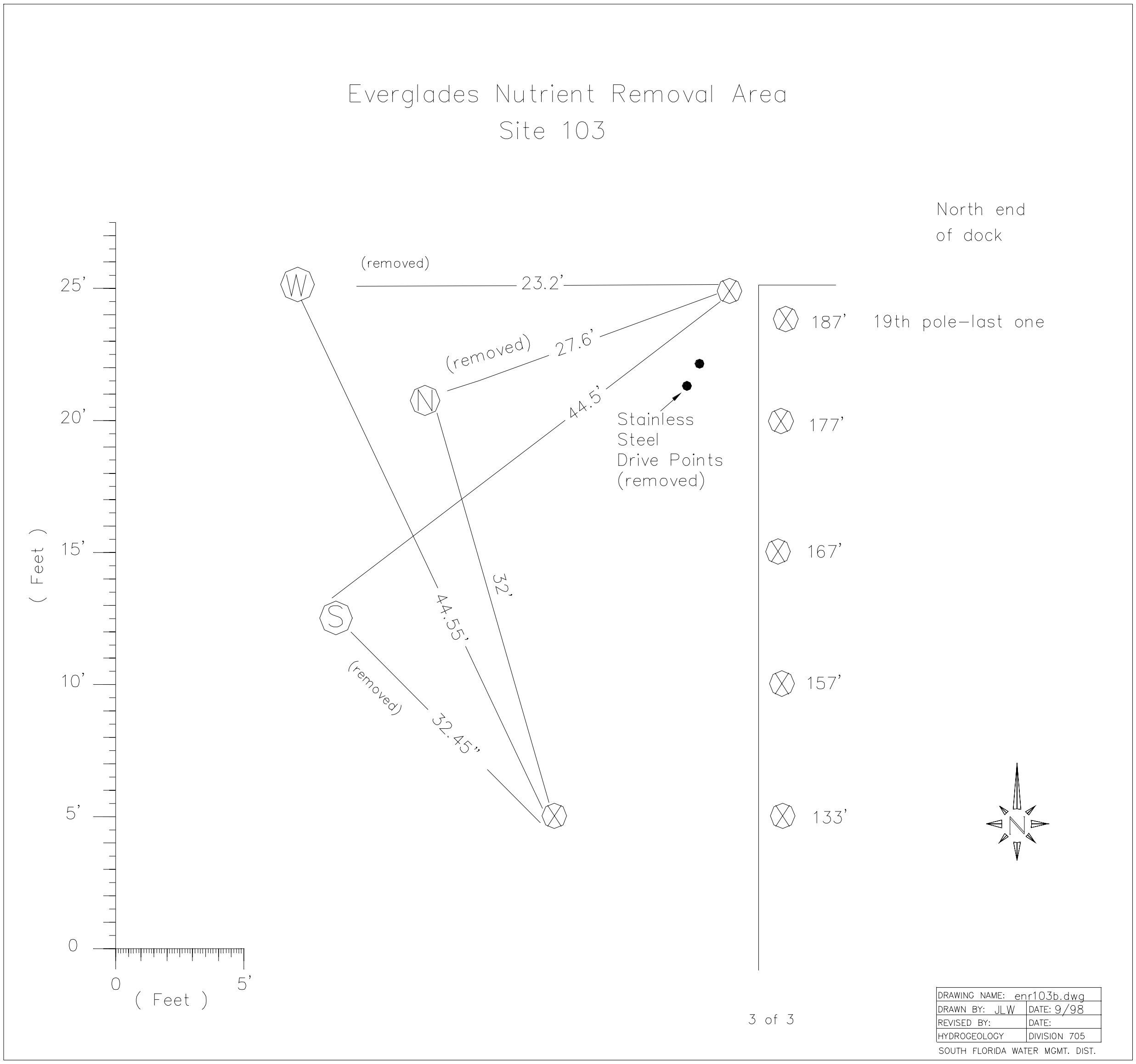


Figure 184. Site diagram for seepage meters located at ENR dock 103 **Page 3 of 3**

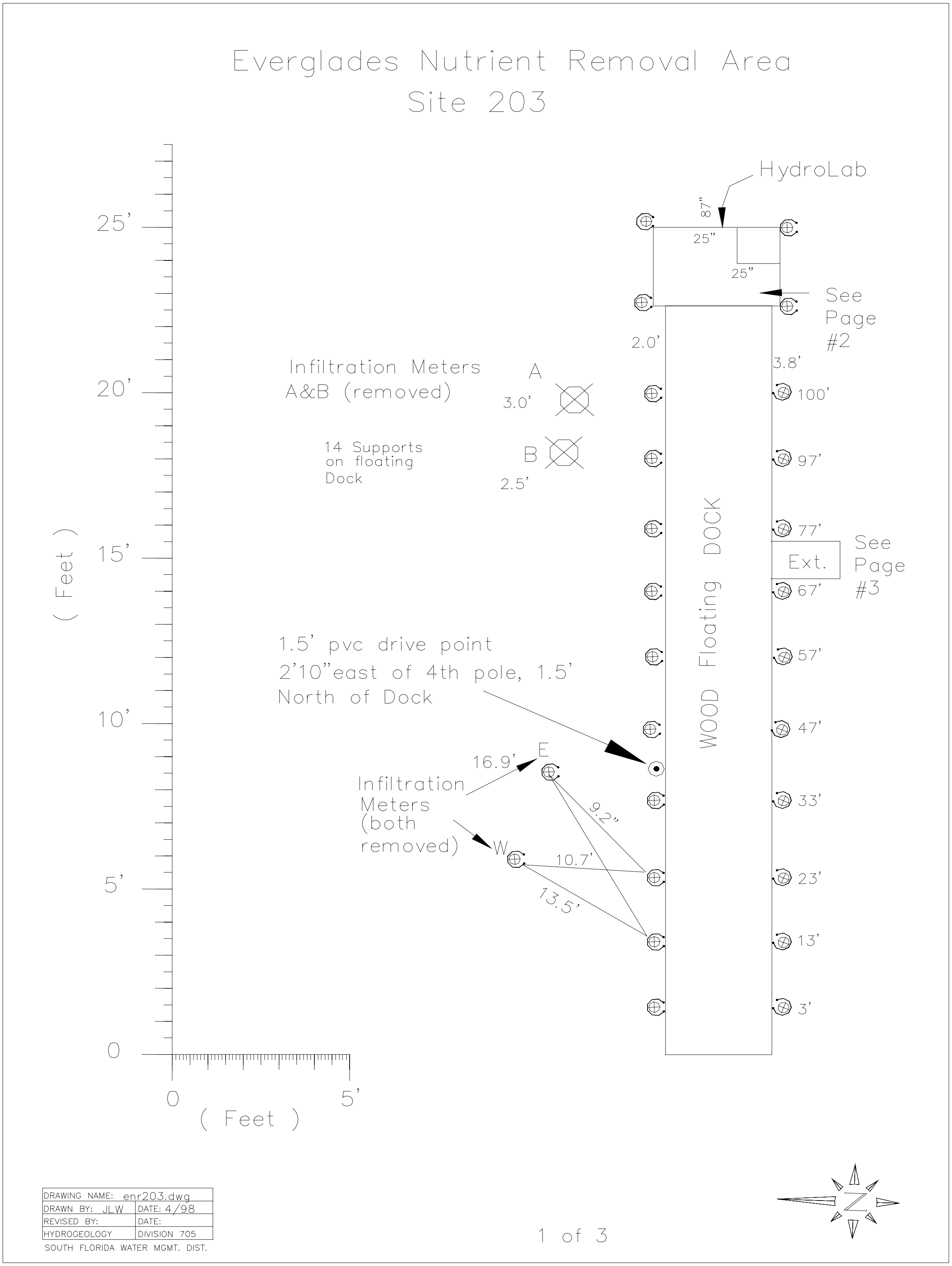


Figure 185. Site diagram for ENR dock 203 Page 1 of 3.

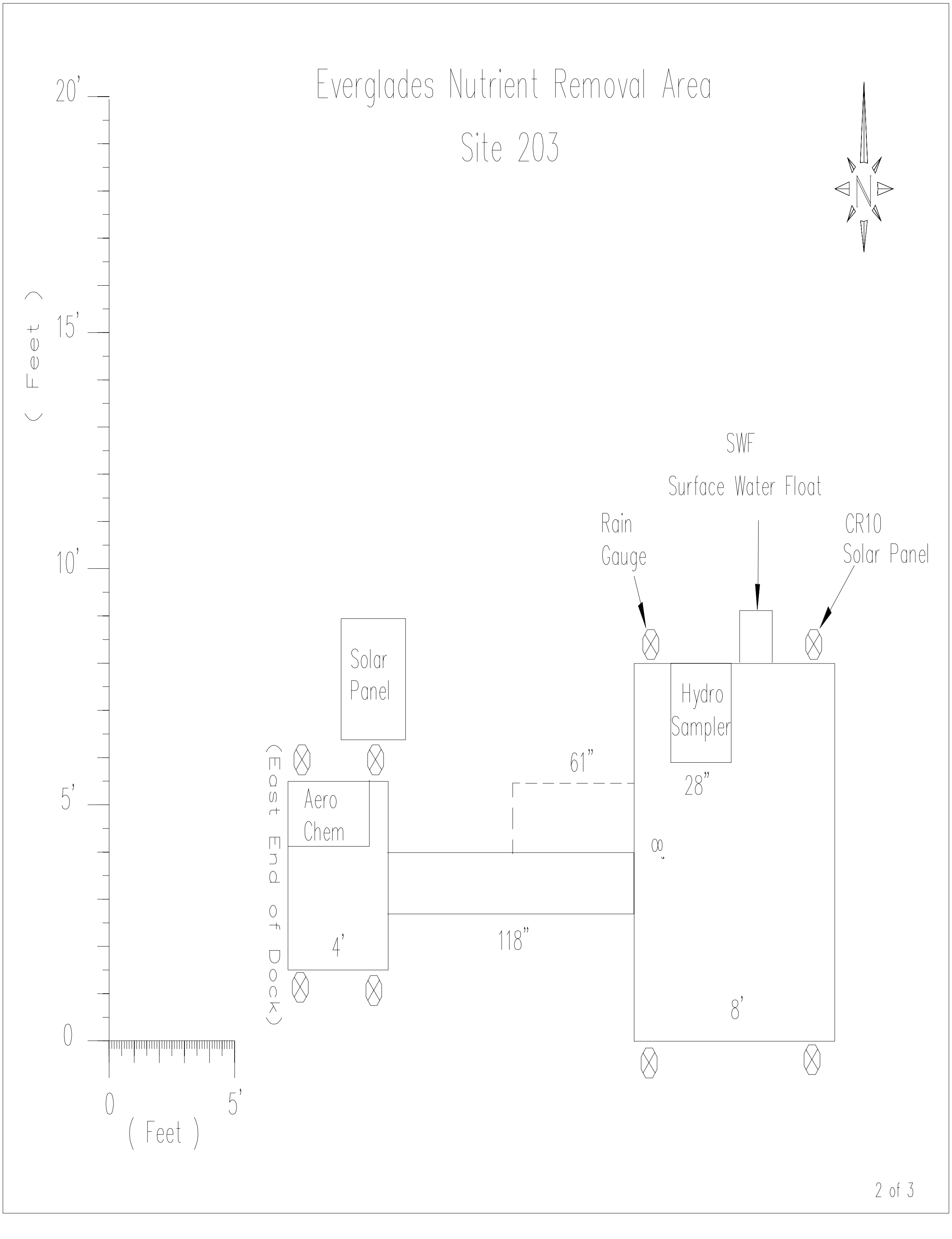
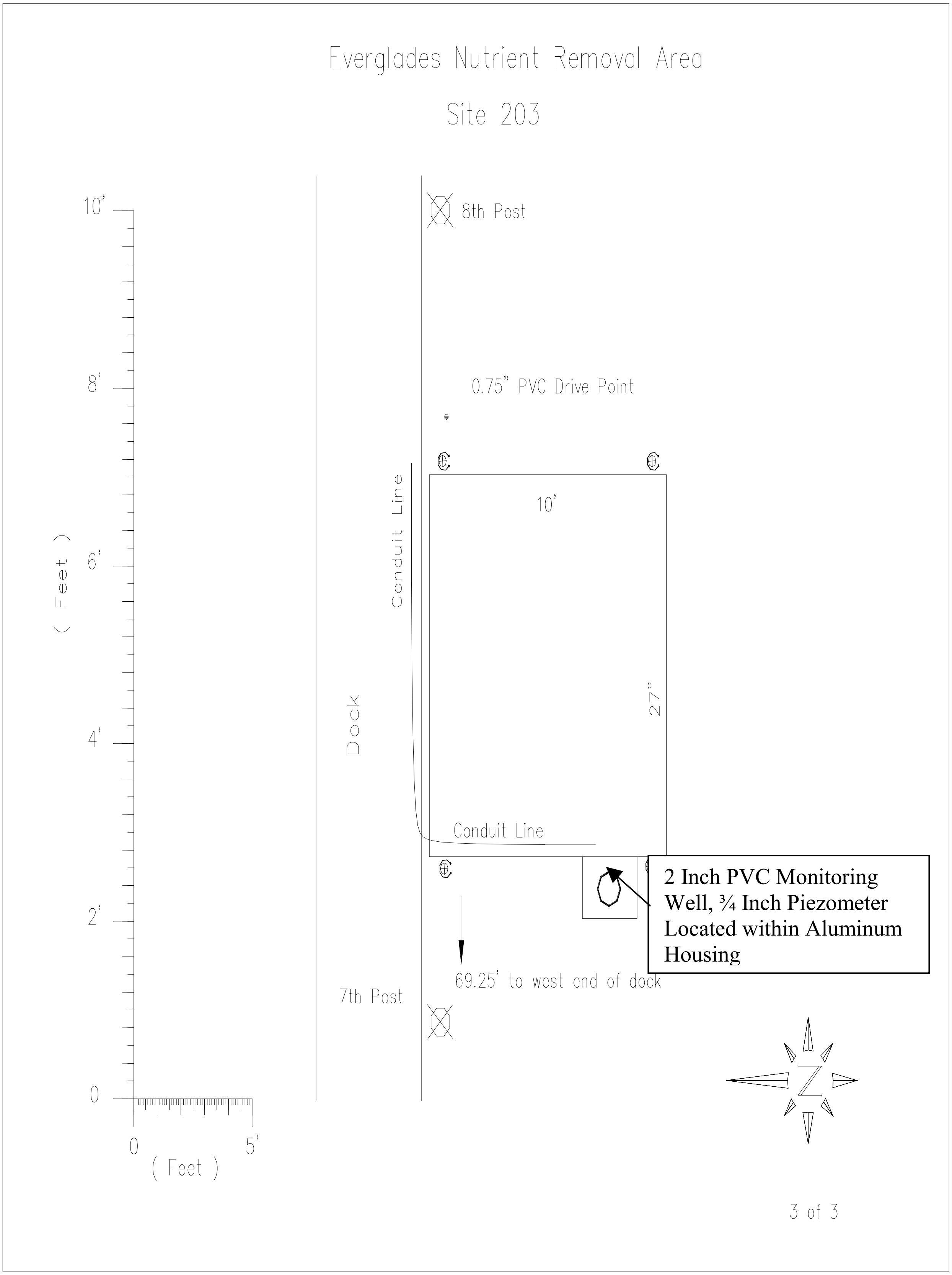


Figure 186. Site diagram for main dock located at ENR dock 103   Page 2 of 3.


Everglades Nutrient Removal Area
Site 203
10'
8'
6'
4'
2'
0
(Feet)
0
5'
(Feet)
8th Post
0.75" PVC Drive Point
Conduit Line
10'
27"
Dock
Conduit Line
2 Inch PVC Monitoring Well, ¾ Inch Piezometer Located within Aluminum Housing
69.25' to west end of dock
7th Post
N
3 of 3

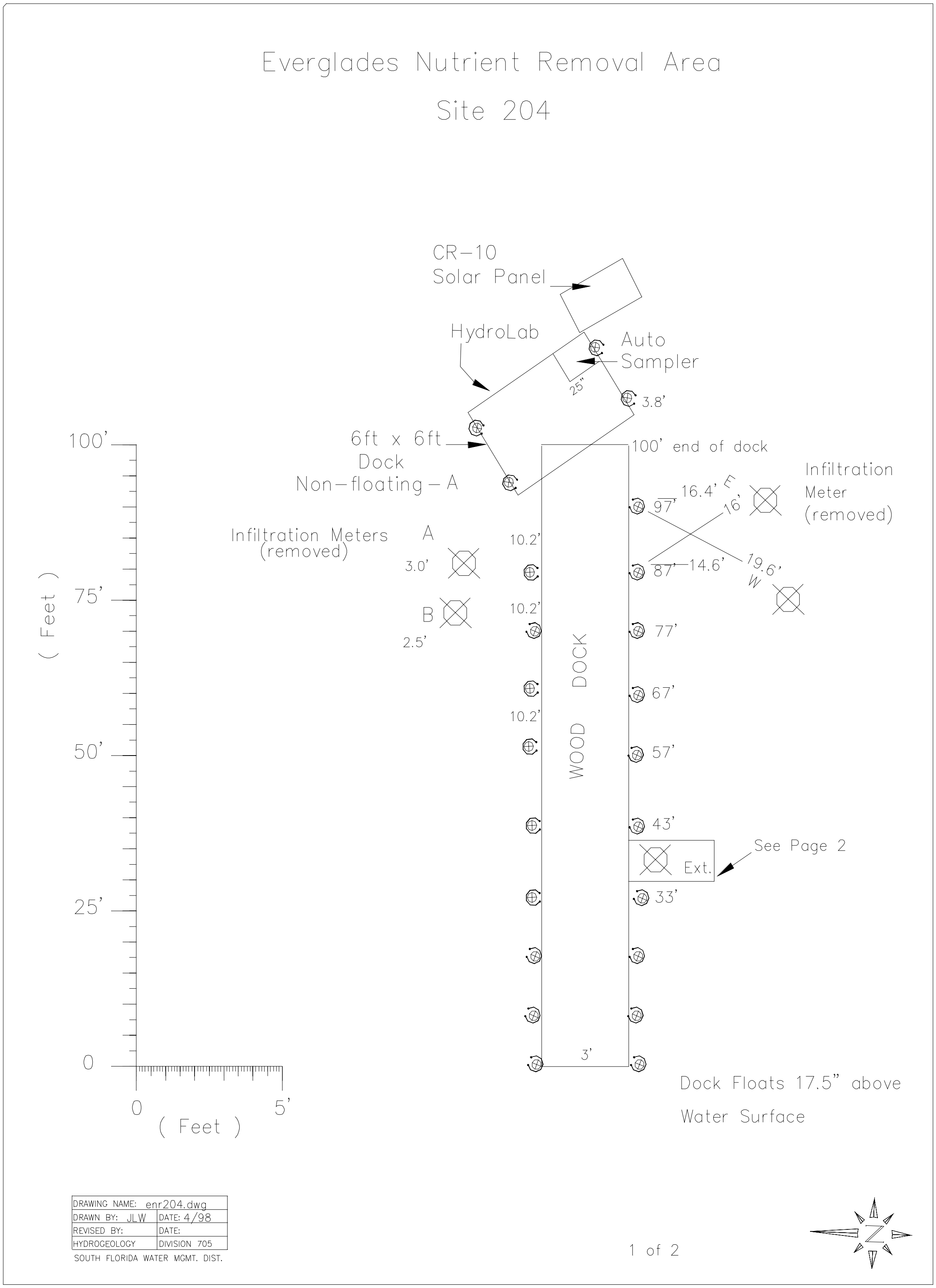
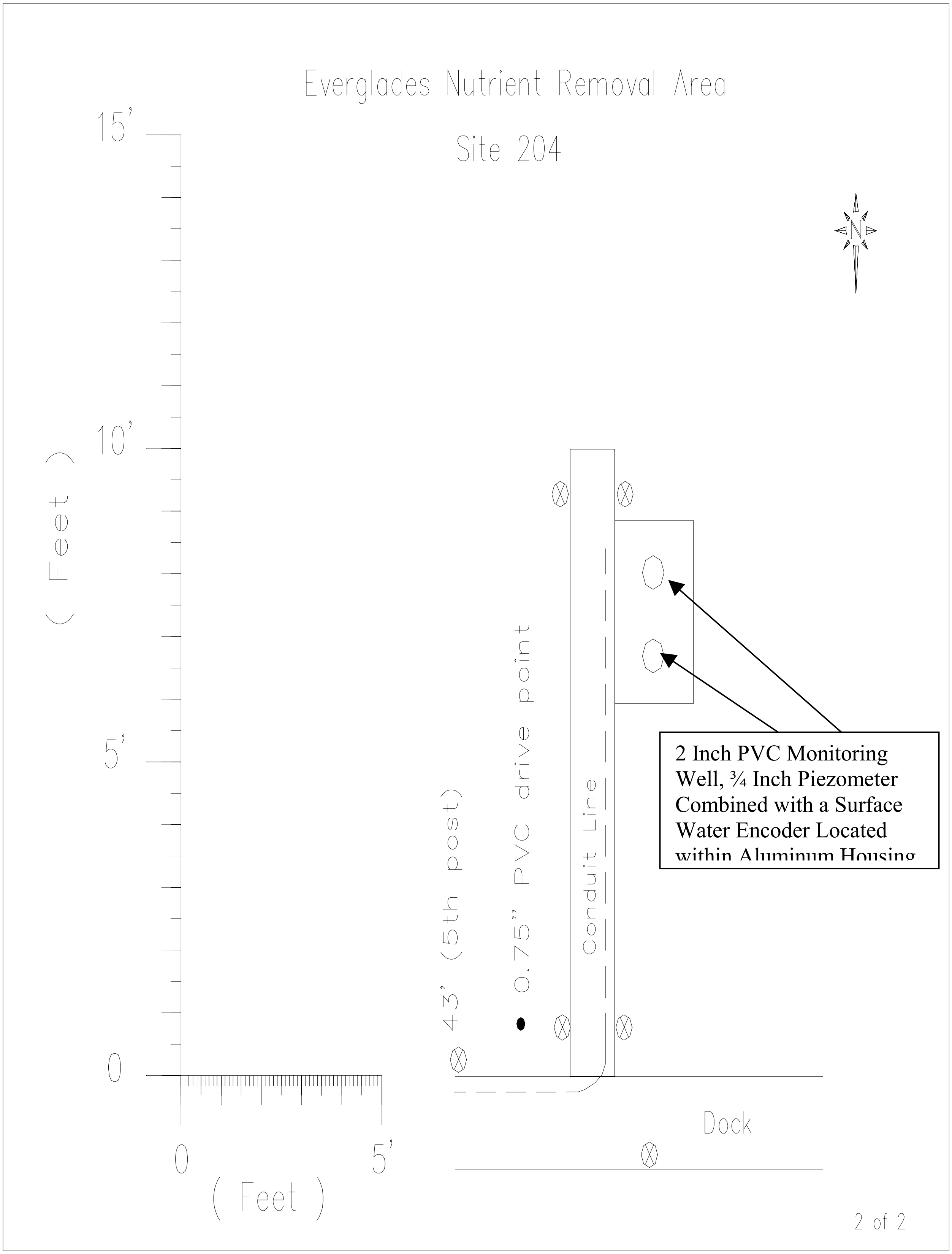


Figure 188. Site diagram for ENR dock 204 **Page 1 of 2.**



2 Inch PVC Monitoring Well, ¾ Inch Piezometer Combined with a Surface Water Encoder Located within Aluminum Housing

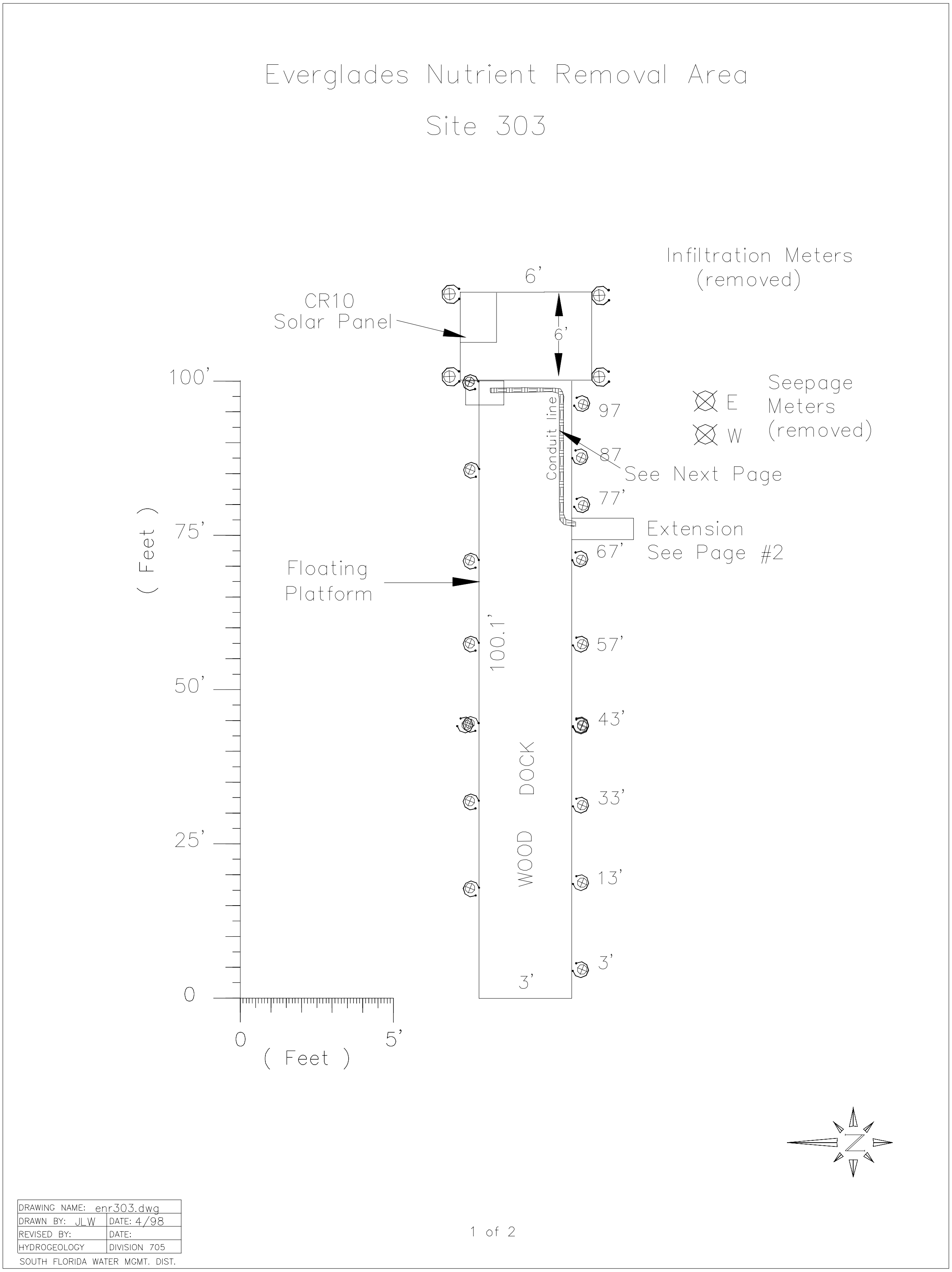
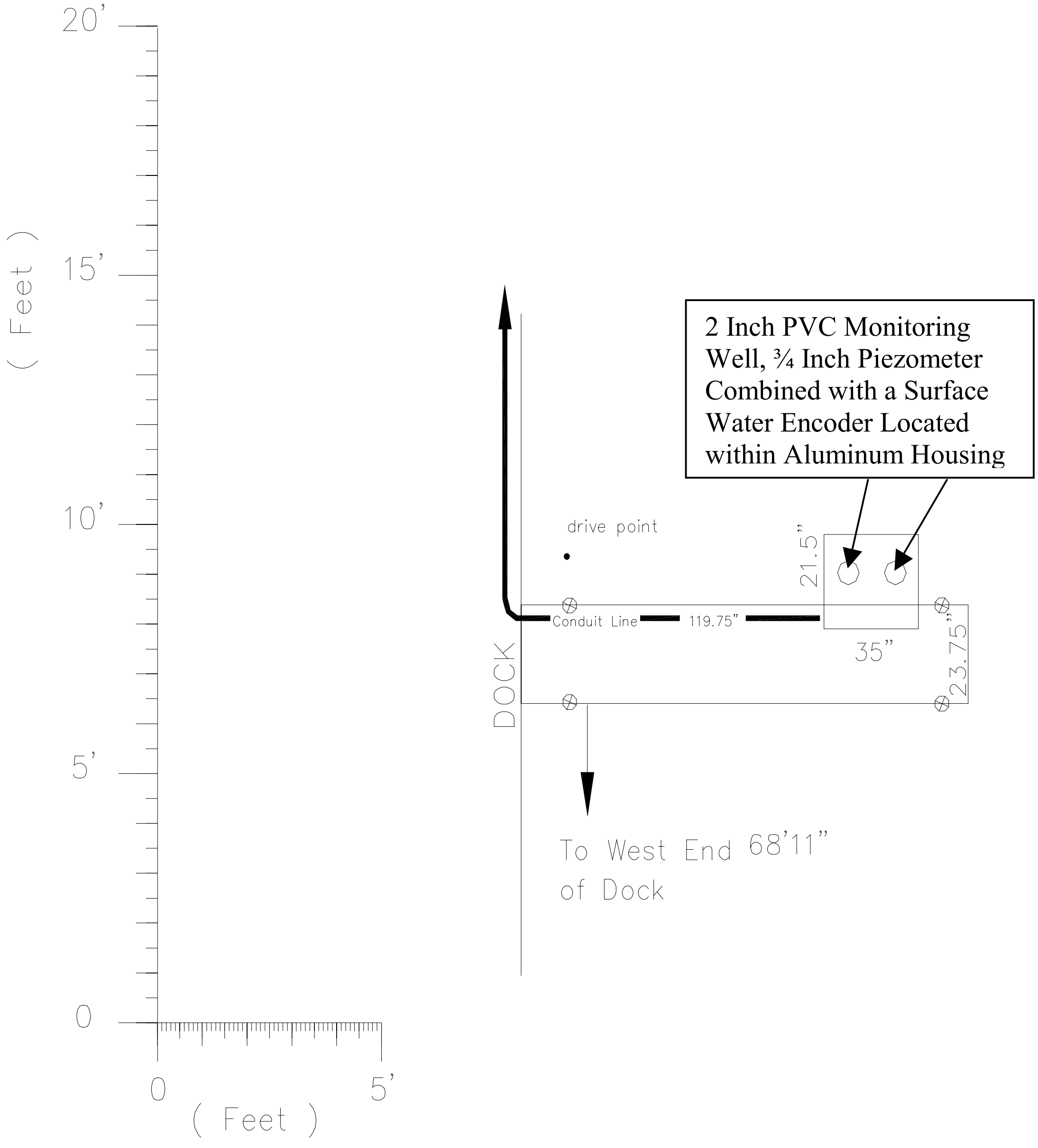


Figure 190. Site diagram for ENR dock 303 Page 1of 2.

Everglades Nutrient Removal Area

Site 303



2 Inch PVC Monitoring Well, ¾ Inch Piezometer Combined with a Surface Water Encoder Located within Aluminum Housing

2 of 2

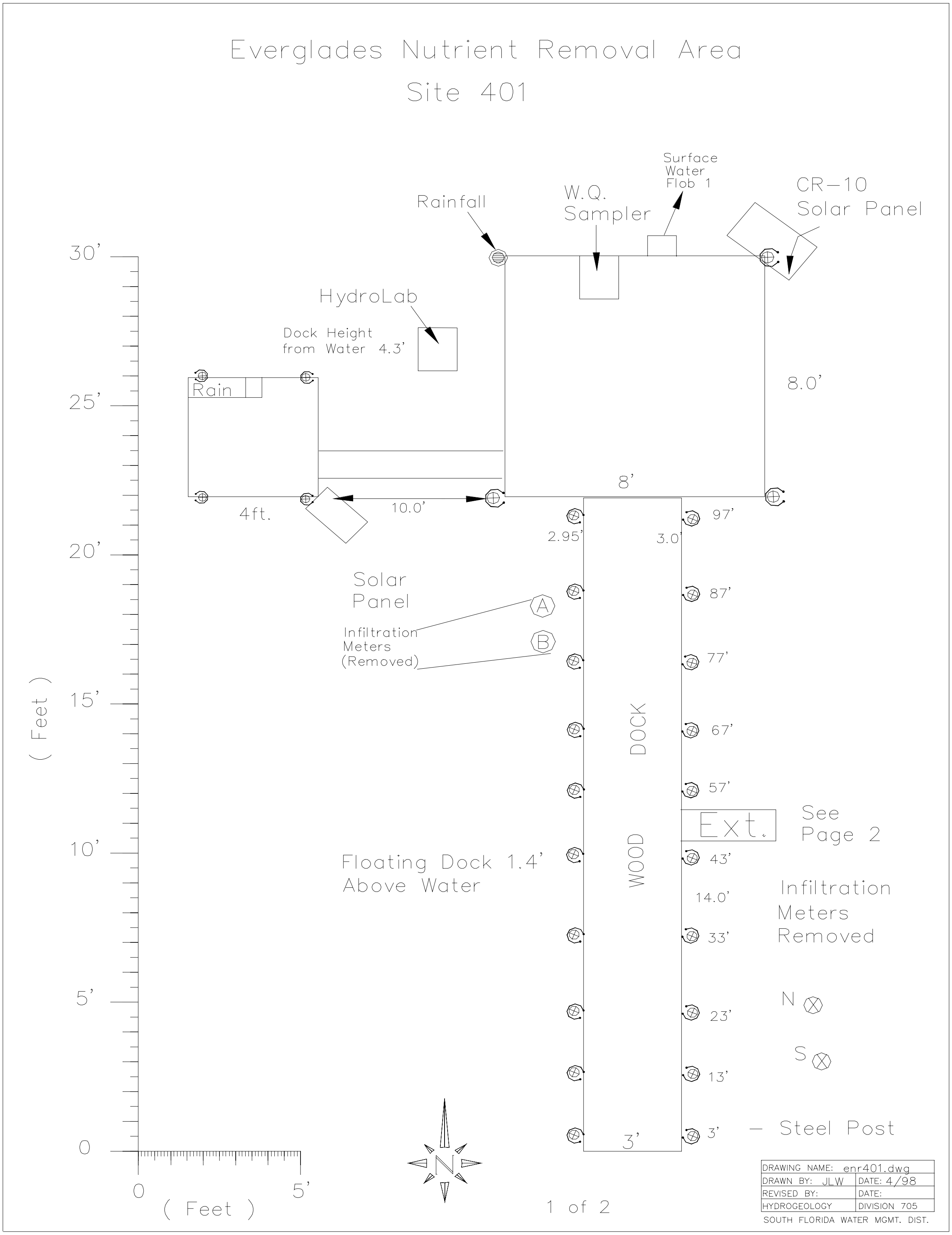
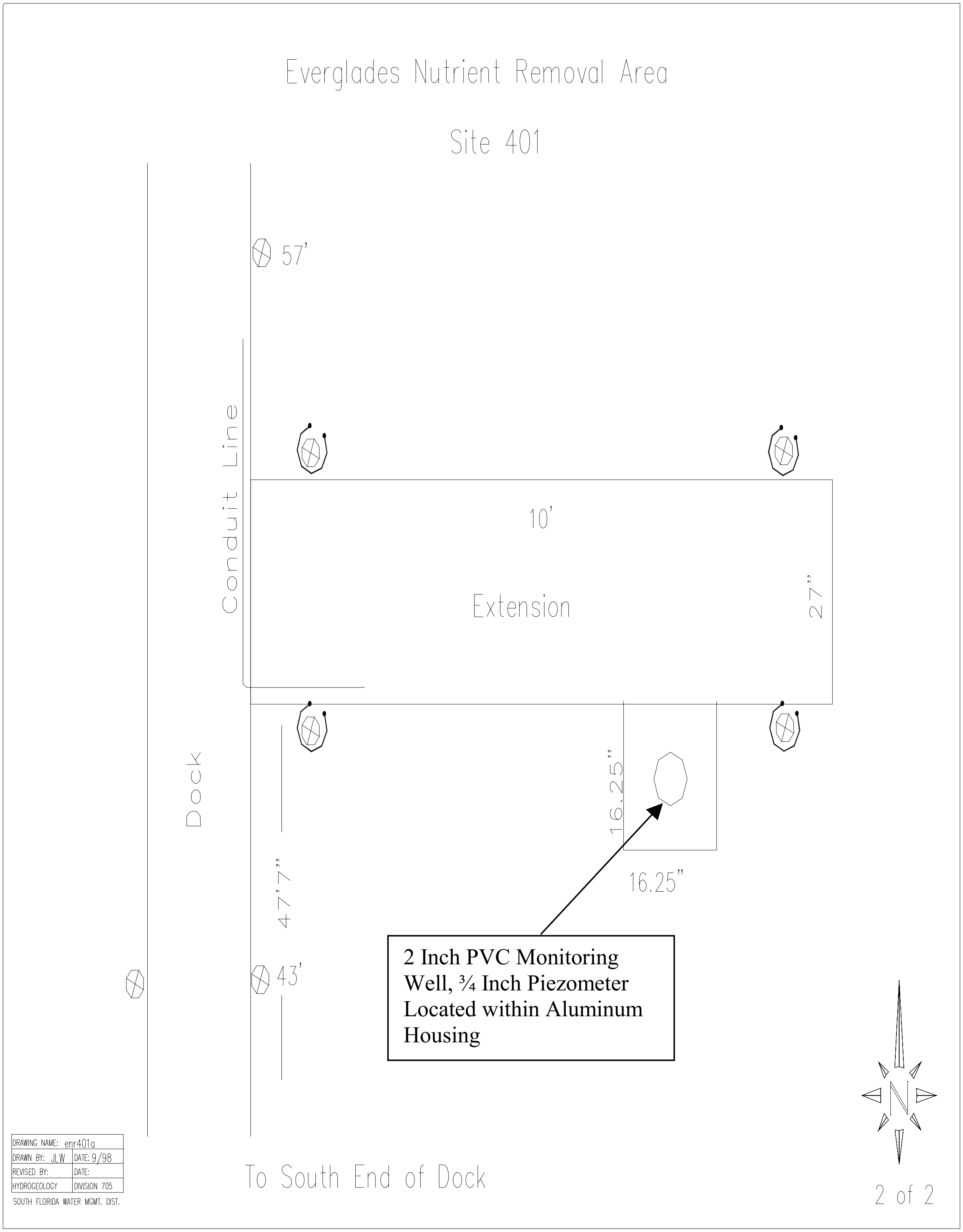


Figure 192. Site diagram for ENR dock 401 Page 1 of 2.



2 Inch PVC Monitoring Well, ¾ Inch Piezometer Located within Aluminum Housing

Figure 193. Site diagram for ENR dock 401 extension Page 2 of 2.

WCA-2A Dock Location Maps

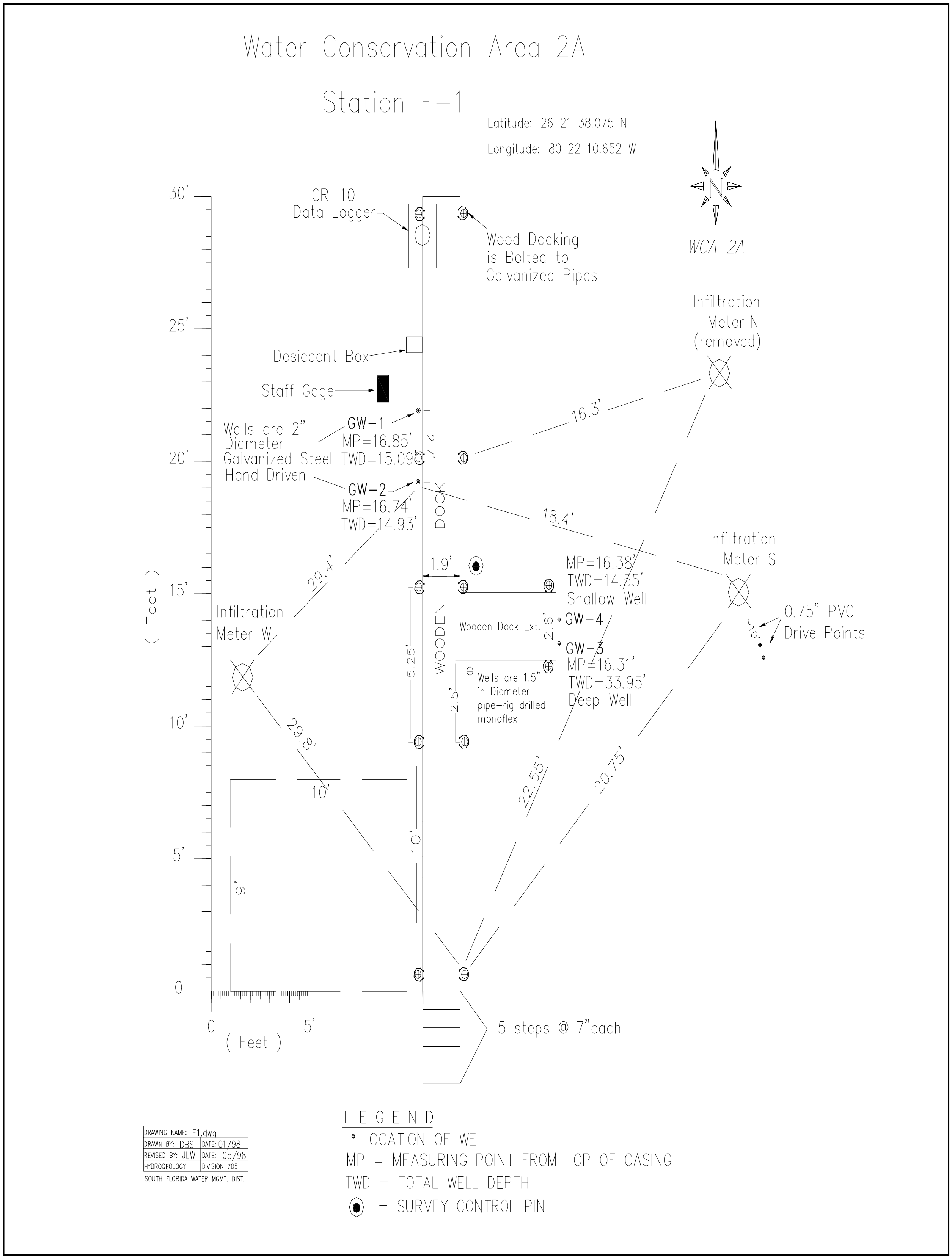


Figure 194. WCA-2A site diagram for seepage meters and dock at transect site F-1.

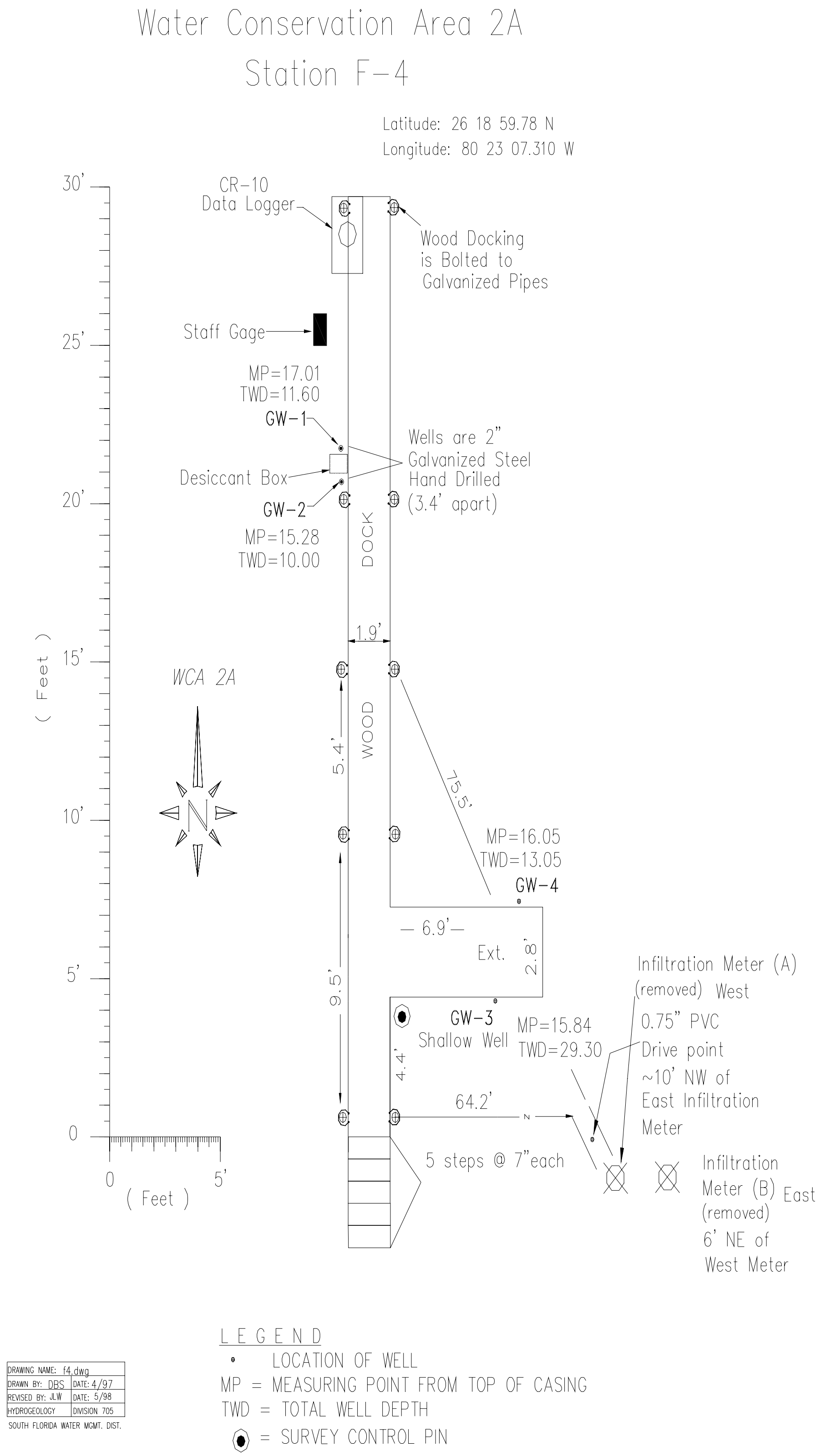


Figure 195. WCA-2A site diagram for seepage meters and dock at transect site F-4.

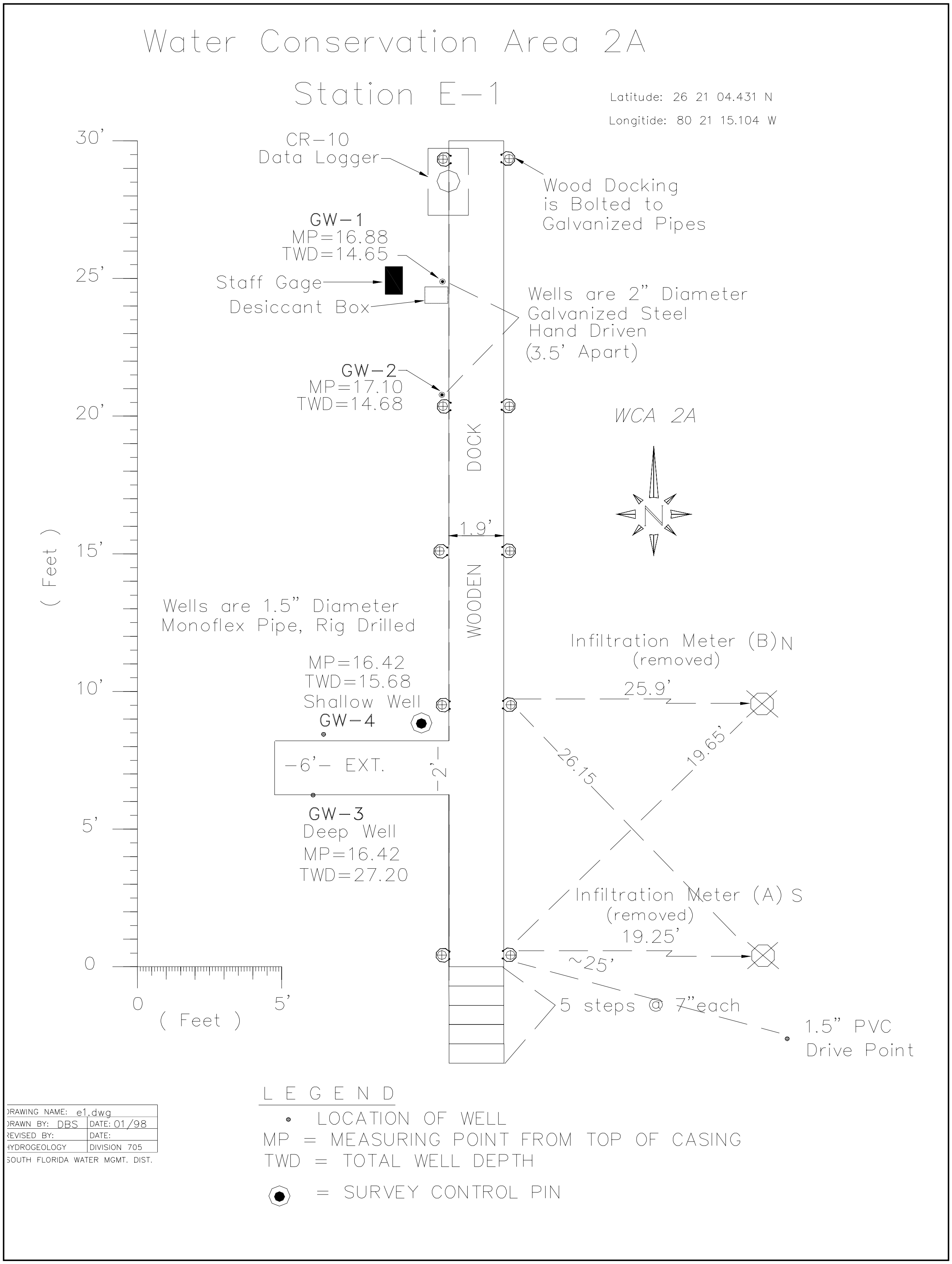


Figure 196. WCA-2A site diagram for seepage meters and dock at transect site E-1.

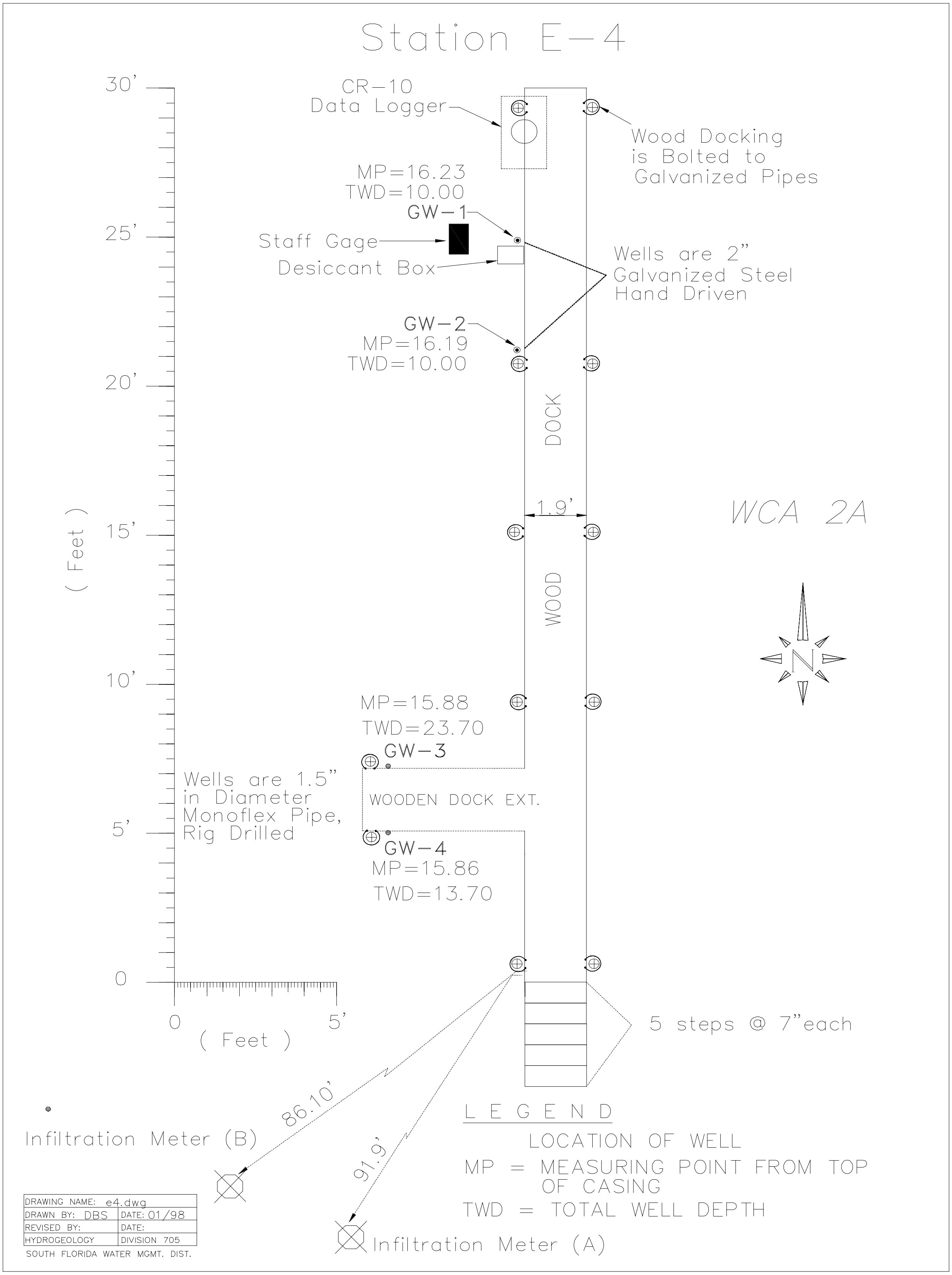


Figure 197. WCA-2A site diagram for seepage meters and dock at transect site E-4

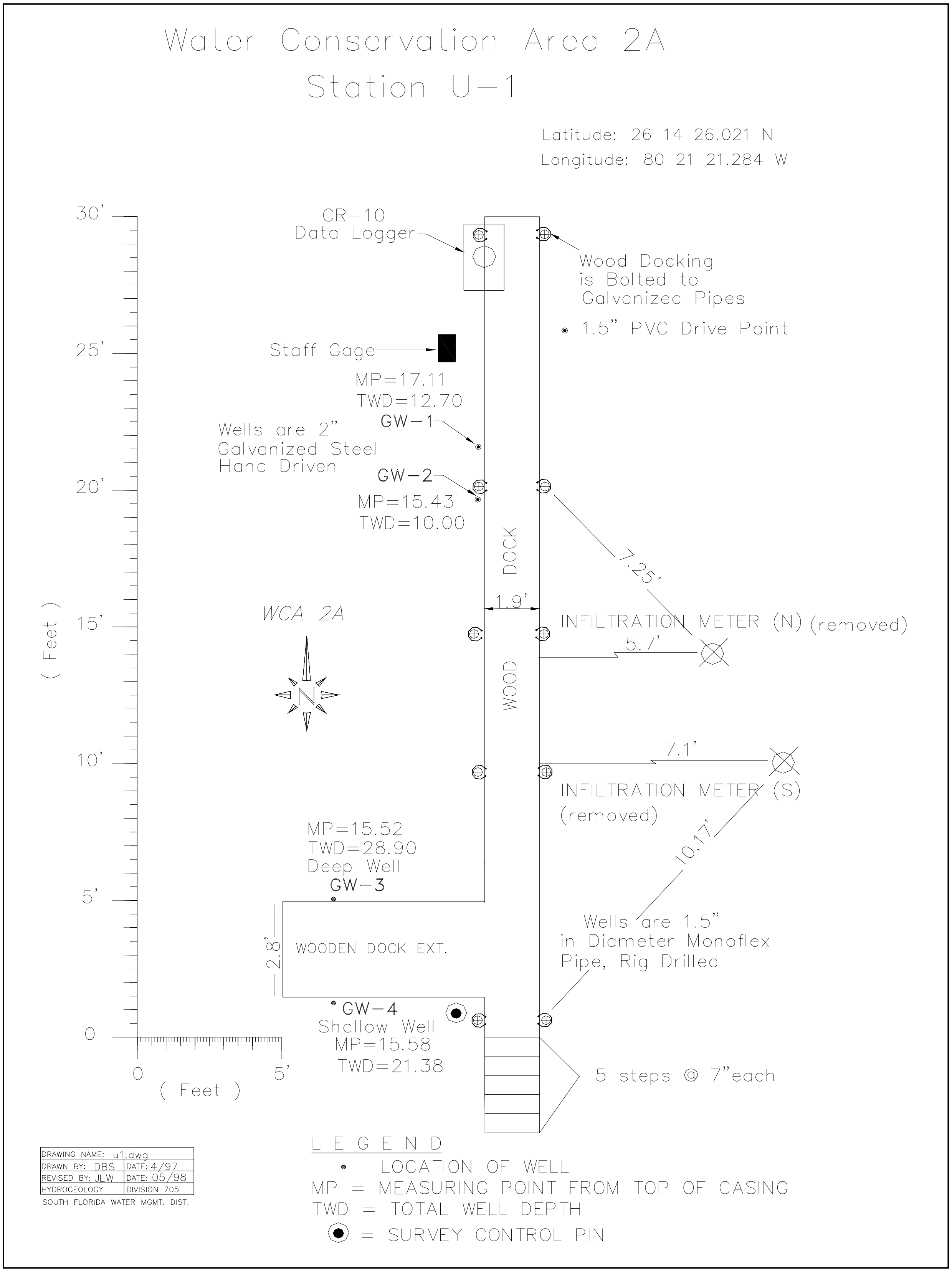


Figure 198. WCA-2A site diagram for seepage meters and dock at transect site U-1.

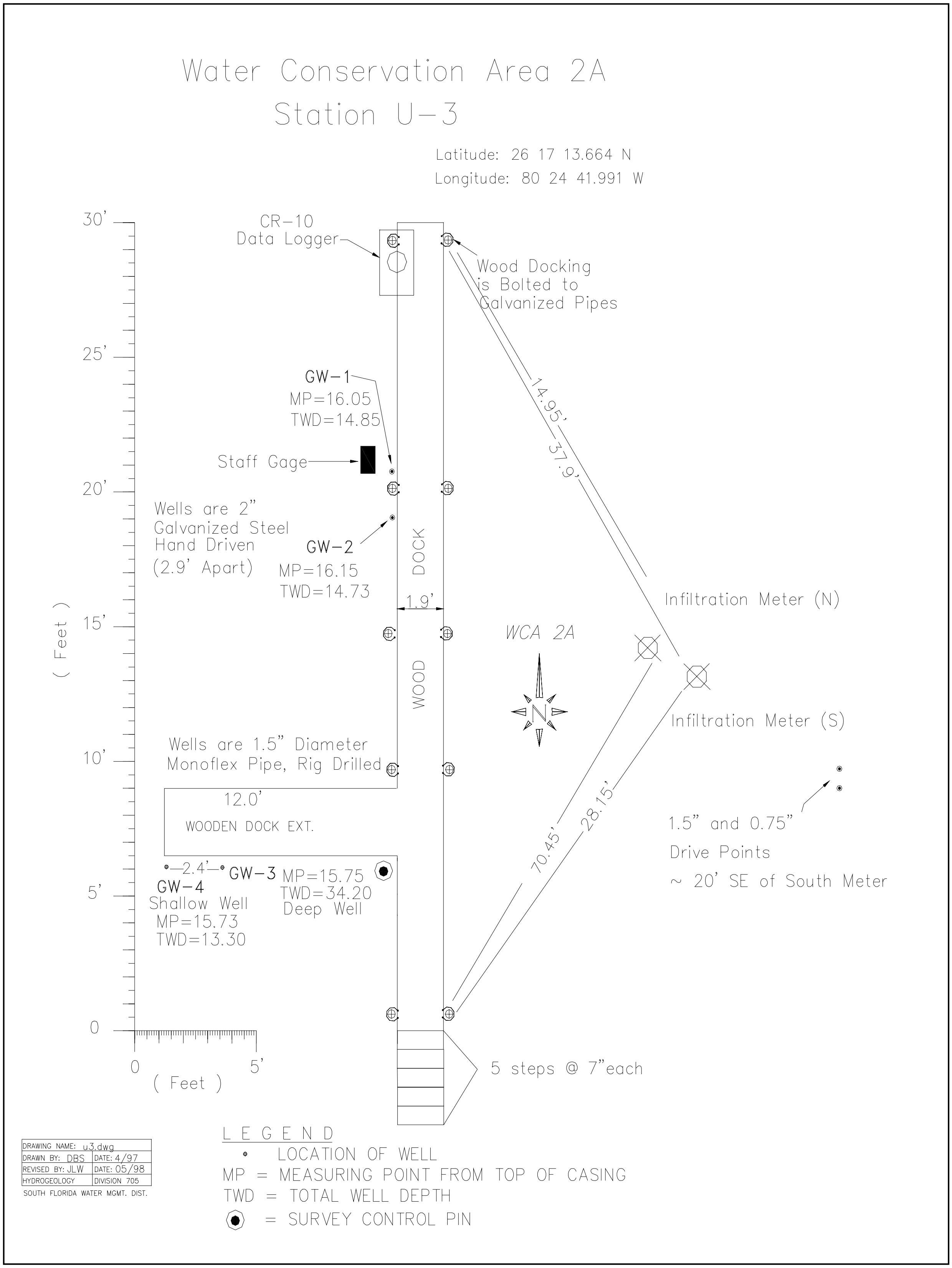


Figure 199. WCA-2A site diagram for seepage meters and dock at transect site U-3.